



# 2017 GREENBOOK

**RENEWABLE ENERGY**  
**WASTE AND WATER**  
**GREEN BUILDING**  
**SMART CITIES**

**BEST PRACTICES AND SOLUTIONS FOR  
SMART AND SUSTAINABLE DEVELOPMENT  
IN A NEW ERA FOR EUROPE-VIETNAM  
GREEN BUSINESS, TRADE AND INVESTMENT**



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# ABOUT EUROCHAM

Since its establishment with only 60 members in 1998, the European Chamber of Commerce in Vietnam (EuroCham) has grown to represent over 900 European businesses, counting among its supporters many of the world's leading enterprises. With offices in both Hanoi and Ho Chi Minh City, and with regional Chapters in Central Vietnam and in North-Eastern Vietnam, EuroCham's mission is to represent the business interests of our members in Vietnam and to improve the business environment in the country for the benefit of all players.

The Chamber is the leading organisation representing European business interests in Vietnam, and also an umbrella organisation with the Belgian Luxembourg Chamber of Commerce in Vietnam (BeluxCham), the Central and Eastern European Chamber of Commerce in Vietnam (CEEC), the Dutch Business Association Vietnam (DBAV), the French Chamber of Commerce and Industry in Vietnam (CCIFV), the German Business Association in Vietnam (GBA), the Italian Chamber of Commerce in Vietnam (ICham), the Nordic Chamber of Commerce Vietnam (NordCham), and the Spanish Business Group in Vietnam (SBG). The British Business Group Vietnam (BBGV) and the Swiss Business Association (SBA) are also associated as partner organisations. EuroCham is also a founding member of the inter-foreign chamber platform Vietnam Business Forum (VBF).

EuroCham is a member of the European Business Organisation Worldwide Network ASBL (EBOWWN) representing European businesses in nearly 40 countries across the globe and addressing common trade and investment related issues to the European Commission. Regionally, EuroCham is a member of the EU ASEAN Business Council. Since the end of 2015, EuroCham is the implementing partner of the South East Asia IPR SME Helpdesk providing free of charge advice and support on intellectual property protection when entering and expanding in the ASEAN market. Since 2016, EuroCham has also served as an implementing partner of the EU-Vietnam Business Network (EVBN), an EU co-funded project under the ICI+ programme, which aims to support EU Small and Medium Enterprises interested in doing business in Vietnam, while promoting the country and ASEAN's business opportunities in Europe. In 2017, EuroCham was awarded Best Large Chamber of the Year at the Asia Pacific International Chambers of Commerce Awards.

*For more information on EuroCham,  
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# INTRODUCTION

## CHAPTER I

# EUROPE'S GREEN TRADITION - A HISTORY OF SOLUTIONS



**Nicolas Audier**  
Co-Chairman European  
Chamber of Commerce in  
Vietnam



**Dr. Gellért Horváth**  
Co-Chairman European  
Chamber of Commerce in  
Vietnam

## 1.1. CONNECTING GREEN BUSINESS IN EUROPE AND VIETNAM

As EuroCham Co-Chairman, I am proud to present the EuroCham Greenbook.

2017 is an important stepping stone to a new reality in trade and investment relations between Europe and Vietnam. As the EU-Vietnam Free Trade Agreement (EVFTA) signed in 2015 is expected to come into force soon, exchanges between the two parties are also expected to intensify.

Fostering a meaningful partnership under the EVFTA will mean that these exchanges must go beyond goods, services and capital and on to the sharing of principles, ideas and perspectives; between companies, organisations, business professionals, public officials; and most of all, citizens.

This was already the spirit that guides EuroCham as established in our mission statement: EuroCham is the voice of European business striving for an open and fair market environment in Vietnam. We promote European sustainable investment and trade through good corporate citizenship, collaboration and engagement with Vietnamese society.

The Greenbook is a reflection of these principles, promoting an exchange of views between Vietnam and Europe while encouraging the private sector to act responsibly, constructively and with the advancement of Vietnam in mind. It is about ideas and solutions which can be employed to create a path for Vietnam towards an economy truly integrated into a global market, with sustainable development and responsible investment at its core.

Recent messages from Vietnam's leaders express the wish that it should continue to grow in a sustainable, smart and inclusive way, learning from examples at home and abroad, and betting on innovation and the value of its citizens as the drivers of its future. If this is the way to go, then Europe truly qualifies as its best partner.

Throughout history, sacrificing the environment for economic growth has generated great obstacles, many of which are today surpassable by Europe's world class technology and innovation, one which was and is inspired by similar challenges that Vietnam is also facing today. European know-how can help Vietnam overcome these challenges and help build a progressive partnership from which both sides can benefit. Moreover, beyond the specific "green expertise", Europe brings knowledge and technology transfer, good corporate governance, and long term investment. All elements which are part of a shared vision for the future of Vietnam.

The EuroCham Greenbook tells Europe's story as a "green" and innovative continent, a story of partnerships between the public and private sectors joining forces to overcome challenges that are borderless. In addition, it also shows what European green business has done so far, employing its trend-setting and creative technology, helping Vietnam to transform.

Conversely, EuroCham's Greenbook speaks also to European companies, telling them what we, as the local European Chamber of Commerce, already know very well: Vietnam is a high-potential green trade and investment destination, a great option for a regional

base for any company; and the country with which the most ambitious EU FTA was signed: An agreement that not only creates very favourable conditions for EU business, but specifically encourages green business.

Finally, inspired in the yearly EuroCham Whitebook and our regular advocacy action, the Greenbook also covers a crucial side to making this very sought-after shift towards green and inclusive growth in Vietnam possible: policy action. This includes making the necessary changes to the regulatory landscape, abolishing barriers to the development of green business and ensuring enforcement of regulations.

We hope the Greenbook can serve as an inspiration to Vietnamese authorities and the country's business community as a catalogue of good practices, good projects and the right partners.



**Bruno Angelet**  
*EU Ambassador  
to Vietnam*

## 1.2. EUROPE'S NEW ECONOMIC STRATEGIES: GREEN, SMART AND CIRCULAR

For decades, mankind has been aware of the limits of Earth's natural resources. Warning signs reached us already in 1972, with the Club of Rome's report "The Limits to Growth". It affirmed that trends in population growth, intensive use of natural resources, pollution and climate change are not sustainable. Today, these trends have only aggravated and the Club of Rome's forecast has largely been confirmed. Without change of course, life on our Blue Planet will reach the limit of its survival capacity.

European leaders are deeply concerned by these prospects. They are committed not to let this happen. The EU has been at the forefront in designing new strategies to fight climate change, protect the environment and bio-diversity and generate alternative resources for consumption in the industry and households. The ambition is to turn economic growth into the best friend of climate and environment, rather than their worst enemy. Competitive growth can be inclusive while at the same time sustaining the environment. The economy can be the solution rather than being the cause of the planet's ongoing destruction if it can switch from exhausting resources, increasing pollution and accelerating climate change to a new development model entirely oriented towards generating alternative resources, renewable energy, recycling waste, reducing greenhouse gas emissions, and overall protecting natural resources and bio-diversity.

For decades, as a result of increased awareness in public opinion and of pressure from alternative political movements, European initiatives have emerged involving local and central authorities, civil society, business and science multiplying best practices and showcases for "smart and green solutions". In day-to-day life, at home as in public places, in the industry as in urban management those smart and green solutions are increasingly reducing costs, creating jobs and profit while improving lives of our citizens, the efficiency of public services and the resilience of our economies.

That inspired our leaders to scale-up and consolidate these new approaches into a pan-European strategy. In 2010, notwithstanding the serious challenges they faced in the midst of the financial crises, European leaders endorsed the EU Strategy 2020. It coordinates the economic governance of EU institutions and national Governments in various areas such as public finances, promoting productivity, funding research and innovation to achieve agreed targets to decrease greenhouse gas emissions, increase energy efficiency and develop renewable energy. Those targets and timelines have been ambitiously updated before the recent Paris Climate Change Summit in 2015, turning the EU into the most ambitious power with the highest achievements in its



transition towards a green economy. Meanwhile, EU institutions and national governments have also adopted a Blue Economy Strategy, to develop sustainable economic activity on the Ocean.

As European economic strategies further develop, "Green Growth" also increasingly integrates with the other European strategy focused on modernizing the industrial production base through automation and digitalization. "Industry 4.0" is indeed a German concept that increasingly provides "smart" solution for a more effective industry, but contributing also to a rapid greening of our economy. So "Industry 4.0" and "Green Growth" have become the two sides of the same European coin, the product of European challenges and ideas, bringing new vision and models for the future. Cleaner production processes and an efficient use of resources, including recycling used resources from industry and households, allowed Europe to foster high economic growth while at the same time reducing greenhouse gas emissions and creating jobs. Smart and Green Growth have now become a robust engine of growth in Europe, presently the world's biggest economy but also the world's strongest growing economy.

And more recently, the strategic leadership also started to scale-up models for better use of resources. Indeed, new technologies allow us now to recycle used resources and convert them into new, alternative resources. Industrial, hospital or household waste have over recent years been turned into a lucrative source for energy production, or for recycled materials for industrial production processes. This so called "circular economy" has enthused so many business leaders, researchers and political leaders that it nurtures a new "Utopia" about an almost 100% circular economy, reducing to a minimum new external sources input, while recycling waste and all re-usable output as the new, alternative input and reducing to a minimum reliance and pressure on the environment.

Don't be surprised that Europe has been leading on this: It was not really Europe's choice, but its most urgent imperative to survive in a globalized and shrinking world. Indeed, Europe is the smallest continent and the biggest economy on earth. But Europe is also one of the most crowded continents with hardly any natural resources, relying almost entirely on imports of resources for industrial production. In other words, we didn't invent Green Growth by design but by default to remain competitive while strengthening our strategic autonomy. Finally, Europe has an enormous historic and cultural heritage to preserve. Our cities are amongst the most beautiful on Earth, hosting most of Europe's population and equal to 70% of production of goods and services, road transport, energy consumption and pollution including greenhouse gas emissions. Urban management is key to succeed in green growth, make cities more livable for the population while preserving Europe's heritage and our historic identity.

All these topics are exactly what EuroCham's Greenbook is about. Europe is best placed to share with partners in Asia its expertise in renewable energies, water and waste management, green building and smart cities. Europe and Asia share a lot and face very similar challenges: Our densely populated continents are the world's most urbanized. Yet our rich civilizations leave us with the key task to preserve our cultural heritage. Exhaustion of natural resources, increasing pollution and logistic bottlenecks ask for clean, smart, recyclable and sustainable solutions. Limits on public budgets call for partnerships between the State, business and the academic world and citizen-centered approaches including consultations with civil society.

Vietnam is particularly exposed to those challenges. But with its vibrant society and extrovert economy, Vietnam is also well placed to leapfrog and take the best of Europe's experiences for its own benefit. Europe is today Vietnam's second trade partner after China. Our economy brings high added value to Vietnam. Europe promotes good and sustainable governance through an equal partnership with Vietnam. European businesses pursue opportunities in a win-win spirit and in line with our corporate social responsibility principles. The forthcoming implementation of the EU-Vietnam Free Trade Agreement will further boost our joint efforts in this field.

The first ever "Greenbook" of EuroCham offers Vietnam a real insight in the strategies pursued by the people and leaders in Europe, in the capabilities and smart solutions developed for decades on our continent, and in the calibrated opportunities European companies could bring to Vietnam. I trust our smart and creative friends in Vietnam will make the best use of it!



Established in May 2014, the **EuroCham Green Growth Business Sector Committee (GGSC)** aims to work with stakeholders to fulfill its mission: to facilitate the mainstreaming, abolishment of barriers and development of the conditions that are essential for Green Business to prosper in Vietnam. The GGSC works together with the Government of Vietnam and its agencies as well as with Vietnamese and European companies and other stakeholders.

**Focus areas of the GGSC:** Renewable Energy, Energy Efficiency; Clean technologies and environmental technologies (including water, waste and sanitation); Financing Green Business; Sustainable Buildings; Urban and Industrial Green Growth.

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EuroCham Sector Committees are self-financed, self-governed bottom-up entities and their activities are determined by its members and available resources.

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# **VIETNAM'S ECONOMIC GROWTH AND GREEN DEVELOPMENT**

## **CHAPTER II**

# VIETNAM'S ECONOMIC GROWTH AND GREEN DEVELOPMENT

## 2.1. THE STATE OF SUSTAINABLE DEVELOPMENT IN VIETNAM TODAY

Vietnam has undergone rapid growth since the onset of the Đổi Mới economic reforms in 1986 transformed its centrally planned economy into a much more open and market oriented one. Improvements were made in terms of the business climate and competitiveness and the country negotiated several trade deals including WTO membership. During the same time the GDP/Capita has risen over ten times and the poverty ratio has fallen over 3% annually.<sup>1</sup> The country has moved from being one of the poorest globally into a lower Middle Income Country (MIC).

The rapid development brought several challenges to green growth relating to the overuse of natural resources and the environment such as rising emissions from the increasing coal power production and fossil-fuel use and lack of wastewater/waste treatment and proper public transport. Beside the local challenges in terms of climate change vulnerability Vietnam, (especially the Mekong Delta which is among top 3 deltas in danger by the rising sea level globally), is among the most impacted countries (over 50% of the workforce and income depends on climate sensitive resources).<sup>2</sup> Vietnam's agriculture and infrastructure is suffering an average of more than 1% GDP loss related to climate change and disasters on annual basis.<sup>3</sup> The effects are numerous and unsustainable: increasing power demands; steadily climbing CO<sub>2</sub> emissions, an annual 3% urbanization growth resulting in projections of 50% of the population living in urban areas by 2050<sup>4</sup>; the degradation of natural resources.<sup>5</sup> The Environmental Performance Index ranks Vietnam 170 out of 180 for air quality.

The Government has recognized the challenges and in 2012 the Prime Minister appointed the Ministry of Planning and Investment to elaborate and launch the National Green Growth Strategy (VGGS – approved by the PM as 1393/QĐ-TTg)<sup>6</sup> for the period of 2011 – 2020 with the vision to 2050, followed by the Green Growth Action Plan in 2014.<sup>7</sup> The documents state the main goals for the decade: the building of a sustainable, green economy. Based on that policy an Intended Nationally Determined Contribution to the United Nations Framework Convention on Climate Change (UNFCCC) was issued in late 2015 and the government of Vietnam gave its approval to the Paris Agreement under the UNFCCC on 3 November 2016 (climate change policies are signed to the Ministry of Natural Resources and Environment). In order to implement the contributions, the government agencies along with development partners started to carry out different activities to promote the implementation of these commitments.

In 2017, over five government ministries and nearly 30 provinces/cities in Vietnam have developed and implemented their Green Growth Action Plan<sup>8</sup>. The Plans are aiming to drive the resource mobilization, institutional & policy improvement, capacity strengthening, and new technology application. The above-mentioned plan for the Paris Agreement and NDC implementation contributes to concretize Vietnam's actions towards the 2030 Agenda for Sustainable Development. The Ministry of Planning and Investment is the focal point for green growth, responsible for leading and coordinating with concerned ministries, sectors and People's Committee of provinces and cities. It collaborates with international development partners to mobilize financial resources to implement the Vietnam Green Growth Strategy and Action Plan, and acts as the Coordinating agency for the implementation of the 2030 Agenda for Sustainable Development. Parallel to the VGGS in 2011 the country's Socio-Economic Development Strategy (SEDS) 2011 – 2020<sup>9</sup> also highlighted the need for environmental sustainability and promoting skills development, particularly for modern industry and innovation.

<sup>1</sup> World Bank Data Bank: World Development Indicators – Viet Nam

<sup>2</sup> Global Green Growth Institute, "Viet Nam Country Planning Framework 2016-2020"

<sup>3</sup> PM Decision No. 2139/QĐ-TTg on the approval of the National Strategy on Climate Change (2011)

<sup>4</sup> World Bank Viet Nam Urbanization Review: Technical Assistance Report

<sup>5</sup> World Bank and Ministry of Planning and Investment: Vietnam 2035 Report

<sup>6</sup> PM Decision No.1393/QĐ-TTg on the approval of the Viet Nam National Green Growth Strategy 2011-2020 (2012)

<sup>7</sup> PM Decision No. 403/QĐ-TTg on the approval of the National Green Growth Action Plan of Viet Nam 2014-2020 (2014)

<sup>8</sup> Government of Vietnam

<sup>9</sup> Viet Nam Socio-Economic Development Strategy 2011-2020 approved by the 11th National Congress of the Communist Party of Viet Nam (2011)



The work ahead is tremendous: the budget of the green growth projects are still 2/3 covered by the state, the involvement of the private sector is crucial for the state to play only as facilitator in the procedure (the Government through the Investment Law, the Enterprises Law, the Enterprises Income Law and others provides special provisions to give preferential policies for enterprises that invest in hi-tech/environmentally friendly projects). Due to the MIC status official development assistance (ODA) loans will not be available as source of upfront financing – new financial schemes are to be developed.

The current market size for the clean technology sectors in Vietnam is approximately US\$ 4-5 billion per year. There is no specific data for the whole market hence using the total of each sub-sector the size can forecast that in the next 5 to 10 years, Vietnam will need to invest US \$15-20 billion for renewable energy sector and US \$14 billion for the environment and the water sector to be able to achieve the governmental targets. Funding of these projects remains a challenge or a test of patience and networks, as decentralized licensing, local banking system, Public Private Partnerships or international donor organizations will have need to become involved.<sup>10</sup>

The Government also issued a plan for implementation of the Paris Agreement in Vietnam however, the energy sector contribution towards the overall nationally determined contribution target is judged by researchers as unambitious even though it is the largest source of greenhouse gas emissions and the energy sector's emissions are rapidly increasing.<sup>11</sup>

The country has developed a comprehensive set of policies, and major growth is expected to come from Renewable Energy development as the Vietnamese government has issued the Power Master Plan VII (revised 2016) which forecasts the development of Renewable energy from now to 2030. The environmental and water sector will see strong growth as well, due to several environmental scandals and prevalent pollution. Currently the population from rural and urban areas still does not get access to clean water (70% in city; approximately 40% in rural areas in 2015). Due to international donor aid, waste treatment has improved recently, but is still poorly handled as well. The government also plans to invest in improving water supply to reach 100% population coverage and 100% of wastewater and solid waste to be treated properly in the future.<sup>12</sup>

Besides partners from international development, the private sector's and foreign companies' support and involvement will be crucial in terms of new technologies and R&D, climate change adaptation; financial schemes and resources for the sustainable development; policies and company management practices; trainings and education. Government has to encourage those types of joint actions in order to find market and environmentally friendly solution for economic growth and national development. It will bring an economically sustainable operation to the private sector players. Beside those strengthening the natural assets management and the legal enforcement will be necessary for the long term development.

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## 2.2. KEY GREEN GROWTH SECTORS IN VIETNAM: WHERE DO WE STAND TODAY?

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### 2.2.1. RENEWABLE ENERGY<sup>13</sup>

#### 2.2.1.1. Power Production and Consumption

Vietnam's energy sector in recent years has been constantly growing, especially in terms of production, distribution, and imports, mirroring the country's economic development. Vietnam's three main energy resources are crude oil, coal and electricity, while hydroelectric has played an important role for a long time. Regarding

<sup>10</sup> Christoph Schill: Clean Technologies in "Doing Business in Viet Nam Guide" first edition published in June 2017 by Central and Eastern European Chamber of Commerce in Vietnam

<sup>11</sup> Ibid

<sup>12</sup> Ibid

<sup>13</sup> As indicated in the relevant sub-headers, some of the content in this section was extracted and adapted from the: EU-Vietnam Business Network, Green Technology - Research Report (Ho Chi Minh City, 2017). This publication is accessible at [www.evbn.org](http://www.evbn.org). The extracts were kindly provided by the EU-Vietnam Business Network as an active contributing organisation to the EuroCham Greenbook.



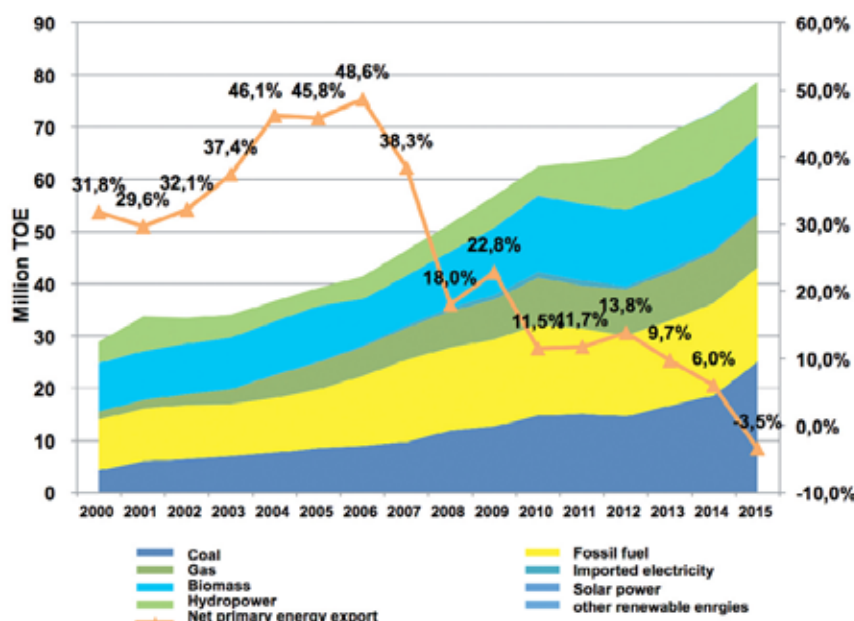
energy consumption, the total consumption of primary energy in Vietnam grew by an average of 6.54% annually from 2000 to 2009, reaching a total of 57 million TOE (Tonne of Oil Equivalent) at the end of 2009.

The abovementioned rapid development has in fact been a constant since the Doi Moi reforms, bringing about new challenges for power production.

As an overview, this evolution can be read in statistical terms as follows: the rapid increase in energy demand went from a total primary demand of 13.4 million (TOE) in 1990, to 78.6 million TOE in 2015. This represents a 7.3% annual growth in 15 years. In turn, Vietnam's energy production of Vietnam increased from 13.9 million TOE, to 76 million TOE, which represents 7.2% annually within this period.<sup>14</sup> The industry and residential sector consumed about 39% and 33% of total power demand respectively.

The ADB pointed out that Vietnam has substantial proven reserves of fossil fuels and is an important coal, oil, and natural gas producer.<sup>15</sup> However, the rate of primary energy export to import steadily decreased from +48.6% in 2006 to -3.5% in 2015 (Figure 1).

**Figure 1. Primary Energy Consumption of Vietnam 2000-2015**



Source: Nguyen Van Vy, 2016

These patterns of energy production and rapid consumption increase put together turned Vietnam from a net primary energy exporter to a net importer in 2015. Under the current trajectory, Vietnam is expected to reach a peak of 24.3% net energy imports in 2030. Afterwards, this would then gradually decrease to 7.1% in 2050; but only under the condition of significant development of biomass, solar energy, wind power and nuclear power.<sup>16</sup>

<sup>14</sup> Nguyen Van Vy, The needs to develop renewable energy in Vietnam. Presentation at CIEM workshop on 28 November 2016

<sup>15</sup> Asian Development Bank (ADB), Vietnam Power Sector Reforms, 2015

<sup>16</sup> Koos Neeffes and Dang Thi Thu Hoai, Friedrich-Ebert-Stiftung Vietnam Office, Towards a Socially Just Energy Transition in Viet Nam: Challenges and Opportunities, 2017

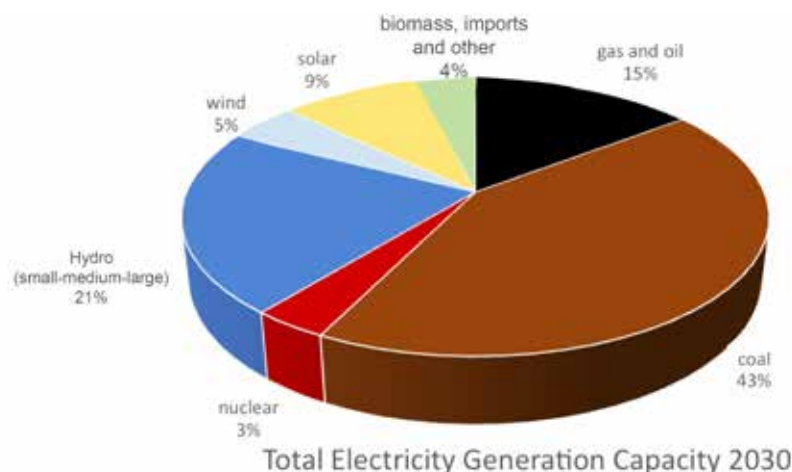
Table 1. Energy Demand and Production in Vietnam 2000-2015<sup>17</sup>

Table 1. Energy demand and production in Viet Nam, 2010-2015						
Indicators	2010	2011	2012	2013	2014	2015
GDP annual growth (%)	6.4	6.2	5.3	5.4	6.0	6.7
GDP per capita (US\$)	901	947	986	1,523	1,596	1,685
Total primary energy supply (kilo-tonne oil equivalent (KTOE))	57,023	57,073	57,855	59,203	64,797	70,588
Non-commercial energy as % of total primary energy	24.4	24.5	24.4	23.1	19.7	16.9
Total energy import as % of total primary supply	23.6	23.6	20.6	18.2	19.3	21.9
Total final energy consumption (KTOE)	47,445	48,485	49,134	50,606	52,248	54,080
Final energy consumption per capita (kilogramme oil equivalent (KgOE))	546	552	553	564	576	590
Electricity consumption per capita (kWh)	998	1,077	1,187	1,294	1,416	1,564
Electricity intensity (kWh/US\$1,000)	748	769	813	850	887	929
Electricity sale annual growth (%)	14.5	10.5	11.4	9.3	11.6	11.7
Electricity consumption as % of total energy consumption	22.2	23.6	25.9	27.0	27.9	29.2

Source: Institute of Energy (IOE) 2016

Source: Institute of Energy (IOE), 2016

In 2016, the Government of Vietnam published a revised Power Development Plan 7, which indicates a significant change in the power generation structure (SR Viet Nam, 2016a). The total installed capacity for power generation is forecasted to increase massively from 39,000 MW in 2015, to 129,500 MW in 2030.

Figure 2. Total Electricity Generation Capacity 2030<sup>18</sup>

Source: Christoph Schill, 2017

<sup>17</sup> Socialist Republic of Vietnam - Institute of Energy (IOE), Practices of energy development and primary energy supply in Viet Nam. Presentation to the workshop "National energy development master plan", Hanoi, September 30, 2016

<sup>18</sup> PDP7-revised, own calculation

**Table 2. Total Electricity generation installed and project capacity in Vietnam**

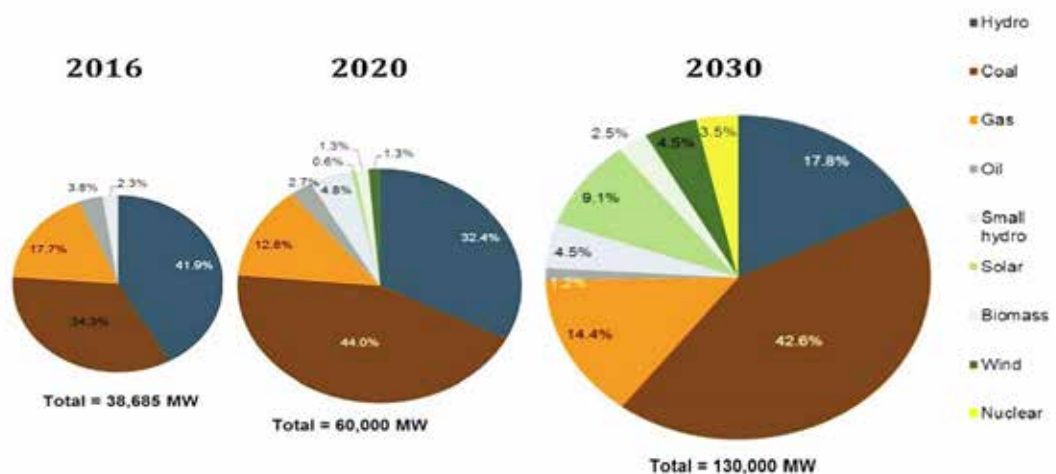
Table 2. Total electricity generation installed and projected capacity in Viet Nam (PDP7-revised)			
Capacity (MW)	2015	2020*	2030*
Gas- & oil-fired power	8,501	9,000	19,000
Coal-fired power	12,751	26,000	55,300
Nuclear power	0	0	4,600
Hydro power (small, medium, large)	16,075	21,600	27,800
Wind power	140	800	6,000
Solar	0	850	12,000
Other, including biomass & import	1,533	1,750	4,800
<b>Total</b>	<b>39,000</b>	<b>60,000</b>	<b>129,500</b>

Source: Data for 2015 from: IOE 2016; SR Viet Nam 2016a (\*projected)

19

Source: Institute of Energy (IOE), 2016

Up to 2015, Vietnam's power sector was otherwise dominated by hydro-power. Even the installed capacities of hydro-power would more than double from 2015 to 2030 according to the plan (see Table 2). Gas-fired and coal-fired power power-installed capacity would increase even more. Conversely power-installed capacity starts from near-zero in 2015 and remains modest through to 2030. The preparations and plans for nuclear power were halted in 2016 and postponed to 2030.

**Figure 3. Power Development Plan VII for renewable energy (2030)**<sup>20</sup>

Source: Christoph Schill, 2017

In terms of percentage points regarding power production, in 2030, coal-fired power will increase significantly and presents itself as the predominant source of energy in Vietnam. This will also mean a tremendous increase in coal imports as the forecasted demand will reach in projected terms 75 million tons.<sup>21</sup> The share of hydro-power will

19 Socialist Republic of Vietnam - Institute of Energy (IOE), Practices of energy development and primary energy supply in Viet Nam. Presentation to the workshop "National energy development master plan", Hanoi, September 30, 2016 and projection of PDP7-revised.

20 Own calculation, based on the PDP7-revised

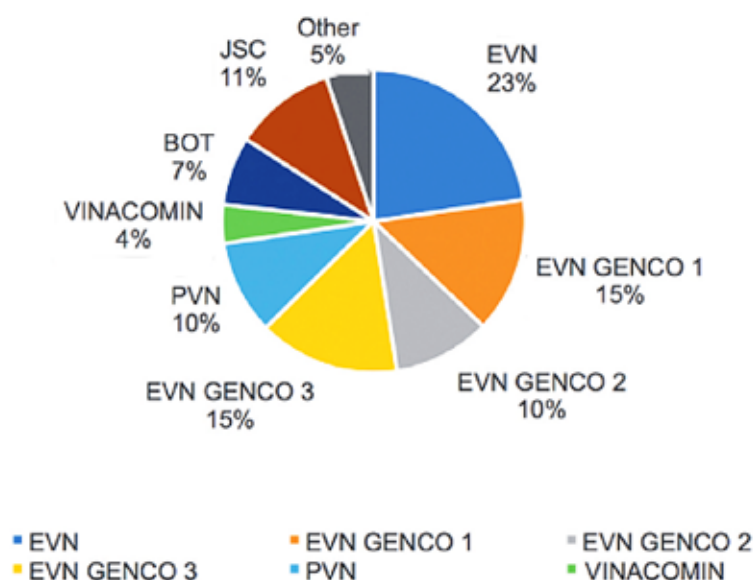
21 Prime Minister Decision No. 403/QĐ-TTg, Adjusting the development planning of the coal industry in 2016 – 2020 period with outlook up to 2030, 14. 3. 2016

decrease, and hydro-power will lose its dominant position, also due to environmental concerns regarding hydro-power projects.

The Renewable Energy Development Strategy (REDS)<sup>22</sup> forecasts a total power production of 1,050 TWh/year in 2050, with a share of 43% renewables, including biomass, wind, solar and (small and large) hydro-power. Beyond the underestimated financing and technical capacity to develop renewable energy in Vietnam, it is perhaps noteworthy that energy demand might be overestimated (due to an underestimated energy saving and efficiency effort, in the context of a high and energy-intensive GDP growth rate). Even for 2030, the forecasted total power demand can be reasonably projected ca. 30% lower than indicated in the PDP7-revised: 407.7 TWh per year. This could provide some leeway to allowing renewable to gradually occupy market share, however within the scenario described above.

#### 2.2.1.2. Energy Market Organisation<sup>23</sup>

**Figure 4. Share of Power Generation in Vietnam in 2015 by main investors**



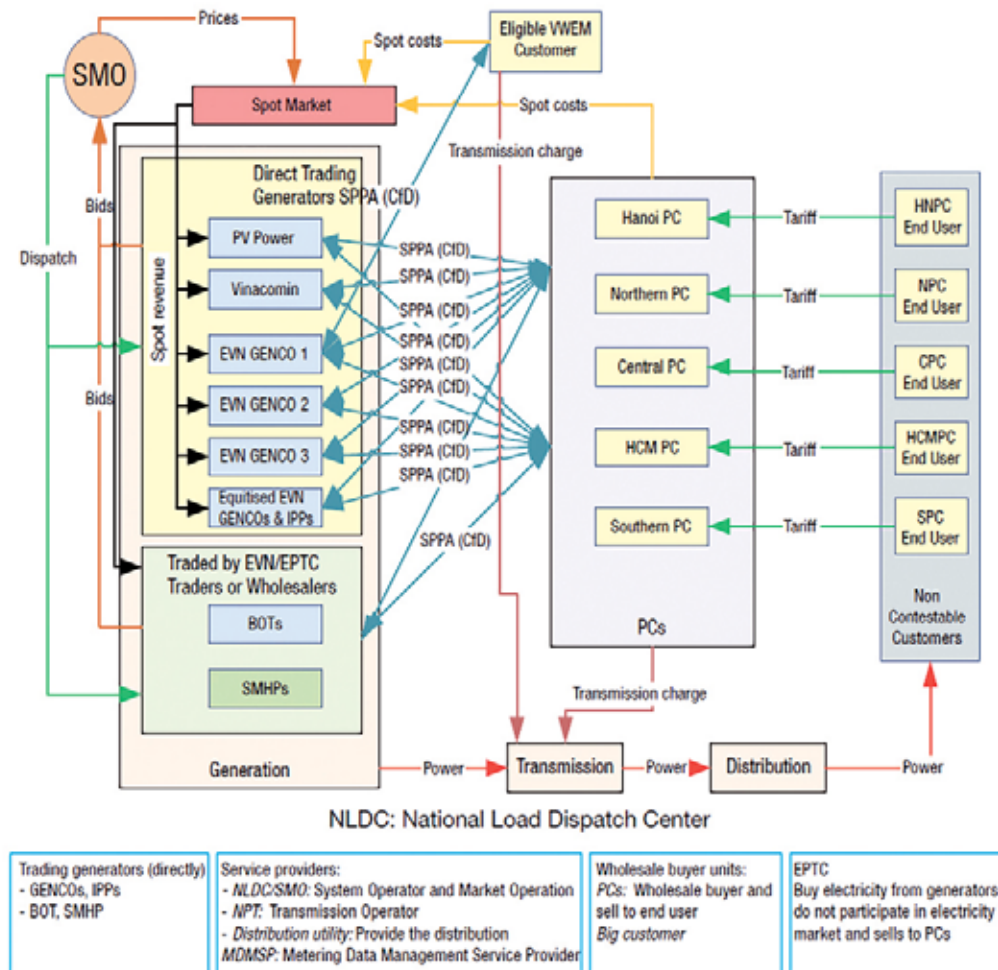
Source: PV Power, 2016

Currently, the Vietnamese Wholesale Electricity Market (VWEM) is in a phase of transition. While it remains a fact that energy generation facilities in Vietnam are dominated by State Owned Enterprises (SOEs) - notably Electricity Vietnam (EVN), PetroVietNam (PVN), Petrolimex and the Vietnam Coal-Mineral Industries Holding Corporation (VINACOMIN) – other types of players are also part of the landscape. Among them, the most notable would be Joint Stock Companies (JSCs) with SOEs as shareholders, as well as a small share of “build Operate and Transfer” (BOT) projects, where Vietnamese banks and SOEs also participate.

Regarding distribution, EVN owns the operator of the national grid, the National Power Transmission Corporation (NPT), and five more power corporations responsible for distribution. In addition, the National Load Dispatch Centre (NLDC) and the Electric Power Trading Company are under the direct control of EVN.

<sup>22</sup> Prime Minister Decision 2068/QĐ-TTg, on approval of the “Vietnam Renewable Energy Development Strategy up to 2030 with an Outlook to 2050” (REDS), 25. 11. 2015

<sup>23</sup> Viet Nam National Oil and Gas Group (PVN) - Power Corporation, PV Power Thị trường điện cạnh tranh đối v ới: Tập Đoàn Dầu Khí Quốc Gia Việt Nam - Tổng Công Ty Điện Lực Dầu Khí Việt Nam [Competitive power market for PV Power], 2016

Figure 5. Structure of the Vietnam wholesale electricity market<sup>24</sup>

Source: EVN, 2017

Currently, the selling price of power to customers is strictly regulated. However, there is a roadmap for developing competitive power markets in Vietnam and a fully competitive retail market by 2024.<sup>25</sup> The power production units that fall directly under EVN, as well as the three EVN GenCos, are all owned by EVN. The State representative or owner of EVN is the Ministry of Industry and Trade (MOIT), who is also in charge of the Electricity Regulatory Authority of Vietnam (ERAV), the National Competitiveness Council, and SOEs in the energy sector.

Market entry for new investors is challenging, despite the expressed will of the current Government to find ways to make the market more dynamic. At the present stage, new power investment projects must be in the project list attached to the PDP7-revised or obtain special permission from the MOIT. In addition, other licenses and e.g. a contract with the NPT related to grid connection, land use, etc; are likely to be required.

<sup>24</sup> Vietnam Electricity (EVN), Annual Report 2016, 2017, available at: <http://www.evn.com.vn/userfile/files/2017/3/AnnualReport2016.pdf>, (consulted on 12. 10. 2017), p.35

<sup>25</sup> Socialist Republic of Vietnam National Assembly Resolution 28/2004/QH11, "Electricity Law", 3. 12. 2004; National Assembly 24/2012/QH13 revising and amending some articles of the "Electricity Law", 20. 11. 2012; Prime Minister Decision 63/2013/QĐ-TTg of 8/11/2013 on the "Roadmap, Conditions, and Sector Structures for Establishment and Development of Power Market Stages in Vietnam", 8. 11. 2013; Prime Minister Decision 168/QĐ-TTg, on approval of "Restructuring the Power Sector for the 2016-2020 Period with a Vision to 2025", 7. 2. 2017.



### 2.2.1.3. Energy Policies and Regulations

The Government of Vietnam has had different policies to encourage the development of renewable energy as well as establish targets for renewable energy production and move toward competitive energy market with diverse investment and business models.

The most important regulations in the energy sector build on previous provisions or complement them. The most important ones are:

- National Assembly 28/2004/QH11, "Electricity Law", 3. 12. 2004
- National Assembly 24/2012/QH13 revising and amending some articles of the "Electricity Law", 20. 11. 2012
- Prime Minister Decision 79/2006/QĐ-TTg on the "National Target Program on Economical and Efficient Use of Energy", 14. 4. 2006
- Prime Minister Decision 1855/QĐ-TTg on the "Vietnam Energy Development Strategy to 2020 and vision to 2050", 27. 12. 2007
- National Assembly Resolution 50/2010/QH12, "Law on Economical and Efficient Use of Energy", 17. 6. 2010
- Prime Minister Decision 37/2011/QĐ-TTg on the "Mechanism Supporting the Development of Wind Power Projects in Vietnam", 29. 6. 2011
- Prime Minister Decision 1208/QĐ-TTg on approval of the "National Power Development Plan for the 2011 - 2020 period with a vision to 2030" (also known as PDP7), 21. 7. 2011
- Prime Minister Decision 1393/QĐ-TTg National on approval of the "National Green Growth Strategy 2011-2020 with outlook to 2050", 25. 9. 2012
- Prime Minister Decision 1427/QĐ-TTg on the approval of the "National Targeted Program on Energy Efficiency and Conservation Phase 2012 – 2015", 2. 10. 2012
- Prime Minister Decision 1670/QĐ-TTg on "Development of Smart Grid in Vietnam", 8. 11. 2012
- Prime Minister Decision 63/2013/QĐ-TTg of 8/11/2013 on the "Roadmap, Conditions, and Sector Structures for Establishment and Development of Power Market Stages in Vietnam", 8. 11. 2013
- Prime Minister Decision 403/QĐ-TTg on approval of the "National Action Plan on Green Growth in Vietnam for the Period of 2014-2020", 20. 3. 2014
- Prime Minister Decision 24/2014/QĐ-TTg on the "Support Mechanism for Development of Biomass Power Projects, 24. 3. 2014
- Prime Minister Decision 31/2014/QĐ-TTg on "Support to the Development of Projects to Produce Power from Waste", 5. 5. 2014
- National Assembly Resolution 55/2014/QH13, "Law on Environmental Protection" (including a chapter on management of GHG emissions and renewable energy), 23. 6. 2014
- Intended Nationally Determined Contribution of Vietnam. Submitted to the UNFCCC in 2015<sup>26</sup>
- Prime Minister Decision 2068/QĐ-TTg, on approval of the "Vietnam Renewable Energy Development Strategy up to 2030 with an Outlook to 2050" (REDS), 25. 11. 2015
- Prime Minister Decision 428/QĐ-TTg, on approval of "Adjustments of the National Power Development Plan for the 2011 - 2020 period with a vision to 2030. (also known as "PDP7-revised"), 18. 3. 2016
- Prime Minister Decision 168/QĐ-TTg, on approval of "Restructuring the Power Sector for the 2016-2020 Period with a Vision to 2025", 7. 2. 2017
- Prime Minister Decision 11/2017/QĐ-TTg, on the "Mechanism to Encourage Development of Solar Power Projects in Vietnam", 11. 4. 2017
- Circular 96/2012/TT-BTC by MOF, "Guiding the financial mechanism to support electricity price for grid connected wind power projects." Hanoi: Ministry of Finance (MOF), 2012
- Decision 18/2008/QĐ-BCT of the Ministry of Industry and Trade (MOIT) on "Avoided cost tariff and standardized power purchase agreements", 2008

<sup>26</sup> Socialist Republic of Vietnam, Intended National Determined Contribution, 2015, available at: <http://newsroom.unfccc.int/unfccc-newsroom/vietnam-submits-its-climate-action-plan-ahead-of-2015-paris-agreement/>, last consulted on 12. 10. 2017

- Decision 5106/QD-BCT by the Ministry of Industry and Trade (MOIT) issuing the avoided cost tariff for 2017, 29. 12. 2016
- Circular 32/2014/TT-BCT by the Ministry of Industry and Trade (MOIT) on “Regulations for preparation and application of the avoided cost tariff and power purchase agreements for small hydro-power plants”, 9. 10. 2014
- “Vietnam’s Intended Nationally Determined Contribution - Technical report.” Hanoi: Ministry of Natural Resources and Environment (MONRE), 2015

The Vietnam Renewable Energy Development Strategy (REDS) and PDP7-revised are currently the framework setting regulations and include general provisions for stimulating renewable energy development and general provisions for this simulation, such as tax policies and a renewable energy development fund.

REDS targets are:

- An increase in total production of renewable energy from 25 million TOE (tons of oil equivalent) in 2015 to 37 million TOE in 2020, 62 million TOE in 2030 and 138 million TOE in 2050.
- The renewable energy share in total primary energy consumption of 31.8% in 2015 would reduce to 31% in 2020 and increase to 32.3% in 2030 and 44% in 2050 (these projections include large scale hydro-electricity).
- It includes specific targets, on increased absorption area of solar water-heating units (3 million m<sup>2</sup> in 2015, 8 million m<sup>2</sup> in 2020; 22 million m<sup>2</sup> in 2030 and 41 million m<sup>2</sup> in 2050);
- scale up the application of biogas technologies (construction volume of 4 million m<sup>3</sup> in 2015; 8 million m<sup>3</sup> in 2020; 60 million m<sup>3</sup> in 2030; 100 million m<sup>3</sup> in 2050);
- increased percentage of households using advanced/high-performing stoves (negligible at present; 30% in 2020; 60% in 2025; and from 2030 most rural households);
- increased production of biofuels for transport (150 thousand TOE in 2015 to about 800 thousand TOE in 2020 or 5% of transport fuel demand; 3.7 million TOE or 13% of transport fuel demand in 2030; 10.5 million TOE or 25% of transport sector’s fuel demand in 2050).
- domestic development and manufacture of renewable energy technologies and projects an increase in the proportion of domestically-manufactured renewable energy equipment value from 30% in 2020 to 60% in 2030 and in 2050, domestic equipment needs would be essentially met and Viet Nam would also export such equipment.
- “However, this strategy has not been operationalised yet, as the Renewable Energy Development Action Plan is still under development”.<sup>27</sup>
- The PDP7-revised outlines following targets and developments:
  - increase renewable power production, “but of the projected total power produced in 2030 of 506 TWh, less than 11% would be from renewables (including small hydro), which seems un-ambitious”.
  - summed up, 53% of electricity production from coal and 17% from natural gas fired power plants, the remaining 30% from large hydro, nuclear and imports.
  - installed capacity of solar PV would be 850 MW in 2020; 4,000MW in 2025 and 12,000 MW in 2030;
  - installed wind capacity is targeted as 800 MW in 2020; 2,000 MW in 2025 and 6,000 MW in 2030.<sup>28</sup>

#### 2.2.1.4. Electricity Prices and Consumption Challenges

Summing up the regulations and policies in price-terms, the support policy on wind power regulates the feed-in-tariff (FiT) of 1,614 VND/kWh (fixed at 7.8 US cents/kWh).<sup>29</sup> But on a Prime Minister’s decision, the main off-shore wind park in Southern Vietnam was awarded a FiT of 9.8 US cents/kWh in July 2016.<sup>30</sup>

Other pricing support policies exist for biomass power generation and waste-to-power projects: combined heat and power projects with biomass FiT are 1,220 VND/kWh (5.8 US cents/kWh); direct-fired solid waste power

<sup>27</sup> REDS summary and the quote from: Koos Neeffes and Dang Thi Thu Hoai, Friedrich-Ebert-Stiftung Vietnam Office in “Towards a Socially Just Energy Transition in Viet Nam: Challenges and Opportunities”, 2017, p. 12

<sup>28</sup> Ibid., p. 12f.

<sup>29</sup> This is widely considered too low to transform the markets.” Ibid, p.13

<sup>30</sup> This wind power FiT includes 207 VND (1 US cent/kWh) which was regulated by the MOF in 2012 as a “financial mechanism to support the electricity price for grid connected wind power projects”.

generation projects FiT 2,114 VND/kWh (10.05 US cents/kWh); for solid waste landfill and biogas-fired power generation projects the FiT was set 1,532 VND/kWh (7.28 US cents/kWh).

Moreover, the latest addition in the "FiT-family" is the solar PV FiT, at a rate of 2,086 VND/kWh (9.35 US cents/kWh).

The wind power FiT and the solar PV FiT are considered too low to attract substantial foreign investors, as a EuroCham solar experts survey showed in 2016.<sup>31</sup>

On the other hand, for consumers, when comparing to other Southeast Asia countries or even globally, the energy prices are low in Vietnam. However, policymakers are still reluctant to increase the prices or present a roadmap with an electricity price outlook with forecasted price increases.<sup>32</sup> The average electricity retail prices in Vietnam remain strictly regulated according to official pricing tables (at the exchange rate in 2015, it would be equivalent of US\$ 0.076, which could be slightly lower due to VND devaluation but otherwise unchanged until 2017).<sup>33</sup>

The opportunity remains however to develop further dialogue with the private sector and to accompany the evolution of regional and global energy markets. EuroCham Vietnam, its Green Growth Sector Committee, and other business associations remain committed to continue a constructive dialogue with the Government to improve the business environment in the renewable energy field, as well as to advocate for a more sustainable energy future for Vietnam.

## 2.2.2. WASTE AND WATER

### 2.2.2.1. Waste

According to the Department of Waste Management and Environmental Improvement, 35 of 63 provinces have hazardous waste. The amount of hazardous waste generated nationwide is approximately 800 thousand tons, while the amount of hazardous waste collected and processed by the hazardous waste management practice units licensed by the Vietnam Environment Administration was only about 190 thousand tons (according to the report of the 39/55 hazardous waste management practice units).

The draft Decree No.02 on waste and scrap management consists of 09 chapters, 61 articles and focuses on guiding some contents in the Law on Environmental Protection and other matters serving the state management of waste and scrap management, including provisions on normal waste management, hazardous waste; wastewater management; management and control of dust and gases; import of scrap management and pollution control of soil.

Industrial waste is concentrated in focused economic zones, industrial parks, and urban areas. About 80 percent of the 2.6 million tons of industrial waste generated each year is from the industrial centres in the North and South. Ho Chi Minh City and its surrounding provinces generate nearly 50 percent of the country's industrial waste; 30 percent is generated in the North Coast – Red River Delta region. Additionally, the nearly 1,500 craft villages—predominantly found in rural areas in the North, produce a fair share of non-hazardous waste.

The largest sources of hazardous waste are industries (130,000 tons/year) and hospitals (21,000 tons/year of hazardous healthcare waste). Additionally, agricultural sources produce approximately 8,600 tons of pesticides and contaminated pesticide containers each year and past pesticide use has resulted in the accumulation of an estimated 37,000-ton stockpile of confiscated agricultural chemicals. Regional differences in hazardous waste generation are significant; in the case of industrial hazardous waste generation, the Southern Focus Economic Zone accounts for 75 percent of the industrial hazardous waste in the country. Most hazardous healthcare waste is found in HCMC, Hanoi, and Thanh Hoa (27% in total), whilst most hazardous agricultural waste is found in the agricultural areas of the Mekong River Delta.

Generally speaking, considerable improvements in waste generation are necessary to improve the overall

<sup>31</sup> European Chamber of Commerce in Vietnam, Solar Expert Survey Vietnam 2016 – Highlights, 2016

<sup>32</sup> As the past has shown, this sensitive topic of electricity price increase would be widely reported by the media.

<sup>33</sup> For a comparison, Neefjes and Hoai state: According to Worldatlas.com (2017), tariffs in e.g. Sweden, Canada, Finland, Australia, South Africa and the USA were 8-10 USD cents/kWh in 2014, and, at the higher end of the spectrum, tariffs in the UK, Germany and Italy were 15-21 USD cents/kWh. Average tariffs were above 10 USD cents/kWh in Thailand, 11 USD cents/kWh in Malaysia, and above 20 USD cents/kWh in the Philippines in 2012 (UNDP, 2014).

situation. By 2010, Vietnam will have a projected 10 million more urban dwellers. Furthermore, it is foreseen that consumption will increase and manufacturing will grow also, resulting in an increase in hazardous waste-intensive industries. Moreover, the healthcare system is expected to undergo continued modernization.

These changes are estimated to result in a 60 percent increase in municipal waste generation; a 50 percent increase in industrial waste generation and an over-threefold increase in hazardous waste generation, mostly attributable to industrial sources. Considering the high cost of safe collection and disposal, initiatives to reduce waste—such as promoting public awareness and cleaner production, and introducing economic incentives based on the Polluters Pay Principle—could result in significant savings. For example, a 10 percent reduction in waste generation could result in an annual disposal savings of approximately VND 200 billion and VND 130 billion for municipal and hazardous healthcare waste, respectively.

In general terms, cities are collecting more municipal waste than rural areas as of today. Waste collection in cities is improving, but is limited in rural and poor areas. Urban areas collect an average of 71 percent of the waste, a number that has increased steadily since 2000. In general, larger cities in Vietnam collect a higher percentage of their waste (76 percent) than smaller cities (70 percent), while in rural areas collection rates are typically less than 20 percent. The poor areas are by and large not served by collection services; nine out of ten of the poorest urban households do not receive solid waste collection service. New initiatives are being promoted to fill the gaps in municipal waste collection services. For example, community-based and private sector organizations are collecting waste in the rural villages and urban areas without municipal coverage.

Municipal waste disposal practices are improving but still represent a threat to public health and the environment. The dominant form of disposal of municipal waste remains open dumping; 49 sites have been identified on a national list as hotspots with high environmental and human health risks. Of the 91 disposal sites in the country, only 17 are sanitary landfills. In many areas, self-disposal methods—such as burning or burying waste, or dumping in rivers, canals, and open fields—is common.

The handling of waste—including reuse and recycling, collection, treatment and disposal—is crucial to providing a cost-effective waste management system that is able to reduce public health and environmental risks. Most of the municipal waste in Vietnam is not safely disposed. However, there have been significant improvements by the public urban environmental companies (URENCOs) that are responsible for municipal waste collection and disposal. Proper handling of hazardous waste, which is the responsibility of the industries and hospitals that produce it, remains severely limited.

Recycling and reuse in Vietnam is an active industry driven by an informal network of waste pickers at landfills, informal waste collectors, and waste buyers.

### **2.2.2.1.1. Waste Recycling**

Recycling is common practice in Vietnam. Households routinely separate recyclable wastes such as metals and paper for sale to itinerant buyers, or sell it directly to local depots. Waste pickers also separate reusable and recyclable wastes. This dynamic recycling market is largely led by the informal sector. In Hanoi, for example, the informal sector recycles 22 percent of all waste produced. In the industrial sector, several types of industries can recycle as much as 80 percent of their waste. Artisans and workers at many craft villages have been particularly successful in capitalizing on this opportunity, recycling over 90 percent of their potentially recyclable waste. Annual cost savings on disposal waste could be substantial. For example, if each of the six key industries could recycle 50 percent of its potentially recyclable waste they would save VND 54 billion on disposal costs. Similarly, a 10 percent decrease in municipal waste could save VND 200 billion annually on disposal.

The market for recyclables has a large potential for expansion. 32 percent of the municipal waste currently placed in disposal sites in urban areas in Vietnam, or 2.1 million tons per year, consists of commercially recyclable materials such as paper, plastic, metal, and glass. This additional recycling could result in a substantial reduction in disposal costs and allow the largely poor informal sector to capture an estimated VND 135 billion per year in additional recycling revenues in HCMC alone.

The composition of Vietnamese waste makes composting potentially attractive. The high proportion of organic matter in municipal waste provides potential for composting, which can reduce disposal costs while producing a marketable soil conditioner for uses in agriculture and for the public. However, this practice is not widespread

in Vietnam for many reasons, including inadequate separation of organic waste, poor product quality, and poor marketing. With the development of a strong market for composting fertilizers and successful source separation, the effectiveness of centralized composting facilities could increase considerably.

The poor involved in the informal recycling sector remain at risk. In terms of the ratio of waste pickers to total urban population, the size of the informal sector in Hanoi compares to that of Jakarta and Bangalore and is two times higher than in Manila. These groups tend to be socially marginalized. They frequently live on or near garbage disposal sites, and thus are exposed to environmental and safety hazards. A few efforts have been carried out to provide micro-credit to female waste pickers, and to reduce the number of children working at waste dumps. Much remains to be done to support the informal waste sector and to organise it in a professional manner.

### 2.2.2.1.2. Management Issues

While there are many barriers to effective implementation, Vietnam has put in place a sound legal framework for environmental protection and waste management. The institutional framework includes URENCOs as service providers for municipal waste management at the local level. Led by MONRE, regulatory agencies at both central and local levels oversee and monitor the management of solid waste from industries, hospitals, and URENCOs. Several new strategies have resulted in a major increase in investment, especially in municipal waste.

Nevertheless, several weaknesses remain. Local institutions are limited by staff skills. While URENCOs allocate sufficient staff to undertake their duties, they suffer from a lack of equipment and capital, staff trained specifically for solid waste management, and an institutional mandate for cost-effective waste management. As they have focused much of their efforts on services for municipal waste management, URENCOs also have limited skills and equipment to provide potentially valuable hazardous waste collection and disposal services for hospitals and industries. Regulations are not effectively enforced. Resources and institutional capability to implement Vietnam's policy framework are lacking at the operational level, and regulations are not effectively enforced. The regulation of waste management operators, industries, and hospitals—by MONRE and other line agencies and authorities, including MOH, MOI, and IZMB—suffers from major gaps in enforcement and insufficient supervision of waste management practices, largely due to limited human resources, unclear mandates, fragmented and overlapping roles of various government agencies, and limited interagency coordination. This has resulted in limited incentives for proper operation of landfills or investments by industries in waste treatment, and has allowed inexpensive, unsafe methods of disposal—such as open dumping—to proliferate.

Lack of financing for operations threatens the sustainability of investments. Investments have increased nearly six fold, from VND 195 billion in 1998 to VND 1,083 billion in 2003, and are expected to continue. Between now and 2020, planned landfill development, closure of unsafe open dumps, and further investment in incinerators for hazardous healthcare waste are expected to cost between VND 30 and 40 trillion. However, the sustainability of these investments is questionable under current conditions. There, currently exists limited spending on operation and maintenance of solid waste collection and disposal systems (0.18 percent of GNP, or VND 160,000 per ton), and fees only cover about 50 percent of the expenditure for operation and maintenance of solid waste collection and disposal. While large subsidies from central and local governments (VND 400 billion in 2003) are provided, the resources are not adequate, especially in the case of disposal, where overall poor operation and maintenance has resulted in unsafe disposal sites.

In many cities, improved cost recovery can be achieved through more effective fee collection and service agreements with the city's departments. In other cities, it may be necessary to increase fees, a measure that has met with resistance in many localities.

Civil society plays a limited role in waste management. Public communities and private groups currently play a limited role in solid waste management systems. To respond, the government has developed a number of policies and programmes to promote public participation and carry out more public awareness programmes, which has helped improve waste collection and other services such as street sweeping. Volunteer clean-up programmes and public hygiene awareness campaigns have also started to gain momentum in Vietnam.



## 2.2.2.2. Water

### 2.2.2.2.1. Water Resources

In recent years Vietnam has been experiencing a fast period of socio-economic development due to rapid urbanization and industrialization. As a result, the traditional water resources for rural and urban inhabitants have been under intense pressure. The demand for water for domestic and industrial use is increasing at an alarming rate.

Surface water resources such as rivers, lakes and streams, have been polluted due to the discharge of industrial, agricultural, aqua-cultural and domestic waste into bodies of water without treatment. During the last few decades, ground water resources were affected by excessive exploitation or inadequate protection of aquifers due to the millions of poorly constructed and maintained tube wells. In other words, the competition for water resources between water users and the ensuing conflicts of interest are on the rise.

At the same time, due to global warming and climatic changes, the country faces numerous water related problems such as typhoons and drought. Also, the deforestation that has occurred over the past 20 years along with the challenging geo-physical conditions aggravates the management of water resources. Vietnam is a sub-tropical country with a relatively high average if uneven rainfall. During the rainy season, floods are abundant whereas portable water for cooking and drinking still may be scarce, while during the dry season most traditional water resources in rural areas, such as dug wells and streams dry up and, again, cause portable water scarcity.

#### a. Surface Water Resources

Vietnam has high rainfall and a dense river-stream system; therefore surface water resources are very abundant. There are nine basins which are over 10,000 sq. km in area. These nine basins contribute more than 80% of the total area of basins in the whole country. The total annual average volume of surface water is 880 bio cbm, of which 75% is from the Red River and the Mekong River basins, while the water volume generated within Vietnam is 325 bio cbm.

Rainfall in Vietnam is irregularly distributed during the year and over different regions in the country. There are frequent droughts in the provinces of northern midlands and central highlands (particularly in south of central highlands) and also in the highlands plateau.

As non-treated industrial and urban wastewater is discharged into the waterways, organic water pollution is a serious problem in rivers such as in the cases of the Cau and Nhue rivers (in the North), and the Sai Gon and Dong Nai rivers (in the South).

#### b. Ground Water Resources

Ground water resources are mainly present in loose, disconnected sediment layers generated from the Fourth Period or layers embracing carbonate stones. Carbonate stones alternate with young basalt or with other mixed components. It has been estimated that the potential reserve of ground water could be up to 48 billion cbm per year (17-20 million cbm per day). About 1 billion cbm (app. 2.3 million cmpd) of ground water is annually exploited.

#### c. Water Supply Status

During the last 10 years, the urban water supply systems of Vietnam have been developed without proper management. There are 68 urban water supply companies with a designed capacity of 5.5 million m<sup>3</sup> per day in the whole country. Exploitation capacity is about 3.9 million m<sup>3</sup> per day.

The 2008 surveys carried out by the Vietnam Water & Sanitation Association (VWSA), revealed a mixed performance in 66 out of the 68 provincial/municipal water supply companies (WSCs), which are mostly "state owned, one member limited companies."

In many provinces, the existing water production capacity even exceeded the demand, but the service coverage remains very low. The percentage of connections in small towns is very limited, with about one third of the 727 district towns having some form of piped water supply. Even where there is piped water, it typically supplies only a small proportion of the population, mainly in the town centers.



INDONESIA  
UNILEVER SAVORY FACTORY  
LEED GOLD



KAZAKHSTAN  
ECO-CITY ASTANA  
Under LEED



CHINA  
NOVOZYMES WASTE WATER TREATMENT PLANT



VIETNAM  
BEL FACTORY  
LOTUS



CAMBODIA  
LAURELTON DIAMOND FACTORY  
LEED



VIETNAM  
COCA-COLA FACTORY  
LEED SILVER



VIETNAM  
ETOWN CENTRAL  
Under LEED GOLD



INDONESIA  
CAPITAL PLACE  
GREEN MARK

## Our Sustainable Design

As one of the leading design firms in Asia, Archetype Group is committed to protecting our environment by incorporating Sustainable Design Principles into our normal course of work. One of our challenges is helping our clients overcome the mindset that making their buildings 'green' is an unnecessary and expensive premium, while showing them how it can bring them overall cost and reputation benefits at the end of the project.

Archetype Group has made a substantial investment in putting our beliefs into practice with extensive experience in delivering certified green building projects. Although we have the technical knowledge to work with any recognized Certifying Green Agency, we have focused our efforts and knowledge on the number one and fastest growing "green" brand in the world, the United States Green Building Council (USGBC) program, LEED®, as well as the Vietnam Green Building Council (VGBC) program, LOTUS, in Vietnam and the France Green Building Council.

In Asia-Pacific, Archetype Group also partners with the International Finance Corporation (IFC) on EDGE, an innovative tool that can be used to determine the financial viability of a green building project at the early design stage and is also a green certification system for emerging markets.

To further Archetype Group's commitment to sustainability, the firm has established Archetype Environment, a joint venture with leading French Consulting firms Altereo and Berim. Archetype Environment JV specialises in water and sanitation, solid waste, energy efficiency and dedicated GIS ([www.archetype-environment.com](http://www.archetype-environment.com)).

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The existing water resources for urban and rural water supply systems are being polluted due to the discharging of domestic and industrial wastewater directly into the water sources without treatment. It has been shown that if the government does not take urgent measures to address this problem, the quality of water resources for water supply plants will be affected and the treatment process will be more complicated.

The need for investment in just the urban water supply sector, in order to achieve the government's target of 100% in 2020 for urban water supply coverage, is 284% higher or 341 million USD annually, compared to the investment level that was needed during the last decade, while the ODA sources will likely decrease as Vietnam becomes a middle income country in the near future.

There are also possibilities of financing sources from the domestic capital markets with private sector participation. Many domestic and international investors, however, are more interested in building up the water production facilities and not in financing distribution systems. Currently, there are 708 urban areas including: five central cities - Hai Phong, Da Nang, Can Tho, Da Lat, Ho Chi Minh - 86 provincial cities, 617 towns with 21.59 million people (accounting for 26.3% of the population nation-wide). There are over 240 water supply utilities with the total capacity of 3.42 million m<sup>3</sup> per day, of which 92 utilities use surface water sources with a total capacity of 1.95 million m<sup>3</sup> per day and 148 utilities use underground water sources with a total capacity of 1.47 million m<sup>3</sup> per day.

The existing capacity of water supply utilities can supply 150 liters per capita on a daily basis. Due to the outdated and incomplete water supply infrastructure, however, the water supply systems are not working at full capacity in many places and the water loss rate is high (up to 40% in some areas) and as a result, in some areas only 40-50 liters per capita is supplied.

For suburban areas, 36.7 million out of 60.44 million people are supplied water. There are 7,257 centralized water supply systems for 6.13 million people and another 2.6 million small-scale water supply systems. The rate of suburban populations who can access water for living in the south is the highest, at 66.7%, Red River Delta at 65.1%, and Mekong Delta at 62.1%.

According to the environmental sanitation and water source management workshop that was held on 6th June 2009, 50% of suburban populations have access to clean water, 40% have access to sanitation services and 70% of urban populations have access to running water.

According to a recent survey by VWSA, just 31% of suburban households have used water from drilled wells, 32% use water from dug wells, 1.8% use rainfall, 11.7% use running water, 1.7% use water from ponds and lakes, 11.6% drink natural water (untreated sources). Large numbers of those who use running water have not met the standards stipulated by WHO.

### **2.2.2.3. Wastewater Treatment**

Along with the rise in investment sources from the state budget (for construction and rehabilitation of sewage, and drainage systems, capacity building for companies engaged in management of operation and maintenance of the systems), the salient feature after five years of implementing the country's orientation for the development of urban sewerage and drainage by the year 2020 (OUSD), is the significant increase in the number of urban sewerage and drainage projects funded by the ODA.

The first was Hanoi Sewage and Drainage project phase I, whose construction commenced in 1998 with ODA funding mainly from Japan and with a total budget of USD 200 million. Since then, there have been about 32 out of 64 cities and provincial towns of Vietnam, namely Hanoi, Ho Chi Minh City, Hai Phong, Ha Long, Da Nang, Hue, Thai Nguyen, Vung Tau, Buon Ma Thuot, Da Lat, Viet Tri, Vinh and Nam Dinh, that have received ODA funded sewage and drainage projects from the Government of Japan, France, Denmark, Belgium, Switzerland and international Financial Institutions like World Bank, Asian Development Bank.

As for wastewater treatment systems, the government has made great efforts to invest in installing new systems and upgrading older ones. Moreover it has called for the support of the private sector and the international community due to budget constraints. However, it is difficult to get the sufficient investment capital in place to narrow the huge gap, even though the ODA contribution has significantly increased in recent years. Very few private investors show interest in this area because they are inexperienced in this field and the government and private sectors have no common voice in policy as well as implementation.

## 2.2.3. GREEN BUILDING

### 2.2.3.1. Sustainable Building and Infrastructure

The green building sector in Vietnam is still at an early stage of development. As Vietnam's government is heavily focusing on economic development, the green agenda is still not yet adequately sought after. A lack of proper knowledge about actual costs and benefits of green buildings in the market also serves as an additional hindrance contributing to the sector's slow development.

A few efforts to promote green building have been initiated by different stakeholders. After a series of laws passed to promote energy efficiency with inconsistent regulatory enforcement during the 2005-2012 period, Vietnam's Ministry of Planning and Investment along with the participation of various relevant line ministries including the Ministry of Construction, are now targeting to reduce annual energy consumption and GHG emission by 2.5-3% (per unit GDP) until 2020 and 2-3% from 2020-2030, respectively, through their Green Growth Strategy. On the other hand, VGBC developed a local certification called the LOTUS rating tool, in which relevant training programmes are initiated and financed by multilaterals through Vietnam's NGO network. The endeavors being carried out resulted in the increase of LOTUS registrations this outnumbered LEED, due to LOTUS' stronger relevance to the Vietnamese market and its locally customized conditions.

As the manufacturing sector is a major destination for FDI inflows - reaching nearly US\$8 billion in 2011 - Vietnam's green building market is currently dominated by factories which account for nearly half (42%) of all certified green buildings, followed by offices (22%) and hospitalities (19%) which segments with the existing buildings, achieving renowned certifications such as LEED, LOTUS, Earthcheck, GreenMark, and GreenStar. The reason behind this domination by the factory segment is associated with multinational corporations' prowess in the green sector. Multinational corporations are leading the green building adoption in Vietnam due to the increasing global guidelines for their overseas factories by headquarters, typically based in countries with mature environmental laws.

In its current stage, opportunities in the industry exist in the insulation and lighting sectors where only limited players are currently operating in the market. Consulting, surfacing and architectural service industries are however, showing signs of saturation as they are already seeing high growth in the market.

For the market outlook of Vietnam's green building industry, Heiko Bugs, the Asian partner of Solidiance remarks: "While there are uncertainties about the speed of economic recovery, foreign investment is returning and companies are once again looking for growth opportunities. Buildings consume up to 40% of energy and more sustainable ways to develop and construct buildings will drive future change in Vietnam."

### 2.2.3.2. Vietnam's Green Building Market

The green buildings market in Vietnam is in the infant stages of development but the foundation for future growth is being established, according to a recently published White Paper by Solidiance, a B2B consulting firm active in advising green building suppliers throughout Asia. A simple statistic illuminates where the market is today – there are just over 40 buildings in a country of 90 million people that have, so far, achieved a green building certification. This number factors in all green building certifications, including locally-developed LOTUS standards, international standards such as LEED (U.S.) or Building Construction Authority (BCA) Green Mark (Singapore), and industry standards such as EarthCheck (Hospitality). To put that into perspective, in Singapore, a green buildings leader in Southeast Asia, certified its 1,000th building under BCA Green Mark standards in 2012.

### 2.2.3.3. The Development of LOTUS Standards

In Vietnam, a local green building certification was not in place until 2010 when the Vietnam Green Building Council unveiled LOTUS standards. These are based on international standards such as LEED but adapted to meet local conditions. The advent of LOTUS was an important step in laying the groundwork for future adoption of green building practices in Vietnam. Results from a survey of green building industry players conducted by Solidiance, showed that LOTUS is perceived to be both easier to obtain, as well as more cost effective to implement, than international certifications like LEED, paving the way to accelerate green building development in Vietnam.





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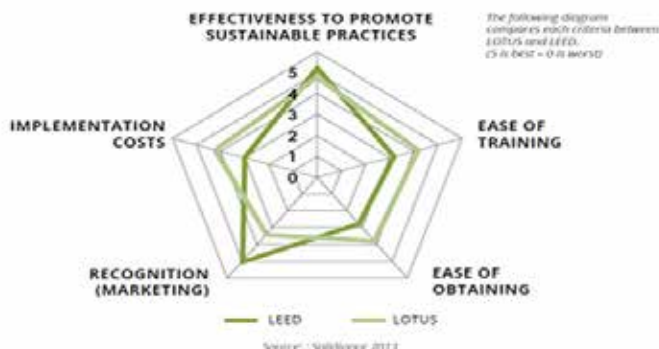
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**Figure 6. Effectiveness to promote sustainable practices**

The following diagram compares each criteria between LOTUS and LEED (5 is best – 0 is worst)



Source: EU-Vietnam Business Network, Green Technology – Research Report, 2017

## 2.2.4. SMART CITIES

### 2.2.4.1. Smart City Programmes in Vietnam

Currently more and more countries are beginning to build smart cities and this will only become more common. Vietnam must accelerate its smart cities' development as this will play a vital role in the socioeconomic development of the country.

Vietnam can learn from its predecessors who have already successfully implemented and applied such solutions as e-government, smart environmental management system, smart energy, smart education and disaster prevention based on ICT fundamentals. At the moment however, clear strategies for Vietnam are non-existent, and there is no nationally scalable policies for a detailed development of smart cities.

Indeed, a distinct lack of replication of actions taken by other sustainably developing countries, characterises Vietnam's smart cities programme. In 2007, the EU started to implement a number of plans for smart cities, smart economy, smart environment and transportation. In the ASEAN region, Singapore was the first country that officially announced to build smart country in 2014<sup>34</sup>. In 2014, India also claimed to start its plan for 100 smart cities.

Thus, the Vietnamese government can define its interpretation of a "real" smart city, and its goals when implementing smart city projects, in order to issue adequate policy frameworks. Although there is no specific national policy framework for developing the smart city model in Vietnam, many cities are actively developing themselves into smart cities in their own ways and achieving initial successes.

### 2.2.4.2. Hanoi

Hanoi is the capital of Vietnam and its second largest city with a population of approximately 7.6 million people (January, 2016). Since 2006, Hanoi has aimed to become a smart city, improving quality of life and solving social problems by improving traffic congestion reduction, traffic management, smart infrastructure, clean water supply, electricity, lightning, waste collection and technologically induced treatments. A Smart traffic system was considered as the most essential solution required to achieve this goal.

The FPT Information System (from the FPT Corporation) has also proposed the construction of a smart transportation system, directed by the Intelligent Transportation Operations Command Centre. This is one component of the centralized supervision and control centre of Hanoi. It will also be interconnected and based on 9 other core components: the Command Center; Traffic monitoring and information collecting system; Traffic information system; Traffic control system; System of security and safety; Emergency management system; Traffic Infrastructure management system; Transportation management system and Personal vehicle management system.

34 see <http://www.smartnation.sg/>



## BINH DUONG SMART REGION



Binh Duong is developing an internationally established reputation in the field of technology, innovation and manufacturing.

### Binh Duong New City, your future destination!

In the center of Binh Duong province, Becamex IDC and Binh Duong government are developing a new metropolitan city to accommodate further economic and population growth in South Vietnam: Binh Duong New City. This development follows an integrated approach, creating a modern and environmentally

friendly city that meets international standards. With 6 industrial parks of the highest standards and quality in the near proximity, over 1,000 hectares of residential area, services, healthcare, education, retail and leisure facilities will form the heart of Binh Duong New City and the home of the new generation.

**Both for Vietnamese and international talent and their families,  
Binh Duong New City is the place to be:**

Residential solutions from social housing to luxury apartments and villas

Eastern International University, Vietnam German University and vocational colleges

Excellent infrastructure and well connected public transportation

Parks, recreational and sports facilities



World class conference center and 4-star hotel

International educational facilities from kindergarten to high school

Healthcare facilities according to international standards

Shops, banks and restaurants

### Binh Duong's key enablers



Focus on (high) tech and advanced manufacturing



Continuous investment in (technical) education and training and stimulating entrepreneurship and creativity



Close cooperation between (multinational) companies, universities and research centers to create advanced technology and innovation clusters



Expanding supplier networks and building (high) tech ecosystems in the Binh Duong region and the South of Vietnam



Pro-active & pro-business government, offering incentives, one-stop services and public-private partnerships

FPT proposes to implement 4 components in 2017, including: traffic monitoring and information collecting system; Traffic infrastructure information system; Traffic management system; Public traffic management system. Specifically, from the period of June – November 2017, there will be the construction of a traffic monitoring and information gathering system (from surveillance camera systems and GPS devices) and traffic information systems, with integrated maps and data, mobile applications, centralised transport information portals and transport infrastructure management systems. These systems are expected to be completed by September 2017.

In Hanoi, IT development was considered to be a strategic priority task in the 2020 plan (with orientation to 2030<sup>35</sup>). To achieve this, technological infrastructure application in smart cities must be the most important element of the plan. To make Hanoi a smarter city, the focus is to build an e-government which can manage, administer and develop effective education, healthcare, culture and traffic systems. The expected result is the formation of the knowledgeable economy, which can help the city become one of the smartest in the world. The core solutions being implemented: Building a legal environment; finding financial solutions, attracting investment capital, and proposing solutions for domestic and international cooperation promotions.

An online service system, a CCTV traffic monitoring system, and an online student records management system were additionally operated in some districts. The greatest challenge for Hanoi's development into a smart city is the fact that its infrastructures are not synchronized and fully developed, making it particularly difficult to integrate with developing technologies.

### 2.2.4.3. Ho Chi Minh

Ho Chi Minh is not only the most populated city in Vietnam, with the total estimated population is 8.4 million (2016), but also Vietnam's economic centre. As one of the largest cities in the country, it is particularly aware of the importance of developing a smart city model. Accordingly started developing a Smart City project in 2016.

In 2015, the World Bank approved the Ho Chi Minh City Green Transport Development Project, which is scheduled to run until 2020, improving the performance and efficiency of infrastructure, construction and supervision. In addition, the project is also expected to improve the traffic management system and introduce smart cards for public transportation<sup>36</sup>.

In 2016 it was reported that Ho Chi Minh City planned to establish a steering committee to provide guidance on its development into a smart city. Under the plan, thousands of security and traffic cameras would be connected, engendering smart systems of traffic management, including, amongst others, a bus system. The plan is expected to be completed by 2018.

Concentrates on seven breakthrough programmes: (1) a human resources quality improvement programme; (2) an administrative reform programme; (3) an economic competitiveness; (4) a traffic congestion and traffic accidents reduction programme; (5) an urban flooding reduction programme; (6) an environment pollution reduction programme; (7) an urban renovation and development programme.

In September 2016, the Ho Chi Minh City People's Committee, and the Vietnam Post and Telecommunications Group (VNPT) ratified an agreement to develop a smart programme for Ho Chi Minh City in the period 2017-2025 (with a vision to 2030). Under the agreement, VNPT will make plans and give advice on the content and methods of conducting a survey to discover the concrete issues related to developing a smart city programme. It will also consult the committee about the building of a general architecture frame for a smart city, including the required information and communication technology (ICT) and wider solutions to required for a smart city.

Additionally in 2016, The IoT Start-up Competition was launched by Saigon Hi-Tech Park Incubation Centre, which aims to collect ideas on how sensors can be used for traffic safety, as well as air and water pollution. Ho Chi Minh City is also enhancing its online government services, which are seen as critical to building a smart city. Currently, bus stations in the metropolitan area have public Wi-Fi, but the additional free Wi-Fi is also being rolled out across the entire city.

Ho Chi Minh city also promotes full integration and inter-disciplinary dialogue with all citizens. Such action,

35 The master plan on socio-economic development of Hanoi city through 2020, with orientations toward 2030. Decision No. 1081/QĐ-TTg dated July 6th, 2011 by the Prime Minister

36 at <http://projects.worldbank.org/P126507/ho-chi-minh-city-green-transport?lang=en>

thereby creates favourable conditions for people and businesses to participate in building, sharing comments, and providing dialogue with the government; hence ensuring relevant and appropriate policies, services and solutions for all citizens and businesses.

Through a people-centred approach to developing their “smart city” project, HCMC leaders have found that the participation of its citizens has a positive impact on achieving the intended goal. Technology is a tool, a method to an interactive connection between the people and their government. Technology serves both the individual and the corporate business, thereby contributing to developing a city with a good quality of life; one that is civilized, modern and kind.

#### **2.2.4.4. Binh Duong**

Another city that is also very active in implementing the smart city programme is Binh Duong. Binh Duong's population is estimated to be close to 2.2 million. In January 2015, in order to develop the smart city programme, Binh Duong's authorities signed a deal to cooperate with Eindhoven's government – a Dutch city, which was dubbed 2011 world's smartest city by the Intelligent Community Forum.<sup>37</sup>

Binh Duong had similarities with the city of Eindhoven because of its large business community, and multiple facilities for vocational training and universities. The aim of the “Binh Duong Smart City” project was to build and develop a city that enhanced the quality of life of citizens, reduced the cost of resource consumption, and improved the communication and interaction between the people and the Government. Those development goals will help Binh Duong City become a clear, beautiful and green industrial city, and further meet the Province's ultimate goal: to become the leading (local) industrialised, modernised and internationally integrated city in the country.

The 2016-2021 plan to develop Binh Duong as a smart city focused on four key elements: the human element, technological element, the business community and infrastructure, and the living and working environments. A memorandum of understanding on developing a smart public lighting system in Binh Duong New City was signed on October 2016, marking the first move towards building a smart city in the southern province. It represents the cooperation of the energy and environmental sectors of Vietnam and the Netherlands, as well as the collaboration in building a smart city of Binh Duong and Eindhoven.

On November 21, 2016, the People's committee formally approved the ground-breaking strategic programme for Binh Duong until 2021 (also called Binh Duong Navigator 2021). This was the key project of “Binh Duong Smart City”. The intention was to help Binh Duong develop quickly in many different areas. Areas that must transform include traditional manufacturing which is shifting to high-tech services with a high grey matter. Such a plan has and will continue to lessen the deficit of labour use, and has raised the value of the local economy.

In terms of the development of ICT, Binh Duong's Provincial People's Committee and the Vietnam Posts and Telecommunications Group (VNPT), recently signed a cooperation agreement. Under the agreement, the VNPT will work with the province's relevant units to carry out the approved architectural plan and should ensure the flexible application of domestic and international technological units' measures for a smart city.

#### **2.2.4.5. Da Nang**

Da Nang, a city with a population of more than 1 million people (2016), is often considered to be the most liveable city in Vietnam and is one of the first cities to outline a clear road map for a full implementation of a smart city programme.

In 2012, Da Nang became the first city in Vietnam to be recognized by IBM as among the top 33 smart cities in the world. At that time, Da Nang received funding from the “smarter city” programme (a three-year initiative of IBM, with a total value investment of more than 50 million US dollars for 100 cities around the world). The city has used a smart central management system to ensure the quality of its water supply; to provide high quality public transport; and to minimize traffic congestion.

On March 25, 2014, the Chairman of Da Nang People's Committees approved work for “Smarter City” Programme in Da Nang (for the future period of 2014-2020). From 2014 onwards, Da Nang has officially boasted an E-Government which includes a data centre, free Wi-Fi, a comment port, a service switchboard, an employee management

37 at <http://www.eng.binhduong.gov.vn/Lists/TinTucSukien/ChiTiet.aspx?ID=1295&PageIndex=15>



system, and over 500 online public services. When put into operation, these services make administrative and management tasks far more effective and affordable. Through these measures, Da Nang continues to lead the way in all IT application indexes for the past seven years. These results are the successful foundation upon which Da Nang continues to develop its E-Government system, central to the smart city concept.

Since the smart city model has not yet been unified all over the country, Da Nang is progressing gradually - step-by-step. Based on the fundamentals of the Da Nang E-Government, there are five areas that were highlighted and considered to be central to a smart city construction: traffic, water supply, drainage, food safety control and connectivity.

Da Nang has also deployed a number of intelligent traffic applications. This includes bus journey monitoring, a camera monitoring system, a traffic signals control system and a centralised traffic control centre. At the same time, other projects have also begun to be deployed. These include an automatic water source monitoring system which monitors and manages water standards and reports to the centre when necessary. Another application is the wastewater monitoring system, which measures the pollutant index. In addition, some other developing projects include the development of a database, intended to support people looking for food safety standards; a food safety management software programme; and food safety stamping for unpackaged products.

In terms of education, Da Nang has also approved the architectural industry to build an intelligent education sector that deploys ID software for student management.

Over the last few years, the Da Nang authorities have made great efforts to apply IT in the operation of state agencies, thus improving the management and administration efficiency in the city's socio-economic fields. The city is planning to launch a city-wide internet network (MAN network), which will provide Wi-Fi coverage for all public spaces (tourist attractions, amusement parks, Trade fairs and exhibitions). The hope is that the system will support traffic control, a water pollution control system, a water quality monitoring system, food hygiene, safety control and natural disaster warnings. Da Nang has also implemented several e-application services such as motorbike registration, car registration, and online medical registration, amongst others.

In general, the cities of Vietnam have undertaken the first steps to become smart cities. Nonetheless, the focus on ICT has not yet been fully comprehensive as of yet, and the fact that the government has not yet developed a complete policy framework for the development of smart cities at the national level has created difficulties for local agencies to accelerate the plan.

Another factor that cannot be ignored is investment capital. Experiences from European cities which successfully undergone smart city projects prove that exclusively using public capital is not enough and that the participation of private sector through PPPs is of equal importance.

To successfully achieve any implementation of a smart city programme, Vietnam will need to create a clear road map with two main platforms: ICT and an administrative mechanism.

#### **2.2.4.6. Intellectual Property Rights Protection for EU SMEs related to Smart City Solutions**

With the rapid development of Vietnam, cities have been experiencing a growing urban integration of information systems. This enhances the efficiency of cities, as well as the quality of life of its citizens in many crucial aspects such as mobility, healthcare, waste management, energy, or water-access<sup>38</sup>. Online interconnected systems and Information and Communication Technologies (ICT) features play a key role in these advancements<sup>39</sup>. The province of Binh Duong, for instance, has started cooperating with the Vietnam Post and Telecommunications Group to develop the necessary ICT infrastructure with local government agencies.

The importance of intellectual property rights (IPR) protection in such context then becomes evident. By combining a growing demand for high-tech solutions to tackle urban challenges with a tech-savvy population, Vietnam's cities provide plenty of opportunities for European SMEs to expand their businesses. Yet, European SMEs dealing with smart solutions should be mindful of possible IPR risks at hand. They often provide highly innovative niche solutions, but for many urban problems, a solution can only be made successful through a combination of interdependent technologies. Therefore, European SMEs may need to expose their innovations to third parties on

38 Singh, Sarwant, 2014, [Smart Cities -- A \\$1.5 Trillion Market Opportunity](#), Forbes

39 PWC, 2015, [Smart Cities in South-East Asia](#), p. 7 – 8.



a regular basis, thus increasing the risks of IP infringement if proper measures are not taken in advance.

Therefore, a comprehensive IP strategy is a vital part any SMEs approach to smart city solutions in Vietnam. At the same time, this raises yet another important question: the choice of patent filings vs. trade secrets protection for innovative technology. Both of these will be outlined in this article given that they provide viable options for different reasons and needs.

### **Patents: a solid choice**

Patents are intangible assets which can boost business competitiveness in the global economy. Once the patent has been granted, the right holder, as patent owner, has the right to prevent others from making, using, importing or selling their invention without explicit consent. Patents can be obtained for any product or process that provides a new technical solution to urban challenges (as well as new production methods), the composition of a new product or technical improvements. The requirement of novelty versus existing or disclosed technology is crucial to affirm patentability.

In relation to ways of obtain patents in Vietnam, the distinction between invention patents and utility solution patents should be noted. For a new invention or technology to be deemed patentable under an Invention Patent, it needs to meet three requirements. Firstly, it must be novel – meaning that it has not been publicly disclosed inside or outside Vietnam (including Europe) before the date of filing. Secondly, it must involve an inventive step, meaning that the invention or improvement must not be obvious to professionals in the relevant industry. Finally, it must be industrially applicable: if mass production of the product or repeated application of the inventive process are possible through the patented technology.

Utility solution patents are not required to meet the inventive step, as novelty and industrial applicability will suffice for the patent to be granted. However, this comes with an important difference: while invention patent protection lasts for 20 years from the date of filing, utility solution patents only last for 10 years. In both cases, a patent in Vietnam is not renewable. Utility solution patents are often suitable for smart cities solutions due to the quickest time needed to be obtained and the less inventive steps required.

The most important point to take into consideration is that Vietnam follows a ‘first-to-file system’. This means that the first person to file a particular patent in Vietnam will own the right to it once this patent has been granted, regardless of the author of the invention. Therefore, European SMEs should make IP registration a core component of their IP strategy abroad.

### **How to keep your Trade Secrets**

Once a patent is granted, the invention or technology is protected, while it simultaneously becomes publicly available to access as the period of ‘monopoly’ of the patent is granted in exchange of disclosure. This means that competitors could develop a similar invention by using reverse engineering. Keeping the information as a trade secret would help to avoid this.

Trade secrets are defined under Vietnamese law as any “information obtained from financial or intellectual investment activities, which has not been disclosed and is applicable in business”. This means that any innovation dealing with smart city solutions can be protected as a trade secret if 1) it has not been made available to the general public; 2) it provides its owner with a business and economic advantage; and 3) secrecy remains through necessary measures taken by the owner to protect the confidentiality of the information.

Protecting an invention as a trade secret does not require any registration, but instead requires businesses to take reasonable measures to prevent third parties from accessing it. Therefore, in theory, protection can last indefinitely as long as the secret is kept. Trade secrets should be the preferred option if reverse engineering is extremely difficult and if the company has taken steps to maintain secrecy over confidential information, for instance through physical and contractual measures with employees, consultants, partners and third parties.

When a device’s structure, function or operation reveals the technological foundations of how this device operates, patenting should be the preferred option. However, if the technology has a relatively short life-cycle, or does not meet the requirements for patentability, protecting the invention as trade secret shall be considered.

### Do not forget Trade Marks

Trademarks refer to any signs owned by a company through which consumers can identify and differentiate your product and its authenticity. Therefore, protecting trademarks contributes to EU SMEs brand recognition and trust, as well as being an important marketing tool. In order to protect your trade mark in Vietnam, a registration in the country is necessary. Only after an application is approved EU SMEs will become the sole right-owner of the registered trademarks. It is important to take this step as early as when the company is considering to enter the Vietnamese market because the 'first-to-file' system applies to trade marks.

### Key Take-Away

While smart city solutions offer plenty of opportunities for innovative European SMEs, IPR protection should be a top priority for any sustainable business expansion in Vietnam. Acquiring patents will play an important role in protecting innovations, as they will give the patent owner the explicit right to use, import, sell or otherwise develop this invention once the patent is granted. For SMEs who do not want to publicly disclose valuable information, trade secrets could prove to be a useful and potentially crucial alternative. Also, do not forget that protecting trademarks is also an important step to strengthen the company's strategy in Vietnam. For more information on IP rights protection in Vietnam, please see the Guides and the Vietnam IP Factsheet of the South-East Asia IPR SME Helpdesk available on the website.



The South-East Asia IPR SME Helpdesk supports small and medium sized enterprises (SMEs) from the European Union (EU) member states to protect and enforce their Intellectual Property Rights (IPR) in or relating to South-East Asian countries, through the provision of free information and services. The Helpdesk provides jargon-free, first-line, confidential advice on intellectual property and related issues, along with training events, materials and online resources. Individual SMEs and SME intermediaries can submit their IPR queries via email ([question@southeastasia-iprhelpdesk.eu](mailto:question@southeastasia-iprhelpdesk.eu)) and gain access to a panel of experts, in order to receive free and confidential first-line advice within 3 working days.

The South-East Asia IPR SME Helpdesk is co-implemented by EuroCham is co-funded by the European Union.

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#### 2.2.4.7. Livable and Smart Cities: A theoretical framework

For many people, cities represent a world of new opportunities, including employment. As people migrate for work, they often struggled with the absence of basic urban infrastructures, such as better transportation, adequate housing, means of communication, and efficient sources of light and energy. The rapid urbanization process often causes social disturbances and forces the government to face a series of negative effects on natural resources, environment, infrastructure, people's health, etc.

The current scenario requires cities to find ways to manage many new challenges. Cities worldwide have started to look for solutions which enable transportation linkages, mixed land uses, and high-quality urban services with long-term positive effects on the economy. For instance, high quality and more efficient public transport that responds to economic needs and connects labor with employment is considered a key element for city growth. High-quality urban services are also developed basing on harnessing technologies, helping to create what some call "smart cities."

In general, building smart cities is considered as a strategic solution to solve problems arising from the explosion in population growth and urbanization. As the term "smart city" is more widely known, there is still confusion about what a smart city is.

There are many definitions of smart city. A range of variants is often created by replacing "smart" with alternative adjectives for example "intelligent", "digital" or "livable". When those words: smart, intelligent, digital are mentioned,

many people usually focus on ICT as a technology driver for a smart city. Obviously, this is not a sufficient understanding. Using the term “livable city” can help people think out of that box as broader definitions of the term smart city have to include efficient infrastructure, smart traffic, clean environment and multi-stakeholder aspects such as the use of social participation to enhance sustainability, quality of life and urban welfare.

The term was first used in the 1990s. At that time, the focus was on the significance of new ICT with regard to modern infrastructures within cities. It cannot be denied that technology has definitely played an important role during the last 20 years of smart cities development and in the near future as the Internet of Things (IoT) becomes a reality, technology will still be an irreplaceable element.

Furthermore, according to Smart Cities Council, “A smart city is one that has digital technology embedded across all city functions”<sup>40</sup>. The issues of data management need to be addressed in for tomorrow’s cities however, innovative technologies alone are not enough.

Caragliu and Nijkamp (2009) defined the “smart city” by referring to multiple aspects. “A city can be defined as “smart” when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participated governance”.<sup>41</sup>

For the Department for Business, Innovation and Skills, UK (2013) the focus on “ICT” has shifted to “livable” and “resilient” to define smart cities: “The concept is not static, there is no absolute definition of a smart city, no end point, but rather a process, or series of steps, by which cities become more ‘livable’ and resilient and, hence, able to respond quicker to new challenges”.<sup>42</sup>

Good governance and livability are main points in the definition from Abha Joshi Ghani of the World Bank who state: “Smart cities make urbanization more inclusive, bringing together formal and informal sectors, connecting urban cores with peripheries, delivering services for the rich and the poor alike, and integrating the migrants and the poor into the city. Promoting smart cities is about rethinking cities as inclusive, integrated, and livable. [...] The concept of smart cities is really about good governance. It’s about giving basic services to our citizens. It’s about livability. It’s about how we are using our resources. It is how a city functions on a day-to-day basis. I think smartness is about doing more with less.”<sup>43</sup>

40 “Definitions and overview”, Smart Cities Council. Available at <<http://smartcitiescouncil.com/smart-cities-information-center/definitions-and-over-views>>

41 Caragliu, A; Del Bo, C. & Nijkamp, P (2009), “Smart cities in Europe”, Serie Research Memoranda 0048 (VU University Amsterdam, Faculty of Economics, Business Administration and Econometrics)

42 “Smart Cities background paper”, Department of Business, Innovation and Skills, UK (2013). Available at <[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/246019/bis-13-1209-smart-cities-background-paper-digital.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/246019/bis-13-1209-smart-cities-background-paper-digital.pdf)>

43 R.Morier (2012), “Who Needs Smart Cities for Sustainable Development”, World Bank. Available at <<http://www.worldbank.org/en/news/feature/2012/03/20/who-needs-smart-cities-for-sustainable-development>>

**Table 4. Other Definitions<sup>44</sup>**

Definition	Source
Smart city as a high-tech intensive and advanced city that connects people, information and city elements using new technologies in order to create a sustainable, greener city, competitive and innovative commerce, and an increased life quality	Bakıcı et al. (2012)
Being a smart city means using all available technology and resources in an intelligent and coordinated manner to develop urban centers that are at once integrated, habitable, and sustainable	Barrionuevo et al. (2012)
Smart cities will take advantage of communications and sensor capabilities sewn into the cities' infrastructures to optimize electrical, transportation, and other logistical operations supporting daily life, thereby improving the quality of life for everyone.	Chen (2010)
Two main streams of research ideas: 1) smart cities should do everything related to governance and economy using new thinking paradigms and 2) smart cities are all about networks of sensors, smart devices, real-time data, and ICT integration in every aspect of human life.	Cretu (2012)
A smart city is based on intelligent exchanges of information that flow between its many different subsystems. This flow of information is analyzed and translated into citizen and commercial services. The city will act on this information flow to make its wider ecosystem more resource efficient and sustainable. The information exchange is based on a smart governance operating framework designed to make cities sustainable.	Gartner (2011)
A city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens. Smart city generally refers to the search and identification of intelligent solutions which allow modern cities to enhance the quality of the services provided to citizens.	Giffinger et al.(2007)
A smart city, according to ICLEI, is a city that is prepared to provide conditions for a healthy and happy community under the challenging conditions that global, environmental, economic and social trends may bring.	Guan (2012)
A city that monitors and integrates conditions of all of its critical infrastructures, including roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, even major buildings, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens.	Hall (2000)
A city connecting the physical infrastructure, the IT infrastructure, the social infrastructure, and the business infrastructure to leverage the collective intelligence of the city.	Harrison et al. (2010)

<sup>44</sup> Vito Albino; Umberto Berardi; Rosa Maria Dangelico, "Smart Cities: Definitions, Dimensions, Performance, and Initiatives". Available at <[https://www.researchgate.net/profile/Umberto\\_Berardi/publication/267038770\\_Smart\\_Cities\\_Definitions\\_Dimensions\\_Performance\\_and\\_Initiatives/links/553131c90cf27acb0dea8da6/Smart-Cities-Definitions-Dimensions-Performance-and-Initiatives.pdf](https://www.researchgate.net/profile/Umberto_Berardi/publication/267038770_Smart_Cities_Definitions_Dimensions_Performance_and_Initiatives/links/553131c90cf27acb0dea8da6/Smart-Cities-Definitions-Dimensions-Performance-and-Initiatives.pdf)>

(Smart) cities as territories with high capacity for learning and innovation, which is built-in the creativity of their population, their institutions of knowledge creation, and their digital infrastructure for communication and knowledge management.	Komninos (2011)
Smart cities are the result of knowledge-intensive and creative strategies aiming at enhancing the socio-economic, ecological, logistic and competitive performance of cities. Such smart cities are based on a promising mix of human capital (e.g. skilled labor force), infrastructural capital (e.g. high-tech communication facilities), social capital (e.g. intense and open network linkages) and entrepreneurial capital (e.g. creative and risk-taking business activities).	Kourtit and Nijkamp (2012)
The application of information and communications technology (ICT) with their effects on human capital/education, social and relational capital, and environmental issues is often indicated by the notion of smart city.	Lombardi et al. (2012)
A smart city infuses information into its physical infrastructure to improve conveniences, facilitate mobility, add efficiencies, conserve energy, improve the quality of air and water, identify problems and fix them quickly, recover rapidly from disasters, collect data to make better decisions, deploy resources effectively, and share data to enable collaboration across entities and domains.	Nam and Pardo (2011)
Smart Cities initiatives try to improve urban performance by using data, information and information technologies (IT) to provide more efficient services to citizens, to monitor and optimize existing infrastructure, to increase collaboration among different economic actors, and to encourage innovative business models in both the private and public sectors.	Marsal-Llacuna et al. (2014)

In general, there is no standard definition of what constitutes a “smart city”. A common denominator is that a smart city is first and foremost a city – one that pushes the quality of resource management and service provision to the limit possible at the time. To be truly smart a city must use technology to improve the lives of its citizens and smart cities are about putting people first.

It is impossible to create a perfect definition but with all mentioned definitions and the development process of smart a city since about last two decades, there are at least four keywords that should be included in the term “smart city”.

## ICT

Technology has definitely played an important role during the last 20 years of smart city development. Citizenship is also an important factor in the process, but technology is still the main enabler and will be more and more in the future as the Internet of things becomes a reality.<sup>45</sup>

## Citizens – Putting the People First

A smart city has to be a livable city where “people can have a healthy life and where I have the chance for easy mobility – by foot, by bicycle, by public transportation, and even by car where there is no other choice...The Livable City is a city for all people. The city should be attractive, worthwhile, safe for our children, for our older people, not only for the people who earn money there and then go and live outside in the suburbs and in the

<sup>45</sup> Renato De Castro (2016), “Smart City Trends: What is your definition of Smart City”. Available at < <https://www.smartresilient.com/smart-city-trends-what-your-definition-smart-city/>



surrounding communities. For the children and elderly people it is especially important to have easy access to areas with green, where they have a place to play and meet each other, and talk with each other" (D. Hahlweg, *The City as a Family*, 1997). Issues of migration that can bring chaos to megacities are related to people in the same way that smart solutions that are being applied should be people-oriented. Smart cities are about putting people first.








### Livability

The ultimate goal of building a smart city is to have a better life in the city: It is not simply about solving problems. The cities have to be livable places for all people. Here, the citizen's perception plays an important role.

### City Resilience

Another popular concept that brings an additional perspective to the topic of smart cities is resilience. If the core idea is to use technology to mitigate urban problems and leverage quality of life, it definitely can help cities to be faster and more effective in adapting themselves. Smart village concepts, for example, can help small towns avoid losing people and becoming economically sustainable. Urbanization will no longer be a serious problem because people will understand that they do not want a new city, they want their city to go smarter.

Table 5. Main urban dimensions for creating a smart city<sup>46</sup>

	<b>Smart Living (quality of life)</b> <ul style="list-style-type: none"> <li>• housing • provision of basic services • education • health</li> <li>• safety and security • culture and tourism • lifestyle • urban farming</li> </ul>
	<b>Smart Economy (competitiveness)</b> <ul style="list-style-type: none"> <li>• green jobs • small and medium-sized enterprises</li> <li>• green technologies and jobs • innovative local industry and businesses</li> </ul>
	<b>Smart Energy (efficiency)</b> <ul style="list-style-type: none"> <li>• renewable energy resources • energy efficiency</li> <li>• smart grids • smart meters • fuel cells • energy storages</li> </ul>
	<b>Smart Mobility (connectivity)</b> <ul style="list-style-type: none"> <li>• public transport • environment-friendly modes of transport like</li> <li>• public transport • bicycling walking • alternative fuel vehicles</li> <li>• reduction of congestion • provision of logistics information</li> </ul>
	<b>Smart Environment (Sustainability)</b> <ul style="list-style-type: none"> <li>• reduction of GHG emissions • green and open spaces • green buildings</li> <li>• efficient use of natural resources • water management</li> <li>• waste management • disaster risk management</li> </ul>
	<b>Smart People (knowledge)</b> <ul style="list-style-type: none"> <li>• local human and social resources • universities • schools</li> <li>• business community • adolescents minor and ethnical groups</li> <li>• bottom-up engagements • social integration • social cohesion</li> </ul>
	<b>Smart Government (participation)</b> <ul style="list-style-type: none"> <li>• communication mechanism between local government and residents</li> <li>• e-government • open data • data centers • transparency</li> <li>• community consultation</li> </ul>

Currently, many cities around the world are implementing smart solutions that create better services to their citizens, making their cities more attractive to businesses, and becoming a better place to live, work, study and visit. This, however, is not easy to implement.

<sup>46</sup> "Green Cities" (2012), ADB. Available at < <https://www.adb.org/publications/green-cities> >

The first challenge that a city has to face is convening a stakeholder group to co-create a specific smart city strategy. As can be seen quite clearly from the main urban dimensions for creating smart city, a smart city is made up of several smart aspects within city so that finding managers who represent each aspect with both expertise and management skill to implementing the general strategy is really important. And, to define the general strategy, a city's leaders must have clear awareness of the existing problems in the city, as well as the organisational capacity, and human resources ability.

Securing funding is the second challenge. Although smart city projects can be created with state funding, identifying opportunities to establish partnerships with the private sector is an important step. PPPs are very good from both technological and profitability. But in order to benefit from their creativity early, cities will need to take action to attract and support them.

According to Jane Jacobs (1961), "Private investment shapes cities, but social ideas (and laws) shape private investment. First comes the image of what we want, then the machinery is adapted to turn out that image. The financial machinery has been adjusted to create anti-city images because, and only because, we as a society thought this would be good for us. If and when we think that lively, diversified city, capable of continual, close-grained improvement and change, is desirable, then we will adjust the financial machinery to get that."<sup>47</sup> To support private sector or increase the private investment, establishing the policy framework of how cities are operated, financed, regulated and planned to ensure the transparency is necessary for the success of smart cities projects.

There is no universal approach that can be applied to every city to become a smart city. Each city needs to define what a "Smart City" means to apply the efficient approaches. No matter the city, establishing a cross-city consensus to act and finance are always main challenges.

Smart cities are a vision, a gradual process, to virtually connect a city's infrastructure, its citizens, government, and all other stakeholders, using Information and Communication Technology (ICT), so that urban cities may become more livable and can respond quicker to new challenges.

To achieve this, cities need an adequate and innovative set of policies and regulations. New governance concepts are required to coordinate and integrate smart city stakeholders – cities, businesses, and research organizations – so as to identify strengths, weaknesses, opportunities and threats these advancements bring about. Stakeholders need to jointly experience and learn with new forms of governance, policy and regulatory concepts to accelerate the process of becoming a sustainable, smart city.

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<sup>47</sup> Jacobs, J (1992), "The Death and Life of Great American Cities", Vintage Books, New York

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The background of the entire page is a photograph of green leaves and dark branches, likely from a tree, with soft lighting and a slight blur effect.

# **THE FUTURE OF GREEN BUSINESS IN VIETNAM: THE EVFTA AND POLICY IMPROVEMENT**

**CHAPTER III**

# THE FUTURE OF GREEN BUSINESS IN VIETNAM: THE EVFTA AND POLICY IMPROVEMENT

## 3.1. INTRODUCTION: A NEW OPPORTUNITY FOR GREEN BUSINESS IN VIETNAM

Vietnam is the land of opportunity for businesses. Already the National Green Growth Strategy pointed out that Green Growth is ‘the cause of the entire Party, all people, every level of Government, ministries, localities, enterprises and social organisations.’<sup>1</sup> Besides the reduction of greenhouse gas emissions, greening production and greening lifestyle were outlined as strategic goals with key targets until 2020 (e.g. a share of 42-45% of GDP for high-technology and green technology; or the rate of large and medium cities gaining green urban standards reaching 50%).

The implementation schedule outlines until 2020 mainly communication, awareness, human resource and policy mechanisms or data systems and management tools, but also norms and standards development. While the period 2031 until 2050 is vague and refers to the national socio-economic and international circumstances, as well as the implementation progress of the crucial period 2021-2030, this period promises ‘the economic restructuring of according to the green economy model.’

In the light of this Green Growth Strategy, the businesses and social organisations, who very welcomed this strategy in 2012 and were expecting a boom in the sustainable practices, were early movers and have not seen much more than pilot projects, green communication, awareness campaigns, human resource training and laws put into place. At the same time, environmental conditions were deteriorating, coal power plants were planned and continue to be built, air and water quality is becoming more and more challenging, and galloping urbanisation creates non-liveable cities in Vietnam. EuroCham and several other stakeholders have been working with the Government of Vietnam, international donor organisations and European Government representatives on the legal and practical outline for a green economy model.

As can be seen through examples like major cities, rivers, seas and landfills in India, China, the Philippines or Indonesia, a growing consumer-oriented population and ever increasing middle-class, coupled with a handsomely growing economy and integration in the world markets, creates huge challenges. The air quality in many of these major cities is hazardous<sup>2</sup>; rivers, lakes and the sea are heavily polluted<sup>3</sup>; efficiency and productivity of the businesses are overall non-sustainable, while the resource consumption and greenhouse gas emissions are exploitive of the planet and the future generations. Moreover, the energy hungry lifestyles and business practices has led to plans to build 400 new coal power plants in Southeast Asia, of which 120 are currently under construction.<sup>4</sup> Consequently, a look into today’s overcrowded, congested and polluted metropolis in the above mentioned Asian cities, can give a glimpse on Vietnam’s future if business as usual is applied: Water and food security but also safety are at risk. Climate Change commitments will not be able to be met.

The pollution of the Pacific Ocean could increase through polluted rivers. Incomes could be trapped at low levels. Education and jobs may remain at low levels. Tax revenues and government funds will not increase. Dependency from outside resources will strike earlier or later. This scenario is still a possibility, given the current status of neglect

<sup>1</sup> Prime Minister Decision No. 1393/QĐ-TTg, 25 August 2012)

<sup>2</sup> Several recent articles are compiled on [www.airqualityasia.org/suggestedresearch](http://www.airqualityasia.org/suggestedresearch)

<sup>3</sup> An overview of the challenges can be found e.g.: [www.unep.org/ecosystems/what-we-do/economics/ecosystems/proecoserv/countries/Vietnam](http://www.unep.org/ecosystems/what-we-do/economics/ecosystems/proecoserv/countries/Vietnam) ; [www.ukessays.com/essays/environmental-sciences/the-real-situation-of-water-pollution-in-Vietnam-environmental-sciences-essay.php](http://www.ukessays.com/essays/environmental-sciences/the-real-situation-of-water-pollution-in-Vietnam-environmental-sciences-essay.php) ; [www.thewaterproject.org/water-crisis/water-in-crisis-Vietnam](http://www.thewaterproject.org/water-crisis/water-in-crisis-Vietnam) ; Minh Thi Vu, Hoa Thi Hoang Nguyen: “A Study on Water Resources in Vietnam: Current Status, Problems and Solutions for Sustainable Consumption”, ISSS Journals 57th Meeting, 2013

<sup>4</sup> [www.energydesk.greenpeace.org/2017/01/13/southeast-asia-coal-plans-health-japan-indonesia/](http://www.energydesk.greenpeace.org/2017/01/13/southeast-asia-coal-plans-health-japan-indonesia/), Lauri Myllyvirta, 13. January 2017, last access 11. August 2017.



from several decision makers and enterprises, foreign and Vietnamese alike, coupled with the environmental protection delay arguments. This is a lesson previously learned in Europe. Given that the proper implementation of the Green Growth Strategy involves many stakeholders, as outlined, its success depends also on both political and social will. The optimistic scenario can lead Vietnam onto a similar path like Singapore on the water protection track; a European standard recycling path, circular economy resource efficiency and a well aware, well educated workforce.

More can be done but the challenges are mounting. The current Power Development Plan foresees a massive expansion of coal power plants. Meanwhile the Renewable Energy Development Strategy lacks private sector implementation incentive mechanisms and the feed in tariffs for wind and solar energy are far too low to attract foreign direct investments. Moreover the GDP growth continues to be fuelled by a high electricity demand (currently ca. 1.7% electricity consumption growth for 1% GDP growth; this should come down to 1:1 in 2020). As of 2017 as the word of a 4<sup>th</sup> Industrial Revolution is spreading widely in Vietnam and public policies are being put into place. A cumulative attempt towards greening the economy could lead to resource efficiency, but whole-hearted efforts and implementation measures have to be put into place earlier rather than later.

There is room for optimism as there exists some potential, however signs are pointing into the direction of a not fully implemented Green Growth Strategy and a slow movement into the right direction. The recommendations of EuroCham aim to contribute to speed up the Green Economy train and keep it on track. Some crucial points must be tackled within the fields of environmental protection, water and waste management, education and vocational training and the energy sector:

In the field of Renewable Energy, the current Power Purchase Agreements are non-bankable<sup>5</sup> and the licensing process in the energy sector is under a degree of corruption risk.<sup>6</sup>

Resource efficiency has to be tackled on all levels and emphasis has to be put on electricity, water and raw materials in order to reach higher competitiveness, productivity, salaries and profits.

To attract high rates of Foreign Direct Investments in the future, Vietnam has to appear attractive in terms of resource efficiency, vocational training in terms of high-quality and productivity (which includes circular understanding of production-consumption patterns), ICT infrastructure (and data quality as is pre-requisite for modern economies) and open market based approaches to key sectors (e.g. direct power purchases and de-monopolizing inefficient SOEs or too-big-too-fail private enterprises in key sectors, where reforms and restructuring is not taking place but also their creditworthiness is presenting an obstacle to foreign or local private investors).

This last track is pointing into the direction of Renewable Energy or Energy Efficiency developments in the private sector in industrial processes and buildings, which is currently under-incentivized, under-valued and not important to many enterprises in Vietnam.

Thus, this scenario has the potential to develop into a positive scenario, upon implementation of few critical recommendations and will lead to a much higher adoption of green business methods in a much shorter time. The potential is imminent and as several European CEOs have put it recently in the field of Renewable Energy: "The change will happen. And we will see it faster than one might believe. Not mainly from policies and strategies, but from international push-and-pull factors and private businesses."

EuroCham is supporting the Government of Vietnam, European and international donor organisations and European investors in the clean technology and green sectors through various activities and keeps pointing out the obstacles for a optimistic scenario. In 2016, a Smart City conference series was agreed upon with the city leaders of Ho Chi Minh City and in addition to allowing for regular input to regulations and draft legislation, these conferences enable direct exchange and support towards clean energy, sustainable buildings, sustainable water and waste management, sustainable urbanisation with appropriate traffic solutions and education.

<sup>5</sup> <https://www.eurochamvn.org/node/16601>, last access 11. August 2017 11 August 2017

<sup>6</sup> Transparency International 21. June 2017, Katrin Heger: „Corruption Risks in Vietnams Energy Sector“, accessible via [www.transparency.org/whatwedo/answer/corruption\\_risks\\_in\\_Vietnams\\_energy\\_sector](http://www.transparency.org/whatwedo/answer/corruption_risks_in_Vietnams_energy_sector)

## 3.2. GREEN ISSUES AND RECOMMENDATIONS

EuroCham Green Growth Sector Committee (GGSC) regularly contributes to EuroCham's Whitebook on Green Issues. Established in May 2014, GGSC aims to work with stakeholders to fulfil its mission: to facilitate the mainstreaming, abolishment of barriers and development of the conditions that are essential for Green Business to prosper in Vietnam. To fulfil this mission, the GGSC work together with the Government of Vietnam and its agencies as well as with Vietnamese and European companies and other stakeholders.

Focus areas of the GGSC:

- › Renewable Energy and Energy Efficiency;
- › Clean and Environmental Technologies (including water, waste and sanitation);
- › Financing Green Business;
- › Sustainable Buildings; and
- › Urban and Industrial Green Growth.

With respect to energy, GGSC has contributed to the Made in Vietnam Energy Plan (MVEP)<sup>7</sup> to assist Vietnam in meeting its growing energy demand, climate change and economic development goals. The MVEP focuses on analysis and regulatory support for energy efficiency, renewable energy and Vietnam's natural gas. Like the Whitebook, the MVEP has been presented to Vietnam's Prime Minister and other key government officials.

Vietnam has regulatory frameworks for renewable energy, including hydro, wind, solar, waste-to-energy, and biomass. However, on-grid renewable energy (excluding hydropower) generation is minimal despite massive potential and interest from foreign investors, as Vietnam's electricity demand increases at double the rate (12% p.a.) of Vietnam's GDP growth (6-7% p.a.).

Energy efficient buildings are key to tackle Vietnam's electricity demand and environmental issues. Buildings are and will remain the largest consumers of electricity due to the intensive use of air conditioners in the cities. Very low electricity prices deter investments in green energy efficient green buildings. In addition, most construction use materials that are damaging the environment. GGSC works to advocate for an electricity price roadmap, green building standard, and energy efficiency of buildings.

On waste and water, Vietnam must still continue to work towards developing compliance and effective enforcement of existing environmental laws further. In other words, Vietnam needs to accelerate its efforts to build a more far-reaching framework for effectively enforcing current water treatment standards, e.g., strictly suspending the operating licenses in case of severe violations, and aligning conflicting regulations on environment impact assessment.

GGSC recommends that the Government set a mandatory waste collection quota for e-waste recycling, and provide clear, enforceable guidelines and timelines for the approval of waste-to-energy projects to accelerate implementation.

Vietnam is also increasingly suffering from air pollution. GGSC proposes that Vietnam taxes coal power plants and other major air polluters according to their costs caused to human health and the environment. In addition, Vietnam has no air odour regulations against strong smells from landfills, factories, and aquaculture. The country must accelerate development of the public transportation sector and push vehicle producers and importers to focus on electrical technology.

While all of these environmental issues are seriously concerning, it is hoped that private investors will see the obvious business opportunities and invest in the sustainable future of Vietnam.

<sup>7</sup> Available at EuroCham's website at: [https://drive.google.com/file/d/0B7jI7\\_c3nBdgaGpKcF9QanQwME0/view](https://drive.google.com/file/d/0B7jI7_c3nBdgaGpKcF9QanQwME0/view). [last accessed 14th July 2017]

## Digitalization makes cities smart.

Digitalization is changing the way cities work. It is enabling them to rise to the challenges they are facing: dealing with population growth, traffic congestion, and power outages. And more than ever before, they are relying on integrated and intelligent technologies to come up with solutions. Providing leading software and the know-how to interpret massive amounts of data, Siemens is their trustworthy partner. Digitalized automation helps create a reliable energy supply, smart mobility, and efficient buildings. For cities of all sizes they are the key to maximize their resources, lower operational costs, and reduce their environmental footprint.

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## 3.2.1 RENEWABLE ENERGY

In the Global Leaders Dialogue on Climate Change and Access to Clean Energy in Vietnam on 5 September 2016<sup>8</sup>, Dr Mary Robinson, United Nations Special Envoy on El Niño and Climate and Former President of Ireland, has shared the message of urgency in addressing climate change, which is having clear influences on society while encouraging support for clean energy in developing countries. At the event, Vice Minister of Industry and Trade Mr. Hoang Quoc Vuong also highlighted a strong commitment to enhance the importance of renewable energy in future policy-making, and particularly, informed that the Ministry of Industry and Trade has been working on direct power purchase agreements. EuroCham Green Growth Sector Committees (GGSC) highly appreciates such efforts in opening doors to the mechanism for promotion of the energy market in Vietnam.

To support the Government in accelerating the transition, on 5<sup>th</sup> December 2016, GGSC presented the Made in Vietnam Energy Plan (MVEP) to the Prime Minister of Vietnam in Hanoi. The MVEP outlined a national energy plan using indigenous resources to deliver a sustainable energy future to 2030. European Union – Vietnam Business Network (EVBN) and Dragon Capital Group Ltd. supported the production of MVEP with assistance from American Chamber of Commerce in Vietnam (AmCham) and Nordic Chamber of Commerce in Vietnam (NordCham).

### 3.2.1.1. Made in Vietnam Energy Plan (MVEP)

Made in Vietnam Energy Plan has been written to assist Vietnam in supplying its growing energy needs and its climate change goals from the 21<sup>st</sup> session of the Conference of the Parties (COP21)<sup>9</sup> and to achieve its economic development goals, building on the Power Development Plan VII (PDP VII)<sup>10</sup> (MOIT revised for 2016-2030), the Exploring a Low-Carbon Development Path for Vietnam Report<sup>11</sup> sponsored by the World Bank Group, the ADB's Renewable Energy Development and Potential in the Greater Mekong Sub-region Report<sup>12</sup> and the World Bank's Financial Recovery Plan for Vietnam Electricity.<sup>13</sup>

The MVEP outlines the advantages of greater emphasis on cleaner domestic solutions for Vietnam's future energy needs and to demonstrate the advantages of prioritizing domestic versus imported energy resources with respect to Vietnam's social, economic, energy security goals, Vietnam's global and domestic environmental commitments, and to attract private sector investment. The report also provides key policy and regulatory measures that could help move Vietnam towards these goals.

The MVEP focuses on analysis and regulatory support for the following:

- **Energy Efficiency** - including enhancing the role of Government and using Demand Side Management tools to reduce waste and attract private sector investment and innovation in efficiencies.
- **Renewable Energy** - preparing the policy and regulatory framework to enable the further development of successful markets and attract the needed investments in renewables for local and foreign investors, technology and service providers.
- **Vietnam's Natural Gas** - accelerating and expanding investment in the use of domestic natural gas as a more flexible, cheaper and cleaner fuel than imported coal. Gas remains the least polluting (with 60 percent less CO<sub>2</sub> emissions than coal) and most cost effective fossil fuel which can serve as a secure bridge fuel.

Vietnam can successfully continue to make maximum use of its indigenous energy resources to reduce the risks and maximise the socio-economic benefits of future energy development building on its achievements to date.

<sup>8</sup> Vietnam seeks more international support to combat climate change; The Saigon Times. Available at <http://english.thesaigontimes.vn/49661/Vietnam-seeks-more-international-support-to-combat-climate-change.html> [last accessed 14th July 2017]

<sup>9</sup> A COP of firsts; COP21's website. Available at: <http://www.cop21.gouv.fr/en/la-cop-des-premieres-fois> [last accessed 14th July 2017]

<sup>10</sup> Decision No. 1208/2011/QĐ-TTg dated 21st July 2011 of the Prime Minister approving the national master plan for power development in the 2011-2020 period, with considerations to 2030.

<sup>11</sup> Audinet, Pierre; Singh, Bipulendu Narayan; Kexel, Duane T.; Suphachalasai, Suphachol; Makumbe, Pedzisayi; Mayer, Kristin, 'Exploring a low-carbon development path for Vietnam,' World Bank Group. Available at <http://documents.worldbank.org/curated/en/773061467995893930/Exploring-a-low-carbon-development-path-for-Vietnam> ; [last accessed 14th July 2017]

[last accessed 14th July 2017]

<sup>12</sup> 'Renewable Energy Developments and Potential for the Greater Mekong Subregion,' Asian Development Bank. Available at <http://hdl.handle.net/11540/5054> [last accessed 14th July 2017]

<sup>13</sup> Maweni, Joel J.; Bisbey, Jyoti, 'A financial recovery plan for Vietnam Electricity (EVN) : with implications for Vietnam's power sector,' World Bank Group. Available at <http://documents.worldbank.org/curated/en/971901468196178656/A-financial-recovery-plan-for-Vietnam-Electricity-EVN-with-implications-for-Vietnam-s-power-sector> ; [last accessed 14th July 2017]

### 3.2.1.1.1. Issues Description

#### Risks in the Current Plan

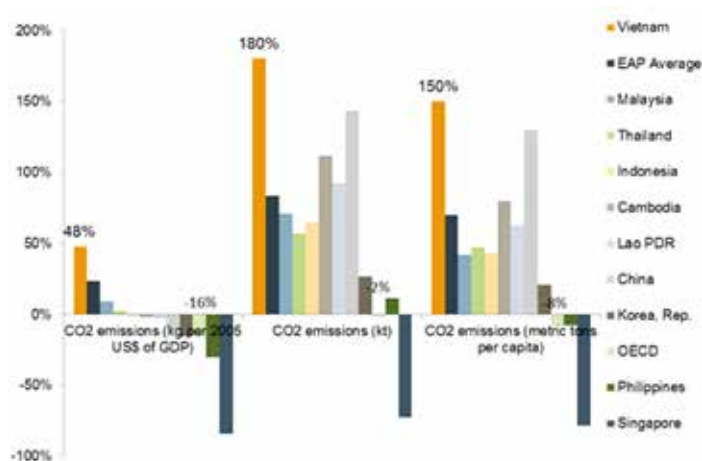
Vietnam's current PDP VII expects 55 GW of power to be fuelled by coal by the year 2030, up from 14 GW today. PDP VII projects the percentage of coal fired power in Vietnam's energy mix by 2030 to increase to 53.2% of installed capacity. This increase in coal energy would be primarily fuelled by importing coal at great financial cost and risk to the Government. It would need Vietnam to import approximately 10 million tons of coal per year from 2017 onwards, an enormous financial and transportation burden that is not fully reflected in the assumed costs of coal.

Vietnam currently ranks as the twentieth largest global user of coal-fired plants but, under PDP VII, by 2030, it would be burning 15 times as much coal making Vietnam the eighth-largest user in the world. Vietnam's use would be similar to that of Russia and Indonesia despite a population projected at only two-thirds of Russia's and one-third of Indonesia's. In the Mekong Delta alone, 14 coal-fired power plants with an installed capacity of 18 GW are planned by 2030. A joint study by Green Peace and Harvard University<sup>14</sup> estimated that air pollution from coal-fired power plants kills around 4,300 people in Vietnam each year and that this would rise to 25,000 per year if the Mekong Delta plants went into operation.

In May 2016, World Bank President Jim Yong Kim said a decision by Vietnam to build the full 40 GW of coal power stations country wide would be a 'disaster' for the planet, and announced the World Bank would devote 28% of its funding to helping developing countries invest in renewables.<sup>15</sup>

Electricity of Vietnam (EVN) does not have the resources to realize the plan, and private investment support for coal technology is quickly disappearing except perhaps in a small groups of countries where it may be politically risky to over rely, and most official development assistance (ODA) is now contingent to the adoption of renewable energy and the opening of the markets to private investment.

**Figure 5. Vietnam's carbon emissions are growing at the fastest rate in the region**



Source: World Bank (2015) *Vietnam Low Carbon Options Assessment*<sup>16</sup>

The MVEP outlines how Vietnam's energy needs can be met with greater emphasis on cleaner domestic sources of energy including: renewables including biomass, wind and solar; sustainable energy efficiencies, and the increased development of Vietnam's offshore natural gas—all reducing the effects on the environment and the need for imported coal. The MVEP report derives regulatory and policy recommendations that can deliver the

<sup>14</sup> 'Coal expansion in Vietnam could claim 25,000 lives per year,' Green Peace. Available at <http://www.greenpeace.org/seasia/Press-Centre/Press-Releases/Coal-expansion-in-Vietnam-could-claim-25000-lives-per-year>; [last accessed 14th July 2017]

<sup>15</sup> 'Remarks by World Bank Group President Jim Yong Kim: Development in a Time of Global Interdependence,' World Bank. Available at <http://www.worldbank.org/en/news/speech/2016/04/05/remarks-world-bank-group-president-jim-yong-kim-development-global-interdependence>; [last accessed 14th July 2017]

<sup>16</sup> Audinet, Pierre; Singh, Bipul; Kexel, Duane T.; Suphachalasai, Suphachol; Makumbe, Pedzi; Mayer, Kristy, 'Exploring a Low-Carbon Development Path for Vietnam,' World Bank. Available at <<https://openknowledge.worldbank.org/handle/10986/23522>>; [last accessed 14th July 2017]



private sector investment necessary to meet the \$100 billion required by 2030 to meet Vietnam's energy needs and doing so in a way that maximises the use of indigenous resources and delivers on Vietnam's environmental goals.

### With no change, Vietnam's inefficient use of energy is expected to worsen

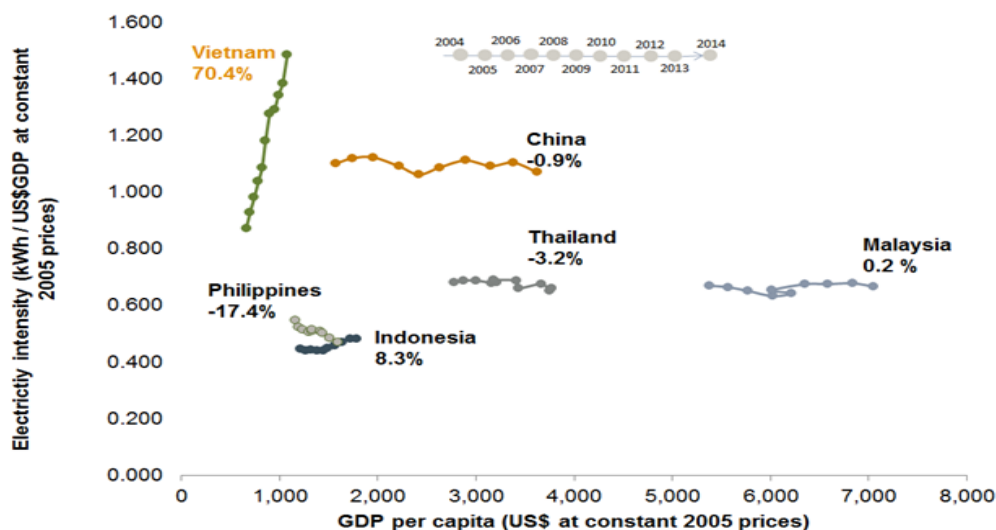
The growth in electricity demand has exceeded income growth resulting in a rapid rise in electricity intensity. Between 2004 and 2014, the increase of electricity demand outpaced that of GDP growth. In 2004, producing one dollar of GDP required 0.9 kWh of electricity. By 2014, this had risen to almost 1.5 kWh of electricity for one dollar of GDP (at constant prices).

Compared to the 70% increase in electricity intensity seen in Vietnam over this 10-year period, other countries in the region have experienced flat or declining intensities. Vietnam's electricity intensity now exceeds that of China and is approaching levels seen in such notoriously inefficient countries as the Ukraine. And projections are for further increases in electricity intensity reaching as high as 2.3 kWh for each dollar of GDP by 2030. The implication is clear – Vietnam is hugely inefficient in its use of electricity and is projected to remain so without significant regulatory correction.

The main constraints facing Energy Efficiency measures are:

- a lack of policy framework and its enforcement,
- insufficient electricity tariffs, and
- financial mechanisms for investment in energy efficient technology and conservation.

**Figure 6. Vietnam's electricity intensity is extremely high and growing rapidly**



Source: ECA calculations using data from BP Global's Statistical Yearbook (electricity generation) and World Bank (real GDP and GDP per capita)

Globally, countries have added regulatory requirements on household, office, factory and other electricity using technological innovation and updated equipment to enhance efficiencies. Such regulatory requirements have led to investment in innovation and savings. Building construction and manufacturing codes can greatly reduce electricity use in office, residential, retail and factory buildings and manufacturing production. Raising prices to reflect actual costs has been shown to reduce use across the board, enhance revenue streams and enable governments to focus resources on assistance for the truly needy.

Additionally, educating the public to the benefits of energy saving and the ways to participate in responsible energy use would help to build support for renewables and efficiencies, and encourage innovation, private sector investment, involvement and support for an overall plan to build a clean and sustainable environment in Vietnam.

### 3.2.1.1.2. Potential Gains/Concerns for Vietnam

The adoption of Made in Vietnam Energy Plan (MVEP) will:

- Allow a more flexible power development plan that can be adjusted to fit future demand, low or high, and removes the risk of either stranded assets or of failing to meet demand if growth exceeds estimates.
- Attract much greater new investment from multiple domestic and foreign sources, in particular mobilising private sector resources, building local manufacturing capabilities, reducing the reliance on foreign governments and for the need of Vietnam government revenues, subsidies and guarantees or GGUs.
- Achieve a more efficient use of electricity that will reduce energy waste and make Vietnam more competitive, productive and attractive for FDI.
- Immediately deliver private investment in cleaner energy after a decade of slow action, thereby freeing Vietnam from its reliance on mega-sized coal power plants which require many years of lead-time, unnecessary costs and put greater pressure on public sector borrowing, and Government borrowing capacity.
- Reduce the social and environmental costs of pollution from a new generation of coal power plants which contribute to poor air, water and land quality and high health costs. Following the International Monetary Fund (IMF) calculations, we estimate the costs of health and environmental impacts of the current power development plan with its reliance on coal could be as high as \$15 billion annually by 2030<sup>17</sup>.
- Avoid building a new dependence on the imported fuel of coal with its consequent risks for security of supply and tens of billions of dollars in foreign exchange demands and balance of payment risk.
- Decrease the heavy financial, logistical and severe environmental costs of transporting coal and coal waste.
- Add an estimated \$15 - \$20 billion in Government revenues over the project lifetime in developing 3 GW of indigenous gas-fired power plants, compared to an estimated \$20 - \$25 billion in foreign exchange costs to import coal for an equivalent coal-fired development.
- Solar installations require only one year to be completed, and even wind farms are much faster to come to market than thermal plants and are scalable, so they can be increased as the need arises.
- Build new and high tech industries such as batteries and solar panels and create new employment.

### 3.2.1.1.3. Recommendations

**A more sustainable energy future path that attracts investment** can be implemented immediately with the enacting of some key policy, regulatory and institution reforms, which have been identified for government and utilities through the advice of supporting donors and private sector experts and which have been successful in other similar countries.

Adopt Energy Efficiency Measures

**Make most consumers pay for the true cost of energy to increase energy efficiency** pull and issue regulations to enhance the push, to encourage individual households and businesses to reduce energy use and install their own solar, wind or other renewable energy sources to relieve pressure on the power distribution system.

**Include the private sector investment into smart grid and smart transition** technologies providing effective cost-saving solutions.

**EuroCham recommends mandatory energy efficiency requirements for particular products** such as appliances, generators and air-conditioning units, as well as improved construction standards for housing, office, factory, and retail development.

<sup>17</sup> Calculated using planned coal-fired generation of 311 TWh in 2030 and IMF estimates of the health and environmental costs of coal consumption in Vietnam of \$ 2.26/GJ (equivalent to around 8.07/MWh of electricity generated). A cost of carbon of \$ 35/tCO<sub>2</sub>e is applied. Available at <<http://www.imf.org/external/np/fad/enviro/data/data.xlsx>>

**Develop small and large-scale well-structured waste-to-energy systems**, especially to benefit local communities through improved health and hygiene, increased power supply, and decreased carbon emissions and health effects from the open burning of agricultural waste and trash. Landfills with mixed waste make it especially difficult to and hazardous to use or recycle the waste.

**Start a public education campaign to raise awareness of ability of consumers** to reduce energy waste and to create a clean environment for the good of all including the generations to come.

**Allow more private investment into electricity generation.** Introduction of direct power purchase agreements (DPPA) between power producers and large power consumers in 2017, as they have shown to be extremely effective in other similar countries. Companies such as Apple, Nike, Coca Cola, Google, TetraPak and other multinational corporations have publically made global commitments to work towards using energy from renewables and energy efficient projects. This will attract additional investment and global brands that will help carry Vietnam up the manufacturing value chain.

**Implementation of the recommendations of German Agency for International Co-operation (GIZ) and United Nations Development Programme** on changes to wind and solar PPAs to make these “bankable” increases in Feed-In-Tariffs (FIT) for renewable energy (to at least 10.4 US cent/kWh for wind and 15 US cent/kWh for solar power under 20-year PPAs).

Issuance of a rational Power Price Roadmap for the full introduction of Market-Based-Pricing by 2020 with a vision to 2025, including definition of variable pricing between the three main tariff groups (residential, commercial and industrial).

**The provision of actual cost information can empower businesses, consumers and investors as to the most effective way to invest** in higher efficiency equipment and processes. Energy efficiency investment and innovation is not occurring in high volumes now because businesses and consumers believe that power prices will remain subsidized by the Government. Meanwhile, investors require Government guarantees because prices do not reflect the full costs of production.

Continue the restructuring of EVN to enhance its creditworthiness. Increasingly international donors are offering support and guarantees for renewables and clean energy development and procedures which can assist in increasing EVN’s creditworthiness from the perspective of new investors in these projects at low cost to Vietnam. This credit enhancement for EVN would aid the government of Vietnam to reach energy and environment goals and help encourage developers to consider Vietnam as an attractive market for investment on commercial terms.

The Government is encouraged to work with private sector solar experts and business groups in Vietnam and to publish a modified Solar Power Decision with its supporting regulations in the form most likely to attract private capital investment. The following move could be a comprehensive Renewable Energy Law that contemplates an independent Energy Agency from renewable sources that speeds up all administrative tasks, given the otherwise very rapid deployment of the investments.

Develop the offshore gas potential. Careful analysis indicates that offshore gas development cost and revenue structure is preferable to imported fuel options. Further, the high cost of “clean coal” technology far outweighs natural gas. Therefore, EuroCham hails the recent contracts signed for gas extraction and plans to build combined cycle gas fired power plants, as this is one of the key measures to reduce air, water and land pollution, alleviate the logistic burden and meets the favour of the populations involved.

### 3.2.1.1.4. Conclusion

In recent years there have been several promising changes which seem to follow the right direction. One recent and worth-mentioning shift is the renouncement of nuclear power plant projects<sup>18</sup> in the central of Vietnam. The establishment of a department dedicated to new and renewable energy and of one dedicated to energy efficiency under Ministry of Industry and Trade is also a good signal to business community on a movement of the Government towards cleaner sources of energy. Beyond that, a more sustainable energy future path can only be realized with concrete actions and enforcement starting from now.

<sup>18</sup> ‘Vietnam abandons plan for first nuclear power plants’, Reuters. Available at: <http://www.reuters.com/article/us-Vietnam-politics-nuclearpower-idUSKBN13H0VQ> [Consulted on 11 Aug 2017]

## 3.2.2. WASTE, WATER AND AIR MANAGEMENT

### 3.2.2.1. Water Management

#### 3.2.2.1.1. Issues Description

Vietnam has painfully learned that the lack of coordinated supervision of waste water treatment can cause massive environmental and socio-economic disasters, such as the massive fish deaths along the coast of central Vietnam in 2016.

#### 3.2.2.1.1. Potential gains/concerns for Vietnam

Vietnam has conflicting regulations on environmental impact assessment (EIA) “in the Law on Investment (LoI) and the Law on Environmental Protection (LEP), and poor-quality EIA reports”, are the main causes of growing environmental pollution according to MONRE.<sup>19</sup> In addition these regulations are not enforced, often as local authorities prioritize economic growth to the protection of the environment.

MONRE reports that “more than 2,000 investment projects have insufficient environmental impact assessments, while hundreds of industrial zones (IZs) have no waste water treatment systems”,<sup>20</sup> although required by law.<sup>21</sup> “Industrial parks nationwide discharge more than a million cubic meters of wastewater each day, 75 percent of which is untreated and harmful”.<sup>22</sup>

#### 3.2.2.1.2. Recommendations:

Create a framework for effectively enforcing current water treatment standards.

- Suspend operating licenses in case of severe violations.
- Align conflicting regulations on environment impact assessment
- Accelerate private investment into waste water treatment facilities.

### 3.2.2.2. Waste Management

#### 3.2.2.2.1. Issues Description

Vietnam’s Law on Environmental Protection operates under the principles of minimization, re-use, collection, and treatment meeting environmental standards.<sup>23</sup> However, most waste is still dumped to landfills without further processing. Unsanitary landfills are not only causing environmental hazards and infuriate the residents surrounding them,<sup>24</sup> but also waste valuable materials, that could be recycled or used for power generation. Multinational corporations are also setting their own recycling and renewable energy goals, and need a supportive regulatory framework to follow.

#### 3.2.2.2.2. E-Waste Recycling

The Prime Minister’s Decision No. 16/2015/QĐ-TTg<sup>25</sup> regulates the collection, recycling, and disposal of products, including batteries and accumulators, civil and industrial electric and electronic equipment (EEE), lubricants, tubes and tires, as well as vehicles. The Vietnam Environment Administration (VEA) is working on a draft Circular to guide

19 “Unclear laws contribute to environmental crisis”. Available at: <http://english.Vietnamnet.vn/fms/environment/164584/unclear-laws-contribute-to-environmental-crisis.html> [last accessed on 14th July 2017].

20 “Environment Ministry’s report shows serious environmental problems”. Available at: <http://english.Vietnamnet.vn/fms/environment/163554/environment-ministry-s-report-shows-serious-environmental-problems.html> [last accessed on 14th July 2017]

21 Article 37, Decree 38/2015/ND-CP dated April 22, 2015 of the Government on the management of wastes and scraps.

22 “Over 1 mln cu.m of industrial wastewater dumped every day in Vietnam”, VietnamNet, 03/12/15. Available at: <http://english.Vietnamnet.vn/fms/environment/148243/over-1-mln-cu-m-of-industrial-wastewater-dumped-everyday-in-Vietnam.html> [last accessed on 14th July 2017]

23 Law on Environmental Protection 2014; Decree 80/2014/ND-CP; Decree 19/2015/ND-CP; Decree 179/2013/ND-CP; Decree 03/2015/ND-CP; Decree 38/2015/ND-CP.

24 “PM calls for joint environmental efforts”. Available at: <http://Vietnamnews.vn/society/342513/pm-calls-for-joint-environmental-efforts.html#W8sAKJ1ivcUXDrtZ.97> [last accessed on 14th July 2017]; “Ho Chi Minh City finally traces source of foul smell”. Available at: <http://tuoitrenews.vn/society/37179/ho-chi-minh-city-finally-traces-source-of-foul-smell> [last accessed on 14th July 2017].

25 Decision No. 16/2015/QĐ-TTg dated 22 May 22 2015 of the Prime Minister on regulations on recall and treatment of discarded products

Decision 16 among other regulations.<sup>26</sup> These regulations are steps in the right direction, but they would be more effective if they set clear collection goals, so that manufacturers and consumers can plan and adapt in advance.

### 3.2.2.2. Waste-To-Energy

Vietnam has a regulatory framework for power generation from solid waste (waste-to-energy or WTE),<sup>27</sup> but only one or two small pilot WTE projects are in operation in Vietnam as of August 2017.<sup>28</sup> Despite completed comprehensive feasibility studies and lengthy negotiations with the authorities, indecisiveness on part of the involved Vietnamese authorities and burdensome licensing procedures have prevented larger WTE projects from proceeding to implementation stage. WTE has much potential, as Vietnam's waste output and energy demand increase.

### 3.2.2.3. Overall Recommendations

Disposal of products: set a mandatory collection quota beginning with 10% (or more) of the yearly put-to-market volume and increase on a clear timeline. WTE: provide clear, enforceable guidelines and timelines for the approval of waste-to-energy projects and accelerate implementation.

### 3.2.2.3. Air Quality

#### 3.2.2.3.1. Issues description

Air quality in Vietnam's cities is quickly deteriorating, as sulfur dioxide, dust, particulate matter, dioxide, carbon monoxide and nitrogen dioxide are emitted from transportation, industry and construction. Coal power plants are also major air polluters. For example, the estimated costs of health and environmental impacts of the current power development plan with its reliance on coal could be as high as \$15 billion annually by 2030.<sup>29</sup>

Vietnam still lacks clarity on Government policies with specific policy targets on air quality control. In addition, Vietnam has no air odour regulations against strong smells from landfills, factories, and aquaculture. GGSC recommends that Vietnam introduce specific policy targets and regulations for air quality control and emissions, to tax all coal power plants, cement factories, and other major polluters in accordance with their effect on the environment and health costs; to accelerate development of the public transportation sector and push vehicle producers and importers to focus on electrical technology.

## 3.2.3. GREEN BUILDING

### 3.2.3.1. Issues description

Buildings will remain the largest consumers of electricity. The rapid development of the middle class and its associated lifestyle, which includes intensive air conditioning use, accounts for a considerable proportion of the energy consumption growth in the main cities of Vietnam. Proper building design can reduce this growth for the next 25 years of building lifetime. The development of green buildings in Vietnam is still at an infancy stage with approximately only 40 buildings with certifications, the majority of these being in the industrial sector.

### 3.2.3.2. Potential gains/concerns for Vietnam

First, due to a lack of enforcement of regulations, global corporate guidelines seem to currently be the only drivers. As there is no need to reduce operating expenses due to low energy prices, the green building investments remain far too low to address the current environmental concerns.

26 "Lấy ý kiến góp ý Thông tư quy định về quản lý chất thải rắn thông thường, thu hồi sản phẩm thải bỏ, sản phẩm thải lỏng không nguy hại và tiêu hủy xe ưu đãi, miễn trừ." Available at:

<http://vea.gov.vn/vn/vanbanphapquy/layykiemgopy/LayYKienGopy/Pages/LayykiemgopyTTveQLCTvaTHXUDMT.aspx> [last accessed on 14th July 2017].

27 Mainly, Prime Minister's Decision 31/2014/QĐ-TTg and MOIT's Circular 32/2015/TT-BCT.

28 <http://nangluongVietnam.vn/news/en/mechanical-project/inaugurating-the-first-waste-to-energy-plant-in-hanoi.html>; <http://english.Vietnamnet.vn/fms/environment/182397/several-companies-want-to-develop-waste-to-power-projects-in-hcmc.html> [last visited on 11 Aug 2017].

29 Page 3, "Made in Vietnam Energy Plan", Vietnam Business Forum, October 2016.



Secondly, every year by using clay brick, Vietnam destroys 3.000 ha of rice fields and consumes over 6 mill., tons of coal. There are already several measures from the Government and Ministry of Construction (MOC) since 2010 such as: Decision 567/QĐ-TTg<sup>30</sup> (30-40% NFB usage by 2020 with 15-20 mill. ton of industrial waste; Directive No.10/CT-TTg<sup>31</sup> and Circular 09/2012/TT-BXD<sup>32</sup> (100% state projects and other projects over 9 floor to have over 50% usage of non-fired brick materials) and Decree 121/2013/ND-CP<sup>33</sup> (VND 20-30 mill. fines for non-compliance). However, the enforcement of these laws is not properly implemented.

Finally, Vietnam Energy Efficiency Building Code (VEEBC) published in 2013 by the Ministry of Construction (MOC) is legally mandatory. The VEEBC code is comprehensive and reflects international norms as well as local norms. However, the code is poorly disseminated and buildings are not currently required to follow this code in order to obtain a construction license. Even a simplified version of this code would require owners to build much more efficiently, and would require engineers to achieve basic knowledge about energy efficiency of equipment.

### 3.2.3.3. Recommendations

Promotion of Green Building standard usage: Many building owners have now been introduced to the concept of green building, and organisations such as the Vietnam Green Building Council (VGBC) report a significant uptick in interest over the past two to three years in comparison with previous years. Over 100 buildings are now already Green Building certified or are undergoing GB certification in Vietnam. EuroCham recommends the government to provide effective encouragement for building owners to certify their buildings. In addition to international green building certifications already being used in Vietnam such as USGBC's LEED and International Finance Corporations's Edge, among the locals emerges VGBC's certificate LOTUS. EuroCham would support a move to recognise multiple systems for use in Vietnam, letting the market determine which systems are practical and useful. These systems could be licensed for operation based on a set of simple criteria such as transparency, reliability, and coherence according to recognised norms.

Reinforcement of non-fired brick solutions application: EuroCham recommends effective enforcement, and promotion through the Vietnam Association of Building Materials (VABM) since compliance may reduce carbon footprint from 40% to 70%.

Increase Energy Efficiency in building: Energy efficient building does not mean higher investment cost and can be applied from the architecture phase with passive design and using environmentally friendly construction materials to finally implementing energy efficient devices. Vietnam would do well to encourage all buildings to achieve the minimum standards of the VEEBC code (or a simplified version of the code) in order to receive the Building License at Basic Design Stage. Another option regarding the Electricity of Vietnam (EVN) could be the imposition of a tariff scheme that rewards low energy consumption buildings with lower prices and impose higher prices to high consumption buildings.

Showcases: There exists already a number of sustainable building solutions from the market and best practices from companies. The solutions are already applied in some green building case study. However from the micro perspective, EuroCham believes in a macro perspective show case to define incentives and policies reinforcement to use these solutions, to have a clear urban planning design including not only green building but as well, water, waste, traffic and environment livelihood improvement and implementation towards a vision of a Smart City.

30 Decision No 567/QĐ-TTg of the Government dated 28th April, 2010 of the Prime Minister on approval of the Program of development of non-baked materials till 2020.

31 Directive No. 10/CT-TTg dated 16th April, 2012 of the Prime Minister on increasing the use of non-baked building materials and limiting the production and use of clay brick

32 Circular No. 09/2012/TT-BXD dated 28th November, 2012 of the Ministry of Construction on the of non-baked building materials in construction

33 Decree No. 121/2013/ND-CP dated 10th October, 2013 of the Government providing regulations on sanction of administrative violation in construction activities, real estate business; operation, production and business of building materials; management of technical infrastructure management of housing and office development.



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\* The character's visual and information are for demonstration purposes only

\*\* Subject to selected colors

## 3.2.4. SMART CITIES

### 3.2.4.1. Sustainable building, Energy Efficiency and EuroCham action

In 2017, EuroCham employed great efforts to advocate and contribute to the development of Ho Chi Minh City towards becoming a Smart City. To this end, EuroCham organised a series of dialogues with Government, businesses, research and development institutions dedicated to green, efficient and sustainable solutions for the city.

On 24<sup>th</sup> November, 2016, EuroCham in collaboration with Phillips, St Gobain, Ecocim and Siemens organized the “Sustainable Building towards a Smart City” workshop to propose sustainable solutions in construction towards contributing to the sustainable urbanisation in HCM. The conference gathered high interest and support of Peoples Committee leaders and Department of Construction, Department of Urban Planning & Architecture, Department of Environment and Natural Resources, Energy Conservation Center, Ho Chi Minh City Investment & Trade Promotion Center. At the conference, Mr. Le Thanh Liem, Deputy President of Ho Chi Minh Peoples Committee expressed the City’s interest to strengthen the cooperation with European companies. The City welcomes, supports the European business community coming to HCMC to invest in long term and efficient solutions towards a Smart City.

The workshop came up with three main recommendations relating to the application of green building standards; the replacement of unbaked brick to the traditional brick; and energy efficiency solutions. These three key recommendations are shown in details through presentations from leading experts in green building and sustainable construction: Mr Yannick Millet (Member of the Board VGBC), Mr Yoan Guyon (Boydens Engineering), Mr Huynh Trung Hieu (Indochine Engineering).

Regarding to the application of green building standards in construction, the assessment items of green building and guideline for implementation of these criteria are also carrying out in the presentations to clarify each standards in energy, water, materials, indoor facilities; operational management; innovations and improvements of design and so on. In addition, the presenters have provided guidance for users to apply the green standards and encourage to apply green standards in their building.

Regarding materials solution, a wide range of green materials have been suggested with their practical benefits such as: energy saving, recycling, waste reduction adverse environmental impact. The advantages of these green materials (Concrete masonry unit CMU, Aerated Autoclaved Concrete AAC plasterboard, etc.) compared to the traditional materials have been raised in order to strengthen the recommendation to replace the old ones to increase construction efficiency and simultaneously reduce carbon emissions during operation.

Regarding efficient energy solutions, the experts also presented the solutions to optimize energy usage as water, light, wind and electric devices for building from the passive design. The practical examples have shown to demonstrate the benefits of using these solutions during the construction period, when applied these solutions, the constructing cost is not incurred, but reducing the operating costs of the facility/building and contributing to save the environment.

With the above key recommendations, the sustainable building workshop has brought numerous effective solutions to build our city become a smart and sustainable urban and to catch up the trend of sustainable construction globally. The presentations also covered the implementation and enforcement of existing regulations. Even though the policies have been in place since 2013, they are not consequently and effectively implemented. There is also further need for Vietnam to issue incentives and other forms to encourage the society and builders to apply the regulated standards in the practice.

Mr. Tomaso Andreatta, Vice-Chairman of EuroCham also stressed the importance of a strategic approach of developing green building and architecture in the future. He also recommended Ho Chi Minh City to start a pilot project in the new urban area of Thu Thiem in District 2 of Ho Chi Minh City. This conference was a promising start of a series of events toward smart city development, for which EuroCham plans to work closely with Ho Chi Minh City and its Departments to support and implement smart, efficient and environmentally friendly solutions to

make Ho Chi Minh City a better place for its citizens and more attractive for European investors.

### 3.2.4.2. Internet of Things and Big Data Management

On 30<sup>th</sup> June, 2017 in Ho Chi Minh City, EuroCham and Information and Communication Technology Sector organized a second conference of the EuroCham Smart City Series to advocate on “Cyber Security, Internet of Things & Connected Services towards a Smart City”.

The conference attracted more than 100 participants from local authorities, private businesses, research and development institutions, universities and high profile experts from business community in the Ho Chi Minh City. Mr. Vo Quang Hue, EuroCham Vice-Chairman opened the conference with the spirit of European investors who through the event, wish to showcase potential solutions toward Smart City. EuroCham members presented smart solutions, the best practices to respond to the key challenges that Ho Chi Minh City is facing in the becoming the Smart City. EuroCham wants to create a platform to bring together Government, development institutions, investors, academics, the business community to have dialogue. Mr. Hue emphasized that EuroCham and its members would be happy to contribute to the Smart City success in Vietnam, helping the country overcome its current problems.

The conference demonstrated the desire for knowledge sharing and an open dialogue on the topic of Smart Cities between all involved stakeholders. Mr. Guru Mallikarjuna, EuroCham ICT SC Vice Chairman envisaged that there will be growing surge of connected devices worldwide, a reality more and more common where devices are seen as crucial to everyday life, activities and communication.

Talking about E-Government, Dr. Nguyen Viet Hai from VINASA Science and Technology Institute showed that there are already ISO standardizations for E-Government, with the Asian Oceania Computing Industry Organization Vietnam will have a guide how to approach the Smart City topic.

Through the presentation of Mr. Philip Hung Cao about Cyber Security, it is clear that Ho Chi Minh City has still a lot to learn, and one of the prerequisite conditions of being a Smart City is becoming a Safe City.

It is reflected in the discussed vision for Binh Duong shared by Mr. Viet-Long Nguyen, Director of the Binh Duong Smart City Office, the importance to have a clear roadmap, timelines, ambition and cooperation via a model called “Triplex Helix” to coordinate among the Governments, Research & Education and the Private sector/Industry.

During the discussion panel, Mr. Le Quoc Cuong, Vice Director of Ho Chi Minh City Information and Communications Department stressed that Vietnam has great potential and is in a favorable position to learn many lessons from other countries and save resources without having to create new solutions. It is also clear that a concrete roadmap, timelines, ambition and cooperation since creating a Smart City is not only about applying new technologies or bring about paper-free Government but it is foremost important to set up main conditions to be fulfilled in order to achieve success in a Smart City. It is crucial to have existing and ongoing dialogue between Government, knowledge centers, citizens and the private sector, to foster a vision that is broadly supported; clear policy-making, legal and regulatory system that is clear, fair and up to date, reflecting the vision and protecting compliance and the enforcement of new rules in a consistent manner as well as creating a healthy environment to develop and disseminate Education, a key factor to efficiently deliver any Smart City model.

The closing remarks made by Mr. Amanuel Flobbe, EuroCham ICT Sector Committee also underlined the role of EuroCham and its belief that “the European Business Community in Vietnam can add priceless values to the city’s Smart City project process and its implementation. This goes much beyond the state-of-the-art technology we can bring, and into the realms of experience and knowledge transfer; best practices and proven solutions. EuroCham does not want to work alone, and seeks to work together with the Vietnamese Government as well as colleagues to create Smart Cities in Vietnam, including Ho Chi Minh City, and EuroCham wishes to have a role that contributes to the future development of Vietnam”.

The next EuroCham’s Smart Cities topics will be dedicated to Green Growth and Transportation challenges of the City. EuroCham will further follow up with the City’s authorities and experts to contribute to the implementation of the Smart City project.



### 3.2.4.3. EUROPEAN SMART CITIES: POLICIES AND SUCCESS STORIES

#### Overview

The development of smart cities is now an inevitable trend and is expected to be the core strategy of the most important cities in the world. According to a new study conducted by Navigant Research, European is the region with the largest number of smart city projects.<sup>34</sup>

Since 2007, the European Union has launched programs and started implementing a series of goals for smart city projects. The concept “smart city” had a boom in 2009, after the EU strongly committed to support and fund “smart initiatives” in European cities, aiming to reduce CO<sub>2</sub> emissions and govern energy consumption, waste treatment, and building efficiency. European smart cities are conceived around high performance in 6 key fields: smart economy, smart mobility, smart environment, smart people, smart living, and smart governance) of urban development.<sup>35</sup>

Another major driving factor for smart city development in Europe is the EU’s 2020 climate and energy package, which has three goals: cut greenhouse gases by 20 percent, produce 20 percent of EU energy from renewable resources and improve energy efficiency by 20 percent.<sup>36</sup>

Through efficiency enhancement in resource allocation and usage; while focusing on innovative technologies by promoting public and private investment, a range of new jobs and services is expected to be created, along with the development of smart cities.

#### Barcelona

Barcelona has always been known for being one of the world’s leading smart cities. Barcelona is the capital of the autonomous community of Catalonia and the second largest city in Spain, with urban population of about 4.2 million people and about 5.4 million people in its metropolitan area. Although Spain was one of the most affected countries by the 2008 recession, Barcelona transformed itself into a model of smart urban systems, becoming a world’s leading tourism, trade, culture and sports destination.

In recent years, Barcelona has been building an impressive series of smart city initiatives to develop evenly all aspects which a smart city has to achieve. Not only focusing on promoting its own initiatives, Barcelona also strives to support the global smart cities development.

#### Smart city strategy & ICT plan

Barcelona implements a combination of urban planning, ecological research and information channels to ensure that the benefits of technology to reach every household in the city. Barcelona’s transitional approach is guided by a long-term vision of productivity enhancement towards people, in a highly connected, high-speed, and hazardous emissions-restricting metropolis.

A new team called “Smart City Barcelona” was formed by Xavier Trias, Mayor of Barcelona from 2011 to 2015. The responsibility of this team is to integrate existing projects and identify new opportunities to enhance services for the city’s residents and businesses. Since its inception, Smart City Barcelona has worked on an impressive portfolio of 22 programs covering 12 action areas including transportation, water, energy, waste, and open government.<sup>37</sup>

Barcelona’s ICT long-term strategic plan is underscored by the MESSI Strategy. The latter is an intelligent and integrated management approach of IT infrastructure is one of the key elements to obtain the objectives of the strategy: Mobility, E-administration, Smart city, Systems of information and Innovation.

34 At <https://www.worldsmartcity.org/europe-leads-number-of-smart-city-projects-says-new-report/>, (Consulted on 13.10.2017)

35 At <http://www.smart-cities.eu/?cid=2&ver=4>, (Consulted on 13.10.2017)

36 At [https://ec.europa.eu/clima/policies/strategies/2020\\_nl](https://ec.europa.eu/clima/policies/strategies/2020_nl), (Consulted on 13.10.2017)

37 At <http://datasmart.ash.harvard.edu/news/article/how-smart-city-barcelona-brought-the-internet-of-things-to-life-789>, (Consulted on 13.10.2017)



With the expectation of drawing on the fiber infrastructure to provide free Internet access network to all citizens and visitors, Barcelona worked on the installation of a 500 kilometers of fiber optic cable within the city. Until now, there are about 700 free Wi-Fi hotspots in Barcelona (the figure in 2013 was 670 Wi-Fi hotspots<sup>38</sup>) at a maximum distance of 100 meters from point-to-point.<sup>39</sup>

The current models of ICT service development at city level have been gradually approaching sustainable development, in which the application of some more efficient technologies such as cloud, using standards, and sharing service is noteworthy.

### **Impressive smart city service/application of the city**

From 2013, the official implementation of the Intelligent Data project which is considered to be a key part of over one hundred smart city projects in Barcelona created a platform for integrating and sharing information about the city and its services.

The other one which is also in the group of transversal projects under the Intelligent Data project is Urban Platform. This project was ready from 2014 and brings to city management a solution to unify data from various sources. CityOS (City Operating System), Sensor Platform or iCity are main platforms of the project

Regarding vertical projects, Electric Vehicles is a project which can be seen as clear evidence towards the goal of reducing pollutant emissions and improve air quality in Barcelona. According to a report issued by the General Directorate of Traffic Services, Barcelona is a leader in the number of registered electric vehicles in all of Spain<sup>40</sup>. Since 2009, the Barcelona City Council has developed the LIVE (Logistics for the Implementation of the Electric Vehicle) platform as the core electric vehicles in the city. This platform is open to all public and private entities, promoting e-mobility and encourages the use of EVs (Electric Vehicles).

Sensors plays an important role in the smart city implementation of Barcelona. This city has made extensive use of sensors to help monitor and manage traffic. They were applied in the Smart Parking project, whereby sensor systems can guide drivers to available parking spaces by sensing whether a vehicle is parked at a certain location. Sensor systems are also used in the Lighting Directorate Plan, a strategic plan for lighting in Barcelona.

### **Measures on collaboration and policy**

Central to in Barcelona's smart city approach is to work with multiple partners. It collaborates with several Catalan institutes, research center, technology companies, as well as other city councils and institutions. Barcelona has also enhanced the participation of the private sector in its smart city projects. The Barcelona City Council has signed strategic collaboration agreements with corporations such as Cisco Systems, GDF Suez, Indra, IBM, Telefonica, HP, Endesa, Ros Roca, Abertis or Schneider Electric, and others.

The promotion of PPP (Public Private Partnership) or the collaboration with private companies is expected to create and develop new innovative products for a more efficient urban management. Since 2015, after being known as a world leader in developing smart cities, Barcelona has been chosen as the location for the Centre for Public-Private Partnership in Sustainable Smart Cities (PPP for cities) of the United Nations.<sup>41</sup>

### **Amsterdam**

Amsterdam is the most populous city within the Kingdom of the Netherlands. It has a population estimated at 1.1 million in the urban region and about 1.6 million in the greater metropolitan area.

Amsterdam is subdivided into seven 'stadsdelen' (boroughs), a system that was implemented in the 1980s to improve local governance. Local decisions are made at the borough level, and only affairs pertaining to the whole

38 Ibid.

39 At <https://www.kayak.com.au/news/free-wi-fi-cities/>, (Consulted on 13.10.2017)

40 At <https://www.engelvoelkers.com/en-es/barcelona/blog/barcelona-the-city-with-the-most-electric-vehicles-in-spain/>, (Consulted on 13.10.2017)

41 At [http://www.catalangovernment.eu/pres\\_gov/AppJava/government/news/282913/un-selects-barcelona-establish-ppps-specialist-center-smart-sustainable-cities.html](http://www.catalangovernment.eu/pres_gov/AppJava/government/news/282913/un-selects-barcelona-establish-ppps-specialist-center-smart-sustainable-cities.html), (Consulted on 13.10.2017)

city, such as major infrastructure projects, are handled by the central city council.<sup>42</sup>

### Smart city program & ICT plan

As a pioneer in smart city development area, Amsterdam launched its Smart City Program (ASD) in 2009 to promote and support energy and connectivity innovation. The core targets of the project are to reduce CO<sub>2</sub> emissions and to develop the economy of the Amsterdam Metropolitan Area. The city wants to reduce 40% of its CO<sub>2</sub> production by 2025 and 75% by 2014 compared to 1990 numbers.<sup>43</sup> The city also wants to be climate neutral before 2015 and be powered by 20% of sustainable energy sources. There are four main vectors of the ASD: Sustainable Living, Working, Transport and Municipality.

The local authorities indicate three main principles of ASC: Collective effort, Economic viability and Push-Pull relationship between technology and new demand. Collective effort refers to the active and involvement of all important parties, which mainly belongs to the private sector. Push-Pull relationship is the term used to describe the expectation of technology application to be able to create a push towards sustainable behavior and in return, behavior change can result in pull demand for more new technology applications<sup>44</sup>.

Since connectivity plays a key role in the ASD, Amsterdam invested in new fibre-optic networks and ICT infrastructure to increase its connectivity. These actions are generally taken care of by the authorities, but sometimes they are provided by partners that relate to the projects.

Amsterdam is considered as the ICT capital of the Netherlands. Almost all big companies in the city notably focus on development in the ICT field. These dynamics are partly due to the city's ICT infrastructure, and more particularly, the city's Internet Exchange System (AMS-IX)<sup>45</sup>.

With the speed of 593 Gbit per second, the AMS-IX proved to be a valuable asset to attract companies that own advantages in high speed communications. The Netherlands is in the top three of the world in Internet usage, and 89% of the citizens in Amsterdam are connected to Internet. The wireless system covers almost the entire city.

The development of ICT in Amsterdam was also due to a partnership was also due to a partnership with two universities: VU University and the CWI.<sup>46</sup>

### Impressive smart city service/application of the city

The Nieuw-West smart grid is the first one that was implemented in Amsterdam; providing energy for more than 10,000 households in the city. In this intelligent system, interconnecting nodes are put in connection with computers and sensors so that the system can operate remotely. It was also improved continually to allow its structure energy to be transferred two-ways, helping users experience fewer and shorter interruptions.

Amsterdam also established an open database that updates all information on the city regarding public space, buildings and plots of land, traffic, healthcare, and environment. All this data is open and available through one online portal: City Data. By unlocking data sources to the citizens, local authorities expected it would be positive to the local economy, since it is also easier for businesses to access information, which can help them develop services or products with a more accurate notion of necessity<sup>47</sup>.

The city also made available to citizens the Energy Atlas, a comprehensive tool showing a plethora indicators regarding energy usage, creating wide opportunities for energy saving. This partnership has been well received and resulted in widespread information on energy level consumption of the neighbourhoods or housing blocks. This helps citizens and companies to manage their energy consumption more effectively and prompt necessary measures when needed.

42 Jeanette Whyte et al (2016), "Comparative Study of Smart Cities in Europe and China". Available at: [http://uk-chinasmartcities.com/wp-content/uploads/2014/05/Smart\\_City\\_report-Final--July-2014.pdf](http://uk-chinasmartcities.com/wp-content/uploads/2014/05/Smart_City_report-Final--July-2014.pdf), (Consulted on 13.10.2017) – P122

43 At <http://www.eurocities.eu/eurocities/Climate-and-energy-good-practices>, (Consulted on 13.10.2017)

44 At < <http://www.top-expo.cz/domain/top-expo/files/tee/tee-2011/prednasky/prednasky%202.%20den/2-3%20stahlavsky%20roman%20-%20amsterdam%20smart%20city%20project.pdf>> (Consulted on 13.10.2017)

45 "Amsterdam Knowledge Capital", AIM Amsterdam Innovation Motor (2007). Available at < <https://www.amsterdameconomicboard.com/app/uploads/2007/10/AmsterdamKnowledgeCapitalICT-1.pdf>>, (Consulted on 13.10.2017) – P13,17

46 Ibid. P22

47 At < <https://amsterdamsmartcity.com/projects/dataamsterdamnl>>, (Consulted on 13.10.2017)

Another remarkable innovative program in Amsterdam is the Vehicle2Grid project. This pilot initiative has been in its pilot phase since 2015 and aims to provide Amsterdam residents with the possibility to use the battery in their electric car to store their locally produced energy. Residents will be able to decide how to put their locally produced energy (i.e. from solar panels) to use. The energy can be transferred to the energy grid, used immediately or stored in the battery of an electric car, to be used at some later time to drive the car or run household appliances<sup>48</sup>.

### Measures on collaboration and policy

The ASC was initiated by the Amsterdam Economic Board, the City of Amsterdam, Liander and KPN. This unique partnership between businesses, authorities, research institutions and the people of Amsterdam contributed to the success of many smart city projects in Amsterdam. With more than 100 partners involved in a variety of projects focusing on open connectivity and the transition of energy, ASC has been broadening its scope gradually.

In order to facilitate private-public partnerships, the program has been structured as a foundation owned by the city of Amsterdam (50%), and Liander (a Dutch energy transportation operator) (50%). ASC is funded by AIM and Liander under the same split rate.<sup>49</sup>

ASC focuses on the total sum of testing innovative products and services, while attempting to understand the behaviors of the residents and users of the Amsterdam Metropolitan Area, forecasting sustainable economic investments. If new initiatives are adequately and successfully tested, the most effective initiatives can then be implemented on a larger scale, all the acquired knowledge and experience is shared via the ASC platform.

### Copenhagen

Copenhagen is the capital and most populous city in Denmark, with an urban population of about 1.3 million people and a metropolitan population of about 2 million people. It is the economic and financial center of Denmark.

Leading the Siemens Green City Index for Europe, Copenhagen has been known as one of the world's greenest.

### Smart city program & ICT plan

The goal of Copenhagen is to become the most modern and liveable city in the world, while being first capital in the world to be carbon-neutral in 2025. In terms of Energy Performance, an estimated 75% of CO<sub>2</sub> reductions come from initiatives related to the city's energy system with a huge increase in the share of renewable energy in district heating.<sup>50</sup>

The Council of Copenhagen established a long-term strategy in 2013 towards these goals. This focused on five main areas: smart mobility, health, energy & climate, smart citizens and smart learning.

Since then, seven administrations of Copenhagen cooperate hand in hand to follow the strategic objectives of the Government to create one of the smartest cities in the world. A core value of the plan is to help the capital to become a green city; hence Copenhagen Solutions Lab (CSL) was established. The vision of CSL is to connect companies of all sizes to take part in intelligent solutions for a greener environment for the city.

Copenhagen continues to work towards those goals, having already won the World Smart Cities Award in 2014. The latter was greatly due to the Copenhagen Connecting Project.<sup>51</sup>

The city also recognized the essential role of ICT planning is undeniable. Copenhagen established various plans with a clear direction of building sound smart infrastructures. The Lighthouse Projects is the key to these plans. Copenhagen's strategic Lighthouse Projects comprise big data platforms, digital infrastructures and mobility projects. This interface approach earned Copenhagen the number 1 place on ICT development in Europe in 2016

48 Amsterdam Smart City, website, Available at <https://amsterdamsmartcity.com/projects/vehicle2grid/>; (Consulted on 13.10.2017)

49 Roman, S (2011), "Amsterdam Smart City project". Available at: <http://www.top-expo.cz/domain/top-expo/files/tee/tee-2011/prednasky/prednasky%202.20den/2-3%20stahlavsky%20roman%20-%20amsterdam%20smart%20city%20project.pdf>, (Consulted on 13.10.2017) – P8

50 The Guardian, available at: <https://www.theguardian.com/environment/2013/apr/12/copenhagen-push-carbon-neutral-2025>, (Consulted on 13.10.2017)

51 At <https://stateofgreen.com/en/profiles/city-of-copenhagen/news/connecting-copenhagen-is-the-world-s-best-smart-city-project>, (Consulted on 13.10.2017)

after many of its impressive results.

### **Impressive smart city service/application of the city**

From 2014, the establishment of CSL (Copenhagen Solutions Lab) was the clearest evidence of the vision of Denmark and Copenhagen in general about private sector involvement in smart city development. CSL is an innovation hub that was established by the Danish Government to find solutions for the development of the capital to become a smart city. Generally, everyone is encouraged to be involved, from citizens, companies, start-ups, universities or research institutions. CSL is a place that has regular meetings for everyone to come and discuss on how to find out new solutions, especially those that apply technology.

Beyond a big data platform accessible by citizens and businesses local authorities of Copenhagen decided to establish new facility to turn waste into energy, known as “Amager Bakke”. Basically, this facility is a world-class tool for energy efficiency. The project is valued at €470 million, and helped Copenhagen impress the world with an attempt to advance in energy efficiency.<sup>52</sup>

The ITS (Intelligent Transport Systems) is also in focus in the city, and a key action in its Climate Plan. The “Intelligent bus priority” is a typical example of Copenhagen’s ITS application. The system has been tested and illustrated positive results. Other products include ITS projects: ECO-drive, Data and traffic management, sensor networks for collecting traffic data.

### **Measures on collaboration and policy**

At the core of Copenhagen’s approach to eco-innovation and sustainable employment are public-private partnerships. The city works with companies, universities and organizations in dedicated forums to develop and implement green growth.

Holding a big contribution to the success of Copenhagen are the two private sector partners: Hitachi and Cisco. They made a marked difference in the several smart city projects implemented, contributing not only with funding, but also the most advanced expertise. Cisco invested \$150 million to accelerate IoT start-ups and ecosystem.<sup>53</sup>

Hitachi also help the city to achieve outstanding results by successfully building a big data platform.<sup>54</sup> The private sector should not be forgotten while talking about Copenhagen success, thanks to its large private investors supported the city’s ambition.

## **Tallinn**

Tallinn is the capital and largest city of Estonia. It occupies an area of 159.2 km<sup>2</sup> and has a population of 439,517. Tallinn is the financial capital of Estonia. Over half of the Estonian GDP is produced there. The city benefits from a high level of economic freedom and liberal economic policy and has a highly diversified economy with particular strengths in information technology, tourism and logistics.

### **Smart city program & ICT plan**

In 2013, the City Council adopted the “Development Plan 2014 – 2020” in which Tallinn started its initial objective of making the city smarter.<sup>55</sup> The goal is to build an efficient city authority with an excellent service culture and a management system based on knowledge. For the city’s development, specific objectives were set, involving various projects to help the city follow the path of becoming smarter. This development document includes every aspect of development and improvement. ICT definitely is an important part of this. There were also projects that apply technological solutions and advance technologies in core areas.

With its Enterprise and Innovation Strategy 2014 – 2018, the city showed a clear direction towards transforming itself into a smart city. Tallinn wants to create an environment that supports innovation at all scales, and as a result promotes Tallinn’s competitiveness. A 5-year strategic action plan was draw out to support this goal. The key activities of the plan directly relate to cluster projects, inter-sectorial cooperation, innovation, new products, and

52 At <https://stateofgreen.com/en/profiles/ramboll/solutions/waste-to-energy-chp-amager-bakke-copenhagen>, (Consulted on 13.10.2017)

53 At <https://newsroom.cisco.com/press-release-content?articleId=1425984>, (Consulted on 13.10.2017)

54 At <http://europe-re.com/copenhagen-capacity-smart-city-of-the-future/50756>, (Consulted on 13.10.2017)

55 Jeanette Whyte et al (2016), “Comparative Study of Smart Cities in Europe and China”. Available at: [http://uk-chinasmartcities.com/wp-content/uploads/2014/05/Smart\\_City\\_report-Final-\\_-July-2014.pdf](http://uk-chinasmartcities.com/wp-content/uploads/2014/05/Smart_City_report-Final-_-July-2014.pdf), (Consulted on 13.10.2017) – P159

new services with technology applications.

As being greener is one of the key objectives, the city intends to be included in the 'European Green Capital Movement'; a title given to cities that show outstanding improvement in living environment and sustainable development. The plan partly involves new ICT systems. Some example includes zero-energy constructions, zero-emission transportation in the city center, and new lighting systems to head to energy efficiency to be achieved by 2030.<sup>56</sup>

Thanks to intelligent and specific strategies, the city was ranked in the top seven of the smartest cities for the third times.<sup>57</sup>

### **Impressive smart city service/application of the city**

Tallinn's public service database was successful to make most of its 580 public services online on an accessible database, rewarded as 'best practice' by EIPA in 2012.

Tallinn's official website makes transparent and regularly updated information available to the public. Nearly all information of the nation, such as temporary interruptions and new discoveries is available. The capital itself has suffered a digital transformation with impressive numbers to prove it. For instance, 70% of the health records are available online, local authorities manage businesses by an e-Business registration system, 95% of tax declarations and 98% of bank transactions are online. Digital signatures are common use in the country. Communication between the people and local authorities is mainly done through online D cards.

From January 2013, Tallinn officially made its public transportation system free to a large part of its residents, students and senior passengers. This made the city the first capital in the EU to have free virtually public transportation. For example, the population of the city increased by 25,055 from January 2013 to May 2017. As a result, Government revenue from personal income tax increased sharply. In 2016, 68% of the population of the city used the free public transportation; and income from all tickets sales was more than 4 million euros<sup>58</sup>. The city also increased parking tariffs within urban territories to reduce traffic and provide funding for the free public transportation system. Local authorities also merged two main public transport companies to save administration fees and improve management efficiency.

Within urban areas, local authorities are pushing strongly towards energy saving and efficiency and there were practical programs launched to support renovations to eliminate energy waste. These programs focus mainly on large apartments or big buildings.

### **Measures on collaboration and policy**

The Intelligent Community Forum ranked the city on a list of 7 most innovative cities for 5 times between 2007 and 2011. In the future, Tallinn will continue to focus mainly on developing e-government and e-services.

The success of Tallinn in smart city development is contributed to mainly by Government Partners, not really the Government itself. The private sector is indeed the most active player in this development path. There was an impressive variety of company types cooperating with Estonian municipalities to support its projects. A typical example is Reach-UAS - a company that provides solutions for wide range of areas from energy, forestry to tourism, it focuses mainly on how to efficiently use and evaluate data in local areas.

In all of these initiatives, the Science Park Tehnopol of Tallinn was a key contributor in ICT, green, and health technologies. In its R&D action, the organization looks for not only cooperation with global and international institutions, but also SME and new companies in the science areas<sup>59</sup>.

Financially, Tallinn also received significant support from EU funding for its projects. The EU structural funds were the major investment resources of Tallinn projects. There countless beneficially projects; but some examples include the digital payment portal, SMS-notification system and the online public service database.

56 At <http://news.err.ee/633112/social-democrats-smart-cities-more-equality-transparent-government>, (Consulted on 13.10.2017)

57 At <http://www.tallinn.ee/eng/uudised?id=26423>, (Consulted on 13.10.2017)

58 Toomas Sepp (2017), "Digitalized and smart city – Tallinn", City of Tallinn. Available at < <http://www.greencruiseport.eu/workshop-tallinn.html>>

59 Urben OU (2016), "Smart City Research of Tallinn and Tartu". Available at < <http://www.internationalondernemen.nl/sites/internationalondernemen.nl/files/marktrapport/Smart%20City%20Research%20report%20Estonia.pdf>>



## Frankfurt

Frankfurt am Main is the fifth-largest city in Germany, with a population of about 0.7 million. The actual urban area has a population of about 2.3 million people. The city is at the center of the larger Frankfurt Rhine-Main Metropolitan Region which has a population of about 5.8 million people (December 31, 2015) and is Germany's second-largest metropolitan region.

Frankfurt is one of the world's leading financial centers and also the largest financial center in continental Europe. Frankfurt is a major air, rail and highway transport hub. Frankfurt Airport is one of the world's busiest international airports by passenger traffic and Frankfurt Central Station one of the largest terminal stations in Europe. The city is also a center for commerce, culture, education, tourism and web traffic.

### Smart city program & ICT plan

Frankfurt researches has merged its smart city approach with a "green city" perspective. In its policies the term 'smart city' is hardly found frequently. Frankfurt's vision really is to create a green city; but the method of the city to attain this goal is using latest technology.

Frankfurt set out some specific objectives such as reducing 40% of CO<sub>2</sub> production by 2025. Integrated in a wider German national strategy to fully consume renewable energy resources by 2050. Between 2012 and 2014, Frankfurt had mass support from public and experts for the preparation of the city's plan.

To attain the goal of only rely on renewable energy by 2050, Frankfurt will have to reduce its energy consumption by half. A public consultation was undertaken to draw out a master plan to help the city achieve this

From the local authorities' point of view, the most realistic assumption is to cut down 35% of today's consumption through efficiency solutions. 45% will be supplied by both national and international renewable energy sources, while the remaining 20% will be solved by local renewable sources.

The "Passive House Strategy" is key to Frankfurt's practice to achieve the status of green city. The "passive house" strategy is widely applied in German construction, aiming to achieve optimal energy efficiency in building. In basic terms, a "passive house" is a house or a residential unit built in such a way that can, under the right circumstances, generate more energy than it consumes. This is a Frankfurt city standard for new real estate development. In basic terms, "the Passive House is the world's leading standard in energy efficient design. It started out as a construction concept for residential buildings in Central Europe. Today, the Passive House Standard can be implemented in all types of buildings almost anywhere in the world. The demand for Passive Houses as well as information on and experience with Passive Houses has been increasing at an enormous pace, reflecting the trend-setting developments in this field"<sup>60</sup>.

When it comes to the environment, transportation is a fundamental. In 2003, Frankfurt's parliament approved a plan to increase bicycle usage from 6% in 1998 to 15% in 2012. The global transport plan of the city, which was draw out in 2005, also included the plan of making the transportation system integrated in 2015.

The city recognizes the importance of changing the energy system because of the fact that 75% of CO<sub>2</sub> emissions are from urban communities and areas. The government also clearly defined that active involvement at a national scale is needed, and to raise awareness among the population on the essentials of the issue, pushing for a wider usage of public means of transportation. To succeed, it is recognized that public sector, private sector, organizations, and institutions need to take part<sup>61</sup>.

To promote and develop digital infrastructure in the local region, the city established the Digital Hub to help promote networks that is hoped to create more value. The association operates following particular goals such as:

- Creating a network that connects different industries, sciences and institutions together to transform Frankfurt into a digital infrastructure city of Europe that has strong R&D capacity.

<sup>60</sup> Passipedia, website, Available at <https://passipedia.org/basics>; (Consulted on 13.10.2017)

<sup>61</sup> Gerhard Stryi Hipp (2014), "How to develop reliable and sustainable energy systems for smart cities?"; Fraunhofer Institute for Solar Energy Systems ISE. Available at <[https://www.fraunhofer.in/content/dam/indien/en/documents/FIT%20Platform%202014\\_%20Mr\\_Gerhard%20Stryi-Hipp\\_Fraunhofer%20ISE.pdf](https://www.fraunhofer.in/content/dam/indien/en/documents/FIT%20Platform%202014_%20Mr_Gerhard%20Stryi-Hipp_Fraunhofer%20ISE.pdf)>

- › Having supports from the public as they have clear awareness of the key role of digital infrastructure
- › Both politically or industrially commitment of leaders in this strategic goal
- › Promote the development and innovations in digital infrastructure of Frankfurt Rhein-Main.
- › Fast-track expansion of digital infrastructure movement

A symbol of the ICT development of Frankfurt is DE-CIX, one of the key internet exchange system in the world, which belongs to the city. The system ranks second place in Europe. The massive energy consumption of the system and its direct association to CO<sub>2</sub> production made it a great challenge for the city's green IT development; hence, it became a required part of the city's general strategy to reduce CO<sub>2</sub> emissions. It is calculated that around 9,000 tons of CO<sub>2</sub> were emitted annually by the contribution of the Government's IT alone, equivalent to € 2.4 million. The city authorities aimed to reduce 50% of the city consumption and CO<sub>2</sub> total quantity within 5 years.

The Information and Communication Technology Department of Frankfurt planned to build a center that has an integrated capacity of all individual server functions. Only the highly efficient parts are kept and all the components will be utilized as much as possible. This also means the closing of more than thirty computer centers of all sizes.

### **Impressive smart city service/application of the city**

An outstanding move of Frankfurt is its E-Mobility 2025 Strategy. The initial step of the city in the field was taken in February 2010, when the first charging station was opened and the first electrical car was delivered. At the end of 2010, e-vehicles became free of registration thanks to the free access system. Today, Electric mobility is a daily sight in Frankfurt, generally used by many companies with little sign of problems and absolutely eco-friendly. But the ambition of Frankfurt does not stop there. By 2025, the city committed that 10% of cars will be operated electrically and more than 50% of its traffic low-emission and low-noise. The model of electric mobility of Frankfurt is recognized and applied nationwide<sup>62</sup>.

Another successful application of Frankfurt is the Digital City guild mapping system - a software that can work in unlimited environments. It is being used by more than 40 different cities as the official map on their websites. The map documented more than 100 projects that relate to energy efficiency and new renewable energy resources.

One of Frankfurt's most famous products is its fintech ecosystem. There are various fintech success stories that can be found in Frankfurt. A typical example is 360T, an electronic FX trading company that was acquired by Deutsche Börse Group in 2015 for 725 million euros. Another success story is Vaamo which launched the digital wealth management service in 2014 and soon helped Germany to attain a leading position in the field.

In 2016, the world's first lighting controller, which applied the innovative LoRa™ technology, was built in Frankfurt. It brought a telemanagement system in an easier, faster and more economical way and this makes it possible to operate in large geographical areas. The modern design of the system allows it to operate independently even in worst cases of communication or power failures. The system can be considered as one of the leading smart city platform in the world as it can measure and analyze independently different electrical parameters lighting and transmit information through an advanced synchronization mechanism, reporting any errors in real time<sup>63</sup>.

### **Measures on collaboration and policy**

There was an environmental guideline developed in 2004 which defined sustainable development as responsibility of all authorities in local areas and requiring all social and economic parties to have a role. The 'Guidelines for cost-efficient construction' are considered as the world's leading high-standard rules of municipal management and procurement. The passive house standards need to be applied to any new buildings and refurbishment work is a must component.

Many projects on energy efficiency offices were completed after the adoption of a cooperation policy with banks and investment companies through the 'Energy Forum Banks and Offices' in 1992. The 'High-Rise Framework Plan' of the city in 2008 assigned a limited energy usage of 150 kWh/m<sup>2</sup>a, at least 50% of which should be from renewable resources. There are no exceptions to operate out of the Cost-efficient construction guideline. All the information about values and costs of energy consumption for the city assets in the last few years was made

62 At <[http://www.frankfurtmobil.de/files/7\\_frankfurt\\_-\\_ansgar\\_roese.pdf](http://www.frankfurtmobil.de/files/7_frankfurt_-_ansgar_roese.pdf)>

63 At <<https://intelliglight.eu/innovation-light-building-frankfurt-2016-new-intelliglight-lora-street-lighting-controller/>>

available online.

Frankfurt is still showing an active approach and commitment to its strategic goal. For instance, an investment plan valued at € 500 million in Frankfurt's wind farms implemented made by Mainova AG. ÖKOPROFIT, a joint project between Frankfurt am Main and local companies, shows no sign of conflicts between environmental preservation and profit making. The project aimed at protecting and preserving valuable natural resources of the city, cut down total CO<sub>2</sub> production, eliminating operating wastes, and reducing costs by efficient usage of energy and materials.

### 3.3. THE EU-VIETNAM FREE TRADE AGREEMENT (EVFTA): PAVING THE WAY FOR GREEN BUSINESS

#### 3.3.1. RENEWABLE ENERGY

The EVFTA is expected to be implemented in 2018. In order to well prepare for the implementation, the Government should raise the awareness among the authorities and society on the EuroCham's Green Growth Sector Committee recommendations as below. Renewable energy would benefit from an efficient and sustainable energy market and sustainable, energy-saving and environmentally friendly buildings. These topics are covered by Chapters 14 and 15 of the EVFTA.<sup>64</sup>

In Article 1, Chapter 14 of EVFTA regulated that "To this effect, the Parties shall cooperate towards removing or reducing non-tariff barriers and fostering cooperation, taking into account, where appropriate, regional and international standards". It is recommended to make sure that Vietnam first removes non-tariff barriers and fosters cooperation in accordance with EVFTA commitments.

Vietnam would do well to also introduce clear and practical legislation, as to facilitate and incentivize investment in renewable energy. The general principles with respect to renewable energy found in the EVFTA should be addressed in a new and comprehensive Renewable Energy Law (e.g., the definition of "renewable energy" in accordance with Article 2(f), Chapter 14, EVFTA). The new Law should supersede current conflicting regulations, which are very scattered over several laws and a myriad of secondary legal documents.

#### 3.3.2. MARKET ACCESS AND TRANSPARENCY

According to Article 4(1)(e), Chapter 14, EVFTA provides that "A Party shall ensure that the terms, conditions and procedures for the connection and access to electricity transmission grids are transparent and do not discriminate against suppliers of the other Party." It is recommended that Vietnam adopt a faster timeline for the implementation of the competitive wholesale market (CWM), so that EU suppliers can participate in the market. Adapting renewable energy in this CWM as equal or even provide preferential treatment as opposed to coal, gas and oil.

#### 3.3.3. CLIMATE CHANGE

According to Article 5 (2), Chapter 15, the commitments on climate change note that Vietnam and the EU agree to engage in a dialogue and share information and experience in, inter alia, the promotion of energy efficiency, of low-emission technology and of renewable energy. It is expected that by offering green and clean, economic energy solutions, European companies can hope for Vietnam re-consideration of its power development plan.

<sup>64</sup> The agreed text as of January 2016 of EU-Vietnam Free Trade Agreement is available here: <http://trade.ec.europa.eu/doclib/press/index.cfm?id=1437> [last accessed on 14th July, 2017].

The improvement of air quality is an issue to be solved urgently and this is threatened by the revival of coal energy.

EuroCham also hopes that European Union and Vietnam will implement their commitment to reaching the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol and to cooperate on the development of the future legally-binding international climate change agreement, to have more dialogues and share information, best practices and lessons learned in designing, implementing, and operating mechanisms for pricing carbon. EuroCham Green Growth Sector Committee has been very proactive to work on the topic, EuroCham having hosted in 2016 a dedicated event with UN Envoy for Climate and El Nino Mrs. Mary Robinson, as previously mentioned.

### 3.3.4. SPECIALISED COMMITTEE ON TRADE AND SUSTAINABLE DEVELOPMENT

According to Article 15, Chapter 15, EVFTA: “The Parties shall establish a Specialised committee on Trade and Sustainable Development. The Specialised committee on trade and sustainable development on Trade and Sustainable Development shall comprise senior officials from the relevant administrations of each Party or officials they designate. [ . . . ] Each Party shall convene new or consult existing domestic advisory group(s) on sustainable development with the task of advising on the implementation of this Chapter.” It is suggested that oversight of the mechanism and institution be set-up in accordance with EVFTA commitments. This could work by appointment of a ‘higher authority’ of the Vietnamese Government to supervise and rule on investments involving sustainable development (e.g., renewable supplier and off-taker issues). The higher independent authority would be in charge of coordinating regulations and implementation between the ministries and EU partners.

It would help to secure objective, transparent, non-arbitrary, not discriminating procedures and capacity building with respect to the renewable energy market. Moreover, foreign direct investors should have the right to directly appeal decisions from local authorities to this higher authority, which should have the power to overrule the decisions of local authorities. EuroCham’s Green Growth Sector Committee would be pleased to cooperate, support and be part of this new authority.

### 3.3.5. COOPERATION AND INFORMATION EXCHANGE, CAPACITY BUILDING

Article 7 of Chapter and Article 2.2, Chapter 16 mention the cooperation and exchange of information as well as cooperation and capacity building, under which “to achieve the objectives referred to in Article 1, the Parties attach particular importance to cooperating in the following areas: [ . . . ] (e) Sustainable development, notably in its environmental and labour dimensions”. The European Union and Vietnamese Government shall provide such capacity building activities and organize joint workshops and seminars between the Ministry of Industry and Trade, Ministry of Planning and Investment, Ministry of Finance, Ministry of Construction, Ministry of Natural Resources and Environment and other related Vietnamese governmental bodies with EuroCham’s Green Growth Sector Committee. EuroCham is also keen to exchange information on other levels, such as providing studies and investor surveys on renewable energy and direct meetings with Vietnamese governmental agencies and regulators.

As the positive outcomes for businesses, in 30th June 2017, Prime Minister Nguyen Xuan Phuc signed Decision No. 24/2017/QĐ-TTg replace for Decision No. 69/2013/QĐ-TTg on the adjustment mechanism of average electricity retail tariff. In July 2017, EuroCham was approached by Power Market Development Research and Training Center, Electricity Regulatory Authority of Viet Nam under Ministry of Industry and Trade to seek for EuroCham’s view of the revised average electricity tariff adjustment mechanism regulated in the new Decision. This clearly shows the proactive approach of the relevant authorities to seek for business opinions, information exchange on the subject from very early stage. EuroCham is motivated by such approach and looks forward to having more opportunities to support in improving the policies towards readiness for the EVFTA implementation in 2018.

### 3.3.6. SUSTAINABLE FOREST MANAGEMENT AND TRADE IN FOREST/ TIMBER PRODUCTS

It is anticipated that Vietnam will increase sustainable forest management and trade in forest/timber products under which the European Union can encourage the promotion of trade in forest products from sustainably managed forests, harvested in accordance with the domestic legislation a Forest Law Enforcement Governance and Trade (“FLEGT”) Voluntary Partnership Agreement. By also exchanging information on measures to promote consumption of timber and timber products from sustainably managed forests and cooperation this will promote the conservation of forest resources and combat illegal logging and related trade and to improve forest law enforcement. EuroCham Green Growth is also supporting to ensure eliminating illegally harvested timber and timber products from trade flows and having transparent product process chain from Vietnam. EuroCham has been also cooperating with Vietnam Trade Promotion Agency under Ministry of Industry and Trade to share its perspectives on the opportunities and challenges for business in the handicraft and timber products and recommendations how to best promote these products to the European market.

EuroCham sees many opportunities for both EU and Vietnamese companies. Imports of wood raw materials from the EU are expected to increase in the coming years in Vietnam. Vietnamese producers can import more wood from EU to produce better quality products with high technology. EU companies can enjoy protection of investments with trade facilitations and increase investments in the handicraft and furniture sector in Vietnam; therefore, local production would be improved with more variety of design and patterns as well as quality. EU investors would bring their well-known technology in management and training, allowing for more value added production, and less waste of material and resources.

With stronger awareness on license and origin, Vietnam’s wood and furniture products could have easier access to EU market. However, there are challenges for Vietnamese products: which still lack effective resource management, IPRs protection (patterns and designs), have low labour efficiency, etc. Vietnamese products also face global competitiveness: especially from other countries in the South East Asia region, and to overcome this, Vietnamese producers must develop product differentiation and diversification. Of course, Vietnamese legal framework would do well to be in line with the EU requirements with respects to the legality of products and the environment protection and to ensure the legitimate origins of the products’ materials.

EVFTA contains a comprehensive chapter on trade and sustainable development which gives a unique opportunity for Vietnam to improve some aspects of its economy. European customers do not only care about quality and safety, but also environment protection, Sustainable development and Corporate Social Responsibility. International practices, in regard to climate changes and commitment to preservation and sustainable management of biodiversity are important criteria of EU businesses. There are some other requirements such as fair labour and working conditions, health and safety; effects to community; protection of their trademarks, copyrights, inventions and patents, etc. EuroCham strongly believes that through its advocacy effort, aims to strengthen cooperation with Vietnam Government and EU Stakeholders on the trade/investment in timber and forestry industry.



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# **EUROPEAN SOLUTIONS FOR A GREENER FUTURE FOR VIETNAM**

**CHAPTER IV**

# EUROPEAN SOLUTIONS FOR A GREENER FUTURE FOR VIETNAM

## 4.1. INTRODUCTION: THE EUROPEAN GREEN BUSINESS SECTOR IN VIETNAM

On 20<sup>th</sup> December 2009, the Wind Energy and Electric Vehicle Magazine spread the news that “First wind power project will be up and running soon.”<sup>1</sup> This was a first sign of a new era for renewable energies in Vietnam.

Previously that same year, EuroCham and VCCI in cooperation with the Ministry of Industry and Trade<sup>2</sup> organized the first exhibition and conference on Green Business Solutions for Vietnam. While showcasing European solutions to Vietnam’s development challenges – focusing on energy, water, transport and construction sectors, as well as financing for green projects. Many opportunities have been pointed out and several have been implemented in Vietnam since then, and European companies – many of which EuroCham members – have taken an active role in making the most of these opportunities whenever possible.

Since 2009, with German company Fuhrländer (as Vietnam Renewable Energy joint stock company - REVN) opening the first wind power plant in Vietnam, several enterprises from Europe’s renewable energy sector have been coming to Vietnam. The implementation of a more efficient regulatory framework has been slower than expected; and there has also been a lack of incentives as well as cost-covering Feed-in Tariff (FiT) and as a result the market has moved slower than initially expected.

Good wind power conditions in Vietnam’s southern and south-central areas remain to be explored in a more broadened approach. So far, most of the private sector investments in Vietnam’s Renewable Energy sector have been possible due to subsidies or international climate change action funds. The market has kept moving in this context, however the need for more purely private investment has gradually taken a higher profile with decision-makers.

European business has been highly involved with the history of the development of the market, since its origin until today. In 2017, German-based company EAB inaugurated a 16 turbine wind power park in Mui Dinh. Currently, the Danish group Vestas and the German-Spanish joint venture is also involved in projects at the development stage.

In total, the wind power development in Vietnam has 12 projects, ranging from 1 to 150 turbines. Not all of them are currently fully functional, but construction is underway. Challenges in the market remain, with a low FiT which has been keeping the development of the market somewhat sluggish. In any case, great potential remains and small steps are being taken forward. The revised Power Development Plan 7 foresees only 0.8% of the electricity production from wind power by 2020<sup>3</sup>, while 65 projects with more than 5,700 MW capacity are registered.<sup>4</sup>

When it comes to solar PV, a similar picture can be painted. Vietnam has very favourable solar irradiation conditions and the international costs for solar PV are constantly decreasing. In 2020, a modest amount of 0.8% of electricity generation should be achieved through solar PV. By 2030, this would be 3.3%, which would mean 12,000 MW. Several European technology providers, project developers and investors are closely observing the upcoming progress, whether Vietnam can become even more interesting for solar development. In 2016, EuroCham conducted and published its Solar Expert Survey covering inputs from business professionals and experts in

<sup>1</sup> [www.evwind.es/2009/12/20/wind-power-in-Vietnam-first-wind-power-project-will-be-up-and-running-soon/2939](http://www.evwind.es/2009/12/20/wind-power-in-Vietnam-first-wind-power-project-will-be-up-and-running-soon/2939), last access 16. August 2017

<sup>2</sup> Remark: besides the cooperation and involvement in 2013 with 10 more Ministries of Vietnam at the European Green Business Solutions for Vietnam 3rd edition.

<sup>3</sup> GIZ, Deutsche Gesellschaft fuer Internationale Zusammenarbeit, Vietnam Power Development Plan for the Period 2011-2020, available at: [http://gizen-ergy.org.vn/media/app/media/legal%20documents/GIZ\\_PDP%207%20rev\\_Mar%202016\\_Highlights\\_IS.pdf](http://gizen-ergy.org.vn/media/app/media/legal%20documents/GIZ_PDP%207%20rev_Mar%202016_Highlights_IS.pdf) (Consulted on 15.08.2017), p.6

<sup>4</sup> LEXCom, 2017 Outlook for Vietnam Renewable Energy, <http://36mf1a0yt01ki78v3bb46n15gp.wpengine.netdna-cdn.com/wp-content/uploads/2017/06/2017-Outlook-for-Vietnam-Renewable-Energy.pdf> (Consulted on 15.08.2017), p.9



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An initiative co-funded by the European Union

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Southeast Asia, and summarised therein the necessary steps towards an attractive solar energy market.<sup>5</sup>

In addition, passive solar utilization and waste-to-energy projects also bare mentioning. Concerning the latter, many small-scale solutions have been implemented already. Until 2016, the Swedish-Swiss building material producer Holcim Vietnam was the frontrunner in this field, joined at the top by Xella from Germany and Saint Gobain Gyproc from France.

In the field of passive solar heating, Ariston and Arkon-Solar, from France and Denmark respectively, have been active in Vietnam for many years. Related to energy efficiency in industrial processes, the Swiss-Swedish ABB group has been established for a long time in Vietnam, while the Dutch company Philips Lighting services many cities. Overall, in the field of energy efficiency equipment and projects on industrial, sustainable buildings or smart city scales, European companies have an overwhelming presence in the market.

Similar to resource efficiency, green building is a sector that cannot easily be listed in entirety, as many European professionals and enterprises are involved in such exercises, thanks to the strong expertise in this field found in Europe. This ranges from architecture and design offices, to building automation and efficiency adaptation specialists.

In the field of water or waste management, there are many active enterprises from Europe with established longstanding partnerships and joint ventures or are acting as suppliers in the Vietnamese market. Dutch, Swedish, German or Austrian companies appear regularly, Royal Haskoning DHV among them.

In order to round up some other clean technology and green related fields of businesses in Vietnam, recycling, contaminated soil remediation, CO2 offsetting, and landfill clean-up experts are regularly active in the market or established partnerships. In short, European presence in the green business market in Vietnam is diverse, both in terms of countries of origin and depth of involvement. What can be concluded from their output and local demand so far is that European know-how and experience matches the needs of Southeast Asia's diverse geo-political profile, but in particular Vietnam as it shifts to a market economy its leaders desire to be deeply connected to global trends. Green growth being unavoidably one of them.

Other European green business achievements and projects could be mentioned. For instance, the Deutsche Haus in HCMC<sup>6</sup> is the award-winner 2016 for Southeast Asia's best green building.<sup>7</sup> Additionally, Robert Bosch's cooperation in Vietnam's with 3 universities in HCMC, Binh Duong and Danang which has led to pilot projects for e-scooters and solar-docking stations.<sup>8</sup> Also noteworthy is Austrian FDI Biomin Vietnam's output in terms of sustainable agriculture, aquaculture and food safety in several regions in Vietnam.<sup>9</sup> Furthermore, the European approach is also felt in other industries which take on best practices with the goal to minimize their industrial footprint and reduce future negative externalities. A good example would be German leather manufacturer TanTec which works in a context of minimal environmental impact in the non-green leather manufacturing industry, with a focus on knowledge transfer and high-value employment.<sup>10</sup>

Clearly, green business field for clean technology and green growth in Vietnam is extensive. Developments in recent years have brought green business in Vietnam from a European donor support base (e.g. GIZ, Swedish Centec, Danish DANIDA, French AFD, Finnish FinPro, Dutch SNV or European Union funds) towards market-based dynamics. There are definitely many opportunities and European green business solutions are well sought-after.

5 EuroCham, Solar Expert Survey Vietnam 2016, [https://www.eurochamvn.org/user/login?destination=files/docs/solar\\_power\\_survey\\_eurocham\\_green-growth.pdf&page=403](https://www.eurochamvn.org/user/login?destination=files/docs/solar_power_survey_eurocham_green-growth.pdf&page=403) (Consulted on 16.08.2017)

6 Deutsches Haus HCMC, website, available at: <http://www.deutscheshausVietnam.com/energy-efficiency-green-features-61.html> (Consulted on 15.08.2017),

7 Ibid.

8 Vietnam Investment Review, Bosch Scooters built to rideshare, available at: <http://www.vir.com.vn/boschs-escooters-built-to-rideshare.html> (Consulted on 15.08.2017),

9 Biomin, website, Biomin Announces new Aquaculture research centre in Vietnam, available at: <http://www.biomin.net/en/press-releases/biomin-announces-new-aquaculture-research-center-in-Vietnam/> (Consulted on 15.08.2017)

10 Leather Mag, accessible at: <http://www.leathermag.com/news/newsthen-schneider-isa-tan-tec> (Consulted on 15.08.2017),



The EU-Vietnam Business Network (EVBN) is a project co-founded by the European Union and established in 2014. The overall objective of EVBN is to increase exports & investments of the European Union (EU) to Vietnam in particular by SMEs as well as to strengthen the EU Business sector in Vietnam by facilitating market access.

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- Trade Mission: 3 - 4 day agenda with potential Vietnamese partners through B2B match making
- Events: exhibitions, trade shows, business luncheons
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### Pre-market Consultation

- Free-to-download market studies and reports
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- Unique comprehensive startup facilities for European companies

## EVENTS COMING UP



### Green Technology Trade Mission

November 7 - 10, 2017  
Ho Chi Minh City



### Food & Beverage Trade Mission

Jan 29 - Feb 3, 2018  
Ho Chi Minh City

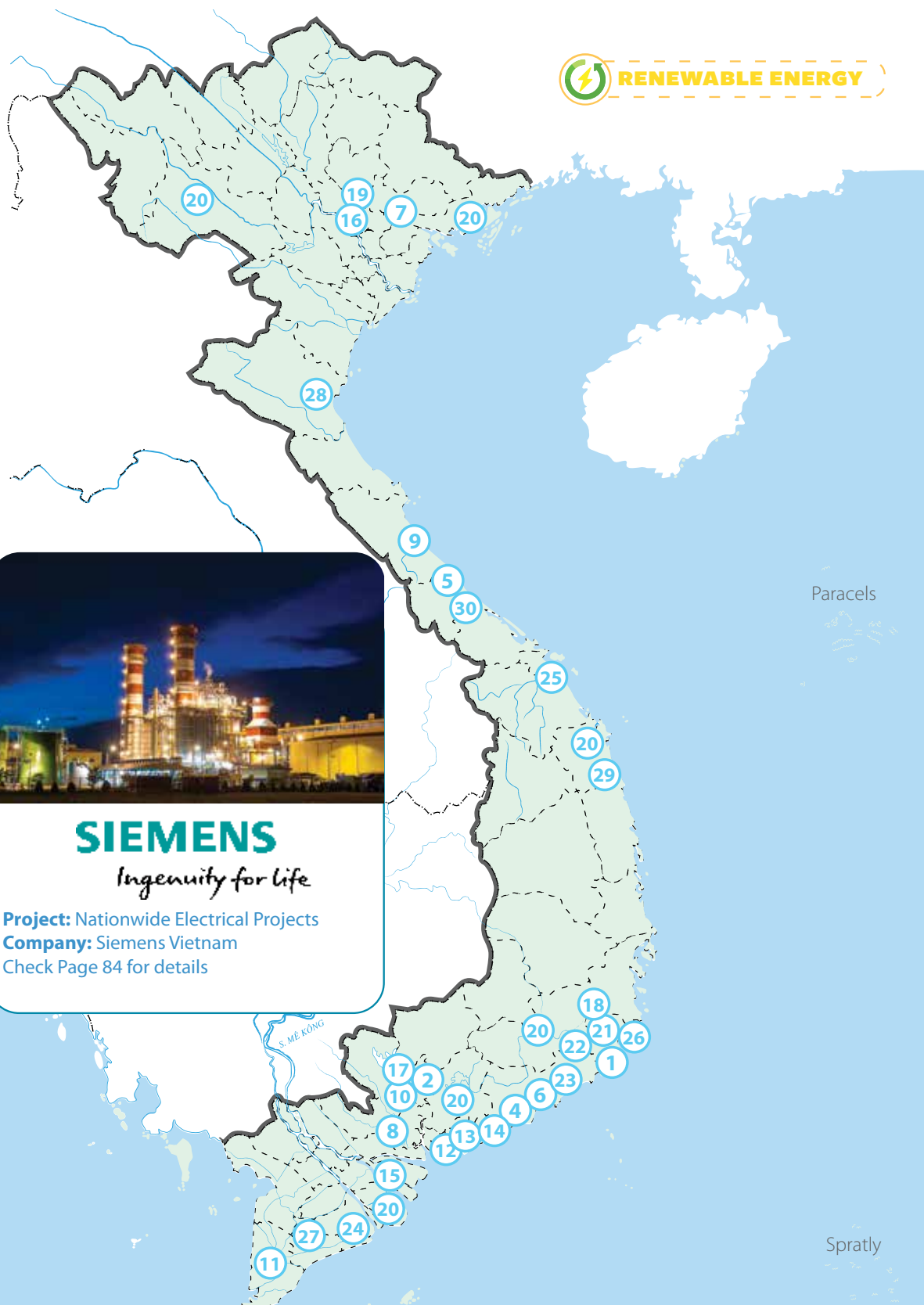
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## 4.2. MAP OF RELEVANT PROJECTS INVOLVING EUROPEAN GREEN SOLUTIONS IN VIETNAM





## LIST OF “RENEWABLE ENERGY” PROJECTS



## Belgian Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
1	Wind farm Thuan Nam and Ninh Phuoc (124.5MW)	Belgium's Enfinity Asia Pacific Limited	Ninh Thuan	Belgium's Enfinity Asia Pacific Ltd



## Danish Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
2	Arcon-Sunmark Solar Panels Production	Arcon Sunmark	Di An, Binh Duong	Arcon Sunmark
3	Energy partnerships with public authorities in Vietnam	Danish Ministry of Energy, Utilities and Climate	Nation-wide	COWI
4	Hybrid Diesel-Windpark Phu Quy (6MW)	PetroVietnam Power Corporation	Long Hai, Ngu Phong, Phu Quy island, Binh Thuan	Vestas
5	Windpark Huong Linh 2 (30MW)	Tan Hoan Cau JSC	Huong Hoa, Quang Tri	Vestas
6	Windpark Phu Lac 1 (24MW)	EVN	Tuy Phong, Binh Thuan	KfW Development Bank; Vestas



## Dutch Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
7	Swire Group	Royal Haskoning DHV/ABB Group	Bac Ninh	Royal Haskoning DHV



## French Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
8	Deutsche Bekleidungswerke Ltd	Royal Spirit Group, Hong Kong	Long Hau Industrial Zone, Long An	Artelia Vietnam
9	Hybrid Diesel-Solar System (11kWp)	Suez Foundation	Village 61, Thuong Tra Commune, Bo Trach District, Quang Binh	Schneider Electric Vietnam
10	Solar panels on the roof of Big C shopping centre	Big C Green Square	Di An, Binh Duong	Schneider Electric Vietnam



## LIST OF “RENEWABLE ENERGY” PROJECTS



### German Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
11	1500MW Ca Mau 1&2 CCPP - Power Island	Siemens AG	Ca Mau	Siemens AG
12	278MW Phu My 2.1 Extension	Siemens AG	Phu My, Tan Thanh, Vung Tau	Siemens AG
13	750MW Nhon Trach 2 CCPP - Power Island	Siemens AG	Phu My, Tan Thanh, Vung Tau	Siemens AG
14	750MW Phu My 3 BOT CCPP	Siemens AG	Phu My, Tan Thanh, Vung Tau	Siemens AG
15	SCADA/DMS and 110kV unmanned substations for Southern Power Corporation	Siemens AG	South of Vietnam	Siemens AG
16	Solar Roof-top System of MoIT Building (12kWp)	Ministry of Industry and Trade of Vietnam	MoIT Building, Hanoi	GTZ; Dena; Altus AG
17	Solar Roof-top System XP Power Factory (40kWp)	XP Power Vietnam	XP Power Factory, Thoi Hoa, Binh Duong	XP Power Vietnam
18	Solar System (2MW)	Trung Nam Group	Ninh Thuan	Enercon Group
19	Thanh Cong and Tay Ho 220kV gas-insulated switchgear (GIS)	Siemens AG	Hanoi	Siemens AG
20	Thousands of 110Kv substations, hundreds of 220kV substations and dozens of 500kV substations	Siemens Vietnam	Quang Ninh; Son La; Doc Soi, Quang Ngai Dai Ninh, Lam Dong Song May, Dong Nai Duyen Hai, Tra Vinh	Siemens Vietnam
21	Windpark Mui Dinh (37,6MW)	EAB New Energy	Onshore - Tu Thien Village, Phuoc Dinh Commune, Thuan Nam District, Ninh Thuan	EAB New Energy
22	Windpark Ninh Thuan (90-100MW)	Trung Nam Group	Ninh Thuan	Enercon Group
23	Windpark Phong Dien 1 (30MW)	REVN	Tuy Phong, Binh Thuan	Enercon Group



### Irish Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
24	Swire Cold Storage	Phu Cuong Group	Nearshore - Lac Hoa Commune, Vinh Chau Town, Soc Trang	Mainstream Renewable Power



## LIST OF “RENEWABLE ENERGY” PROJECTS



## Italian Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
25	Da Nang Airport	Da Nang Government	Da Nang	Entoria; ABB Group



## Spanish Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
26	Dam Nai Wind Power (40MW)	Blue Circle; TSV	Ninh Thuan	Gamesa



## Swiss Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
25	Da Nang Airport	Da Nang Government	Da Nang	Entoria; ABB Group
27	Bac Lieu wind	Cong Ly Ltd Company	Mekong Delta, Southern Vietnam	ABB Group
28	NASU Sugar Mill	ABB Group	Nghe An	ABB Group
29	Quang Ngai Sugar Factory	Quang Ngai Sugar Joint Stock Company	Quang Ngai	ABB Group
30	Quang Tri Wind Park	Tan Hoan Cau (Vietnam); ABB Group	Quang Tri	Vestas





## WASTE AND WATER



4 International certificates  
ISO 9001:2008  
ISO 14001:2005  
ISO 45001:2018  
OHSAS 18001:2007

\$155 million  
Invested into 2 most advanced factories in Binh Duong & Ho Nam

40%  
Energy saving  
15%  
Water saving

50%  
Waste recycling

REUSE REPAIR RECYCLE

- Reuse wastewater to water plants
- Encourage to use ceramic cups instead of paper cups
- Utilize domestic leftovers to raise livestock

**FrieslandCampina**  
nourishing by nature

**Project:** Green Production  
**Company:** FrieslandCampina Vietnam  
Check Page 88 for details

Paracels



**BOSCH**

Sáng tạo vì cuộc sống

**Project:** Waste & Water Treatment at Bosch  
Gasoline Systems Plant  
**Company:** Bosch Vietnam  
Check Page 86 for details

Spratly



## LIST OF “WASTE AND WATER” PROJECTS



## Belgian Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
1	Environmental and Social Impact Assessment	Ecorem-AIEI Vietnam	Lach Huyen Seaport, Dam Nha Mac IZ, Hai Phong	Ecorem-AIEI Vietnam



## Dutch Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
2	Green Production	FrieslandCampina Vietnam	Ha Nam; Binh Duong	FrieslandCampina Vietnam
3	Ground Water Treatment Plants	Water Supply Holland Company; PWN Technologies	Tan Kim and Truong Binh Commune, Can Giuoc District, Long An	PWN Technologies



## Finnish Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
4	Hai Phong Water Supply Programme	ODA	Hai Phong	n.a.
5	Hanoi Water Supply Programme	ODA	Hanoi	n.a.



## French Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
6	Construction of Lao Cai Solid Waste Treatment Plant	VinaEnvitech; HUDI; RIAM	Lao Cai	Brim
7	Construction of Thai Nguyen Waste Treatment Plant and Piping System	Berim; Vinci Construction; Degremont	Thai Nguyen	Berim; Vinci Construction; Degremont
8	Construction of Vung Tau Waste Treatment Plant and Piping System	Berim; Vinci Construction; OTV	Vung Tau	Berim; Vinci Construction; OTV
9	Design Of Sanitation Network For Hoi An (Solid Waste/Waste Water Treatment)	Berim; Vinci Construction; Stereau	Hoi An	Berim; Vinci Construction; Stereau
10	Veolia Water Technologies Vietnam	Veolia Water	Ho Chi Minh City	Veolia Water



## LIST OF “WASTE AND WATER” PROJECTS



### German Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
11	Bac Ninh Water Supply and Sewerage Company	GIZ; Tilia GmbH; GFA Consulting Group GmbH	Bac Ninh	GIZ; Tilia GmbH; GFA Consulting Group GmbH
12	E-Waste Recycling	Reverse Logistics Group	Ho Chi Minh City	Reverse Logistics Group
13	Waste and Water Treatment at Bosch Gasoline Systems Plant	Bosch Vietnam	Dong Nai	Bosch Vietnam



### Hungarian Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
14	Quang Binh/ Quang Trach Water Supply	Hungarian Water Cluster; Hungarian ODA	Quang Binh	Hungarian ODA



### Italian Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
15	Hydro Meteorological Monitoring Network of the Mekong Delta	National Hydro Meteorological Service of Vietnam; CAE S.p.A.	Mekong Delta, Southern Vietnam	CAE S.p.A.



### Spanish Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
16	SAWACO ICT	Pyrenalia, ABB Group	Ho Chi Minh City	ABB Group



### Swiss Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
17	Hue Waste Water Plant	Swing, ABB Group	Hue	ABB Group

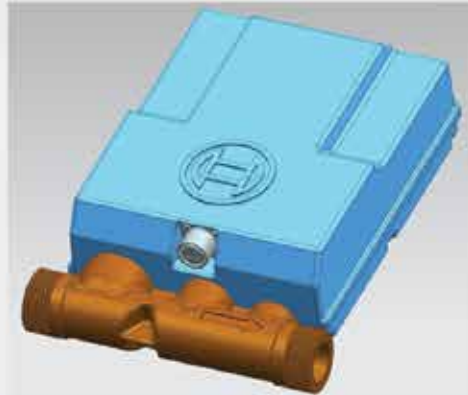
**BOSCH**

Invented for life

## Smart Aqua

According to World Bank, in 2016, everyday there was 45 million cubic meters of water loss which is enough to serve 200 million people.

94% of families would like to know their water consumption in advance, so they can adjust their water usage



**Smart Aqua** is a self-powered smart water meter designed for apartments, and homes to measure water flow and detect water leakage inside the home. It uses a hydro generator for generating power which makes the smart water a maintenance free product. This product can be installed in any part of building.



## Micro Climate Monitoring and Sensing Systems (MCMS)

How breathable is the air in your neighborhood? WHO Global Urban Ambient Air Pollution data 2016 highlights that 98% of densely populated cities in economically under-developed countries showcase highest urban ambient air pollution levels.

**Bosch Micro Climate Monitoring and Sensing System (MCMS)** supports 'Quality of Life' by remotely monitoring and collecting data 'over the cloud' on the concentration of common air pollutants. MCMS is easy to deploy, technologically advanced and incurs zero added infrastructure investment. It connects compact wireless sensors over Wi-Fi and GSM networks enabling micro-climatic data collection. MCMS is powered with the state-of-the-art IoT-friendly Intel Quark processor enabled with a "pattern matching" technology; facilitating energy-efficiency, scalability and sustainability for real-world applications.



## GREEN BUILDING

**Project:** B. Braun AP Five Building Stage 2  
**Company:** Shimizu Corporation  
 Check Page 94 for details

**SHMZ**

**Project:** CP Sustainability project  
**Company:** Royal Haskoning DHV  
 Check Page 92 for details

**INSEE**

**Project:** Big C Di An Binh Duong  
**Company:** Siam Cement City Group  
 Check Page 90 for details





## LIST OF “GREEN BUILDING” PROJECTS



### British Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
1	Mainetti Factory & Office	Mainetti Group	Long Thanh IZ, Long Thanh City, Dong Nai	n.a.



### Dutch Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
2	CP Sustainability Project	CP	n.a.	Royal Haskoning DHV
3	Solar Roof-top System (1.2kWp)	Elite Technology Co. Ltd; SNTEK	Thu Duc, Ho Chi Minh City	Elite Technology Co. Ltd; SNTEK



### French Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
4	Bel Greenfield Asean Factory	Bel Group	Song Than 3 Industrial Zone, Thu Dau Mot, Binh Duong	Archetype Vietnam Ltd
5	Lycee Francais Alexandre Yersin - HQE certification	Agence pour l'enseignement français à l'étranger (AEFE)	Hanoi	DK Engineering Ltd; Artelia Vietnam
6	SCADA Solution for sewage plant (part of "Improved sanitation in Nha Trang city" Project)	World Bank	Nha Trang	Schneider Electric Vietnam



## LIST OF “GREEN BUILDING” PROJECTS



### German Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
7	Deutsches Haus	Deutsches Haus Ho Chi Minh Stadt (Vietnam)	Ho Chi Minh City	gmp International GmbH; Federal Foreign Office of Germany; Sellhorn Hafkemeyer GmbH; Mace Group – Mace Vietnam Company Limited; Thyssenkrupp; Sellhorn Hafkemeyer GmbH; WSP Germany – WSP Vietnam Limited; Aurecon; Acardis; WSP
8	Energy Efficient Model House	College of Urban Works Construction	Hanoi	German Development Cooperation; Xella Baustoffe GmbH; iproplan Planungsgesellschaft mbH; BFW Bau Sachsen; Bau msr GmbH
9	UN ONE Greenhouse	Government of Viet Nam, donors and the United Nations	Hanoi	Xella Baustoffe GmbH



### Swiss Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
10	PVN Tower HCMC	PetroVietnam Power Corporation	Ho Chi Minh City	ABB Group; IBS



### Other Countries

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
11	B.Braun Five AP Building Stage 2	B.Braun	Thanh Oai Industrial Complex, Thanh Oai District, Hanoi	Shimizu (Japan)
12	Big C Green Square Binh Duong	Big C Vietnam	Di An, Binh Duong	Siam City Cement (Thailand)

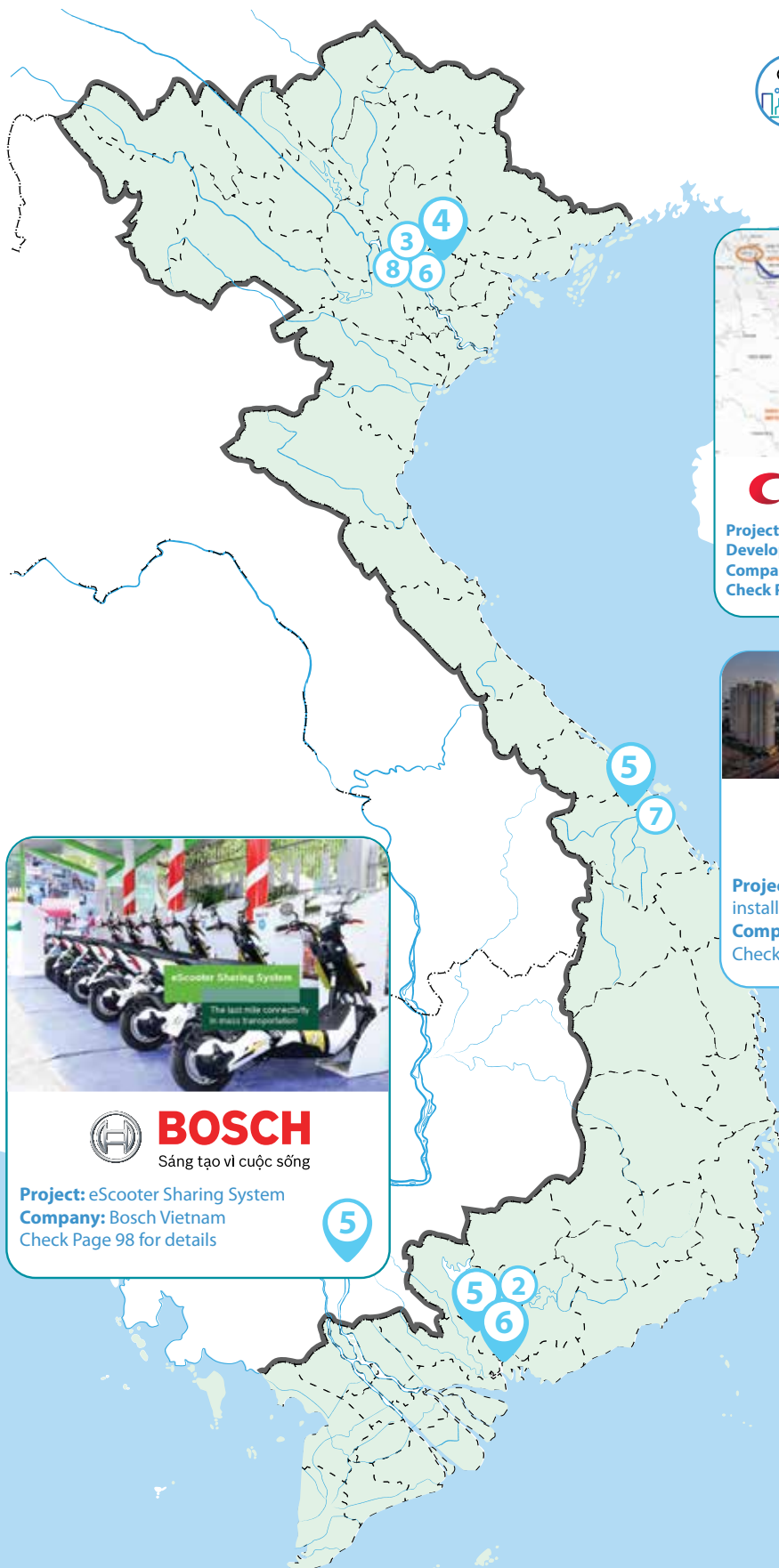
# Deutsche Bank: a long-term commitment to Vietnam

Deutsche Bank's presence in Vietnam goes back 25 years. We are here to help clients make the most of opportunities in the country and to connect them to the global financial market. That is how we make a positive impact for our clients by enabling them to achieve their business goals.





## SMART CITIES



**CNR ENGINEERING**

**Project:** Northern Delta Transport Development  
**Company:** CNR Engineering  
 Check Page 100 for details

4



**ABB**

**Project:** ABB Ability Symphony® Plus installation  
**Company:** ABB Group  
 Check Page 96 for details

6



**BOSCH**

Sáng tạo vì cuộc sống

**Project:** eScooter Sharing System  
**Company:** Bosch Vietnam  
 Check Page 98 for details

5

Spartly



## LIST OF “SMART CITIES” PROJECTS



### Danish Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
1	Urban Environmental Planning Programme, Vietnam	EU Fund	Nation-wide	Cowi; Danida



### Dutch Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
2	Consultation on Smart City Strategy for Binh Duong City	Brainport	Binh Duong	Brainport



### French Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
3	General consultant to Contracting Authority for Metro Hanoi project	Systra; Alstom; Colas Rail; Thales; Apave	Hanoi	Systra; EIB; AFD
4	Northern Delta Transport Development Project	World Bank; VIPO	Hanoi and Red River Delta	CNR Engineering



### German Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
5	eScooter Sharing System	Bosch Vietnam	Ho Chi Minh City; Binh Duong; Da Nang	Bosch Vietnam



### Swiss Projects

No.	Name of Project	Consortium Leader	Location	European Partnership Involved
6	ABB Ability Symphony® Plus installation in HCMC	HCMC's People Committee	Ho Chi Minh City	ABB Group
7	Central Power Company	PTS; ABB Group	Da Nang	ABB Group
8	Northern Power Company	PTS; ABB Group	Hanoi	ABB Group



### 4.3. GREEN BUSINESS SUCCESS STORIES IN VIETNAM

## WE DELIVER WHAT WE PROMISE!

### CHALLENGE

A reliable energy supply is crucial in growth regions: The more reliable the energy supply, the more the economy can flourish and compete internationally – which ultimately translates to greater prosperity. Vietnam is one of Southeast Asia's most rapidly growing economies. The demand for electricity in Vietnam is expected to soar by as much as 14 percent a year until 2020. However, due to insufficient capacity, the country is still plagued by unreliable supply. Vietnam's energy master plan for 2011-2015 with vision to 2030 for its present capacity to be more than doubled by 2020. To cope with this demand is the pre-requisite for Vietnam to continue the path of successful economical growth and to become an industrialized nation in the near future. It is truly a very challenging task for the state-owned corporation Electricity of Vietnam (EVN) and other investors in power generation.

Against the backdrop of electricity shortage, Vietnam is also encountering a high rate of power transmission and distribution losses. According to Vietnam Electricity Corporation (EVN), estimated losses in 2016 for the entire country were about 7.57%, which was relatively higher than that of the world average (5% - 6%) and in comparison with other countries in the region. Vietnam sets the target to reduce the above loss rate to 6.5% by 2020.

### SOLUTION

Siemens has been helping Vietnam to increase its power generation capacity through the application of high efficiency technology at many key gas-fired power plants in Vietnam thus enabling these plants to achieve the net efficiency of more than 57% while nitrogen oxide emission at full load on gas is very low at 25 ppm (parts per million) or less. Siemens is either the turn-key contractor or supplier of the main power island for a number of important power projects in Vietnam such as 750MW Phu My 3 BOT combined cycle power plant (CCPP), 1500MW Ca Mau 1 & 2 CCPP, and 750MW Nhon Trach 2 CCPP. Siemens also received long-term maintenance contracts for these plants.

Siemens is one of the leading global suppliers of products, systems, solutions and services for the economical, reliable and intelligent transmission and distribution of electrical power. Its portfolio ranges from systems for the low-voltage and distribution power grid level to smart grids and energy automation solutions to power supplies for industrial plants and high-voltage transmission systems.

Siemens is a trusted partner for efficient and reliable power transmission and distribution in Vietnam. Apart from efficiency and reliability Siemens' latest innovative technologies installed at numerous substations across Vietnam has helped to reduce the loss rate substantially.

Most recently Siemens and the state-run energy company, Electricity of Vietnam Southern Power Corporation (EVN SPC), have opened a new main control center in Ho Chi Minh City. The Vietnamese energy provider had Siemens develop, design and build the facilities in the main control center in order to be able to remotely monitor and control the medium- and low-voltage grids in 21 provinces in the southern part of the country.



Son La 500kW Sub-station

**SIEMENS***Ingenuity for life***COMPANY OVERVIEW****Enterprise:** Siemens AG**Headquarters:** Munich and Berlin**Specialty:** Power and Gas, Power Generation Services, Wind Power and Renewables, Energy Management, Mobility, Building Technologies, Digital Factory, Process Industries and Drives, and Healthcare**Headquarters in Vietnam:** Ho Chi Minh City

**Projects concluded in Vietnam:** 278MW Phu My 2.1 Extension; 750MW Phu My 3 BOT CCPP; 1,500MW Ca Mau 1&2 CCPP; 750MW Nhon Trach 2 CCPP; Thousands of 110kV substations, hundreds of 220kV substations and dozens of 500kV substations in Vietnam. Some of 500kV substations include Đại Ninh (2005), Quảng Ninh (2009), Sông Mỹ (2009), Sơn La (2011), Dốc Sỏi (2007), Duyên Hải (2015) và Móng Dương 1 (2015). Two 220kV gas-insulated switchgear (GIS) in Hanoi namely Thành Công and Tây Hồ; SCADA/DMS and 110kV unmanned substations for Southern Power Corporation...

**RESULTS**

The total installed electricity capacity of Vietnam by end of 2015 is about 34GW and Siemens contributes about 12% with a high reliability of more than 95%. We supplied 10 large gas turbines for gas fired power plants. Our technology supports not only high efficiency but also low emission. Phu My 3 CCPP, Ca Mau 1&2 CCPP and Nhon Trach 2 CCPP are among the most efficient and environmentally friendly power plants in Vietnam. In particular, Nhon Trach 2 CCPP, which was built together with the local turnkey contractor - LILAMA, has achieved the remarkable rating for having the short construction time and stable operation, as well as for being one of the highest efficient and cost effective power plants.

All substations using Siemens technology are working efficiently thus contributing to the secure and reliable electricity supply of the national grid.

SCADA/DMS and 110kV unmanned substations project will significantly improve the availability and efficiency of the distribution grids in 21 provinces in the southern region of Vietnam, and at the same time reduce power outages and losses in the distribution systems, thus contributing to the economic development.

We are committed to bringing our latest state-of-the-art technology and our best service to Vietnam to help our customers ensure a reliable energy supply for Vietnam's sustainable economic growth. And we deliver what we promise!



Nhon Trach 2 combined cycle power plant

# MANUFACTURING RESPONSIBLY: SETTING NEW TRENDS IN VIETNAM'S INDUSTRIAL WATER TREATMENT

## CHALLENGE

Vietnam is ranked among the countries highly prone to the global climate change, and is dealing with the degradation of water quality resulting from irrigation, industry, urban, and aquaculture<sup>1</sup>. As one of the fastest urbanizing and industrializing countries in the Asia Pacific region, Vietnam now has more than 280 industrial zones<sup>2</sup>. It is estimated that by 2020, water demand for industrial manufacturing in Vietnam will hike up by almost 190%<sup>3</sup>. Thus, the pressure is increasing on national water resource management to ensure water availability for manufacturing and minimizing the environmental risks.

On those grounds, it is crucial to shift Vietnam's manufacturing towards being a greener and more sustainable one. For Bosch, sustainability means securing the company's long-term success while at the same time protecting the natural environment and conserve resources for future generations. Underlining the company's commitment, Bosch Vietnam has started implementing green manufacturing practices. The Wastewater Recycling System has been put into operation at the Bosch Gasoline Systems plant in Long Thanh, Dong Nai province since 2015.

## SOLUTION

Bosch Vietnam has invested around USD 1 million to implement the Wastewater Recycling System at its plant, with a target that the treated wastewater to constitute 65 percent of the plant's total water consumption by 2020. The wastewater, resulting from the manufacturing process, undergoes two treatment processes before it is reused either for manufacturing or gardening purposes.

The Wastewater Recycling System is using an Ultra-filtration and Reversed Osmosis technology. During the first step, the used water goes through a process of flocculation & coagulation, follows by a process of lamella clarifier and 100 µm self-cleaning filter. In the next steps, the pre-treated water will pass the Ultra-filtration before being further treated through the reverse osmosis process. With the complication of this process, the treated water is then stored in a clean water tank.

The designed capacity of the Wastewater Recycling System is 1,085m<sup>3</sup> per day, and normally this system can treat 81%, approximately 878m<sup>3</sup> per day. The treated water is either used for gardening purpose or for the cooling tower.



<sup>1</sup> Water vital for Vietnam's Future, Asian Development Bank, 2009

<sup>2</sup> Chi 5% cum công nghiệp có xử lý nước thải tập trung, <http://www.tienphong.vn/xa-hoi/chi-5-cum-cong-nghiep-co-xu-ly-nuoc-thai-tap-trung-1071716.tpo>, 10/11/2016

<sup>3</sup> Water vital for Vietnam's Future, Asian Development Bank, 2009



# BOSCH

Sáng tạo vì cuộc sống

## COMPANY OVERVIEW

**Enterprise:** Bosch

**Headquarters:** Stuttgart, Germany

**Specialty:** trading, manufacturing, research & development

**Headquarters in Vietnam:** Ho Chi Minh City

**Projects concluded in Vietnam:** Wastewater treatment



## PROJECT DETAILS

**Name:** Wastewater treatment

**Location:** Long Thanh IP, Dong Nai province

**Challenge:** Recycling wastewater for reducing the plant's total water consumption by 2020

**Budget:** USD 1 million

## RESULTS

In economic terms, implementing and using a Wastewater Recycling System (or promoting other green manufacturing practices) might not be profitable on the first sight. In environmental terms, however they are crucial and necessary in order to fight against environmental degradation, climate change and contributing to the conservation of natural resources. Moreover, such investments will pay off in the long-term perspective since no one is able to achieve economic success while living in an unhealthy environment.





# FRIESLANDCAMPINA VIETNAM: JOINING HANDS TO PROTECT THE ENVIRONMENT IN VIETNAM.

## CHALLENGE

Being a developing country with continuous positive changes, Vietnam is worldly viewed as a young, dynamic and potential destination for foreign investors. However, to achieve a greener future with sustainability, there are still additional challenges when it comes to using and managing natural resources efficiently and wisely, especially for the wastewater management. In Vietnam, there is a growing demand for sufficient treatment of industrial wastewater, especially in the southern parts of the country. Even though the government of Vietnam released the new environment protection law in 2014, followed by further implementing regulations, there are still major shortcomings in the local wastewater treatment.

Up to 70% out of one million cubic meter of wastewater discharged daily by 126 industrial parks in Vietnam are not treated, said a senior official from the Vietnam Environment Administration (VEA). Understanding that, with full social responsibility, Frieslandcampina entered Vietnam with innovative solutions for the matter from the very beginning.



## SOLUTION

### From wastewater after treatment is of high quality with AQUA – MPS...

As early as 1995, since the very first days of operation with the goal of protecting the environment, FrieslandCampina has paid great attention to the treatment of wastewater from the plant in Binh Duong. Wastewater treatment system, namely AQUA - MPS - Netherlands, has been installed from the first stage and made continuous improvement proactively with the increasing of production. Now the maximum capacity is up to 2400 m3 of wastewater per day and night, ensuring that wastewater after treatment is always of high quality. In addition, the installation of the camera and automated monitoring systems in the factory premises has created a platform for effective management and utilization of resources. Wastewater is sampled and analyzed automatically, accurately assessing the criteria of wastewater after treatment to ensure the good quality of wastewater eventually released to environment. Most of the wastewater criteria after treatment by Binh Duong wastewater treatment plant have met standard A of the Ministry of Natural Resources and Environment instead of B as required by the law which helps reduce lots of waste discharge to the river. (Fish can swim in the pond with wastewater after treatment of the plant in Binh Dinh Province of FrieslandCampina).

### ... to the efficient steam project and LED project

Not only is the wastewater treated responsibly, the company also uses green energy instead of DO oil to run the boiler. The company has signed a long-term contract with Green Energy Company (NLX) to supply steam for production (NLX uses rice husk, sawdust as fuel). At present, 03 Boilers of FrieslandCampina Vietnam are only used in case the NLX boiler has to stop for maintenance or due to technical error. At the same time, the company has also employed grid electricity instead of generators using DO. Since July 2012, FrieslandCampina Vietnam has invested in power converters (UPS) to use electricity for production and living. As a result, the use of generators is reduced to the maximum (use only when electricity is cut off). Also, starting from 2016, FrieslandCampina Vietnam has been working on the project called LED in Binh Duong by replacing the existing light bulbs with LED products to reduce maintenance cost and help protect the environment.





## COMPANY OVERVIEW

**Enterprise:** Royal FrieslandCampina

**Corporate Headquarters:** Netherlands

**Specialty:** Food & Beverages

**Headquarters in Vietnam:** FrieslandCampina Vietnam, Thuan An, Binh Duong, Vietnam

**Projects concluded in Vietnam:** Green production, Wastewater management system



## PROJECT DETAILS

**Name:** LED IN BINH DUONG

**Location:** Thuan An, Binh Duong, Vietnam

**City Population:** 1.8 million people

**Challenge:** Reduce maintenance cost and electricity demand, protect the environment

**Budget:** 190.000 EUR

**Other Partners:** HUNG VINH INTERNATIONAL TRADING CORPORATION

**Completion:** 30/3/2016 – 31/12/2016

## RESULTS

With a certain of above-mentioned innovative projects, as for the wastewater, the average chemical oxygen demand released reduced by 81.5% compared to law regulations. For the steam project, the energy cost has been cut down by 415k EUR per year and the used compressed natural gas has been reduced by 2.8 million m3 annually. When it comes to the LED project, 60k EUR has been cut down in term of energy cost per year and CO and CO2 released to the environment has been reduced by 223 tons/ year. Certainly, FrieslandCampina will not stop with these stories, but the company is going to continue to strive for more pioneering, intelligent and especially environmentally friendly solutions, in hope of contributing to building a sustainable green future for Vietnam.

### 6/2016 THE FIRST GRADE LABOR MEDAL



**Sustainability award of Benelux Business Award**  
(Given by The Dutch Business Association Vietnam and the Belgian – Luxembourg Chamber of Commerce in Vietnam)

**Certificate of Merit for significant contribution to rural development of Vietnam from 2011 - 2015**  
(Given by Prime Minister)

**National Green Environment Award Outstanding Business Award**  
(Given by the Binh Duong & Ha Nam people committees)

2013

**Big Green's Nation Awarded** (Given by the Vietnam Association conservation of nature and environment)

2012  
(and 2014)

**Green Business** (Given by the Department of Natural Resources and Environment in Binh Duong for the contribution on environmental protection)

2015

**Vietnam Environment Award**  
(Given by the Ministry of Natural Resources and Environment for the outstanding achievements on environmental protection)

2016

# THE NEW BIG SHOP IN TOWN: BUILT SUSTAINABLY

## CHALLENGE

"Green Building" is an unavoidable trend in a time that resources are being exploited faster than ever. Energy and water source security, climate change are becoming critical issues around the world. While the construction industry consumes about 40% of resources and contributes with about the same with CO2 emissions into the atmosphere, the awareness towards "Green Building" in general in Vietnam is still very limited. In fact, it is lagging behind to some extent other countries in the region. However, here "Green Building" can flourish just as it has recently in Thailand's and Singapore.

As a leading company in the construction materials industry, INSEE wishes to make a difference and help the market to recognize appropriate construction solutions with its "Green Label" products in accordance with the "Green mark" certification scheme of the Singapore Green Building Council (SGBC) or the Lotus Green Database of the Vietnam Green Building Council (VGBC).

This was the approach we took when we were first approached by Big C Binh Duong, which had an interest in developing their new unit in line with the province's green and smart policy. Finding a set of products to support the development of this retail unit was within the expertise of INSEE and we decided to take on this challenge.

## SOLUTION

The "Green Label" on each cement bag demonstrates the confidence that we have in:

- **Reduced Resource Use:** reduction in the amount of material, energy or water used in producing or distributing a product or packaging, or a specified associated component. E.g.: to replace Limestone by a co-product from other industrial source, such as Slag, Fly Ash.
- **Recovered Energy:** a characteristic of a product that is made by using energy recovered from material or energy that would have been disposed of as waste but instead has been collected through managed processes. E.g.: to reduce coal consumption by using an alternative fuel resource (AFR) or waste heat recovery to produce electricity.
- **Reduced Energy Consumption:** reduction in the amount of energy associated with the use of a product performing the function for which it was conceived. E.g.: dry clinker process; vertical roller mill, auto packer & sling...
- **Extended Life Product:** a product designed to provide prolonged use, based on either improved durability or an upgradability feature, which results in reduced resource use or reduced waste. E.g.: INSEE internal specification is higher than product standards.

Therefore, picking the most adequate materials was key to make this project and approach a success. The solution was a combination of different INSEE materials and techniques, providing a set that could achieve the results expected by Big C and a landmark in green retail units in Vietnam.





## COMPANY OVERVIEW

**Enterprise:** Siam City Cement (Vietnam) Ltd  
**Headquarters:** Thailand  
**Specialty:** Construction materials  
**Headquarters in Vietnam:** Ho Chi Minh City  
**Projects concluded in Vietnam:** Big C - Di An, Binh Duong



## PROJECT DETAILS

**Name:** Big C – Di An, Binh Duong  
**Location:** Dong Hoa, Di An, Binh Duong  
**City Population:** 1.8 million  
**Challenge:** Earning the trust of contractor and providing Green Building materials for the first major retail/urban project in the city  
**Governing Authority:** Binh Duong People's Committee  
 - Public Works Department  
**Type of Contract:** Sub contractor  
**Completion:** Apr 2013

## RESULTS

A mix of different products was used at the Big C – Di An, Binh Duong. After years of continuous improvement and investment in facilities, INSEE cement and concrete solutions have been appropriately certified for use in "Green Building". The following products make up for a diverse number of savings in energy, emissions, and the life of materials. Please find out more at: <http://www.siamcitycement.com>.



No	Brand	Model(s)	Number of tick(s) Awarded		
			SGBP	LEED	LOTUS
Cement solutions					
1	INSEE DaDung Power S	IPSC	2	0	1
2	INSEE Quick Cast	IQCC	2	0	1
3	INSEE Easy Flow	IEFC	2	0	1
4	INSEE Extra Durable	IEDC	4	1	6
5	INSEE Mass Pour	IMPC	4	1	6
6	INSEE Stable Soil	ISSC	4	1	6
7	INSEE Compact Rock	ICRC	4	1	6
Concrete solutions					
1	INSEE Green BeTong TCVN 374/9340 Standard	B60/M800	2	1	1
2	INSEE Green BeTong ASTM C94 Standard	C70, C80	2	1	1
3	INSEE Green BeTong EN 206 -1 Standard	C60/75, C70/85, C80/95	2	1	1
4	INSEE Green BeTong TCVN 374/9340 Standard	B40/M600, B50/M700	3	1	1
5	INSEE Green BeTong ASTM C94 Standard	C45, C50, C55, C60	3	1	1
6	INSEE Green BeTong EN 206 -1 Standard	C40/50, C45/55, C50/60, C55/67	3	1	1
7	INSEE Green BeTong TCVN 374/9340 Standard	B3.5/M5, B5.0/M75, B7.5/M100, B10/M150, B12.5/M150, B15/M200, B20/M250, B25/M350, B30/M400, B35/M450	4	1	1
8	INSEE Green BeTong ASTM C94 Standard	C5, C10, C20, C30, C35, C40	4	1	1
9	INSEE Green BeTong EN 206 -1 Standard	C8/10, C12/15, C16/20, C20/25, C30/37, C35/45	4	1	1
10	INSEE Hydropave TCVN 9340 Standard	M7.5, M10, M15, M20	4	1	1

Note:

- LOTUS (The VGBC's own label); present in "Vietnam Green Database".
- SGBP: Singapore Green Building Product Mark
- LEED: Leadership in Energy & Environmental Design (USA)

# HELPING MANUFACTURING GIANTS BE MORE SUSTAINABLE

## CHALLENGE

From a global perspective, the world is changing fast. Population growth, increasing demand for finite and contentious resources, climate changes, environmental and social issues all demand new ways of thinking and innovative solutions. This drives company management to ensure that business operations are ecofriendly and sustainable, in order to continue attracting socially-conscious customers, staff, investors and business associates.

In the building market, the design, construction, and the maintenance of buildings have a tremendous impact on our environment and natural resources. Traditional building practices often overlook the interrelationships between a building, its components, its surroundings, and its occupants. As a result, such a building consumes more of our resources than necessary, negatively impacting the environment, and generating a large amount of waste.

As an independent international engineering and project management consultancy, RHDHV takes it as a challenge. How to meet current needs for prosperity while also creating a 'future-proof' society.

This was precisely the case of the challenge that RHDHV accepted when prompted by CP [simplified name due to communications conformity reasons] to change its approach to production and storage, in order to become a more sustainable business in Vietnam. The scale of change required by this request drove our teams to re-invent its approach, with the motivation of the large impact that an efficient delivery could have. In the spirit of RHDHV, our teams had in mind not only for our client, but Vietnam as whole given the size of CP's operation in the country.

## SOLUTION

Royal HaskoningDHV is an independent, international engineering company delivering consultancy and project management services for the entire living environment. Throughout its many years of experience, RHDHV has been driving positive change through innovation and technology, helping clients use resources more efficiently and creating solutions which connect with people to make their lives easier, happier and safer.

It was with this same spirit that we created a unique solution for CP's operation in Vietnam. We believe that there is enough expertise and innovation available to create positive and lasting change, and this applies to the construction and building. With change in mind, RHDHV set to create an inspiring and sustainable building, done at a minimum expense in terms of total cost of ownership: durable, efficient and healthy, but also exciting and beautiful.

As is the usual approach in our projects, we worked towards creating a solution that was economically viable achieved through innovation and the creative use of new techniques and materials. CP Vietnam's unit was therefore the subject of a combination of several services RHDHV provides, including Sustainability design, Building energy optimization, and consulting towards the alterations necessary to obtain the relevant certification: LEED, LOTUS, HQE, Green mark within sector of Industry and Buildings.

Our combined solution, assisting the client in a 360o approach, was employed with the purpose of justifying investment and ensuring minimum-environmental impact durability, taking into account the people that come to work every day to the building and in regards to functionality, healthy work environment, and safety standards. The mixed approach was also designed to ensure that the upgraded CP Vietnam building would become economically justified for its whole life-cycle, balancing investment costs (short term) and operation costs (long term). Regarding the latter, RHDHV's solution also included a building performance monitoring practice methodology essential to ensure that environmental impact and cost aspect remain at expected levels.

RHDHV is qualified with the following Sustainability Assessment Expertise:





## COMPANY OVERVIEW

**Enterprise:** Royal HaskoningDHV

**Corporate Headquarters:** Amersfoort, Netherlands

**Specialty:** Consultancy and Project Management services for the entire living environment.

**Green projects concluded in Vietnam:**

- Colgate – Palmolive – LEED Silver
- TAL – LEED Gold
- Swire – LEED Gold



## PROJECT DETAILS

**Name:** CP – sustainability project

**Location:** Binh Duong Province

**Challenge:** develop a study and implement changes using a 360o approach, ensuring the requested building efficiency certification

**Type of Contract:** Contractor

**Completion:** April 2016

## RESULTS

The CP project was completed on time and on budget, having become the first LEED (Leadership in Energy & Environmental Design) certified project in Vietnam.

RHDHV's project resulted in at least 30% water savings and various energy saving measures in the facility design, among other sustainability-oriented solutions. Because of RHDHV action, CP Vietnam became equipped to comply with internal principles of the company and begin working more efficiently towards reducing energy use and carbon emissions, contribute to zero deforestation, increase recycled content, and provide a better space for its employees.

CP's factory now complies with all high-level standards of CP on high quality production, as well as with GMP (Good Manufacturing Practices) standards.

Due to this success, Royal HaskoningDHV was selected to carry out phase 2 of this project in 2010 and continued implementing green building design and construction in phase 3 in 2016. This green building project design became an RHDHV template for other successfully completed Green facilities, for clients such as: TAL Garment, CP, Swire Cold Storage, Pepsico, among others.

Tomorrow's industries and buildings must be greener, healthier, and more sustainable. RHDHV is proud to deliver global and local expertise to help achieve this vision, always believing that "Together, we enhance society."





## B. BRAUN FIVE AP BUILDING STAGE 2: THE STORY

### CHALLENGE

Shimizu is the 4th largest Japanese construction company with tradition of more than 200 years, based on craftsmanship, commitment to quality and innovation. Shimizu built first Western style hotel in Japan - "Tsukiji", in 1868, National Museum of Western Art in 1959 and established first institute of technology in construction industry in Japan in 1944. This inclination toward Western culture and innovation led Shimizu to European clients, not only in Europe but in Vietnam as well.

With very wide range of services, from office fit out to high-rise buildings, hospitals, factories, infrastructure, renewable energy, green building and waste management Shimizu can virtually cope with any construction task.

Cooperation with the German company B. Braun Vietnam, one of the world's leading providers and manufacturers of healthcare solutions, is a shiny example how European companies can smoothly expand their operations in Vietnam. How Europe and Japan meet in the right place – in Vietnam, the regional epicenter of economic growth and prosperity.

Major challenge, when taking on the task to build a factory extension for B. Braun factory in Hanoi was difference in working style and approach to contractual documentation, document control, and drawings.

On the technical side, Shimizu was facing a daunting task of demolishing the existing wall and connecting on-going operations, especially the clean room, to the new facility without any interruption.

The major challenge was to keep the clean room air tight at all times. This was especially difficult with regard to very large 4 x 4 m HVAC ducting (heating, ventilation and air conditioning).

### SOLUTION

Although Japanese companies use relatively simple contracts and rely largely on verbal agreements opposite tendency - to very detailed documentation and great emphasis on the in-depth contracts, did not pose a threat to the relationship built on mutual trust and understanding.

European and Japanese working styles blended into success through close coordination between all parties involved, especially between experienced engineers on both sides and goal-driven, solution-oriented management. Daily coordination meetings between Shimizu, B. Braun, consultants, designers and Shimizu controlled construction management paved the way to successful implementation. Crucial to recognizing a European solution (to the challenge) was the ability of both Japanese and European side to devise new methods and approach to the task.





## COMPANY OVERVIEW

**Enterprise:** Shimizu Corporation, Shimizu Vietnam

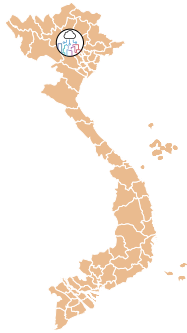
**Corporate Headquarters:** Tokyo Japan

**International Division HQ:** Singapore

**Specialty:** Construction

**Headquarters in Vietnam:** 3<sup>rd</sup> floor, 14 Lang Ha Building,  
14 Lang Ha Street, Thanh Cong Ward, Ba Dinh District,  
Hanoi

**Projects concluded in Vietnam:** More than 400 projects



## PROJECT DETAILS

**Name:** B. Braun Five AP Building Stage 2

**Location:** Thanh Oai Industrial Complex, Thanh Oai Dist,  
Hanoi, Vietnam

**City Population:** 7,588,000 people (2015)

**Challenge:** Clean room HVAC ducting

**Tender:** Factory extension

**Type of Contract:** Lump sum

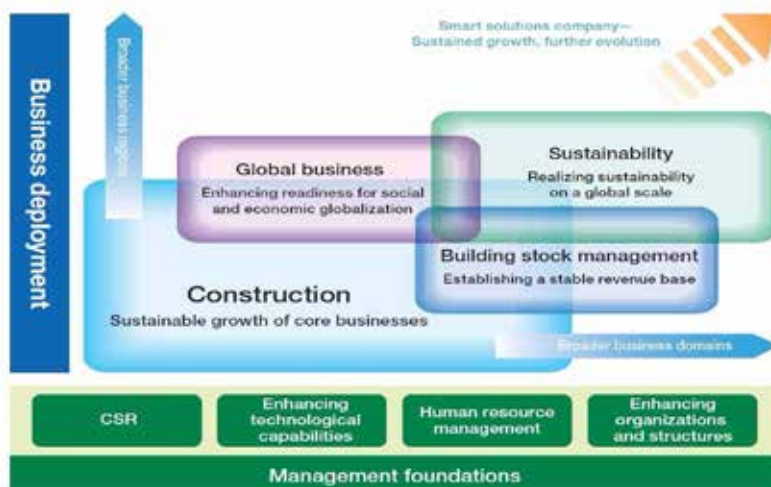
**Other Partners:** Design and consulting companies

**Completion:** Jan 2015

## RESULTS

“Tie in” was managed with great care because conditions in the “clean room” and product quality of ongoing operations had not been compromised at any point. Additional platform was built above the existing clean room to perform sensitive tasks under very stringent supervision. Method applied belongs to “Shimizu way” and, among other components, implies careful risk reduction. This enabled flawless integrations and successful expansion of the facilities.

Site area was 99,994 m<sup>2</sup>, construction 7,314 m<sup>2</sup> while floor occupies 12,753 m<sup>2</sup> with clean room covering 3,885m<sup>2</sup>. Construction was performed within 12 months, according to the original plan and budget.



# EMPOWERING HO CHI MINH CITY'S WATER MANAGEMENT

## CHALLENGE

If the 1.5 million motorbikes on the streets of Ho Chi Minh City everyday queued one behind the other, they would still cover less than 1/10 of the local water distribution network, which serves more than 8 Million residents and stretches around 33,000 kilometers.

In just 50 years, Ho Chi Minh City has transformed from a simple economy based on fishing into the economic heart of Vietnam and the country's largest city. In the 1960s only five percent of the Vietnamese population lived in cities - the number has grown to 33 percent today, as people are attracted by higher quality living conditions and job opportunities.

It is a trend that sees the Ho Chi Minh City's boundaries expand by four percent each year, a significant growth brings wealth for the entire country, but threatens the rapidly aging urban infrastructure, including the city's water network. Ho Chi Minh City lost nearly 30 percent of its clean water in 2016 through leaking and damaged pipes. Many sections of the water distribution infrastructure are old. Some sections were built more than 30 years ago, while others even date back to the colonial era. More than 150 million cubic meters of water went to waste last year. For perspective, most developed cities have a water loss rate of five to seven percent.

## SOLUTION

In order to keep up with the rapid pace of urbanization and meet the target of reducing the water leakage to only 10 percent by 2020, the local utility Saigon Water Corporation (SAWACO) recently undertook a major renovation of the city's water distribution network. Expansion of the current network capacity, integration of more isolated sections, reduction of water leakage, and real-time control and monitoring of the network conditions to prevent major disruptions are all part of the project scope.

To meet this complex target, a strategic ABB Ability™ Symphony® Plus SCADA system has been designed.

The ABB system integrates a sophisticated leakage detection and management system from the water network management company TaKaDu. The project will deploy several data collection points, such as sensors and meters for flow and pressure monitoring, to the water network and allow SAWACO to digitally monitor the network conditions in "nearly real time". The utility will be able to continually detect, analyze and manage network events transforming that information into immediate actions to reduce the water losses.

ABB Ability Symphony® Plus is a distributed control system (DCS) especially tailored for the water and power industries. Part of the ABB Ability™ portfolio of digital offerings, this control system adds value for customers by carefully collecting, analyzing and providing actionable insights on plant and engineering data in their systems, ultimately allowing them to lower project risk, reduce cost and throughput times and improve asset performance and profitability.

ABB's scope of supply for this critical project includes field instrumentation and sensors that are critical components to deliver high quality data to the control system.

"Projects like Ho Chi Minh City water network show the full potential of advanced automation for all municipalities dealing with rapid expansions or aging infrastructures," comments Kevin Kosisko, Managing Director of ABB's Power Generation & Water business. "Furthermore, the smart collection of digital data from the field will offer real-time insights on the network status, allowing for increased revenues".



## COMPANY OVERVIEW

**Enterprise:** ABB (ASEA Brown Boveri)

**Headquarters:** Zurich, Switzerland

**Specialty:** Electrification Products, Robotics and Motion, Industrial Automation, Power Grids

**Headquarters in Vietnam:** Ho Chi Minh City

**Present in Vietnam since:** 1993



## PROJECT DETAILS

**NAME:** ABB Ability Symphony® Plus installation in Ho Chi Minh City

**Location:** Ho Chi Minh City

**City Population:** 8.4 Million

**Challenge:** Modernising urban the water network

**Governing Authority:** Ho Chi Minh City People's Committee – Public Works Department

**Type of Contract:** Service

**Completion:** 31.12.2017

## RESULTS

ABB Ability™ Symphony® Plus SCADA system Thanks to the digitalization of its network, the real-time knowledge of network conditions and the accurate detection of leaks, SAWACO will be able to increase the amount of water delivered to households and industries. In doing so, it will minimize the estimated 500,000 cubic meters of non-revenue water lost per day, roughly the daily capacity of a medium-sized water plant in the city. Since its launch in 2011, ABB Ability™ Symphony® Plus has achieved more than 6,800 new installations, on top of the thousands of plants that have chosen to upgrade to this DCS. Symphony Plus is the DCS of choice for other projects in Vietnam such as the original commissioning and further extension of the Vinh Tan 4 supercritical power plant, located 250 kilometers east of Ho Chi Minh City. Upon completion, the complex will provide an additional 5,600 megawatts of electricity to the Vietnamese national grid.



# MOVING GREEN: E-BIKES CHANGING MOBILITY IN BIG CITIES

## CHALLENGE

Megacities are going to be the world's dominant demographic and economic clusters and it is estimated that roughly two-third of the global population will be living in metropolises by 2050. Vietnam – an emerging market with robust urbanization – will not be going off this trend. Cities in Vietnam are getting more and more congested resulting in traffic jams, rising emission, accidents and stress. Solutions for developing livable and sustainable cities, with the increasing flow of traffic, goods, services, and labor require huge efforts in urban planning, willing for cross-sector cooperation, and the embrace of innovative technologies.



At Bosch, we envision the future mobility with zero-emission, stress-free, and accident-free. Hence, we see multimodal and connected mobility as part of smart cities where people's quality of living is ensured and the urban administration are as efficient as possible. That's the motivation behind the company's investment in the Green Challenge 2015 initiative, in collaboration with three universities in Vietnam.

## SOLUTION



The Green Challenge 2015 started its first phase with a contest in which students were asked to develop a system to manage and operate a fleet of electrically powered and connected two-wheelers. In 2016, the winning teams of the contest, with support from Bosch associates, began the second phase of the project - implementation. And finally in quarter IV/2016, three e-scooter sharing systems were launched at the campuses of Ho Chi Minh University of Technology, Vietnamese - German University, and Da Nang University of Science and Technology.

Each e-scooter sharing system in the Green Challenge 2015 project consists of a central interactive processor, six modified e-scooters which are connectable to six charging stations fed by the solar power panels on the station's roof. The charging stations – independent from the power grid – monitor the charging status of the connected e-scooters. If required, e.g. during the rainy season when solar power is insufficient, the charging stations could be connected to the regular power grid or other green power grid solutions. Furthermore, a smart power usage can be set up by installing extra batteries inside the charging stations, which accumulate the solar energy during over-supply periods. A fully-charged e-scooter can travel up to 80km, at the maximum speed of 45km per hour. People aged 18 and above with a motorcycle driving license can use the e-scooters.

The shared-mobility solutions from Bosch can be beneficial for both users and administrators. Users can locate the charging stations, book and ride an e-scooter with ease via a mobile app. For administrators (traffic authority, businesses, etc.), the e-scooter sharing systems provide the last-mile solution next to the public transport. In the longer run, an inclusive traffic planning which allows commuters to fully access the multimodal transport system is needed for smart and connected urban living spaces.





**BOSCH**  
Sáng tạo vì cuộc sống

## COMPANY OVERVIEW

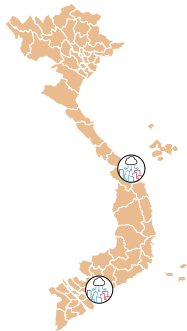
**Enterprise:** Bosch

**Headquarters:** Stuttgart, Germany

**Specialty:** trading, manufacturing, research & development

**Headquarters in Vietnam:** Ho Chi Minh City

**Projects concluded in Vietnam:** Green Challenge 2015



## PROJECT DETAILS

**Name:** Green Challenge 2015

**Location:** Ho Chi Minh City, Binh Duong and Da Nang

**Challenge:** Developing a shared-mobility solution to tackle urban traffic

**Other Partners:** Ho Chi Minh University of Technology, Vietnamese-German University, Danang University of Science and Technology

**Completion:** QIV/2016

## RESULTS

Within about one year since the start of the student contest, Bosch was able to launch three e-scooter sharing systems together with three universities. Students at these campuses can use the e-scooters for free while the Bosch project team continuously monitor and evaluate the stableness and effectiveness of the systems. The successful completion of the Green Challenge 2015 project demonstrates the feasibility of Bosch green and connected mobility solutions, especially for developing countries where small vehicles are the most popular means of transportation in and across cities. The company is now looking towards a larger application of its solutions in major cities as well as touristic hubs in Vietnam.



LARGE  
CAMPUSES



SMART  
CITIES



INDUSTRIAL  
ZONES

# WATERWAYS TOWARDS THE FUTURE

## CHALLENGE

Vietnam is one of the countries in the world that most relies on navigable waterways for transporting goods. Thus they are vital for the Vietnamese economy, to ship bulk products year round, and increasingly for containerized products. Moreover, river transport is not only less expensive than other modes of transport, especially road transport – the other mode of transport most used in Vietnam – it also generates fewer carbon emissions. So it plays a key role in favour of economic growth and also mitigates risks of climate change, which are two major priorities for the Vietnamese government.

Hanoi is the transportation hub of the Northern Delta Region. The city provides international and domestic access by road, rail, inland waterways, and air transportation with nearly all routes radiating from the nation's capital. Of the region's total freight transport task (ton-km), nearly 67 percent is carried by inland waterways. In general, waterways carry the bulk goods that are predominant in this region such as cement, coal, building materials, rice, timber, and fertilizer.

The inland waterway network consists of the Red River, and Thai Binh River systems. They provide 2,100 km and 840 km of navigable national and provincial waterways respectively. However there was some limited access by coastal shipping to/from river ports, in particular between Quang Ninh in the northeast and in specific condition of tide and sediment, to the ports of Nam Dinh and Ninh Binh through the Ninh Co and Day Rivers respectively.

The challenge was then to fulfill the project objectives of the Northern Delta Transport Development Project and to enhance the efficiency, the environmental sustainability, and safety of the inland waterways transport infrastructure and services in the Red River Delta whatever the hydrological conditions can be, and through the alleviation of physical and institutional bottlenecks.

## SOLUTION

Developing river navigation on the Rhône River is one of CNR's three historic missions. Thus CNR develops and manages the port infrastructures of Lyon and others wharfs along the river, including enterprise zones close to the docksides linked to both rail and road, bringing the river and land closer together. CNR maintains the inland navigable channel and, through its navigation management center, ensures full time operation of the waterways and fluid traffic in ship locks in full security for users.

The River is equipped with 18 multimodal platforms along the Rhône from Lyon to the Mediterranean that provides port facilities for 230 industrial and logistics companies on more than 800 ha of land. To ensure the best possible service to skippers, CNR manages and monitors its 14 wide gauge locks remotely 24/7 365 days a year. It optimizes lockage time and provides information on traffic in real-time.

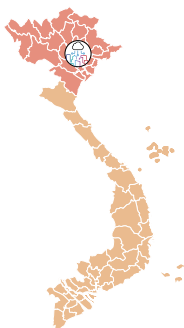


## COMPANY OVERVIEW



## ENGINEERING

## PROJECT DETAILS



**Name:** NORTHERN DELTA TRANSPORT DEVELOPMENT PROJECT

**Location:** HANOI and RED RIVER DELTA

**City Population:** 19 Millions for the whole area

**Challenge:** Implementation of the Northern Delta Transportation Development Project

**Tender:** CS-A5i-NDTP-A & CS-A5i-NDTP-B

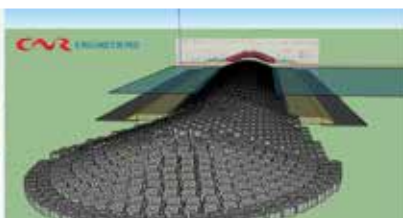
**Governing Authority:** Ministry of Transport – PMU-W

**Budget:** 280 M USD

**Type of Contract:** World Bank

**Other Partners:** VIPO Vietnam

**Completion:** First phase June 2017 – Second phase December 2020



## RESULTS

CNR has completed this project in coordination with the Ministry of Transport of Vietnam, using Vietnamese standards and the European guidelines. The project included various adaptations for each section, including the construction of one artificial estuary at the Ninh Co mouth. Two branches of the Red River of 160 km long each were developed as follow:

- › Improvement in 2015 of the capacity of Viet Tri port by three new docking area, warehouse and water treatment;
- › Improvement in 2015 of Ninh Phuc Port capacity with one new 300m docking area for bulk material including belt conveyors;
- › Construction in 2015 of the Lach Giang estuary at the Ninh Co River Mouth that provide full time channel to the River for large sea-River vessel;
- › Commissioning in 2017 of two corridors of 320 km wide gauge transport as route to the industrial port of Viet Tri, 70 km from Hanoi.
- › Development in 2017 of the Day-Ninh Co Canal project that will link Ninh Phuc Port to Quan Ninh by the Marine-inland waterways route (construction schedule 2018-2019).



At last, a project of new canal was newly prepared by CNR to link the Ninh Co and Day Rivers systems, after the construction schedule in 2018-2019 it will provide a strong uptake of completed infrastructure facilities in a very short time that will allow Ninh Binh port to access unlimited destinations via the sea routes. Today, based on these benchmarks, NDTDP is solidly on its way to attaining the project development objectives fixed by the World Bank.















# GREEN BUSSINESS DIRECTORY

CHAPTER V

## HOW TO USE THIS DIRECTORY

In the following pages, the Greenbook presents profiles of participating businesses that operate in one of the four areas in focus in this edition: Renewable Energy; Waste and Water Management; Smart Cities; and Green Building. Other participating companies that are not directly related to the aforementioned fields but do employ sustainability practices or actively promote them in their operations are herein included under the category Other Green Business.

This directory is presented in alphabetical order and allows the reader to identify under which Green Business category (or categories) each participating company operates. To this end, please refer to the following symbols, whereby the fields in which a given company is active will appear in colour, while the ones not relevant will appear in grey:

Categories	Active	Not Applicable
Smart Cities		
Green Building		
Waste and Water		
Renewable Energy		
Other		

Beyond company information, this section also shows the reader if the companies presented have implemented projects or engaged in business operations in or with Vietnam. Please refer to the following symbols:

Experience in Vietnam?



YES



NOT YET

### DISCLAIMER:

The information presented in this section was provided by participating companies and received only minor adaptations and/or editing. EuroCham Vietnam makes no warranty as to its accuracy or completeness and is not to be deemed responsible for any errors or loss resulting from its use.





## ABB LTD

### Company Introduction

ABB in Vietnam ([www.abb.com.vn](http://www.abb.com.vn)) is part of ABB Group ([www.abb.com](http://www.abb.com)), a pioneering technology leader in electrification products, robotics and motion, industrial automation and power grids, serving customers in utilities, industry and transport & infrastructure globally. Continuing more than a 125-year history of innovation, the ABB Group today is writing the future of industrial digitalization and driving the Energy and Fourth Industrial Revolutions. ABB operates in more than 100 countries with about 132,000 employees.

ABB was established in Vietnam in 1993 as a Joint Venture Company between ABB and a local transformer manufacturer. The Joint Venture became a wholly owned ABB in 2002.

Since then, ABB in Vietnam has built itself as a member of the ABB family and meets global manufacturing standards. ABB supplies the full range of ABB's products and services produced worldwide. In each market and industry, we offer our customers a dedicated and competent team of sales, professional services and engineering expertise in support of the Group's extensive ranges of systems and products.

ABB recently has around 900 employees working in three regions across the country to ensure the nationwide presence of the ABB brand. The Head Office and Transformer Factories are located in Hanoi, High Voltage and Medium Voltage Power Product factories are in Bac Ninh, other branch offices are in Da Nang and Ho Chi Minh City.

**Business category:** Power and Automation Technologies

**Employees in Vietnam:** >850

**Experience in Vietnam:**



### Contact Point

REE Tower, 12 & 12B Floors,  
9 Doan Van Bo Street, Ward 12, District 4  
Ho Chi Minh City  
Tel: (84-8) 3943 1488  
Fax: (84-8) 3943 1480  
@: [abb.vietnam@vn.abb.com](mailto:abb.vietnam@vn.abb.com)  
URL: [www.abb.com.vn](http://www.abb.com.vn)

Km 9, National Road 1A,  
Hoang Liet Ward Hoang Mai District,  
Hanoi  
Tel: (84-4) 3861 1010  
Fax: (84-4) 3861 1009  
@: [abb.vietnam@vn.abb.com](mailto:abb.vietnam@vn.abb.com)  
URL: [www.abb.com.vn](http://www.abb.com.vn)





# AQUAGROWGREENS COMPANY LIMITED

## Company Introduction

AquaGrowGreens was founded in the first quarter of 2017 by Danny Simmons. Together we want to make green things happen. CSR is in our DNA, we believe not just in profits, but in people: our employees, our partners, our customers, and the entire global village.

We are in business doing two main things: one, designing and creating personal hydroponic kits & systems that allow busy people to grow fresh, nutritious greens just about anywhere. Two, working with ethical farmers and seed supplier in every market to ensure our customers can get the absolute highest-quality seeds and beans. With AquaGrowGreens you can grow your own microgreens, sprouts, herbs and veggies you can trust using hydroponic principles.

The name AquaGrowGreens flows directly from our products: water--aqua--growing healthy greens. But it also encapsulates something more: our vision of CSR and of being a green company this is explained in our values.



Our values: #1. To always use water efficiently, reduce pollution and deliver clean water to needy people as part of our charitable efforts. Our products are designed to use as little water as possible. #2. To help our communities grow by doing charitable work. We offer free education about nutrition and aquaculture and have already begun planting trees to offset our carbon footprint. #3. To be green in our corporate practices. We pledge to leave the smallest possible ecological footprint and remain aware of how our decisions affect local ecosystem as we strive to inspire others to do the same wherever they may be.

For career opportunities: [hello@aquagrowgreens.com](mailto:hello@aquagrowgreens.com)

**Business category:** Retail Agriculture

**Employees in Vietnam:** <10

**Experience in Vietnam:**



## Contact Point

4.21 Officetel Sunrise City North, Tan Hung Ward, 27  
 Nguyen Huu Tho, Tan Hung Ward, District 7,  
 Ho Chi Minh City, Vietnam  
 Tel: (84-28) 3620 9949  
 @: [info@aquagrowgreens.com](mailto:info@aquagrowgreens.com)  
 URL: <http://www.aquagrowgreens.com>





## ARCHETYPE VIETNAM LTD

### Company Introduction

With more than 330 employees, Archetype Vietnam is the largest private construction consultancy of the country with core services in Architecture & Planning, Building Design & Engineering, Industrial & Process Engineering, Project & Cost Management. Our expertise covers some key construction sectors such as buildings & real estate, industry & manufacturing and energy & infrastructure.

Since 2002, Archetype has been involved in many different buildings and real estate projects throughout Vietnam. Iconic built projects in the healthcare, residential, commercial and hospitality sectors include notably the French-Vietnamese Hospital and Pacific Place in Hanoi, REE Tower, Saigon Pearl and Sunrise City in HCMC, Amano'i Resort in Nha Trang and Banyan Tree in Lang Co. In the region, our built references include some prestigious projects such as the MahaNakon Tower in Bangkok, the Taj Mahal Palace in Mumbai, Capital Place in Jakarta, Amansara in Siem Reap and the Shangri-La hotel in Ulaanbaatar.

Archetype's Industrial division has now increased to more than 500 employees in the region following the recent acquisition of Tebodin Asia-Pacific, already well-known for its work in this sector. This acquisition positions us as market leader for industrial and transportation projects in Vietnam and in the region. Our extensive portfolio of industrial references includes factories and complexes for such companies as Sanofi, Bel, Medochemie, Amway, Galtronics, GE and Buhler. Transportation references include the Noi Bai Control Tower in Hanoi, Danang International Airport, Siem Reap International Airport and 11 stations for the new Metroline 1 in HCMC.

Archetype Group has also subsidiaries in France, Cambodia, China, India, Indonesia, Kazakhstan, Laos, Mongolia, Myanmar, Philippines, Qatar, Singapore, Sri Lanka and Thailand and has more than 1,100 employees worldwide.

**Business category:** Architecture, Engineering, Planning, Project & Construction Management and Cost Management

**Employees in Vietnam:** 330

**Experience in Vietnam:**



### Contact Point

20<sup>th</sup> Floor, REE Tower,  
9 Doan Van Bo Street, District 4, HCMC  
Tel: (84-28) 3943 1256  
Fax: (84-28) 3943 1257  
@: info.hcm@archetype-group.com  
URL: www.archetype-group.com

12A<sup>th</sup> Floor, CDC Building,  
25 Le Dai Hanh Street,  
Hai Ba Trung District, Hanoi  
Tel: (84-24) 3972 6472  
Fax: (84-24) 3972 6473  
@: info.hn@archetype-group.com





## ARCON-SUNMARK PRODUCTION CO., LTD

### Company Introduction

Arcon-Sunmark is a Danish company specialized in high temperature (HT) solar collector solutions for district heating. We also provide our large-scale solar thermal solutions for industrial process heat, large residential buildings, hotels, sports facilities, offices and public buildings. As market leader, we hold more than 25 years of experience building large solar thermal systems in Denmark and Europe. Our HT solar collectors are optimized for large-scale installations and have the highest yields available. At Arcon-Sunmark, we constantly:

- Profound knowledge and experience in system integration and engineering, short lead times and quick installation.
- High temperature solar collector fields optimized to in-line use (HT-HEAT-boost), as well as solar energy storage (HT-HEAT-store).
- Innovative and elegant steel foundation mounting solutions.
- Production facilities with automation of key processes at our plant in Skørping, Denmark and highest quality standards applied in our plant in Binh Duong, Vietnam.
- Complete turnkey solutions covering all project phases from concept development to warranty and service or collaboration with domain specialists and partners.

**Business category:** Renewable Energy, industrial solar heating solutions, solar district heating solutions

**Employees in Vietnam:** ~70

### Contact Point

Lot D\_83A3\_CN, My Phuoc Industrial Park No.3  
Thoi Hoa, Ben Cat, Binh Duong Province  
Tel: (84-274) 3577 533  
Fax: (84-274) 3577 532  
URL: [www.arcon-sunmark.com](http://www.arcon-sunmark.com)

**Experience in Vietnam:**





## ARDOR GROUP

### Company Introduction

ARDOR GROUP includes a full-service Architecture Firm with a focus on sustainable design as well as Green Building Certification consulting. Established in 1999, ARDOR was awarded as a Top Ten Architecture Firm in Viet Nam award in 2015. ARDOR has worked on over 100 highrise buildings as well as a wider array of other project types including resort villas, commercial offices, high end hotels, retail, and F&B. ARDOR supports clients from conceptual design phase all the way through building occupancy and afterward as needed to ensure user satisfaction.

ARDOR was an early adopter and leader in sustainable design in Vietnam and currently consults on green building certifications under LEED, LOTUS, and EDGE protocols. Other services include feasibility studies on green building potential, presentations on green building for a wide variety of audiences, full 12 month building energy simulations, HVAC analysis, and sustainable and efficient materials and equipment recommendations. ARDOR is currently consulting on the tallest LEED green building certification project for new construction in the world (Landmark81, HCMC, VN).

ARDOR is led by its mission to assist its clients in achieving their highest possible sustainability goals. This typically includes green design including site development, energy efficiency, renewable energy, water efficiency, indoor environment quality, and environmentally sustainable materials. ARDOR's team of both local Vietnamese and international experts (USA, Australia, and South Africa) is ready to assist you. Staff green building project experience extends back to 1995 and includes high tech manufacturing, healthcare, education, F&B, public housing, commercial offices, and residential.

Contact ARDOR today so we can join together to build your sustainable future.

**Business category:** Green Building

**Employees in Vietnam:** 30

**Experience in Vietnam:**



### Contact Point

Please insert your first main office address:  
216/1/1 Nguyen Van Huong, Thao Dien Ward  
District 2, Ho Chi Minh City, Vietnam  
Tel: (84-28) 35 194 325  
Fax: (84-28) 35 194 323  
@: ardor@ardorarch.com  
URL: www.ardorarch.com

B10, Khu Dau Gia, Van Phuc Ward  
Ha Dong District, Hanoi  
Tel: (84-24) 62 946 840







## ARTELIA VIETNAM CO., LTD

### Company Introduction

ARTELIA is an independent engineering, project management and consulting group that operates in the following nine markets: building construction, water, energy, environment, industry, maritime, multi-site projects, transportation and urban development. It has a regional network of 39 offices in France and an international network of 42 offices in 35 countries with more than 4,000 permanent staffs. In 2016, the group's consolidated turnover amounted to €439 million.

ARTELIA provides services to private clients (industrial groups, developers, investors, building contractors, banks, etc.) as well as to public clients (government departments, local authorities, public bodies, international funding agencies, etc.).

ARTELIA Vietnam, a subsidiary of ARTELIA International, was established back in 2006. Its main activities concerns buildings, infrastructures, expertise in water engineering, environment and energy. The team is composed of 600 staffs, with offices in Ho Chi Minh City (headquarters), Hanoi, and also in the neighboring countries (Thailand, Phillipines, Cambodia, Myanmar).

Three departments are involved in the building and energy sectors:

- The project management and supervision team
- The design department (including all technical specialists, in HVAC, electricity, plumbing, civil works and architects)
- The Energy and Environment Department of ARTELIA Vietnam

The latter has been created in 2011, and is composed of a highly specialized team of consultant/engineers, working in Vietnam, South East Asia and surrounding countries.

Its main fields of activities are:

- Design, supervision, audits and training on renewables energy systems, with proven track records in Vietnam on hydro, solar and wind power
- Energy efficiency and demand side management (DSM), using specialized tools to conduct measurement campaigns and specialized software
- The design and environmental certification of buildings using rating tools (LEED, LOTUS, HQE, etc.), with focusing on building performance simulation (energy, daylight and CFD)

**Business category:** Renewable Energy, Construction, Engineering

**Employees in Vietnam:** >700

**Experience in Vietnam:**



### Contact Point

6 Phung Khac Khoan Street, Dakao ward,  
District 1, Hochiminh City.  
Tel: (84-28) 38 22 13 14  
Fax: (84-28) 38 23 81 07  
@: nicolas.jallade@arteliagroup.com  
URL: www.arteliagroup.com

193 C3 Ba Trieu, Ha Noi  
Tel: (84-24) 37 34 72 60





## BASF VIETNAM CO., LTD

### Company Introduction

At BASF, we create chemistry for a sustainable future. We combine economic success with environmental protection and social responsibility. The approximately 114,000 employees in the BASF Group work on contributing to the success of our customers in nearly all sectors and almost every country in the world. Our portfolio is organized into five segments: Chemicals, Performance Products, Functional Materials & Solutions, Agricultural Solutions and Oil & Gas. BASF generated sales of about €58 billion in 2016. BASF shares are traded on the stock exchanges in Frankfurt (BAS), London (BFA) and Zurich (BAS). Further information at [www.basf.com](http://www.basf.com).

BASF has been active in Vietnam since the establishment of its representative office in 1994. BASF Vietnam Limited was set up in 2009. The company has two production sites for construction chemicals, located at Vietnam-Singapore Industrial Park, Binh Duong province and Van Trung Industrial Park, Bac Giang province. BASF Vietnam also maintains three sales offices in Ho Chi Minh City, Hanoi and Danang. It provides a wide range of products, including plastics, petrochemicals, construction chemicals, fine chemicals, performance chemicals, paper chemicals, crop protection, etc. BASF sales to customers in Vietnam were approximately €245 million in 2016. BASF employed 142 people in Vietnam as of the end of 2016. Further information on BASF in Vietnam is available at [www.basf.com/vn](http://www.basf.com/vn).



BASF contributes to science education in Vietnam through its interactive and fun-filled experiments at BASF Kids' Lab in partnership with Ho Chi Minh City Department of Education & Training. Since 2011, almost 3000 primary students have participated in this annual event to explore the role of chemistry in the daily life.

BASF offers scholarships to underprivileged students and school renovation, school painting in needy areas to provide better learning facilities as well as improved hygiene and safety conditions for the schoolchildren. The program is implemented in collaboration with Saigon Children's Charity, a charity with 25 years of experience in Vietnam, and other partners including Nippon Paint

**Business category:** Chemicals

**Employees in Vietnam:** 142

**Experience in Vietnam:**



### Contact Point

#### Head office

12 Tu Do Boulevard, Vietnam-Singapore Industrial Park  
Thuan An, Binh Duong  
Tel: (84-274) 3743 100  
Fax: (84-274) 3743 200  
@: [info-vn@basf.com](mailto:info-vn@basf.com)  
URL: [www.basf.com/vn](http://www.basf.com/vn)

#### Ho Chi Minh City Branch office

Suite 1101, Floor 11, Saigon Trade Center  
37 Ton Duc Thang Street, District 1, HCMC  
Tel: (84-28) 3824 3833  
Fax: (84-28) 3824 3832  
@: [info-vn@basf.com](mailto:info-vn@basf.com)





## BECAMEX IDC CORP

### Company Introduction

Founded in 1976, Becamex IDC Corp. is a provincial investment and development enterprise patterned on Singapore's Temasek Holdings and one of Vietnam's leading Industrial Park and Township developers. With a strong footprint in the Southern Key Economic Region, the conglomerate of 23 subsidiaries and affiliates, holds a diversified portfolio with the following core businesses: (1) Investment and Development of infrastructure: industrial parks, townships, real estate, commercial and residential projects; (2) Hospital and Health Care service; (3) Education and Training; (4) Retail and Hospitality; (5) Telecommunication and (6) Public Transportation, all in operation under the umbrella of the name "Becamex".

Established projects along with well-known brands, include several joint ventures with leading multinational investors, such as Becamex Tokyu Gardens City, Vietnam Singapore Industrial Parks (VSIP) 2,000ha in North, South and Central Vietnam with was the first joint venture industrial park in Vietnam and still the most successful of all Vietnam's Industrial Parks; Eastern International University (EIU); Becamex International Hospital (BIH); Ecolakes Residential Township; Becamex Binh Duong Soccer Team. Especially Binh Duong Province is now implementing the Binh Duong Navigator 2021 focusing on 4 domains namely technology, people, basics and business. This project uses the Triple Helix model to attract and connect resources from 3 parties: governments, educational/ research institutions and business communities.

**Business category:** Construction, development & investment of industrial zones & townships

**Employees in Vietnam:** ~4,000

**Experience in Vietnam:**



### Contact Point

#### Binh Duong Headquarters

230 Binh Duong Boulevard  
Thu Dau Mot City, Binh Duong Province  
Tel: (84- 650 3811 777  
Fax: (84-650 3811 666  
Email: [vietlong.nguyen@becamex.com.vn](mailto:vietlong.nguyen@becamex.com.vn)  
URL: [investinsouthvietnam.com](http://investinsouthvietnam.com)





## BNP PARIBAS

### Company Introduction

BNP Paribas has been present in Vietnam for almost 3 decades. Currently, the 2 core activities of the bank in Vietnam are:

- Corporate Institutional Banking (CIB) via 2 branches located in Ho Chi Minh City and Hanoi. CIB main focus is State-Owned Enterprises (SOEs), Local Corporates, Multinational Corporations (MNCs) and Financial Institutions. BNP Paribas in Vietnam offers the following services: Global Cash Management, Trade Services, Supplier Financing, Project and Export Finance, Global Markets and Investment Banking (M&A)
- Investment Solutions through the insurance activity with the joint-venture Vietcombank Cardif Life Insurance (VCLI)

**Business category:** Banking

**Employees in Vietnam:** 150

**Experience in Vietnam:**



### Contact Point

Tel: (84-28) 3528 5555

Fax: (84-28) 3823 1504

URL: [Vietnam.bnpparibas.com](http://Vietnam.bnpparibas.com)

Tel: (84-24) 3825 3175

Fax: (84-24) 3825 9784





# BOSCH

Sáng tạo vì cuộc sống

## BOSCH VIETNAM CO., LTD

### Company Introduction

Bosch first started its operations in Vietnam in 1994 and registered a wholly-owned subsidiary in 2008. Since 2008, Bosch in Vietnam has invested into a high-tech Bosch Gasoline Systems plant, manufacturing pushbelts used for continuously variable transmissions (CVT) in automobiles in the Long Thanh Industrial Zone, Dong Nai. There are also a Software and Engineering Research and Development (R&D) Center (Robert Bosch Engineering and Business Solutions Vietnam Co., Ltd) inaugurated in 2011, and an Automotive R&D center in Ho Chi Minh City established in 2014.

Today, Bosch supplies a wide range of technological products and solutions including the business divisions: Automotive Aftermarket, Automotive Electronics, Drive and Control Technology, Packaging Technology, Power Tools, and Security Systems.

As of December 31, 2016, Bosch employed more than 3,000 associates in Vietnam.

**Business category:** Trading, manufacturing, research & development

**Employees in Vietnam:** > 3,000

**Experience in Vietnam:**



### Contact Point

#### Branch of Bosch Vietnam Co., Ltd. in HCMC

194 Golden Building, 10<sup>th</sup> Floor  
473 Dien Bien Phu Street, Ward 25  
Binh Thanh District, HCMC  
Tel: (84-28) 6258 3690  
Fax: (84-28) 6258 3692  
@: bosch-infoteam@vn.bosch.com  
URL: www.bosch.com.vn

#### Branch of Bosch Vietnam Co., Ltd. in Hanoi

International Center, Room 03C, 2nd Floor  
17 Ngo Quyen Street, Hoan Kiem District, Hanoi  
Tel: (84-24) 3939 3119  
Tel: (84-24) 3936 2899

#### Robert Bosch Engineering and Business Solutions Vietnam Co., Ltd

E - Town 2 Building  
364 Cong Hoa Street, Tan Binh District, HCMC  
Tel: (84 - 28) 38128000  
Fax: (84 - 28) 38128001

#### Bosch Gasoline Systems Plant

Street No.8  
Long Thanh Industrial Zone, Tam An Village  
Long Thanh District, Dong Nai Province  
Tel: (84-251) 626 1990  
Fax: (84-251) 628 0350

#### Bosch Automotive R&D center in HCMC

Floor 1, E - Town 1 Building  
364 Cong Hoa Street, Tan Binh District, HCMC  
Tel: (84 - 28) 6287 9051







# BOYDENS ENGINEERING

## Company Introduction

Boydens Engineering Vietnam integrates expertise in mechanical, electrical, plumbing and fire engineering (MEPF) and structural design with our sustainable consulting division promoting sustainable solutions, renewable energy sources in conjunction with optimizing energy demands.

With 40 engineers both expats and locals in Vietnam offices, we provide, in specific:

### 1. Sustainable engineering consulting

- **Thermal simulation:** calculation of indoor thermal conditions. Assessment of comfort based on international norms. Estimation of energy consumption
- **Wind simulation:** evaluation of wind direction and velocity. Assessment of natural ventilation over outdoor space
- **Daylight simulation:** calculation of natural light quantity indoor. Evaluation of visual comfort. Estimation of artificial lighting support needs
- **Certification:** project assessment towards Green Certifications (LEED, BREEAM, LOTUS, etc.). Certification process leading Consulting – related studies along certification process.

### 2. MEPF engineering

### 3. C&S engineering

### 4. Lighting design consulting

Our market in South-East Asia. Selection of our projects in the region includes:

- 5 star Grand Mercure Hotel Hanoi
- United Nations International School Hanoi
- Sao Thai Duong mixed use office headquarters Hanoi
- Low energy consumption exemplary building – CUWC – Ministry of Construction, Hanoi
- 4 star Qudos resort Hoi An
- Crescent Mall 2 Phu My Hung Saigon
- MPC mixed use building Saigon

Boydens Engineering Vietnam is a branch of, and 100% FDI owned by Boydens Sustainable Engineering Group, an MEPF engineering practice founded in 1961 in Belgium  
[www.boydensvn.com](http://www.boydensvn.com)

**Business category:** MEPF and C&S Building engineering design services

**Employees in Vietnam:** 40

**Experience in Vietnam:**



## Contact Point

Tel: (84-24) 3519 08 08  
 Fax: (84-24) 3519 10 04  
 @: [hn@boydensvn.com](mailto:hn@boydensvn.com)  
 URL: [www.boydensvn.com](http://www.boydensvn.com)

Tel: (84-28) 3822 1989  
 Fax: (84-28) 3822 1589  
 @: [hcmc@boydensvn.com](mailto:hcmc@boydensvn.com)





## COMPAGNIE NATIONALE DU RHÔNE

### Company Introduction

CNR Engineering is the integrated engineering-consulting office of the "Compagnie Nationale du Rhône" which is the concessionary of the Rhone River, France's no. 1 producer of 100% renewable electricity and the designer-operator of the wide gauge waterway between Lyon and the Mediterranean Sea.

Specialized in Energy and river engineering, our expertise is designing and operating hydraulic structures, solar plant and wind Farms.

We use our feedback from experience to take a pragmatic approach to your projects in order to meet the challenges of today: reliability, optimizing return on investment, sustainable development, the environment and safety.

CNR Engineering places all its skills and its most recent innovations at the service of your projects, relying on the variety and synergy between the specialties of our engineers: hydrology-meteorology, hydraulics and modeling, the environment, civil engineering, hydropower, sedimentation.

In addition, we benefit from the expertise of CNR's specialists in operation and maintenance (O&M), renewable energy management with our optimization center (COCPIT), and river port development.

Lastly, CNR integrates its own physical model laboratory equipped with rare competences in physical modeling, monitoring structures and metrology (hydrometry, bathymetry, hydrography).

Acting as regional developer, CNR has built 19 hydropower plants and opened 330 km of navigable waterway on the Rhone. France's leading producer of 100% renewable energy, we develop an energy mix based on hydro-, wind and solar power. Strongly committed to sustainable development, we perform flagship environmental actions such as the hydraulic and ecological restoration of the natural bypassed reaches of the Rhone and the restoration of fish migration corridors

**Business category:** Green Power and River Engineering

**Employees in Vietnam:** 15

**Experience in Vietnam:**



### Contact Point

#### Headquarter

2 rue André Bonin  
69316 LYON CEDEX 04 – FRANCE

Tel: + 33 (0)4 72 00 69 69  
Fax: + 33 (0)4 72 10 66 66  
@: ingenierie@cnr.tm.fr  
URL: www.cnr.tm.fr

#### South-East Asia Regional Office

Horison Tower, 40 Cat Linh,  
Dong Da District, Hanoi

Tel: (+84-24) 37 15 23 44  
Mob: +84 169 514 26 11  
Fax: (+84-24) 37 15 22 30  
@: j.mentre@cnr.tm.fr  
URL: www.cnr.tm.fr



**COMMERZBANK**

The bank at your side



## COMMERZBANK AG

### Company Introduction

Commerzbank is a leading international commercial bank with branches and offices in almost 50 countries. In the two business segments "Private and Small-Business Customers" and "Corporate Clients", the Bank offers a comprehensive portfolio of financial services which is precisely aligned to the clients' needs. Commerzbank finances 30% of Germany's foreign trade and leads in financing for corporate clients in Germany. Due to its in-depth sector know-how in the German economy, the Bank is a leading provider of capital market products. Its subsidiaries Comdirect in Germany and mBank in Poland are two of the world's most innovative online banks. In total, Commerzbank serves more than 18 million private and small business customers, as well as more than 60,000 corporate clients, multinationals, financial service providers, and institutional clients. The Bank, which was founded in 1870, is represented at all the world's major stock exchanges. In 2016, it generated gross revenues of €9.4 billion with approximately 49,900 employees.

Our sustainable, client-focused way of doing business is oriented toward achieving the highest client satisfaction. Our products, services and advice are designed to meet our promise of fairness, professionalism, responsibility and sustainability.

Since the 1980s, Commerzbank has been developing sustainability strategies for the age of renewable energies. In 2003, Commerzbank founded its Competence Center Energy in Hamburg which is today one of the largest funders of renewable energies. It provides finance for wind farms and solar parks operated by institutional investors, municipal utility companies, energy corporations and private investors. Commerzbank supports the funding of such plants through non-recourse project finance in Germany and abroad.

**Business category:** Financial Services

**Employees in Vietnam:** Representative Office with 3 employees

### Contact Point

Please insert your first main office address:

**Commerzbank AG**

Representative Office Ho Chi Minh City  
7th floor, The Landmark, 5B, Ton Duc Thang St.,  
District 1, Ho Chi Minh City  
Tel: +84 28 38226868  
Fax: +84 28 38233838  
@: fi.vietnam@commerzbank.com

**Experience in Vietnam:**





# CONCORDIA INTERNATIONAL SCHOOL HANOI

## Company Introduction

Concordia International School Hanoi is a 100% American-owned, non-profit school teaching a traditional US curriculum with AP courses. Offering grades Pre-K through 12, Concordia provides a rigorous and supportive academic environment led by dedicated teaching professionals averaging 18 years' experience in the classroom.

With our sister schools in Hong Kong (Hong Kong International School) and Shanghai (Concordia Shanghai) ranked among the Top 5 and Top 10 respectively among international schools worldwide, Concordia brings decades of international education experience and a proven track record for academic excellence to Hanoi.

Now in our 7th year of operation, we are in our 2nd year in new, state-of-the-art campus facility in Van Tri, conveniently located 10 minutes from the Tay Ho area.

Our stated objective is to provide an elite education and the academic foundation for our students to gain admission to the world's top universities and succeed at the next level and beyond.

Our program also centers around the "whole-child" concept and, along with academics, includes a healthy focus on sports, drama, art and music, which we believe helps build students into creative, well-rounded individuals.

Today our student population boasts 350 students from 25 countries, and we see a diverse population as fundamental to identity.

**Business category:** Education, Training

**Employees in Vietnam:** 60

**Experience in Vietnam:**



## Contact Point

Vân Trì Golf Compound, Kim Nỗ  
 Đông Anh District, Hanoi  
 Tel: (84-4) 3795 8878  
 Fax: (84-4) 3795 8879  
 @ : admissions@concordiahanoi.org  
 URL: www.concordiahanoi.org





## CTV INGENIERIE VIETNAM

### Company Introduction

CTV INGENIERIE Vietnam is an experienced engineering consulting firm dedicated to Balance-of-Plant design for Wind farm and Solar farm. Member of CTE Wind group, CTV's office is in Hanoi Vietnam and the headquarters is in France, we are also present also in Brazil, Poland, Portugal, Spain and Ireland.

We have designed more than 780 Wind farms with the total power more than 14 500MW of Wind energy and 1000 MW of Solar energy throughout 42 countries in the world. We realized the first wind farm of Vietnam in 2008 this is Binh Thuan Wind Farm 1 (30MW) at Binh Thuan province, and now we have realized more than 80% wind farm in Vietnam such Phu Lac Wind Farm (24MW), Thuan Nhon Phong Wind Farm (30MW), Tay Nguyen Wind Farm (28MW) and Dam Nai Wind Farm (40MW).

#### Business category:

- Balance-of-Plant Design of Wind farm and Solar farm
- Foundation of wind turbine design, road, hardstand, substation civil engineer design, value engineering optimization, site inspections and supervisor of the foundation construction
- Road and Foundation and support structure for the solar panel analysis and design.
- Topography survey and Investigation geotechnical, geotechnical engineering analysis and design,

**Employees in Vietnam:** > 30



### Contact Point

CEO Mr NGUYEN Viet-Hung  
8th Nam Anh Building N°68 Hoang Dao Thuy, Thanh Xuan,  
Hanoi, Vietnam  
Tel: 84-09 79 85 85 40  
Fax: 84-24 35 56 93 96  
@: vh.nguyen@cte-sa.com  
URL: <http://www.cte-wind.com>

**Experience in Vietnam:**







# DANIELI ENVIRONMENT & SYSTEMS

## Company Introduction

Since the 1970s Danieli has established a division specialized in environmental protection. Today Danieli Environment & Systems offers a full range of proprietary technologies and processes for water treatment & waste water treatment, air pollution control, energy saving & energy recovery, solid waste recovery, and noise reduction. The use of BAT (Best Available Technologies), which is mandatory in many countries promote the development of many industries which are environmentally sustainable. The goal of Danieli is to reduce to zero the environmental impacts; Danieli believes that the reduction on the environmental impact is not necessarily in conflict with the goal of being cost-competitive, in fact many environmental technologies are cost-friendly.

Danieli Environment & Systems is not just an "hardware" supplier, but a technology partner, supporting its customer with:

- Concept & feasibility studies;
- Engineering & Process design;
- Hazard & operability studies;
- Procurement of materials & equipment;
- Supply of proprietary equipment package;
- Turn Key plants solutions;
- Plant commissioning & operator training;
- Technical service & supports;
- Spare parts & services.



### FUME TREATMENT

- > Reduction of Fume;
- > Reduction of harmful and toxic pollutants in the fumes;
- > Treatment of the fume.



### WATER TREATMENT

- > Water usage saving;
- > Water & waste water treatment;
- > Water recycling and Zero discharge;
- > Optimize water use.



### SOLID WASTE RECOVERY

- > Slag recovery from EAF, LF, and BOF.
- > Application in civil & road constructions;
- > Circular economy, systematic thinking.



### ENERGY RECOVERY

- > Enhancement and reduction of energy consumption;
- > Recovery of the energy from the waste heats.

## Contact Point

Tel: (+39) 0432 1958111  
 Fax: (+39) 0432 1958289  
 @: de@danieli.com  
 @: f.casarsa@danieli.it  
 URL: <http://www.danieli.com/>

## Experience in Vietnam:



Tel: (+84 28) 3528 7400  
 Fax: (+84 28) 3528 7451  
 @: info@Vietnam.danieli.com  
 @: n.martinuzzi@Vietnam.danieli.com





# DEUTSCHES HAUS HO CHI MINH CITY

## Company Introduction

Deutsches Haus Ho Chi Minh City is an award-winning, pioneering, premium International Grade A+ office-tower strategically located on the corner of Le Duan Boulevard and Le Van Huu Street in the heart of Ho Chi Minh City. The 25-storey building consists of approximately 40,000 square meters GFA of prime office real estate including retail areas, a multifunctional exhibition-, event- and conference area and restaurant areas with an outdoor terrace. The building will be home to the Consulate General of the Federal Republic of Germany, making it the destination and gateway for German companies for doing business in Vietnam and ASEAN and promoting German and Vietnamese relations. The opening of Deutsches Haus Ho Chi Minh City is in September 2017.

Deutsches Haus Ho Chi Minh City is the first building in Vietnam and one of the few in South East Asia awarded with two energy efficiency certificates: LEED Platinum and DGNB Silver. The Federal Ministry of Economic Affairs and Energy of Germany granted Deutsches Haus Ho Chi Minh City the "EnEff" distinction applying state-of-the-art sustainable energy-efficient building solutions and technologies "Made in Germany."

Deutsches Haus Ho Chi Minh City is the winner of the "Vietnam Property Awards" for "Best Office Development" in 2015 & 2016, "Best Green Development" in 2015 & 2016, "Best Commercial Development" of Vietnam in 2016 and is also the winner of the "South East Asia Property Awards" for the "Best Green Development" of South East Asia in 2016.

Deutsches Haus Ho Chi Minh City will offer premium services to tenants and their employees: High quality drinking water, bicycle racks, car-driver lounge and many more.

**Business category:** Engineering, Construction, Real Estate, Property Development, Business Services

**Employees in Vietnam:** 25-30

**Experience in Vietnam:**



## Contact Point

Office:  
120 Pasteur Street, Ben Nghe Ward,  
District 1, Ho Chi Minh City, Vietnam

Site Location:  
33 Le Duan Boulevard, Ben Nghe Ward, District 1, Ho Chi  
Minh City, Vietnam





## ECOHEL LTD.

### Company Introduction

Ecohel is cleantech company from Finland; we specialize in researching and manufacturing multi-fuel power plants. Our team has extensive knowledge and experience in bioenergy and power plant technology. We offer turnkey waste-to-energy projects for municipalities and private-sector customers to treat solid waste as well as biomass and produce green energy.

Our comprehensive solution includes treating of municipal solid waste and biomass waste (i.e. rice husk, wood chips, animal residues, plant residues, etc.) to produce electricity and valuable by-products. Our main target markets include Vietnam and other South-East Asian countries.

Ecohel's technology is designed in modular model, which allows us the flexibility to scale a project according to different demands. The range of Ecohel power plant is from 0,5 MW to 5MW electricity, with a focus on small and medium-sized solutions.

**Business category:** Energy, Environment, Biotechnology.

**Employees in Vietnam:** < 10

**Experience in Vietnam:**



### Contact Point

Heikkiläntie 7, 00210 Helsinki, Finland  
Mr. Jarmo Himma  
CEO  
Tel: (+358) 504608341  
@: jarmo.himma@ecohel.fi  
URL : www.ecohel.fi

Ms. Nhu Tran  
Sales and Marketing Coordinator  
Tel: (+358) 440998829  
@: nhu.tran@ecohel.fi





## ECOREM AIEI

### Company Introduction

Ecorem-AIEI is a Vietnamese environmental consultancy company that employs local experts to develop and complete environmental projects with valuable experience in technical analysis and project management in Vietnam, focusing on projects related to waste management, pollution control, environmental impact assessment, and other environmental services.

Ecorem-AIEI Vietnam is further supported by Ecorem NV, an ISO 9001 certified, Belgian company employing international and national experts in complementary disciplines, with more than 25 years of international experience in environmental pollution assessment, sound environmental and social development of industrial zones and ports, environmental and social (pre) feasibility studies and master planning, national and international environmental and social policy, environmental project management, and other services.

Our company provides local expertise and flexibility combined with international knowledge and quality standards, to perform tailor-made services in environmental projects

**Business category:** Waste and water management

**Experience in Vietnam:**



### Contact Point

12nd Floor, West Tower, Hancorp Plaza, No. 72 Tran Dang  
Ninh, Dich Vong Ward, Cau Giay District, Hanoi.

Tel: (84-24) 3219 1496

@: sebastien.heris@ecorem-aiei.com

URL: www.ecorem-aiei.com





# ENVIRONMENTAL ENGINEERING AND ECOLOGY

## Company Introduction

eE+E Environmental Engineering+Ecology develops solutions for environmental impacts caused by human activities in the fields of environment, groundwater, surface water and ecological systems.

eE+E is working on Research + Development, Expertises, Planning and Teaching:

Environmental investigations and monitoring: groundwater, surface water, ecosystems etc.

- Environmental system analyses: water, water+socio-economy, water+environment etc.
- Environmental modeling: ground water, surface water, flood, flood risk etc.
- Environmental planning: land use, post-mining land use, water resources, climate change adaption, environmental risk assessment etc.
- Environmental management: Integrated Water Resources Management in rural and urban areas (IWRM), Water and Ecology (wetlands, minimum flow etc.)

eE+E is actively working in Vietnam since 2000. eE+E is closely cooperating with the start-up-company Resource.ful, Cologne, Germany.

**Business category:** Environment, Biotechnology

**Employees in Vietnam:** <10

**Experience in Vietnam:**



## Contact Point

**eE+E Environmental Engineering+Ecology – Prof. Dr. H. Stolpe**

Project office in Vietnam – Dr. Katrin Broemme

c/o VINACOMIN, Room 102B

226 Le Duan, Hanoi

Tel: (84-24) 351 82 406

@: katrin.broemme@rub.de

URL: www.rub.de/ecology







## EGSPLAN

### Company Introduction

EGSplan international is an innovative engineering firm with more than 25 years of experience in energy-efficient and sustainable design.

Originally founded as a spin-off of a solar energy research group at the University of Stuttgart in 1990, our group is committed to innovation, science-oriented reasoning and the development of evidence-based solutions in design and building projects.

Through leadership in the advanced market of Germany and the considerate development of adapted design solutions in various locations and climates, we can deliver energy-efficient and sustainable projects worldwide on a high level of performance and professional excellence.

With offices in Shanghai and in Bangkok we support projects locally in the Asian region. Our office in Stuttgart serves projects worldwide.

We offer:

- localized energy design and engineering for all type of projects (industry, hotel, office)
- quality control, monitory and coaching for advanced building systems design
- building certification services for quality development (LEED, DGNB, PlusEnergy)

**Business category:** Engineering and Construction

### Contact Point

**Experience in Vietnam:**



**Dr. Dirk Schwede**

**EGSplan international GmbH**

Gropiusplatz 10, 70563 Stuttgart, Germany

Tel: (49-711) 99 007 05

Fax: (49-711) 99 007 99

@: info@egs-int.com

URL: www.egs-int.com

**EGS-plan (Bangkok) Co. Ltd.**

Bangkok, Thailand

@: info@egs-int.com

URL: www.egs-bangkok.com





## ELITE TECHNOLOGY CO. LTD / FREELUX

### Company Introduction

The Elite Technology Co Ltd/Freelux activities are related to the R&D of IoT solutions for Smart Buildings. We design connected energy monitoring devices, sensors and led dimmers. With our Vietnamese partner SNTek we explore the Vietnamese market for renewables with a focus on rooftop solar systems to realize energy neutral buildings. Via data obtained by our monitoring hardware and intelligent software we offer building owners to choose the level of saving, comfort and safety. With led dimmers we reduce the energy consumption of lighting while the functionality remains on the required level needed in homes, offices and factories.

We welcome building owners and project developers to discuss their ideas and needs with us to create an optimal solution.

**Business category:** Electronics

**Employees in Vietnam:** 10

**Experience in Vietnam:**



### Contact Point

124/2 Street No 2,  
Truong Tho Ward, Thu Duc Dist., HCMC  
Tel: +84 915992468  
@: vanngo@freelux.com.vn  
URL: www.freelux.com.vn





## FRIESLANDCAMPINA VIETNAM

### Company Introduction

FrieslandCampina Vietnam has set up business in Vietnam since 1994 and supplied more than 1.5 billion high-quality milk units annually with favorite brands such as Dutch Lady, Friso, Fristi and Yomost. FrieslandCampina Vietnam has been the first ever company in Vietnam to achieve 4 international certificates on management system: ISO 9000:2008 (Quality), ISO 14000:2007 (Environment), ISO 22000:2005 (Food safety) and OSHAS 18001: 2007 (Safety and occupational health) of Bureau Veritas – a global leader in Testing, Inspection and Certification (TIC).

On the topic of green innovation and sustainability, in 2016, FrieslandCampina Vietnam won the Best Sustainable Company award of the BeNeLux Business Awards jointly organized by Dutch Business Association in Viet Nam (DBAV) and Belgian-Luxembourg Chamber of Commerce in Viet Nam (Beluxcham). In the same year, together with Ministry of Natural Resources and Environment, the company successfully organized the “Green Innovation Award” for senior high school students to raise awareness among community in protecting the environment.

FrieslandCampina Vietnam’s factories in Binh Duong and Ha Nam are invested with the most advanced technology, completed sewage treatment system, saving-energy measures and using clean energy sources to protect environment. In the past five years, FrieslandCampina Vietnam achieved outstanding results in green production as follows: energy saving of over 15%, water use saving over 25% and reduce emissions more than 40 % and the amount of waste and waste water discharged into the environment is reduced by over 25% vs to year 2010.

20 years constantly creating shared value for Vietnam community, FrieslandCampina Vietnam was honored to receive the 1st Labor Medal from the Government in 2016 for the continuous contribution to the rural development, excellent achievement in environmental protection and outstanding assistance to school children and teachers in remote and disadvantaged areas.

**Business category:** Producing, processing, packaging good stuff and beverage products include dairy and products from dairy, importing materials, component, machine, equipment and other items for manufacturing, processing and packaging products from the company.

**Employees in Vietnam:** 1001 - 5000 Employees

**Experience in Vietnam:**



### Contact Point

HCM Office: Floor 16-17, Bitexco Financial Tower,  
2 Hai Trieu, District 1, Ho Chi Minh City  
Tel: (84-28) 39 156 256  
Fax: (84-28) 39 156 015  
URL: <http://www.frieslandcampina.com>

Binh Duong factory: Binh Hoa, Thuan An, Binh Duong  
Tel: (84-274) 375 6240





## GATE TO ASIA

### Company Introduction

GTA was established in 2007. Our activities cover Vietnam, Cambodia and Myanmar. Our investment services are focused on Clean Development, particularly LED Lighting and PV Solar. We have advised many Renewable Energy projects and Energy Efficiency projects in the region.

We have a long and broad experience in evaluating investment opportunities in the region for foreign investors.

For project owners we offer to evaluate business plans and investment memorandums and to source capital.

We are a Danish managed company. Most of the staff members are Vietnamese with a high level of qualifications.

We have long-term exclusive agreements with suppliers, who are amongst the best Scandinavian suppliers who ensure our customers the highest possible quality, together with the best possible financing solution. All project solutions are designed in close collaboration with our suppliers:

- High-quality products
- International installation teams
- Full maintenance agreements
- Long International Product Guarantees
- Production Guarantees
- Savings Guarantees

We can work as equipment supplier, full EPC and financing, or as any combination of the aforementioned.

**Business category:** Renewable energy

### Contact Point

Suite 8409, 3905 Two Exchange Square, 8 Connaught Place  
Central, Hong Kong  
Tel: (84-28) 62899688  
@: thomas@g82asia.com

**Experience in Vietnam:**





# GREEN SHOOTS INTERNATIONAL SCHOOL

## Company Introduction

Green Shoots is an international school located in Hoi An, Quang Nam. We have a student body of 140 ranging from 18 months to 16 years old, and currently offer the British curriculum culminating in Cambridge IGCSEs.

Green Shoots opened in 2012 and has grown rapidly ever since. We are now focused on building a new campus mid-point between Hoi An and Da Nang to serve expanding communities in both cities.

This campus will be innovative in design, integrating different styles and materials and ensuring a minimal footprint upon the land we occupy. It will be highly sustainable - from the materials we use to the type and amount of energy we consume, from the way we recycle our waste to the classroom discussions of sustainable living.

Green Shoots has always had a strong focus on sustainable education and on teaching our learners to focus on the long-term needs of our shared world. For example, we integrate into classroom and extra-curricular activities an understanding of the United Nations' Sustainability Goals, and our class mascots are endangered Vietnamese animals. Students are reminded not to waste food, and scraps are given to our campus chickens.

For our new campus, we aim to achieve Lotus accreditation from the Vietnam Green Building Council, an organisation that rates sustainable buildings in Vietnam. This step will further cement our green credentials and offer reassurance to our stakeholders that Green Shoots is as good as its name!

We are keen to make connections with other Green companies in Vietnam, particularly with those that may be able to assist us as we develop our exciting new home. Upon completion, we look forward to opening our campus up to others wishing to access green and sustainability learning opportunities.

**Business category:** Education & Training

**Employees in Vietnam:** Fewer than 50

**Experience in Vietnam:**



## Contact Point

Catherine McKinley, Director

Tel: (84-235) 3924954

@: c.mckinley@greenshoots.edu.vn

UR: greenshoots.edu.vn







## GROUPE VALECO

### Company Introduction

Groupe Valeco is a major player in the French energy sector, founded in 1989 by Gilbert Gay. This family business benefits from 25 years of expertise in project development, construction, realization, as well as operation and maintenance of industrial renewable energy production units. In 2001, Groupe Valeco developed its first wind farm (11.7 MW), then in 2008 built its first photovoltaic plant.

Now run by Erick Gay, the company has become, in a few years' time, a major player in the French energy sector. In 2008, the Caisse des Dépôts et Consignations, a financial institution of the French Government, acquired a 35.56% stake in the share capital of Valeco (equivalent to a contribution of € 22.8 million). This achievement enabled Groupe Valeco to strengthen its financial structure and complete ambitious national targets related to renewable energy production. Thanks to a team of 120 employees, Valeco is currently operating 354 MW of green energy: 253 MW of on shore wind farms and 101 MW of ground mounted and rooftop solar plants. Presently, the group is developing an extra 1 GW of renewable energy.

Building on its success, Valeco began expanding outside France, starting with Canada in 2012. A 5 MW cogeneration plant is currently under operation and a 66 MW windmill project is under development. The company then settled in Mexico with a 150 MW solar project (under development), and in South-East Asia with an extensive photovoltaic project in Vietnam.

In summary, Groupe Valeco has expertise in all the segments of the renewable energy industry, working in cooperation with local actors and elected representatives worldwide. The company always insures the positive social, economic and environmental impact of its projects.

**Business category:** Renewable Energy

**Employees in Vietnam:** <10

**Experience in Vietnam:**



### Contact Point

Saigon Trade Center suite 2101-2102  
37 Ton Duc Thang, District 1, Ho Chi Minh City, Vietnam  
Tel: (84) 1.20.40.24.184  
@: valeco-Vietnam@groupevaleco.com  
URL: www.groupevaleco.com





## SIAM CITY CEMENT (VIETNAM) LTD

### Company Introduction

INSEE in Vietnam is a member of the Siam City Cement Public Company Limited (SCCC), one of the market leaders in building materials industry in the region

SCCC has already listed itself into a prominent name in the building materials industry, spanning its operations in different parts of the South East Asia region. The Company manufactures the "INSEE" branded, cement, construction aggregates and solutions which are marketed in Cambodia, Indonesia, Bangladesh, Sri Lanka and Vietnam, in addition to Thailand where it is one of the market leaders.

#### INSEE in Vietnam

Being established in 1994, INSEE in Vietnam - earlier known as Holcim (Vietnam), has become over the years the leading cement producer and waste management in the South of Vietnam. We are proud that our products have been used in so many of the iconic buildings and infrastructure as well as housing and commercial developments in the south of Vietnam and how we have contributed to the economy, environment and society. The company has more than a 1,100 employees working on 5 different cement production sites in South Vietnam as well as RMX in the greater HCMC area.

INSEE looks forward to contributing to Vietnam's national growth with the ambition to continuously provide innovative solutions to our customers while improving living condition for the community, protecting the environment, investments on people and enhancing sustainable construction. INSEE is committed to sustainability across our value chain that will pave the way to brighter futures.

#### Business category:

- Cement solutions manufacturer
- Concrete solutions
- Waste management solutions service

Experience in Vietnam:



**Employees in Vietnam:** >1100

### Contact Point

Nguyen Cong Minh Bao – Sustainability & Communication  
 Director  
 81-85 Ham Nghi St, Dist.1, HCM City  
 Tel: (84-28) 39149 000  
 Fax: (84-28) 39149 001  
 @: baoSD.nguyen@siamcitycement.com  
 URL: www.insee.com.vn





## NS BLUESCOPE VIETNAM

### Company Introduction

#### **BlueScope is a leading international supplier of steel products and solutions**

BlueScope is a leading international supplier of steel products and solutions, principally focused on the global building and construction industry.

Our business has been built on the strength of our global partnerships, global networks and global brands. Many of our customers are Fortune 500 companies, and we can help them realize significant savings in the total cost of their buildings by reducing construction schedules.

Our global networks are another great BlueScope strength, with more than 100 facilities in 17 countries, employing 17,000 people serving thousands of customers.

Our strong partnerships and networks are built on BlueScope's great product brands, such as COLORBOND®, Clean COLORBOND® and ZINCALUME® steels, LYSAGHT® steel building products, and Butler® and Varco Pruden® engineered building solutions.

#### **NS BlueScope Vietnam – a joint venture enterprise between BlueScope and Nippon Steel & Sumitomo Metal Corporation of Japan in Vietnam**

NS BlueScope became one of first foreign investors in Vietnam when we built a roll-forming plant in Bien Hoa, Dong Nai in 1993. NS BlueScope Vietnam has supplied hi tech steel buildings products & solution to many construction projects in Vietnam. NS BlueScope's products have been a part of Vietnam's architectural and buildings throughout the country's landscape. With success momentum in Vietnam, in 2005, NS BlueScope invested US\$105 million to commission a new world-class steel metallic coating and pre-painting facility in Phu My Industry Zone – Ba Ria Vung Tau to serve the growing demand of Vietnam market. We are proud of our success, and we understand that our success come from support and loyalty of investors, contractors and architect consultants. They welcome innovative value from us. It encourages us to invest more in research & development to launch new steel building solutions and products.

**Business category:** Industrial Products

**Employees in Vietnam:** < 600

**Experience in Vietnam:**



### Contact Point

Tel: (84-28) 38210066  
 Fax: (84-28) 38210119  
 @: Info@bluescopesteel.com  
 URL: www.bluescope.com.vn





## PRACSIS S.P.R.L. REPRESENTATIVE OFFICE IN HCMC

### Company Introduction

#### PRACSIS: the bridge between the EU and South East Asia

PRACSIS is a privately owned expert consultant SME, specialized in providing practical, innovative, and sustainable solutions for EU tenders, conferences, events, stands, exhibitions and business matching with a focus on green growth and clean technology. Since 1995 we start every single of our professional engagements with the strategy and KPI development for successful implementation of clean technology, innovation related projects or getting funding for it; we advise on potential or necessary partners, main stakeholder engagement in the respective country or tendering process and act as a bridge to Brussels, to the EU. All over Europe we built the EURACSIS network of partners and also have started our network and partnerships in Asia. Here, a focus is since 2013 on ASEAN countries, especially with respect to the EU stakeholders, business communities and their multiplier organisations.

Our main office in Southeast Asia is located in Ho Chi Minh City and we are currently able to offer an integrated portfolio of services, from strategy development, planning-through to all facets of the implementation, gathering information about EU funding, e.g.: call for tenders and proposals, the necessary eligibility steps, consulting on the context, content and deliverables and also bridging of potential partners, key experts and target sectors with first-hand business feedback. In close collaboration between our offices in Vietnam and Belgium, PRACSIS can provide you access to a global network of prominent Professional Congress Organisers (PCO) and communication agencies, experienced H2020 participants and innovative companies, EU funding experts and proposal drafters. On a practical working level, we act as added value creators, boosting your visibility and business outreach and connecting you with the right audience. With a solid expertise in eco-innovation and green growth, our team includes senior consultants in EU public affairs, energy and environment, innovation and the bio-economy to create content and activate stakeholders or partners.

PRACSIS can be your EU project implementation partner with our HQ in Brussels, or your service provider that works efficiently behind the scenes to implement for you the right stakeholder impact, best possible visibility or targeted audience recognition.

**Business category:** Professional Services Consultancy, Environment, Publicity

**Employees in Vietnam:** < 30

**Experience in Vietnam:**



### Contact Point

PILOTCO – 1 Building, 5th floor, 45 ABCD Dinh Tien Hoang Street, District 1, Ho Chi Minh City  
Tel: (84-28) 3910 0370  
Fax: (84-28) 3827 7020  
@: greengrowth@pracsis.be  
URL: www.asia.pracsis.be

#### BRUSSELS OFFICE

Place Communale d'Auderghem 8,  
B-1160 Brussels, Belgium  
Tel: (32-2) 345 91 00  
Fax: (32-2) 345 17 84  
@: info@pracsis.be  
URL : www.pracsis.be





## ROYAL HASKONINGDHV VIETNAM

### Company Introduction

Royal HaskoningDHV is an independent, international engineering and project management consultancy since 1881 with knowledge and experience in aviation, buildings, energy, industry, infrastructure, maritime, mining, transport, rural and urban areas, and water. With nearly 7,000 colleagues across the world, we work for public and private clients in over 130 countries.

Active in Vietnam since 1985 and established in 1994, Royal HaskoningDHV Vietnam is recognized as one of the most prominent leading engineering and consultancy firms with a unique track record of acknowledged projects in Vietnam and SE Asia. With offices in Ho Chi Minh City and Hanoi and about 200 employees, Royal HaskoningDHV Vietnam has carried out numerous key projects for the private and public sectors, comprising the full scope of engineering, project management, construction management and consultancy services for Industrial, Maritime, Water and Real Estate markets.

**Business category:** Industrial, Maritime, Water and Real Estate markets.

**Employees in Vietnam:** 180

**Experience in Vietnam:**



### Contact Point

Tel: (84-28) 6281 4556

Fax: (84-28) 6287 0757

@: info@vn.rhdhv.com

URL: www.royalhaskoningdhv.vn

Tel: (84-24) 3760 6431

Fax: (84-24) 3760 6432





Life Is On



## SCHNEIDER ELECTRIC VIETNAM LTD. CO

### Company Introduction

Schneider Electric is the global specialist in energy management and automation. With revenues of ~€25 billion in FY2016, our 144,000+ employees serve customers in over 100 countries, helping them to manage their energy and process in ways that are safe, reliable, efficient and sustainable. From the simplest of switches to complex operational systems, our technology, software and services improve the way our customers manage and automate their operations. Our connected technologies reshape industries, transform cities and enrich lives.

At Schneider Electric, we call this Life Is On.

[www.schneider-electric.com](http://www.schneider-electric.com)

**Business category:** Smart City, Green Building, Waste and Water, Renewable Energy, Automation and others.

**Employees in Vietnam:** 1,000

### Contact Point

#### Headquarter

35, rue Joseph Monier  
CS 30323 F-92506 Reuil-Malmaison Cedex  
(France)  
Tel: +33 (0) 1 41 29 70 00  
Fax: +33 (0) 1 41 29 71 00

#### HCMC office

Unit 7.2, level 7, Etown 1 Building  
364 Cong Hoa, Tan Binh District, HCMC  
Tel: (84-28) 38 103 103  
Fax: (84-28) 38 120 477  
@: [customercare.vn@schneider-electric.com](mailto:customercare.vn@schneider-electric.com)

#### Hanoi office

Level 8, Vinaconex Building  
34 Lang Ha, Dong Da District, Hanoi city  
Tel: (84-24) 38 314 037  
Fax: (84-24) 38 314 039  
@: [customercare.vn@schneider-electric.com](mailto:customercare.vn@schneider-electric.com)

Experience in Vietnam:





## SCHOMBURG VIETNAM CO. LTD.

### Company Introduction

SCHOMBURG Vietnam Co. Ltd. offers high quality building products systems and products for the construction industry.

Product ranges: construction waterproofing, restoration systems, industrial flooring, surface protection systems, tiling systems, coatings, plasters & screeds, products for road, track & hydraulic structures, concrete repair, waste water systems, concrete additives and general construction materials.

The company offers over 1,000 different products and solutions for construction.

#### Business category:

- Waterproofing systems
- Industrial floor coating
- Systems for laying tiles
- Building restoration systems



#### Green Schomburg

#### Protection of the environment and mankind

##### Distinguished...

Sustainability – not only in restoration but also in environmental protection. The SCHOMBURG group of companies places great emphasis on this. A range of our products has been subjected to strict testing.

SCHOMBURG sets new benchmarks relating to the requirements for sustainable building and economy. In particular, the health and comfort of the user. This is assured, above all, via the use of low emission products.

Employees in Vietnam: < 50

Experience in Vietnam:



EPDs

### Contact Point

19P Nguyen Huu Canh St., Ward 19, Binh Thanh Dist., Ho  
Chi Minh City, Vietnam  
Tel: (84-28) 73008228  
@: Vietnam@schomburg.com  
URL: www.schomburg.vn





## SHIMIZU VIETNAM

### Company Introduction

Shimizu is a Japanese construction company established in 1804. Its founder, a carpenter, Shimizu Kisuke, took part in building Imperial Castle in nowadays Tokyo. SHMZ is based on innovation and openness. Headquartered in Singapore international operations are facilitated through 40 offices in 21 countries, including Southeast Asia for more than 40 and Vietnam for 25 years.

SHMZ was eight times “the first in Japan” – building, among other, the first true western style hotel in Japan in 1868. Three times “the first in the world”, including longest center span of a single-plane, cable-stayed, “Bai Chay Bridge” in Ha Long City, Vietnam.

As the fourth largest Japanese construction company, among top 25 in the world, SHMZ employs approximately 11,000 people with annual sales over USD 13 billion. Shimizu excels in design and build projects and is able to provide financing, Build-to-Suite Lease, property management and many other business models.

More than 400 realized projects in Vietnam, for last 25 years, high tech facilities (e.g. 17 “clean rooms”), positioned SHMZ as a great contributor to Vietnam’s rapid industrial and socio-economic growth. Our projects include Hanoi International Technology Center - “HITC”, Sun Red River Building, Omni Saigon Hotel, Sun Wah Tower, Zen Plaza, in Ho Chi Minh City, garment factory in Binh Phuoc, processing plants in Hai Phong, Ha Nam, Binh Duong, ODA based projects - metro line in HCMC, Binh Khanh Bridge, a weather radar in Hai Phong and many others.

We invite you to join us, get familiar with our work and become a member of a growing family - because today’s work is tomorrow’s heritage.

**Business category:** Construction, Engineering, Real estate, Development, Property Management, Consulting, Environmental protection, Construction and materials technology, Foreign investments, Consulting

**Employees in Vietnam:** 300

### Contact Point

Mr. Shimizu at +84 (0) 4 3772-0500 or at [shimizu.yasuhiro@shimz.biz](mailto:shimizu.yasuhiro@shimz.biz).

Mr. Shimizu Yasuhiro

General Director

Tel: 84. 24. 3772 0500

@: [shimizu.yasuhiro@shimz.biz](mailto:shimizu.yasuhiro@shimz.biz)

#### HANOI OFFICE

3<sup>rd</sup> Floor, Lang Ha Building

14 Láng Hạ, Thành Công, Ba Đình, Hà Nội

Tel: 84. 24. 3772 0500

Fax: 84. 24. 3772 3570

URL: <http://www.shimz-global.com/vn/en/>

### Experience in Vietnam:



#### HCMC OFFICE

3<sup>rd</sup> Floor, Y-Ban Office Building

69 Thạch Thị Thanh, Tân Định, District 1, Hồ Chí Minh

Tel: 84. 28. 3824 1807

Fax: 84. 28. 3824 1809

@ : URL: <http://www.shimz-global.com/vn/en/>





## SIEMENS LIMITED

### Company Introduction

Siemens is a global technology powerhouse that stands for engineering excellence, innovation, quality, reliability and internationality.

Siemens Vietnam dates back to 1979 when the company supplied and installed the first two industrial steam turbines at Bai Bang Paper Mill. The establishment of our representative offices in Hanoi Capital and Ho Chi Minh City in 1993 and the turn into a limited company in 2002 are the most significant and far-reaching steps in our history in Vietnam. During several decades, Siemens has successfully participated in numerous infrastructure projects in Vietnam and made remarkable contributions to the socio-economic development of Vietnam.

Today, Siemens is a market and innovation leader in the fields of Power and Gas, Energy Management, Power Generation Services, Mobility, Building Technologies, Digital Factory, Process Industries and Drives as well as in Healthcare. Currently, Siemens has three offices located in the heart of Hanoi, Danang and Ho Chi Minh City together with a manufacturing site in Binh Duong province.

We are proud to be a trusted partner of Vietnamese customers and We grow together with Vietnam.

**Business category:** Electrical engineering and Electronics

**Employees in Vietnam:** <300

**Experience in Vietnam:**



### Contact Point

7th floor, Deutsches Haus, 33 Le Duan Street,  
Ben Nghe Ward, District 1, Ho Chi Minh City.  
Tel: (84-28) 3825 1900  
Fax: (84-28) 3825 1580  
@: info.vn@siemens.com  
URL: www.siemens.com.vn

Ocean Park Building, 9th floor, 01 Dao Duy Anh Street,  
Dong Da District, Hanoi.  
Tel: (84-24) 3577 6688  
Fax: (84-24) 3577 6699  
Hotline: 1800 588 820





## SOLAR ELECTRIC

### Company Introduction

The majority of electricity supply in the world comes from fossil fuels such as coal, oil and natural gas. However, these energy sources face problems of rising prices, dependence on supplied countries, and especially growing environmental concerns from climate change and air quality. Alternative energy sources and new technologies for electricity generation is crucial to tackle the problem. Indeed, renewable energy sources such as solar, biomass, geothermal, hydroelectric and wind power generation emerged as good alternatives which can handle these concerns with the advantages of generally unlimited in availability and environmental friendly.

In Vietnam, solar in particular has a lot of advantages; not only solar energy technology but also the government policies have been supporting the development of solar electric in both rooftop and utility scales. The Vietnam's Power Development Master Plan VII and Decision No. 11/2017/QĐ-TTg ("Decision 11"), are concrete evidences for the support of Vietnamese government for the development of renewable energy.

Solar Electric Vietnam - SEV was formed in 2015, which aims at taking part in green growth movement of Vietnamese economy and contributing to reduce carbon emission. So far, we have been done quite a few projects at different scales for different purposes such as 100 Kwp in Green Capital Tower Hanoi- To Huu street, 15 Kwp for Bac Ki logistic in Bac Ninh Province and next month, in September/2017 a project of 9 kwp for 3 islands in Ha Long Bay will be installed.

With the target of being the best local EPC for rooftop scale in 2020, we are partnership with many international EPCs and suppliers so that we can offer the best solutions at best quality for green and sustainable growth of Vietnam.

**Business category:** + Supply renewable energy systems (Solar power) serving power plants, industrial factories and civil buildings and infrastructure.

- EPC construction: Consultation, construction investment, project set-up, cost estimate of power plant, industrial and civil constructions in renewable energy.
- Research and development of renewable energy technology.

**Employees in Vietnam:** 20

### Contact Point

No.10, lane 107 Tran Duy Hung street, Cau Giay Dist, Hanoi  
City, Vietnam  
Tel: (84-24) 3200 3752  
Fax: +84914.544.449  
@: contact@solarelectric.vn  
URL: www.solarelectric.vn

**Experience in Vietnam:**





## SOLVAY CHEMICALS VIETNAM LTD

### Company Introduction

- **Environmental protection:** Water & Air Treatment Our solutions support air and water treatment and soil remediation using filtration, gas separation, absorption, and chemical reactions. Water: Both UDEL® PSU and ALGOFLON® PTFE ensure better water filtration in membrane processes, while INTEROX® hydrogen peroxide is widely used in drinking water treatment. Capterall™ capture a large range of heavy metals from wastewater. Air: SOLVAIR® Solutions are a range of products and systems for air emission control and associated waste management that meet the demands of waste-to-energy incineration, industrial boilers, cement manufacturing...
- **Renewable Energy solutions:** Our solutions are used in the production and storage of renewable energies and to improve energy efficiency. HALAR® ECTFE brings high performance and UV protection to photovoltaic panels. Our LiTFSI lithium salt makes Li-Ion batteries last up to 20% longer while improving safety and performance. We were a partner in the recently concluded LIFE+ GLEE project, which focused on replacing organic solvents with water in the Li-Ion battery manufacturing process.
- **Building & Construction:** Our solutions meet the higher demands of new buildings, energy efficiency through better thermal insulation and efficient heating and cooling systems. Energy performance: Solutions used in energysaving triple-glazed windows and in foam wall insulation for low-energy housing (Soda Solvay®). Protection & Safety: Corrosion-resistant, UV-resistant and flame-retardant materials for greater safety and longevity in buildings (Rhodoline®, Cyasorb Cynergy Solutions®). Resource management: High-performance plastics ensuring the robustness of water supply systems and drinking water quality (Technyl® eXten®, Radel® PPSU).
- **Sustainable mobility for Smart Cities:** Our solutions contribute to cleaner, safer and more energy-efficient modes of transportation. Lightweighting: Lightweight materials (high-performance polymers, advanced composite materials, etc.) for lighter and greener vehicles (Solvavite™, Tegracore™). Powertrain Efficiency: Products (fluorinated elastomers, polymers...) improve the motor longevity (Nocolok® Flux, Tecnoflon®). Electrification: Flame-retardant materials and heat-resistant engineering plastics improve the lifespans of hybrid and electric vehicles (Solef® PVDF, LiTFSI salts, Amodel® PPA). Green Technology: Catalytic materials and highly dispersible silica, limit polluting emissions and fuel consumption (Premium SW, Optalys®).

**Main Business Category:** choose same as your EuroCham Membership Directory 2017 entry.

**Employees:** Solvay HQ in Brussels with around 27,000 employees in 58 countries.

### Contact Point

Diamond Plaza, 34 Le Duan, Ben Nghe Ward, Dist 1, HCMC,  
Floor 9, Room 901C.  
Tel: (84-28) 38229511-5  
Fax: (84-28) 38229514  
@: han.to@solvay.com

### Experience in Vietnam:







## SWISS POST SOLUTIONS LTD.

### Company Introduction

- Founded in 2004
- Business Process Outsourcing (BPO) Provider
- Located in Ho Chi Minh City and Can Tho, Vietnam
- Majority of customers are located in Europe and USA

**Data Entry:** Data capturing forms/documents and translating them into digital formats (txt, csv, xml), address capturing and enrichment, address management

**Document Processing:** Postal entry, white mail processing, document content categorization, address management

**Complex BPO:** Web researches, press clipping, customer order fulfillment, complex back office functions

**IT Operational Services:** Intelligent Automation Centre acting as NOC (monitoring, maintaining and hardware & software control for international companies), robotics and artificial intelligent centre, innovation and continuous improvement incubator

**Software Development:** Web applications, java projects, data entry & OCR solutions, database design

#### Competencies

Swiss Post Solutions Vietnam believes in a combination of quality, security and competitive price as a key to market success. Effective operational mode allows to process up to 1,000,000 documents per day in 36 languages. ISO 9001:2008 and ISO/IEC 27001:2013 are applied to ensure quality and security of business processes. Compliance with the Directive 95/46/EC and the German Federal Data Protection Act enables the processing of confidential data. CMMI Level 3 is a solid basis of improving software development processes. ISO 14001:2004 enables effective management of environmental impact.

**Business category:** Business Process Outsourcing

**Employees in Vietnam:** >1000

**Experience in Vietnam:**



### Contact Point

Saigon ICT Tower  
Quang Trung Software City  
District 12, HCMC, Vietnam  
Tel: (84-8) 3715 5359  
Fax: (84-8) 3715 5391  
@: sales@spsVietnam.vn  
URL: www.spsVietnam.vn

No. 41 Cach Mạng Thang 8  
District Ninh Kieu  
Can Tho, Vietnam  
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Fax: (84-8) 3715 5391  
@: sales@spsVietnam.vn





## THE BLUE CIRCLE VIETNAM CO LTD

### Company Introduction

The Blue Circle is a developer of wind energy projects focusing on Southeast Asia. The Singapore-based company looks to bridge the gap in project development in the Mekong Region by bringing international project development experience, financial expertise and capabilities together with local market understanding. Its growth strategy is twofold: through the development of its own projects and through acquisition or partnership with local developers. By being vertically integrated, The Blue Circle can identify greenfield sites, pursue project development milestones up until financing and operating of the generating assets

**Business category:** Renewable Energy

**Employees in Vietnam:** 15

**Experience in Vietnam:**



### Contact Point

Level 5, 47-49-51 Phung Khac Khoan Street  
Da Kao Ward, District 1,  
Ho Chi Minh City  
Tel : +84 8 3829 4707  
@: jeff.peron@thebluecircle.sg  
URL: www.thebluecircle.sg





## TILIA GMBH

### Company Introduction

Tilia was established in 2009 by a group of drinking and wastewater experts with broad international experience and a common vision for the future of the water and energy sector. Our customers are trans-regional and local utilities, local authorities and other public agencies and industrial companies worldwide, realizing projects in the areas of water and energy. Together with our clients we achieve sustainable progress in the fields of drinking water, waste water, renewable energies, waste management and other essential services, while improving efficiency, increasing competitiveness and getting set for the future.

Our clients, which are located all over the world, benefit from our independent perspective, our strong operational experience, and a wide range of strategic, technical, financial and legal expertise. We strengthen our clients' capabilities and enable them to achieve their goals in a sustainable way.

Tilia has been operating in Vietnam since 2015. The Tilia Group's Representative Office in Ho Chi Minh City is also representing decon international GmbH, a 100% subsidiary specialized in donor-financed development aid projects.

**Business category:** Engineering, Environment

**Employees in Vietnam:** < 10

**Experience in Vietnam:**



### Contact Point

**Tilia Group Representative Office**

Suite 103, 140 Nguyen Van Thu Street,

District 1, Ho Chi Minh City, Vietnam

Mobile: +84 169 986 2000

Email: dung.truong@tilia.vn

www.tilia.vn





Global reach  
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## TMF GROUP

### Company Introduction

Having more than 114 offices in over 80 jurisdictions, TMF Group provides outsourced accounting, tax, payroll support and corporate secretarial services to companies worldwide.

TMF Group also specializes in helping international investors establish a presence in Vietnam by A-Z services such as incorporation of companies and representative offices, offshore companies, opening of bank accounts, licensing, tax stamps, work permits and residence cards.

#### Business category:

- Accounting, Tax Compliance;
- HR & Payroll;
- Corporate Secretarial, Incorporations & Licensing;
- International Structuring and International Incorporations

**Employees in Vietnam:** nearly 100

### Contact Point

Unit 1, 8th Floor Bitexco Financial Tower, 2 Hai Trieu Street,  
Ben Nghe Ward, District 1, Ho Chi Minh City, Vietnam

Tel: (84-28) 3910 2262

Fax: (84-28) 3910 0590

@]: Vietnam@tmf-group.com

URL: www.tmf-group.com

3rd Floor Hanoi Toserco building, 273 Kim Ma Street, Giang  
Vo Ward, Ba Dinh District, Hanoi, Vietnam

Tel: (84-24) 3944 9733

Fax: (84-24) 3944 9730

@: Vietnam@tmf-group.com

**Experience in Vietnam:**





# VK ARCHITECTS & ENGINEERS

## Company Introduction

VK Architects & Engineers is a multi-disciplinary design and engineering company, integrating all disciplines of the design and construction process, architecture to interior design, infrastructure to landscaping, building services and structural engineering.

With over 65 years of history, and over 350 staff, VK has its head office and three other offices in Belgium, and has two offices in Vietnam.

### Healthcare

VK is acknowledged as a leading design office on the European healthcare market. It has designed large greenfield site hospitals, and has ongoing projects for hospital extensions and renovations, senior care facilities and mental health institutions.

In Vietnam, VK is taking a major role in improvement of healthcare infrastructure. Its first completed project was the Vinmec Hospital in Hanoi. VK is the designer of the second facilities for Bach Mai and Viet Duc Hospitals, which are both 1,000 in-patient bed hospitals on greenfield sites. In Hanoi, VK designed the new Hanoi High Tech and Digestive Center for St Paul Hospital, and its design for a new Outpatient building for Bach Mai Hospital is currently under construction. VK is currently working on other public and private sector hospital projects in both HCMC and Hanoi.

### Building Design, Industry and Infrastructure

VK undertakes the widest range of design missions. From its formation, VK has specialized in industrial work, and its comprehensive experience encompasses; design, engineering, procurement and construction management, and includes projects for; power plants and energy production, metallurgy, agro-industry, laboratories, pharmaceuticals, cooling installations, silos and malteries.

In Vietnam, VK is now undertaking a range of major commercial, residential and education building design projects for well renowned clients.

Through its combination of world-class European skills and knowledge, and its team of experienced local engineers and architects, VK can provide exceptional quality and value for its clients in Vietnam, whether local or international.

**Business category:** Architecture, Engineering, Consultancy Services

**Employees in Vietnam:** >50

**Experience in Vietnam:**



## Contact Point

Please insert your first main office address:

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Fax: (84-28) 3914 0730  
@: vietnam@vkgroup.be  
URL: www.vkgroup.be

Hanoi office: Hanoi Office, Pullman Hanoi, Unit B12, 4 th Floor, 40 Cat Linh Street, Dong Da District, Hanoi, Vietnam  
Tel: (84-24) 3736 9097





WAMGROUP®



SPECOL®



SAVI

# WAMGROUP VIETNAM COMPANY LIMITED

## Company Introduction

WAMGROUP Spa is leader in developing and manufacturing industrial equipment for Bulk Solids Handling, Dust Filtration, Mixing and Screening. Dedicated Waste Water Treatment divisions, design manufacture and deliver machinery for mechanical pre-treatment of screening, and sludge treatment for a wide range of volumes:

- screw screens, Screw Separators, Drum screen, Bar screens,
- Screw press, Compactors
- Clarifiers and Thickeners, Grit Treatment Equipment, Compact Pretreatment Plants
- Septage Receiving Stations, Penstocks
- Aggregate Reclaimers for Concrete Plants

SAVI and SPECOL operate in municipal waste water treatment plant, as well as industrial sector, with application in chemicals, paper recycling and food industries with integrated waste water purifications plants.

WAM division operate in construction sector and batching plant recycling system, cement plants, lime dosing plants

SEPCOM division with screw press screens equipment operates in agricultural, pig and cow farms, manure treatment and biogas.

RONCUZZI design and manufacture Archimedean water Screw Pumps used in waste water treatment, in drainage and irrigation applications.

By providing large range of equipment, WAMGROUP mission is to support all factories and facilities to operate within a safe and clean production process.

**Business category:** Waste water treatment – Industrial Equipment

**Employees in Vietnam:** 08

**Experience in Vietnam:**



## Contact Point

140/1 Ly Chinh Thang Street, Ward 7, District 3,  
Ho Chi Minh City, Vietnam  
Tel: (84-28) 3846 9812  
Fax: (84-28) 3846 9813  
@: info@wamgroup.com.vn  
URL: www.wamgroup.com.vn







## ZUELLIG PHARMA VIET NAM

### Company Introduction

In March 1999, Zuellig Pharma Vietnam Ltd. was incorporated as a 100% foreign-owned enterprise.

Since its launch, Zuellig Pharma has become the largest multi-national service provider in the healthcare industry in Vietnam and has been meeting the ever-changing needs of the marketplace through an effective combination of local knowledge, flexibility and innovation. Through the broad range of innovative tailored services, the Company's objective is to make healthcare more accessible to all Vietnamese Patients.

Zuellig Pharma opened the Tan Tao II Warehouse in Q2/2016, the largest investment project of Zuellig Pharma Group in recent years. Quality of healthcare infrastructure and supply chain is a key decision criterion for multinational manufacturers when evaluating investments in Vietnam, and therefore Tan Tao II is expected to have a strong positive influence on attracting pharmaceutical FDI.



Zuellig Pharma Tan Tao II provides for 23,000 pallets capacity, meeting international standards, with 2,000m<sup>2</sup> office space. The design and construction is built in accordance with FM Global Platinum Standard and is the only warehouse in Asia that reached FM Platinum certification. The facility is equipped with the highest standards of fire-prevention and fire-fighting equipment. It furthermore features modern and environment-friendly technology. Utility savings exceeding 30% compared to a conventional warehouse are generated through the use of advanced thermal isolation, a sophisticated air-conditioning system and solar panels.

In November 2015, ZPV has phased out the use styrofoam and gel packs for cold chain products. As a replacement, it has launched the eZCooler, based on the BioThermal Credo® technology, of Pelican Company, USA. This initiative is designed to increase product and patient safety, by ensuring the integrity of temperature sensitive products during goods movement, while minimizing the impact on the environment by eliminating the waste generated from the traditional packaging.

**Business category:** Pharmaceuticals

**Employees in Vietnam:** 1,600

**Experience in Vietnam:**



### Contact Point

#### Zuellig Pharma Viet Nam

180-192 Nguyen Cong Tru, 5th Floor TNR Tower,  
Dist 1, HCMC  
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#### Zuellig Pharma Viet Nam – Tan Tao II

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## EDITION

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Jens Ruebbert, Nicolas Audier and Dr. Gellért Horváth

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H.E. Bruno Angelet

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Gellért Horváth

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Christoph Schill

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Dang Le Bao Khanh; Nguyen Ngoc Dang Huan

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Almut Roessner

French Chamber of Commerce and Industry in Vietnam (CCIFV)

German Business Association Vietnam (GBA)

German Chambers of Commerce Worldwide Network (AHK)

### 4.4. Success Stories

ABB

INSEE

Bosch Vietnam

Royal Haskoning DHV

CNR

Shimizu

Friesland Campina Vietnam

Siemens

## CHAPTER V: GREENBOOK BUSINESS DIRECTORY

Coordination: Dang Le Bao Khanh



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