

ENERGY EFFICIENCY IN BUILDINGS

Da Nang, Vietnam



STATUS AND TRENDS

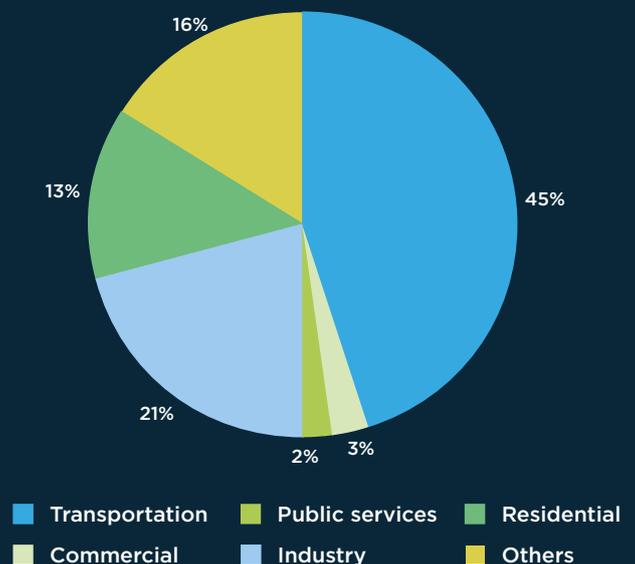
Da Nang is a major harbor city and the largest urban centre in central Vietnam. The city is spread over 1,283 square kilometres, with 911,890 people and a population density of 814 inhabitants per square kilometre.

Da Nang is in a tropical monsoon zone with high temperatures and a stable climate. There are two seasons, with the wet season lasting from August through December and the dry season from January through July. The annual average temperature is 25.9°C, with average humidity of 83.4 percent. On average, the city receives 2.5 metres of rainfall and 2,156 hours of sunshine annually (World Bank 2012).

For the past decade the services sector became the largest economic sector in the city as measured by gross output, outrunning the industry and construction sectors, which were most prevalent historically. Service-oriented industries are the focus of local policy targets for economic development. The tourism sector is also undergoing growth, which is expected to continue as the city strives to become a major national tourist hub that capitalizes on the city's beaches and proximity to the old capital (World Bank 2012).

In 2010, the city used roughly 17.9 petajoules of energy in various forms. Lack of local fossil fuel resources results in 100 percent reliance of Da Nang on energy imports. While notable solar energy potential and local wind resources are present, their utilisation has not yet started in the city. Transportation accounts for almost half of the city's energy consumption, followed by industry (21 percent). The building sector is comprised of residential, commercial and public end-users, accounting for roughly 18 percent of energy consumption (see Figure 1).

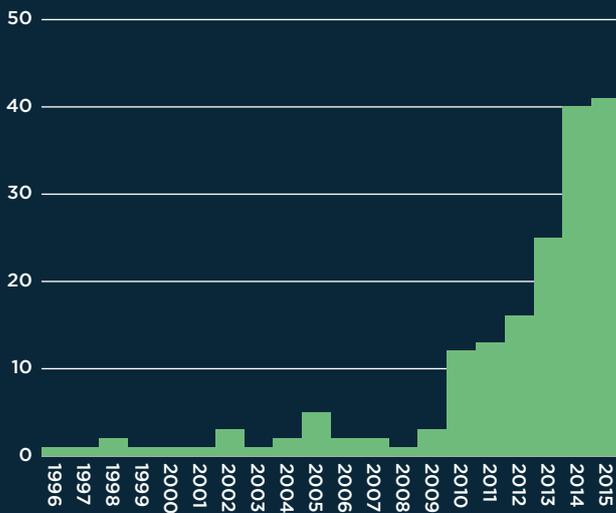
Figure 1. Da Nang energy consumption by end-use (%)



Source: World Bank and Australian Aid (2012)

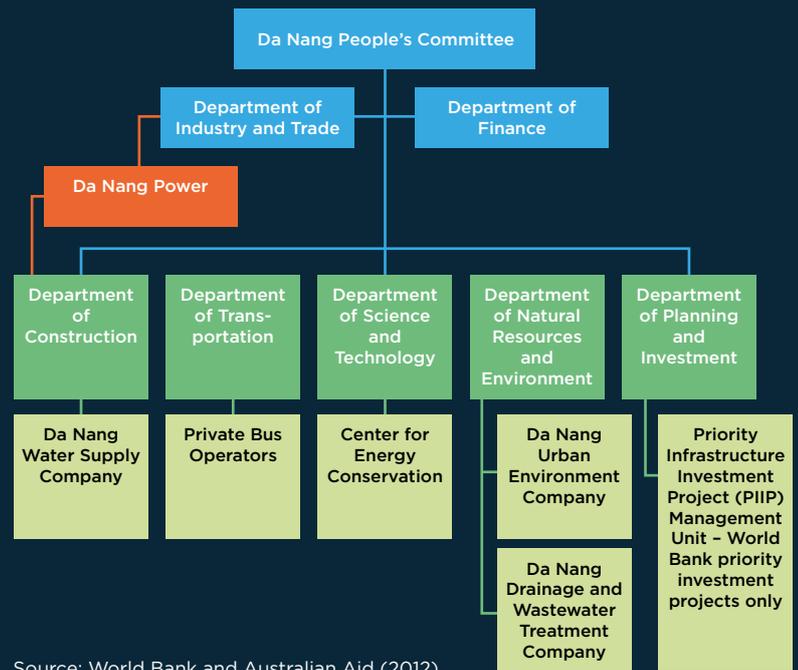
In respect of the building sector Da Nang has a relatively low building energy intensity (kWh/m²) as the existing building stock consists predominantly of smaller, low-rise buildings with basic lighting, air conditioning, and appliances. Large buildings, with floor area above 2500 m² (the only ones covered by the Vietnam Energy Efficiency Building Code (VEEBC)), constitute less than 5% of the building stock (see Figure 2). However, new buildings are responsible for a rapid increase in energy consumption in the sector due to larger floor areas, and increased utilization of energy-consuming

Figure 2. Number of buildings with floor area over 2,500 m² constructed in Da Nang each year



Source: VCEP (2015)

Figure 3. Da Nang government structure for energy matters



Source: World Bank and Australian Aid (2012)

equipment, including air-conditioning, ventilation, lighting, appliances and computers. Therefore, the buildings sector offers a substantial potential for cost-efficient energy reduction.

According to a 2013 household survey covering 250 households and 1,134 inhabitants, electricity represents 50 to 75 percent of the final energy consumption of households, and gas from 15 to 25 percent. The average energy consumption in 2013 is estimated at 4,255 kWh/year per household, or 32 kWh/m². Nearly 90% of households use gas for cooking and 32 percent for the production of hot water. On average, 53 percent of households are equipped with a water heating system. Close to 100 percent of households have refrigerators, mobile phones and televisions, while the average ownership rate is 78 percent for washing machines, 66 percent for computers and 41 percent for water pumps. 100 percent of households are equipped with fans, and only 38 percent with individual air conditioners, however, the installation of an air conditioning system is considered as a priority investment for households in Da Nang (DACLIMB 2014).

The most important trend in the tertiary sector is exponential growth of electricity consumption. The number of tertiary buildings connected to the local electrical grid grew from 3,800 buildings in 2008 to over 8,000 in 2014 and the electricity consumption of tertiary buildings is estimated to increase from 204 GWh in 2013 to about 688 GWh in 2025. Hotels account for about 25 percent of the electricity consumption in this sub-sector with air-conditioning being responsible for nearly 50 percent of the electricity consumption in hotels (DACLIMB 2014).

Replacement of old air conditioning units and other inefficient appliances and electricity-consuming devices, improvement of design and construction of building envelopes, as well as upgrades in existing buildings provide important opportunities for energy performance improvement.

INSTITUTIONAL FRAMEWORK

Da Nang became a centrally governed city in 1997. The central Vietnamese government and Da Nang City People's Committee are key actors for policy making, but a strong base of local entities is involved in energy planning matters and energy systems operations. Figure 3 presents main actors for planning, development, and operation of energy-consuming sectors in Da Nang.

POLICY FRAMEWORK

Da Nang has three city-wide plans that complement the national policies and programs:

1. Da Nang's Master Plan for Socio-economic Development until 2020 – the fundamental plan with various goals on social and economic development
2. 'Plan for 2000-2020 in Da Nang' – the construction plan
3. 'Building Da Nang City as an environmental city' – the environmental plan covering different issues such as: air pollution reduction, waste treatment and recycling, energy conservation, and renewable energy.

In addition, there are two district-focused plans specifically for Ngu Hanh San District ("NHSD") of the city.

Implementation of the VEEBC at the local level is one of the crucial areas of policy work in Da Nang city. In September 2017, the city adopted the Directive 'On strengthening the use of energy saving and efficiency in the building sector in the city of Danang' (hereafter 'the Directive on Buildings EE'), which stipulates responsibilities of various local departments on activities for implementation of VEEBC and the Law 'On Economical and Efficient use of Energy'. These activities can be summarized in the following way:

- Improve the data and information on energy use in buildings and energy efficiency measures, including training, monitoring and evaluation activities (Department of Industry and Trade);
- Allocate capital for building works and integrate energy saving measures into the process (Department of Planning and Investment);
- Ensure compliance with the national technical regulation on energy efficiency in buildings and promote usage of environmentally friendly technologies and materials that reduce energy losses when constructing, renovating or upgrading construction works (Department of Construction).

The Department of Industry and Trade has primary responsibility to coordinate implementation of the Directive.

INTERNATIONAL SUPPORT

A number of international initiatives and projects have been supporting improvement of energy efficiency in buildings in Da Nang.

Between 2011 and 2013 Da Nang's Department of Industry and Trade worked in collaboration with the Australian Department of Foreign Affairs' foreign aid division (formerly AusAID) and the World Bank on the Sustainable Urban Energy Program. The main aim of the Program was to establish the current status of energy use and greenhouse gas emissions, and identify a range of policy and technical measures to formulate long term sustainable urban energy developing strategies in the context of the city's overall development plans (World Bank and Australian Aid 2012).

The World Bank is supporting Da Nang in developing and implementing Sustainable and Green Development Indicators. The Indicators include 8 green topics: green transport, clean drinking water, solid waste management, clean air, renewable energy and carbon dioxide, green land use, waste water management and healthy economy (VNEEP 2015).

IFC and USAID have been working with the Department of Construction and the Department of Science and Technology to enforce VEEBC compliance, which among other activities included training and communications workshops for designers, construction companies and municipal officials; demonstration projects; work on M&V; and support for green buildings to achieve the EDGE certification.

The Building Efficiency Accelerator led by World Resources Institute conducted a number of workshops and engagement activities in the city, which have become the catalyst for development and adoption of the Directive on Buildings EE.

In 2018, the Da Nang People's Committee cooperated with the British Embassy in Hanoi to organise a workshop to officially launch the project "Upgrading the Viet Nam 2050 Pathways Calculator and Developing a Version of Webtool for Provincial Level Policy Making on Energy and Greenhouse Gas Emissions" (Da Nang 2018).

During a pilot project in 2012, 202,000 households in the city committed to participate in a program to save electricity in three peak months of the dry season. At the end of the program, 12,079 households reduced energy consumption by 10 percent or more in comparison with the same period in 2011. Total electricity savings reached more than 3.6 million kWh (Châu 2012).

LOCAL IMPLEMENTING CAPACITY

During the past decade, Da Nang has been making progress towards becoming a more sustainable city.

In 2011, Da Nang won the "ASEAN Environmentally Sustainable City" Award. The city was evaluated based on the indicators of clean atmosphere, land and water and efforts of the cities' authorities in improving and conserving the environment (VN+ 2011).

In 2015, Da Nang was announced as the Winner for the FT/IFC Special Award: Excellence in City Transformation. The Award was given based on an evaluation of the demonstrated tangible progress between 2010 and 2015 towards city-wide, integrated reforms, covering one or more of the following parameters: environmental; social; governance; economic; and services. Da Nang surpassed 191 application entries from 167 organisations in a total of 140 countries (CityNet 2015).

In 2018, the city government and the Vietnamese information technology leader FPT signed an MOU to make Da Nang a smart city within the next two years, focusing on fields such as agriculture, medicine, energy and traffic (Tomiyama 2018). In the area of energy efficiency in buildings the progress is still limited due to a number of barriers related to lack of coordination between responsible agencies, lack of technical capacity, low awareness about energy efficiency in buildings, etc.:

- Two departments share responsibilities for implementation of VEEBC in the city (the Department of Construction and the Department of Industry and Trade), which requires efforts for collaboration and coordination. The Department of Construction has organised training to support and guide construction companies and design consultants on integrating VEEBC's requirements into their work and organize inspections according to the Code.
- Absence of penalties for no compliance with the VEEBC, low awareness and technical capacity within the construction industry and lack of resources and expertise for building inspection and examination of successful building commissioning undermines the actual impact of the VEEBC at the local level. Local stakeholders reported that 'only a few' buildings in the city are fully compliant with the VEEBC's requirements and no assessment has been conducted regarding the VEEBC's impact and level of enforcement.
- Involvement of the private sector and non-governmental organizations in improving energy efficiency in buildings is very limited or non-existent.
- Low awareness, price-sensitivity, perceived high upfront costs of energy efficient equipment and short-term thinking among domestic companies, local suppliers and property developers are considered by local stakeholders as main reasons for the lack of investments into energy efficient buildings.
- Lower electricity prices relative to the rest of Southeast Asia further discourage the uptake of energy efficiency in the building sector.
- Lack of government incentives at the national level has not provided property developers with the short-term benefits needed to drive green building adoption (VGBC 2013).
- Low awareness about the benefits of energy efficiency among building owners further reduces their motivation to implement energy efficiency measures in their properties.
- Public institutions also do not consider energy efficiency upgrades as priority for their respective buildings when allocating the limited budgets.

RECOMMENDATIONS

In order to ensure the effectiveness and impact of further energy efficiency improvements in the city's buildings, it is important to:

- Accelerate the efforts on local implementation of the VEEBC, including specific enforcement measures, such as penalties for non-compliance with VEEBC's requirements, and issuing construction permits only after confirmation of compliance with VEEBC based on the results of the on-site inspections.
- Facilitate establishment of partnerships and coordination between public and private investors, foster such public-private partnerships and mobilize green infrastructure financing by helping to prioritize and coordinate investment projects, as well as through systematic monitoring, reporting, and verification of the impact.
- Foster alliances and collaborate closely with a coalition of actors from the national, state, and local levels, and from civil society and the private sector, which share a commitment to advance energy efficiency in buildings, placing it centrally within top strategic priorities for the city.
- Develop a high-quality pipeline of energy efficiency investment projects in the building sector that can be effectively communicated to local stakeholders, private investors, financing institutions, and the international donor community.
- Clearly define roles and responsibilities on energy efficiency in buildings among individual agencies and

personnel to avoid overlaps and increase the effectiveness of efforts. Potentially establish a task force to strengthen the coordination across agencies.

- Establish a robust data collection framework, which will include various sources of data, including data from national agencies, city government collection arrangements, audits of individual buildings, etc.; define methodologies and frequency of data collection and reporting.
- Engage more actively with the international donor community for identification and development of bankable energy efficiency projects in buildings.
- Develop an audit and retrofit program for existing buildings in the city, starting with the ones owned by the city to lead by example. Such programs can help reduce energy bills and the carbon footprint of the city, and they offer a good knowledge basis for upgrading and updating city building codes.
- Develop and implement demonstration projects to show benefits of energy efficiency in buildings to building owners, tenants and other stakeholders. Demonstration projects in public buildings can lead by example to jumpstart the creation of a local green building marketplace.
- Imposing requirements for building energy performance at the city level which go beyond the VEEBC, and also for specific building types, such as hotels, especially in light of Da Nang's plans to dramatically expand the local tourism industry.

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