Draft Report

"FTA for Enabling Readiness for Up Scaling Investments in Building Energy Efficiency for Achieving NDC Goals in Thailand"

Deliverable 1: Contribution of Building Sector in meeting Thailand's NDC target

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Contribution of Building Sector in meeting Thailand's NDC Target:

Introduction:

The building sector offers great potential for energy savings and GHG emissions mitigation in Thailand. Assessing the existing energy efficiency programmes implemented under the Alternative Energy Development Plan (AEDP) and Energy Efficiency Development Plan (EEDP 2011–2030), Thailand has adopted both compulsory and voluntary measures as a strategic approach to achieve its energy efficiency and sustainable development goals (Chirarattananon, Chaiwiwatworakul, Hien, Kubaha, & Kubaha, 2016). The measures are formulated to enhance building energy performance and to expedite the use of energy efficient technologies and adoption of renewable energy in buildings. They are implemented through various regulatory regime and programmes such as ministerial regulation on building design for energy conservation, mandatory building energy efficiency labeling for new government buildings, compulsory mechanisms for large commercial building to install solar hot water system, home energy efficiency labeling, etc (ONEP, 2015).

The residential and commercial building sector is responsible for 53% of electricity consumed country-wide (Pantong, Chirarattananon, & Chaiwiwatworakul, 2011). About half of the 53% electricity generated is consumed by large commercial buildings, which include offices, schools, department stores, condominiums, hospitals, hotels, hypermarkets, and other buildings. The increasing number of large, commercial buildings utilizing climate control technologies in Thailand is energy intensive, and the Thai Government foresees that energy demand for buildings will increase substantially in the next 20 years. This higher demand for power generation and expected reduced energy resources supports concerns for future energy security. The electricity consumption of large commercial buildings in metropolitan areas is increased annually from 8,756 GWh/year in 2002 to 11,127 GWh/year in 2009 (King Mongkut's University Technology Thonburi, 2014). The electrical consumption of large commercial buildings in provincial area is lower than that in metropolitan but its growth rate is significantly higher. In provincial area, the consumption share of offices, hotels and department stores are quite comparable, amounting to 67% of total electricity consumption of large commercial buildings in provincial area (5,505 GWh in 2007). Although the electrical use of condominium and hyper markets in provincial area are rather small compared to the three buildings above but their consumption growths are high, up to almost 12% per year (King Mongkut's University Technology Thonburi, 2014).

Building Energy Code (BEC) of Thailand (Chirarattananon, Chaiwiwatworakul, Hien, Kubaha, & Kubaha, 2016):

Under the Energy Conservation Promotion Act (ECP Act) of Thailand, Building Energy Code (BEC) was established for large commercial buildings in 1995. It is a mandatory prescriptive code to improve the energy performance of large buildings in commercial sector. The code sets the minimum energy performances of the three main systems of building envelope, lighting and air conditioning systems. The BEC is reviewed and revised every three or five years to strengthen the code requirements for enhancing building performance progressively. In 2007, the BEC was revised in order to strengthen the code requirements. In the revised code, the performance of air-conditioning system is evaluated in terms of the system performance (not only the chiller). Different from the previous code, the enforcement of the revised code is applied to a new building with floor area exceeding 2,000 m^2, designated as a large building under the Building Control Act. A new building must comply with requirements of the revised code for its design to be approved. A number of

promotion and supportive voluntarily measures formulated in the EEDP and AEDP to support the BEC in enhancing energy performance of large buildings.

Energy Efficiency and Renewable Energy Integration in Buildings Sector:

The Building Energy Code of Thailand set specific minimum mandatory requirements for energy efficiency in building envelope, air conditioning and lighting systems. It does not set requirements for Renewable Energy (RE) integration with the buildings. However it does set specifications for integrating solar water heaters with the buildings to meet the requirement for water heaters (King Mongkut's University Technology Thonburi, 2014).

As per NDC target submitted by Thailand, the country proposes to reduce 115.6 $mtCo_2$ GHG emissions by 2030.The energy sector accounts for 70% of the country GHG emission (Thailand Research Fund (TRF), 2011). The major contributor to energy sector related HG emissions are:

- Power generation
- Industrial process
- Buildings sector and
- Transport sector.

As per the draft assessment report, the building sector holds potential of mitigating a cumulative of 18 $mtCO_2$ by 2030 over 2011 baseline through energy efficiency (King Mongkut's University Technology Thonburi, 2014).

As per a published report, of the total installed solar, solar PV installation accounts for 130 MW (Fraunhofer Institute for Solar Energy Systems ISE, 2017). Assuming all the PV is installed at commercial buildings and is operating at full load. Based on the assumption it is estimated that RE will contribute to mitigating a cumulative $2mtCO_2$.

Therefore the total potential of mitigating CO_2 from the building sector is 20 $mtCO_2$ by 2030 over 2011 baseline

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TERI has a Sustainable Building (SB) Group which has vast experience in the building sector for providing green design assistance to design teams at conceptual stage of projects. CRSBS offer services for enhancing the design of buildings and selection of climate responsive building materials. These interventions optimize the building systems through resource efficiency and reduced operational costs, ultimately improving the environmental footprint of the building. SB group of TERI also conducts building energy audits and recommends retrofit measures for improvement of energy efficiency in existing buildings. TERI has also helped develop an indigenous rating for green buildings called GRIHA, (Green Rating for Integrated Habitat Assessment), which has been adopted by the Ministry of New and Renewable Energy, and supported as a national rating system for India. This rating covers new constructions, large developments and existing buildings. Over the years, SB has contributed to formulation of enabling policies, norms and standards, and providing technical support for implementation of the various codes and standards at the national and sub national levels. Presently, TERI is supporting a number of State governments in the implementation of Energy Conservation Building Code (ECBC) through handholding and amendments in their building bye laws.

Apart from consultancy SB also conducts regular training programs for green buildings, energy conservation & energy efficiency, and sustainable habitats.SB has a dedicated team of professionals from varied backgrounds such as architecture, electrical and mechanical engineering, environmental & energy. It has pan India presence with established offices at Delhi, Mumbai and Bangalore.

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