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BHUTAN

POLICY ENVIRONMENT PAPER

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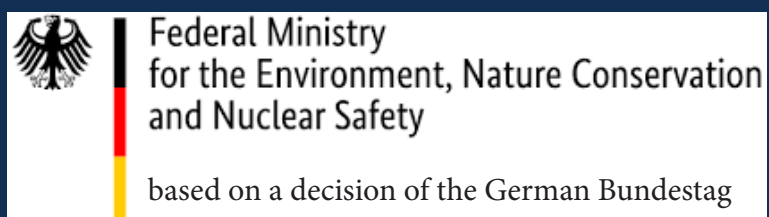
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ABSTRACT

This paper aims to identify policy measures in line with the United Nation's New Urban Agenda and in the context of the respective Intended Nationally Determined Contributions of the Kingdom of Bhutan (Bhutan). This paper reviews current developments of Bhutan to mitigate and its adaptation to greenhouse gas (GHG) emissions by focusing on the country's national policies and implementation strategies in keeping with the Paris Agreement on Climate Change (2015). A brief analysis of Thimphu's strategies to accordingly mitigate and adapt is conducted by reviewing the sectors of energy, transport and resource/waste management.





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COUNTRY OVERVIEW

Bhutan is a landlocked developing country, located in South Asia. A population of about 779,666 lives in a total area of 38,394 km², which makes Bhutan's population density of 20.3 person per km² (National Statistics Bureau, 2017). Of the total population, urban population comprises of 39% with annual growth rate of 3.2% recorded in 2016 (World bank, 2018). Thimphu is the country's capital and accounts for over 30% of its urban population. Other larger cities with above 20,000 people are Phuntsholing, Samdrup Jongkhar and Punakha.

Bhutan's economy is based on hydropower, agriculture, and forestry. The country's GDP per Capita is US\$ 2,879.07 and has a GDP growth rate of 7.99% (2016) (National Statistics Bureau, 2017). Gross National Happiness (GNH) is the guiding philosophy of Bhutan's socio-economic development for the prosperity and happiness of the people in Bhutan, whose main four pillars are: 1. Good governance; 2. Sustainable socio-economic development; 3. Cultural preservation, and 4. Environmental conservation.

SUMMARY OF BHUTAN'S NATIONALLY DETERMINED CONTRIBUTION (NDC)

As per the second national greenhouse gas (GHG) inventory, Bhutan is a net sink of greenhouse gases (GHG). This is due to the huge forest cover the country has, currently 70.46%, and a constitutional mandate to maintain the forest cover above 60%. The sequestration by forest is estimated at 6.3 million tons of CO₂ and emissions in 2013 amounted to an estimated 2.2 million tons of CO₂ equivalent. The emissions from Bhutan's agriculture sector have more or less remained constant, but emissions from sectors such as industrial processes and transport are increasing. During the period 2000 - 2013, emissions from the energy sector, industrial processes and waste management increased by 191.6%, 154.3% and 247.54% respectively. Bhutan is highly vulnerable to adverse impact of climate change mainly on the sectors such as water resources, agriculture, forests and biodiversity, and hydropower. The frequency and intensity of extreme climate events are projected to increase with changing cli-

mate (Royal Government of Bhutan, 2015). Bhutan's Intended Nationally Determined Contribution (INDC) was submitted in September 2015 which included a target to remain carbon neutral by ensuring that GHG emission will not exceed the net sink capacity of its forest (Climate Action Tracker, 2017). Considering the historical and current emissions from Bhutan and its imperatives for sustainable development, Bhutan's INDC indicates the fair share of efforts to combat climate change. The existing laws and policies applicable to Bhutan's INDC are the Constitution of the Kingdom of Bhutan, National Environment Protection Act (NEPA) 2007, National Forest Policy 2011, and Economic Development Policy (EDP) 2010 (Royal Government of Bhutan, 2015). In addition, Bhutan's INDC, called on the international community to support its effort to achieve its set target, but did not specify a concrete financial or technical support requirement or proposal (Climate Action Tracker, 2017).

MITIGATION PLANS AND ACTIONS

Bhutan's mitigation plans and actions to support low carbon development pathways are drawn based on the National Environment Protection Act, National Strategy and Action Plan for Low Carbon Development (2012), Economic Development Policy (2010 and draft 2015), Bhutan Transport 2040: Integrated Strategic Vision, National Forest Policy, and other sectoral plans and strategies (Royal Government of Bhutan, 2015), and include:

- Sustainable forest management and conservation of biodiversity to ensure sustained environmental services;
- Promotion of low carbon transport system;
- Minimising GHG emission through application of zero waste concept and sustainable waste management practices;
- Promote a green and self-reliant economy towards carbon neutral and sustainable development through promoting green industries and services;
- Promote clean renewable energy generation;
- Promote climate smart livestock and agriculture;
- Energy demand side management by promoting energy efficiency in appliances, buildings and industrial processes and technologies; and
- Integration of low emission strategies in urban and rural settlements through green buildings, sustainable construction methods and climate smart cities.

ADAPTATION PLANS

In order to adapt to the effects of climate change, Bhutan prepared its National Adaptation Program of Action (NAPA) in 2006 and also updated the project profiles (2012). It is currently implementing few of the priority actions identified as urgent and immediate needs. Bhutan's adaptation needs include (Royal Government of Bhutan, 2015):

- Increase resilience to the impacts of climate change on water security through Integrated Water Resource Management (IWRM) approaches;
- Promote climate resilient agriculture to contribute towards achieving food and nutrition security
- Sustainable forest management and conservation of biodiversity to ensure sustained environmental services;
- Strengthen resilience to climate change induced hazards;
- Minimize climate related health risks;
- Climate proof transport infrastructure against landslides and flash floods;
- Promote climate resilient livestock farming practices to contribute towards poverty alleviation and self sufficiency;
- Enhancing climate information services for vulnerability and adaptation assessment and planning;
- Promote clean renewable and climate resilient energy generation; and
- Integrate climate resilient and low emission strategies in urban and rural settlements.

POLICIES AND STAKEHOLDER MAPPING

In order to implement mitigation and adaptation plans and actions, it is necessary to understand the country's main political actors. The National Environment Commission (which also acts as the high level National Climate Change Committee) and Multi-Sectoral Technical Committee on Climate Change plays the lead role in coordinating action on climate change in Bhutan (Royal Government of Bhutan, 2015).

Political background

The Government of Bhutan has been a constitutional monarchy since July 2008 with a parliamentary form of government. The King of Bhutan is the head-of-

state, although its council of ministers, headed by the Prime Minister, are mandated with executive power. Bhutan's Parliament is bicameral in composition, hosting both an upper National Council and a lower National Assembly. The Local Government Act of Bhutan by its parliament, enacted in 2009 and amended in 2014, decentralises the power and authority to local governments. Three administrative divisions exist at the local government: Dzongkhag government (District council) (20 districts in total), Gewog government (Councils) (205 Gewogs in total), and Thromdes (Municipalities). National Council election was held in April 2018 and the third National Assembly election will be held in the end of 2018.



ENERGY

Hydropower dominates Bhutan's electricity generation and the country has immense hydropower potential, with an estimated theoretical potential of up to 26,760 MW while present installed potential of 1,500MW (ADB, 2014). The country's electricity generation is expected to grow as more hydropower projects are completed and start operating. A significant share of electricity generation is exported to India. Currently, Bhutan offsets 4.4 MtCO₂e through exports of hydroelectricity. Additionally, by 2025 Bhutan can offset up to 22.4 MtCO₂e per year through export of clean electricity from hydropower projects (Royal Government of Bhutan, 2015). Bhutan has no fossil fuel (liquid fuel or gas) reserves except some coal reserves, extracted for domestic use. The imported oil to the country are used for automobile and other essential purposes (Alam, Alam, Reza, Khursid-ul-Alam, Saleque, & Chowdhury, 2017). Bhutan's energy demand is increasing and it is expected to grow faster. In order to remain carbon-neutral and have a net sink of GHG emissions, Bhutan is exploring options to increase renewable en-

ergy (RE) sources, such as solar and wind. Bhutan is also planning to generate 5MW of electricity from solar and at least 1.5 MW from wind turbines (Kuenzel, 2017). Recently, Bhutan adopted its Alternative Renewable Energy Policy in 2013 and some of the activities carried out are, draft the RE project development mechanism and feed-in-tariff framework, operationalisation of renewable energy, pursued development fund, completed RE resource assessment, and formulated RE master plan (Gyeltshen, 2016).

The key stakeholders responsible for Bhutan's energy sector comprises of its department of Renewable Energy (includes divisions: Planning and Coordination Division, Alternate Energy Division and Research and Development Division) and its department of Hydropower and Power system under Ministry of Economic Affairs. Some of its regulatory authorities include, Bhutan Electricity Authority (BEA), the National Environment Commission (NEC), Bhutan Power Corporation (BPC) and Druk Green Power Corporation.



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MOBILITY

With increases in economic growth in Bhutan, the vehicular growth is also significantly increasing. Currently, Bhutan has no railways and mode share are buses, taxis and private cars. The rate of motorisation in Bhutan grew about 12% per year during 2008–2012 with an average of about 6,300 newly registered vehicles each year. In 2014, the total number of vehicles registered in Bhutan was 68,744, of which around 38.4% of vehicle registration was in Thimphu Dzongkhag (Zhu, Patella, Steinmetz, & Peamsilpakulchorn, 2016). This increased emission and congestion, and declined air quality. Bhutan’s long-term strategic vision of the development of its transport sector by 2040 is “to provide the entire population with a safe, reliable, affordable, convenient, cost effective and environment-friendly transport system in support of strategies for socio-economic development” (ADB, 2013), guided by the document ‘Bhutan Transport 2040 Integrated Strategic Vision’. Bhutan also drafted its ‘National Transport Policy 2017’ to formulate a new transport policy (KPMG, 2017). Bhutan’s INDC further elaborates on its ambitions to promote low carbon system (Royal Government of Bhutan, 2015), which include:

- Improve mass transit and demand side management of personal modes of transport;
- Explore alternative modes of transport to road transport;

- Improve efficiency in freight transport;
- Promote non-motorised transport and non-fossil fuel powered transport such as electric and fuel cell vehicles;
- Improve efficiency and emissions from existing vehicles through standards and capacity building; and
- Promote use of appropriate intelligent transport systems

Electric vehicles (EV) have been introduced within Bhutan’s market (mainly in Thimphu) in 2014, with support from policymakers. Bhutan’s government also have plans to convert some of public sector vehicle-fleet and public transport to EVs (Tshering, 2014) (yet to be implemented). According to the RSTA, the percentage of electric cars in Bhutan as a proportion of the total of Light Vehicles is about 0.17% (until 2016) (Gross National Happiness Commission, 2016). From the study carried out by the Zhu et al. (2016) on the Bhutan Electric Vehicle Initiative, annual GHG reduction benefits in 2027 are estimated to be 1.39%, 4.5%, and 33.6% of annual transport emissions in 2000 in the low, high, and super high uptake scenarios¹, respectively. The key stakeholders in the transport sector in Bhutan are: Road Safety and Transport Authority (RSTA) under the Ministry of Information and Communications (MoIC).

¹ Low uptake scenario: EV replacement rates of 1% and 2%. High uptake scenario: EV replacement rate for government and private vehicles of 3%. Super high scenario: EV replacement rate for government and private vehicles of 5% and introduce about 1,000 EVs per year including all new taxi is assumed to be an EV (Zhu, Patella, Steinmetz, & Peamsilpakulchorn, 2016).



WASTE MANAGEMENT

Waste management is an important issue in Bhutan, mainly in urban areas (from household, commercial and industry) due to increasing quantity of waste and its related emissions. Bhutan intends to minimise GHG emission on waste through application of zero waste concept and sustainable waste management practices. It includes enhancing 3R principles of waste management including conversion of waste into resources, and improving the current system and infrastructure for waste management (Royal Government of Bhutan, 2015). Bhutan's comprehensive regulation for the

waste minimisation and management is its policy on Waste Prevention and Management Regulation 2012 (Ghalley, 2017). Its key stakeholder in waste management comprises of the Ministry for Works and Human Settlements, National Environment Commission, Clean Bhutan (a civil society organisation with the Civil Society Organisation Authority, Royal Government of Bhutan), Green Road (a public-private partnership that use plastic waste in road making), and private companies (e.g. Greener Way and Clean City in Thimphu) for waste collection and segregation.



THIMPHU

Thimphu is the capital of Bhutan which is located within an area space of 1,794.87 km². A population of 116,012 lives in Thimphu Dzongkhag in 2015 with an estimated population density of 64.6 per km² (National Statistics Bureau, 2017a) and future projection foresee the city to grow. Thimphu's households are 100% electrified. 64.3% of Thimphu's land is covered by the forest (in 2016) (National Statistics Bureau, 2017a), which contributes in net carbon sink. Some of Thimphu's initiatives on energy generation/conservation, sustainable transport and waste management are discussed below:



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ENERGY IN THIMPHU

In response to an increasing energy demand in the city, Thimphu is initiating measures to implement renewable energy (e.g. Solar and Wind) and improve energy efficiency. Thimphu is replacing street lamps with LED lighting which could save 2 to 3 million units of electricity each year (Tshomo, 2015; ICLEI, 2016).

TRANSPORT IN THIMPHU

Vehicle density is high in urban areas of Bhutan, including Thimphu. The city public transport services (buses) are inadequate so that use of taxis and private modes of transport (private cars and two wheelers) are increasing. Metropolitan areas have typical characteristics of higher incomes, shorter travel times, and more incentives to improve air quality or reduce CO₂ emissions, making them more suitable for EV programs. Thimphu has these characteristics, which, along with its mild climate, make it a good pilot area for testing the new EVs and building a foundation for a cost-effective countrywide roll-out (Zhu, Patella, Steinmetz, &

Peamsilpakulchorn, 2016). Bhutan plans to make Thimphu - a clean Green Electric city (Tshering, 2014). As of March 2016, 52 Nissan Leaf EVs had been introduced in Bhutan, including 13 for government officials and 39 for general users, most of which in Thimphu (Gross National Happiness Commission, 2016). A quick charging stations on the road between Paro and Thimphu, the two main cities of Bhutan, are available (Tijhuis, n.d.). Moreover, Thimphu municipality plans to build dedicated cycle lanes and tracks around the city, and transforming Thimphu into a bicycle-friendly city (Sundas, 2016).

WASTE MANAGEMENT IN THIMPHU

The main challenges in waste management in urban areas in Bhutan (including Thimphu) are illegal dumping of waste (although waste collection services are available) and lack of cooperation in segregation and disposal of waste. Thimphu has piloted evening waste collection services and CCTV surveillance to monitor illegal dumping (Ghalley, 2017). The availability of not enough waste compost plants and landfill sites are also an issue in Thimphu. To tackle this, the city is planning to explore technology either to make composting faster or to establish a bio-gas plant (which requires waste segregation at the source) (Bhutan Times, 2017). Greener Way and Clean City are private companies (outsourced by Thimphu municipality) to manage waste in Thimphu.



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