



Brunei Darussalam's Intended Nationally Determined Contribution (INDC)

November 2015



Ministry of Development
Jalan Lapangan Terbang Lama Berakas
Bandar Seri Begawan
BB3510, Brunei Darussalam

30 November 2015

Dear Executive Secretary,

Subject: Brunei Darussalam's Intended Nationally Determined Contribution (INDC)

Brunei Darussalam recognises the need for respecting the principles of the United Nations Framework Convention on Climate Change (UNFCCC). In response to the 'Lima Call for Action'¹, the Ministry of Development, in its capacity as Brunei Darussalam's national focal point to the UNFCCC is pleased to present its Intended Nationally Determined Contribution (INDC), ahead of COP 21 in Paris, December 2015².

Our INDC is aligned with national development priorities and includes both adaptation and mitigation actions based on national circumstances; it has been developed from existing action plans and strategies. Brunei Darussalam's INDC is composed of six sections:

- Section 1: National circumstances, presenting national context relevant to the INDC
- Section 2: Mitigation contribution, highlighting the actions Brunei Darussalam is and could be undertaking to reduce greenhouse gas emissions, with information to ensure clarity, transparency and understanding of the activities being proposed
- Section 3: Adaptation contribution, covering Brunei Darussalam's vulnerability to climate change and prioritised adaptation actions
- Section 4: Fairness and ambition, outlining how Brunei Darussalam's contributions are rational in a global context
- Section 5: Planning for implementation, highlighting the policies, strategies, institutions and plans that will support the implementation of the INDC
- Section 6: Means for implementation, which assess the support Brunei Darussalam's needs to implement the INDC.

Through "bottom up" assessments to address climate change, such as INDCs, Brunei Darussalam is confident that a new and ambitious agreements can be negotiated and finalised at COP 21 in Paris this year. This agreement is essential to successfully limit temperatures to a level that would prevent dangerous anthropogenic interference with the global climate system, and at the same time contribute to global poverty reduction and promote economic growth efforts.

Yours sincerely,

Dato Paduka Awang Haji Bahrin bin Abdullah,
Minister of Development
Brunei Darussalam

¹ Decision 1/CP.20 -

https://unfccc.int/files/meetings/lima_dec_2014/application/pdf/auv_cop20_lima_call_for_climate_action.pdf

² Brunei Darussalam reserves the right to make revisions to this document, as the country continues along its development pathway.



Brunei Darussalam's Intended Nationally Determined Contribution (INDC)

1 National circumstances

For over a decade, Brunei Darussalam has represented stability and continuity in a region subject to rapid social, economic and climate change. At the same time, under the leadership of His Majesty Sultan Haji Hassanal Bolkiah, the Sultan and Yang Di- Pertuan of Negara Brunei Darussalam, the country continues to enhance global partnership and to collaborate closely with partners in the Association of Southeast Asian Nations (ASEAN) and internationally on areas of mutual interest including in the field of environment and energy. To highlight its commitment to this cause, His Majesty announced at the UN Climate Summit on 23rd September 2014:

"Brunei Darussalam is targeting a 63% reduction in our total energy consumption by 2035. We [Brunei Darussalam] aim to achieve this by reducing fossil fuel demand for inland energy use, and through a revised power tariff that encourages energy savings. As of 2013, Brunei Darussalam has managed to attain an average reduction in energy consumption of 13.9%. My Government also further aspires to generate at least 10% of total power from new and renewable resources by 2035.

For the past 80 years, forest conservation has been an important part of our national development strategy. Today, 75% of Brunei Darussalam's land area is covered by tropical rainforests comprised of highly diverse ecosystems. In addition, Borneo's pristine peat swamps forests, which act as a carbon sink to counter emissions, are acknowledged by scientists as being some of the only remaining examples of their kind in the world. Our commitment to preserving our environment is further reflected through the allocation of 58% of our land area to the "Heart of Borneo" forest conservation initiative. We continue to work with our neighbours, Indonesia and Malaysia, and other international partners such as the World Wildlife Fund (WWF) in this endeavour."

Brunei Darussalam is in the process of developing its Initial National Communication (INC). As part of the preparation of the INC, a Greenhouse Gas (GHG) emissions inventory is also being developed which will outline the GHG emissions arising from different sources and sectors. The draft INC estimates that in 2010 Brunei Darussalam's GHG emissions were approximately 10.02 million tonnes of CO₂ equivalent (Mt CO_{2eq}). It is also estimated that land-use change and forestry (LUCF) contributes to the removal of 2.63 million tonnes equivalent CO₂ sequestration. The net GHG emissions were approximately 7.40 million tonnes of CO₂ equivalent. This total represents a small fraction of global emissions; approximately 0.016%³ of global emissions in 2010.

The GHG emissions arising in Brunei Darussalam are dominated by sources in the energy sector. Electricity generation is the largest source of GHG emissions. Currently, around 99% of the country's electricity is generated from natural gas⁴, of which the majority comes from open cycle power plants. Preliminary estimates show that in 2010, emissions from these plants were approximately 4.18 Mt CO_{2eq}. Energy production, including the production of oil and gas for domestic and exports markets, is another important source. Emissions from this sector were estimated to be 3.31 Mt CO_{2eq}, in 2010. GHG emissions also arise from the direct combustion of fossil fuels in end-use sectors. Of these sources, fuel consumption in transport is responsible for approximately 1.17 Mt CO_{2eq}, with emissions from energy consumption in industry responsible for 0.45 Mt CO_{2eq}. Combustion emissions from the residential and other sectors represent less than 0.39 Mt CO_{2eq}.

³ Calculated based on Brunei Darussalam's 2010 net total emissions and CAIT Climate Data Explorer 2010 global estimated emissions

⁴ International Energy Agency (2012) Brunei Electricity and Heat for 2012.

<http://www.iea.org/statistics/statisticssearch/report/country=BRUNEI&product=electricityandheat&year=2012.2015> (Accessed on 18/09/2015)



Other emissions sources, including emissions from waste management, agriculture and industrial processes, overall represent less than 0.53 Mt CO_{2eq} in 2010. These other sources are therefore small in comparison to the emissions from the energy sector.

Brunei Darussalam's planned mitigation efforts are focused primarily on energy related policies and actions, promoting energy efficiency and conservation and renewable energy as examples.

The energy sector is a core element of the economy as it accounts for more than 60% of Brunei Darussalam's GDP. To drive the economy into a sustainable future, the Government of Brunei Darussalam has recognised the need for the implementation of strategies related to energy security, diversification of supply, energy efficiency and conservation. The introduction of the Energy White Paper in 2014 highlights the roadmap the country is taking in exploring strategies to diversify the energy mix through a concerted effort to promote the use of alternative and renewable energy sources for power generation.

Promoting sustainability within the current economy is also a priority for the Government of Brunei Darussalam. It is working with the hydrocarbon industry, which is a major source of GHG emissions, to limit its direct impacts whilst also maximising its wider environmental benefits. For example, the industry provides funding of forestry projects, such as increasing tree plantation for carbon sequestration, forestry protection initiatives and for awareness raising campaigns. The Government of Brunei Darussalam is actively pursuing integrated approaches such as this amongst departments to achieve national goals. This approach is further re-enforced by strong "top-down" support from His Majesty in many areas of the economy, and through "bottom up" approaches to activities such as awareness raising on climate change in schools and communities.

The Government of Brunei Darussalam also recognises the need for a more balanced economy; identifying growth areas in the country to promote the development of other sectors in addition to energy. These include the financial and service industries, which will diversify the economy to ensure future economic stability.

Brunei Darussalam has also adopted the national vision of "Wawasan Brunei 2035", which aims to make the nation widely recognised for its educated and highly skilled people as measured by the highest international standards; achieving and maintaining quality of life among the top 10 nations in the world; and operating under a dynamic and sustainable economy with income per capita within the top 10 countries of the world. In order to achieve the three goals, the Government of Brunei Darussalam has identified eight strategies to ensure all aspects of development are implemented systematically and effectively. Recognising the importance of the environment to its future development, a dedicated environmental strategy has been developed with the aim to: (i) reduce environmental pollution to a minimum; (ii) prevent the possible deterioration of the country's natural ecosystem; and (iii) preserve the country's biodiversity. Sectoral strategies have also been developed in line with the national vision, to promote a more sustainable and efficient economy in the country. All in all, our Vision 2035's priority is to safeguard the welfare of our people and its plan includes ensuring a clean, green and healthy environment for every citizen.

Brunei Darussalam is vulnerable to the impacts of climate change. It has a tropical climate, experiencing year-round high temperatures, high rainfall and high humidity. Vulnerability assessments show that the country has medium to high climate change exposure, mainly due to higher temperatures during the months of April- May-June, the hottest months (and potential for heat-related stress), and higher rainfall intensities during the wet season. Brunei Darussalam is exposed to flooding incidences particularly in low lying areas; heat stress and transboundary haze pollution arising from forest fires in neighbouring countries during dry season. Sea level rise is also of concern, given some areas of the country are up to 12 meters below sea level.

The country's estimated population in 2014 was 411,900 and it is projected to reach approximately 650,000 people by 2035, a 58% increase compared to the population in 2014. Climate change stresses on the population are a concern to the Government of Brunei Darussalam as part of its mandate is to ensure the highest quality of life for its people, which encapsulates protecting their living and surrounding environment. Appreciating the risk the country is under, Brunei Darussalam has recently taken part in a Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA) climate change vulnerability study, with the aim to attain self-sufficiency in food and security of energy and water resources.



The Government of Brunei Darussalam has also developed plans addressing the adverse impacts of unusual and extreme weather and climate events. These together with the vulnerability study, provide the starting point for a National Adaptation Plan (NAP).

2 Mitigation Contribution

Brunei Darussalam's economy benefits from the revenues from the extraction, refining and export of its oil and gas reserves. Given that the energy sector is the dominant sector with respect to GDP and GHG emissions generated. The country's first intended mitigation contribution concerns actions primarily within the energy sector. However, this does not preclude its intention to reduce and report on emissions as a result of actions in other sectors which will result in carbon sequestration, i.e. in the forestry sector. Further, there are a number of measures which have been identified for future research and development whose contribution to meeting overall targets has not yet been quantified, but are anticipated to lead to significant mitigation impacts in the coming decades.

Brunei Darussalam's Intended Nationally Determined Contributions are summarised as follows:

- i. **Energy sector:** to reduce total energy consumption by 63% by 2035 compared to a Business-As-Usual (BAU) scenario; and to increase the share of renewables so that 10% of the total power generation is sourced from renewable energy by 2035
- ii. **Land Transport sector:** to reduce carbon dioxide emissions from morning peak hour vehicle use by 40% by 2035 compared to a business as usual scenario.
- iii. **Forestry sector:** to increase the total gazetted forest reserves to 55% of total land area, compared to the current levels of 41%.

2.1 Energy Contribution

Brunei Darussalam has an aspirational target to reduce total energy consumption by 63% by 2035 from a Business-As-Usual (BAU) scenario. This will be achieved by implementing policies and actions in a number of areas which are outlined in the following sections, and by further research, development and capacity building in areas where the magnitude of possible climate change mitigation benefits have yet to be determined.

2.1.1 Reduction of Energy Intensity Across all Economic Sectors

A reduction of 45% in energy intensity is measured as a 45% reduction in tonnes of oil equivalent per unit of gross domestic product, using 2005 as a base year. This will be achieved by implementing a number of measures including:

Policies and regulatory frameworks for energy efficiency and conservation:

- i. Electricity Tariff Reform
- ii. Energy Efficiency and Conservation Building Guidelines for Non-Residential Sector
- iii. Standards and Energy Labelling for Products and Appliances
- iv. Energy Management Policy
- v. Fuel Economy Regulation
- vi. Financial Incentives
- vii. Awareness Raising

Project based energy efficiency measures such as the increased use of energy efficient streetlights. This involves replacement of the existing high pressure sodium vapour street lighting to low wattage and superior technology lighting to increase standards nationwide.

For more information on the implementation plans to achieve energy intensity reduction goals, please refer to Section 5.



2.1.2 Increasing the share of Renewable Energy in the national total power generation mix

Increasing the share of renewables so that 10% of the total power generation is sourced from renewable energy by 2035 which will be achieved through measures such as:

- i. **Increasing the use of solar power** as a renewable resource. To this end a three year study from 2010-2012 was carried out on six types of solar cells at the Tenaga Suria Solar Power Plant (a solar demonstration project) to increase technical capacity for deploying solar resources in future
- ii. **Utilising the 10-15 MW potential of waste to energy resources** that have already been identified in the Energy White Paper.

For more information on the implementation plans to achieve this goal, please refer to Section 5.

2.1.3 Land Transport

In 2014, Brunei Darussalam published its Land Transport Master Plan (LTMP); based on a comprehensive assessment of the country's current land transport situation. A variety of forecasts and mitigation scenarios were explored; however the preferred scenario, and that most in line with the Wawasan Brunei 2035 national vision, entails a 40% reduction in morning peak hour carbon dioxide emissions against a BAU scenario in 2035. With no action, the BAU scenario represents a 178% net increase in GHG emissions over 2012 levels. However in implementing the preferred scenario, this will limit the net increase in emissions in 2035 to 67% over 2012 levels.

In order to achieve this scenario, as well as various other transport policy objectives, the Land Transport White Paper sets out a total of 38 transport policy recommendations, some of which are immediately relevant to GHG mitigation, such as implementing fuel standards or promoting electric and hybrid vehicles. For more information on the policy plans, please refer to Section 5.

2.2 Mitigation Contributions from the Forestry and Land Use Sectors

Brunei Darussalam is considered one of the world's leading nations in terms of its actions to preserve forest cover, with currently approximately 75% of its 5,765 square kilometres national land area is under forest cover. It is comprised of what experts believe to be the oldest tropical rainforest ecosystem in the world, but also mangroves, peat swamps and other areas which sequester carbon dioxide from the atmosphere.

Approximately 41% of the country's land area have been gazetted as forest reserves. These forest reserves are protected by robust legislation. The Government of Brunei Darussalam intends to increase the total gazette forest reserves to 55%, and has already commenced working with the relevant authorities to increase the area. The decision to ban logging concessions from nationally designated forest reserves has also been implemented. Restricted and controlled logging will only be allowed in designated Inter Riverine Zones (IRZ), a small area of land which has been strictly regulated by volume quotas to manage activity in the region. IRZ areas in the country are small areas, totalling 50,000 hectares, of which logging and forest plantation can only take place in a designated area of 30,000 hectares.

Brunei Darussalam is also a key member of the "Heart of Borneo" Initiative, a trilateral forest conservation agreement signed with Malaysia and Indonesia to preserve and protect its remaining unique ecosystems. The initiative will further ensure the best sustainable forestry practices in the country.

2.3 Other mitigation measures

The Government of Brunei Darussalam has developed building guidelines; all buildings including commercial and housing estates, industrial and government buildings are required to set aside or to retain 10% of the land as open space or green area.

Studies are being undertaken to identify measures to reduce flaring and venting during gas extraction, which in turn will reduce emissions of methane and carbon dioxide. Gas flaring and venting also wastes valuable energy resources that could be used to support economic growth.



3 Adaptation Contribution

One of the principal goals of Wawasan Brunei 2035 is to protect its people and their future livelihoods; enhancing climate resilience and adapting to climate change plays a major role in achieving this. Protecting both terrestrial and marine biodiversity of the country's ecosystem is also a priority for the Government of Brunei Darussalam, as demonstrated by its integration into national development plans.

3.1 Climate related risks

Flooding is one of the major climate related risks and causes the most significant climate impacts in Brunei Darussalam. In January 2015, as an example, heavy rainfall coinciding with a high tide caused widespread disruption and damage to transport links such as bridges, river navigation as well as on residential assets.

The available climate projections suggest that the country needs to prepare for significant changes in the future. The mean surface temperature is expected to increase by 2-3 °C between 2031 and 2060 and by 3-4°C between 2071 and 2100⁵. Increased heat stress could result in extreme drought events and a higher risk of water scarcity, along with adversely affecting the health of workers and increasing the occurrence of forest fires. Regarding precipitation, the uncertainty is larger and some long-term projections show a drier February-March season and a wetter April-May-June season. Therefore flooding and increased heat stress are expected to be the major hazards that require integrated adaptation planning and implementation of actions to ensure that the development vision of the country will be achieved.

3.2 Priority sectors

Brunei Darussalam has identified the following sectors for priorities for further climate change adaptation actions:

- i. Biodiversity
- ii. Forestry
- iii. Coastal and flood protection
- iv. Health
- v. Agriculture
- vi. Fisheries.

Climate change adaptation is currently most advanced in the biodiversity and forestry sectors. The key achievements and principles are explored below.

3.2.1 Biodiversity sector

Brunei Darussalam's highly diverse ecosystems are considered among the most significant hotspots in the world. It has already undertaken climate change adaptation actions which demonstrate its commitment to protect its people and the very unique biodiversity the country is home to, such as:

- i. Participating in the "Heart of Borneo" Initiative. Borneo's tropical rainforests stretch from north to south and are understood to be one of the world's oldest tropical rainforest ecosystems. The initiative builds on five pillars: trans-boundary management; protected area management and sustainable natural resource management, ecotourism development and capacity building.
- ii. Development of the National Biological Resources (biodiversity) Policy and Strategic Plan of Action (2012). The plan outlines the strategic objectives and actions to conserve the biodiversity.
- iii. Ratification of the Convention of Biological Diversity of the United Nations. Brunei Darussalam will be hosting the second Asia Pacific Rainforest Summit in 2016.
- iv. Designation of 150,000 hectares of Marine Protected Area (MPA) under the Fisheries Act (1972); the aim of the act is to protect and conserve the marine ecosystem within the coral reef. The coral reef has the ability to sequester the atmospheric carbon therefore this policy also provides a co-benefit for climate change mitigation.

⁵ Meteorological Service Singapore and Met Office Hadley Centre (2014). A Regional Climate Modelling Experiment for South East Asia. Available at: <http://ccrs.weather.gov.sg/wp-content/uploads/2015/03/Regional-Climate-Modelling-Experiment-for-Southeast-Asia.pdf>



- v. Establishment of the Tropical Biodiversity Centre whose goal is to promote the development of a local biotechnology industry based on the country's forest biodiversity resource. This is an example of a fruitful collaboration between research institutes and government departments.

3.2.2 Forestry sector

In addition to the unique biodiversity some forest types provide flood protection, slope stability and support fresh water supply. The ground level in Brunei Darussalam is below sea level (up to 12 meters in some places) and the peat that accumulates in forest floors raises the ground level. However, if the trees are cut down in peat swamp forests (PSFs) the peat will speed up the drying process, increasing the likelihood of flooding due to increase surface run off and making forests more prone to forest fires. This could result in lower ground levels and contaminated fresh water supply in rivers as seawater encroaches. This could consequently have adverse effect on the Brunei Darussalam's economy as the oil and gas industry relies on fresh water supply from the rivers.

The activities that Brunei Darussalam is undertaking to protect forests, including both 'bottom up' and 'top down' approaches are already moving in the right direction for integrating climate change and providing co-benefits for climate change adaptation.

"Top-down" approaches include legislation and regulations in the land use sector, such as restrictions and reduced-scale on logging activities which include limiting tree numbers to be cut in designated zones, the height of those trees and setting a minimum distance from a river where trees can be felled (which provides protection against flooding due to preserving soil quality around the rivers). The authorities carry out aerial monitoring as well as planned and random forest patrols, in addition to dedicated border inspections.

"Bottom-up" approaches include:

- i. Awareness raising activities such campaigns in schools and communities, along with initiatives like "International Day of Forests"
- ii. The Universiti Brunei Darussalam conduct and undertake research projects on biodiversity in climate change, as well as through its collaboration with renowned international universities under International Consortium of Universities for the Study of Biodiversity and the Environment (iCUBE).⁶
- iii. The oil and gas industry also support research and development projects in carbon sequestration and fund some conservation projects.

Finally, the forestry sector provides opportunities for both adaptation and mitigation. As explained above actions to preserve the forest provide flood management benefits (adaptation) and where this is coupled with reforestation or afforestation to expand the forests reserves area, there could be enhanced mitigation benefits too.

3.2.3 Coastal and flood protection

Regarding flood protection, an integrated approach combining flood protection, river quality improvement and coastal protection has been initiated by The Government of Brunei Darussalam to implement both structural measures (such as flood walls, drainage improvement, and energy efficient pumping stations) and non-structural measures (such as land use planning, capacity building, collaboration across sectors and research institutes). It also intends to share knowledge and mobilise stakeholders, not only within its government departments, but also including schools, communities, remote villages and the private sector.

3.2.4 Other sectors

Further work will be carried out to assess the health impacts of climate change on Brunei Darussalam, as well as impacts on agriculture and fisheries.

⁶ iCUBE aims to cooperate with international universities in research, teaching and learning on issues related to biodiversity, climate change and the environment. Its members comprised of King's College London-Korea University, Monash University, National University of Singapore, Universiti Brunei Darussalam, University of Auckland, University of Bonn, and University of North Carolina. UBD is the secretariat for the iCUBE project.



3.3 Strengthening of adaption planning

Brunei Darussalam will continue to strengthen its adaptation efforts by:

- i. promoting the mainstreaming of sectoral adaptation plans into a national holistic and coordinated plan;
- ii. promoting the collaboration of multiple stakeholders and expertise across the sectors and society in general;
- iii. increasing the development and use of tailored data and information systems; and
- iv. establishing and promoting the appropriate legislative framework.

For example the Department of Drainage and Sewerage will implement the flood monitoring information system and the Department of Forestry is planning to undertake an updated forest inventory.

4 Fairness and ambition of the contribution

Although Brunei Darussalam's total GHG emissions share of global emissions is very small (0.016%), it is highly vulnerable to the adverse impacts of climate change. It recognises the importance for all countries to present fair and ambitious INDCs, and acknowledges the objectives laid out in the Lima Call for Action.

This document marks Brunei Darussalam's first presentation of mitigation contributions to limit growth in GHG emissions, to the UNFCCC. In developing the INDC, consideration has been given to Article 4.8 and 4.10 of the Convention; recognising Brunei Darussalam's economy is heavily dependent on income generated from the production, processing and export of fossil fuels. Nevertheless, the contributions that have been identified in this INDC are ambitious and highlight significant progression beyond historic and current undertakings. Delivery of the contributions will require major investments in new technologies, such as the promotion of renewable energy technologies that are not currently cost-competitive with fossil plant in Brunei Darussalam's, as well as changes in consumption behaviours of end-users. The main focus of the mitigation actions are currently on the energy sector, the largest sector in the country's economy; however equally ambitious targets have also been presented for the forestry - including increasing the already large areas of protected forest cover - highlighting the Government of Brunei Darussalam's clear objective to limit its net GHG emissions.

As Brunei Darussalam's first National Communication and GHG emissions inventory are currently under development, quantified GHG reduction targets (or contributions) have not been provided in this version of the INDC. Brunei Darussalam therefore reserves the right to update its INDC as more data becomes available.

5 Planning for Implementation

The production of Brunei Darussalam's INDC is a nationally led process, co-ordinated by the Ministry of Development. In order to successfully deliver on the contributions outlined in this INDC a number of steps have already been taken:

- i. Brunei Darussalam's Initial National Communication and GHG inventory is being drafted. This is the country's first GHG inventory which will give the first accurate estimation of sectoral GHG emissions and will assist with policy development, along with international reporting requirements (e.g. BURs);
- ii. Brunei Darussalam established the Brunei National Energy Research Institute (BNERI) in 2011 to assist with the formulation of energy policy;
- iii. Brunei Darussalam's National Disaster Management Centre (NDMC) has developed a Strategic National Action Plan for Disaster Risk Reduction, along with the private sector, non-governmental organisations, local bodies and other national agencies, to ensure a safer and disaster resilient country and community;
- iv. Sectoral adaption plans currently exist; with further effort these can be developed into a national integrated and coordinated adaptation plan;
- v. Brunei Darussalam is and will continue to participate in regional networks, such as the ASEAN forum to strengthen regional collaboration efforts, research studies on climate change and its impacts on



ASEAN countries' biodiversity, and organised future activities on "Green themes". This will help the nation to better understand future climate risks and play an active role in co-ordinated regional actions such as the Heart of Borneo Initiative;

- vi. In terms of flood mitigation, river quality improvement and coastal protection the Government of Brunei Darussalam has outlined an action plan comprised of both structural (physical defences) and non-structural (institutional) measures that are currently being and will be implemented in Brunei Darussalam;
- vii. The Government of Brunei Darussalam will continue to promote inter-ministerial and inter-departmental co-ordination and collaboration to achieve goals with respect to forestry protection and its associated adaptation benefits. Already for example, revenue generated by the energy sector has financially supported:
 - a. The development of the setup of the project implementation framework of the Heart of Borneo Initiative
 - b. The project "Biodiversity Action Plan for Peat Swamp Forest"
- viii. Other areas identified where an integrated approach will be pursued is in the fight against diseases, the incidence of which may be increased due to climate change; and
- ix. With current limitations on land space for agriculture, the Government of Brunei Darussalam recognises the need to have more efficient agriculture production to meet the increasing demand and to ensure that the crops are resilient to withstand the future impacts of climate change, such as temperature increases and higher risk of flooding.

5.1 Implementing Energy Related Measures

The following sections highlight more specific implementation actions in existing strategies for the energy and transport sector, as previously outlined in Section 2.

5.1.1 Development and Implementation of EEC Legislative Measures

Seven key policies have been identified which need to be developed and implemented between now and 2035:

- i. *Electricity Tariff Reform*
In January 2012, the implementation of a new progressive electricity tariff structure for the residential sector was introduced. This was followed by the replacement of post-paid to pre-paid meters as a way of encouraging energy saving by the public. The new tariff structure is a more progressive way of billing and aims to integrate an element of energy saving into the public's consumption habits
- ii. *EEC Building Guidelines for Non-Residential Sector*
The Ministry of Development in collaboration with the Energy Department Prime Minister's Office have developed EEC Building Guidelines for non-residential buildings which established energy efficiency and conservation standards, and a regulatory mechanism for buildings in Brunei Darussalam. The EEC Building Guidelines are mandatory to all government buildings and voluntary to all commercial buildings at present. It is intended that they will become mandatory for all buildings in the next phases of policy roll-out. The guidelines were launched by the Minister of Development in May 2015.

The Green Buildings Initiative takes forward a number of actions which support the implementation of the policy. The following actions have already been undertaken or are currently being phased into practice:

- a. A green building rating system which is being developed for government and commercial buildings with the aim to give transparency on the energy performance of buildings.
- b. Pilot energy audits are being undertaken some government buildings to identify 'no cost', 'low cost' and 'high cost' efficiency savings. All no and low cost measures are being implemented, such as reducing the operating hours of centralised air conditioning to be in line with office working hours, setting a minimum temperature of 23°C, and the replacement of inefficient lighting with energy efficient technology. The Government of Brunei Darussalam aims to roll out building energy audits across other governmental, commercial and



residential buildings in future. The anticipated energy savings as a result of these and other measures is anticipated to lead to an overall reduction in energy consumption in government buildings of up to 50% against previous years' performance.

- c. An energy consumption building index which will define a maximum energy consumption target for buildings is currently being developed.
- d. Public houses under the National Housing Programme are designed with green building features that make possible saving in water and energy consumption as well as rain harvesting. This coupled with provision of environmentally friendly and zero carbon modes of mobility (pedestrian and cycling networks) in housing areas enable convenient access to facilities and amenities as well reduce carbon emissions. These houses are targeted to meet the internationally recognized Building and Construction Authority (BCA) Green Mark standard.

iii. Standards and Energy Labelling for Products and Appliances

The Energy Department Prime Minister's Office in collaboration with the Brunei National Energy Research Institute is currently developing the Standards and Labelling Order for electrical appliances. The objective is to restrict and potentially halt the import of the non-efficient electrical appliances and products in future, while concurrently educating and encouraging the public to purchase more energy-efficient electrical appliances and products. The next step is to organise a series of public consultations and roadshows to determine the potential financial incentives that could be provided by the Government of Brunei Darussalam to expedite market transformation once the Order has been endorsed. The Order is expected to be implemented in late 2016

iv. Energy Management Policy

Brunei Darussalam is considering adopting an Energy Management System that is compatible with the ISO 50001. Equipment such as demand controllers, Building Automation Systems (BAS) and Building Energy Management Systems (BEMS) have the potential to support energy management initiatives. This aspect of energy policy is planned to be developed in late 2015 and 2016, and expected to be implemented by 2018

v. Fuel Economy Regulation

A transport fuel economy regulation is currently under development in Brunei Darussalam to improve the emissions performances of vehicles on the road. The Government of Brunei Darussalam is considering setting fuel consumption targets for new vehicles that are similar to those in the EU, such as 17.2 kilometre/litre by 2020 (EU 2016 target equivalent) and at 21.3 kilometre/litre by 2025 (EU 2020 target equivalent). Technologies such as electric, hybrid and more fuel-efficient conventional engine vehicles are also being promoted

vi. Financial Incentives

The Energy Department Prime Minister's Office in association with the Ministry of Finance will identify suitable financial incentives which can be introduced. These may be in the form of tax exemptions, tax reductions or rebate schemes on energy-efficient appliances and products. This aim of the financial support is to address the increased capital cost that may be incurred when purchasing more energy efficient equipment. The Energy Department Prime Minister's Office and Ministry of Communication are also exploring several options to provide appropriate financial incentives in the transportation sector, in particular for hybrid cars and fuel-efficient vehicles

vii. Awareness Raising

The Energy Department Prime Minister's Office, in collaboration with the Ministry of Education's Science, Technology and Environment Partnership (STEP) Centre, will continue to expand Energy Clubs with EEC priorities at schools and hold an annual Energy Week to share with the public the latest developments on best practices in EEC for Brunei Darussalam. The Energy Department Prime Minister's Office also periodically conducts a seminars on energy savings for newly appointed government officers and staff organised by the Public Service Institute, Prime Minister's Office. The



seminars on energy saving are also planned to be extended to rural communities so that they will be given an equal opportunity to learn about EEC

5.1.2 Power Efficiency Improvement

Improving the overall existing power generation efficiency to greater than 45% by 2020, will be brought about by replacing traditional open cycle power plants with more efficient combined-cycle or combined heat and power plants. Further, a structured maintenance programme will be put into place to minimise system losses.

5.1.3 Deployment of Renewable Energy

While efforts are being made to improve efficiency in electricity usage, the Energy Department Prime Minister's Office has also taken steps and will continue to put emphasis on the introduction of alternative and renewable energy sources into the electricity generation mix for Brunei Darussalam. The use of renewable energy for generation will offset the use of fossil fuels required to generate the same amount of electricity at conventional fossil fuel power plants.

Brunei Darussalam commissioned its first photovoltaic solar power plant, the Tenaga Suria Brunei (TSB) in Seria in 2010. At 1.2 MW capacity, it is generating approximately 1,600MWh per year and is an important first step in the development of renewable energy sources in the country, where experience of renewable technologies is currently limited.

In addition to solar power, the Energy Department Prime Minister's Office in collaboration with other government and non-government agencies are also investigating the feasibility of a waste-to-energy facility at Sungai Paku. This facility is expected to generate up to 10-15 MW of power from municipal solid waste, which will also result in a reduction in GHG emissions.

Other alternative energy sources such as wind power, hydropower and tidal power are currently being researched by the Government of Brunei Darussalam. Further development will potentially make the technology more economically and technically feasible in the medium and long-term, supporting the Government of Brunei Darussalam's goal to increase the share of renewables so that 10% of the total power generation is sourced from renewable energy by 2035.

5.2 Implementing Transport Related Measures

As outlined in Section 2, the Government of Brunei Darussalam commissioned a detailed Land Transport Master Plan (LTMP), including background studies on current land transport use, based on which a Land Transport White Paper was drafted.

Brunei Darussalam currently has a high level of vehicle ownership and usage; ownership levels were 0.68 vehicles per capita in 2014. As outlined in the Transport White Paper, under a scenario in which the growth in private transport is left unmitigated, private car traffic is projected to increase rapidly over the next 20 years. The increase will be driven by the anticipated growth in population and levels of car usage. This is expected to create significant congestion issues, and result in rapidly increasing journey times and a 6-fold increase in the share of public roads that are 'over capacity' at peak times by 2025. In order to achieve the scenario of a 40% reduction in morning peak hour carbon dioxide emissions against the BAU scenario in 2035 (see section 2.1.3), the Land Transport Master Plan (LTMP), outlines a number of policies that are being implemented to increase the share of public transport journeys as a percentage of total journeys from its current level of approximately 1% to 22% by 2035. Measures include expanding the bus fleet from 105 to 275 buses, creating a national school bus system, creating separate bus rapid transit (BRT) infrastructure in four corridors from 2017 onwards, and further increasing the capacity by 2035. Such measures will also have the effect of reducing GHG emissions from the use of motorised vehicles.

As current walking and cycling infrastructure is fragmented, more integrated walking and cycling networks are planned for Bandar Seri Begawan and other areas. Moreover, an Urban Smart Travel Zone is proposed for the capital city Bandar Seri Begawan under the LTMP, which is designed to reallocate road space towards public transport and active travel modes. Improved parking policies and intelligent transport systems (ITS) also form part of the suggested policy package, in order to manage traffic demand and improve traffic



flow. The LTMP also suggests a review of the Government of Brunei Darussalam's fuel subsidies as a means of managing the increase in road traffic. The Government of Brunei Darussalam's White Paper recommends that as a minimum, demand management policies should include "a focus on parking management, land-transport integration, investment in public transport, and physical/regulatory regulation of access to urban centres and other sensitive locations".

As outlined in the 'Implementing Energy Related Measures' section, fuel economy regulations are being developed so the transport sector can contribute to the overall reduction of energy intensity targets. This is a joint policy action led by the Energy Department Prime Minister's Office with support from the Ministry of Communication in its implementation. As described in the Transport White Paper, there is an overall goal to introduce policies to promote the use of more efficient "green" vehicles such as hybrid and electric vehicles which will go some way towards achieving these targets. This initiative is being carried out in association with the Energy Department Prime Minister's Office, demonstrating cross-departmental co-operation.

6 Means of implementation

Brunei Darussalam intends to implement its mitigation contributions identified in its INDC through domestic efforts. However, in order to do so successfully, the country will have to address and overcome a number of challenges. To support the implementation Brunei Darussalam will continue to collaborate with its partners at sub-regional, regional and international level to enhance its capability and capacity towards achieving its climate mitigation and adaption objectives:

- i. Wawasan Brunei 2035 highlights the need for the legislative framework in Brunei Darussalam to be developed to address the cross-sectoral environmental challenges including climate change mitigation and adaptation.
- ii. Closer co-ordination amongst stakeholders to avoid duplication and synergise efforts. Defining roles and responsibilities around flood risk assessment, as an example, will lead to more effective and efficient policy decisions in this area. This integration and collaboration between different stakeholders will allow for the sharing of knowledge lessons learnt and expertise to ensure a more comprehensive and effective plan is developed. Improved coordination can also address data gaps; closer and defined working relationships will help streamline data collection process to ensure reliable, accurate information is being captured (especially for GHG inventory purposes).
- iii. To put in place a comprehensive monitoring system for gathering information on pollution and environmental quality. Once in place, this could be built upon to monitor and report against climate change targets i.e. to facilitate the collation of baseline data and evaluate the effectiveness of spending on climate related policies and actions.
- iv. A lack of a national GHG inventory from which to draw a common source of data is a significant technical barrier to addressing climate change. Improved access to baseline and updated data in the energy, transport and forestry sectors will facilitate more effective and efficient policy making in all sectors described in this INDC.
- v. Expertise in climate mitigation and adaptation needs to be enhanced. This includes capacity to study and explore the potential adoption of international market mechanisms as a means of achieving its mitigation objectives.
- vi. Brunei Darussalam has limited experience with (e.g.) energy efficiency conservation and renewable energy technologies. It will continue to participate in regional networks for knowledge sharing and capacity building.
- vii. Social and behaviour changes in terms of vehicle use by the general public. The Land Transport White Paper highlighted, Brunei Darussalam features "extremely high levels of car ownership, use and dependency" and shares of public transport, walking and cycling are extremely low. Incentives to encourage the use of public transport is required.