



REPUBLIC OF CABO VERDE



United Nations  
Framework Convention on  
Climate Change

# INTENDED NATIONALLY DETERMINED CONTRIBUTION OF CABO VERDE



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The “Intended Nationally Determined Contribution” (INDC) of Cabo Verde is hereby submitted jointly by the Ministry of Environmental, Housing and Land Planning and by the Ministry of Foreign Affairs with a view to contribute to the process of the 21st Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) to be held in Paris in December 2015.

It responds to COP decisions 1/CP.19 and 1/CP.20 inviting all Parties to communicate to the secretariat their INDCs so as to achieve the objective set out in Article 2 of the UNFCCC and in a way that demonstrates a progression beyond their current undertakings. The submission draws attention to the fact that Cabo Verde is a small island developing state (SIDS) and that the strategies, plans and actions for low greenhouse gas emission (GHG) development put forward herein reflect the special circumstances and adaptation challenges of Cabo Verde, which require specific international support in terms of capacity-building, technology transfer, and financial commitments.

The preparation of this document was coordinated by the National Directorate of Environment and is structured as follows: (i) summary of contributions; (ii) national context and overall vision; (iii) mitigation; and (iv) adaptation.

Cabo Verde’s mitigation contributions listed herein are expressed in the form of Renewable Energy (RE) and Energy Efficiency (EE) Targets and other Nationally Appropriate Mitigation Actions (NAMAs). RE and EE Targets are proposed for both 2025 and 2030, along with biennial monitoring of progress based on pre-defined indicators and supported by GHG inventories.

Where expressly indicated, the mitigation contributions and adaptation measures proposed are unconditional unilateral efforts. All other contributions proposed are conditional upon receipt of adequate, timely and predictable international support. Cabo Verde supports the use of market-based mechanisms to implement and achieve the conditional portion of the contributions mentioned in this document.

Finally, Cabo Verde will update, as appropriate, its INDC to account for the most recent GHG inventory currently being prepared as part of Cabo Verde’s Third National Communication process, expected to be concluded in the second half of 2016.

This INDC demonstrates Cabo Verde’s continued commitment to sustainable, low-carbon and climate resilient policies and the country’s contribution to global efforts to reduce emissions and limit the increase in global average temperatures to 2°C or 1.5°C above pre-industrial levels.

# I. Summary of contributions

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In order to facilitate clarity, transparency and understanding, this first section presents a summary of Cabo Verde's intended mitigation and adaptation contributions.

Cabo Verde strongly believes that, in light of its national circumstances, in particular its position as an arid small island developing states (SIDS) particularly vulnerable to climate change, its INDC is fair, ambitious, and represents a genuine contribution towards achieving the objective of the Convention as set out in its Article 2.

**Table 1-** Summary of contributions

<b>Types of contribution</b>	Both target and action-based contributions, tailored to Cabo Verde's special circumstances. Where indicated, the mitigation and adaptation measures proposed are unconditional, domestically realised commitments. All other contributions proposed herein are conditional upon receipt of adequate and predictable international support.
<b>Coverage and scope</b>	Specific priorities: <ul style="list-style-type: none"><li>▪ Sectors: Energy, transport, waste, AFOLU (Agriculture, Forestry and Other Land Use), and adaptation.</li><li>▪ GHGs: carbon dioxide (CO<sub>2</sub>); methane (CH<sub>4</sub>); and nitrous oxide (N<sub>2</sub>O).</li></ul>
<b>Time dimension of contributions</b>	2025 and 2030
<b>Planning processes</b>	<p>Cabo Verde's planning process is anchored on a wide participatory and societal approach and has been shaped by a core set of programmatic documents, including:</p> <ul style="list-style-type: none"><li>▪ Cabo Verde's Transformational Agenda for 2030;</li><li>▪ National Energy Efficiency Plan of 2015 (PNAEE);</li><li>▪ National Renewable Energy Plan of 2015 (PNAER);</li><li>▪ The Strategic Water and Sanitation Plan ("PLENAS");</li><li>▪ Growth and Poverty Reduction Strategy Paper (DCRP III); and</li><li>▪ Cabo Verde's Low Carbon and Climate Resilient Development Strategy (in preparation).</li></ul> <p>Cabo Verde is committed to implement the Sustainable Energy for All (SE4all) agenda and – as host to the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) – intends to assume regional leadership on energy transformation in Africa.</p> <p>Cabo Verde has recently signed together with the European Union, Luxembourg, Spain, Portugal and Austria a Joint Declaration on Reinforced Cooperation in the Field of Sustainable Energy. The cooperation will support Cabo Verde on its pathway to universal energy access and enhanced electricity supply from 100% renewable energy sources.</p> <p>Cabo Verde's national efforts and ambitions respond to</p>

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the process of the Durban Platform as well as to the Barbados Programme of Action for the Sustainable Development of SIDS, the Samoa Pathway, and the Post-2015 Development Agenda.

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**Fair and ambitious**

As a small island development state (SIDS), Cabo Verde has one of the lowest GHG emissions per capita and yet is among the countries most vulnerable to climate change. In particular, Cabo Verde faces severe adaptation challenges associated with water resources availability, food and energy security, and desertification processes.

In light of these circumstances and according to the country's capacities, Cabo Verde believes its conditional and unconditional contributions to be fair and ambitious, effectively contributing to collective global efforts to reduce emissions and limit the increase in global average temperatures to 2°C or 1.5°C above pre-industrial levels.

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**Mitigation (target-based)**      Renewable Energy

Cabo Verde makes an unconditional commitment:

- to achieve 100% grid access by 2017; and
- to achieve a 30% renewable energy penetration rate into the electric grid by 2025.

With international support, Cabo Verde seeks to increase the renewable energy uptake in electricity to 100% by 2025, with best efforts to achieve this goal already by 2020, in accordance with the following indicative trajectory:

- 35% RE penetration rate in 2016-2018;
- 50% RE penetration rate in 2018-2020;
- 100% RE penetration rate in 2020-2025.

To achieve this goal, the following key measures are envisaged:

- smart-grid enhancement for the country's 9 independent networks with state-of-the-art power conditioning, production and distribution control;
- built-up of energy storage facilities (including through batteries and flywheels);
- design of renewable micro-grids;
- design of individual energy systems (solar home systems); and
- systematic deployment of solar-water-heaters across all islands.

The ambitious renewable energy roadmap will require close planning in public-private partnerships, simplified procedures for licensing and certification ("one-stop-shops") and the creation of robust competitive market conditions and the consideration of specific fiscal incentives to attract the private sector.

To reach the above indicative targets, investments in the order of 310 million EUR (50% RE penetration) and 1 billion EUR (100% RE penetration) will be needed.

Cabo Verde estimates that the renewable energy target will generate annual GHG emission reductions in the range of 600-700 tCO<sub>2</sub>eq.

Energy Efficiency	<p>Cabo Verde makes an unconditional long-term commitment to reduce overall energy demand by 10% in relation to the Base Scenario by 2030.</p> <p>With international support, Cabo Verde seeks to reduce overall energy demand by 20% in relation to the Base Scenario by 2030, with best efforts to achieve this indicative reduction effort already by 2025.</p> <p>To achieve these goals, the following key measures are envisaged:</p> <ul style="list-style-type: none"> <li>▪ seeking to reduce the proportion of technical and non-technical losses in energy distribution from about 25% in 2010 to less than 8% by 2030 or before;</li> <li>▪ improving energy efficiency of large consumers, with particular focus on hotels, hospitals and public administration offices by 2030 or before, including through mandatory installation of solar-water-heater components;</li> <li>▪ achieving 30% of efficiency improvement in the use of electric power (15% residential, 15% commercial);</li> <li>▪ improving by at least 10% fuel-usage across sectors and modes of application (except butane usage) by 2030 or before;</li> <li>▪ improving energy performance of the building envelop and implementing a green building code, seeking to cover all new (public or private) buildings by 2030 or before;</li> <li>▪ enhancing energy efficiency of street lighting and creating energy rating labels for domestic appliances and air conditioning by 2030 or before;</li> <li>▪ further promoting the use of smaller distributed energy solutions (e.g. solar pumps) for water pumping, distribution and irrigation;</li> <li>▪ promoting the built-up of a comprehensive network of energy services companies (ESCOs) and clean-energy business incubators.</li> </ul>
Base Scenario	<p>The Base Scenario for the overall energy demand until 2030 considered the historical evolution and relevant variables associated with energy use, population and economic growth. It projects a moderate annual growth rate in energy demand of around 2% until 2020, increasing to 3% per year from 2020 to 2030.</p> <p>The overall energy demand in 2030 under the Base Scenario is estimated to be around 2,700GWh.</p>
Estimated GHG reductions	<p>The overall GHG reductions corresponding to Cabo Verde's energy sector-related goals and other intended mitigation contributions will be calculated and updated once the 3<sup>rd</sup> National Communication and GHG inventory is concluded (second half of 2016).</p>
<b>Assumptions and methodologies</b>	<ul style="list-style-type: none"> <li>▪ According to Cabo Verde's Base Scenario for the energy sector as presented in the 2020/2030 National Renewable Energy Plan and the National Energy Efficiency Plan;</li> <li>▪ Methodologies for estimating GHG emissions: IPCC Guidelines 2006; and</li> <li>▪ Global Warming Potential on a 100 year</li> </ul>

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timescale in accordance with the IPCC's 4th Assessment Report.

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**Other mitigation contributions (NAMAs)**

**Transport**

Seek to develop a NAMA that increases energy efficiency of the transport sector, including domestic shipping and domestic air travel, and evaluates options for policies and actions available to reduce the impact of GHG emissions originating from this sector.

The NAMA will initially be focused on the collection of relevant data for the sector, including, among others, fuel type and consumption per transport mode, technology performance, fuel substitution possibilities, estimation of costs, and an updated GHG emissions profile for light-duty vehicles as well as for freight and passenger transportation services.

This NAMA will also consider options for boosting hybrid and electric fleet in the country, in particular, the feasibility of making government vehicles electrically powered by 2030.

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**Forestry**

Cabo Verde makes an unconditional long-term commitment to engage in new afforestation/reforestation ("A/R") campaigns in the order of 10,000 hectares by 2030.

With international support, Cabo Verde seeks an A/R campaign area of around 20,000 hectares until 2030.

We estimate a planting effort of 400 trees per hectare. If 20,000 hectares are successfully planted, this will generate a long-term sequestration gain of 360 tCO<sub>2</sub>eq per hectare sequestered after 30 years, corresponding to 7.2 mtCO<sub>2</sub>eq for 20,000 hectares after 30 years.

Cabo Verde also aims at eliminating three stone cooking stove (35% of households still use three-stone stove) through improved low-emissions cookstoves by 2025 at the latest, and thereby substantially removing demand for firewood.

At the level of governance and institutional infrastructure, Cabo Verde seeks to improve overall forestry governance by investing in inventory and land registry systems, designating priority afforestation/reforestation, and preparing long-term sustainable land management plans coupled with performance-based subsidies.

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**Waste**

Seek to provide proper waste management coverage (with waste segregation, recycling, and treatment in sanitary landfills) for at least 50% of the more vulnerable municipalities by 2030, including:

- implementing educational programs for the separation of basic waste types by households and waste producers;
- planning and building 5 waste collection and recycling facilities and/or general drop off points by 2025;
- planning and building at least 1 landfill equipped with gas-to-energy systems by 2025; and
- developing stand-alone bio-energy solutions.

Seek to promote the use of the resulting sludge from the wastewater treatment process for the production of clean

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		<p>energy;</p> <p>Seek to further develop and implement the Waste Roadmap for Cabo Verde, as well regulate and implement the new General Solid Waste Law;</p> <p>Seek to further develop and implement the water and sanitation master plans (“Planos Diretores de Água e Saneamento - PDAS”), as well as regulate and implement the new Water and Sanitation Code; and</p> <p>Seek to improve governance, institutional and technical capacities by:</p> <ul style="list-style-type: none"> <li>▪ collecting and organizing relevant data on waste generation;</li> <li>▪ designing an inter-municipal integrated waste management system; and</li> <li>▪ capacitating the public sector to engage with private sector operators and technology providers.</li> </ul>
<b>Adaptation contributions</b>	Key strategic axes	<ul style="list-style-type: none"> <li>▪ Promoting integrated water resources management, guaranteeing stable and adequate water supply (for consumption, agriculture, ecosystems and tourism);</li> <li>▪ Increasing adaptive capacities of agro-silvo-pastoral production systems in order to ensure and improve national food production and promoting Cabo Verde’s ocean-based (“blue”) economy;</li> <li>▪ Protecting and preventing degradation of coastal zones and their habitat.</li> </ul>
	Proposed measures	<p>Seek to ensure by 2030:</p> <ul style="list-style-type: none"> <li>▪ that every citizen has safe access to a minimum of 40l potable water per day;</li> <li>▪ that all urban households are connected to the water supply network;</li> <li>▪ that sewage collection system and proper disposal is extended to cover at least 90% for the cities of Praia and Mindelo and at least 50% of rural areas;</li> <li>▪ the construction (or retrofitting/expansion) of at least 4 wastewater treatment plants and water re-use facilities.</li> </ul> <p>Seek to establish a systematized electronic database for storage and management of relevant water-related information as well as a framework for measuring, reporting and verification (MRV) to assess water-relevant data and to better evaluate performance in the sector;</p> <p>Seek to build several new desalination and water pumping units. With progressive increase of RE penetration in the grid, overall energy costs are expected to reduce, decreasing also potable water supply and irrigation costs. Decentralized renewable energy solutions and more efficient technologies will also be considered and tested by Cabo Verde;</p> <p>Seek to promote new water storage and distribution techniques and to build at least 5 new dams by 2030;</p> <p>Seek to develop water and sanitation master plans (“planos diretores”) for each island and encourage private</p>

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sector participation through different policy incentives and business models;

Seek to increase urban resilience by developing master plans for rainwater drainage, improving and extending drainage infrastructure, and implementing flood management systems in vulnerable areas;

Seek to disseminate more efficient small-scale irrigation techniques and promoting soil conservation schemes for farmers and rural producers;

Seek to diversify income generating activities in rural areas by promote artisanal fishing activities (providing training, equipment, micro-credit) in coastal areas;

Seek to promote Cabo Verde's ocean-based ("blue") economy by, among others, supporting new techniques of aquaculture, improving quality of fishery products through ecolabelling, and promoting sustainable coastal and maritime tourism and sports;

Seek to strengthen governance, strategy development and capacity building by, among others:

- promoting workshops in order to introduce crop varieties and species more adaptable to climatic conditions;
- improving strategies associated with the distribution of agro-climatic zones and the structure of crops;
- improving data collection and modelling capacity associated with water and soil management;

Seek to rehabilitate or construct infrastructures for the protection of coastal zones against sea level rise and beach erosion; and

Seek to implement actions for the adaptation of fishing activities and fishing communities, building on the scenarios and strategies already developed by the Fishery Development National Institute (INDP).

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## **International support**

The Government of Cabo Verde is dependent on international support in the form of technology support, capacity-building, business development, private-sector involvement, and international climate finance.

In particular, achieving the energy-related goals communicated in this INDC will require substantial investments on grid extension and energy storage capacity, as well as technical assistance for, among others:

- preparing feasibility studies and impact assessments;
- assessing technological options;
- capacitating human resources and technicians;
- certifying equipment and systems;
- establishing monitoring protocols and performance evaluation procedures; and
- developing market-oriented policies and incentives for private sector engagement and strengthening institutional arrangements.

The cost estimates mentioned in the mitigation section above will need to be further examined, together with financing options, a roadmap for structural reforms and technical developments, and a detailed investment

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agenda. To the extent mentioned above, Cabo Verde will seek the support of international climate finance through the involvement of both public and private sources.

Private and public financing needs for implementing the proposed adaptation measures still need to be assessed and determined.

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**Use of market-based mechanism**

Several conditional measures envisaged may be financed through mechanisms and/or carbon markets, including the Clean Development Mechanism, new market and non-market based mechanisms, and credited NAMAs.

A proper GHG accounting system needs to be established to address the risk of, and ultimately avoid, double-counting of outcomes, in accordance with UNFCCC guidance and technical specifications.

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## II. National Context and Overall Vision

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Cabo Verde is made up of ten islands and eight islets, located in the Atlantic Ocean, some 450 km west of Senegal. It has a land area of 4,033 square kilometres and a 700,000 square kilometres Economic Exclusivity Zone. The 10 islands are grouped into Windward islands (northern islands group) comprising Santo Antão, São Vicente, São Nicolau, Santa Luzia, Sal, Boa Vista, and Leeward islands (southern islands group) consisting of Maio, Santiago, Fogo and Brava. Cabo Verde has an estimated population of 524,832 inhabitants in 2015.

While the country's contribution to global warming has been negligible, as a small island country and a dry Sahelian country with only 10% arable land area, Cabo Verde is particularly vulnerable to climate change and its impacts, ranging from extreme weather conditions to sea-level rise and the degradation of fish stocks. Changes in seasonal, weather and rain patterns are already showing. Along with a depletion of the country's scarce natural resources, climate variability in Cabo Verde will increase leading to more storms, floods and droughts, and an ever-shorter rainy season. With 80% of total population live in coastal areas, Cabo Verde is particularly sensitive to sea-level rise and coastal hazards.

Despite the challenges, Cabo Verde is an emerging nation with a strong and transformative development agenda. Since achieving independence in 1975, Cabo Verde has evolved into a stable democracy and continuously growing economy, leading to substantial increases in per capita income, widespread education and health, and life-expectancy, graduating in 2007 from the list of least developed countries. Cabo Verde's human development index (HDI) grew by 11% between 2000 and 2013 and stood, in 2014, at 0,636.

Today's economy is mainly shaped by the tertiary sector (almost 70% of GDP), with the tourism industry already representing about 30% of GDP. The industry expects robust growth rates, from half a million tourists in 2013 to one million tourists per year by

2020. While a welcome boost to the economy, this development will increase the pressure on the country's fragile ecosystem and resources.

Cabo Verde is firmly committed to a global low-carbon transformation, which decouples economic growth from emissions, provides for the sustainable use of natural resources, limits average global warming to 2 degrees Celsius, with the ultimate goal of achieving 1.5 degree Celsius in the long-term, and assists nations with adapting to the consequences from sea-level rise, extreme weather events, and other effects of a changing climate.

At the domestic level, Cabo Verde has laid the relevant groundwork to achieve energy-independence on 100% renewable sources, integrate highest levels of water-efficiency and resilience to climate change, operate a fully sustainable economy and a sustainable tourism infrastructure, and work towards building what Cabo Verde has always carried in its name: a truly green island state.

### III. Mitigation

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#### Energy Sector

By 2010, the total annual energy use stood at 1,686,2 GWh. Road transport, aviation and shipping (between islands) stood for most of energy demand, followed by the residential, business and tourism sector, industries, and water production (see Figure 1).

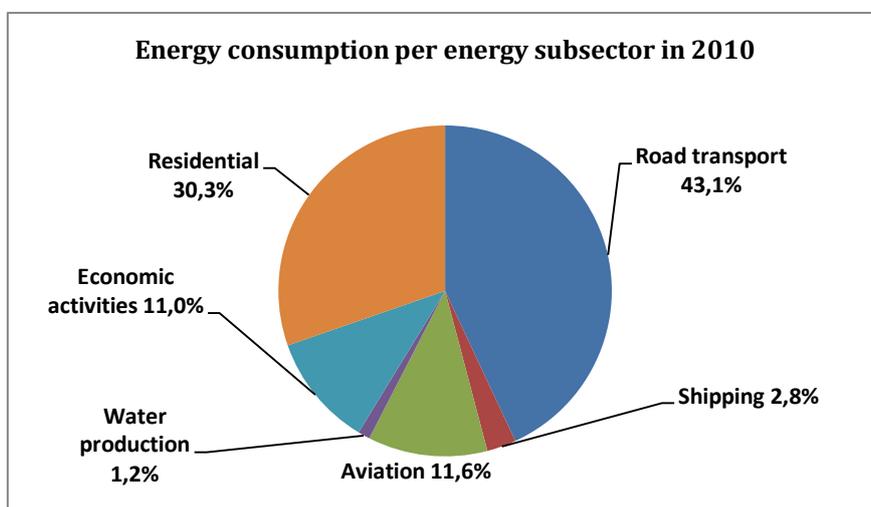


Figure 1 - Energy consumption per energy subsector in 2010

The entire sector is heavily reliant on imported fossil fuels (petroleum, diesel, gasoline, gas butane, and gasoil) and, in the year 2000, corresponded to around 92.9% of the CO<sub>2</sub>e emissions in the country.

However, Cabo Verde is beginning to gradually increase the proportion of wind and solar energy in the energy mix, moving from 1.2% of electricity production from renewable energy in 2010 to about 25% (representing 35 MW capacity) today. Cabo Verde supports and works closely with the Sustainable Energy for All (SE4all) Initiative and – as host to the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) – assumes regional leadership on energy transformation in Africa.

According to Cabo Verde’s National Energy Efficiency Plan (PNAEE), today’s primary energy consumption will grow by about 2% until 2020 and then increase to 3% per year from 2020 to 2030 (“Base Scenario”). The overall energy demand in 2030 is estimated to be around 2,700 GWh (see Figure 2).

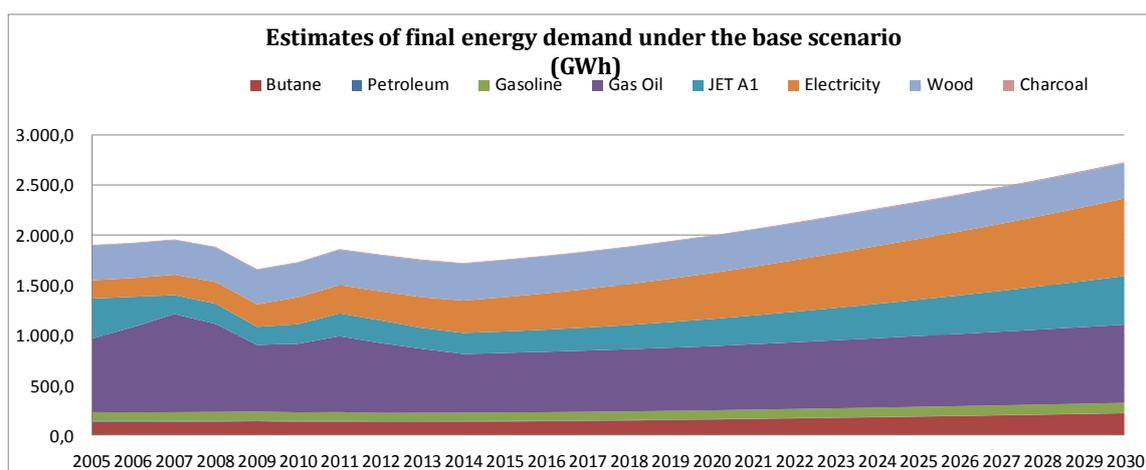
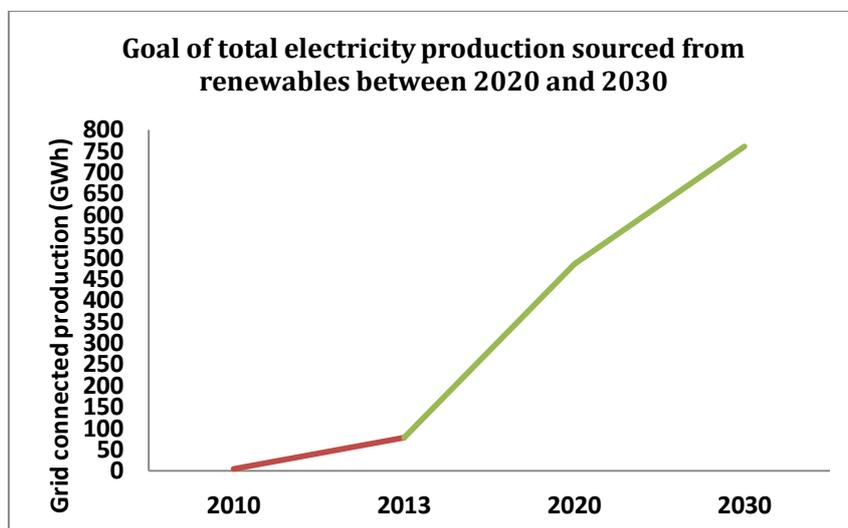


Figure 2 - Estimates of final energy demand under the Base Scenario

We attempt to depart from the Base Scenario and its GHG emissions profile by transforming the electricity sector to rely on 100% renewable sources until 2025 and by reducing overall consumption by 20% until 2030.

### Proposed measures

Within the context of the domestic structural reforms planned under Cabo Verde’s Transformational Agenda, the country aims to achieve a fully decarbonized electricity system by 2030, while meeting increased demand (see Figure 3) at affordable prices.



**Figure 3** - Share of renewables on electricity production between 2020 and 2030

Cabo Verde’s detailed energy agenda is based on, and laid out, in the following documents, as approved at the highest Government level:

**Table 2-** Approved documents

<b>Instrument</b>	<b>Content</b>
National Renewable Energy Plan of 2015 (“PNAER”)	National roadmap to become 100% renewable for electricity generation
National Energy Efficiency Plan of 2015 (“PANEE”)	National comprehensive pathway to implement energy efficiency targets from now up to 2025
Agenda for Action – Sustainable Energy for All (SE4ALL Initiative)	International action agenda, approved by Cabo Verde in 2015, to secure universal energy access to all, double EE rates and to double RE proportion in the energy matrix
2015 Joint Declaration between the EU, Luxembourg, Spain, Portugal, Austria and the Republic of Cabo Verde on Reinforced Cooperation in the Field of Sustainable Energy	Bilateral policy dialogue and framework for technical assistance on energy sourcing and energy efficiency

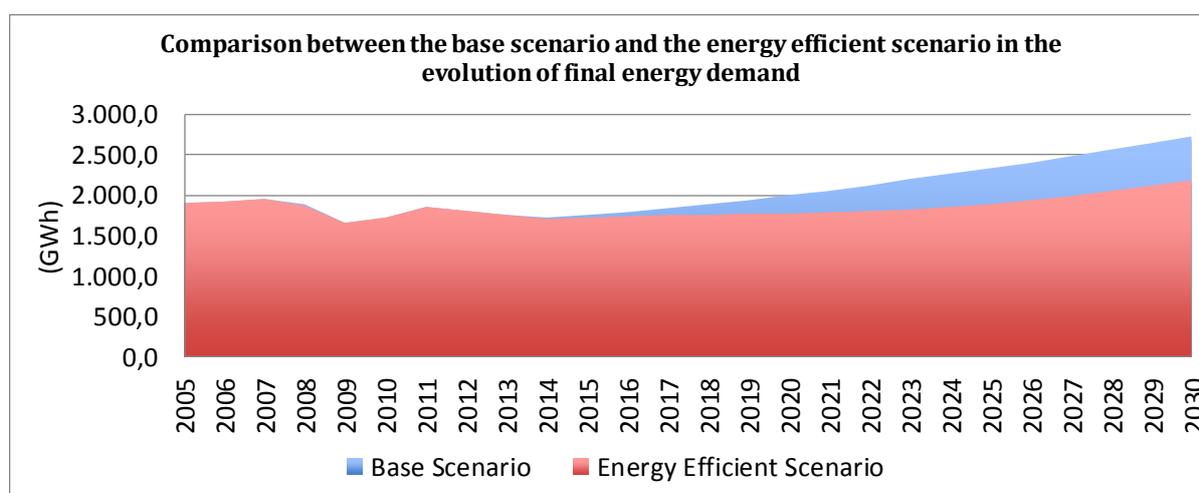
Cabo Verde unconditionally commits to achieving a electric power penetration rate of 30% by 2025. Provided the necessary international technical and financial support is made available (in adequate, timely and predictable manner), Cabo Verde will increase the penetration rate to 100% of the installed electric power from renewables sources by 2025, with best efforts to achieve this indicative goal already by 2020. The indicative implementation trajectory is (i) 35% RE penetration rate in 2016-2018; (ii) 50% RE penetration rate in 2018-2020; and (iii) 100% RE penetration rate in 2020-2025.

Renewable sources will be based mostly on mature technologies, in particular, wind and solar, without however ignoring the potential for geothermal energy and biodiesel in specific areas.

In addition, Cabo Verde unconditionally commits to achieving long-term energy efficiency gains in the order of 10% in relation to the Base Scenario by 2030. Conditional on international technical and financial support, Cabo Verde will reduce overall energy demand by 20% in relation to the Base Scenario by 2030, with best efforts to achieve this indicative reduction effort already by 2025.

With respect to the goal to achieve the 10% reduction and 20% reduction, respectively, in overall energy demand by 2030, Cabo Verde intends to adopt a number of energy efficiency measures in several sub-sectors, including buildings, appliances, large energy consumers, fuel use and at household level.

Figure 4 below contrasts energy demand under the Base Scenario with the potential energy efficient scenario communicated in this INDC.



**Figure 4:** Energy efficiency target for 2030 (red) compared to the base scenario (blue)

The high ambition of Cabo Verde’s goals on renewable energy and energy efficiency will require a technology overhaul of the country’s energy system, paired with an enabling regulatory environment (including the consideration of specific fiscal incentives) that is able to attract sufficient private sector interest. Energy grid and storage capacity will also have to be expanded considerably and different storage technologies will be applied in light of the particularities of each island.

Table 3 below indicates the goals and actions proposed by Cabo Verde in the energy sector. Monitoring and reporting of Cabo Verde’s performance will be done via Biennial Update Reports (BURs) and, in the case of proposed NAMAs, according to the NAMA’s own MRV mechanism.

**Table 3 - Cabo Verde’s proposed mitigation contributions in the energy sector**

Energy sector	Proposed measures
Electricity	<p>Cabo Verde makes an unconditional commitment:</p> <ul style="list-style-type: none"> <li>▪ to achieve 100% grid access (up from 95%);</li> <li>▪ to achieve 30% of the installed electric power from renewables sources by 2025.</li> </ul>

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With international support, Cabo Verde seeks to increase the electric power penetration rate from renewable sources to 100% of the installed electric power from renewables sources by 2025, with best efforts to achieve this goal already by 2020, in accordance with the following indicative trajectory:

- 35% RE penetration rate in 2016-2018;
- 50% RE penetration rate in 2018-2020;
- 100% RE penetration rate in 2020-2025.

To achieve this goal, the following key measures are envisaged:

- smart-grid enhancement for the country's 9 independent networks with state-of-the-art power conditioning, production and distribution control;
- built-up of energy storage facilities (including through batteries and flywheels);
- design of renewable micro-grids;
- design of individual energy systems (solar home systems); and
- systematic deployment of solar-water-heaters across all islands.

The ambitious renewable energy roadmap will require close planning in public-private partnerships, simplified procedures for licensing and certification ("one-stop-shops"), the creation of robust competitive market conditions, and the consideration of specific fiscal incentives to attract the private sector.

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#### Energy Efficiency

Seek to reduce overall energy demand by 20% in relation to the Base Scenario by 2030, with best efforts to achieve this indicative reduction effort already by 2025.

To achieve this goal, the following key measures are envisaged:

- seeking to reduce the proportion of technical and non-technical losses in energy distribution from about 25% in 2010 to less than 8% by 2030 or before;
- improving energy efficiency of large consumers, with particular focus on hotels, hospitals and public administration offices by 2030 or before, including through mandatory installation of solar-water-heater components;
- improving by at least 10% fuel-usage across sectors and modes of application (except butane usage) by 2030 or before;
- achieving 30% of efficiency improvement in the use of electric power (15% residential, 15% commercial);
- improving energy performance of the building envelop, seeking to cover all new (public or private) buildings by 2030 or before;
- enhancing energy efficiency of street lighting and creating energy rating labels for domestic appliances and air conditioning by 2030 or before;
- further promoting the use of smaller distributed energy solutions (e.g. solar pumps) for water pumping, distribution and irrigation; and
- promoting the built-up of a comprehensive network of energy services companies (ESCOs) and clean-energy business incubators.

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#### Transport-specific NAMA

Seek to develop a NAMA that increases energy efficiency of the transport sector, including domestic shipping and domestic air travel, and evaluates options for policies and actions available to reduce the impact of GHG emissions originating from this sector.

The NAMA will initially be focused on the collection of relevant data

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for the sector, including, among others, fuel type and consumption per transport mode, technology performance, fuel substitution possibilities, estimation of costs, and an updated GHG emissions profile for light-duty vehicles as well as for freight and passenger transportation services.

This NAMA will also consider options for boosting hybrid and electric fleet in the country, in particular, the feasibility of making government vehicles electrically powered by 2030.

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#### Base Scenario

The Base Scenario for the overall energy demand until 2030 considered the historical evolution and relevant variables associated with energy use, population and economic growth. It projects a moderate annual growth rate in energy demand of around 2% until 2020, increasing to 3% per year from 2020 to 2030.

The overall energy demand in 2030 under the Base Scenario is estimated to be around 2,700GWh.

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## Forest Sector

One of Cabo Verde's highest economic, environmental and climate change related priorities concerns the country's forests. Forest vegetation and forest soils prove the most effective means to store and retain water, minerals and nutrients. They avoid erosion, soil degradation and desertification, thus securing agricultural land. They provide biomass sources; and increase resilience against long, increasingly often, periods of drought. Water availability is approximately 500 m<sup>3</sup> a year per person, the second lowest of any country in sub-Saharan Africa.

After centuries of degradation, Cabo Verde has successfully engaged in reforestation and afforestation campaigns since the 1920s. Today's forested area spans some 84,000 hectares, roughly a fifth of the national land territory, the vast majority of it planted (with about 400 trees per hectare). Despite considerable planting activities, management tools such as inventories and management plans remain at an infancy state.

Degradation, too, continues. About 35% of households – virtually all of them located in rural areas – depend on firewood for cooking food. Most of the wood biomass – according to estimates some 100 tonnes a year – originate from forested lands and is harvested with scarce regard to sustainable harvesting methods. Pressure from a growing population, unplanned urbanization, and non-sustainable grazing contribute to overall degradation. Together with a notable increase in drought years since the 1960s, this represents the most single threat to sustainable development in Cabo Verde.

The leading policy framework for Cabo Verde's forestry sector includes the Economic Transformation Strategy (TEE), which proposes, among others, the sustainable management of resources and the development of agroforestry and the participatory management of forest areas, as well as the Strategy Document on Growth and Poverty Reduction (*Documento de Estratégia de Crescimento e Redução da Pobreza - "DECRP")* III – covering the years 2011-2016 – which argues for a “better management of natural resources, including lands, water, fishing and floral resources” and for “economic, social

and physical resilience towards natural disasters and climate change related incidents to alleviate the associated risks” and the National Forestry Action Plan (NFAP).

### Proposed measures

Table 4 below shows the goals and actions proposed by Cabo Verde in the forestry sector. Monitoring and reporting of Cabo Verde’s performance will be done via Biennial Update Reports (BURs) and, where appropriate, make use of CDM (and other widely applied) baseline and monitoring methodologies.

**Table 4** - Cabo Verde’s proposed mitigation contributions in the forestry sector

Forestry sector	Proposed measures
Afforestation and reforestation	<p>Cabo Verde makes an unconditional long-term commitment to engage in new afforestation/reforestation (“A/R”) campaigns in the order of 10,000 hectares until 2030 by 2030;</p> <p>With international support, Cabo Verde seeks an A/R campaign area of around 20,000 hectares until 2030;</p> <p>Cabo Verde estimates a planting effort of 400 trees per hectare. If 20,000 hectares are successfully planted, this will generate a long-term sequestration gain of 360 tCO<sub>2</sub>eq per hectare sequestered after 30 years, corresponding to 7.2 mtCO<sub>2</sub>eq for 20,000 hectares after 30 years.</p> <p>Cabo Verde also aims at eliminating three stone cooking stove (35% of households still use three-stone stove) through improved low-emissions cookstoves by 2025 at the latest, and thereby substantially removing demand for firewood.</p>
Governance, strategies and capacity building	<p>Seek to:</p> <ul style="list-style-type: none"> <li>▪ Improve and update of land inventory and registry (including demarcation services, as appropriate) by implementing: <ul style="list-style-type: none"> <li>- a fully developed and operational inventory and land registry</li> <li>- an area scoping and feasibility analysis;</li> </ul> </li> <li>▪ Designate priority afforestation/reforestation areas based on vegetation options, technical considerations (including concerning water-retention needs, fire prevention and restoration viability), clear tenure rules, and management agreements with private land holders;</li> <li>▪ Prepare a sustainable land management plan coupled with performance-based subsidies.</li> </ul>

## Waste Management Sector

There are few comprehensive surveys on waste, waste management, and emissions from waste. Main sources of wastewater and solid waste emissions are household waste, tourism induced, and agricultural waste. According to the Second National Communication, emissions from the waste sector accounted for 32.4% of total CH<sub>4</sub> emissions in 2000, and solid waste disposal corresponded to 97.0% of that portion.

Cabo Verde solid waste management has traditionally been organized around its 22 municipalities with most of the solid waste – around 113,000 tonnes per year in 2010 – still going directly into open dumps, with the exception of the city of Praia which

currently operates a sanitary landfill. In addition, while there is potential for capturing energy in wastewater treatment plants, the use of sludge for thermal power generation purposes remains at concept stage.

Cabo Verde initiated an ambitious governance reform process to overcome the deficiencies in the sanitation sector. The 2010 the National Basic Sanitation Plan is currently being updated through the Waste Roadmap for Cabo Verde (*Roadmap de Resíduos de Cabo Verde*). It also launched the National Strategic Water and Sanitation Plan (*Plano Estratégico Nacional de Água e Saneamento* - “PLENAS”) and is currently preparing detailed water and sanitation master plans (*Planos Diretores de Água e Saneamento - PDAS*) for each of the islands. The reformed Water and Sanitation Code (*Código de Água e Saneamento*) and the General Solid Waste Law are expected to be soon enacted.

### Proposed measures

Table 5 below shows the goals and actions proposed by Cabo Verde in the waste sector. Monitoring and reporting of Cabo Verde’s performance will be done via Biennial Update Reports (BURs) and, where appropriate, make use of CDM (and other widely applied) baseline and monitoring methodologies.

**Table 5** - Cabo Verde’s proposed mitigation contributions in the waste sector

Waste sector	Proposed measures
Solid waste	<p>Seek to provide proper waste management coverage (with waste segregation, recycling, and treatment in sanitary landfills) for 50% of the most vulnerable municipalities by 2030, including:</p> <ul style="list-style-type: none"> <li>▪ implementing educational programs for the separation of basic waste types by households and waste producers;</li> <li>▪ planning and building 5 waste collection and recycling facilities and/or general drop off points by 2025;</li> <li>▪ planning and building at least 1 landfill equipped with gas-to-energy systems by 2025; and</li> <li>▪ developing stand-alone bio-energy solutions;</li> </ul> <p>Seek to further develop and implement the Waste Roadmap for Cabo Verde, as well regulate and implement the new General Solid Waste Law.</p>
Wastewater	<p>Seek to promote the use of the resulting sludge from the wastewater treatment process for the production of clean energy, which includes carrying-out technological an options assessment and developing business models and investment plans;</p> <p>Seek to develop and implement the water and sanitation master plans (“Planos Diretores de Água e Saneamento - PDAS”), as well as regulate and implement the new Water and Sanitation Code.</p>
Governance, strategies and capacity building	<p>Seek to:</p> <ul style="list-style-type: none"> <li>▪ collect and organize relevant data on waste generation;</li> <li>▪ design an inter-municipal integrated waste management system;</li> <li>▪ increase institutional and technical capacity of the public sector to engage with private sector operators and technology providers.</li> </ul>

## IV. Adaptation

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Due to its small insular and volcanic characteristics, Cabo Verde suffers from severe natural resources constraints. The lack of arable lands (only about 10% of the land is potentially arable) forces the country to import between 80% and 90% of its food needs. In addition, the country's coastal lines are particularly vulnerable to sea level rise and erosion. Around 80% of its population is currently living in these coastal areas. Cabo Verde's coastal zones are also crucial to foster and sustain the local tourism industry, the main driving force behind the country's service-oriented economy.

Climatic models ran during the NAPA assessment for the period 2008-2012 have shown that the country's natural vulnerabilities, along with their social and economic implications, are very likely to be exacerbated by climate-related disruptions in the next decades. These include more frequent extreme events like storms, floods and droughts, as well as shorter rainy seasons, with immediate impacts on livelihoods, infrastructure, sanitary conditions, recharge of reservoirs, and crop productivity.

Cabo Verde is affected by acute water scarcity (both surface and underground). Mean annual precipitation levels are erratic and have decreased considerably since 1970. Rainfall projections to 2020 reveal values below the historical pattern. As result, the country has implemented and regularly maintains around 20 highly costly and energy-intensive water desalination units. Daily water needs of population centres, tourism and agriculture is predicted to increase fourfold, from around 50,000m<sup>3</sup> to 160,000m<sup>3</sup> by 2030 and thus the potential of various sustainable water supply and mobilization solutions will need to be better explored going forward.

Despite the existence of wastewater treatment facilities in the main urban areas, wastewater remains scarcely managed across the islands of Cabo Verde. Cabo Verde plans an ambitious operational overhaul of its sanitation management system to overcome infrastructure challenges, in particular, extending the water supply network, improving sewage collection and disposal, and properly harvesting and storing rainwater/storm water runoffs.

Adapting its fragile ecosystems to climate change is a key priority for Cabo Verde. Table 6 below summarizes existing policies and actions to increase the country's adaptive capacity.

**Table 6** - Cabo Verde's existing adaptation policies and actions

Existing policies and actions	Description
National Strategic Water and Sanitation Plan ( <i>Plano Estratégico Nacional de Água e Saneamento</i> - "PLENAS")	Through Resolution 10/2015, of February 20 <sup>th</sup> , Cabo Verde passed the PLENAS, kick-starting a water and sanitation reform in the country. The Plan provides strategic guidance to the different government levels and a detailed planning process to be carried out in the islands. A key strategic objective the PLENAS is to ensure that every citizen has minimum daily water consumption level of 40l and a maximum of 90l. The

	expansion in water supply is to be aligned with measures to improve overall sanitation system, optimize the use of the resources, reduce water distribution losses, and promote rainwater harvesting and water re-use.
Project “Building adaptive capacity and resilience to climate change in the water sector”	With assistance from UNDP and GEF, this project aims to create a more systematic response to climate disruptions by developing adaptation policies and measures to better manage climatic vulnerability and by implementing targeted demonstration investments.
Water supply project in Santiago	With support from Japan International Cooperation Agency (JICA), Cabo Verde is currently implementing a project that aims to meet water demand of several communities in the island of Santiago. The project includes the construction of wells and promoting efficiency in water use and allocation.
Water, Sanitation and Hygiene (WASH) Project	Within the Millennium Challenge Account framework, the WASH project seeks to improve water supply and sanitation services to companies and families in Cabo Verde.
National Basic Sanitation Plan ( <i>Plano Nacional de Saneamento Básico</i> )	Approved through Resolution 52/100, the Plan seeks to set a new path for sanitation in the country, with particular focus on improving institutional framework and basic sanitation infrastructure.
National Adaptation Programme of Action ( <i>Programa de Acção Nacional de Adaptação as Mudanças Climáticas – “NAPA”</i> )	Cabo Verde elaborated its NAPA covering the period 2008-2012. The NAPA focuses on three strategic areas for action: (i) water resources; (ii) agriculture practices and forestry; (iii) coastal zones and tourism.
Growth and Poverty Reduction Strategy ( <i>Documento de Estratégia de Crescimento e Redução da Pobreza – “DECRP”</i> ):	Since 2004 Cabo Verde elaborates and reassesses periodically its DECRP containing, among other development strategies, actions to promote food security and protect the environment. The DECRP I considered the planning cycle for the period 2008-2013. DECRP II covers the period 2011-2014. Cabo Verde is currently implementing the DECRP III.
National Environmental Action Plan (“ <i>Plano de Acção Nacional para o Ambiente – “PANA”</i> ”)	The PANA seeks to mainstream environmental considerations in all the country’s relevant planning process. In 2004 Cabo Verde launched the PANA II, covering the period from 2004 to 2014. PANA II offers strategic guidance to address key environmental and social issues of Cabo Verde: water scarcity, loss of marine biodiversity, and poor sanitation infrastructure.
Strategic Plan for Agriculture Development ( <i>Plano Estratégico do Desenvolvimento Agrícola – “PEDA”</i> ) and the specific Action Plans for Agriculture Development ( <i>Planos de Acção para o Desenvolvimento da Agricultura – “PADA”</i> )	Following the guidelines established in the PEDA, Cabo Verde launched the PADAs for the islands of Santiago, Fogo, Santo Antão and São Nicolau and set out detailed sectoral guidance for local authorities on, among others, adaptation-related actions for agriculture and fishing activities.
National Program for Food Security ( <i>Programa Nacional para Segurança Alimentar</i> )	Strategy document that provides for adaptation-related actions in the agriculture and fishery sectors.

## Proposed measures

Based on the analysis already carried-out during the NAPA process, Cabo Verde now seeks international support to further develop the necessary strategies and national policies to establish an integrated framework that increases the country's overall adaptive capacity, as well as the level of resilience of those most vulnerable to climatic variability and climate change.

Building on the priorities identified during the development of the NAPA process, Cabo Verde proposes to focus its adaptation actions on the following strategic axes:

- Promoting integrated water resources management, guaranteeing stable and adequate water supply (for consumption, agriculture, ecosystems and tourism);
- Increasing adaptive capacities of the agro-silvo-pastoral production systems in order to ensure and improve national food production, and promoting Cabo Verde's blue economy; and
- Protecting and preventing degradation of the coastal zones and their habitat.

In addition, Cabo Verde will further expand on measures and actions already initiated with international support to other areas of the country, such as increasing groundwater reserves and land conservation practices, implementing measures to mitigate floods and intercept runoff, and expanding more-efficient irrigation practices (e.g., drip irrigation, drainage and irrigation monitoring, and crop adaptation techniques).

Table 7 below identifies the key adaptation actions to be implemented by Cabo Verde with a view to achieve the above stated priorities. Financing needs and flows for implementing the proposed adaptation activities still need to be assessed and determined.

**Table 7** - Cabo Verde's proposed adaptation goals and measures

<b>Adaptation sector</b>	<b>Proposed measures</b>
Water and sanitation management	<p>Seek to ensure by 2030:</p> <ul style="list-style-type: none"><li>▪ that every citizen has safe access to a minimum of 40l potable water per day;</li><li>▪ that all urban households are connected to the water supply network;</li><li>▪ that public sewage collection system and proper disposal is extended to cover 90% for the cities of Praia and Mindelo and 50% of rural areas;</li><li>▪ the construction (or retrofitting/expansion) of at least 4 wastewater treatment plants and water re-use facilities;</li></ul> <p>Seek to establish a systematized electronic database for storage and management of relevant water-related information, including a MRV to assess water-relevant data and to better evaluate performance in the sector;</p> <p>Seek to build several new desalination and water pumping units. With progressive increase of RE penetration in the grid, overall energy costs are expected to reduce, decreasing also potable water supply and irrigation costs. Decentralized renewable energy solutions and more</p>

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	<p>efficient technologies will also be considered and tested by Cabo Verde;</p> <p>Seek to promote new water storage and distribution techniques and build at least 5 new dams by 2030;</p> <p>Seek to develop water and sanitation master plans (“planos diretores”) for each island and encourage private sector participation through different policy incentives and business models, such as concessions, privatization, leasing, among others, and equitable tariff policies;</p> <p>Seek to increase urban resilience by developing master plans for rainwater drainage, improving and extending drainage infrastructure, and implementing flood management systems in vulnerable areas.</p>
<p>Adaptive capacity of agro-silvo- pastoral production and promotion of blue economy</p>	<p>Seek to disseminate more efficient small-scale irrigation techniques and promote soil conservation schemes for farmers and rural producers;</p> <p>Seek to diversify income generating activities in rural areas by promoting artisanal fishing activities (providing training, equipment, micro-credit) in coastal areas;</p> <p>Seek to promote Cabo Verde’s ocean-based (“blue”) economy by, among others, supporting new techniques of aquaculture, improving quality of fishery products through ecolabelling, and promoting sustainable coastal and maritime tourism and sports;</p> <p>Seek to strengthen governance, strategy development and capacity building by, among others:</p> <ul style="list-style-type: none"> <li>▪ promoting workshops in order to introduce crop varieties and species more adaptable to climatic conditions;</li> <li>▪ improving strategies associated with the distribution of agro-climatic zones and the structure of crops; and</li> <li>▪ improving data collection and modelling capacity associated with water and soil management.</li> </ul>
<p>Protecting and preventing degradation of coastal zones and their habitat</p>	<p>Seek to rehabilitate or construct infrastructures for the protection of coastal zones against sea level rise and beach erosion;</p> <p>Seek to implement actions for the adaptation of fishing activities and fishing communities, building on the scenarios and strategies already developed by the Fishery Development National Institute (INDP).</p>

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