



MASTER THESIS – Renewable Energy Management

TH Köln (University of Applied Sciences)

ITT- Institute for Technology and Resources Management in the Tropics and Subtropics
and

German Development Institute / Deutsche Institute für Entwicklungspolitik (DIE)

(Development cooperation financing towards SDG7 and NDCs supporting energy system transition)

(Daksh Kumar Maheshwari)

(2020)

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Resources Management in
the Tropics and Subtropics

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Arts Sciences
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“Development cooperation financing towards SDG7 and NDCs supporting energy system transition”

Thesis to Obtain the Degree of

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RENEWABLE ENERGY MANAGEMENT

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PRESENTS:

Daksh Kumar Maheshwari

SUPERVISOR OF THESIS ITT

Dr. Johannes Hamhaber

SUPERVISOR IN German Development Institute

Gabriela Iacobuta

DATE OF SUBMISSION

18.01.2020

presented by

Daksh Kumar Maheshwari

Student no.: 11122074

Email: daksh.3g@gmail.com

Declaration in lieu of oath

By

Daksh Kumar Maheshwari

This is to confirm my Master Thesis was independently composed/authored by myself, using solely the referred sources and support.

I additionally assert that this Thesis has not been part of another examination process.

Köln, 18.01.2020

Place and Date

Signature

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Acronyms

AfDB	African Development Bank
AIIB	Asian Infrastructure Investment Bank
AsDB	Asian Development Bank
BMZ	Federal Ministry of Economic Cooperation and Development (German: Bundesministerium für Wirtschaftliche Zusammenarbeit und Entwicklung)
CIF	Climate Investment Funds
CPI	Climate Policy Initiative
COP	Conference of Parties
CTF	Clean Technology Fund
DAC	Development Assistance Committee
EU	European Union
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
FDA	French Development Agency
GCF	Green Climate Fund
GEF	Global Environment Facility
GIZ	German Corporation for International Cooperation (German: Deutsche Gesellschaft für Internationale Zusammenarbeit)
IADB	Inter-American Development Bank
IFC	International Finance Corporation
JICA	Japanese International Cooperation Agency
KfW	Credit Institute for Reconstruction (German: Kreditanstalt für Wiederaufbau)
LDCF	Least Developed Countries Trust Fund
MDBs	Multilateral Development Banks
NDC	Nationally Determined Contribution
NDF	Nordic Development Bank
OECD	Organisation for Economic Cooperation and Development
PV	Photovoltaic
RE	Renewable Energy
SCCF	Special Climate Change Fund
SCF	Strategic Climate Fund
UK	United Kingdom
UNDP	United National Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UN	United Nations
US	United States
USD / US\$	United States Dollar
WB	World Bank

ॐ द्यौः शान्तिरन्तरिक्षं शान्तिः
पृथिवी शान्तिरापः शान्तिरोषधयः शान्तिः ।

Om dyauh śāntir antariksam śāntih prithvi śāntih āpah śāntih osadhayah śāntih”

-- Yajur Veda 36.17

**{{Unto Heaven be Peace, Unto the Sky and the Earth be Peace, Peace be unto the Water,
Unto the Herbs and Trees be Peace}}**

Abstract

In 2015, the adoption of the 2030 Agenda for Sustainable Development, including the 17 Sustainable Development Goals (SDGs), and the Paris Agreement provided a basis for considerable optimism for the fight against climate change and efforts to promote sustainable development, but their implementation remains an enormous challenge. Finance, in turn, plays a key role in implementation. This thesis thus seeks to provide new insights into the challenge of implementing the Paris Agreement and the 2030 Agenda by examining pertinent financial flows while taking into considering that making use of thematic overlaps between these two agendas can help to leverage synergies, especially if financial flows take adequate account of these overlaps. Since energy plays an essential role in both the goals of the Paris Agreement and the 2030 Agenda (in SDG 7 and beyond it), this thesis focuses on countries' energy-related national commitments. Against this background, this thesis investigates the question which role energy plays in the Nationally Determined Contributions (NDCs) under the Paris Agreement and to what extent climate finance is considered in the context of the energy system transition. The key finding is that financial flow for renewable energy and energy efficiency improves globally with an unchanged track of non-renewable energy in the post-NDC period.

A cover photo is taken from Kitchen Studio Naples INC.

Chapter: 1 Introduction

1.1 Background

In September 2015, the 2030 Agenda for Sustainable Development was adopted unanimously in the UN General Assembly, addressing 17 different Sustainable Development Goals (SDGs) and their 169 targets to be reached by 2030 (UNDP, 2015). The SDGs recognises the fundamental interdependence of the social, economic and environmental dimensions of development.

In the same year, the UN member states unanimously adopted the Paris Agreements at the 21st Conference of Parties (COP21), which entered into force on 4th Nov 2016. The Paris Agreement includes the “*global commitment to limit the increase in global average temperature to well below 2°C compared to pre-industrial levels and to pursue efforts to limit the increase to 1.5°C*”. As a result, the parties agreed to achieve zero net emissions in the second half of the 21st century. Over 190 countries submitted their Intended Nationally Determined Contributions (called NDCs after the ratification of the Paris Agreements) to the United Nations Convention on Climate Change (UNFCCC), which created a set of commitments

Both agreements differ in context, legal structure and implementing mechanisms, but they also have several similarities. While the adoption of the Paris Agreement and the 2030 Agenda for Sustainable Development sparked optimism for the fight against climate change and efforts to promote sustainable development, their implementation remains to be an enormous challenge. Finance, in turn, plays a key role in implementation.

This thesis, therefore, puts a spotlight on relevant financing trends. More specifically, the thesis seeks to provide new insights into the challenge of implementing the Paris Agreement and the 2030 Agenda by examining pertinent financial flows while considering that making use of thematic overlaps between these two agendas can help to make use of mutually beneficial connections that can generate synergies, especially if financial flows take adequate account of these overlaps.

This thesis focuses on countries’ energy-related national commitments and energy-related financial flows. The reason is that energy plays an essential role in both the goals of the Paris Agreement and the 2030 Agenda. For example, achieving a sustainable energy transition towards renewable energy is of key relevance for fighting climate change. Moreover, most connections between the content of the NDCs and the SDGs occur in the context of SDG 7 on energy (Dzebo, et al., 2019). This thesis thus puts the focus on the energy-related thematic connections between the NDCs (for the implementation of the Paris Agreement) and the SDGs (for the implementation of the 2030 Agenda).

The idea is that taking into account overlaps between the SDG-relevant content in the NDCs in the context of climate finance can contribute to leveraging synergies between the Paris Agreement and the 2030 Agenda. The more money is adequately spent on commitments (actions) in the NDCs that overlap with the content of the SDGs, the better climate finance can make use of synergies between the Paris Agreement and the 2030 Agenda.

Climate finance has a significant impact on turning energy commitments into reality. DAC-members (Development Assistance Committee) countries started providing funds from a very early stage to achieve climate agreements. Climate Finance is the key need for many developing nations, and it becomes essential for developed nations to monitor it.

The guiding research question of the thesis is: Which role does energy play in the Nationally Determined Contributions (NDCs) under the Paris Agreement and to what extent are overlaps between the SDG-relevant energy-related content in the NDCs taken into account in the context of climate finance.

Chapter: 2 explains the context of the current global sustainability transition and financial monitoring system. Chapter: 3 covers the methodology used in this thesis, measuring instruments and the geographical coverage of the analysis. Chapter: 4 discusses the results of sectoral trends concerning energy standards, renewables, non-renewables, energy

distribution, nuclear, and hybrid power plants. This chapter also includes insights into the findings of the analysis of financial transactions from a donor perspective. Chapter: 5 presents the different geographical trends and finance trades from the perspective of the recipients. The analysis of the regional perspectives provides insights into the role of NDCs and financial transition together. Chapter: 6 gives the discussion and recommendations and Chapter: 7 concludes with further findings.

1.2 Objectives

This thesis focuses on the energy sector and it has two main objectives.

Objective 1: An analysis of energy-related actions in the NDCs submitted to UNFCCC

For this objective, 'NDC-SDG Connections Toolbox' is used. It is an interactive online tool developed by the German Development Institute (DIE), which highlights the thematic overlaps of NDCs, and SDGs based on a set of various indicators.

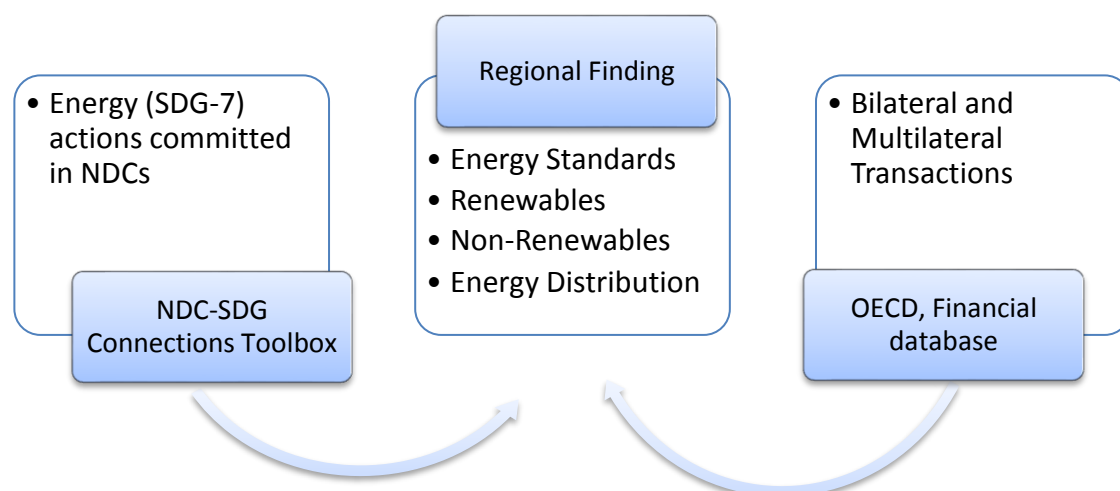


Figure 1 Flow chart of objectives

Objective 2: A trade analysis of financial flows geared towards the energy transition from both donor and recipient perspectives.

For this objective, data from the Organization for Economic Co-operation and Development (OECD) tool is used, which provides information on the financial flows of climate-related development cooperation from the year 2000 to 2017 in the context of the financial instruments grant, debt and equity.

The flow chart (Figure 1) explains the data collection undertaken to reach the two objectives outlined above.

1.3 Scope

As indicated above, this thesis puts the focus on the energy sector, one of the key sectors for both the Paris Agreement and the 2030 Agenda. The thesis does not review individual countries' current progress or any additional policies stated in their NDCs beyond energy-related ones.

I have included more than 160 NDCs submitted to the UNFCCC in the analysis with their original

language but excluded the Iraq, Nicaragua, 4 French Islands due to the time limitations.

There is no consistency among the countries regarding the target year for energy activities. Some set for 2022, 2025 or 2030 or even 2018. However, all actions are considered in this thesis.

For the financial history of relevant financial flows, only the analysis relies on the OECD database. Only recorded transactions have been taken into account in this thesis, rather than mere commitments. There are some pipeline projects that have been agreed just before NDCs were drafted, which may influence the thesis results to some extent.

I have not conducted interviews for any region or any single country or any country group (E.g.: BRICS, G20, etc.); instead, the thesis relies on a careful examination of the above-mentioned data sources, which are discussed in Chapter: 3.

Chapter: 2 Context

This chapter explains key parts of the Paris Agreement, including the NDCs, the SDGs, and development cooperation in that context, putting a particular focus on relevant financial cooperation.

2.1 The Paris Agreement and the NDCs

The UN member states unanimously adopted the Paris Agreement at the 21st Conference of Parties (COP21) in 2015. Article 2 of the Paris Agreement spells out its aims of adaptation, mitigation, and climate finance:

Adaptation: “increase the ability to adapt the impact of climate change, and foster climate resilience and low GHG emissions development in a manner that does not threaten food production”;

Mitigation: to hold the global average temperature to well below 2°C above pre-industrial levels and to ‘pursuing efforts’ to limit the mercury increase to 1.5°C above pre-industrial levels;

Finance: “make finance flows consistent with a pathway towards low levels of GHG emissions and climate-resilient development”.

NDCs are key instruments to implement the Paris Agreements. They create a new era for climate policy and represent an invitation for further action. Not only developed countries like the USA, EU, Australia, Canada have submitted their Intended NDCs, but also emerging economy nations like China, Brazil, India, and Indonesia have made commitments on climate policy as well as developing countries. The relevant country list is provided in Chapter 3.3.

Most of the developing countries raise issues such as adaptation and mitigation activities in their NDCs, but very few have elaborated on the financial needs required for their implementations. Many developed countries, on the other hand, have not included adaptation in their NDCs (Rogelj, et al., 2016). As Mbeva & Pauw argues, the Lima call for climate action (COP 20 in Lima, Peru) offered limited guidance on NDC scope and content, which is a key reasons for why the length, format and content and countries' views on adaptation, mitigation, and finance are highly varied across NDCs (Mbeva & Pauw, 2016).

NDCs have a range of 3 to 57 pages but often lack priorities and ambitions (Pauw, et al., 2017). The transparency and completeness of top-emitting nations' NDCs are critical to assessing both global and national ambition on reducing GHG emissions (Damassa, et al., 2015).

The NDCs have major implications for energy and finance by their choices. There is neither a binding of a percentage reduction of GHG emissions nor a common target year for sustainable energy.

2.2 Sustainable Development Goals

Climate change is a long-term problematic issue with a variety of temporal effects that will have significant effects on the achievement of sustainable development. Moreover, there is a growing recognition that climate change is ultimately about sustainable development, requiring action across many sectors, including energy, forest, land use, transport, etc. (Chan, et al., 2016). As it is a Universal call to act, the SDGs, also known as Global Goals or 2030 agendas, were adopted by all UN member states in 2015

to protect the planet, end the poverty, to ensure peace and prosperity by 2030.

The 17 Sustainable Development Goals (see Figure 2) are integrated, so the action in one area will affect outcomes in others. For example, better energy access (SDG 7) can promote the

industries and infrastructure (SDG 9), which will generate new job opportunities (SDG 8), which can lead to reduced poverty (SDG 1) and can also aspects such as education (SDG 4), hunger (SDG 2), and health (SDG 3). These kinds of a partnership of Goals (SDG 17) will bring Peace (SDG 16) for a better world.



Figure 2 Sustainable Development Goals
The Source of the figure (www.undp.org)

The SDGs do not fundamentally change the dynamic of trade-offs in politics, but with its broad opportunity, numerous connections, and guiding principles of universality, it presents far greater challenges than past development agendas. It should prompt policy-makers and experts to sharpen their tools and generates a call for a more rigorous and systematic approach and ‘governance infrastructure’ that can address trade-offs, running through the entire policy process (Nilsson & Weitz, 2019).

2.2.1 Energy System Transition

The sustainable energy system transition is characteristic that consumes less energy, increases the share of renewable energy for sustainability, and reduces the use of fossil fuels. SDG 7 is mainly focused on energy system transition and it has three overlapping targets (see Figure 3).

7.1 Access of energy: “By 2030, ensure universal access to affordable, reliable and modern energy services”. The sub-targets include to increase the proportion of the population with access to

electricity and increase this proportion with primary reliance on clean fuels and technology.

The electrification in many developing countries is largely dependent on fossil fuels. An increasing population will directly lead to an increase the energy consumptions. According to a joint report of the custodian agencies, the global electrification rate reached 89% and 153mn people gained access each year. However,

people living without electricity are roughly 840mn. The off-grid technologies have created opportunities for electricity to reach out to about 34mn people in 2017 (IEA, et al., 2019).

Access to energy can be divided into two types:

Adaptation: If the energy tariffs and reliability vary over time; Mitigation: if the primary energy sources are in reliance on clean fuel.

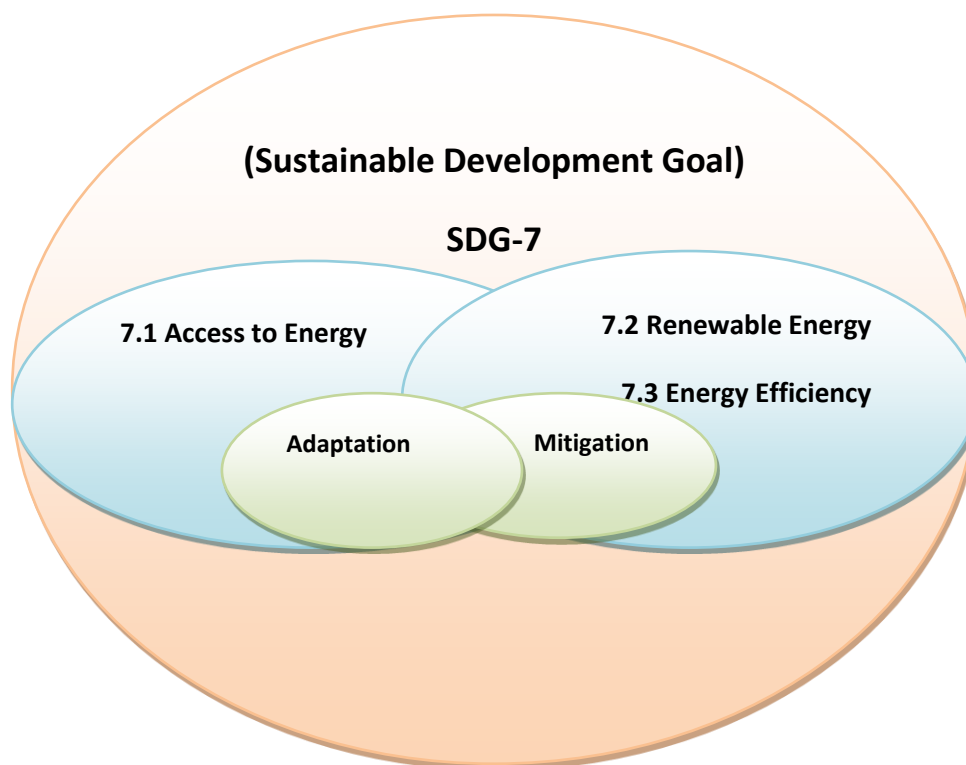


Figure 3 Overlapping of SDG7 targets

7.2 Renewable energy: “By 2030, increase substantially the share of renewable energy in the global energy mix”

The renewables accounted for 17.5% of global total energy consumption in 2016. It is increased rapidly in the power generation side, but it has more potential in the heat and transport sectors (IEA, et al., 2019).

However, these kinds of sources are strongly relying on weather conditions. If the weather varies; a balance mechanism should require supplying energy demand. Balancing can be realized by shifting energy use in time, either autonomously or by shifting technologies or can be adopted by storage technologies. Thus, behavior changes are needed to promote a sustainable energy transition (Steg, et al., 2015).

Renewable energy comes mostly under mitigation activity but sometimes relates to adaptation activity.

Mitigation: The energy generation from renewable sources is directly impacting the reduction of GHG gases.

Adaptation: when electricity becomes an essential element for basic services like health, food storage, and emergency service in the country-side area, it can meet through off-grid renewable sources.

7.3 Energy efficiency: “By 2030, double the global rate of improvement in energy efficiency”

According to the IEA report, global energy Intensity, an indicator used to track the progress of global energy efficiency, must improve by 2.9% annually between 2019 to 2030 to reach SDG target 7.3 (IEA, 2019). In 2017, about three billion people, mostly from Asia and Sub-Saharan African region, are using a traditional way of cooking and under the current policies, the number will reduce only to 2.2bn in 2030 (IEA, et al., 2019).

Energy efficiency can be mitigation and/or adaptation activity.

Mitigation: energy efficiency improvement in households, industries, public sectors, transports, agriculture, transmission & distribution will reduce the significant amount of energy consumption. Hence, the energy generation will require to produce less and GHG reduction can achieve.

Adaptation: energy management activities like improving the cooking system, replacing wood stoves with LPG are related to households and change their behavior to adapt to the impact of climate change and foster climate resilience.

Response to all three targets requires long term systemic changes to the energy system. Renewables and energy efficiency are key for the sustainable development of any country. A joint report from ‘Climate Policy Initiative’ and ‘Sustainable Energy for All research’ shows that investments for better access of electricity fall far short of the spending needed to bring universal access by 2030 (CPI & SE4ALL, 2018).

Sustainable development is feature prominently within the policy agendas, but finance is the basic aspect of these goals. There are many financial institutions working on combatting climate change. But, is it enough?

2.3 Development cooperation and related finance

Adequate financial flows can help to shift the world to a more sustainable path. Finance is key to mobilizing the global response and transformation to a low-carbon economy.

However, the definition of ‘Climate Finance’ is unclear. At the same time, the UNFCCC’s Standing Committee on Finance pointed to a convergence: “*Climate finance aims at reducing emissions and enhancing sinks of greenhouse gases and aims at reducing the vulnerability of, and maintaining and increasing the resilience of, human and ecological systems to negative climate change impacts*” (UNFCCC, 2014). Yet, there is no globally endorsed definition of climate finance so far.

In 2010, UNFCCC noted that developed countries should provide 30 billion USD for the period of 2010-2012 as an additional and new resource with a balanced allocation between adaptation and mitigation” (UNFCCC, 2010). In the same report, paragraph 98 directed developed country Parties to implement meaningful

mitigation actions to the goal of “Mobilizing jointly 100 billion USD per year by 2020 to address the needs of developing countries”. Furthermore, **IPCC** shows in its latest report that about 2.5% of the world GDP i.e. 2.4 trillion USD required for energy system investment between 2016 and 2035 to keep warming within a 1.5-degree Celsius scenario (IPCC, 2018).

According to the **OECD** report, climate finance from developed to developing countries increased from 39.5 billion USD in 2013 to 56.7 billion USD in 2017 (OECD, 2018). Multilateral Development Banks (MDBs) have a major part to play in streaming climate change actions specially for developing nations. MDBs include African Development Bank (AfDB), Asian Development Bank (AsDB), European Bank for Reconstruction and Development (EBRD), European Investment Bank (EIB), Inter-American Development Bank (IADB), International Finance Corporate (IFC) and World Bank (WB). In their latest report published in June 2019, they have shown that climate finance commitments have increased from 27 billion USD to 43.1 billion USD in 2018 (MDBs, 2019).

The Global Environment Facility (**GEF**) was established in 1990-91. It is a working unit of the financial instrument of UNFCCC. It is giving finance for multiple areas like climate change, biodiversity, desertification, land use, and land-use change and forestry, and sustainable cities. It manages the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF). For the sixth replenishment of the GEF, donor countries promised 4.43 billion USD for the period of 2014 to 2018. And for the next replenishment period (2019-2022), the amount will be 4.1 billion USD (GEF, 2018)

The Climate Investment Fund (**CIF**) was established in 2008. It is governed by WB but

operates incorporation with regional MDBs like AfDB, AsDB, EBRD, and IDAB. The main objective of it is for a better understanding of how finance is scaling up the development paths in selected developing countries. It includes the Clean Technology Fund (**CTF**) and Strategic Climate Fund (SCF) and pledges more than 8.3 billion USD till 2018. It was decided to extend this operation until 2019 (Bird, et al., 2019).

The Green Climate Fund (**GCF**), became operational after the Paris Agreements in 2015. It is the financial body of both UNFCCC and the Paris Agreements. It is likely to become the “*primary instrument through which international climate finance will flow and is intended to fund the paradigm shift toward climate-resilient and low-carbon development in developing countries with a country-driven approach*”. The recipient can access the fund with MDBs, UN agencies or any national & regional implementing agencies. With the balance of mitigation and adaptation, it has approved funding of over five billion USD until 2018 (Tanner, et al., 2019).

Bilateral Channels: The standing development agencies like International Climate Fund (ICF), International Climate Initiative (IKI), Nationally Appropriate Mitigation Actions (NAMA Facility), Global Climate Partnership Fund (GCPF), REM (REDD+ Early Movers Programme), etc. have spent notable money. However, there is no common reporting that exists for them, so it always creates a question on transparency and reliability.

The Oak Foundation was formally established in Denmark in 1983 and working on private philanthropies fund. They have made more than 4000 grants for the environment, prevent child sexual abuse, housing & homelessness, international human rights, women empowerment (Oak Foundation, 2019).

The Nordic Development Fund (**NDF**) was established in 1988-89. It is a joint development financial institution of Nordic countries Denmark, Finland, Iceland, Norway, Sweden. The main objective of NDF is to facilitate climate change investments in low-income countries (NDF, 2019). Comic Relief (British Charity Projects) is founded in 1985 and raising money to help people in Africa and the UK (Comic Relief, 2019).

2.3.1 Mapping the financial progress

Financial monitoring can help policymakers to identify gaps, improve coordination and raise funds to implement climate-related actions. Additionally, it can help to develop strategies and policies for future finance requirements. It builds confidence among donor countries that their funds are being used effectively manner (Tirpak, et al., 2014).

“Achieving transparency requires a framework for the measurement, reporting, and verification (MRV) of international climate finance” (Varma, et al., 2011). MRV first appeared in **Bali Action Plan-2007** (UNFCCC, 2007), which called for “measurable, reportable, and verifiable nationally appropriated mitigation commitments or actions “. The MRV of climate fund is a key point of discussions under the UNFCCC since then.

Measurement or monitoring (M): measurement of GHG emissions, emissions reductions utilizing activity data, estimating changes relevant to sustainable development. Reporting (R): Collect the above measurement and make available for the public domain. Verify (V): to establish an independent assessment or review for reliability.

In the absence of a comprehensive MRV system, different actors have developed their own

methodologies to track climate financial over the globe.

The standing committee on Finance (SCF) supporting the conference of parties on climate finance measurements, reporting and verification through Biennial Assessment reports. In the latest report, they estimated that climate finance increased from 584 billion USD to 680 billion USD in 2015 and to 681 billion USD in 2016 (UNFCCC, 2018).

The **OECD** has developed ‘Rio Markers’ methodology. It is implemented by DAC members and adopted by the number of bilateral and multilateral providers. It has a three-tier scoring system: Principal (2), Significant (1), and Not targeted (0). Principal (2): “when the purpose of transaction (mitigation and/or adaptation objective) is explicitly stated as fundamental in the design if the activity”. Significant (1): “when the objective is explicitly stated but it is not the fundamental driver”. Not targeted (0): “when the activity was examined but found not to target the objective in any significant way”.

Since 2011, **IDFC** (International Development Finance Club) reported has conducted a periodic mapping of member institutions to climate finance and other environmental objectives. They have reported total green finance commitments of 134 billion USD in 2018, out of which 125 billion USD spent on climate finance including elements of mitigation and/or adaptation and nine billion USD spent on ‘Other Environmental objective’ (IDFC, 2019).

In 2011, Multilateral Development Banks have created a common practice ‘climate component’ to measure the adaptation and mitigation investments. (MDBs, 2019). It is created by the professional staff of **MDBs**. Later, they have

added additional reporting on climate co-financing flows, which included domestic and international public entities' contributions, private entities and other MDBs.

'**Bloomberg** New Energy Finance' is an online database system to measure global clean energy transactions. It covers thousands of organizations, projects, and investments incl. private equity providers, banks, etc. It says that a cumulative global investment of renewable energy reached in trillion dollars figure since 2004. It has seen 2.6 trillion USD invested in renewables during the years 2010-2019. Solar and wind have secured more than one trillion USD each. Biomass and waste-to-energy have collected 115 billion USD (McCrone, et al., 2019).

A joint report from 'Climate Policy Initiative' and 'Sustainable Energy for All research' measured for electricity in the twenty high-impact countries was avg. 30.2 billion USD/year in 2015-16. (CPI & SE4ALL, 2018).

There has been a rise seen in hybrid and storage energy markets. For example, electric vehicles require a high investment. The Climate Policy Initiative (**CPI**) together with the International Energy Agency (IEA) published a report in 2018. They have an estimated 11 billion USD in 2015 and 18 billion USD in 2016, whereas total investments in electric vehicles were 43 billion USD in 2017 (CPI, 2018).

Chapter: 3 Methodology

This chapter explains the two main databases used for this thesis.

3.1 NDC-SDG Connections toolbox

The thesis makes use of the data from the NDC-SDG Connections database.

The data for the NDC-SDG Connections database and data visualization was gathered by scanning the 164 NDCs submitted to the UNFCCC from over 190 countries. There are more than 7000 individual actions that are assessed in this project (Dzebo, et al., 2019). These actions in the NDCs were manually coded, largely based on binary code (1 or 0). The main goal of the coding was to identify thematic overlaps between the content of the NDCs and the themes in the targets of the 17 SDGs. All actions in the database are coded in terms of the following three broad categories: interpretations, SDG targets, and cross-cutting themes.

1. Interpretations

As a first step, the actions in the NDCs were coded from the following perspectives:

Type of climate actions: Adaptation, Mitigation, Both or None

Adaptation: According to article:7 of Paris Agreements, the *“Parties established the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal”*.

Mitigation: when the action is related to emission reduction. E.g.: Renewable energy generation

Both: when the action stated for both mitigation and adaptation. E.g.: Clean cooking

Capacity-Building measures: Capacity-building under a Paris Agreement is meant to enhance the capacity and ability of developing countries to implement actions with access to finance and facilitate multiple technologies. [Article 11 of Paris Agreements]

Technological improvements: According to Article: 10 of Paris Agreements, *“A technological framework is established for Convention’s Technological Mechanism to improve resilience to climate change and reduce greenhouse gas. This effort shall for a collaborative approach and easing access to technology to developing nations”*.

If any type of technological improvement was mentioned in the action under consideration, then it was marked as 1 and an additional column enabled the coding to take account of different types of technology mentioned E.g.: Renewable energy, new building code, efficient lighting and appliances, clean and efficient transport, etc.

Quantifiable target: If the action mentioned a specific quantified target to be reached irrespective of time frame, it was coded as 1 in the context of this indicator. For example, renewable energy shares to reach 25%, reduce the CO_{2e} (Carbon Dioxide Equivalent) per year, to reach 100% energy demand, etc.

Policy, Plan or strategy: If the activities mentioned with the keywords policy, plan or

strategy, they were coded as 1. The radius of their influence (international, national, regional or local, or multilevel) was also coded.

2. SDG Targets

This database assessed each climate activity in terms of whether it can be linked to SDG-related themes and to SDG targets. Additional columns are created that include SDG Specific sub-themes, which are the official global indicators that follow for each target.

3. Cross-cutting themes

Some themes in the NDCs overlap with other SDGs and may cover two or more SDGs. For example, actions that refer to ‘water’ can be relevant for both SDG 14 (Life below water) and

SDG 6 (Clean Water and Sanitation). The same is true for ‘energy’ which can be relevant, for example, for SDG 7 (affordable and clean energy), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 11 (Sustainable cities and communities). In total 40 cross-cutting themes were created and coded.

The NDCs contain more than 7000 SDG-relevant actions, out of which, 1800 energy-related actions were included in this thesis.

3.2 OECD Database

The OECD publishes a climate-related development finance dataset each year for 50 different fields. It includes over 8000 projects from bilateral, multilateral and private philanthropic providers.

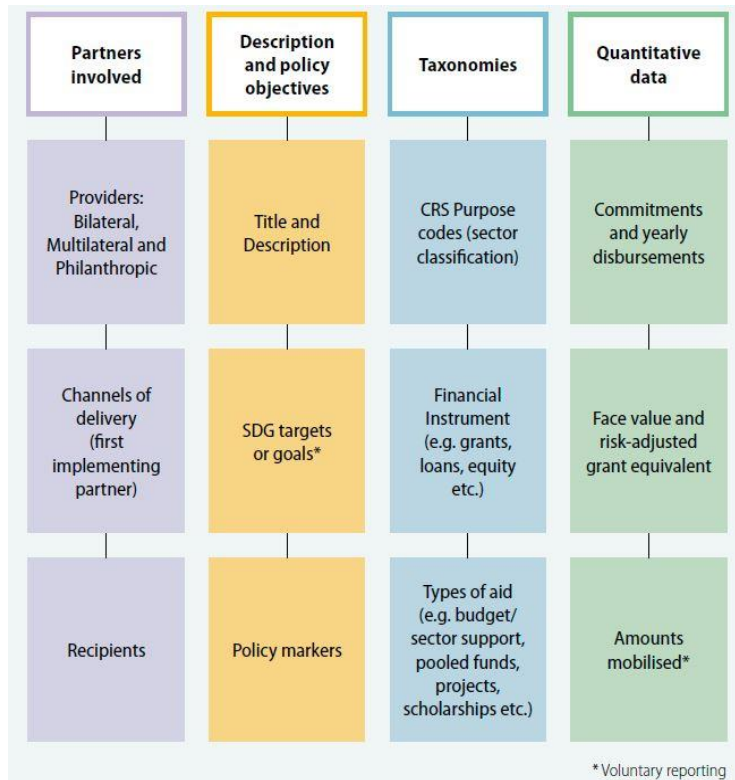


Figure 4 Data collection in OECD

Figure 4 explains the methodology of financial data collection in the OECD Database. The OECD has divided it into four main categories: Partner

involved, cross-cutting themes (policy objective), taxonomies, and quantity.

3.2.1 Partners Involved

The main partners involved in the OECD methodology are DAC and Non-DAC members, MDBs, other multilaterals, and private philanthropic providers.

The data reporting of DAC and multilaterals differ. Both RIO markers and the climate component methodology are already explained in chapter 2.3.1.

Development Assistance Committee (DAC) members include Australia, Austria, Belgium, Canada, Czech Republic, Denmark, EIB, EU Institutions (excl. EIB), Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States. The transactions from the DAC-members were done by different national agencies. E.g.: Germany had financed various projects from its agencies GIZ, KfW, and BMZ.

Non-DAC members include Latvia, Lithuania, Romania, UAE

Multilateral development banks include: Asian Infrastructure Investment Bank¹, European Bank for Reconstruction and Development, European Investment Bank, International Finance Corporation, Islamic Development Bank, World Bank (International Development Association), and 3 Regional Multilateral development banks: African Development Bank, Asian Development Bank, Inter-American Investment Corporation and Multilateral Investment Fund

¹ A newly established multilateral development bank in January 2016

Other multilaterals include Adaptation Fund, CIF (Strategic Climate Fund and Clean Technology Fund), Green Climate Fund, GEF (Special Climate Change Fund-SCCF, Least Developed Countries Trust Fund-LDCF), Global Green Growth Institute, Nordic Development Bank

Private Philanthropy Donors are Charity Projects Ltd (Comic Relief), Children's Investment Fund Foundation, David & Lucile Packard Foundation, Dutch Postcode Lottery, Ford Foundation, John D. & Catherine T. MacArthur Foundation, Oak Foundation, and William & Flora Hewlett Foundation. However, they appeared only in 2016-17-.

The analysis excludes any direct South-South nations cooperation, inter developing nation's support, nation's own fundraising, neighbouring country aid, private business investors, tax revenues system, etc.

3.2.2 Cross-Cutting themes

The OECD has collected the data for various cross-cutting themes: energy, transport, land use, REDD+, Biodiversity, and some other environmental projects. The energy cross-cutting themes are explained below:

a. Energy standards²:

Energy standards are divided into four sub-categories:

Efficiency: Green building, industry improvement, clean cookstoves, Clean cooking, Fuel switching (if fuel type is not mentioned), transport, appliances, lighting, technological improvement, reduced energy bills. It Excludes:

² The term name 'energy standards' is used instead of energy policy after the concerned with UNFCCC expert Mr. Gajananda Hegde.

transmission and distribution losses, improving efficiency in cooling or heating

Awareness: It includes education, training, and awareness of energy efficiency in a residential or industrial area, advanced training, specialization courses in energy-saving or renewables, sharing knowledge, campaigning, energy education, entrepreneurship training, etc.

Energy Policy³: This subsector includes activities that develop/foster appropriate regulatory efforts to promote energy efficiency or renewable energy, policies on energy generation, security, access, audits, roadmap, promoting energy efficiency or renewable energy, remove barriers and encouraging investments for energy program, supporting local authorities, rehabilitation unspecified power plants, electricity-saving program, institutional and regulatory framework, regulatory energy policy reforms, etc.

Research: Energy research includes market study, research, R&D, research institute formation, innovation, new technologies to increase efficiency, conduct assessment on the low carbon market, etc.

Energy intensity discusses separately as the rates of improvements in global primary energy intensity mean the percentage drop in global total primary energy supply per unit of GDP-PPP (Gross Domestic Product-Purchase Power Parity).

b. Renewables:

Activities that include biofuel fired power plants including biomass energy support, energy generation renewable sources-multiple

technologies, geothermal energy, hydroelectric power plants including all micro, nano, and big hydropower projects and dams, solar energy, wind energy including both on and offshore, rural electrification only with renewable solutions.

They are divided into following six sub-categories:

Biofuel: Biofuel includes biogas power plants, biomass projects, biofuel power plants, bio-energy solutions, national biofuels program, agricultural wastes, etc. but excluded waste-fired power plants those included municipal solid waste and industrial waste.

Geothermal energy: Geothermal generation, geothermal power station, Geothermal plants.

Hydro energy: Hydropower includes hydroelectric power plants, expansion of hydropower station, hydraulic energy sources, small hydro sites, hydro projects, etc. Big hydropower plants are also considered in renewable energy, as a definition of big hydropower plants varies from country to country.

Solar energy: Solar energy includes solar power plants, solar farms, on-grid or off-grid solar power plants, photovoltaic power plants, solar thermal plants, solar irrigation pumps, solar PVT technology, installation of solar rooftops, solar home programs, solar water heaters, solar street lights or luminaries, solar LED lamps, solar electrification, solar mission, etc. it exclude: solar water heater.

Wind energy: Wind energy includes wind farms, wind parks, onshore wind plants,

³ The term name is replaced with the original name Energy policy and administration.

offshore wind plants, install wind turbines, small scale or big scale wind-powered electricity generation, wind power facility, etc.

Other RE⁴: This includes decentralised energy, multiple renewable technological projects, increase the share of (unspecified) renewable energy sources, alternative renewables solution, subsidies on renewables, renewables targets, cleaner technologies expansion of renewable generation, renewable energy projects unspecified with type, etc.

It Excludes: Wooden fuel as included in Non-renewable sources

c. Non-renewables:

All non-renewable energy generation activities, those promising to reduce GHG gases are included here. They are divided into four sub-categories:

Coal-fired power plants: This includes technology replacement in coal power plants, cleaner coal mining, maximizes the energy output by improving efficiency, replace old subcritical coal power station with supercritical technology, steam combined cycle, life extension, high-carbon quality coal usage, reduce emission, awareness on issues related to coal emission, etc.

Natural Gas: Natural gas power plants include coal or other fuel shift to natural gas, improve technology to reduces losses, a retrofit project of gas turbines, etc.

Wasted-fired power plants: It includes municipal solid waste, industrial waste or hazardous waste, etc., but excluded agricultural waste and biomass.

Other non-RE⁵: Energy generation from other Non-renewable sources: Includes wooden energy, firewood, wooden fuel, charcoal energy, etc.

d. Distribution:

Thus, is divided into 4 sub-categories:

Grid⁶: Energy transmission, energy distribution, grid retrofitting, grid rehabilitation, rural electrification, rehabilitation of sub-station, mini-grids, transmission & distribution efficiency gains/loss reduction, investment in innovative/smart grid or off-grid technologies, grid network expansion allows for the extension/connection, etc.

Heating & Cooling: Heating, modern heater or air-conditioner, replace existing district heating or cooling system, solar water heater, efficient boiler, central heating, etc. it excludes: clean cooking, cookstoves improvements

Gas distribution: Gas distribution for residence or industry purpose.

Heat Plants: Heat-only plants, in the context of heat generation, etc.

Exclude: Energy Storage, solar home systems, solar electrification

e. Hybrid Energy plants:

⁴ The original name is 'Energy generation, renewable sources-multiple technologies' in OECD database.

⁵ The original name is 'Energy generation, non-renewable sources, unspecified' in OECD database.

⁶ The original name is Electric power transmission and distribution.

Hybrid power plants, which blending a renewable source with fossil fuel.

f. Nuclear Energy Plants:

It is also considered in this thesis as some countries believe that nuclear is a safe and efficient manner to produce energy

3.2.3 Taxonomies

The manner of cooperation between the donors and recipients can take various forms: Grants, Equity or Debt instrument. All the forms are taken in to account in this thesis.

Grants are non-repayable funds disbursed by Donors to recipients; debt is a loan or credit amount given by donors with some interest rate; equity is an investment in the projects as a partnership or ownership; Anonymised: when there is a semi-agreement between donors and recipients

3.2.4 Quantitative data

The quantitative data of all transactions are available on the OECD official website: www.oecd.org

For the content analysis of countries’ national contributions under the Paris Agreement, more 1800 energy-specific actions were identified in the NDCs and housed in an excel sheet and categorised into these six different cross-cutting themes and manually coded, largely based on binary coding (1 or 0) (see Figure 5). Then the filters were added to create different clusters of energy sectors and geographical regions. In the end, tables and graphs were created for the analysis of the energy-related content of the NDCs. Figure 5 shows the screenshot of the excel file.

For the data on financial flows, the available fund years from 2000 to 2017 are divided into two periods: pre-NDC and post-NDC. The Pre-NDC period was defined as lasting from 2000 to 2015 and the post-NDC period was defined as lasting from 2016 to 2017. All transactions are shown in the USD-2016 equivalent.

Overlaps between the various reporting channels entail a risk of double counting when they are brought together. To avoid this pitfall, only the OECD database is considered for this thesis.

Party	code	Actions on Energy	Efficiency	Awareness	Policy	Research	Biofuel	Other RE
Afghanistan	AFG	Clean cooking , heating and power projects	1	0	0	0	0	0
Afghanistan	AFG	Forest and Rangelands: Reduce rural peoples’ dependence on fuel for cooking and heating.	1	0	0	0	0	0
Azerbaijan	AZE	Massive use of control and measurement devices in electrical, heat energy and natural gas systems, application of energy- efficient bulbs , use of modern energy-saving technologies in heating systems, as well organization of public awareness programs on energy use.	1	1	0	0	0	0

Figure 5 Energy action matrix

3.3 Geographical Coverage

Africa:

COUNTRY NAME	COUNTRY CODE	INCOME GROUP	DEVELOPING GROUP
ALGERIA	DZA	Upper Middle Income	-
ANGOLA	AGO	Upper Middle Income	LDC
BENIN	BEN	Low Income	LDC
BOTSWANA	BWA	Upper Middle Income	-
BURKINA FASO	BFA	Low Income	LDC
BURUNDI	BDI	Low Income	LDC
CAMEROON	CMR	Lower Middle Income	-
CAPE VERDE	CPV	Lower Middle Income	SIDS
THE CENTRAL AFRICAN REPUBLIC	CAF	Low Income	LDC
CHAD	TCD	Low Income	LDC
COMOROS	COM	Low Income	LDC
CONGO	COG	Lower Middle Income	-
COTE D'IVOIRE	CIV	Lower Middle Income	-
DEMOCRATIC REPUBLIC OF THE CONGO	COD	Low Income	LDC
DJIBOUTI	DJI	Lower Middle Income	LDC
EGYPT	EGY	Lower Middle Income	-
EQUATORIAL GUINEA	GNQ	High Income	LDC
ERITREA	ERI	Low Income	LDC
ETHIOPIA	ETH	Low Income	-
GABON	GAB	Upper Middle Income	-
GAMBIA	GMB	Low Income	LDC
GHANA	GHA	Lower Middle Income	-
GUINEA	GIN	Low Income	LDC
GUINEA-BISSAU	GNB	Low Income	LDC
KENYA	KEN	Lower Middle Income	-
LIBERIA	LBR	Low Income	LDC
MADAGASCAR	MDG	Low Income	LDC
MALAWI	MWI	Low Income	LDC
MALI	MLI	Low Income	LDC
MAURITANIA	MRT	Lower Middle Income	LDC
MAURITIUS	MUS	Upper Middle Income	SIDS
MOROCCO	MAR	Lower Middle Income	-
MOZAMBIQUE	MOZ	Low Income	LDC
NAMIBIA	NAM	Upper Middle Income	-
NIGER	NER	Low Income	LDC
NIGERIA	NGA	Lower Middle Income	-

RWANDA	RWA	Low Income	LDC
SAO TOME AND PRINCIPE	STP	Lower Middle Income	LDC
SENEGAL	SEN	Lower Middle Income	LDC
SEYCHELLES	SYC	High Income	SIDS
SIERRA LEONE	SLE	Low Income	LDC
SOMALIA	SOM	Low Income	LDC
SOUTH AFRICA	ZAF	Upper Middle Income	-
SOUTH SUDAN	SSD	Low Income	LDC
SUDAN	SDN	Lower Middle Income	LDC
SWAZILAND	SWZ	Lower Middle Income	-
TOGO	TGO	Low Income	LDC
TUNISIA	TUN	Upper Middle Income	-
UGANDA	UGA	Low Income	LDC
UNITED REPUBLIC OF TANZANIA	TZA	Low Income	LDC
ZAMBIA	ZMB	Lower Middle Income	-
ZIMBABWE	ZWE	Low Income	LDC

Americas:

COUNTRY NAME	COUNTRY CODE	INCOME GROUP	DEVELOPING GROUP
ANTIGUA AND BARBUDA	ATG	High Income	SIDS
ARGENTINA	ARG	High Income	-
BAHAMAS	BHS	High Income	SIDS
BARBADOS	BRB	High Income	SIDS
BELIZE	BLZ	Upper Middle Income	SIDS
BOLIVIA	BOL	Lower Middle Income	-
BRAZIL	BRA	Upper Middle Income	-
CANADA	CAN	High Income	-
CHILE	CHL	High Income	-
COLOMBIA	COL	Lower Middle Income	-
COSTA RICA	CRI	Upper Middle Income	-
CUBA	CUB	Upper Middle Income	SIDS
DOMINICA	DMA	Upper Middle Income	SIDS
DOMINICAN REPUBLIC	DOM	Upper Middle Income	SIDS
ECUADOR	ECU	Upper Middle Income	-
EL SALVADOR	SLV	Lower Middle Income	-
GRENADA	GRD	Upper Middle Income	SIDS
GUATEMALA	GTM	Lower Middle Income	-
GUYANA	GUY	Lower Middle Income	SIDS
HAITI	HTI	Low Income	LDC
HONDURAS	HND	Lower Middle Income	-

JAMAICA	JAM	Upper Middle Income	SIDS
MEXICO	MEX	Upper Middle Income	-
PANAMA	PAN	Upper Middle Income	-
PARAGUAY	PRY	Upper Middle Income	-
PERU	PER	Upper Middle Income	-
SAINT KITTS AND NEVIS	KNA	High Income	SIDS
SAINT LUCIA	LCA	Upper Middle Income	SIDS
SAINT VINCENT AND THE GRENADINES	VCT	Upper Middle Income	SIDS
SURINAME	SUR	Upper Middle Income	SIDS
TRINIDAD AND TOBAGO	TTO	High Income	SIDS
UNITED STATES OF AMERICA	USA	High Income	-
URUGUAY	URY	High Income	-
VENEZUELA (BOLIVARIAN REPUBLIC OF)	VEN	High Income	-

Note: These countries have not submitted their NDCs to UNFCCC but, have been considered in the OECD database: Anguilla and Montserrat. Due to time limitations, the translation of Nicaragua NDC was not possible.

Asia:

COUNTRY NAME	COUNTRY CODE	INCOME GROUP	DEVELOPING GROUP
AFGHANISTAN	AFG	Low Income	LDC
ARMENIA	ARM	Lower Middle Income	-
AZERBAIJAN	AZE	Upper Middle Income	-
BAHRAIN	BHR	High Income	-
BANGLADESH	BGD	Lower Middle Income	LDC
BHUTAN	BTN	Lower Middle Income	LDC
BRUNEI DARUSSALAM	BRN	High Income	-
CAMBODIA	KHM	Low Income	LDC
CHINA	CHN	Upper Middle Income	-
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	PRK	Low Income	-
GEORGIA	GEO	Lower Middle Income	-
INDIA	IND	Lower Middle Income	-
INDONESIA	IDN	Lower Middle Income	-
IRAN	IRN	Upper Middle Income	-
ISRAEL	ISR	High Income	-
JAPAN	JPN	High Income	-
JORDAN	JOR	Upper Middle Income	-
KAZAKHSTAN	KAZ	Upper Middle Income	-

KUWAIT	KWT	High Income	-
KYRGYZSTAN	KGZ	Lower Middle Income	-
LAO PEOPLE'S DEMOCRATIC REPUBLIC	LAO	Lower Middle Income	LDC
LEBANON	LBN	Upper Middle Income	-
LESOTHO	LSO	Lower Middle Income	LDC
MALAYSIA	MYS	Upper Middle Income	-
MALDIVES	MDV	Upper Middle Income	SIDS
MONGOLIA	MNG	Upper Middle Income	-
MYANMAR / BURMA	MMR	Lower Middle Income	LDC
NEPAL	NPL	Low Income	LDC
OMAN	OMN	High Income	-
PAKISTAN	PAK	Lower Middle Income	-
PALESTINE	PSE	Low Income	-
PHILIPPINES	PHL	Lower Middle Income	-
QATAR	QAT	High Income	-
REPUBLIC OF KOREA	KOR	High Income	-
SAUDI ARABIA	SAU	High Income	-
SINGAPORE	SGP	High Income	SIDS
SRI LANKA	LKA	Lower Middle Income	-
THE SYRIAN ARAB REPUBLIC	SYR		-
TAJIKISTAN	TJK	Lower Middle Income	-
THAILAND	THA	Upper Middle Income	-
TIMOR-LESTE	TLS	Lower Middle Income	-
TURKEY	TUR	Upper Middle Income	-
TURKMENISTAN	TKM	Upper Middle Income	-
UNITED ARAB EMIRATES	ARE	High Income	-
UZBEKISTAN	UZB	Lower Middle Income	-
VIET NAM	VNM	Lower Middle Income	-
YEMEN	YEM	Lower Middle Income	-

Note: Libya has not submitted NDC, but it has received few transactions as per the OECD Database. Iraq has submitted its NDC in the Arabic language, there is no official English version is available online. Due to time limitations, translation of it was not possible.

Europe:

COUNTRY NAME	COUNTRY CODE	INCOME GROUP	EUROPEAN UNION
ALBANIA	ALB	Upper Middle Income	-
ANDORRA	AND	High Income	-
AUSTRIA	AUT	High Income	EU
BULGARIA	BGR	Upper Middle Income	EU

BELARUS	BLR	Upper Middle Income	-
BELGIUM	BEL	High Income	EU
BOSNIA AND HERZEGOVINA	BIH	Upper Middle Income	-
BULGARIA	BGR	High Income	EU
CROATIA	HRV	Upper Middle Income	-
CYPRUS	CYP	High Income	EU
CZECH REPUBLIC	CZE	High Income	EU
DENMARK	DNK	High Income	EU
ESTONIA	EST	High Income	EU
FINLAND	FIN	High Income	EU
FRANCE	FRA	High Income	EU
GERMANY	DEU	High Income	EU
GREECE	GRC	High Income	-
HUNGARY	HUN	High Income	EU
ICELAND	ISL	High Income	-
IRELAND	IRL	High Income	EU
ITALY	ITA	High Income	EU
LATVIA	LVA	High Income	EU
LIECHTENSTEIN	LIE	High Income	-
LITHUANIA	LTU	High Income	-
LUXEMBOURG	LUX	High Income	EU
MALTA	MLT	High Income	EU
MOLDOVA	MDA	Lower Middle Income	-
MONACO	MCO	High Income	-
MONTENEGRO	MNE	Upper Middle Income	-
NETHERLANDS	NLD	High Income	EU
NORWAY	NOR	High Income	-
POLAND	POL	High Income	EU
PORTUGAL	PRT	High Income	EU
ROMANIA	ROU	Upper Middle Income	EU
RUSSIAN FEDERATION	RUS	High Income	-
SAN MARINO	SMR	High Income	-
SERBIA	SRB	Upper Middle Income	-
SLOVAKIA	SVK	High Income	EU
SLOVENIA	SVN	High Income	EU
SPAIN	ESP	High Income	EU
SWITZERLAND	CHE	High Income	-
SWEDEN	SWE	High Income	-
THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA⁷	MKD	Upper Middle Income	-
UKRAINE	UKR	Lower Middle Income	-

⁷ Renamed to North Macedonia in some reports.

UNITED KINGDOM	GBR	High Income	-
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Oceania:

COUNTRY NAME	COUNTRY CODE	INCOME GROUP	DEVELOPING GROUP
AUSTRALIA	AUS	High Income	-
COOK ISLANDS	COK	Lower Middle Income	SIDS
FIJI	FJI	Upper Middle Income	SIDS
KIRIBATI	KIR	Lower Middle Income	LDC
MARSHALL ISLANDS	MHL	Upper Middle Income	SIDS
MICRONESIA	FSM	Lower Middle Income	-
NAURU	NRU	High Income	SIDS
NEW ZEALAND	NZL	High Income	-
NIUE	NIU	Lower Middle Income	SIDS
PALAU	PLW	Upper Middle Income	SIDS
PAPUA NEW GUINEA (PNG)	PNG	Lower Middle Income	SIDS
SAMOA	WSM	Lower Middle Income	SIDS
SOLOMON ISLANDS	SLB	Lower Middle Income	LDC
TONGA	TON	Upper Middle Income	SIDS
TUVALU	TUV	Upper Middle Income	SIDS
VANUATU	VUT	Lower Middle Income	LDC
WALLIS AND FUTUNA	WLF	Lower Middle Income	-

Note: New-Caledonia, French Polynesia, Saint-Barthelemy, and Saint-Pierre & Miquelon are excluded from Oceania

3.4 Limitations

The thesis entails some limitations encountered during the research, which are highlighted below.

- Incomplete information in NDCs: The NDCs include some elements that are difficult to assess and code due to lack of clarity, e.g.: statements on 'modern lighting'. These kinds of activities have been dealt with as well as possible.
- The pattern of energy consumption varies from country to country, house to

house, industrial sector to sector. Thus, the energy consumption of each is not discussed here.

- One limitation in the context of the NDC analysis is that does not include the assessment of any financial transactions stated in individual NDCs.
- Projects' viabilities: There is no clarity on past projects whether they still exist or do not. Furthermore, there is no information collected in case of any

withdrawal of project funds or repayment of interest.

- Unclear roles of different donor countries' agencies: Full information on responsibilities of donor agencies are lacking. E.g.: eligibility criteria for grants or debts are unclear.
- Undefined roles of recipient: In many cases, there is no full information provided on how the money flows to the destination.
- Continuity of project: There is no exact quantity mentioned in the descriptions in case the same project runs over several periods.
- Financial data from the year 2008 to 2010 are excluded as it is believed that they have a high influence on the energy market due to global financial and economic crises during that time.

- The actual time values are not used in the analysis. Instead, the final amount is transferred to 2016 USD-equivalent.
- Iraq and Nicaragua have not submitted their NDC in the English language. Their translations were not possible, due to time limitations and they were thus not taken into account.

3.5 Quality Assurance

QA of parts of this thesis has been provided by Dr. Clara Brandi. She is a senior researcher at the German Development Institute and core member of project 'NDC-SDG Connections'. QA of the climate actions occurred by random checks of coding in an excel file. She found it satisfactory and her comments on the clear definition of cross-cutting themes are taken into consideration.

For the finance-related quality checks, a separate excel sheet will be provided along with this thesis or one can check on the OECD database, which is publicly available on their official website.

Chapter: 4 Result A: Sectoral Trends

This chapter lays out the outcomes for each of the examined energy sectors.

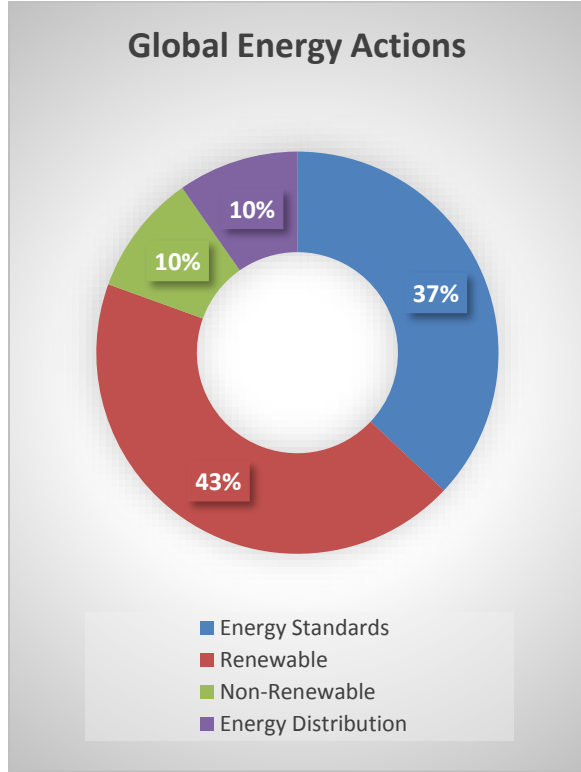


Figure 6 Sectoral trends of global energy actions

Figure 6 shows the global scenario of energy actions extracted from the NDCs. It shows the global shift from non-renewable energy to renewable energy. Over the 784 actions out of 1800 were committed for renewable energy generation followed by 669 actions on energy standards. Energy distribution and non-renewable energy generation had equal sharing with 175 actions. There were about nine actions mentioned for nuclear energy and only one action detected for hybrid energy. They were a tiny portion of the pie-chart, so for this reason, it is not shown here. However, they are discussed in chapter 4.5.

It is analyzed that most of the actions are hitting the mitigation activity (see Figure 7). E.g., Bangladesh had a commitment “400 MW of wind generating capacity by 2030” (NDC: Bangladesh, pg.: 6).

There are just above 30 actions encountered for purely adaption objective. E.g.: “Use energy as a tool for sustainable development and build resilience into a newly restructured economy to guarantee its citizens a sustainable quality of life.” (NDC: Grenada, pg.:7).

Whereas, more than 120 actions combine both objectives, for example, “Reduce rural peoples’ dependence on fuel for cooking and heating” (NDC: Afghanistan, pg.: 8)

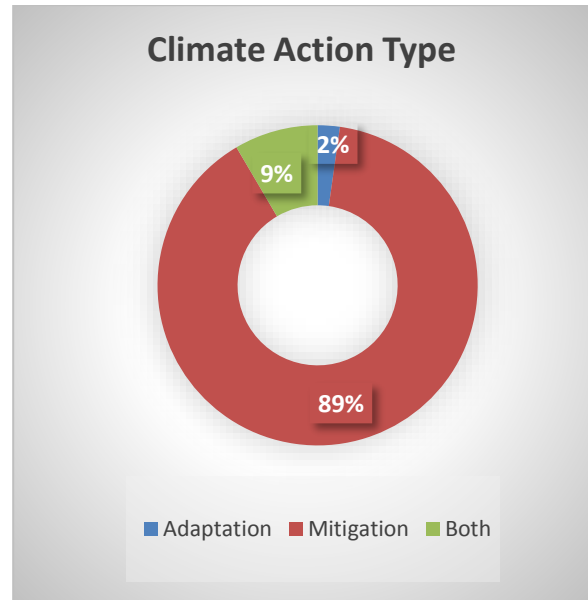


Figure 7 Type of climate actions

The following subchapters briefly explain the energy sectoral trends and the trades from a donor perspective.

4.1 Energy Standards

The NDCs analysis shows that there is a total of 667 commitments on energy standards. Figure 8 illustrates that about 2/3rd of these actions are on energy efficiency. Efficiency is a key focused area among all NDCs. There is a total of 420 actions specific on it and the majority of stated from Asian and African countries in their NDCs (see Figure 9). There is a total of 178 actions for energy policy, 39 actions on energy research, and 30 actions on energy awareness. This cross-cutting theme is directly related to SDG target 7.3 ‘Double the rate improvement in energy efficiency’.

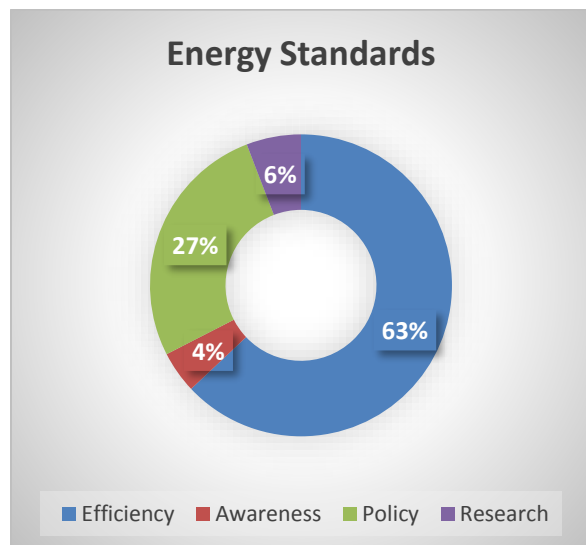


Figure 8 Energy standards actions

Financial transactions were not according to energy action trends. In the Pre-NDC period, there were a total of 8.65 billion USD spent on energy standards. Over 90% of this financed for energy policy and the rest sub-sectors share 1% each. Energy policy has holed the largest share in a post-NDC period as well. Out of a total of 6.35 billion US\$ were financed in the post-NDC period, nearly 80% spent on energy policy (see Figure 10). Over US\$ 57 million was granted for

energy research projects, whereas 10 million USD was granted for energy awareness.

Energy Efficiency: The OECD data revealed that energy efficiency was only got attention in the year 2015. DAC members were granted US\$ 356.50 million in a single year. The Trades on demand-side efficiency have improved tremendously after NDCs form and in the next couple of years, multilateral and private donors had shown their interest in many efficiency projects. As a result, the amount was increased to approx. one billion USD (467.82 million USD in 2016 and 531.40 million USD in 2017).

Most found keywords: Building coding including efficient lighting is the most common action in African and Asian countries.

German agencies had donated the largest amount in both periods. They had granted 16.26 million USD to China, Serbia, and Ukraine in 2015. The amount was increased to 578.18 million USD in the post-NDC period incl. 60 million USD Grant.

Japan had not financed in the pre-NDC period. JICA had given a depth of about 200 million USD and Japan ministry of foreign affairs had given a grant of US\$ 2.75 million in 2016-17. Similarly, EU Institutions had granted 64.04 million USD and EIB had given debt of US\$ 2.62 million in the post-NDC period.

The French agencies ‘COOP decentral’ had granted 453,939 USD mostly to African countries in 2015 however, the amount was reduced to 70,773 US\$ in 2016. Apart from this, Korea and

Norway had also granted African countries with 4.15 million USD in 2015. Even though African countries are more committed to energy

efficiency, they had received only 47.76 million USD in 2016-17.

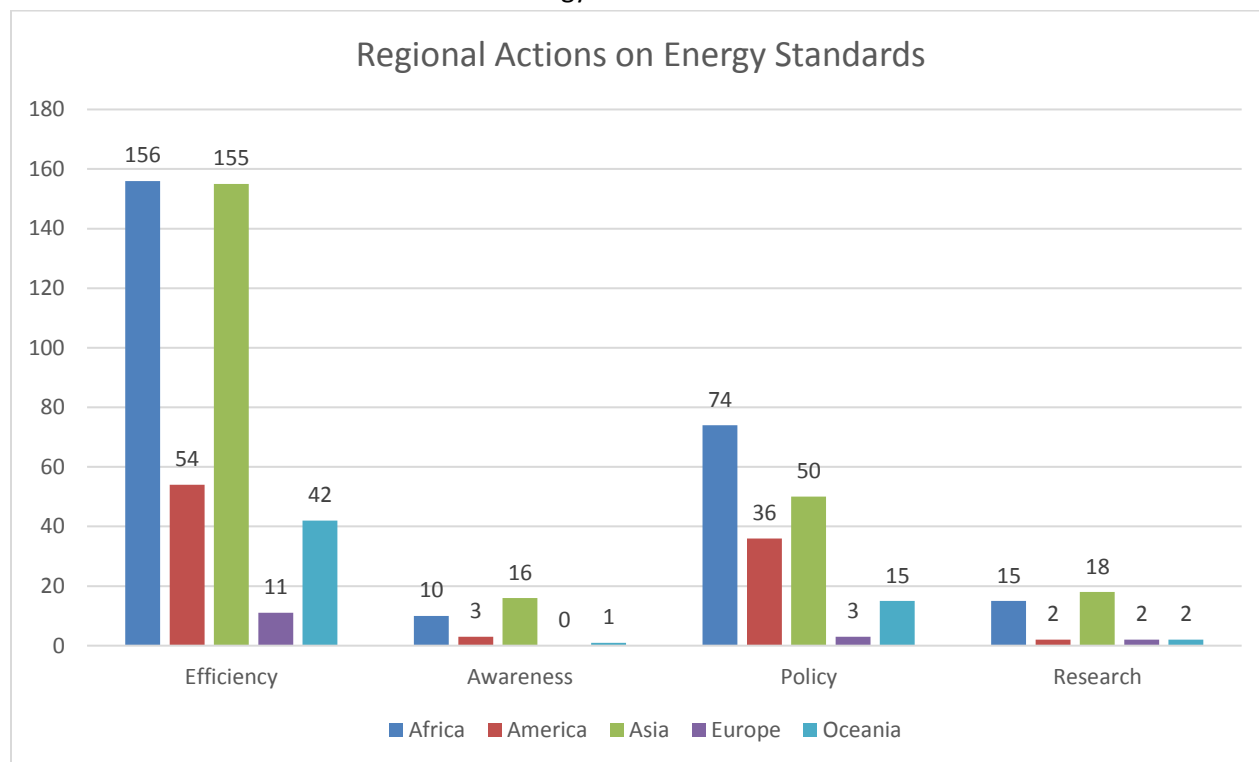


Figure 9 Regional actions on energy standards

Energy Policy: There is a total of 178 commitments on energy policy; Africa has committed 74 actions, followed by Asia with 50 actions and Americas 36 actions (see Figure 9).

Over 120 countries were benefited with 8.41 billion US\$ in pre-NDC and 5.19 billion USD in the post-NDC period. The energy policy has shared the largest transactions in both periods (with over 1600 transactions in pre-NDC and 769 transactions in the post-NDC period).

The American countries had received debt of 1.11 billion US\$ and an additional 31.66 million USD grants from IADB from 2011 to 2015. This amount was reduced to 424.49 million USD in 2016-17.

EU institutions were granting energy policy since 2003. In the pre-NDC period, it had granted a total of 1.06 billion USD and in a post-NDC period, the amount was reached US\$ 761.78 million.

The World Bank had given a debt of 732.75 million USD with an additional grant of 4.24 million USD in 2013-15. WB had increased the debt of 964.46 million US\$ in the post-NDC period.

The AsDB had given a total of 471.26 million USD (in all 3 forms: debt, grants, and equity) from 2012 to 2015. This amount was increased 2.5 times within the next two years and was reached 1.28 billion USD.

Energy awareness: Energy awareness and energy research are among the lowest priorities in NDCs. There were only twenty countries that

had committed a total of 30 actions for energy awareness.

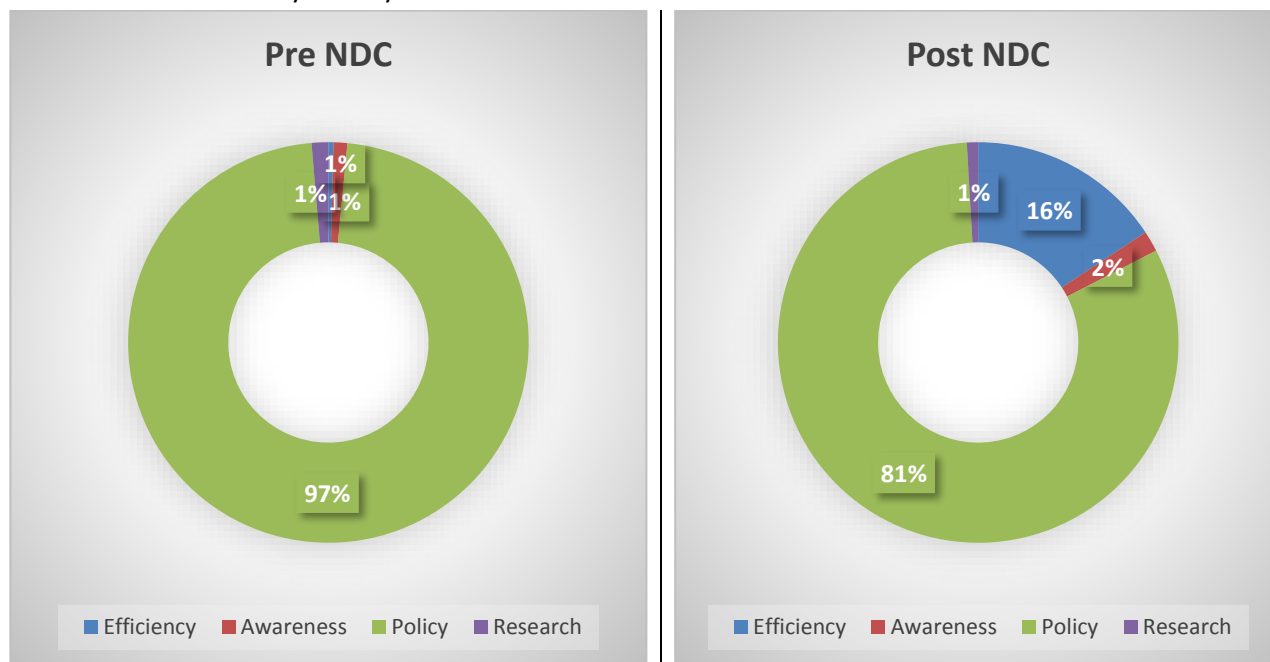


Figure 10 Financial share in energy standards

Most found Keyword: awareness raising on energy conservation, training and capacity-building programs, low-energy construction for all players in value-chain

In the pre-NDC period, a total of 96 million USD had given for energy awareness programs and in the post-NDC period, it was granted just over US\$ 100 million, which was only 2% of total finance spent on energy standards (see Figure 10).

Germany remained the largest donor in both periods. The ten different states and central German agencies had granted about 29 million USD in pre-NDC and approx. the same amount was given in the post-NDC period.

Following Germany, the Netherland Ministry of Foreign Affairs had granted a total of 15.73 million USD from 2000 to 2015 though, there was no financial transaction visible in the post-NDC period. UAE was the only non-DAC member, which had granted 1.28 million US\$ for the E-learning project in 2012.

It is observed that WB had given a debt of 1.42 million USD for education on rural renewable energy development projects in China in 2015. Surprisingly, WB had not focused on energy awareness in 2016-17.

Apart from DAC member countries, only one private firm 'Children's Investment Fund Foundation' and green climate fund had granted energy awareness in the post-NDC period. The GCF had granted about five million USD in 2015, which was increased to 62 million US\$ within the next two years.

Energy research: There were 26 nations committed to energy research with a total of 39 actions. The Asian and African nations had committed 18 and 15 actions respectively, whereas two actions came each of American, Oceanian and European countries.

Most found Keywords: Research and Development, Technical study

The percentage share of energy research remained unchanged in the post-NDC period (see Figure 10). African and Asian countries had received over 116 million USD (incl. 7602 USD equity) in the pre-NDC period and 57.68 million US\$ in the post-NDC period.

The UK remained the largest donor in both periods. Four different UK agencies had granted nearly 102 million USD during 2012-15 and 31.90 million USD in 2016-17.

The German federal ministry had granted about 900,000 USD among India and the Middle East countries in 2011-13. The grants were increased to US\$ 17.57 million in 2016-17 and spent not only on African and Asian nations but also on Latin American countries got benefited from it.

It is noted that no European countries had taken any external fund on energy research. Ireland's foreign affairs had given the least amount among DAC members. It had granted 30,000 US\$ for energy research under civil society program funding in Eritrea and Ethiopia.

Overall, regional multilateral banks AfDB, AsDB, IADB had funded millions of dollars on energy policy but had not focused on energy awareness, efficiency, and research. The Least developed and lower-income countries were highly dependent on DAC-member countries.

4.2 Renewables

The consistent growth in renewable energy is visible in all regions and renewables hold the largest share of finance. The analysis shows that there is a total of 781 actions on Renewable energy.

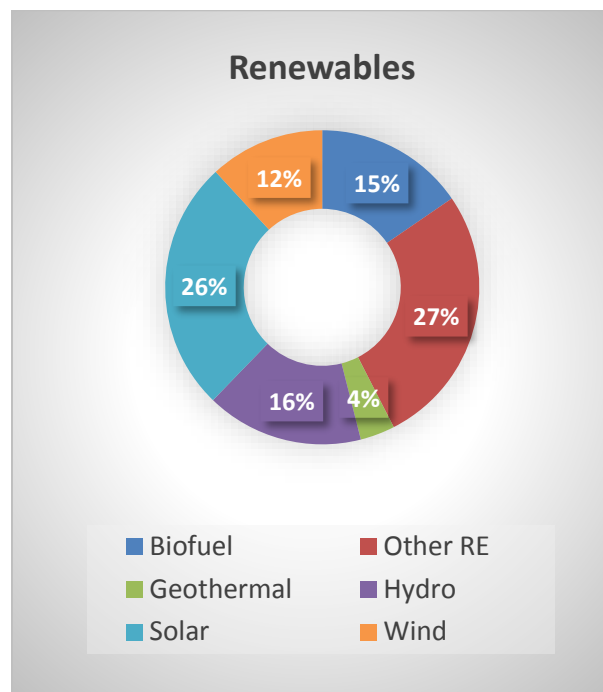


Figure 11 Renewables actions

As seen in Figure 11, other-RE having the highest number of actions. With 211 actions, it is ranked the second-highest sub-cross-cutting theme preceded by energy efficiency. There are over 200 actions specific to solar energy. hydropower and biofuel having 127 and 121 actions correspondingly. For wind energy and Geothermal figures drop to 93 and 28 respectively. This cross-cutting theme is directly related to SDG Target 7.2.

Figure 13 demonstrates the financial share of renewable energy. There were over 26 billion USD spent on renewables in the pre-NDC period and 15.13 billion USD within two years of the post-NDC period. In both cases, another RE has

shared the largest finance. The percentage change in solar, wind, and biofuel look unchanged.

Biofuel: The African nations had committed most on biofuel, followed by the Asians and the Americans (see Figure 12). As shown in Figure 13, bio-fuel was least financed among the renewables in both periods. In the pre-NDC period, about 490 million USD was spent on different biofuel power plants and the amount reached 256.85 million USD in the post-NDC period.

WB had given debt of about 135 million USD from 2013 to 2015, out of which China had secured a loan of about 76 million US\$ and about 59 million US\$ had given for the Belarus biomass district heating project in 2014. During 2016-17, WB had approved a loan of about 55 million USD for biofuel projects in Angola, Kenya, Uruguay, and Vietnam. Germany was serving the world for renewable projects since 2000 and had paid the second-largest amount for biofuels projects in both periods. The German agencies had granted a total of 77.25 million US\$ in pre-NDC, and the amount was increased to 86.24 million USD in the post-NDC period.

It is noted that the Asian Development Bank had created only one transaction in the pre-NDC period. In 2012, Vietnam had received a debt of 38.67 million USD. In the post-NDC period, the amount was increased to 86.78 million USD. Most of this amount was financed for different Chinese projects and the nature of transactions had taken in all three forms of 'debt', 'grant' and 'equity'. China had also received debt of about 39.28 million USD from the 'French Development Agency' in 2014.

Additionally, AsDB had granted 50,000 USD from regional cooperation and integration fund in 2017. AfDB had not shown interest in Biofuel projects in both periods. Whereas IADB had given only 7.23 million USD (incl. grant of 2.45 million US\$ in 2015) during the pre-NDC period, but no amount was sported in the post-NDC period.

Japan’s ministry of foreign affairs had very least focused on biofuel projects compared to other renewables. It had granted a total of 11.86 million USD in 2013-14, whereas no transactions were found in the post-NDC period.

OECD data revealed that no private philanthropes had granted money in biofuel projects.

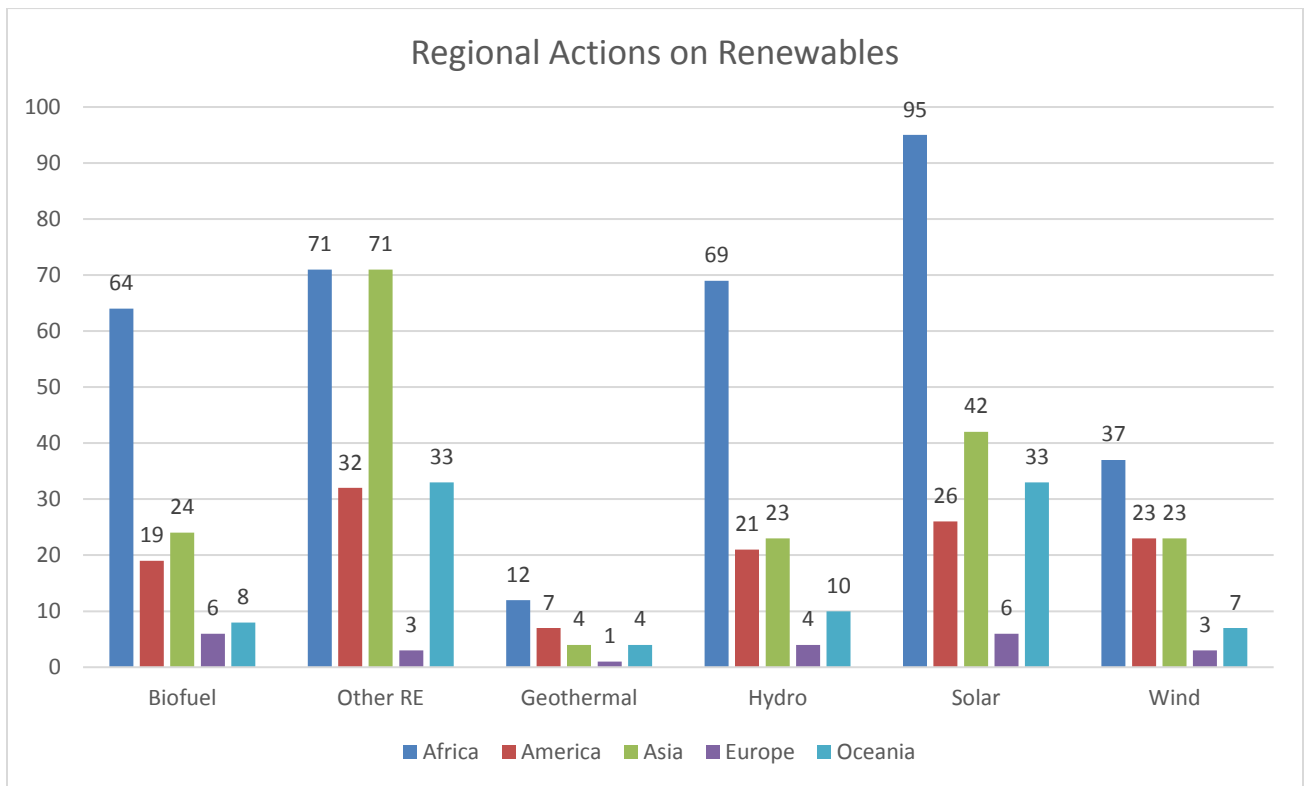


Figure 12 Regional actions on renewables

Wind Energy: As shown in Figure 12, African countries had committed the highest actions on wind energy, and the Asian and American countries shared equally. A total of 2.19 billion US\$ was funded for wind energy plants in the pre-NDC period and the amount was reached 1.19 billion USD in the post-NDC period. European Investment Bank had given debt of about 500 million USD in 2014, out of which 395 million US\$ was given for wind power projects in Chile and Kenya. Furthermore, EIB had given

grants of 28253 US\$ to construct and operate of 310 MW wind power plant in Kenya and had approved 224.19 million USD in 2016-17 for another region. Germany remained the second-largest fund provider on Windpower plants in both periods. Four German agencies had provided a total of 416.87 million US\$ in the pre-NDC period. KfW had given debt of over 300 million US\$ and a grant of 6.68 million USD, BMZ had given over 95 million USD, GIZ had granted about two million US\$ in 2005-06, German

federal ministry had granted about 35,594 US\$ in 2012. Furthermore, the German ministry of education & research had granted about 120,000 USD and BMZ had granted one million USD in 2017. The AsDB had financed 168.47 million USD from 2013 to 2015. The mode of the

transaction was formed in debt and equity. Additionally, Indonesia was granted with 169,259 US\$ for wind power development. In the post-NDC period, the amount was increased to 395 million USD with grants of 500,000 USD.

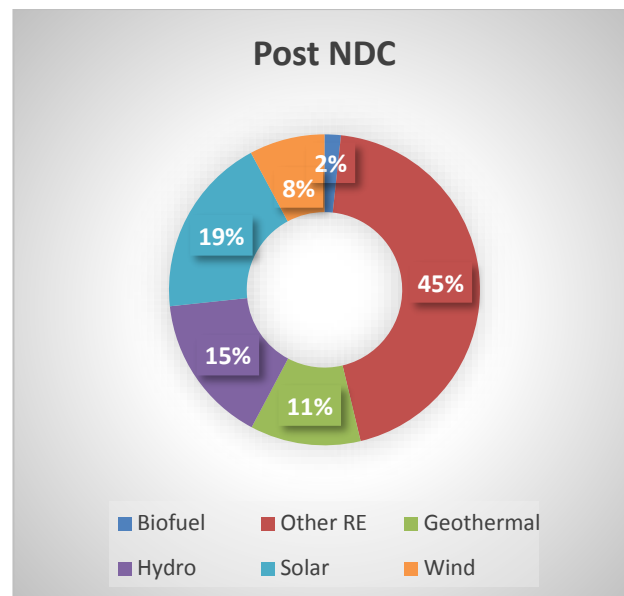
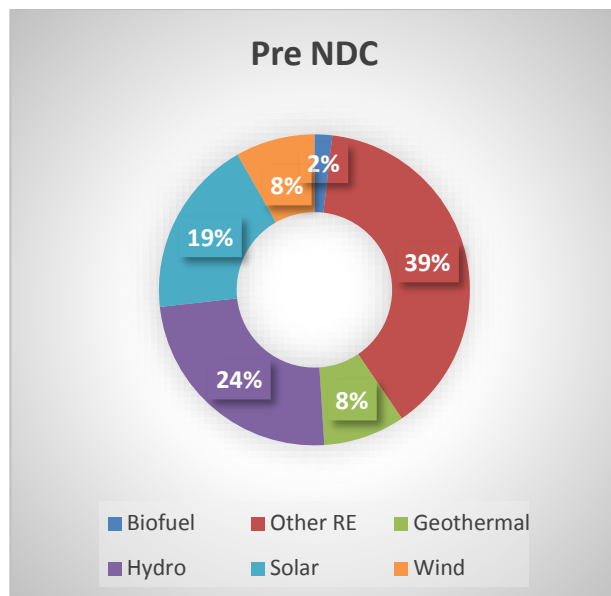


Figure 13 Financial share in renewables

IADB had approved a loan of 143.37 million US\$ for two different wind projects 'Colonia Arias and Los Valentines' of Uruguay in 2015. The capacity of wind projects was estimated at 70 MW for each. In 2017, IADB had given a debt of 50 million USD to Argentina. However, there were no transactions noted from AfDB in the pre-NDC period, but about one million US\$ was granted to the Mozambique wind project in 2017.

WB had funded the least amount to wind power projects among the renewables in both periods. It had given a debt of nine million US\$ to the Mozambique wind power project in 2013. Additionally, Yemen was granted about 18 million USD for Mocha wind park projects in 2014. There was only one transaction occurred in the post-NDC period. Angola was granted 4.38 million USD in 2016.

The JICA had given debt of 166.68 million US\$ among Egypt and Philippines in 2002-03. Since then, Japan had not funded more in the pre-NDC period. In 2016, the JICA had approved a loan of 64.33 million USD for Tsetsii wind farm in Mongolia. In next year, the Japan ministry of foreign affairs had given a grant of 83.69 million US\$ for installation of wind power generation system in Tonga.

Geothermal Energy: It was the least focused renewable in NDCs. Out of a total of 28 actions, African countries had committed 12, followed by American with 7, and Asian and Oceanian each has 4 actions. Only a single European county has committed for Geothermal.

According to the OECD database, global geothermal projects had received 2.26 billion

US\$ in pre-NDC, and the amount was reached 1.74 billion US\$ in the post-NDC period.

Japan remained the largest donor in both periods with a given debt of more than 725 million US\$ in pre-NDC and 1.23 billion USD in the post-NDC period among Bolivia, Costa Rica, Indonesia, and Kenya.

The money was given under the CIF remained the second-largest amount in both periods. More than 32 million US\$ had been granted under the 'Strategic Climate Fund' in 2014-15 and nearly 394 million US\$ had given under the 'Clean Technology Fund'. The amount was reduced to 168.31 million US\$ in the next couple of years.

The WB had given a debt of nearly 280 million USD to Ethiopian and Indonesian geothermal sectors in 2014-15 and approx. 50 million USD to Colombia and Kenya in 2016-17. The German agencies KfW and BMZ had given debt of more than 170 million USD and had granted 44.21 million USD in the pre-NDC period. The BMZ had granted more than 45 million USD in 2016-17.

The AsDB had invested more than 225 million USD in Indonesian geothermal power plants in 2013. The project was to construct and commission three geothermal power generation units with a total capacity of 320 MW. The additional amount of nearly 70 million USD was given for the 'Muara Laboh geothermal power plant project' in 2017. The AsDB had also given 20.77 million USD for other Asian countries in 2016-17.

IADB had given debt of nearly 200 million USD to Costa Rica under the 'Conditional Credit Line for Investment projects' in 2015 and debt of 23.12 million USD had given to Nicaragua's geothermal exploration program in 2016. The aim of that

program was to explore geothermal generation and promote electricity coverage in rural areas of Nicaragua.

The African countries had shown the very least interest in Geothermal power plants. The AfDB had given grants of 2.65 million US\$ to Djibouti's Geothermal power plant and the same amount of loan given in 2013. Since then no transactions were visible. The OECD database revealed that EU-Institutions had not financed for any Geothermal projects in both periods.

Hydropower: There was a total of 127 actions on Hydropower plants encountered in NDCs. The African countries had committed half of these, followed by Asian and American with 23 and 21 actions respectively. According to the OECD database, global hydropower projects had received 6.46 billion USD in pre-NDC, and the amount was reached 2.35 billion US\$ in the post-NDC period. Japan had given debt of over two billion USD in pre-NDC. However, there was only one transaction occurred in the post-NDC period. Myanmar had secured a loan of about 100 million US\$ from JICA in 2017. The WB had given a loan of 483.49 million USD in the pre-NDC period. The loan amount was increased to 640.21 million USD in 2016-17. Additionally, the WB had granted 303.28 million USD in 2013-14.

Solar Energy: There was a total of 202 actions committed on solar specific. The African countries had committed 95, followed by Asian and Oceanian with 42 and 33 actions respectively. American countries had 26 actions, and European countries had only 6 actions. The OECD database shows that global solar projects had received 4.93 billion USD in pre-NDC, and the amount was reached 2.85 billion USD in the post-NDC period.

The financed amount in hydropower was higher than solar energy, however, the number of transactions was higher in solar energy compared to hydropower. The main reason behind this was that the cost of solar equipment reduced over the year. The German agency KfW had given debt of more than one billion USD during 2012-15 and an additional 200 million USD grants given from other German agencies in the pre-NDC period. The amount was reached only 124 million USD in the post-NDC period. The money was given under CIF remained the second-largest amount in both periods. During 2012-15, the amount was over 750 million USD and it reached 523.60 million USD in post-NDC. The WB had given a loan of 582.68 million USD during 2013-15 and nearly a similar amount was given in 2016-17.

Other RE: There was a total of 210 actions committed for 'other RE'. The Asian and African countries had 71 and 70 actions respectively. Followed by Oceania with 33 and Americas with 32 actions. There were only three European nations had committed actions for other-RE. It is shown in Figure 13 that most of the transactions were in other-RE in both periods (Over 10 billion USD spent in the pre-NDC period and 6.74 billion USD in the post-NDC).

Germany remains the largest amount donor in both periods. The KfW had given a loan of about three billion USD in the pre-NDC period and the amount was reached 900 million USD in 2016-17. The other German agencies had granted about 640 million USD in a pre-NDC period of over 275 million USD in the post-NDC period. The French development agency had given about 965.73

million US\$ in the pre-NDC period and 576.37 million USD in the post-NDC period.

There was no transaction recorded under GCF in the pre-NDC period. But, over 900 million USD had been given in the post-NDC period. There were some Private donors that appeared only in the post-NDC period and they had given funds for energy standards and renewable energy. Comic Relief had granted 230,133 USD in 2017 to run a pilot project in Western and Northern Uganda (Full grant: 348,050 GBP). This project was worked directly with communities and provided alternative energy sources for farming. Additionally, Comic Relief had granted 114,709 USD (85,000 GBP) for off-grid lighting solutions in Kenya, which was designed to provide solar power in replacement of harmful kerosene.

Since the foundation, the Oak foundation had spent most of the money on adaptation but in 2017, it had granted over seven million USD for demand-side efficiency improvements and other renewable energy projects in Brazil, India, US and far east Asia. Additionally, 12 million USD was committed to the extension of these projects. There was no direct transaction found for energy-specific action from the NDF until 2016. In 2017, the NDF had financed approx. 280 million USD (50:50 ratio of grants and equity) to renewable energy generation in the South of Sahara and Tanzania.

Tidal or marine energy had only 10 actions found, and there were only three transactions worth of 176,795 USD that occurred in the pre-NDC period, so there are omitted from the graph.

4.3 Non-Renewables

Non-renewable energy consumption is declining in many countries. These rapid changes are leading to less investment in non-renewable energy generations. However, many Asian and African countries are practicing conventional energy. This cross-cutting theme is moderately related to SDG target 7.1 and 7.3.

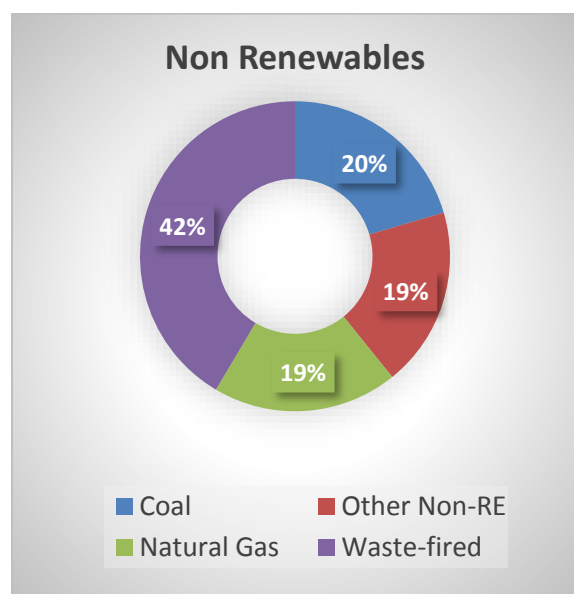


Figure 14 Non-renewables actions

There was a total of 176 actions committed in NDCs. The waste-fired power plants were ranking top with 73 actions. There were 36 and 34 actions on coal-fired and natural gas power plants respectively; 33 actions were for other-non-RE. Figure 14 shows the share of each.

Financial transactions were opposite to energy actions in both periods. As shown in Figure 16, natural gas held the largest portion of financial share, followed by non-RE in the pre-NDC period. However, the share for natural gas was dropped to half in the post-NDC period. Whereas, the financial share of coal was increased in the post-NDC period. There was no transaction found for waste-fired power plants in the pre-NDC period

and it was financed very least in the post-NDC period.

Approx. 1.50 billion USD was financed for non-renewables in the post-NDC period, which was 7.33 billion USD in Pre-NDC time. So, on an annual average basis, the amount was increased, despite the fact of the renewables target.

Out of 1.50 billion USD, one billion USD debt was given by the JICA. Apart from the DAC-members, the EBRD had approved more than 400 million USD loans for non-renewable projects for the African and Asian countries in the pre-NDC period, whereas about 300 million USD given to renewable projects.

The AsDB had granted 250,000 USD under project 'Building climate change resilience in Asia's critical infrastructure' in 2016. It's a joint venture between ICEM (International Centre for Environmental Management), Philkoei international and ADPC (Asian Disaster Preparedness Centre) to implement it. *"This project will help to address emerging development challenges and support for climate-resilient development with a focus on transport, energy and water sectors in its developing member countries of South Asia and Southeast Asia"* (ICEM, 2017).

Coal-fired power plants: Many countries had started a coal phase-out after the Paris Agreements in 2016. However, coal is a primary source in some countries.

As shown in Figure 15, the Asian countries had committed the most on coal-fired power plants, followed by the African nations with five actions. Only two from the Americas and one from European countries had commitments.

The OECD database revealed that only DAC members were financing coal-fired power plants since 2000. The amount was roughly 500 million USD in each period.

From 2002 to 2012, there was only 2.363 million USD spent on coal power plants. However, Japan became the largest share donor since then. With a total of five transactions, the JICA had given a

loan of approx. 447.11 million USD to the Asian countries in 2013-14 and with only three transactions and about the same amount was given in the post-NDC period.

Apart from Japan, Czech Republic, the EU Institutions, Korea, Switzerland, and the US had granted about five million USD from 2013 to 2015.

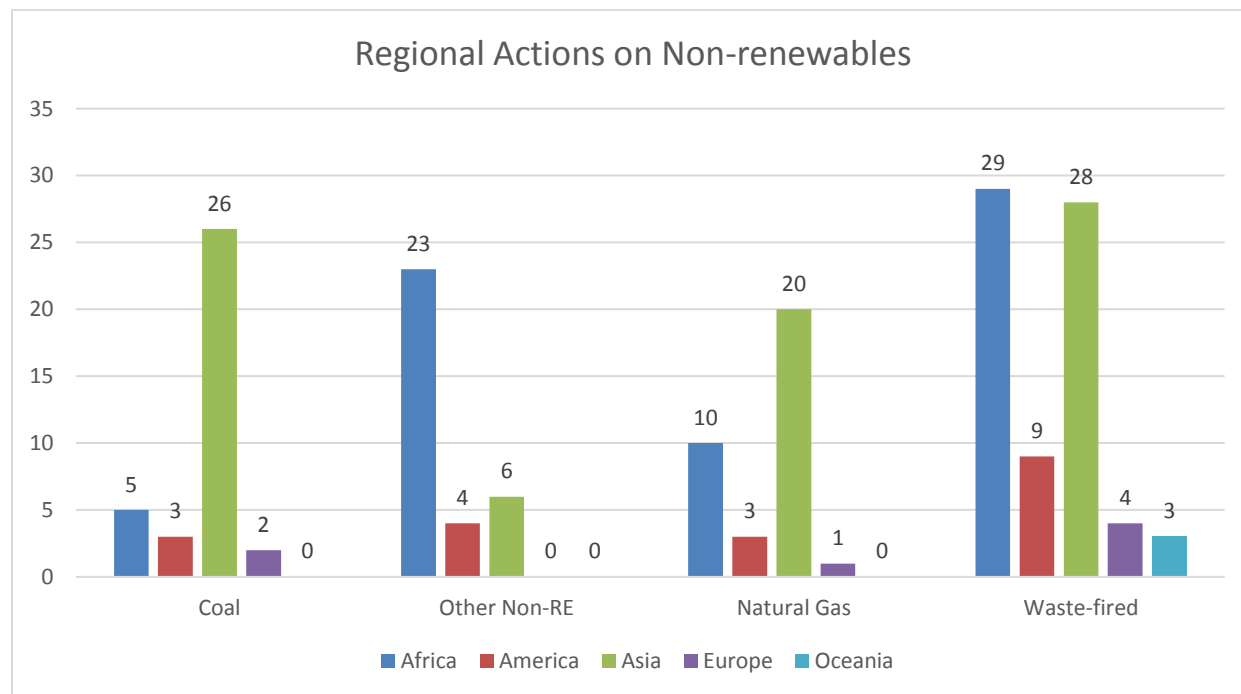


Figure 15 Regional actions on non-renewables

Natural gas: Asian countries had twenty actions on natural gas power plants, followed by the African with ten actions. One European and three American countries had also a commitment to mitigation activity in natural gas power plants (see in Figure 15).

There was a total of 4.25 billion USD spent in pre-NDC, out of which 3.75 billion USD was given by the JICA. The WB had given a loan of about 345 million USD during 2013-15.

There were only two transactions visible in the post-NDC period. In 2016, the JICA had given a

debt of 377.73 million USD to Egypt to recover the capacity of natural gas power plants.

Waste-fired power plants: This kind of plant causes lesser air pollution than coal plants, but more than natural gas. The African countries had committed a total of 29 actions, followed by the Asian with 28 actions; seven American, four European and two Oceanian countries had also commitments on waste-fired power plants.

Until 2015, there was no single waste-fired power plant had been financed. In 2016-17, only two countries were granted finance. DAC

member country France had granted Burkina Faso about 50 thousand USD in 2016 via COOP Decentral agency. On the other hand, Ukraine

had received 530,797 USD via France Ministry of Economy, Finance, and Industry in 2017.

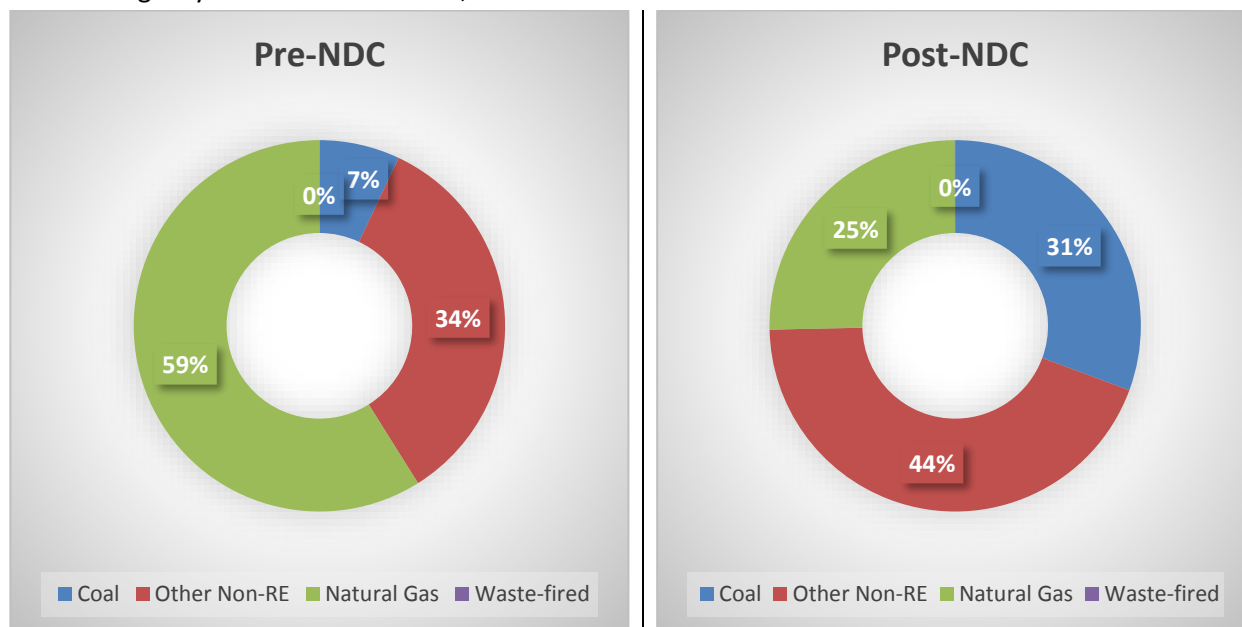


Figure 16 Financial share in non-renewable energy

Other non-RE: the African countries had committed a total of 23 actions on ‘other non-RE’. The figures were dropped to 6 and 4 actions for Asia and Americas. European and Oceanian countries had not mentioned any action on this. As illustrated in Figure 16, it holds more than 30% in both periods. There was a total of 2.45 billion USD given in the pre-NDC period and the amount was reached 657.70 million USD in the post-NDC period.

The WB had given about 650 million USD in the pre-NDC period however, there was no transaction visible in the post-NDC period. The EBRD had given more than 400 million USD in both periods.

Oil-fire power plants: There was no specific action detected for oil-fired power plants in NDCs. However, there were eight different transactions worth 130.80 million USD that

occurred in the pre-NDC period. Over 80 million USD was spent in Asia-Pacific regions.

The IFC had invested over 50 million USD in the middle east for a multi fuel-thermal power plant in 2014. The Japan Bank for international cooperation had approved a loan of 41.32 million USD for the Samoa oil-fired power plant expansion project. There was no other explanation given of this project however, this transaction was taken under mitigation objective. The other transactions were done by the Japan ministry of foreign affairs. The grant of about 40 million USD was given to Indonesia, Mongolia, and the Republic of Palau. Indonesia & Mongolia were granted the rehabilitation of oil power plants. Whereas, Palau was granted for enhancing power generation capacity in its urban area.

4.4 Energy Distribution

Actions on energy distribution are become essential, as electricity access has not reached all people. This cross-cutting theme is directly related to SDG Target 7.1.

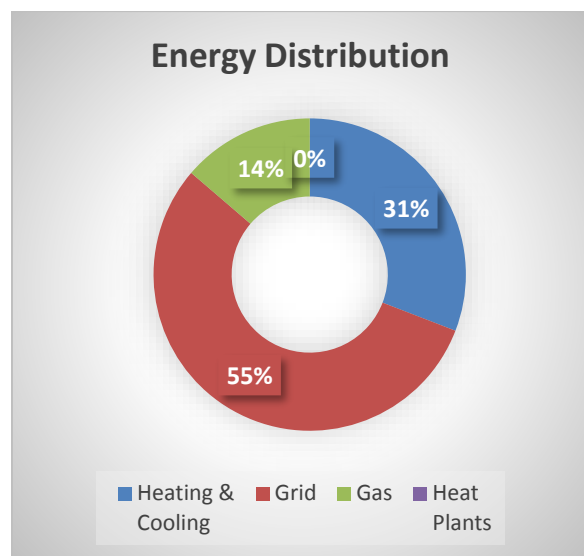


Figure 17 Energy distribution actions

There was a total of 174 actions specifically mentioned for energy distribution in NDCs. As shown in Figure 17, over half of the actions were committed on the grid, followed by 54 actions for heating & cooling. There was a total of 24 actions for gas distribution. However, no specific actions mentioned for heat plants.

Grid: As shown in Figure 19, financial shared for grid networks was remained the highest in both periods, as energy accessibility was the topmost priority.

Over 13.67 billion USD was spent in the pre-NDC period and half of these amounts were given within two years of post-NDC. DAC members were paid a large portion of both cases. The JICA had approved a loan of over 3.50 billion USD for grid connections from 2011 to 2015. Furthermore, the Japan ministry of foreign

affairs had given a grant of 63.87 million USD to the African least developed countries during the same periods. Within the next two years, the JICA had given a loan of over 700 million USD.

The German Agencies 'BMZ' and 'KfW' had financed 2.79 billion USD in pre-NDC period (incl. GIZ granted 7.77 million USD to Asian countries) and over 1.62 billion USD in post-NDC period (incl. German Federal Ministry of Education and Research granted about 190,000 USD in 2017) for transmission line projects.

The French development agency had given debt of about 985 million USD from 2005 to 2015. An additional grant of 1.61 million USD was given by the French ministry of economy, finance & industry in 2014-15 for grid improvements.

In the post-NDC period, each French agency and EU institutions had given more than 320 million USD in terms of grants and debt respectively. Cote d'Ivoire, Kenya, and Pakistan had secured a loan of 322 million USD total from the French development agency in 2016-17. The other French agencies had given a grant of a total of 387,000 USD to Cambodia and South Africa in 2016.

EU institutions had granted 135.85 million USD from 2011 to 2015 via European development banks. This amount was increased more than double within the next year. Niue and 3 other African countries were benefited from this amount for rural electrification and to setup grid infrastructure. However, no transaction was detected from the EU institutions in 2017.

The UK 'Department of International Development' had granted more than 50 million USD to the African least developed countries in

2015. However, the amount was reduced to 18.25 million USD in the next couple of years. Furthermore, the Scottish government had given

grants of about 150,000 USD to electrify rural universities in Sogerv, Malawi in 2017.

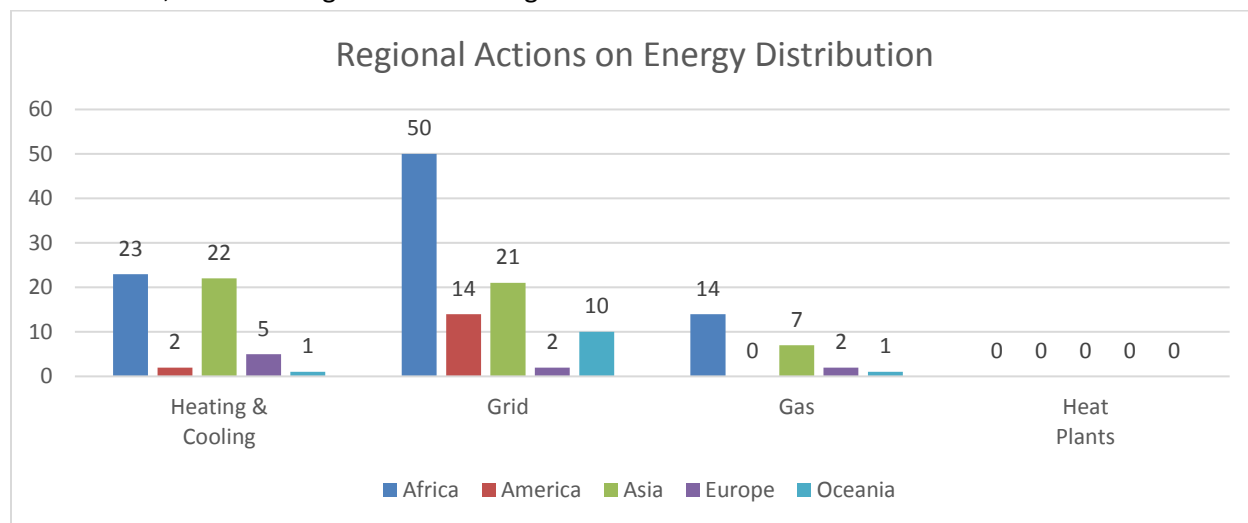


Figure 18 Regional actions on energy distribution

From 2011 to 2015, the US agencies had granted over 250 million USD for grid connections. Malawi got special attention from the US Millennium Challenges Corporation (MCC). Under the MCC project, Malawi was granted over 230 million USD in 2013 for Transmission network up-gradation and distribution system extension. The other money granted from the American ‘Trade and Development Agency’. In 2016, the MCC project was focused on Ghana. It had granted about 29 million USD for modernizing NEDCO (Northern Electricity Distribution Company) and ECG (Electricity Company of Ghana) operations activity. The ECG Financial & Operational Turnaround project was designed to improve efficiency by reducing commercial & technical losses and strengthening the distribution system with a total grant of nearly 340 million USD (DATA.GOV, 2019).

There were only two transactions detected from DAC-member Portugal for electric power transmission and distribution. In 2015, the Portuguese government had given debt of about

13 million USD for improvements of electrical infrastructures in Sao Tome & Principe. This project was included in the construction and rehabilitation of grid infrastructure in order to increase energy efficiency. Camoes (Portugal Institute for cooperation and language) had granted about 60,000 USD for sustainable development of communities in Santo Antao island in Cabo Verde in 2016. The project was implemented to provide access to clean energy for better living conditions of their life.

Apart from the DAC members, the World Bank had given the largest amount for grid networks in both periods. From 2013 to 2015, the WB had approved a total loan of 1.68 billion USD. Furthermore, the WB had given a grant of over 100 million USD among five LDCs and lower-income countries in 2014. In the post-NDC period, the loan amount was reached 1.51 billion USD.

The AsDB had given over one billion USD in each period, which was more than double the combined amount of regional multilateral banks

AfDB and IADB. India had secured half of these debt amounts in the year 2016-17. The AsDB had also granted approx. 35 million USD and invested 11.54 million USD in Asian countries from 2011 to 2013. The amount was reduced to nearly two million USD in Asia-pacific regions in the post-NDC period.

The AfDB had given debt of more than 350 million USD in 2015 and an additional 18.69 million USD granted in 2013. However, there

were no financial transactions that occurred for electric power transmission and distribution in the post-NDC period as the AfDB had allotted money only to Gas distribution projects.

The IADB had approved a loan of more than 200 million USD for various grid projects from 2012 to 2015. The amount was reached nearly 87.50 million USD in 2016-17. Additionally, North and Central American regions were granted 1.50 million USD in 2013-14 and 166,650 USD in 2016.

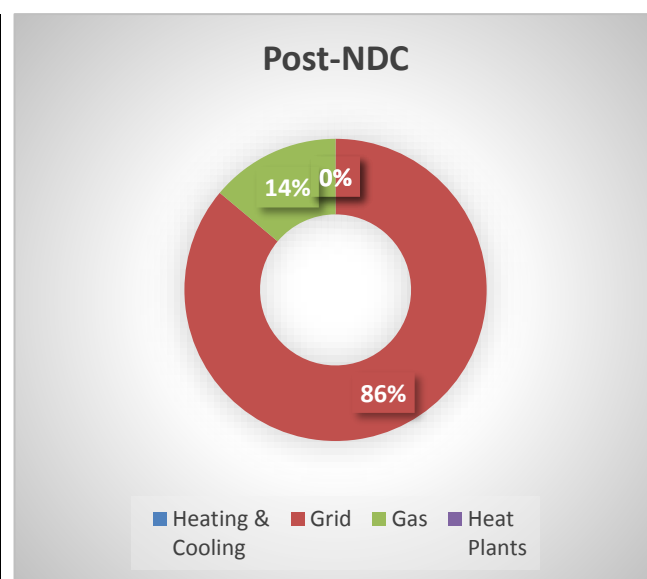
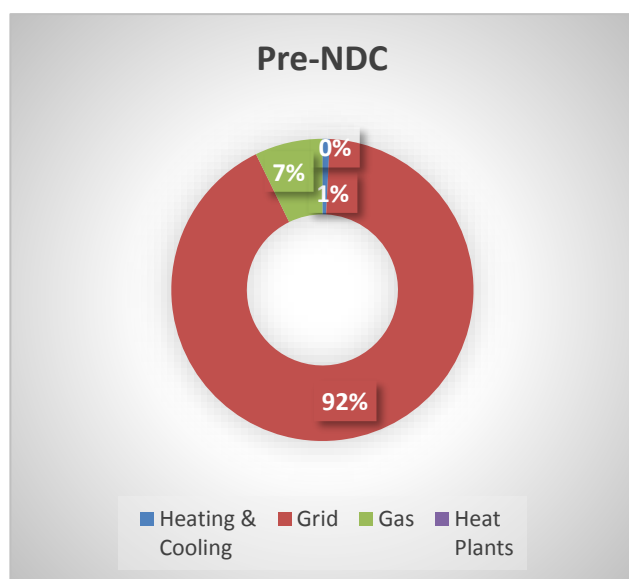


Figure 19 Financial share in energy distribution

The EBRD had given debt of about 444 million USD from 2011 to 2015 and over 275 million USD in 2016-17. After formation, the AIIB had approved a loan of over 200 million USD for strengthening Bangladeshi and Indian transmission and distribution systems.

Gas distribution: There were only 24 actions noted for gas distribution. The African countries had committed over half of it, followed by the Asian with seven actions. Two European and one Oceanian countries had one action each. There was no climate action detected from the Americas on the gas distribution (see Figure 18).

According to the OECD database, about one billion USD spent on gas distribution in the Pre-NDC period and over the same amount given in the post-NDC period. The JICA had given debt of about 750 million USD in 2003. So, in that sense, no large amount of transactions was detected until 2013. It is noted that the EBRD had done only one transaction in the pre-NDC period. Turkey had received 21.72 million USD for gas distribution setup in 2013.

In 2014, the WB had given debt of 17 million USD for Shanxi gas utilization in China. In the same year, the Switzerland state secretariat for

economic affairs had given a grant of about 8.50 million USD to Albania.

In 2015, the French development agency had given a debt of 77.71 million USD to Egypt government with the aim to expand the gas-distribution network to 1.5-million households in four years span. In the same year, IFC had financed China with about 100 million USD (34.5 million USD Equity and the rest amount in debt form) to improve the gas distribution network. The major contributions came from multilateral banks in the post-NDC period. The AfDB and EBRD had given a loan of about 340 million USD each on gas distribution. Half of the EBRD approved amount was given to the Egyptian gas distribution system. Additionally, the AfDB had granted 2.40 million USD in 2016. However, there is no transaction appeared in 2017.

There was only one transaction noted each from the AIIB, JICA, and WB. Japan was the only member of DAC, which had given funds in 2016-17. The JICA had given debt of about 34 million USD to a re-gasification project in Bangladesh. The primary objective of this project was to improve energy supply in the country by operating the LNG floating storage re-gasification unit. The WB had given the least amount. Bolivia had secured about 7 million USD for rural alliances projects on gasification.

The largest amount was noted from AIIB with 250 million USD. This amount was given for Beijing air quality improvement with a coal replacement project in 2017. Another 16.81 million USD was given by the AsDB in the form of debt. The AsDB had approved a loan of 20 million USD for Bangladesh gas infrastructure and efficiency improvement.

Heating and Cooling: The analysis shows that there was a total of 53 actions specifically for district heating and cooling. The African and Asian countries had committed 23 and 22 actions respectively. Each of two Americans and two European nations had mentioned heating & cooling actions. The only Oceanian nation has commitment. Heating and cooling were financed among the least sub-sector in both periods. There were only six transactions detected during 2015-17. In 2015, the AsDB had given a debt of 63.98 million USD to China for low carbon district heating in Hohhot (autonomous region of Inner Mongolia). In the same year, the German agency KfW had given a debt of 43.70 million USD to Macedonia under one phase to increase energy efficiency in its heating and cooling system. That program was to promote sustainable economic growth, social development, and climate protection. In 2017, the Czech Development Agency had granted a total of 23,859 USD. Whereas, the Italian central administration agency had granted 309,014 USD to take mitigation action on emission under UNDP and UNEP.

Heat Plants: There was neither particular action nor transaction detected on heat plants in the pre-NDC period. Though, there were only two transactions noted in the post-NDC period. The German federal ministry of education and research had granted about 87,000 USD for heat plants to scientific cooperation in European regional. The purpose of this unique project was to improve energy efficiency and technologies in the heating sector. France had granted 6635 USD to Morocco via COOP Decentral-MAE agency.

4.5 Nuclear and Hybrid Energy

Nations like China, Egypt, India, Iran, Japan, Niger, Turkey, UAE believe nuclear is a safe and efficient manner to produce energy. So, they had at least a single climate action on nuclear power plants. Nuclear power plants were one tiny slice of the energy pie, so it is not shown in the graph.

The African countries had no specific actions on nuclear and hybrid energy. However, there was one transaction visible in the post-NDC period. Eritrea had received about 81 million USD from the EU institutions in 2017. The purpose of that grant was to give access to the energy to the rural communities and households through solar-battery solutions.

There was a total of 39 transactions that occurred in the pre-NDC period worth of a total of 20.62 million USD. DAC members Greece, Belgium, and Switzerland had granted different European nuclear power plant projects from 2000 to 2007. The EU Institutions had granted 18.23 million USD in 2011. There were eight transactions that occurred worth about 300,000 USD in the post-NDC period. There were no transactions visible for Africa, Americas, and Oceania in both periods.

Chernobyl Nuclear power plant disaster happened on 26th April 1986 and since then many countries supported to overcome it. In 2005, Greece had granted 200,386 USD for the reconstruction of the Chernobyl Sarcophagus.

In 2015, non-DAC member Lithuania had contributed to the Chernobyl shelter fund with 22,327 USD. In the following year, the Lithuanian ministry of foreign affairs had granted an additional 33,175 USD for the same. The fund aimed to create the conditions for the eventual dismantling and decommissioning of the contaminated structure. The EU institutions had granted 8.88 million USD for Infrastructure improvements and radioactive waste management in Ukraine.

Hybrid energy: Hybrid power plants, which blending a renewable source with fossil fuel. It was found that there are very fewer activities in this category and no single transaction discovered in the OECD database of the year 2000 to 2015. Furthermore, it had a very limited number of transactions in the post-NDC period. So, many graphs are omitted here.

Dominica was the only country focusing on hybrid power plants. A single largest electricity user, 'Ross University' in Dominica, wants to compute possible emission reductions and estimated costs. With the renewable energy generation sources, 500 KW diesel power plant was configured as a back-up. The capital cost of the project is estimated at 3,300,00 USD. Actions on hybrid energy power plants are only one in number, so it is not detectable in a graph (NDC: Dominica, pg.:10).

Chapter: 5 Result B: Geographical Analysis

This chapter lays out the comparison between regions and contrasts the individual cross-cutting

theme. Figure 20 shows the global energy actions.

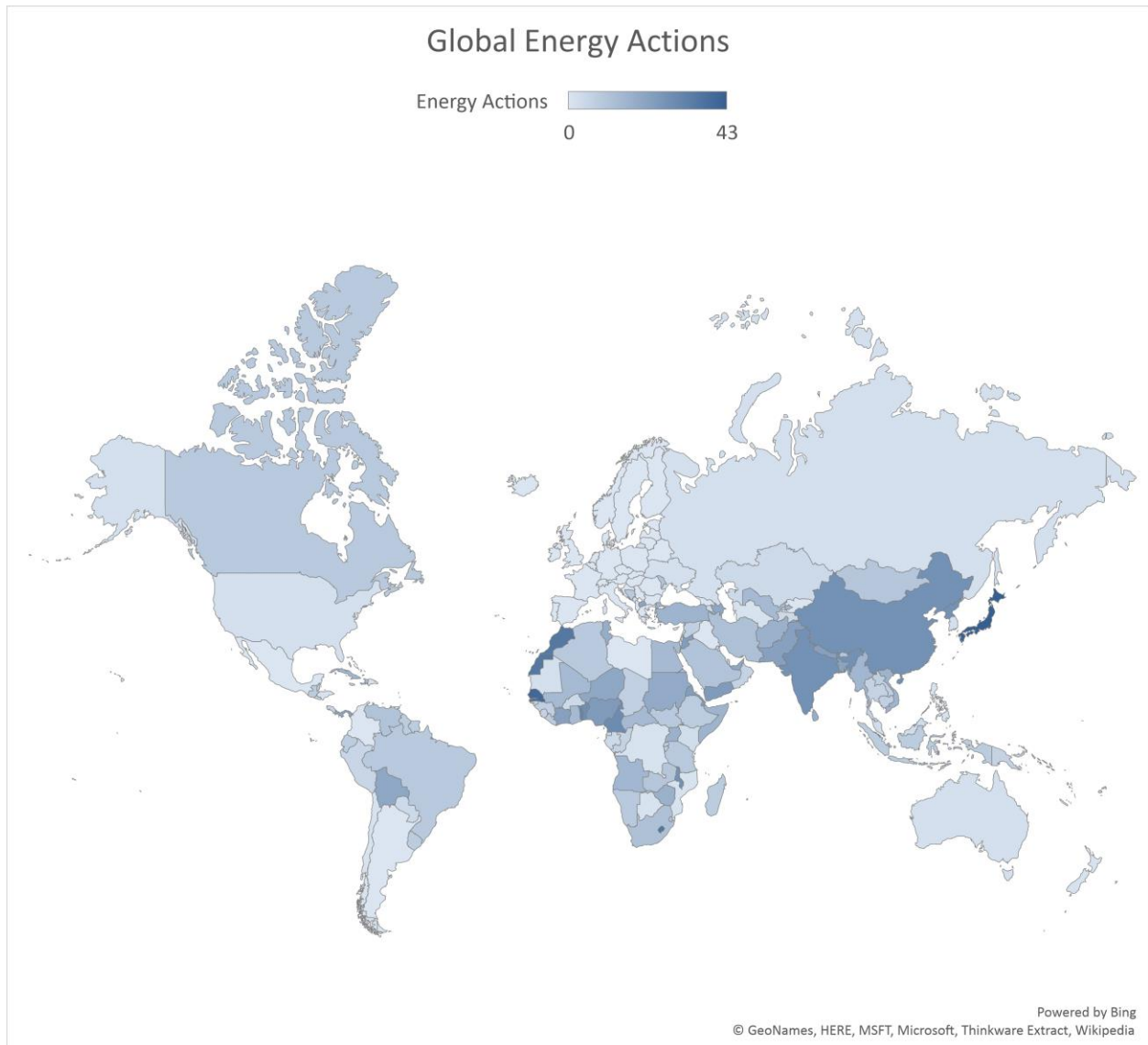


Figure 20 Global energy actions

5.1 Africa

Each African nation had committed energy, so the total number of energy actions reached 759. Figure 21 shows that 46% of actions are on renewables, followed by 34% on energy standards.

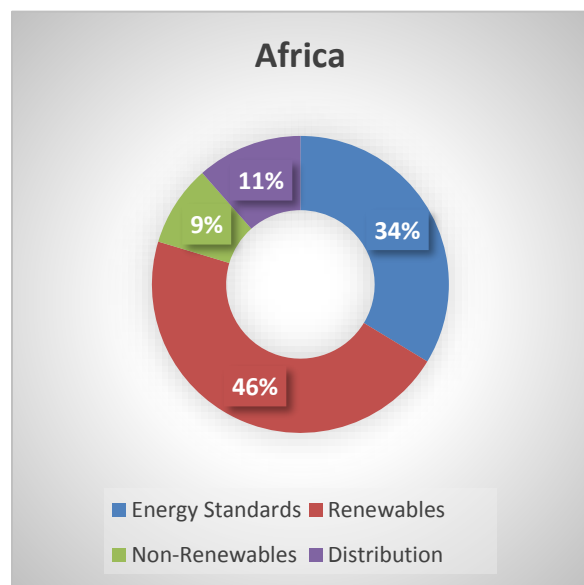


Figure 21 Energy actions in Africa

Senegal had committed 40 actions, which were covering each energy cross-cutting theme. Followed by Lesotho with 36 actions, but it had no priority on non-renewable sources.

Low-income countries in Africa had a mixed trend of energy. On the other side, high-income countries were not focusing on distribution. The following nations had only one action in their NDC: Botswana, Democratic Republic of the Congo (DRC), Mozambique. All three countries had a diverse aspect of energy.

Botswana is mainly focusing on reducing GHG emission by cleaner energy, Mozambique wants to diminish poverty and working on vulnerable communities with access of cleaner and efficient energy and creating of green jobs, DRC wants to

strengthen the supply of drinking water, and management of waste and sanitation with mainly concern on investment on energy and transport with expecting amount of 7.35 billion USD.

Energy standards: There is a total of 256 actions committed from African countries on energy standards. Energy efficiency is the highest priority among half of them. As shown in Figure 22, it has the largest share of a total of 156 actions. Followed by efficiency, 75 commitments were on energy policy. For energy research and awareness, the figures were dropped to 15 and 10 respectively.

According to analysis, 47 out of 53 African countries have committed to energy standards.

The countries like Angola, Botswana, Chad, Kenya, Mozambique, and STP had no specific actions on energy standards. Although these nations except Chad had received the finance in both periods.

The total money spent on energy standards was 1.41 billion USD in the pre-NDC period, but the amount increased to 1.53 billion USD within two years of post-NDC. In both periods, the energy policy holds most of the share. African countries had received 1.36 billion USD for energy **policy** in the pre-NDC period and the amount reached 1.41 billion USD in the post-NDC period.

The energy **efficiency** projects had been granted with only 4.60 million USD in 2015, but this amount was increased to 39.46 million USD within the next two years. Tanzania had received grants of 8.75 million USD from the EU institutions for energy efficiency action plans.

This action was aimed to make the energy sector more sustainable, gender-inclusive and climate-smart. It would also create new jobs and investment in energy-efficient infrastructure and clean technology.

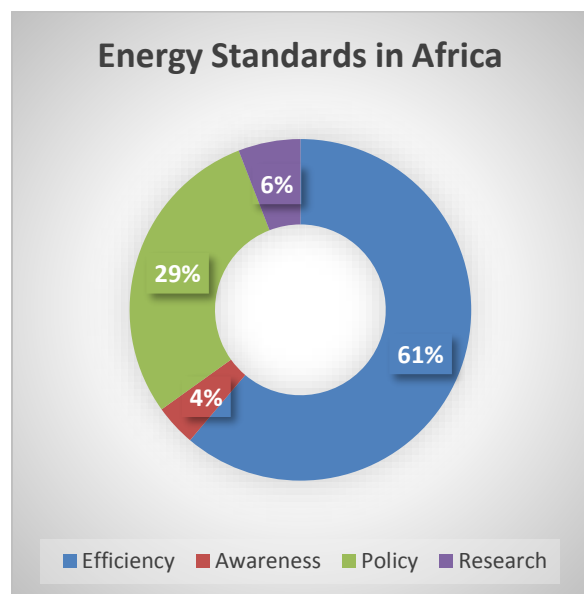


Figure 22 Actions of energy standards in Africa

Morocco had secured a loan of 8.29 million USD from the EIB for a sustainable energy facility. This facility was aimed to finance energy efficiency investments in the commercial services, industries, SMEs, agribusiness, and residential sectors. This project was also co-financed by EBRD, AfDB, and KfW. Morocco had received a 5.53 million USD grant from BMZ to implement an energy efficiency strategy.

There were few countries like Cameroon, CIV, Djibouti, Gambia, Mauritius, Sierra Leone, Togo had commitments on energy **awareness**. Out of which only Cameroon and Togo were visible in the OECD database. There were only two transactions that occurred for Cameroon throughout the period. It was granted with about 23,000 USD from Norwegian Agency for development co-operation to support entrepreneurship training programs for the

development of a community in mini-grid solar power stations in 2013. The French agency coop decentral had granted 16,453 USD for general education on energy production, distribution, and efficiency in 2017. Togo had granted a total of 159,123 USD from 2011 to 2015 from Norway and France. These grants had given for transferring knowledge of sustainable energy services to households.

The African countries had received grants of 35.86 million USD in the pre-NDC period, which was increased to 44.50 million USD in the post-NDC period. South Africa had received more than six million USD from the BMZ for the skills development programs on climate and environment business during 2012-14. The BMZ had also granted Morocco with 4.57 million USD for the promotion of energy efficiency.

Five million USD had granted under GCF for the Kawaisafi venture fund in African regions in 2015. The GCF amount was increased to 20.10 million USD for two different projects in 2016. Madagascar had received 18.50 million USD and 1.60 million USD granted for energy education under the 'Universal Green Energy Access Program'. Senegal had received grants of 15.90 million USD from the BMZ to aware of their young peoples and returnees on energy and to remain in Senegal.

The following eleven African countries are focusing on energy **research**: CIV, Djibouti, Egypt, Guinea-Bissau, Lesotho, Liberia, Malawi, Senegal, Seychelles, South Africa, and Swaziland.

The OECD database revealed that only Senegal and South Africa had received money throughout the period. South Africa had been granted about one million USD since 2001. The German federal ministry for economic affairs and energy had granted 221,658 USD in 2016 for

a study on the potential of renewable energies and their deployment. Whereas, Senegal had received grants of 55,350 USD over the period of

2012 to 2015. However, no amount had been granted after the creation of NDC.

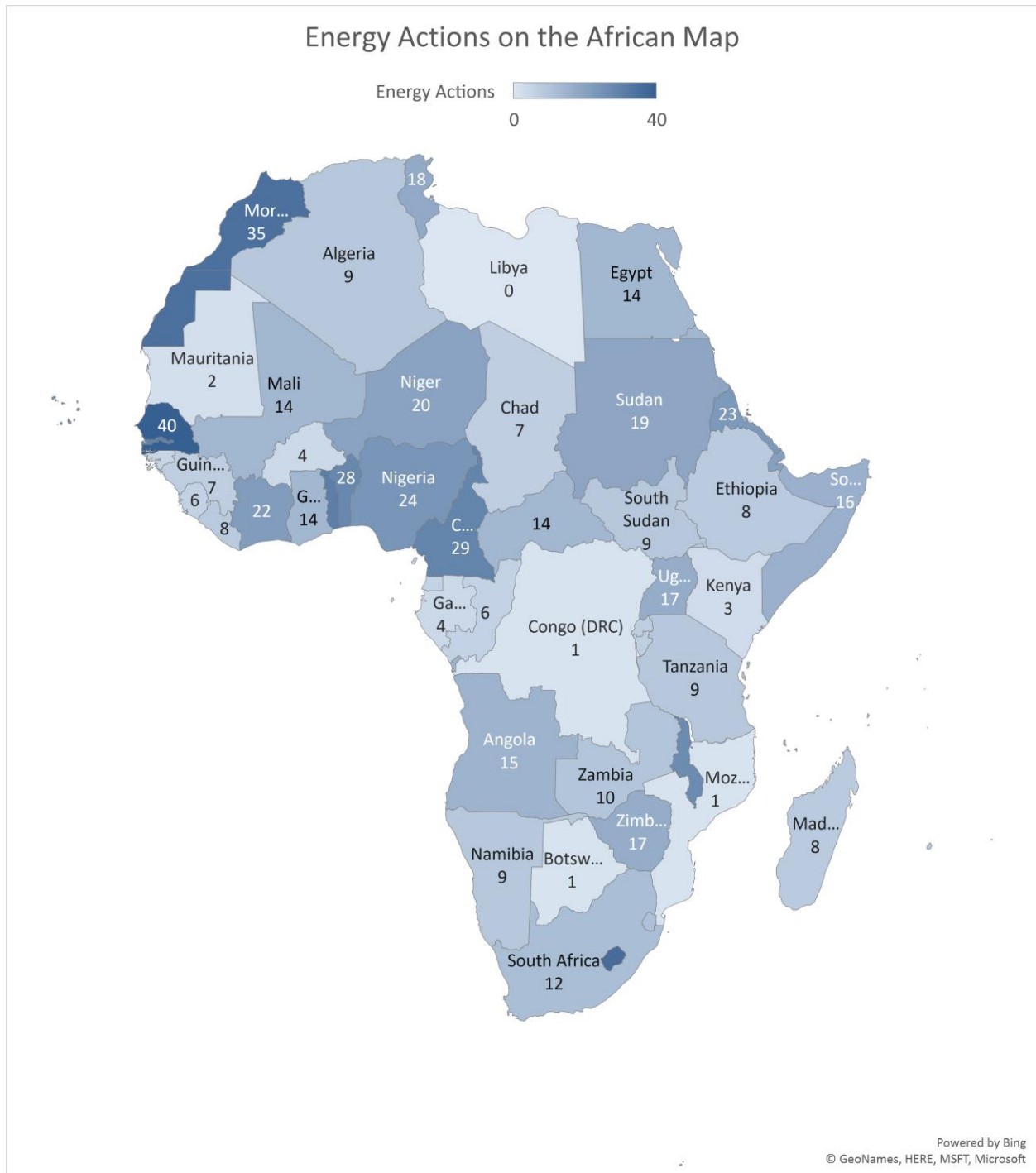


Figure 23⁸ Energy actions on the African map

⁸ Libya has not submitted NDC

The African countries had received over 10 million USD in the pre-NDC period and the amount was increased to 30.54 million USD for energy research.

UK had granted 7.66 million USD during 2013-15 for high-quality research to improve the opportunities to scale up clean energy development in different parts of Africa. The amount was increased to 28.71 million USD in 2016-17. The UK department for international development had granted about 27 million USD to African regions under the Shell foundation project 'Transforming Inclusive Energy Market'. This project was aimed to support innovative technologies and scale up the business models with a fund of 65mn pounds for the next five years.

Renewable energy: The African nations had more focused on renewables than any other sector. They had a total of 347 specific actions on it, which were more than combined actions from the Americas and Asia. Due to geographical and economic conditions, solar power had the highest actions, followed by other-RE with 70 actions. The hydropower had narrowly beaten biofuel for the third position with 69 actions. The figures drop to 37 and 12 for Wind and geothermal energy respectively (see Figure 24).

The African nations had received 6.85 billion USD for renewables in the pre-NDC period and the amount reached 4.28 billion USD in the post-NDC period.

Over 75% of the African countries emphasized their energy activities either on Solar or Hydropower plants

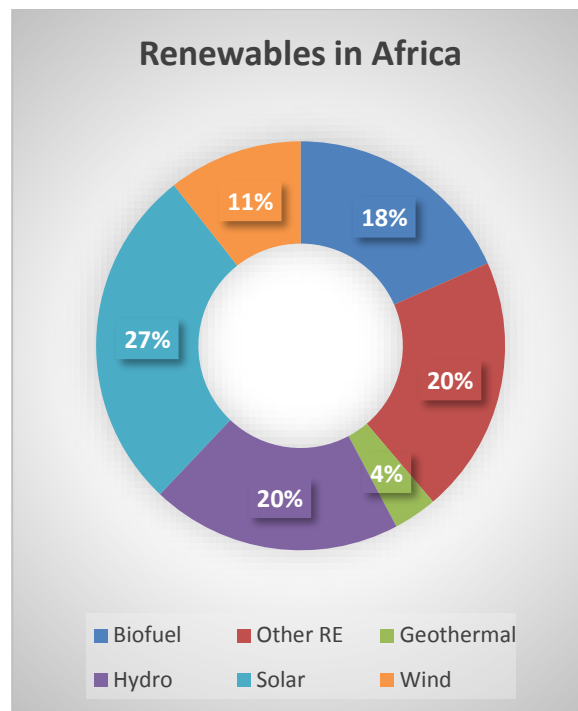


Figure 24 Action of renewables in Africa

Likewise, the actions, **solar** projects had also received the largest amount of funds in both periods. The OECD data revealed that the African countries had received a debt of about two billion USD in the pre-NDC period and an additional 473 million USD in the form of grants. There was one equity investment from GCF noted in 2015. About 20 million USD was invested in solar projects in the Kowasafi Ventures fund. In the post-NDC period, the amount was reached 1.14 billion USD. The biggest transaction was noted from the AIIB. The AIIB had given a loan of 206 million USD for the solar feed-in-tariff program in Egypt. Egypt had received an additional 400 million USD. Hence, Egypt became the biggest recipient in that time period.

The WB had given a debt of 74 million USD for the off-grid solar access project in Kenya in 2017. Morocco was financed by 50 million USD under CTF for two phases of CSP-PV hybrid solution (Concentrating Solar Power-photovoltaic).

Morocco believed that CTF support would contribute to reaching 52% renewable energy by 2030 (page:10, Morocco NDC). Ghana had received about 27 million USD (25 million debt and rest of grant-aid) for different projects incl. solar rooftop, solar charging stations, and solar batteries for rural electrification.

Geothermal, wind energy, hydropower, and biofuel power plants, each had received 20 transactions in the post-NDC period with the amount of 590 million USD, 300 million USD, 200 million USD, 38 million USD respectively.

The African countries had received a total of 1.18 billion USD in the pre-NDC period for the **hydro** projects. However, the amount reached nearly 200 million USD in the post-NDC period.

The WB had given about 480 million USD within 2013-14. Each of Burundi, Rwanda, and Tanzania had received 92.920 million USD for 'Rusumo Falls' hydroelectric power projects. Rwanda had received additional grants of 80.786 million USD for the 'Bi-Jiji & Mulembwe' hydropower project in 2014. Zambia had received 73.61 million USD for a feasibility study conducted by the Norwegian private renewable energy company in 2011-13.

Uganda had secured 50 million USD from the FDA for the hydropower plants over the Muzizi river. The FDA had also approved a loan of 26 million USD for Cote d'Ivoire. Madagascar was financed by debt of 33.50 million USD by the EIB for extension of Andekaleka hydropower station.

The African countries had received about 830 million USD in the pre-NDC period and the amount was reached about 300 million USD in the post-NDC period for **wind** energy projects.

Kenya had received more than 288 million USD from 2011-15. Norway had invested about two

million USD for lake Turkana wind power projects in 2011-12. The amount was increased to 254.27 million USD by the European Investment Bank in 2014.

Egypt had received more than 440 million USD since 2001. The BMZ had given debt of 80.709 million USD for the wind farm projects in the Gulf of Suez. This project had involved the design, construction, and commissioning of a large-size 200 MW wind farm. Additionally, the EIB had given a debt of 125.83 million USD in 2017.

The German agency KfW had given a debt of a total of 143.76 million USD for the wind energy programme-IKLU in Morocco in three different phases.

Only a few African countries had a commitment to **geothermal** energy. The analysis found that there was only a total of 12 actions from Algeria, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Sudan, and Tanzania. However, only the following countries had received funds: Comoros, Djibouti, Ethiopia, Kenya, Tanzania, and Zambia.

The geothermal projects were financed with 345.50 million USD in pre-NDC and the amount was increased to 591 million USD in the post-NDC period. There was no big transaction occurred before 2011. The BMZ had granted 24.09 million USD to support the East African geothermal initiative. In the next three consecutive years, Iceland had granted about 4.27 million USD to continue the geothermal exploration and to increase the possibility of sustainable energy in the East African Rift Valley. Additionally, the UK department of international development had granted 578,277 USD to increase investment in geothermal in East Africa. That project was aimed to reduce the risk of

exploratory test drilling and to attract more investors.

Comoros had received total grants of 1.11 million USD in from the New Zealand Ministry of foreign affairs and trade in 2012-15. The grants were given to assist the development of the potential geothermal resources and counterbalance with diesel-fuelled generation. Whereas, Djibouti had received 8.11 million USD in 2013-14. Ethiopia had received more than 190 million USD in 2014-15, which included 160.23 million USD debt from the WB. However, no transactions for Comoros, Djibouti, and Ethiopia were visible after NDCs creation.

Kenya had received over 100 million USD in the pre-NDC period however, the amount was increased to 550 million USD in 2016-17. Tanzania had reserved a fund of 22.06 million USD under CIF for the Ngozi geothermal site in 2017. Tanzania required rapid additional power generation capacity to cope with grid extension and industrialization, so the BMZ had granted an additional two million USD in the same year. The US had granted Zambia's first commercial geothermal project under trade and development agency in 2017. This plant was expected to produce up to 20 MW.

Biofuel: This sector was least financed among renewables. The African countries had received about 60 million USD in pre-NDC and 38.29 million USD in the post-NDC period. Ethiopia was recorded for the biggest transaction in the pre-NDC period. It had received 23.41 million USD grants from the EU institutions to scaleup the biogas projects. That project was supported to install 35,000 biogas digesters throughout the

country. Angola had secured a loan of 17.50 million USD from the WB in 2016. In the following year, Kenya had received 9.60 million USD from the WB.

Energy Intensity: Figure 25 shows about energy intensity of African countries in 2015 (World Bank, 2016). Somalia had the highest energy intensity among them. Despite this fact, it was granted only two times throughout these many years. Norway's ministry of foreign affairs had granted in 2015 for solar-powered electrification and the UK agency had granted for the other-RE projects in 2016. This fund enhanced resilience and affiliated institutional and regulatory environments to access the electricity. Congo was granted with about two million USD under the GEF trust fund for a hydropower project and an additional 660,000 USD was given by the France ministry for hydro lines for transmission. The Italian ministry had granted 83,000 USD to construct a solar PV plant in Goma.

Guinea-Bissau had only received grants for hydropower and bio power plants under UNIDO (United National Industrial Development Organisation) and UNDP respectively in the post-NDC period. As shown in Figure 25, Guinea-Bissau was an energy-poor country with a 14.7% energy accessibility rate in 2016 (SE4ALL Africa, 2017). In the pre-NDC period, it had received about 90 million USD incl. 78 million USD debt from the WB. This amount had helped the community to access electricity.

Chad only got financial support for renewable energy projects. The DAC members were granting a tiny amount from 2011. Apart from that, the AfDB had granted 780,000 USD in 2015.

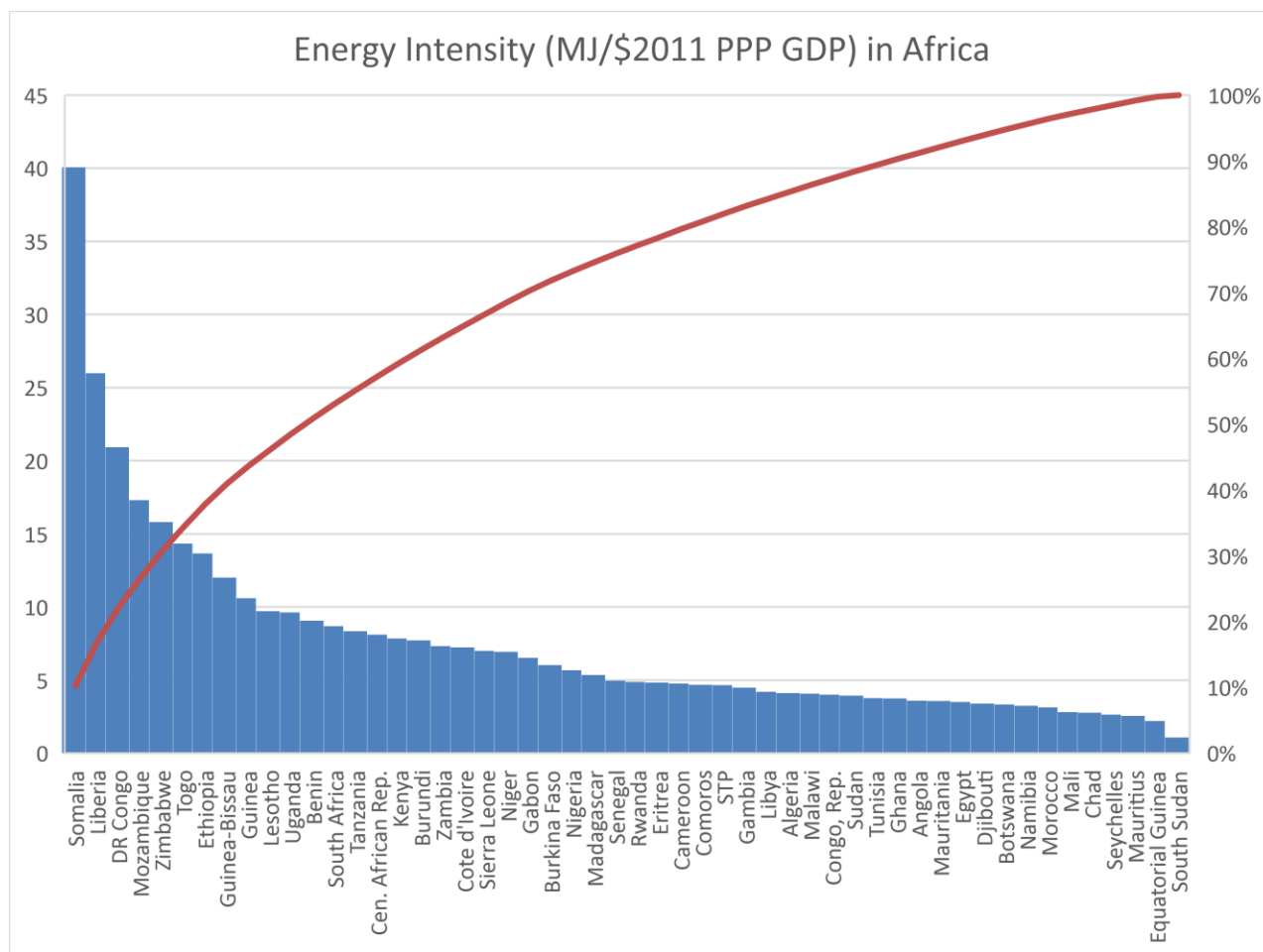


Figure 25 Energy intensity in Africa

Non-renewable energy: 33 African countries had at least a single commitment to non-renewable energy. Out of 67 total actions, 29 were for waste-fired power plants. Followed by 23 actions for ‘other Non-RE’. The figures drop to 10 and 5 for natural gas and coal-fired power plants respectively.

However, the financial trend shows the total opposite. The natural gas was held the largest share in both periods followed by ‘other Non-RE’. There were few transactions visible for coal however, there was only one transaction that occurred for a waste-fired power plant.

Angola, Nigeria, Senegal, Sudan, and Zimbabwe had a commitment to coal-fired power plants.

However, none of these countries had received grants in both periods. There was only one transaction visible in each period. Egypt had received 132,344 USD from DAC-member Korea for the management of its thermal power plants in 2013. Mozambique had received 49,762 USD from the Italian local administration to reduce harmful fumes to health.

Only the following countries had commitments on natural gas power plants: Benin, Cape Verde, Morocco, Nigeria, Senegal, and Sudan. However, none of these countries had received finance in both periods. CIV, Egypt, Mozambique, and Tunisia had received funds from 2012 to 2016.

Mozambique had received 162.45 million USD from the JICA and 6.88 million USD from Sweden to improve the power supply and reduce the current deficit of electricity in the area. The JICA had also financed Tunisia with 358.17 million USD to construct a combined cycle power plant. Egypt had received nearly a similar amount to improve its electricity sector. CIV had received debt of about 120 million USD from IFC in 2013.

23 African countries had commitments on waste-fired power plants. However, only Burkina Faso had received grants of about 50,000 USD in 2017. 14 African countries had commitments on 'other non-RE'. According to the OECD database, the African countries had been funded with 482.06 million USD in pre-NDC however, the amount was reduced to 52 million USD in the post-NDC period. Egypt had received a debt of 27.43 million USD from the KfW, whereas UAE had granted 26.22 million USD to Morocco in 2014. The EBRD was the biggest donor in both periods. It had given debt of about 300 million USD among both countries in 2015 and about 51 million USD to Tunisia in next year.

Energy distribution: As shown in Figure 26, actions on a grid are in the priority list of African countries. There was a total of 50 commitments on it, followed by 23 actions for heating & cooling. The gas distribution sector had 14 actions, whereas no particular action was visible for heat plants.

The African countries had received 3.39 million USD in the pre-NDC period and 2.17 million USD in the post-NDC period. The grid had holed the largest share of finance in both periods, however, no money was granted for heating & cooling. There was only one transaction detected for heat plants.

Togo was ambitious about its commitment to energy. There was a total of 31 actions detected, that covered all cross-cutting themes. Togo was granted with about 20 million USD in the pre-NDC period, most of the amount given by the BMZ for reliable electric supply under the WAPP. That grant was included the rehabilitation of the hydropower plants and strengthening the grid infrastructure for electricity exchange in Nangbeto. In 2017, the WB had given debt of 11.50 million USD for electric power transmission and other support in the energy sector.

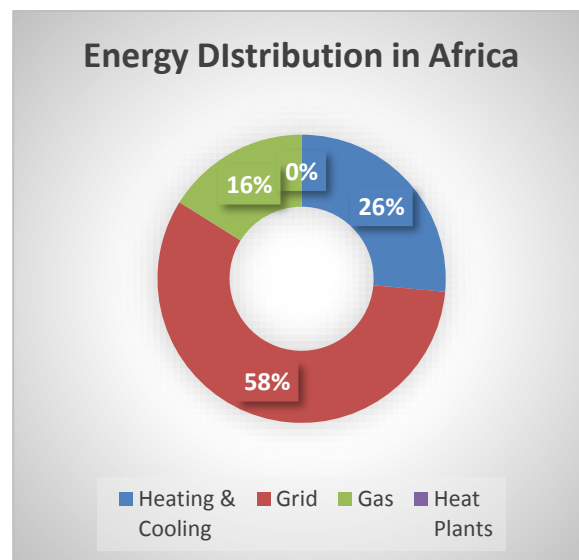


Figure 26 Actions of energy distribution in Africa

DR Congo had no specific actions on renewable energy or energy distribution in NDC, but OECD database revealed that it had received US\$ 44 million for hydropower, US\$ 1.11 million for Solar power, US\$ 4.43 million for biowaste to energy projects, US\$ 44 million debt for Grid expansion in the post-NDC period.

Egypt was among the very few countries, which had received a grant from the UAE. The Abu Dhabi Department of Finance had granted about

165.56 million USD to provide power supply to remote villages via grid connections. In 2015, the target was to reach 70 villages with 159 distribution stations.

Zimbabwe was granted with about 10 million USD over the period of pre-NDC, 7.80 million USD of which granted by the Denmark Ministry of foreign affairs to rehabilitate electric infrastructure. Additionally, one million USD was granted by the Korean International Cooperation Agency to construct a solar water heating system. In the post-NDC period, the amount increased to 43.61 million USD. 85% of this amount was granted by the AfDB for two

different infrastructure projects. One is the EPIRP (Emergency Power Infrastructure Rehabilitation Project) and another is the Alaska-Karoi transmission line.

Only the following countries had commitments on the gas distribution: Algeria, Chad, Comoros, Lesotho, Morocco, Nigeria, Senegal, Somalia, Sudan, and Zimbabwe. However, among them, only Morocco was noted for receiving the grants. Morocco had received grants of 16.25 million USD from the Korean International cooperation agency in 2012.

5.2 Americas

It was analyzed that the American countries have a total of 260 actions specific for energy however, Argentina, Colombia, and Mexico have no energy roadmap mentioned in their NDCs.

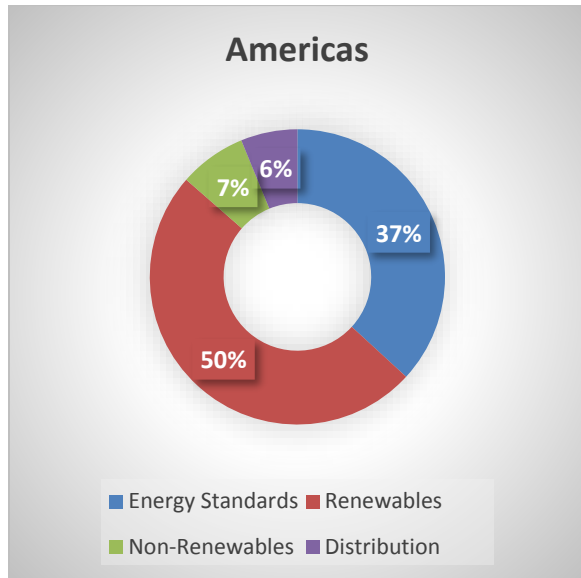


Figure 27 Energy actions in Americas

As shown in Figure 27, half of the actions are on renewables, followed by 96 actions in energy standards. The figures drop to 19 and 16 actions for non-renewables and energy distribution respectively.

Dominica is listed in the top with a total of 25 actions for all sectors incl. one action for Hybrid energy. Panama has narrowly beaten Bolivia for the second position with 21 actions.

Energy standards: There is a total of 96 actions committed from American countries on energy standards. Energy efficiency is covered more than half of the share with 54 actions. Followed by 37 actions on energy policy. Only two countries committed each on energy awareness and research (see Figure 28).

Money flows differ from the actions. Energy policy holds the highest share in both periods. American countries have accounted for a total of 1.66 billion USD in the pre-NDC period for energy standards and the amount reached 935.83 million USD within two years of the post-NDC period. Energy research has got the least priority in both times.

About 2/3rd American nations are committed to demand-side efficiency

Saint Lucia has the highest number of actions on energy efficiency including efficient appliances with labeling scheme, energy efficiency in transport, new building code, and reduce electricity consumption in industries, etc. OECD data revealed that it has not received any external fund for efficiency projects.

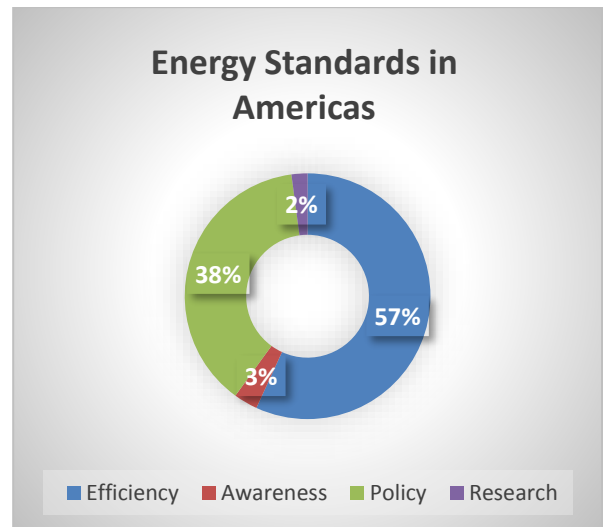


Figure 28 Action of energy standards in America

Antigua & Barbuda, and Venezuela. have priorities on energy **research**. However, they have received grants for different energy policy projects, but no external support detected for energy research.

Only two American countries, Dominica and Guyana have commitments on energy awareness. Records show that they have been granted different energy standards and

renewables projects since 2011 however, none of these countries have received any external support for Awareness.

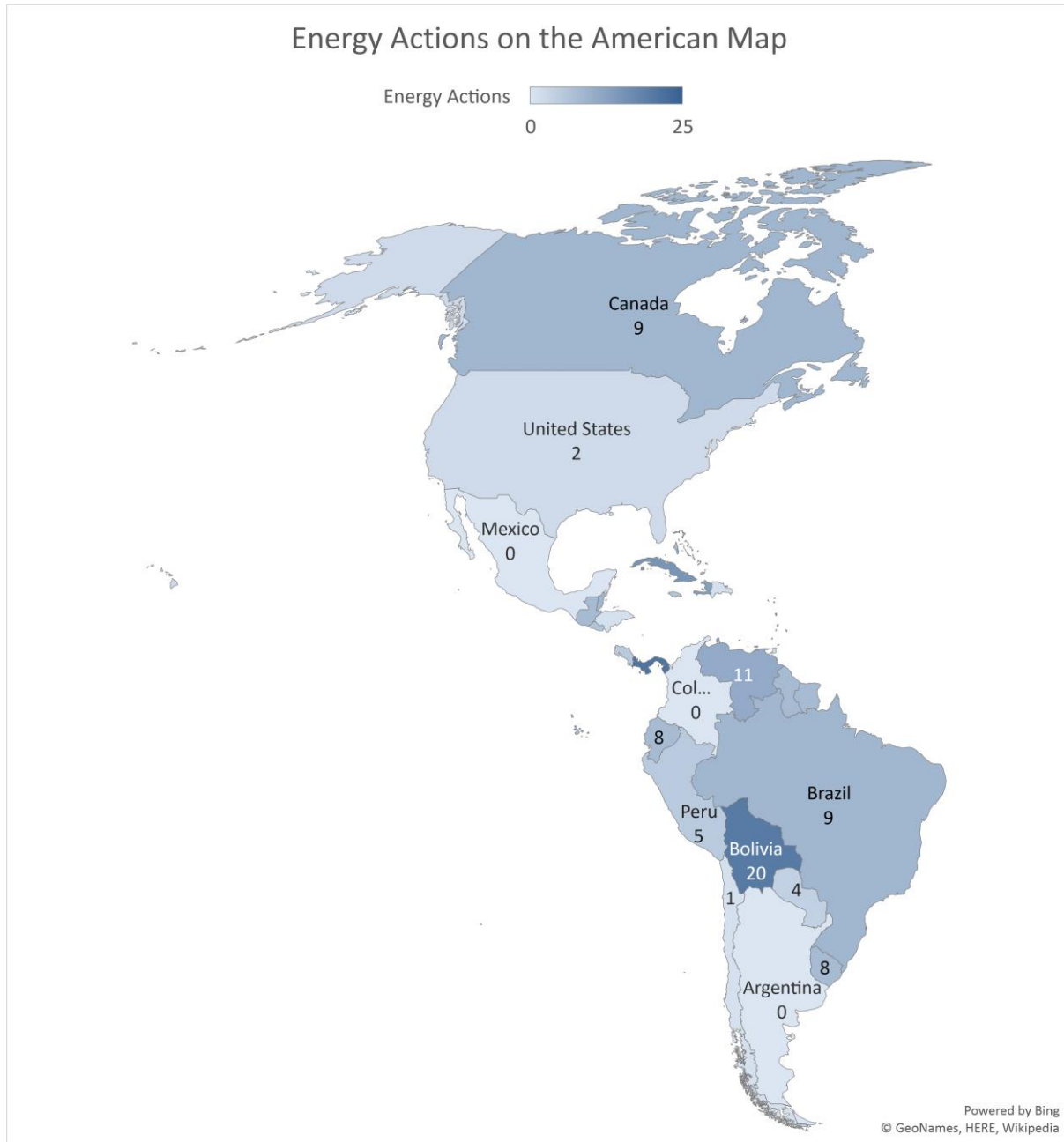


Figure 29 Energy actions on the American map

Honduras, Paraguay, Trinidad & Tobago, and Uruguay have no specific actions on energy standards. According to the information from the OECD database, three out of these four countries have received finance for energy standards projects.

Honduras has received about 45 million USD in pre-NDC and 9 million USD in the post-NDC period. Paraguay has received grants of 65,650 USD from JICA from 2004 to 2016. Furthermore, WB has given debt of 7.20 million USD in 2016. TTD is a high-income country and has not received any external funds. Uruguay has received a debt of 28.72 million USD from WB in 2014 and 12.50 million USD from IADB in 2016.

Renewables: American countries have a total of 128 actions on renewables; 1/4th of these actions are on Other-RE, followed by Solar energy with 26 actions; 23 actions on Wind energy; 21 actions on Hydropower; 19 actions on Biofuel. The figure drops to 7 actions for Geothermal energy (see Figure 30).

Most American countries have a commitment to one of the renewable sources. Though, these countries have not shown their attention in any renewable energy projects: Chile, USA, and 3 other SIDS countries: Antigua & Barbuda, Dominican Republic, and VCT. Costa Rica has reached nearly 100% renewable energy in 2016 (The Guardian, 2017). It has the commitment to maintain a 100% renewable energy matrix by 2030.

According to the OECD database, the Americas have received 5.63 billion USD in the pre-NDC period and 3.72 billion USD. Other-RE holds the highest share whereas, biofuel has the lowest portion of share in both periods. American countries have received the largest amount of

geothermal energy compared to other regions in the post-NDC period.

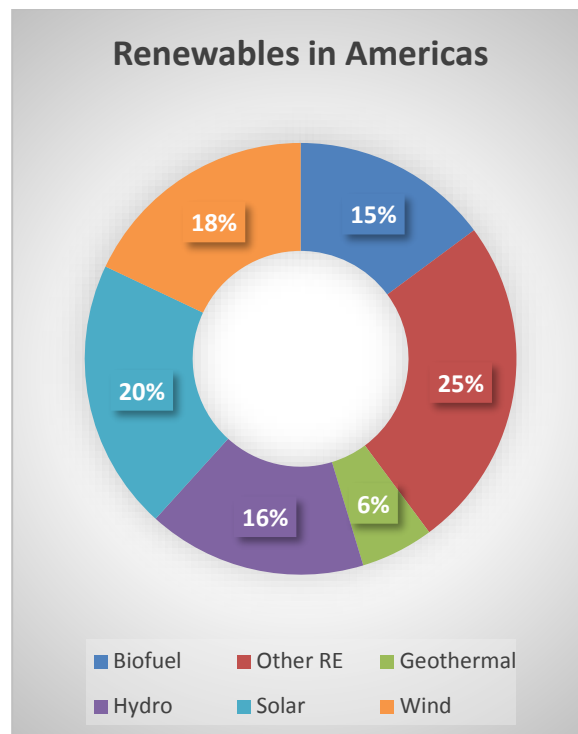


Figure 30 Actions of renewables in Americas

Bolivia and four SIDS countries Dominica, Grenada, KNA and Saint Lucia have specific actions on geothermal energy. Bolivia, Dominica and Saint Lucia were receiving funds since 2013. Bolivia has received a debt of 23.47 million USD from JICA for Geothermal power plant construction in Laguna in 2014. The amount increased to 566.65 million USD for the second phase in 2017, which includes the largest amount given to any renewable energy projects.

According to the OECD database, the Americas have received 1.36 billion USD for 50 different hydropower projects in the pre-NDC period and 435.40 million USD for four different projects in the post-NDC period.

Costa Rica has received more than 300 million USD from IADB for the 'Reventazôn Hydroelectric' project in 2011-12. IFC has given

debt of 90.12 million USD in the next consecutive year. In 2016, Colombia has received a debt of 400 million USD from IADB, which was the third-largest, single transaction amount is given for any renewable energy projects.

Half of the American nations have commitments on Wind energy projects. According to the OECD database, the Americas have received more than 650 million USD in 2014-15, but the amount reduced to 137.15 million USD in 2016-17. IFC

has given debt of about 275 million USD among Brazil, Jamaica, and Panama in 2014. In 2015, Chile has received the loan amount of 169.52 million USD from EIB. There was no transaction occurred in 2016. In 2017, only four transactions detected. Bolivia has received a debt of 72.39 million USD from the French Development Agency, Argentina has received debt of about 50 million USD from IADB. Jamaica has received grants of 840,118 million USD from the US trade and development agency.

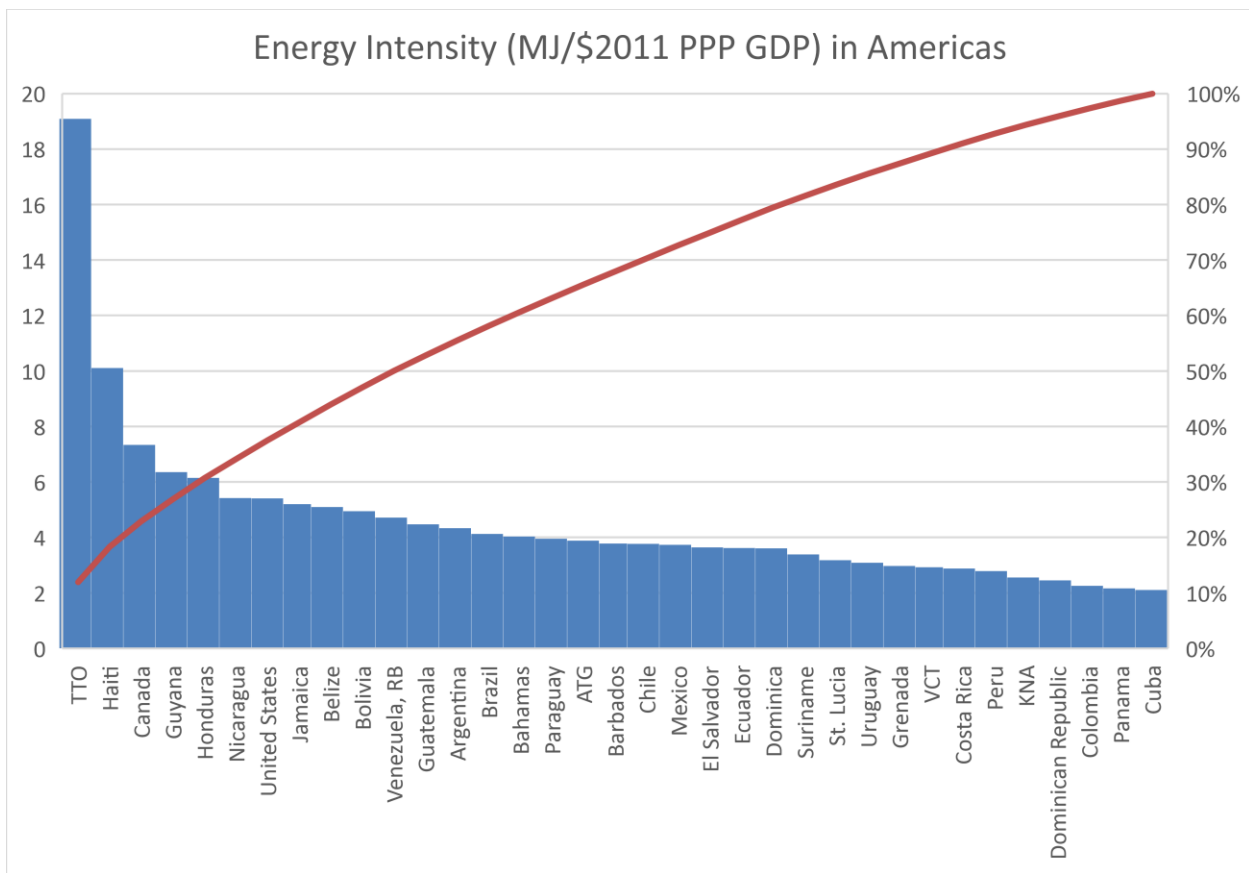


Figure 31 Energy intensity in Americas

Haiti is only a Low-income country and has a high energy intensity in the Americas (see Figure 31) (World Bank, 2016). It has mentioned actions both on energy efficiency and renewable projects. According to the OECD database, it has received grants of about 99 million USD in the pre-NDC period and 29 million USD in the post-

NDC period for energy standards and renewables. Furthermore, Haiti has received a debt of 14.44 million USD from CIF. 'Global affairs Canada' has granted 94,311 USD each for energy efficiency, policy, awareness, and research.

There is one transaction noted for marine energy in Chile. It has subsidized with 58,667 USD from Finland for the maintenance of marine energy companies.

Non-renewable Energy: American countries have committed a total of 19 actions for non-renewable generation energy. There are nine actions for Waste-fired power plants; three actions each for coal and natural gas; four actions for 'other non-RE'. DAC-member Canada has a commitment to both Natural gas and waste-fired power plants. Two other high-income countries, ATG and KNA have also commitments on waste-fired power plants. Whereas, Venezuela has committed mitigation actions on Natural gas power plants.

OECD data revealed that the Americas have received about 65 million USD during 2012-15 and grants about one million USD in 2016-17. None of these amounts have a share of Waste-fired power plants. In 2015 and 2016, the US state department has granted about 40,000 USD under IEA clean coal center project in both years. This project was run with UNEP partnership and the purpose of this project was to get people aware of issues related to mercury emissions from the coal combustion sector.

There are only four transactions visible under US Definitional Mission. Two Out of them were for several feasibility studies and technical assistance in Brazil and Chile in 2012, and others were in the Caribbean region in 2015. The total amount spent was 307,747 USD via US trade and development agency. Two transactions were noted under US Reverse Trade Mission (RTM) in 2013. One was for coal gasification technologies in Chile and the other was for 'Landfill Gas-to-Energy technologies' in Brazil. About 290,000 USD spent on each. The other two RTM featured for Smart grid powered by non-renewables and

wastewater treatment plants. The treatment plant includes energy efficiency, power generation, and non-revenue water reduction technologies in the Caribbean and Central American region, which was granted 282,907 USD in 2016. Under RTM in 2012, 410,573 USD was invested for Smart Grid regulatory in Latin American and the Caribbean region. In the same year, the government of Mexico was granted for technical assistance of the smart grid.

Nicaragua was granted efficient technology on vegetable oil to energy for rural populations: 18,659 USD in 2013 and 7,090 USD in 2014. Bolivia was granted 350,919 USD for the rural electrification from non-renewable sources far back in 2000 and 2001. Guatemala was granted 7,112.57 USD (in 2007) and 24,195.91 USD (in 2017) from miscellaneous agencies of Spain for Indigenous families for power generation and improving housing conditions. Uruguay has received about 63 million USD loans for a new highly efficient gas-fired combined cycle plant, it has a capacity of 532 MW.

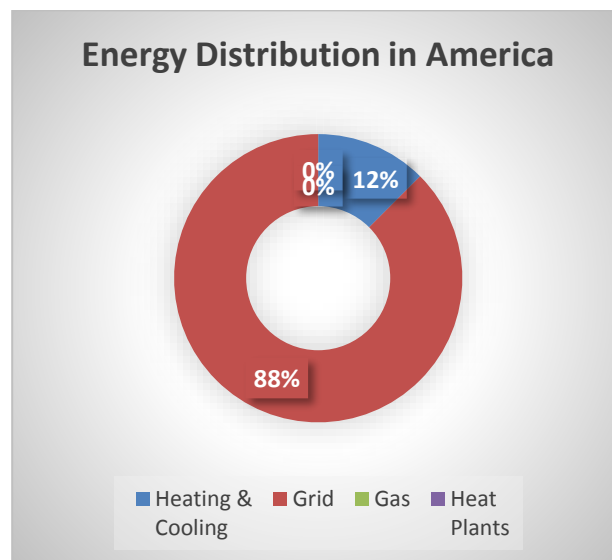


Figure 32 Actions of energy distribution in America

Energy Distribution: As shown in Figure 32, Grid holds the highest share of actions in the

Americas. Eight American countries have committed a total of 14 actions on Grid networks and only two nations committed on heating & cooling. However, no actions detected for Gas distribution and heat plants.

Americas have received about 500 million USD in the pre-NDC period and the amount reached 220.74 million USD in the post-NDC period. In both periods, Grid holds the largest position, followed by Gas distribution. However, there is

no transaction visible on heating & cooling and heat plants.

Four American countries Peru, Brazil, Colombia, and Bolivia got benefited from the Gas distribution system. Brazil has received 6.76 million USD from IFC in 2013, Bolivia has received more than 12 million USD from WB under rural alliance projects, which include gas distribution and grid network expansion.

5.3 Asia

It is analyzed that Asian countries have a total of 563 actions specific for energy however, Georgia and Kyrgyzstan have no energy roadmap mentioned in their NDCs. Georgia NDC stated to have pre-2020 mitigation actions including its first ‘National Energy Efficiency Action Plan’, that supposed to finalized by the end of spring 2016. Maldives, Philippines, and Turkmenistan have a single action in each of the sectors.

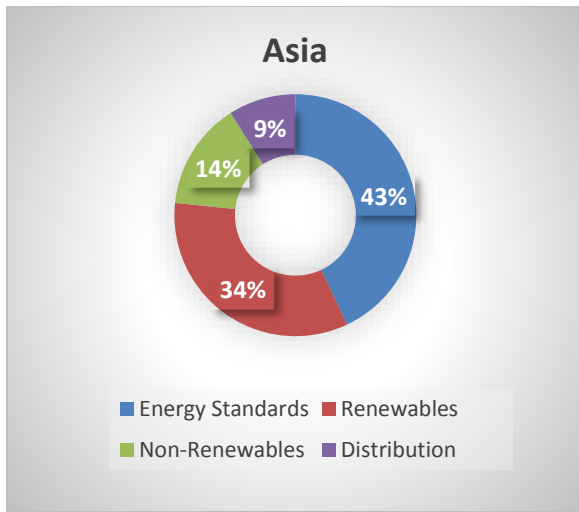


Figure 33 Energy actions in Asia

High-Income groups like Japan, Kuwait, United Arab Emirates are Donors, whereas countries like Bahrain, Brunei Darussalam, Oman, Qatar, Republic of Korea, Saudi Arabia, and Singapore are neither donors nor receivers in energy sectors.

As shown in Figure 33, energy standards have the largest share with 239 actions in total, followed by renewables with 188 actions. The figures drop to 79 and 50 for non-renewables and energy distribution respectively.

Energy standards: There is a total of 239 actions committed from Asian countries on energy standards. Energy efficiency is covering about

2/3rd share with 155 actions. Followed by 50 actions on energy policy. The figures drop to 18 and 16 for energy research and Awareness respectively (see Figure 34).

Money flows are differing from the actions. Energy policy holds the highest share in both periods. Asian countries have accounted for about four billion USD in the pre-NDC period and the amount crossed the three billion USD in the post-NDC period. There was nearly the same amount spent on energy research in both periods.

Japan has committed the highest number of actions. Out of 43 actions, mostly committed to demand-side efficiency. Following by Brunei Darussalam, China, India, and South Korea have 27 actions each.

About 90% of Asian countries are committed to both energy standards and renewable energy sources.

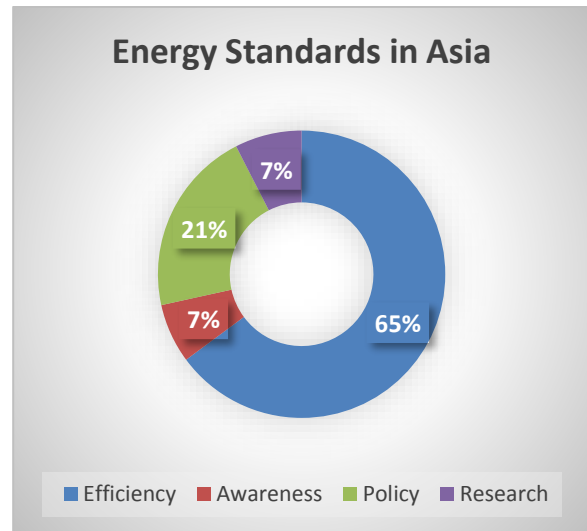


Figure 34 Actions of energy standards in Asia

There are no commitments that came from Maldives, Mongolia, and Philippines on energy standards. But OECD data revealed that all 3 nations have received grants.

The following countries have committed to energy research: Azerbaijan, Brunei Darussalam, China, India, Qatar, Saudi Arabia, Singapore, Syria, UAE, Uzbekistan, Vietnam. However, there are very few transactions visible for China, India, and Uzbekistan.

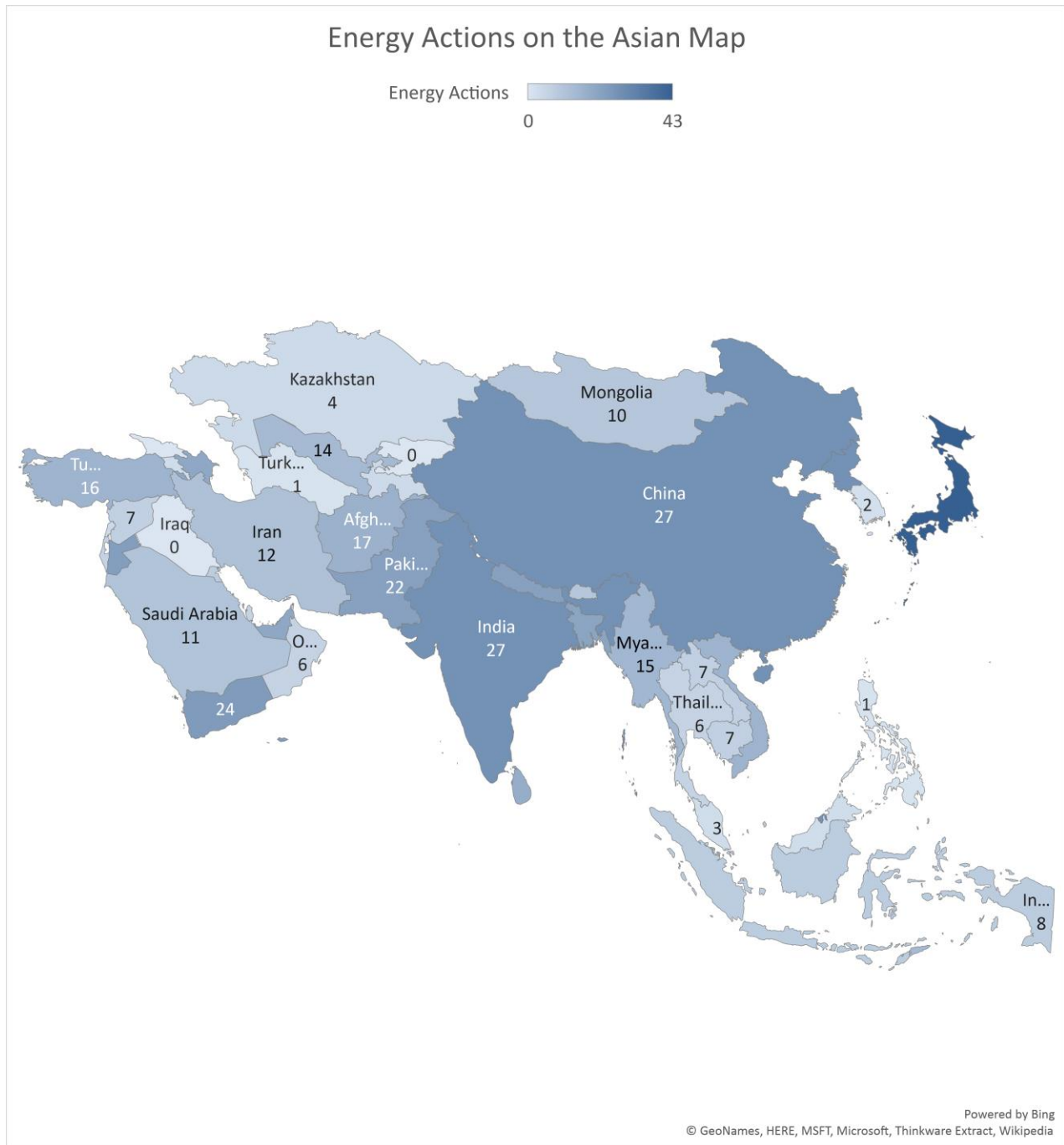


Figure 35 Energy actions on the Asian map

Renewable Energy: Most Asian countries have committed to renewables. Out of total 188 actions on renewables, 71 actions are for Other-RE, followed by Solar energy with 43 actions; 23 actions for both Wind energy and Hydropower; 24 actions on Biofuel. The figure drops to 4 for Geothermal energy (see Figure 36).

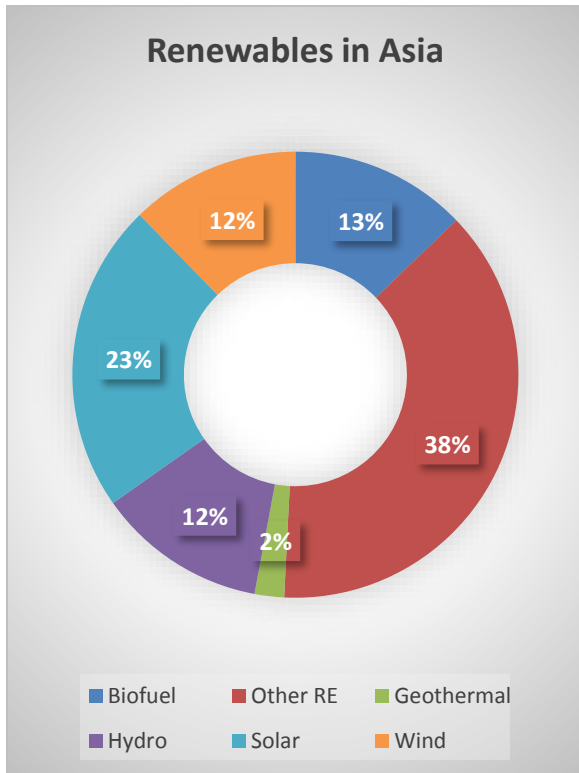


Figure 36 Actions of renewables in Asia

According to the OECD database, Asian countries have received more than 12 billion USD in the pre-NDC period, and the amount reached 5.53 billion USD in the post-NDC period. Other-RE holds the first position in both periods. Followed by hydropower at second and solar in the third position. The amount spent on wind power projects was nearly similar in both periods.

Only the following four countries committed to Geothermal power plants: Azerbaijan, China, Saudi Arabia, and Yemen. According to the OECD database, Armenia, China, India, Indonesia,

Mongolia, Philippines, and Turkey have received funds over the periods. Indonesia holds the largest share among these countries. It has received more than 1.25 billion USD since 2004.

Apart from granting to Chernobyl nuclear disaster site, Non-DAC member Lithuania has granted Georgia, Indonesia, and Malaysia under the project on “sharing of the Lithuanian experience with the developing countries in the use of technologies relying on the renewable energy sources”. Since 2015 the total amount recorded under this project was more than 500,000 USD.

The emerging countries like India and China are focusing on all sectors of renewable energy. India has received 2.50 billion USD in pre-NDC and 1.46 billion USD in the post-NDC period. China has received 1.22 billion USD in pre-NDC and about 500 million USD in the post-NDC period.

Energy Intensity: Figure 37 shows the energy intensity of Asian countries in 2015 (World Bank, 2016). Turkmenistan has the highest energy intensity among Asian countries. It has committed to its energy policy to increase energy efficiency and the share of renewable energy. It has nearly 100% energy accessibility, which is mostly coming from eight thermal power plants. Turkmenistan has a huge amount of solar and wind power, which is comparable to its fossil fuel potential (Energylopedia, 2018). According to the OECD database, it has received grants of 6.58 million USD during 2011-15 and 212,963 USD in 2016-17 for different energy policy and renewable energy projects, which is a baby step to replace the non-renewable energy to renewable energy.

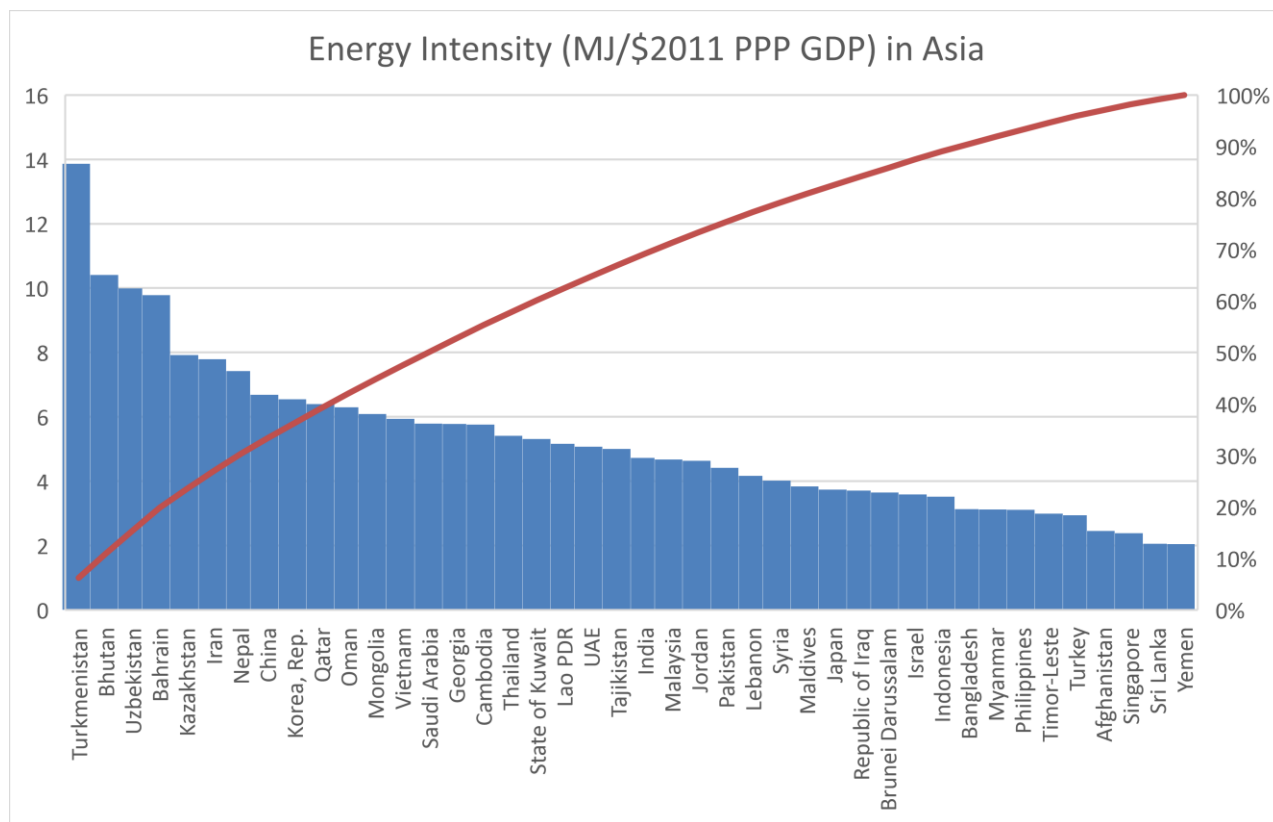


Figure 37 Energy intensity in Asia

Non-renewable energy: Over 2/3rd Asian countries have a commitment to one of the non-renewable sources. With 79 actions in total, Asia has the highest share among all regions. There is a total of 28 actions visible for waste-fired power plants, followed by 25 actions for coal and 20 actions for Natural gas power plans. There are only 5 nations committed for ‘other non-RE’.

The financial transactions are totally opposite. No transactions have appeared on waste-fired in both periods. There was more than five billion USD spent in the pre-NDC period, out of which 3.54 billion USD spent on Natural gas energy production. Other non-RE projects have received 1.28 billion USD, whereas coal-fired power plants have received a fund of more than 500 million USD. The post-NDC amount reached nearly one billion USD. Each of Coal and other non-RE has received more than 450 million USD.

However, no amount detected for natural Gas in the post-NDC period.

Bangladesh received debt of more than 450 million USD by JICA for ‘Matarbari’ Ultra Super Critical **Coal-fired** power project in 2016-17.

JICA has given debt of over 180 million USD for the rehabilitation of ‘Hartha’ thermal power station, Iraq in 2015. An additional debt of 200 million USD given in 2017. Furthermore, WB has given debt of 240 million USD in 2015 for energy sustainability.

AsDB has given debt of more than 300 million USD for non-renewables in 2013, 2014 and 2015. To enhance the energy supply, Pakistan has received about 200 million USD. This project was expected to provide the next five years of operation and maintenance support, to install emission control devices to improve compliance

with international environmental standards and promote education & technical training.

Energy Distribution: Twenty Asian countries have put energy distribution in their priority lists. There is a total of 50 commitment observe from these countries. 22 actions on heating & cooling; followed by 21 actions on grid networks. The figure drops to 7 for Gas distribution. There is no specific action mentioned for heat plants (see Figure 38).

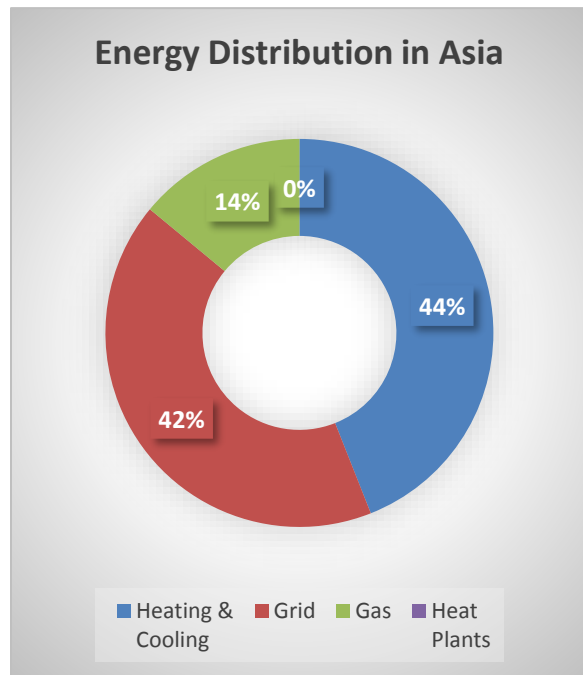


Figure 38 Actions of energy distribution in Asia

According to the OECD database, there were about nine billion USD spent on energy distribution in Asia in the pre-NDC period. The amount reached 4.46 billion USD in the next couple of years. Over 89% amount spent on grid networks. Projects on Gas distribution have received 895 million USD. There is no deal that appeared for heat plants.

In 2017, WB has given debt of 88 million USD to Iraq for emergency operation of electric transmission & distribution lines. In the same year, over 250 million USD loaned by JICA for the reconstruction of transmission from 'Hartha' electricity sector.

Only two Asian countries were financed for **district heating and cooling**. AsDB has given a loan of 64.27 million USD to China for low-carbon district heating in Hohhot (autonomous region of Inner Mongolia). Georgia was granted by the Czech Development Agency for heating schools in 2017. About 25,000 USD was granted to run a pilot project to create heat using organic waste in selected schools.

5.4 Europe

Most of the European countries are High-Income groups and wealthier. Despite this fact, some countries like Moldova and Ukraine are a Lower middle-income group, and countries like Albania, Bulgaria (EU), Belarus, Bosnia & Herzegovina (BiH), Croatia (EU), former Yugoslav Republic of Macedonia, Montenegro, and Romania (EU) are Upper middle-income group.

Latvia and the European Commission on behalf of the EU and its member states combined submitted only one NDC. This NDC mentioned the only action on Land use, Land use change and forestry (LULUCF), but no specific action detected for energy. Countries that have not classified specific energy actions in their NDC, generally having other energy policies.

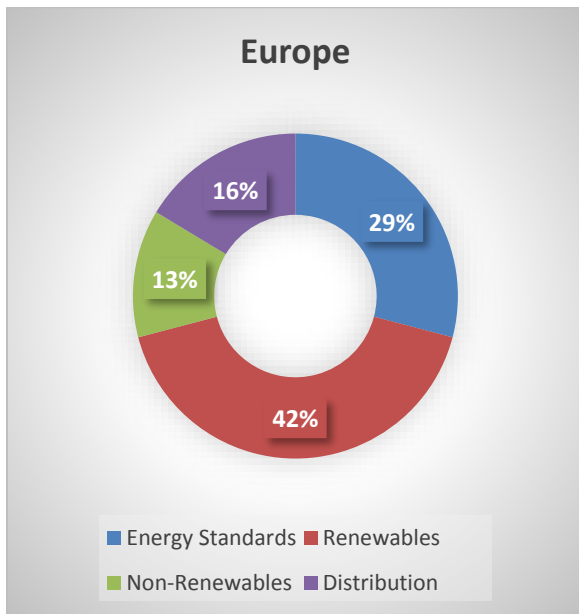


Figure 39 Energy actions in Europe

As shown in the pie chart, European countries have priority on renewable energy, followed by energy standards. Few countries have commitments to non-renewable energy and energy distribution.

There is a total of 55 commitments came from nine European countries. Macedonia has a total of 21 energy actions, which is the highest among Europe. Followed by Moldova with 11 actions and BiH has 9 actions in total. Monaco and San Marino have three actions each. The following countries have only two actions specific for energy: Liechtenstein, Montenegro, Russia, and Ukraine.

Andorra, Belarus, Iceland, Norway, Serbia, and Switzerland have no specific energy actions in their NDCs. Iceland reached 100% renewable energy before 1990, so they are looking following sectors for mitigation: agriculture, fisheries, industrial processes, transport, waste, and LULUCF. Belarus explained the previous track record on energy, which proved that they have very little changed in per capita GHG emissions as compared to 1995 despite the increase in GDP per capita. Thus, they have not stated any energy actions in their NDC.

Energy standards: Except for Lichtenstein, all other countries have commitments on energy standards. Only Moldova has committed energy research. However, no records found for energy research in the OECD database. Europe has received about 950 million USD in the pre-NDC period and more than 200 million USD in the post-NDC period for energy standards.

Belarus and Ukraine have received about 100,000 USD grants for the different study tours, and workshops on energy efficiency & management under Austrian energy partnerships with countries in Central and Eastern Europe.

Renewables: Most of the European countries have mentioned action of at least one renewable energy source of generation except Monaco.

Europe has received more than 940 million USD in the pre-NDC period and more than 340 million

USD in the post-NDC period for renewable energy projects. One big change noted for Serbia. It has received nearly more than 100 million USD in the pre-NDC period, later increased to 241 million USD within two years of post-NDC.

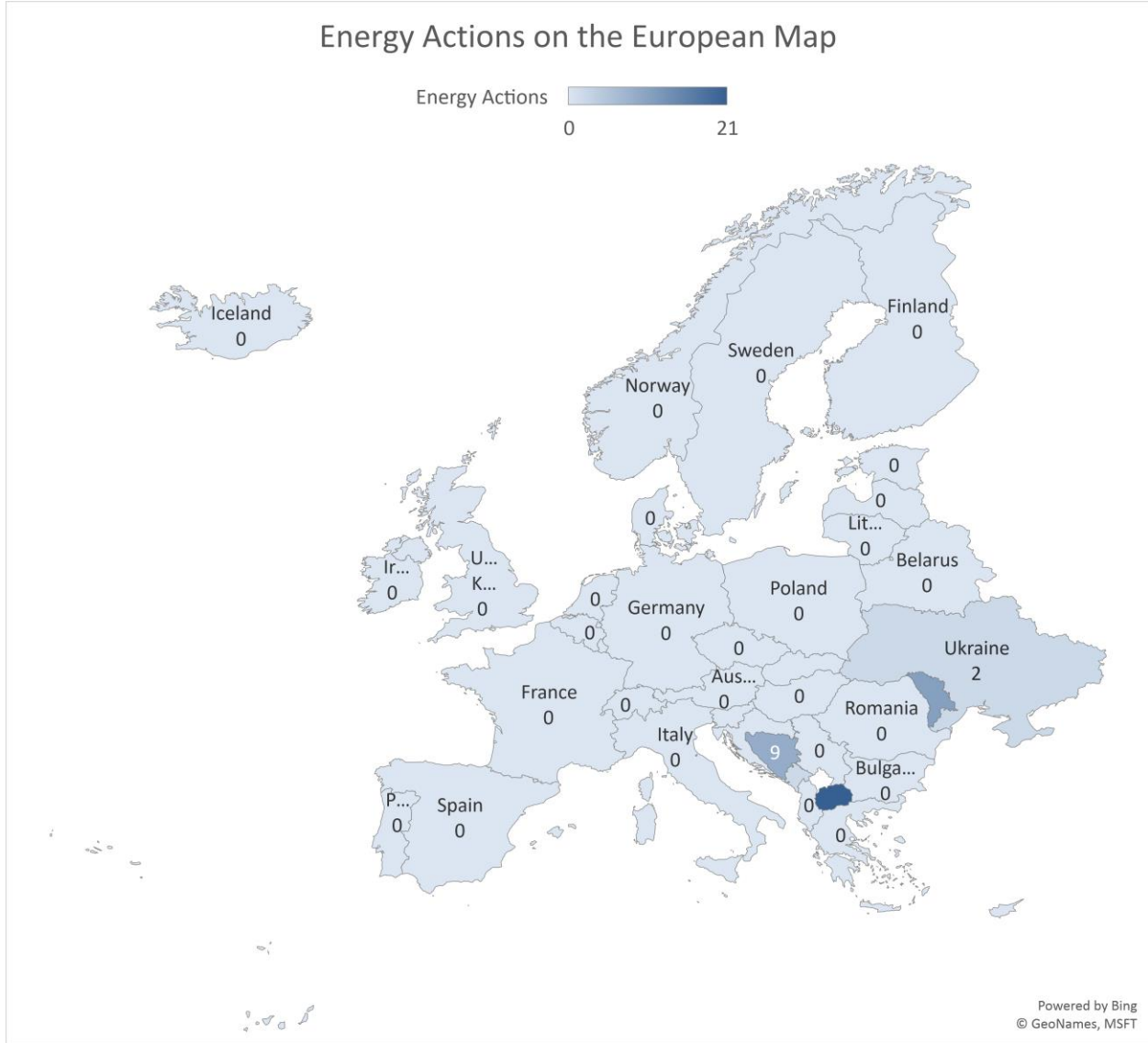


Figure 40 Energy actions on the European map^{9,10}

Over 100 million USD financed for **Biofuel**-fired power plants project in the pre-NDC period. WB has solely given debt of approx. 60 million USD

to the Belarus Biomass district heating project. In the post-NDC period, the amount reached about 35 million USD. Most of these amounts financed

⁹ It excludes the Russian Federation map

¹⁰ According to OECD database, Kosovo was part of Serbia

for Serbian projects. Serbian central government has secured 21.78 million USD debt and 10% of it in grant form for the municipal district heating system to be run by biomass energy. German Federal Ministry of Finance has granted about nine million USD in 2013 and about three million USD in 2016 for the development of a sustainable bioenergy market in Serbia.

BIH, Moldova, and Macedonia have commitments on **hydropower** projects. According to the OECD database, Albania, BIH, Macedonia, and Serbia have received funds for hydropower projects. There was a total of 178.48 million USD spent on a Hydropower project in the Pre-NDC period. Out of which half of the amount financed on Albania Hydropower projects over the period of 2000 to 2015. About 45 million USD financed for the rehabilitation of different plants on Serbia from 2004 to 2007. In 2017, it is granted with 9,803 USD for a feasibility study to convert old water mills into small hydropower plants. Whereas, BIH is working on a methodology for assessing quality infrastructure on small hydropower plants. It is granted with 27,645 USD from Slovenian agencies in 2016.

Wind energy projects were not financed for non-EU countries until 2012. BIH, Serbia, and Ukraine were the only European countries, which financed from an external source for Wind power plants over the periods. BIH has secured a loan of about 65 million USD for a wind farm on at Hrgud site in the Republika Srpska. Serbia is financed with 89 million USD for their 3 different wind projects. IFC and CIF financed a total of 21.52 million USD for two different wind projects in Serbia and Ukraine respectively.

There is a total of six actions came from BIH, Moldova, San Marino and Macedonia for **Solar** energy. Except for San Marino, other nations

have received grants from time to time. There was a total of six million USD granted in the pre-NDC period. Moldova has received about four million USD for the solar electricity generation system in Moldova in 2011. The amount reached 679,000 USD in the post-NDC period and spent among BIH, Moldova, and Ukraine.

Only Macedonia has a commitment to **geothermal** power plants. There is only one transaction visible for it in 2006. Macedonia was granted with 1.90 million USD for its geothermal power plant in Kocani. Apart from it 2.25 million USD spent among BIH, Serbia, and Ukraine from 2013 to 2017. About half of this amount spent on granting for the Sevarlije geothermal power plant in 'Doboj', BIH. This project included the pump testing and supervision of the technical part to implement on-site.

Montenegro, Russia, and Ukraine each have a single action on **other-RE** projects. All have the commitments to increase the share of renewable energy. Montenegro and Ukraine both have received the least grants over the periods. According to the OECD database, there was over 610 million USD financed for other-RE projects in the pre-NDC period. About 2/3rd of this amount went in BIH. The amount just crossed to 150 million USD in the Post-NDC period. Serbia has received over 115 million USD as a loan in 2017.

Non-renewables: There are a total of seven actions committed for non-renewable energy generation; four actions for waste-fired; two for coal-fired power plants and one action for natural gas. BIH, Liechtenstein, Monaco and San Marino have a single action on waste-fired power plants. While BIH and Macedonia have actions on coal and natural gas respectively.

According to the OECD database, Europe has financed over 500 million USD in the pre-NDC period. There are only four transactions detected, two for each coal and natural gas power plants over the period. In 2014, Serbia (incl. Kosovo) is granted a total of four million USD for efficiency improvement in **coal**-fired power plants. Over 60 million USD loans given to Belarus Natural Gas power plants for efficiency improvements and 111,500 USD granted to Ukraine for methane leak prevention.

Out of a total of 131 million USD financed for non-renewable projects in 2016, more than 130 million USD transacted in Albania for other non-RE projects and the rest of the amount granted for Ukraine for waste-fired power plant, which is 2nd most power plant after Burkina Faso over the period.

Energy Distribution: Europe has higher energy accessibility compare to other regions. However, there is a total of 9 commitments detected for mitigation activity in energy distribution. These actions came from BIH, Moldova, and Macedonia.

According to the OECD database, Europe has received more than 600 million USD in the pre-NDC period for energy distribution, out of which Albania has received a fund of 160 million USD for grid networks and over 90 million USD received by Serbia.

In the post-NDC period, the amount is just crossed to 300 million USD. More than half of

this amount was given for rehabilitation of substation in Eastern Ukraine. Over 55 million USD loan was given under 400 KV transmission line projects from Albania to Macedonia, as this project would close the last gap in the grid network with Albania to its neighboring countries.

BIH is the second most country after Georgia, which granted for **Heating & cooling** project in the Post-NDC period. It was granted 300,000 USD under the UN Development Program for improvement in district heating. On the other side, Macedonia has secured a loan of 43.70 million USD for improving efficiency in the district heating and cooling system. The money was allotted under Phase-IV of the program 'Energy Efficiency & Renewable Energy' in 2015. The main objective of the project was sustainable economic growth and the social development of Macedonia with climate protection.

Albania is the only country, which was granted about 8.53 million USD for the project to build technical and managerial capacities for large gas infrastructure development. The reason behind of Albanian project was to secure the energy supply from different administrative obstacles and diversification in energy supply.

5.5 Oceania

Most of the Oceanian¹¹ countries have commitments on energy except Micronesia. According to the analysis, there are a total of 170 actions came from Oceania. As seen in Figure 41, more than half of the share covered by renewables, followed by energy standards with 60 actions. The figures drop to 12 and 3 for energy distribution and non-renewables respectively.

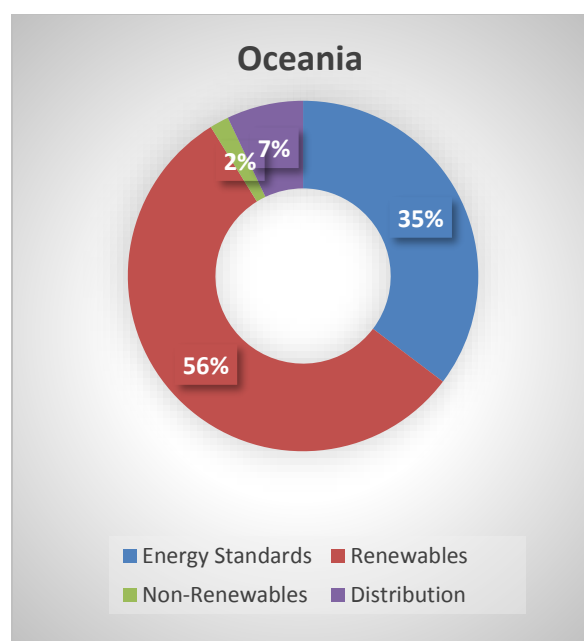


Figure 41 Energy actions in Oceania

Nauru, and DAC-member countries Australia and New Zealand are high-income countries in Oceania. There have three, two and one actions respectively. Australia has a commitment to 23% energy generation from RE sources by 2020 and 40% energy efficiency improvement. New Zealand is already in progress of renewable energy and sets a target to reach 90% electricity from renewable sources by 2025 from the

¹¹ Due to visibility issues, map of the Oceanian countries is not included.

current 80%. Due to Phosphate mining, Nauru is in High-Income groups and transitions to untapped clean energy sources. It wants to bring down Diesel consumption by replacing it with a large-scale grid-connected Solar PV system. However, due to mismanagement in the economy (The Guardian, 2016), per capita income reduced throughout the years and needs financial support for ambitious projects.

Energy Standards: Most of the Oceania islands have at least a single commitment to energy standards. The Solomon Islands has not any action on energy standards, however, it mainly focuses on renewables. As shown in Figure 42, energy efficiency covers a large portion of the doughnut chart. There is a total of 15 actions on energy policy; 2 actions on energy research and 1 action on awareness. The financial share is differing from energy actions. Oceanian countries have received 63.26 million USD in the pre-NDC period and nearly the same amount in 2016-17. In both periods, energy policy holds the largest portion. The other sub-sectors have very tiny portions.

80% of Oceanian countries have commitments on energy **efficiency**. However, it has only one transaction throughout the period. Micronesia has granted about two million USD under GEF for its public sector building efficiency.

Fiji is the only country that focuses on energy research and granted money.

The Oceanian countries seem not focusing on energy **awareness**. Only Tuvalu has a commitment to public education regarding energy efficiency. OECD database revealed that there is only one transaction occurred throughout the period. Fiji is granted 72,127 USD for capacity building on clean energy development in 2007.

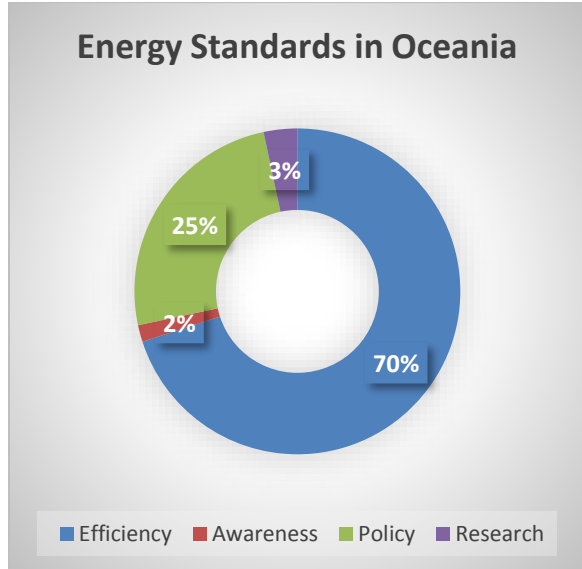


Figure 42 Actions of energy standards in Oceania

Renewable Energy: Likewise, energy standards most of the Oceanian countries have commitments on renewable energy generation. As shown in Figure 43, Solar and other-RE shares equal portions of the doughnut chart. Each has 33 actions in total, followed by hydropower with 10 actions. The figures drop to 8 and 7 for biofuel and wind energy. Only 3 countries are committed to Geothermal energy.

According to the OECD database, Oceanian countries have received 272.03 million USD in the pre-NDC period and nearly the same amount in the post-NDC period. Solar holds the second position in both periods. The amounts for Hydropower and wind energy are increased in the post-NDC period.

In the pre-NDC period, no amount was settled for **Biofuel** energy, however, there is one transaction worth of 456,693 USD seen in the post-NDC period.

Fiji, Solomon Islands, and Vanuatu are committed to **geothermal** energy. However, only Vanuatu and Papua New Guinea have received grants of about 500,000 USD between 2013 to 2017.

Apart from Fiji, Samoa, Solomon Islands, and Wallis & Futuna have also commitments on **hydropower** projects. Except for Wallis & Futuna, the other three Islands have received finance. Solomon Islands has received 13.11 million USD in 2014-15. The amount increases to 150.53 million USD in 2017. Samoa was granted 16.35 million USD from AsDB in 2016. Fiji has secured a debt of 2.24 million USD from IFC in 2014. Furthermore, Vanuatu has received about seven million USD from CIF in 2015 and 4.90 million USD from AsDB in 2016. Whereas, PNG has received about six million USD in 2013.

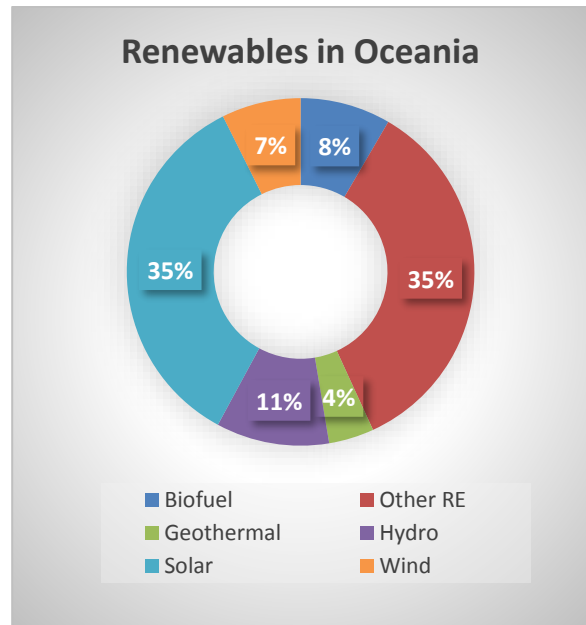


Figure 43 Actions of renewables in Oceania

Fiji, Marshall Islands, Niue, Samoa, Tuvalu, Vanuatu, and Wallis & Futuna have committed actions for **wind** energy. However, only Samoa along with Micronesia has received about 27 million USD from 2013 to 2017.

middle-income country; however, it is among the higher energy intensity group. According to the WB report, PNG had one of the lowest electrification rates in the world with only 10% (World Bank, 2013). According to its commitments in NDC, PNG is putting its big efforts to reduce fossil fuel emissions and set a target to reach 100% renewable energy by 2030.

Energy Intensity: Figure 44 shows the energy intensity of Oceanian countries in 2015 (World Bank, 2016). Papua New Guinea is a lower-

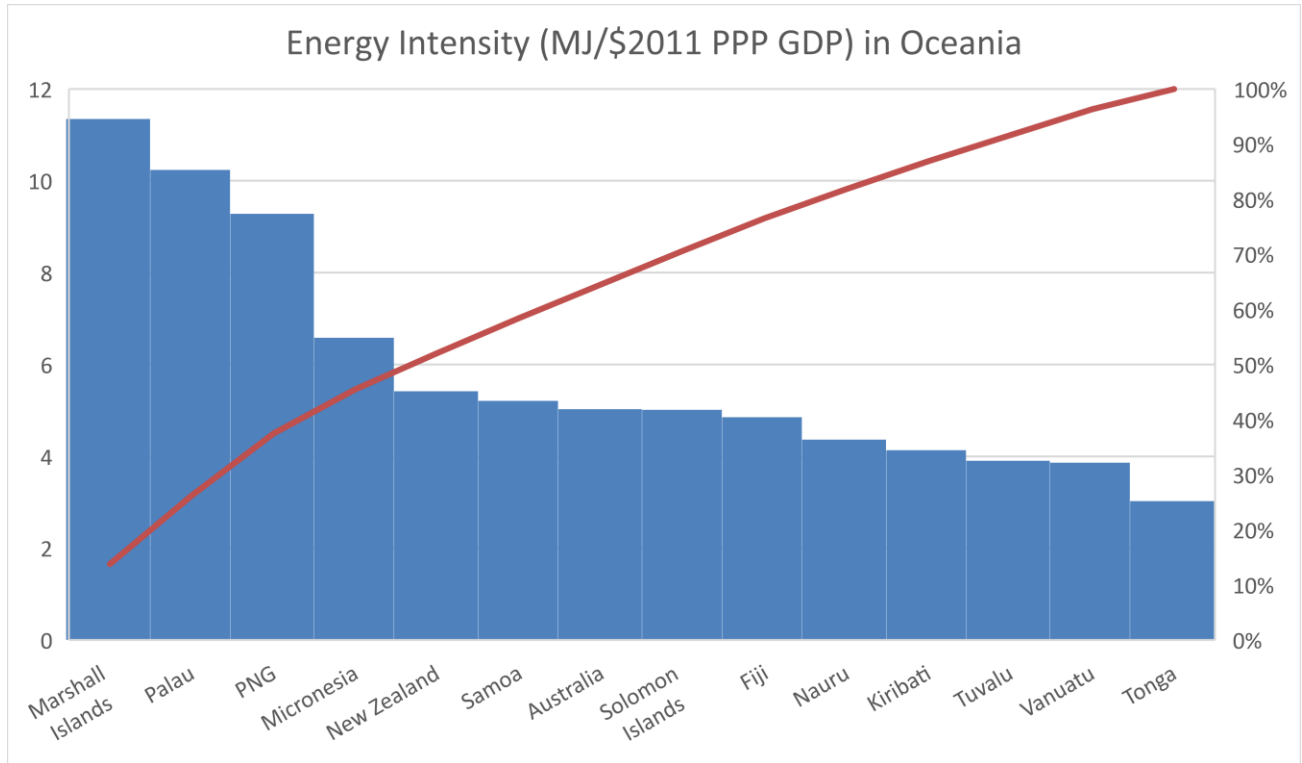


Figure 44 Energy intensity in Oceania

Non-renewable Energy: There is a total of three actions visible in this cross-cutting theme. Fiji, Marshall Islands, and Wallis & Futuna have commitments for waste-fired actions. There is no action detected for Coal, natural gas and other non-RE. In the OECD database, there are very limited transactions occurred in both periods. They have received 9.67 million USD in the pre-NDC period, and the amount reduced to 73.75 USD in 2016-17.

The Pre-NDC amount spent on other non-RE projects in Micronesia, Niue, and Tonga. Out of which, Micronesia is granted more than seven million USD for energy system development and about two million USD in terms of a loan to reduce the dependency of Diesel and improve the supply side efficiencies of power delivery.

Solomon Island is granted 73,753 USD for other Non-Renewable projects under Technical Assistance special fund from AsDB in 2017. There

is no fund transfer that appeared for Coal, Natural Gas, and waste-fire power plants.

Energy Distribution: There are a total of twelve commitments came from Oceania. According to the analysis, 10 actions are for grid networks. Only Niue and Palau have actions for Gas distribution, and Heating & Cooling respectively. There is no action mentioned for heat plants (see Figure 45).

The financial data looks like actions in both periods. Oceanian nations have received funds for grid networks only. There is no transaction visible for other sub-sector of energy distribution.

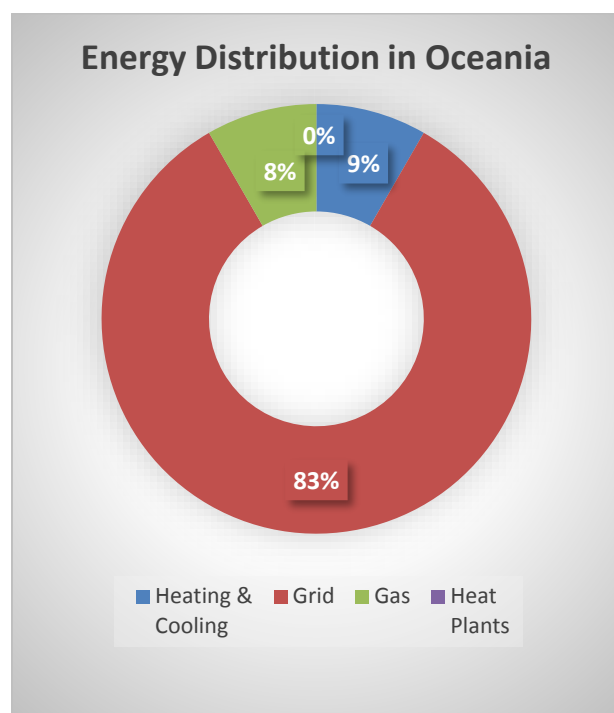


Figure 45 Actions of energy distribution in Oceania

Oceania has received 133.31 million USD from 2011 to 2014 and about 70 million USD in 2016-17. Cook Islands, Kiribati, Niue, Palau, Tonga, and Vanuatu have mentioned actions on grid

connectivity. New Zealand Ministry of foreign affairs & trade granted Tonga with about 20 million USD for energy assistance and village network up-gradation for the years 2011 and 2013. Tonga village network upgrade project has established with ten years of energy roadmap (2010 to 2020) to reduce reliance on imported fuel for electricity generation and provide access to electricity to all rural and peri-urban households. Tonga has received an additional 737,596 USD from AsDB to build power utility in 2017.

PNG faced a chronic shortage of electricity, despite remarkable economic growth. Moreover, to cope with the increasing demand from two major power systems was challenging (JICA, 2013). JICA approved debt of 80 million USD to the Ramu Transmission System Reinforcement Project in 2013. In the same year, PNG has secured an additional 26.50 million USD debt from AsDB for Port Moresby Grid Development Project. The purpose of this project was to upgrade and extend the grid network in the national capital.

About 1/3rd nation are focusing on Grid network and improvement.

About three million USD granted under GEF general trust fund for stimulating progress for rural electrification in the Solomon Islands and an additional three million USD debt given for electric power transmission & distribution network under the Tina River hydropower project.

Chapter: 6 Discussion & Recommendations

6.1 Discussion

In 2015, the adoption of the 2030 Agenda for Sustainable Development and the Paris Agreement provided a basis for considerable optimism for the fight against climate change and efforts to promote sustainable development. Yet, the implementation of these two global agendas at the national level remains a key challenge. This thesis has investigated the role of energy that plays in the Nationally Determined Contributions (NDCs) under the Paris Agreement and to what extent climate finance is considered in the context of the energy system transition

According to review and analysis based on the NDCs, the 'NDC-SDG Connections Toolbox' finds out more than 7000 commitments for climate actions, out of which 1800 actions are specific for energy (SDG 7).

The share of energy system transition is shown in Figure 46. It is clearly visible that half of the actions are on sustainable energy (SDG 'Target 7.2'). Over 140 countries have mentioned renewable energy projects in their NDCs. Followed by 'target 7.3' has a 39% share. Nearly 100 countries have committed to improving their energy efficiency. The share of 'target 7.1' is only 11%. Over 70 countries have committed for accessibility and reliability of energy.

The reduction of Solar power prices will make it possible to brighten up the least developed countries (LDCs). 33 out of 44 LDCs have committed for solar, the rest of the countries have at least a single action on other forms of renewable energy. However, Burkina Faso and DR Congo have no actions on renewables.

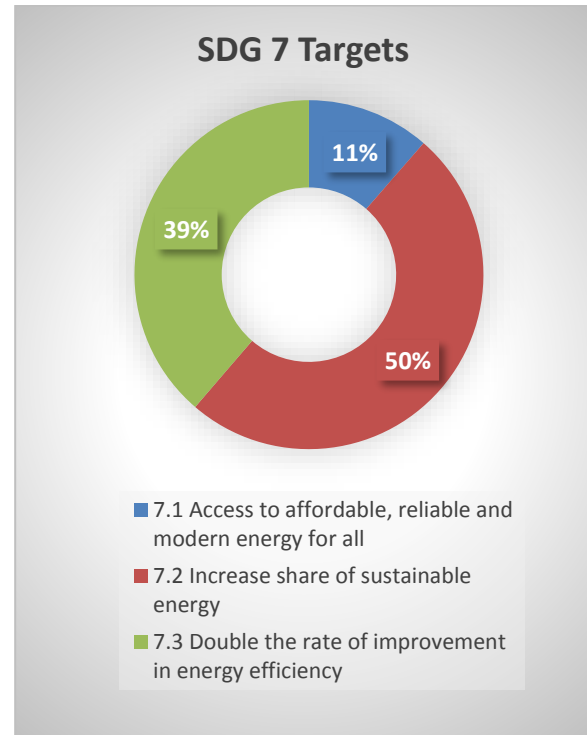


Figure 46 SDG-7 Targets shares

The population of Global South is growing day by day, to fulfill the energy demand with sustainability will be quite challenging. The commitments in NDCs show that there will be a rise in renewable energy generation, many countries committed to reaching 100% renewables by 2030.

Two-thirds of the rural population live in emerging economy countries like Brazil, China, India, and Indonesia. These countries have significant GHG emissions, and therefore much potential to achieve global environmental benefits (GEF, 2018). China and India are focusing on all three targets of SDG 7. Whereas, Indonesia wants to reach a 31% renewable energy target by 2050 with the rest of the power production from Coal, Gas, and Oil (NDC: Indonesia, pg.:4). Brazil wants to achieve 45% renewables in the energy mix by 2030 (NDC:

Brazil, pg.:7). However, both countries have no commitments to improvements in energy distribution.

The definition of climate finance is not precise. Firstly, there are no clear guidelines are given from UNFCCC for climate finance. Too little attention has been paid on the spending side of climate finance in political debate (Steckel, et al., 2017). So, it was quite difficult to estimate the

total external support allocated up to the date. Secondly, no common methodology accepted to calculate climate finance. In the absence of the definition, some institutes like OECD, Bloomberg, IDFC, MDBs, etc have taken initiative and measured climate finance according to their own methodologies. Climate Policy Initiative (CPI) finds that climate finance has been steadily increasing and more money is being invested than ever before, but more is needed (CPI, 2018).

Sankey Diagram of Financial Flows (in billion USD)

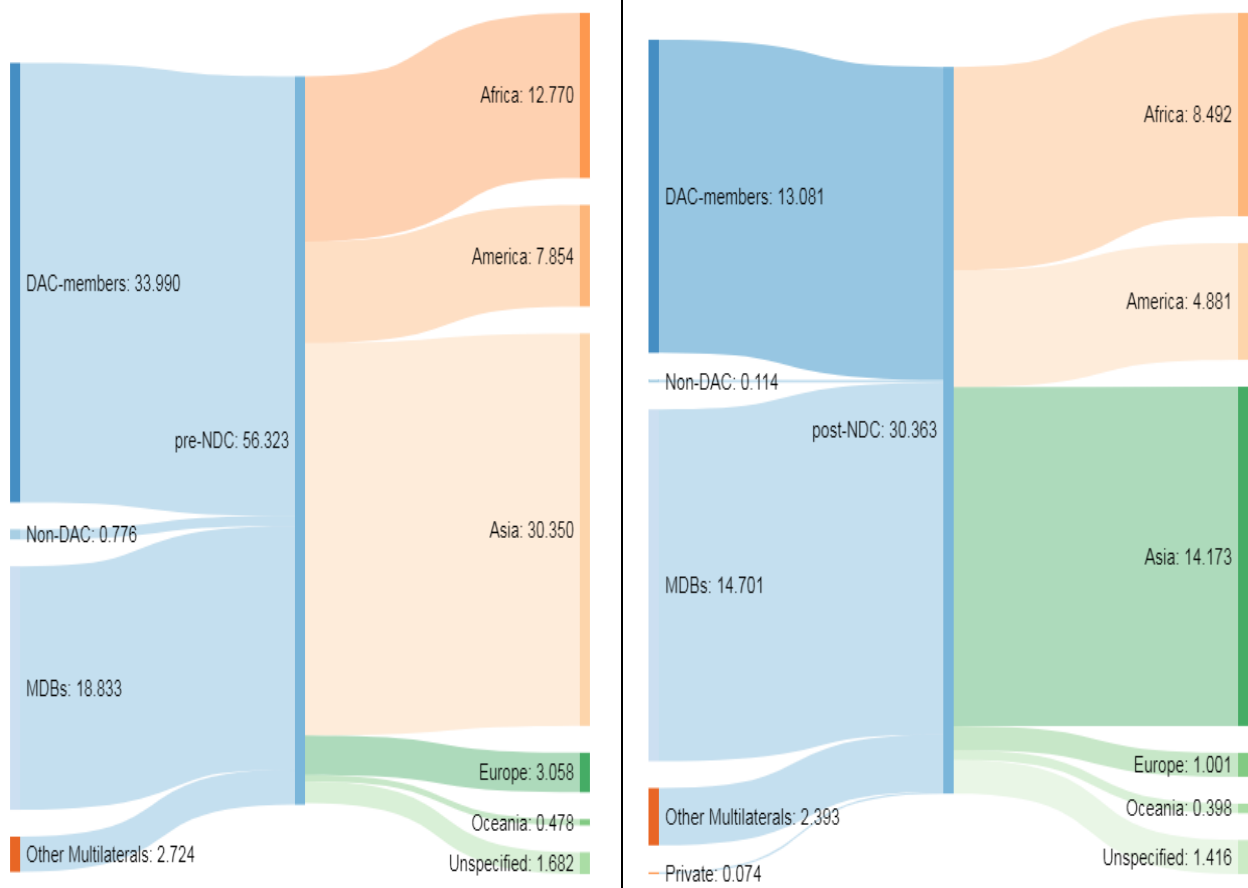


Figure 47 Sankey diagram of pre- and post-NDC period

This thesis talks only about finance related to energy. The OECD database is used here as it has a large dataset of energy since 2000 and it covers the multilateral, bilateral and private philanthropic donors. However, the main

limitation of it is that the on-going amount to recipient countries from the period of 2000 to 2007 was only recorded for DAC members, no private entities or multilateral banks have captured the record of climate finance.

Trade analysis of energy transition from both donor and recipient perspectives is shown in the Sankey Diagram. The financial transactions have been divided into two periods to check the flow before and after the formation of NDCs. While it is not possible to directly compare the pre- and post-NDC periods, the span of time periods is widely differing. But, on an annual average basis, climate finance is increased year by year. According to the OECD online database, there is about 85 billion USD spent on energy-specific projects from 2000 to 2017 (except from 2008 to 2010). A large portion of it was given by the DAC member countries. It is clearly visible that the role of **MDBs** is increased during the post-NDC period. Asia holds the largest share of finance in both periods; followed by Africa. America remains in the third position.

There are mainly four energy sectors discussed here.

Energy standards: It covers energy efficiency, awareness, research, and energy policy and has a direct impact on SDG target 7.3. According to NDCs analysis, over half the countries are focusing on energy efficiency to reduce GHG gases and energy consumptions and the majority have committed for clean cooking and replace the lighting. In support of this argument, the external report shows that the share of the population with access to clean cooking increased from 57% in 2010 to 61% in 2017 (IEA, et al., 2019). The percentage difference is very small because the energy efficiency only got attention in 2015, no financial transactions have visible before that in the OECD database. European countries have focused more on energy efficiency in the pre-NDC period compare to other regions. Whereas, Asian countries have received a large portion of financial pie in the

post-NDC period, followed by Americas and Africa.

The thesis result shows that the regional multilateral banks AfDB, AsDB, EBRD, IADB have not played any role in energy efficiency throughout the periods. Unless the rapid actions are taken place, traditional cooking will remain the cause of millions of deaths from noncommunicable diseases (WHO, 2018).

The rates of improvement in global primary energy intensity mean the percentage drop in global total primary energy supply per unit of GDP-PPP. The thesis results only discussed the energy intensity with the reference of the 2015 year. But the external report has measured until 2016 and stated that "*Improvements in energy intensity are not in line with SDG target 7.3*". The primary energy intensity was 2.3% between 2010 and 2016, which is a far better rate than 1.3% between 1990 and 2010. However, the current average need is over 2.7% until 2030 to reach target 7.3 (IEA, et al., 2019).

Asian countries have received a large portion of the finance for sub-sector energy policy in both periods. India and China are working on energy policy for electricity-saving and labeling the appliances.

Renewables: Decentralised energy is a cost-effective solution to provide power and to increase accessibility. Solar energy, hydropower, biofuel, wind power, geothermal, and other-RE are considered in renewables. The tidal energy has no significant role in both actions and transactions, so it was not covered here. The renewables are directly heating the SDG target 7.2. About 3/4th of all nations have at least one commitment to one of the renewable energy generation sources and it is visible. In 2016, the share of renewables increased at the fastest rate

since 2012 and reached 17.5% due to rapid growth in solar, wind and hydropower (IEA, et al., 2019).

African countries have a high potential for renewable energy. Over 3/4th African countries have emphasized their energy activities either on solar or hydropower projects in NDCs.

DAC-member country Japan trends have changed over the period under consideration. In the pre-NDC period, they have funded more on hydropower, followed by other sources of renewable energy and geothermal power generation. Whereas, in post-NDC, it has focused more on Geothermal, followed by solar and hydropower. Germany remains a second-largest donor in biofuel and wind energy projects. Asia remains the largest receiver of funds for biofuel and hydropower in both periods, as the installation cost for solar energy projects reduces year by year.

Other multilaterals have focussed their financial resources on energy standards and renewables. The funds granted under the Global Environment Facility (GEF) are more than 300 million USD during 2013-15. However, there is no fund recorded in 2016. About 80 million USD was granted in 2017 for energy standards and renewable energy projects. The Climate Investment Fund (CIF) has given about two billion USD in 2012-15 on renewables and more than 960 million USD in 2016-17. Furthermore, 372 million USD was spent on energy standards in 2012-15. The Green Climate Fund (GCF) increased its financial scope very significantly to 1.31 billion USD in a post-NDC period while the GCF had spent 25 million USD on only two transactions in 2015.

Non-Renewables: They are the primary source of many countries and total replacements are

not possible for all of them. However, nations have mentioned mitigation activities related to it. Non-renewable energy is partially related to accessibility (target 7.1) and efficiency (target 7.3).

According to the thesis results, there is no clear indication that the finance for non-renewable energy generation is declining. For example, JICA remains a key funding provider for coal-fired power plants in both periods. A big change can be noted in the context of the World bank: no transaction was financed in the post-NDC period, while the WB used to finance non-renewables with about one billion USD in the pre-NDC period.

Energy Distribution: More than 50 nations have committed themselves to improve the grid networks both in terms of accessibility and efficiency. It relates to SDG target 7.1. According to the thesis results, Germany remains the biggest donor in both periods, followed by the World Bank (however, no transaction seems to have financed by the WB before 2013). As a result, access to electricity rose from 83% in 2010 to 89% in 2017. Despite this surge in electrification growth, it falls short of the mark rate required to reach universal access by 2030. The external report estimates the 0.86% annual rate from 2018 to 2030 to mark the SDG target 7.1 (IEA, et al., 2019).

World Bank's Regulatory Indicators for Sustainable Energy (RISE) has calculated the electricity tariff data of access-deficit countries in 2018. The report reveals that subsistence-level electricity consumption is unaffordable for the poorest 40 percent of households, representing 285mn people (World Bank, 2018).

Heating & Cooling, and heat plants have less share of finance in both periods, so there is no concrete discussion that is possible here.

6.2 Recommendation

Based on the study and drawing on my analysis, I have the following recommendations:

An effective way of tracking the 2030 Agendas is required, as SDGs are long term goals.

Common methodologies: The UNFCCC should create a common format for monitoring finance and compile all transactions without double counting.

A clear definition of climate-finance is required.

A mechanism is needed to find new sources of finance and at the same time, it calculates the

current and future climate finance needs of the country.

GHG reductions should be measured for each climate's actions and transactions.

A new strategy to improve private sector engagement is required to leverage private flows.

The regional MDBs should undertake additional efforts to find out about individual country needs. For example, a recent Asian Development Bank study indicates that approx. 7.7 billion USD is required in the Indian energy sector for adaptation (NDC: India, Pg.: 31)

Chapter: 7 Conclusion and further findings

This thesis provided multiple new insights into energy-related characteristics of countries' commitments under the Paris Agreements, the extent to which they overlap with the content of the SDGs and the degree to which this is taken into account in the context of relevant financial flows.

First of all, this study uncovers the energy-related priorities of countries in their NDCs. The analysis of energy actions in the NDCs under the Paris Agreement shows that Asian countries have a priority on energy standards followed by renewables. Other regions, on the other hand, prioritize renewables, followed by energy standards. Actions on energy distribution varied across countries' national contributions in line with their specific needs. High-Income countries focused more on energy accessibility, putting the spotlight on energy standards and shifting non-renewable generation sources towards renewables. The analysis also shows that there is a growing trend towards mitigation actions to combat climate change. If the climate agreements will fully be implemented, then the global mean warming would be reduced from approx. 3.6°C to 2.7°C above pre-industrial levels (Höhne, et al., 2016).

Secondly, the analysis also finds that the developing countries are receiving more and more support from developed nations, multilateral banks and private philosophies to reach energy targets. At the same time, generating sufficient climate finance remains a challenge, especially in the context of energy-related commitments in the NDCs in light of their very strong overlaps with the content of the SDGs, thereby offering substantial potential leverage synergies between the implementation

of the Paris Agreements. The targets of the Paris Agreement can be well achieved in the energy sector while increasing strong policy leadership.

The amount required for energy transition for a low-carbon future is very large. *"A successful transition to a more sustainable energy system will require a wide range of sustainable actions by diverse people across the globe."* (Steg, et al., 2018).

Building on this study, Further research is needed on the following issues.

- Including the 2018-19 transactions, as only two years in the post-NDC is not justified for all sectors.
- Including storage and hybrid energy, as the future market will highly be impacted by them.
- Including other mitigation activities with energy. E.g.: Land use and forest activities.
- Further break-downs of energy efficiency into agricultural, residence, industry and transport.
- Calculation of additional funding from carbon pricing.
- Include more financial transactions for the heating and cooling sector, as they are high consumption of energy.

If the above recommendations are followed and further findings of future research are taken into consideration, it will be possible help to develop different perspectives on energy-related strategies for the upcoming NDC update in 2020, which in turn can contribute to tackling climate change and achieving the goals of the Paris Agreement and the 2030 Agenda.

Rural household needs an **affordable** electricity to fulfill its basic needs and agricultural aspects; Semi-urban area needs **reliable** energy to

achieve beyond their needs; Urban people required **modern** energy solution to run appliances and transport system; nations are requested to increase the rate of energy **efficiency** to improve their energy intensity and GDP; increase substantially the share of **renewable** energy makes reduction in global energy consumptions. This is how the bottom-up approaches make SDG 7 target to reach by 2030.

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Annex: 1

African Countries	Energy Actions	Energy standards	Renewable	Non-Renewable	Distribution
Algeria	9	33%	56%	0%	11%
Angola	15	0%	80%	13%	7%
Benin	28	43%	32%	21%	4%
Botswana	1	0%	100%	0%	0%
Burkina Faso	4	75%	0%	25%	0%
Burundi	7	14%	86%	0%	0%
Cameroon	29	55%	28%	3%	14%
Cape Verde	26	38%	27%	8%	27%
Central African Republic	14	36%	50%	7%	7%
Chad	7	0%	57%	0%	43%
Comoros	16	19%	63%	0%	19%
Cote d'Ivoire	22	55%	41%	5%	0%
DR Congo	1	100%	0%	0%	0%
Djibouti	21	38%	38%	5%	19%
Egypt ¹²	14	71%	14%	0%	7%
Equatorial Guinea	6	17%	67%	17%	0%
Eritrea	23	39%	39%	9%	13%
Ethiopia	8	13%	75%	0%	13%
Gabon	4	25%	75%	0%	0%
Gambia	30	50%	37%	7%	7%
Ghana	14	29%	57%	7%	7%
Guinea	7	43%	57%	0%	0%
Guinea-Bissau	5	60%	20%	20%	0%
Kenya	3	0%	100%	0%	0%
Lesotho	36	47%	36%	0%	17%
Liberia	8	25%	50%	13%	13%
Libya	NA	0%	0%	0%	0%
Madagascar	8	38%	38%	0%	25%
Malawi	27	26%	63%	4%	7%
Mali	14	29%	64%	7%	0%
Mauritania	2	50%	50%	0%	0%
Mauritius	9	33%	33%	11%	22%
Morocco	35	31%	46%	3%	20%
Mozambique	1	0%	100%	0%	0%
Namibia	9	33%	44%	22%	0%

¹² Remain 7% for Nuclear

Development cooperation financing towards SDG7 and NDCs supporting energy system transition

Niger	20	15%	45%	10%	25%
Nigeria¹³	24	38%	17%	25%	21%
Republic of Congo	6	33%	67%	0%	0%
Rwanda	7	14%	71%	0%	14%
Sao Tome and Principe	7	0%	100%	0%	0%
Senegal	40	28%	38%	28%	8%
Seychelles	17	47%	47%	6%	0%
Sierra Leone	6	33%	50%	17%	0%
Somalia	16	13%	44%	31%	13%
South Africa	12	50%	33%	8%	8%
South Sudan	9	11%	78%	11%	0%
Sudan	19	16%	42%	21%	21%
Swaziland	11	18%	64%	9%	9%
Togo	31	35%	52%	3%	10%
Tunisia	18	28%	61%	6%	6%
Uganda	17	53%	41%	0%	6%
United Republic of Tanzania	9	33%	33%	11%	22%
Zambia	10	30%	50%	0%	20%
Zimbabwe	17	18%	53%	12%	18%
American Countries	Energy Actions	Energy standards	Renewable	Non-Renewable	Distribution
Antigua and Barbuda	5	40%	0%	20%	40%
Argentina	0	0%	0%	0%	0%
Bahamas	7	43%	57%	0%	0%
Barbados	9	33%	33%	33%	0%
Belize	9	44%	44%	0%	11%
Bolivia	20	15%	55%	10%	20%
Brazil	9	22%	78%	0%	0%
Canada	9	44%	22%	22%	11%
Chile	1	100%	0%	0%	0%
Colombia	0	0%	0%	0%	0%
Costa Rica	5	80%	20%	0%	0%
Cuba	15	47%	40%	0%	13%
Dominica¹⁴	25	28%	52%	4%	12%
Dominican Republic	1	100%	0%	0%	0%
Ecuador	8	38%	50%	13%	0%
El Salvador	6	50%	33%	0%	17%

¹³ Remain 5% for nuclear

¹⁴ Remain 4% for hybrid energy

Development cooperation financing towards SDG7 and NDCs supporting energy system transition

Grenada	9	44%	44%	11%	0%
Guatemala	8	63%	25%	13%	0%
Guyana	8	50%	50%	0%	0%
Haiti	13	23%	69%	8%	0%
Honduras	1	0%	100%	0%	0%
Jamaica	6	83%	17%	0%	0%
Mexico	0	0%	0%	0%	0%
Panama	21	19%	67%	10%	5%
Paraguay	4	0%	100%	0%	0%
Peru	5	20%	80%	0%	0%
Saint Kitts and Nevis	6	33%	50%	17%	0%
Saint Lucia	17	47%	41%	6%	6%
Saint Vincent and the Grenadines	2	100%	0%	0%	0%
Suriname	8	38%	50%	13%	0%
Trinidad and Tobago	1	0%	100%	0%	0%
United States of America	2	100%	0%	0%	0%
Uruguay	8	0%	100%	0%	0%
Venezuela (Bolivarian Republic of)	11	45%	45%	9%	0%
Asian Countries	Energy Actions	Energy standards	Renewable	Non-Renewable	Distribution
Afghanistan	17	29%	29%	24%	18%
Armenia	3	67%	33%	0%	0%
Azerbaijan	20	30%	30%	15%	25%
Bahrain	10	40%	30%	30%	0%
Bangladesh	21	38%	29%	14%	19%
Bhutan	10	20%	80%	0%	0%
Brunei Darussalam	27	70%	19%	11%	0%
Cambodia	7	29%	43%	14%	14%
China¹⁵	27	30%	33%	26%	7%
Democratic People's Republic of Korea	27	41%	26%	15%	19%
Georgia	0	0%	0%	0%	0%
India¹⁶	27	37%	37%	19%	4%
Indonesia	8	75%	13%	13%	0%

¹⁵ Remain 4% for Nuclear

¹⁶ Remain 4% for Nuclear

Development cooperation financing towards SDG7 and NDCs supporting energy system transition

Iran¹⁷	12	17%	25%	25%	17%
Israel	6	33%	50%	17%	0%
Japan¹⁸	43	77%	5%	7%	9%
Jordan	23	39%	43%	9%	9%
Kazakhstan	4	50%	50%	0%	0%
Kyrgyzstan	0	0%	0%	0%	0%
Lao People's Democratic Republic	7	14%	71%	0%	14%
Lebanon	4	50%	25%	25%	0%
Malaysia	3	67%	33%	0%	0%
Maldives	1	0%	0%	100%	0%
Mongolia	10	0%	30%	40%	30%
Myanmar / Burma	15	47%	47%	0%	7%
Nepal	22	27%	64%	9%	0%
Oman	6	67%	33%	0%	0%
Pakistan	22	27%	32%	14%	27%
Palestine	10	50%	20%	10%	20%
Philippines	1	0%	0%	0%	100%
Qatar	6	50%	17%	33%	0%
Republic of Iraq	0	0%	0%	0%	0%
Republic of Korea	2	50%	50%	0%	0%
Saudi Arabia	11	27%	36%	36%	0%
Singapore	3	67%	33%	0%	0%
Sri Lanka	18	33%	50%	17%	0%
State of Kuwait	8	25%	38%	25%	13%
Syria	7	14%	57%	29%	0%
Tajikistan	4	25%	75%	0%	0%
Thailand	6	33%	50%	17%	0%
Timor-Leste	14	50%	50%	0%	0%
Turkey¹⁹	16	31%	31%	25%	6%
Turkmenistan	1	100%	0%	0%	0%
United Arab Emirates²⁰	20	80%	10%	0%	5%
Uzbekistan	14	71%	21%	7%	0%
Viet Nam	16	75%	19%	6%	0%
Yemen	24	13%	50%	21%	17%

¹⁷ Remain 17% for Nuclear

¹⁸ Remain 2% for Nuclear

¹⁹ Remain 6% for Nuclear

²⁰ Remain 5% for nuclear

Development cooperation financing towards SDG7 and NDCs supporting energy system transition

European Countries	Energy Actions	Energy standards	Renewable	Non-Renewable	Distribution
Bosnia and Herzegovina	9	11%	33%	33%	22%
Liechtenstein	2	0%	50%	50%	0%
Moldova	11	27%	45%	0%	27%
Monaco	3	67%	0%	33%	0%
Montenegro	2	50%	50%	0%	0%
Russian Federation	2	50%	50%	0%	0%
San Marino	3	33%	33%	33%	0%
The former Yugoslav Republic of Macedonia	21	29%	48%	5%	19%
Ukraine	2	50%	50%	0%	0%
Oceanian Countries	Energy Actions	Energy standards	Renewable	Non-Renewable	Distribution
Australia	2	50%	50%	0%	0%
Cook Islands	4	50%	25%	0%	25%
Fiji	10	30%	60%	10%	0%
Kiribati	28	32%	57%	0%	11%
Marshall Islands	12	58%	33%	8%	0%
Micronesia	0	0%	0%	0%	0%
Nauru	3	33%	67%	0%	0%
New Zealand	1	0%	100%	0%	0%
Niue	18	33%	50%	0%	17%
Palau	22	64%	27%	0%	9%
Papua New Guinea	6	67%	33%	0%	0%
Samoa	8	25%	75%	0%	0%
Solomon Islands	14	0%	100%	0%	0%
Tonga	11	27%	55%	0%	18%
Tuvalu	12	42%	58%	0%	0%
Vanuatu	11	18%	73%	0%	9%
Wallis and Futuna	8	13%	75%	13%	0%