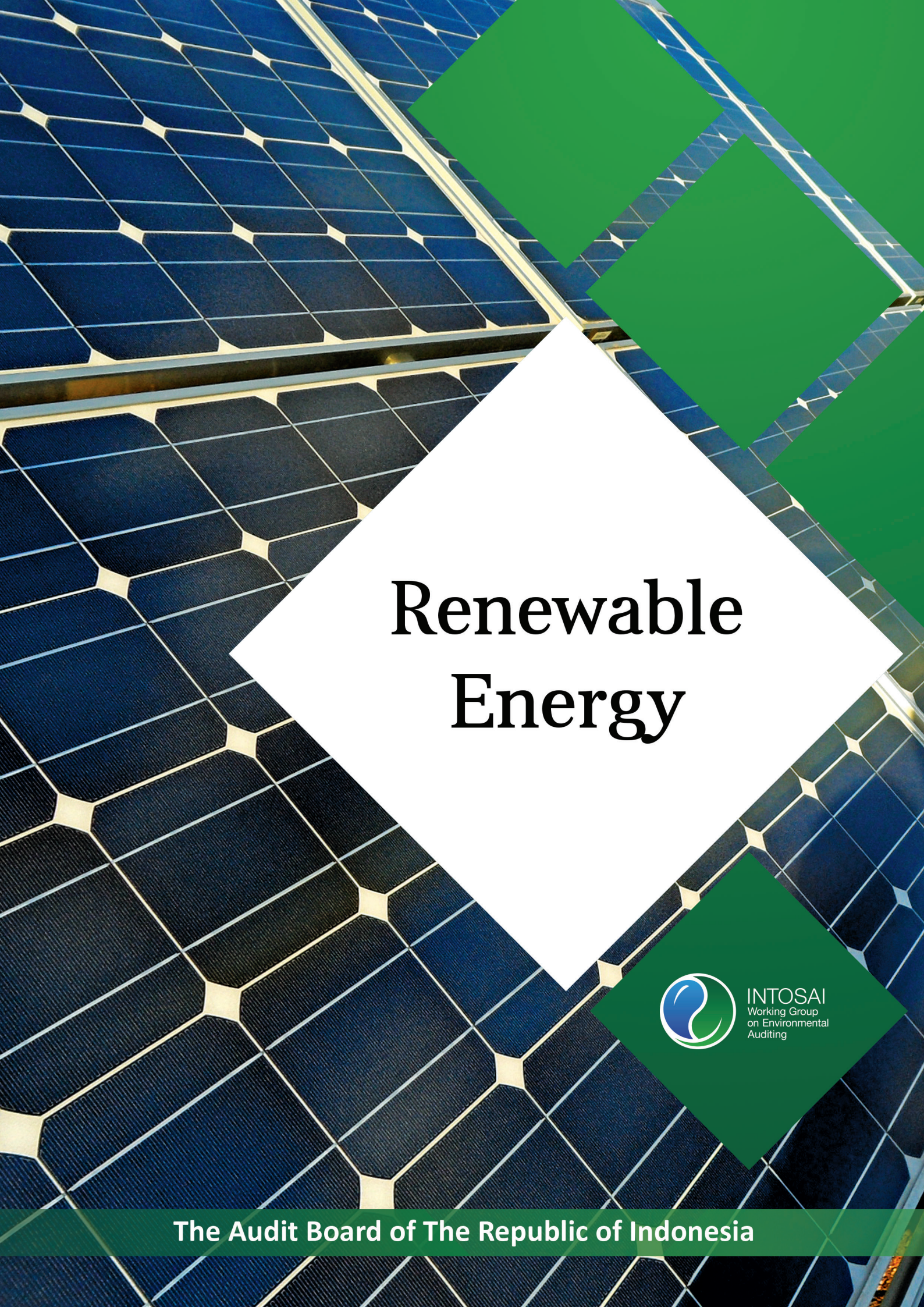

Renewable Energy

INTOSAI
Working Group
on Environmental
Auditing

The Audit Board of The Republic of Indonesia

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INTOSAI Working Group on Environmental Auditing

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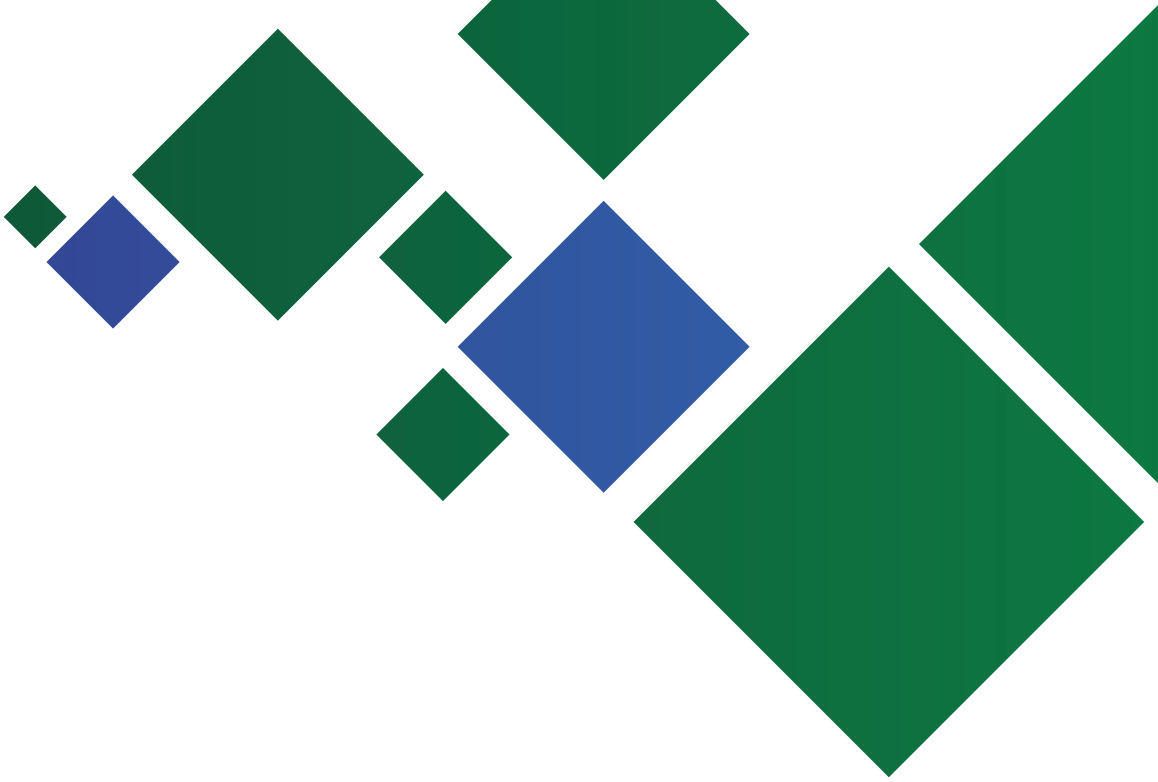

This publication was prepared by the INTOSAI Working Group on Environmental Auditing (WGEA). The WGEA aims to improve the use of audit mandate and audit instruments in the field of environmental protection policies, by both members of the Working Group and non-member Supreme Audit Institutions (SAIs). The WGEA has the mandate to

- Assists supreme audit institutions (SAIs) in acquiring a better understanding of the specific issues involved in environmental auditing;
- Facilitates exchange of information and experience among SAIs; and
- Publishes guidelines and other informative material for their use.

October 2016

Foreword

Under the Goal 1 (Up-date existing and develop new guidance materials available to SAIs, conduct research studies on emerging topics in environmental auditing) of its 2014-2016 work plan, the INTOSAI WGEA planned the achievement of seven research studies on:

- Renewable energy
- Energy savings
- Environmental assessments
- Marine environment : Auditing government responses to a marine environment impacted by climate change: Creative and innovative strategies used by SAIs
- Market based instruments for environmental protection and management
- Greening the Supreme Audit Institutions
- How to increase the quality and impact of environmental audits

INTOSAI WGEA encourages its members to promote the importance of sustainable energy, which is defined as energy which in its production or consumption has minimal negative impact on human health and the healthy functioning of ecosystems, including the global environment, and that can be supplied in a sufficient amount not only to present, but also to future generations without putting a burden on them (INTOSAI WGEA, 2010).

On the other hand, increasing uses of energy produce increasing emissions of anthropogenic greenhouse gases. One way to reduce greenhouse gas emissions is to replace energy from fossil fuels by energy from renewable sources. Renewable energy technologies are clean sources of energy that have a much lower environmental impact than conventional energy technologies. In addition, a broader use of renewable energy resources may help countries to alleviate their dependency on energy imports (INTOSAI WGEA, 2010).

Despite its advantages, in 2013, renewable energy provided only an estimated 19.1% of global final energy consumption (REN21, 2015). Many countries face some obstacles to developing their renewable energy sector. The major obstacles are inherent to the institutional frameworks, the absence of effective policies to boost renewable energy technologies and the financing difficulties.

These challenges highlight the need for Supreme Audit Institutions (SAIs) to focus on this area. Thus, it is important for SAIs to implement an effective framework for auditing renewable energy in the aim to help governments and other stakeholders promote the development of this sector.

As objectives, this research project intends to help SAIs seeking to review their governments' energy policies by:

- Providing comprehensive data and information on renewable energy, including information about government policies and funding for effective technology development;
- Providing information regarding renewable energy audit topics and examples and case studies of best practice in this field.

Accordingly, the first stage of the project will identify the challenges faced by governments in developing renewable energy and how governments successfully respond to them and explore the types of instruments governments use to enhance the development of renewable energy.

The second stage of the project will gather SAIs' experience of auditing how well these policy instruments work, through using case studies. The case studies will provide SAIs examples of audit works of the SAIs.

The work on this document was led by the SAIs of Morocco and Indonesia. In particular, we would like to acknowledge the efforts of the authors, Mohammed DIYER, Hassan NAMRANI, Abdelouahab KADIRI and Tjokorda Gde Budi Kusuma. Many thanks also go to Mohamed Abdelmouhcine HANINE, Abdelkarim JGHILIFA and Ahmed ELABBASSI for their excellent work in preparing the paper. Similarly, we would like to acknowledge the contributions made by the SAIs worldwide, especially the project sub-committee members China, Czech Republic, Ethiopia, Iraq, Lesotho, Macedonia, Namibia, Philippines, UK, USA and Zambia. A special thank also goes to the INTOSAI WGEA and its Steering Committee members for their valuable help in various stages of the project.

We hope you will find this research paper useful.

Harry Azhar Azis, Ph.D.
Chairman of the Audit Board of the Republic of Indonesia
Chair of INTOSAI WGEA

Driss Jettou
First President of Court of Accounts of Morocco
Project Leader

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Abbreviations & Acronyms

ACT	Australian Capital Territory
CDM	Clean Development Mechanism
CER	Certified emission reduction
CSD	Commission on Sustainable Development
ECA	European Court of Auditors
ESA	Emergency Services Agency
EUROSAI	European Organisation of Supreme Audit Institutions
IEA	International Energy Agency
INTOSAI	International Organisation of Supreme Audit Institutions
IRENA	International Renewable Energy Agency
ISA	International Standards on Auditing
ISSAI	International Standards for Supreme Audit Institutions
OECD	Organisation for Economic Co-operation and Development
LDCs	Least developed countries

MDBs	Multilateral development banks
OAG	Office of the Auditor General
ODA	Official development assistance
RE	Renewable Energy
REN	Renewable Energy Policy Network
RES	Renewable Energy Sources
SAI	Supreme Audit Institution
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WGEA	Working group on Environmental Auditing
WTO	World Trade Organization

Executive Summary

Renewable energy is energy that comes from resources naturally renewed on a human time scale such as sunlight, wind, rain, tides, waves and geothermal heat. This energy could replace conventional fuels, especially, in four distinct areas: electricity generation, hot water/space heating, motor fuels, and rural (off-grid) energy services. Moreover, renewable energy resources exist over wide geographical areas, in contrast to other energy sources, which are concentrated in a limited number of countries.

Currently, different types of renewable energy resources exist (Wind Energy, Solar Energy, Biomass Energy, Geothermal Energy, Marine Energy and Hydraulic Energy), and the use of them could have important benefits worldwide.

On one hand, it is a source of energy supply that can be deployed to provide a significant share of future electricity supply and be an alternative to mitigate pressure on fossil energy. On the other hand, the RE has a good impact on the environment and global society. The adoption of renewable energy technologies can decisively help reduce the carbon emissions of growth.

To help using the renewable energy, many national and international policies were set up. At the national level, the measures concern institutional and regulatory aspects that aim to create favorable environment to promote renewable energy and to reach national objectives related to RE. In this context, it is important to note that the majority of countries have put in place regulatory, fiscal or public financing incentives or policies. These policies reflect the awareness of public authorities.

At international level, many agreements, whether at global level or regional level, have been made and ratified. The international community has recognized the critical role that renewable energy can play in meeting its objectives of poverty alleviation and climate change mitigation. Currently, the international cooperation helps developing country in mobilizing funding and play a crucial role in promoting Renewable Energy through many mechanisms such as Clean Development Mechanism (CDM).

However, the development of renewable energy faces many limitations related to the cost of RE investment, compared to conventional energy and the existence of technical and institutional constraints (high level of know-how and qualified personnel, encouraging framework…).

These challenges highlight the need for Supreme Audit Institutions (SAIs) to focus on this area. Thus, it is important for SAIs to implement an effective framework for auditing renewable energy in the aim to help governments and other stakeholders promote the development of this sector.

This research project intends to help SAIs seeking to review their governments' energy policies by providing comprehensive data on renewable energy. It aims also to give information regarding renewable energy audit topics with examples and case studies of best practices in this field.

The analysis was focused on a brief review of the auditing RE practices and on the identification of recurring topics related to the auditing of RE.

The questionnaire used showed that the issue has become a very interesting field for the majority of SAIs around the world. The results showed that 24 SAIs, which reported that they proceeded to the auditing, have published 36 reports during the period 2006-2015. The majority of them (19 SAIs) has been conducted as performance audit. The database available at the WGEA website contains more than 40 audit cases related to the RE issues.

The review of the SAIs reports and reports summaries on the WGEA website have identified the existence of four majors audit topics:

- Public policy on the use of renewable energy sources potential;
- Relevance of public programs and projects on renewable energy;
- Efficiency and effectiveness of measures to promote production and consumption energy from Renewable Sources;
- Linking the use of renewable energy impact and climate change plan.

Chapter 1
Introduction

1.1 CONCEPTS AND DEFINITIONS

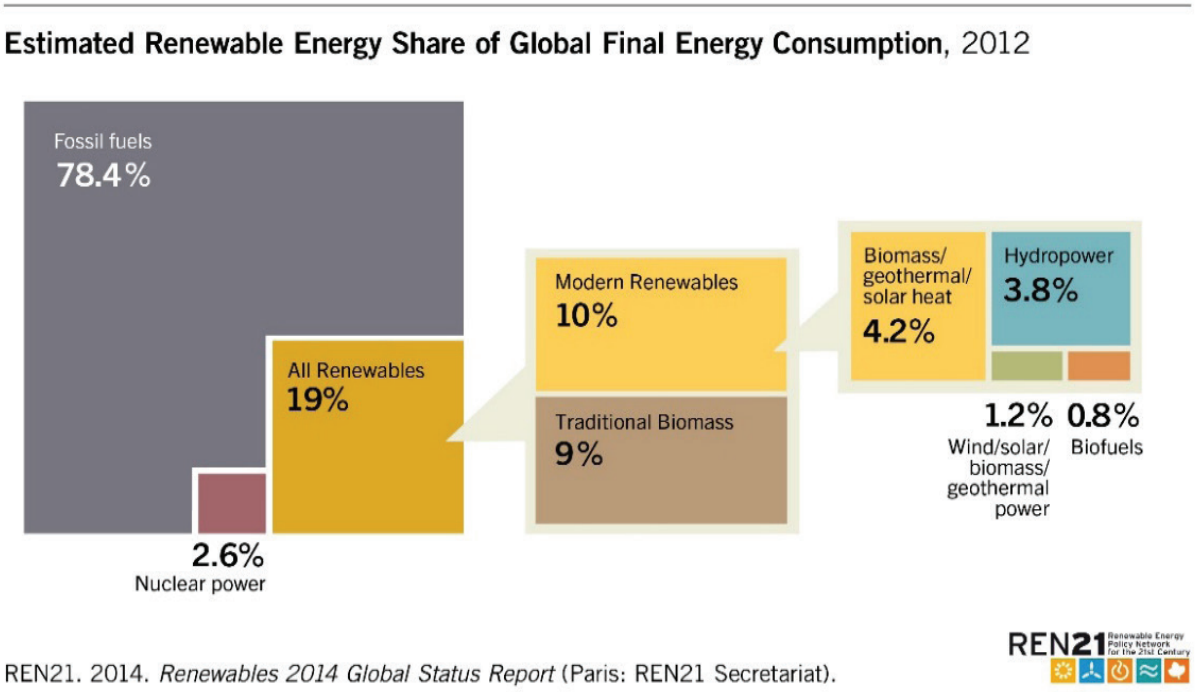
Renewable energy is energy that comes from resources that are naturally renewed on a human timescale such as sunlight, wind, rain, tides, waves and geothermal heat. They replace conventional fuels in four distinct areas: electricity generation, hot water/space heating, motor fuels, and rural (off-grid) energy services.

There are various definitions of renewable energy. The IEA, for example, defines renewable energy as follows:

"Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly or indirectly from the sun, or from heat generated deep within the earth. Included in the definition is energy generated from solar, wind, biomass, geothermal, hydropower and ocean resources, and biofuels and hydrogen derived from renewable resources".

Renewable energy resources exist over wide geographical areas, in contrast to other energy sources, which are concentrated in a limited number of countries. While many renewable energy projects are large-scale, renewable technologies are also suited to rural and remote areas. Renewable energy provided an estimated 19% of global final energy consumption in 2012 (REN21, 2014), while the total worldwide investments in renewable technologies amounted to more than US$ 214 billion in 2013.

Figure 1 Estimated Renewable Energy Share of Global Final Consumption, 2012



1.2 WHY RENEWABLE ENERGY

Renewable energy has the potential to play an important role in providing energy with sustainability and can provide many benefits. The key benefits are:

- ***Environmental benefits***: Renewable energy technologies are clean sources of energy that have a much lower environmental impact than conventional energy technologies;
- ***Energy for future generations***: Renewable energy will not run out ever. Other sources of energy are finite and will be depleted in the future;
- ***Jobs and economy***: Most renewable energy investments are spent on materials and workmanship to build and maintain the facilities, rather than on costly energy imports. This means renewable energy investment will create local jobs and boost local economies;
- ***Energy security***: Renewable energy will decrease foreign oil supplies dependence instead of increasing it. This decreased dependency affects energy policy and security.

1.3 TYPES OF RENEWABLE ENERGY RESOURCES

Wind Energy

Wind power or wind energy is the energy extracted from the wind using wind turbines to produce electrical power, windmills for mechanical power or wind pumps for water pumping. Wind power is renewable, widely distributed and produces no greenhouse gas emissions during operation.

Wind farms consist of several or hundreds of individual wind turbines that are connected to the electric power transmission networks.

Figure 2 Wind Energy

Onshore wind is competitive and, in many places, cheaper than coal, gas or fossil fuel plants. Small onshore wind farms can feed some energy into the grid or provide electricity to isolated off-grid locations.

Offshore wind is steadier and stronger than on land, and offshore farms have less visual impact, but construction and maintenance costs are considerably higher.

Wind power has been growing at over 20% annually, with a worldwide installed capacity which had expanded rapidly to 336 GW at June 2014. Now, Wind energy production accounts of around 4% of total worldwide electricity usage.

Solar Energy

Solar energy technologies use the sun's energy and light to provide heat, light, hot water, electricity, and even cooling, for homes, businesses, and industry. There are varieties of technologies that have been developed to take advantage of solar energy:

- **Photovoltaic** or solar cells systems: Producing electricity directly from sunlight.

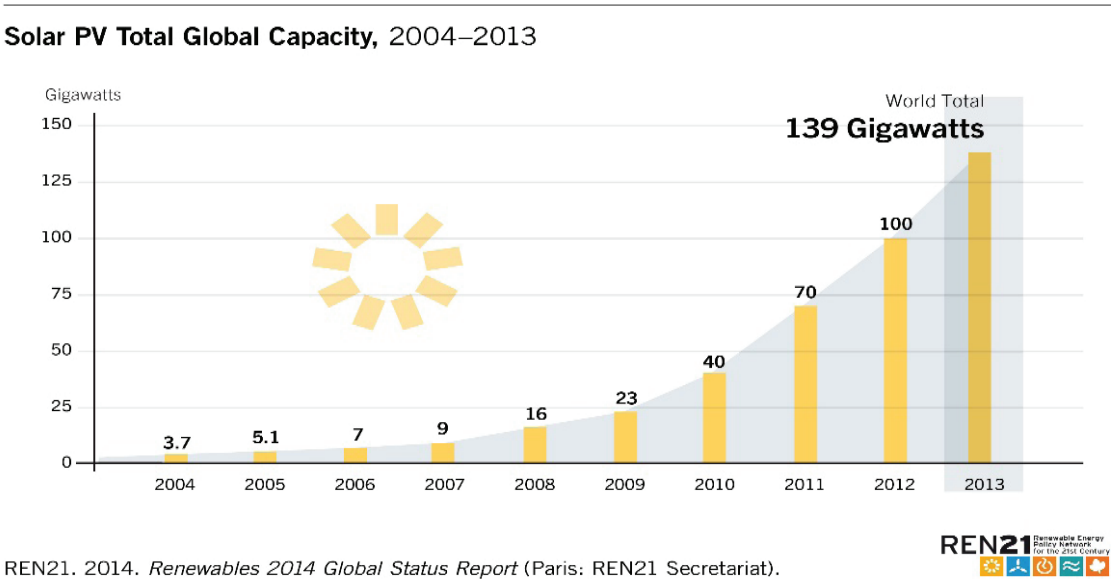
  Solar cells convert sunlight directly into electricity. They are made of semiconducting materials. When sunlight is absorbed by these materials, the solar energy knocks electrons, loose from their atoms, allowing them to flow through the material to produce electricity. This process of converting light (photons) to electricity (voltage) is called the photovoltaic (PV) effect.

Figure 3 Solar Energy: Photovoltaic

Solar cells are typically combined into modules; a number of these modules are mounted in PV arrays that can measure up to several meters on a side.

Some solar cells are designed to operate with concentrated sunlight. These cells are built into concentrating collectors that use a lens to focus the sunlight onto the cells.

Figure 4 Solar PV Total Global Capacity, 2004-2013

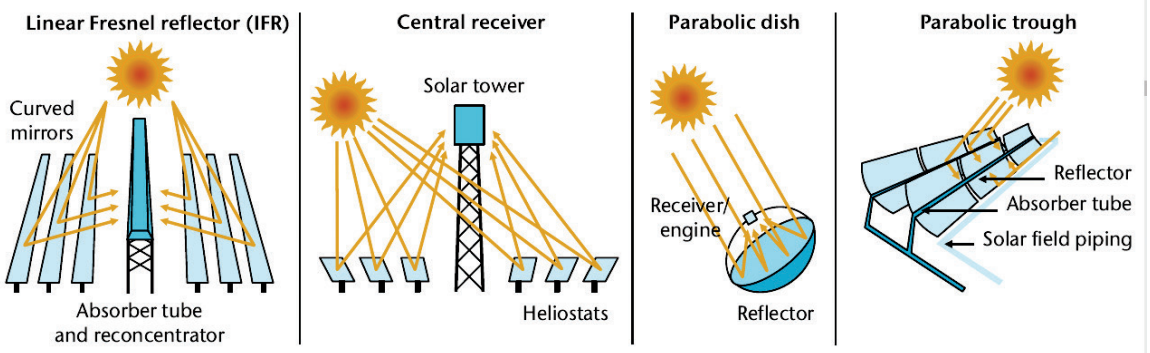


Solar PV is a fast-growing technology doubling its worldwide installed capacity every couple of years. At the end of 2013, worldwide PV capacity reached 139 GW.

- **Solar Thermal Electricity**: Using the sun's heat to produce electricity.

  Many power plants today use fossil fuels as a heat source to boil water. The steam from the boiling water rotates a large turbine, which activates a generator that produces electricity. The same concept is used for power plants with concentrating solar power systems, where the sun is used as a heat source. There are three main types of concentrating solar power systems: parabolic-trough, dish/engine, and power tower.

Figure 5 Solar Thermal Electricity



The solar thermal power industry is growing rapidly with a global capacity that was up nearly 0.9 GW in 2013 to reach 3.4 GW.

- **Solar Hot Water**: Heating water with solar energy.

  Solar thermal technologies, also known as solar hot water, are typically low to medium cost and are easy to install, operate and maintain. Solar water heating is a well-developed technology that already enjoys a reasonably broad deployment. These systems can typically provide all of the hot water needed for residences, hotels, hospitals and apartment buildings.

Figure 6 Solar Hot Water

The main component of a solar water heater is the solar collector. It absorbs solar radiation, converts it into heat, and transfers useful heat to the solar system. There are a number of different design concepts for collectors: besides simple absorbers used for swimming pool heating, more sophisticated systems have been developed for higher temperatures, such as integral storage collector systems, flat-plate collectors, evacuated flat-plate collectors and evacuated-tube collectors.

Biomass Energy

Biomass is generally defined as any organic feedstock available on a recurring basis. Typical biomass resources include wood and wood wastes, landfill gases, agricultural and crop residues, used vegetable oil, human solid wastes, and animal manures.

Biomass energy or **bio-energy** has been used for thousands of years, ever since people started burning wood to cook food or to keep warm. Today, wood is still the largest biomass energy resource in addition to other biomass resources used to produce fuel for cooking, power or transportation.

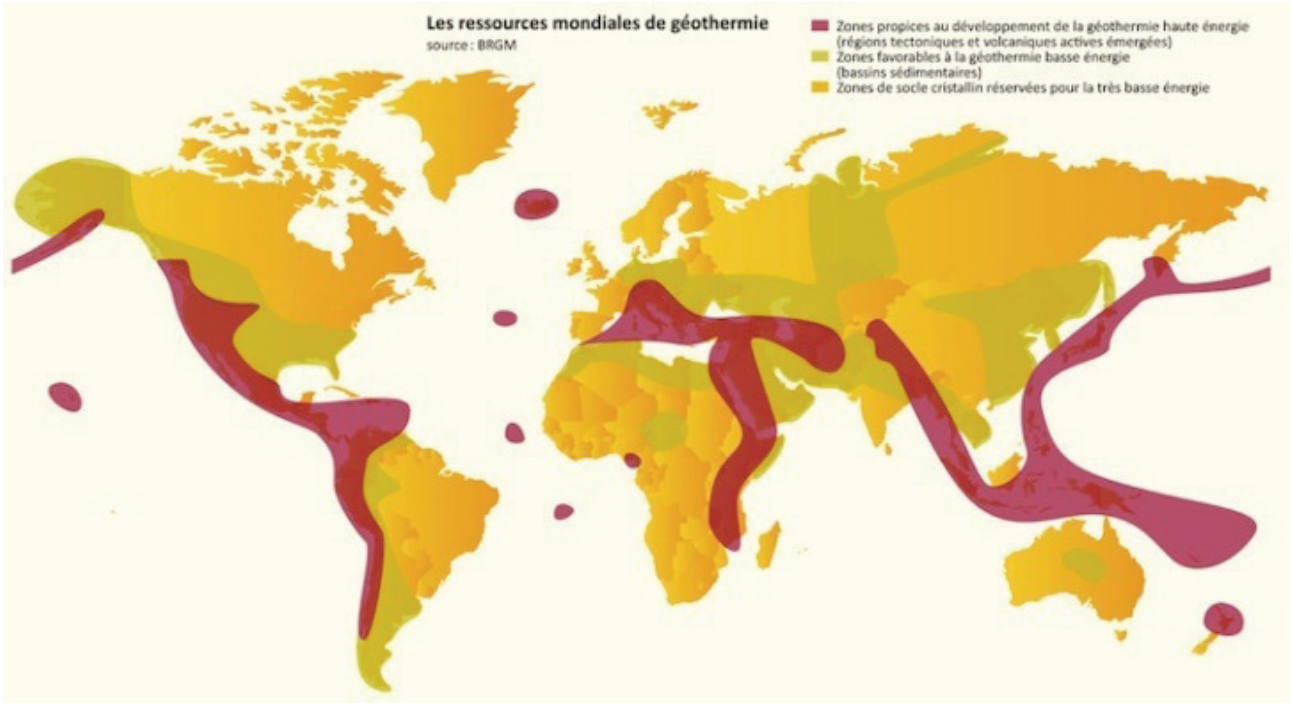
Figure 7 Biomass Energy

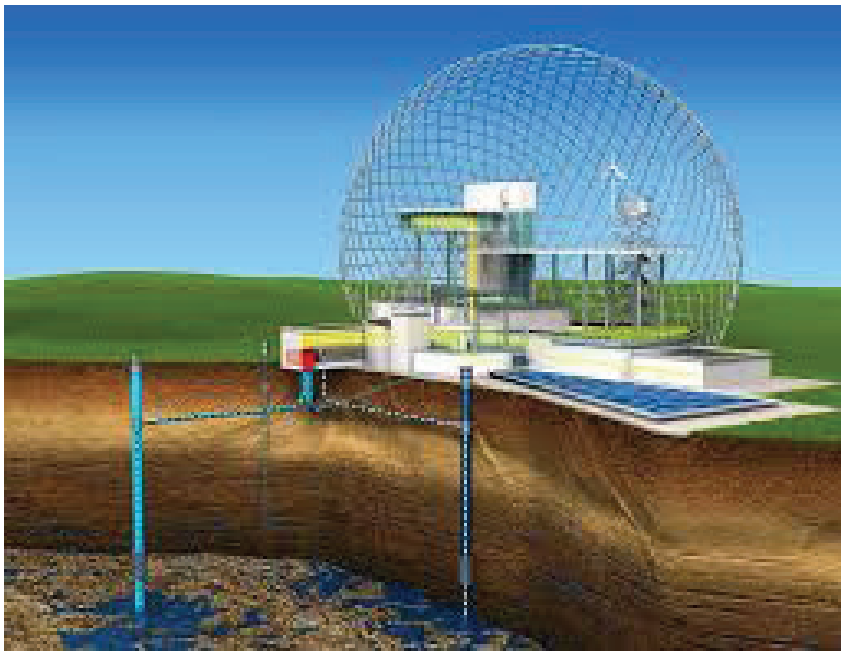
There is also a great interest on research involving algae, or algae-derived, biomass due to the fact that it is a non-food resource and can be produced at rates of 5 to 10 times those of other types of land-based agriculture, such as corn and soy. Once harvested, it can be fermented to produce biofuels.

Geothermal Energy

Geothermal energy is the heat from the earth. It is clean and sustainable. Resources of geothermal energy range from the shallow ground to hot water and hot rock found a few miles beneath the earth's surface and down even deeper. The uses to which these resources are applied are also influenced by temperature.

Figure 8 Geothermal Energy





The highest temperature resources are generally used only for electric power generation. In other uses, geothermal heat pump systems, consisting of a heat pump and a heat exchanger, can tap into this resource to heat and cool buildings. During winter, the heat pump removes heat from the heat exchanger and pumps it into the indoor air delivery system. In the summer, the process is reversed, and the heat pump moves heat from the indoor air into the heat exchanger. The heat removed from the indoor air during the summer can also be used to provide a free source of hot water. The global geothermal generating capacity installed is 12 GW.

Marine Energy

The ocean can produce two types of energy: thermal energy from the sun's heat, and mechanical energy from the **tides** and **waves**.

Figure 9 Marine Energy

Oceans cover more than 70% of earth's surface, making them the world's largest solar collectors. The sun's heat warms the water surface more than the deep ocean water, and this temperature difference creates thermal energy. **Ocean thermal energy** is used for many applications, including electricity generation.

Ocean mechanical energy is quite different from ocean thermal energy. Even though the sun affects all ocean activities, tides are driven primarily by the gravitational pull of the moon, and waves are driven primarily by the winds. As a result, tides and waves are intermittent sources of energy, while ocean thermal energy is fairly constant.

Ocean energy worldwide capacity, mostly tidal power generation, was about 530 MW by the end of 2013.

Hydraulic Energy

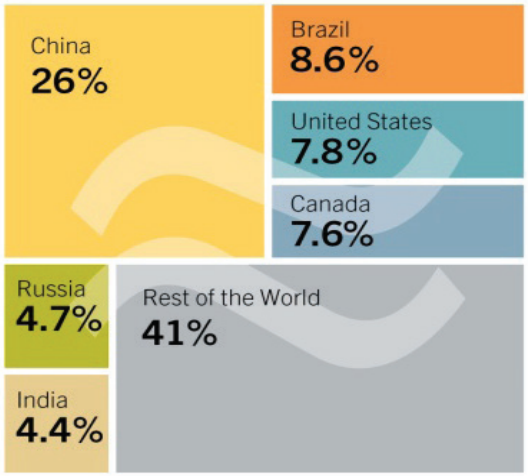
Flowing water creates energy that can be captured and turned into electricity. This is called **hydroelectric power** or **hydropower**.

The most common type of hydroelectric power plant uses a dam on a river to store water in a reservoir. Water released from the reservoir flows through a turbine, spinning it, which in turn activates a generator to produce electricity. But hydroelectric power does not necessarily require a large dam. Some hydroelectric power plants just use a small canal to channel the river water through a turbine.

Another type of hydroelectric power plant - called a pumped storage plant - can even store power. The power is sent from a power grid into the electric generators. The generators then spin the turbines backward, which causes the turbines to pump water from a river or lower reservoir to an upper reservoir, where the power is stored. To use the power, the water is released from the upper reservoir back down into the river or lower reservoir. This spins the turbines forward, activating the generators to produce electricity. A small or micro-hydroelectric power system can produce enough electricity for a home, farm, or village. The total global installed capacity is approximately 1,000 GW.

Figure 10 Hydropower Global Capacity, Shares of Top Six Countries

Hydropower Global Capacity, Shares of Top Six Countries, 2013



REN21. 2014. *Renewables 2014 Global Status Report* (Paris: REN21 Secretariat).

1.4 THE BENEFITS AND THE USES OF RENEWABLE ENERGY WORLDWIDE

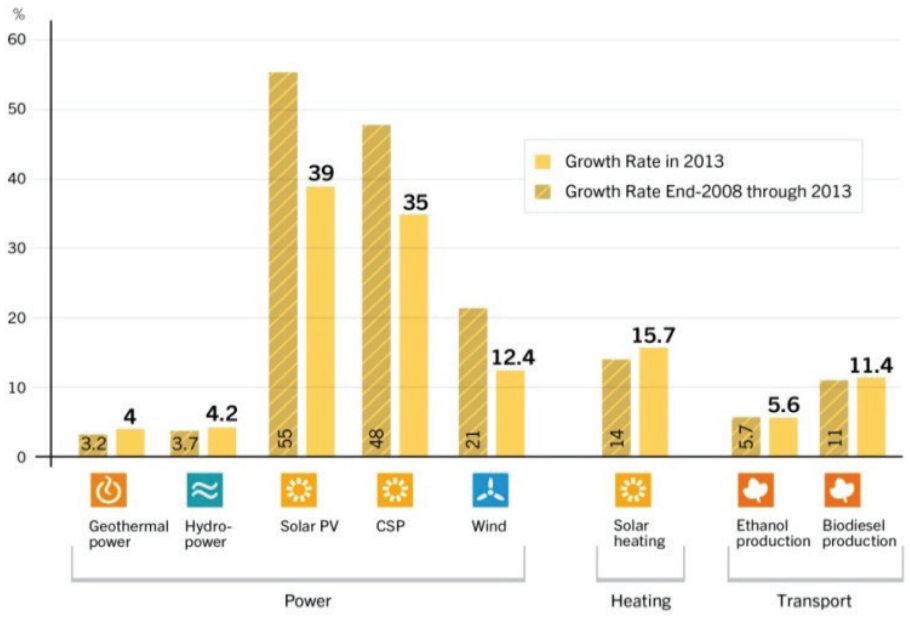
Renewable Energy Supply

Renewable energy as a source of energy supply continues to be one of the world's strongest growth industries:

- Approximately 20% of global electricity generation comes from renewable energy sources.
- Renewable energy accounted for over half of total net additions to electric generating capacity worldwide in 2012.
- Almost 70% of new electric generating capacity in the European Union for 2012 came from renewable.
- Solar photovoltaic electricity generation soared from 10 GW in 2007 to over 139 GW in 2013.

Figure 11 Average Annual Growth Rates Renewable Energy Capacity Biofuels

Average Annual Growth Rates of Renewable Energy Capacity and Biofuels Production, End-2008–2013



REN21. 2014. *Renewables 2014 Global Status Report* (Paris: REN21 Secretariat).

Numerous studies have shown that renewable energy can be rapidly deployed to provide a significant share of future electricity supply. This rapid increase in renewable energy is driven by a number of factors, including falling technology costs, rising fossil-fuel prices, carbon pricing and through government incentives.

Renewable Energy as an Alternative to Mitigate Pressure on Fossil Energy

Today, there is a tremendous pressure on fossil fuel to fulfill the increasing demand on energy, so fossil fuel prices can vary dramatically and are prone to substantial price swings.

In this context, renewable energy can replace conventional fuels, at least, in four distinct areas: electricity generation, hot water/space heating, motor fuels, and rural (off-grid) energy services. Using these sources of energy can lower the prices of natural gas, coal and oil by increasing competition and diversifying the energy supplies. An increased reliance on renewable energy can also help protect consumers when fossil fuel prices spike.

Impact of Renewable Sources on the Environment and Global Society

As highlighted in the Rio+20 Outcome Document, the renewable energy sector has a significant role to play in encouraging a transition to a green economy and in addressing the challenge of access to sustainable modern energy services for all.

The adoption of renewable energy technologies can decisively help reduce the carbon emissions of growth (Sims et al. 2007) and bearing the potential to save an equivalent of 220–560 gigatonnes of CO2 between 2010 and 2050 (IPCC, 2011).

Generating electricity from renewable energy rather than fossil fuels offers also significant public health benefits. The air and water pollution emitted by coal and fossil fuel plants is linked to breathing and health problems.

In contrast, wind, solar, and hydroelectric systems generate electricity with no associated air pollution emissions. While geothermal and biomass energy systems emit some air pollutants, total air emissions are generally much lower than those of fossil fuel fired power plants.

In addition, wind and solar energy require essentially no or little water to operate and thus do not pollute water resources or strain supply by competing with agriculture, drinking water systems, or other important water needs. In contrast, fossil fuels can have a significant impact on water resources. For example, both coal mining and natural gas drilling can pollute sources of drinking water. Natural gas extraction by hydraulic fracturing requires large amounts of water and all thermal power plants, including those powered by coal, gas, and oil withdraw and consume water for cooling.

1.5 LIMITATIONS OF THE DEVELOPMENT OF RENEWABLE ENERGY

Cost Limitations

Renewable energy investment, compared to conventional energy, generally requires higher amount of financing for the same capacity. Therefore, renewable energy developers may have difficulty in obtaining financing at rates as low as may be available for conventional energy facilities. In addition to having higher transaction costs, financial institutions are generally unfamiliar with the new technologies and likely to perceive them as risky, so that they may lend money at higher rates. High financing costs are especially significant to the competitive position of renewable energy, since renewables generally require higher initial investments than fossil fuel plants, even though they have lower operating costs.

Reducing subsidies for fossil fuel and nuclear power seems to be difficult politically. Thus, many policies attempt, rather than reducing these subsidies to compensate for the cost related barriers, by providing additional subsidies for renewable energy in the form of tax credits or incentives, by establishing special pricing, power purchasing rules or by lowering transactions costs.

The analysis of data from the survey conducted among the INTOSAI communities in response to this question shows that, compared to other constraints, the cost is the most important limitation to the development of renewable energy in the world. Indeed, out of 56 countries that responded to the question, 27 (43.55%) consider the cost as the first constraint to this development, 13 countries (23%) consider it as second constraint. Thus, nearly 70% of countries consider the cost of one way or another as the main constraint to the development of renewable energy.

Technical Constraints

The introduction of new technologies such as renewable energy technologies would require the development of technical skills. The importance of technical know-how and qualified personnel to manage all aspects of the renewable energy development process are essential to ensure their effective use. In addition, there are issues related to the renewable energy resource availability and intermittence. For instance:

- Solar or wind power is dependent on availability of sunlight or wind. Thus, the availability of power fluctuates from zero to maximum every day.
- Total potential of renewable energy source as wind power and tidal power is limited. Plant for generating power from windand tides can be located only in places where suitable conditions of tide or wind exist.
- Plant for generating energy from wind and solar energy has to be spread around large areas.
- In addition to these constraints, there are other limits related to the integration of these sources of energy into the electrical network. The use of small amounts of intermittent power has little effect on grid operations. Using larger amounts of intermittent power may require upgrades or even a redesign of the grid infrastructure.

Technical constraints are the second barrier to development of renewable energy after the cost. According to the survey results, among 56 countries that responded to the questionnaire, 27 (48%) consider these constraints as a very important factor or a significant factor influencing the development of renewable energy.

Institutional Constraints

Experience shows that the introduction and success of any renewable energy technology is to a large extent, dependent on the existing institutional framework, local or federal government policies to promote the development and deployment of these technologies.

This institutional framework is an important factor in terms of its ability to create an enabling environment policy, dissemination, sensitization, education, mobilizing resources, as well as encouraging private sector investment.

According to the results of the survey, institutional constraints represent, a moderately significant barrier to development of renewable energy. 32% of countries consider it as important, but, in general, this factor needs special attention because the majority of countries (53.6%) consider it as important to moderately important.

Subsidies for Non-Renewable

Compared with renewable energy, nuclear and fossil fuel technologies enjoy a considerable advantage in government subsidies. Public subsidies can take many forms such as direct budgetary transfers or tax incentives. They can significantly lower final energy prices, putting renewable energy at a competitive disadvantage if it does not enjoy equally large subsidies.

The fossil fuel subsidies may appear at first glance as a major factor hindering the development of renewable energy. However, the survey results show that only about 11% of countries consider them very important constraint, while nearly 61% of countries consider them weakly important to not important.

Geographical/Natural Conditions of Specific Countries

Some renewable energy sources have geographical restrictions, e.g. land use that reduces the theoretical potential. The geographical potential is the theoretical potential limited by the resources at geographical locations that are suitable. The availability of land in small islands is a real issue and is a typical case for this constraint. Also, the possibilities of developing renewable energy projects could be limited in some countries or regions because of their resource scarcity or availability.

Geographical conditions may pose a significant barrier to the development of some types of renewable energies, such as solar energy in the countries of northern Europe or hydropower in arid countries, but the diversity of sources of this energy worldwide has meant that this constraint has little effect on the development of renewable energy as a whole. In fact, survey results reveal that only about 9% of countries that responded to this question have this constraint as the main obstacle, while the majority of countries, nearly 79%, see it as weak barrier or totally not a barrier.

Some countries mentioned other constraints than those presented in the questionnaire. This is particularly the case for barriers related to low awareness of investors and people about the importance of this sector, and its problems related to bank financing and risks of uncertainty.

Chapter 2

Policies and Governmental Responses to Renewable Energy Challenges

2.1 INSTITUTIONAL AND REGULATORY ASPECTS

National Legislation

The regulatory framework laid down by national governments is a key element for creating favorable environment to promote the development, implementation or commercialization of renewable energy and reaching national targets and objectives. To reach the objectives, typical instruments that governments have to lay down rules are: improving the grid access for electricity from renewable energy sources (e.g. Turkey, Greece, Chile, India, Croatia, UK), designing appropriate incentives (USA, Slovenia), setting the administrative and planning procedures (EU, Morocco, Greece, Norway, Poland, Philippines), providing information and training on renewable energy equipment, etc. The regulatory framework relates also to the land use, site identification, and finance issues encountered by developers of renewable energy projects. Detailed examples, about countries experiences, are provided **in the Appendix 1.**

Policies and/or Programs Taken by Governments Worldwide for Promoting and Enforcing the Renewable Energy

Policymakers have turned to renewable energy to achieve a number of goals. The primary objective is generally to maintain or expand energy services. Other social, political, and economic objectives may include reducing health and environmental impacts of fossil fuel energy use, reducing greenhouse gas emissions, enhancing energy access and security as well as improving opportunities for education, job creation, rural economic development, poverty reduction.

In conjunction with designing and putting in place policies, the existence of a sector regulator body can be specified in the enabling legislation. The sector regulator body has a number of roles and responsibilities for implementing the legislation. Its role is to provide legitimacy and transparency for regulatory rulings related to renewable energy. The regulator role also is to oversee the system of policy instruments, for example monitoring national incentives instruments to ensure abuses do not arise and evaluate the system effectiveness in meeting renewable energy objectives.

The number of countries with policies to promote the development and deployment of these technologies continues to increase every year. More than 70 governments around the world, and among them, all IEA member countries, have put in place targets and policies to support the deployment of renewable energy technologies[1]. This finding was confirmed by the results of the research survey which shows that 100% of the countries, among INTOSAI community, that responded to the survey, have developed policies regarding the renewable energy.

The most common policies that have proven their effectiveness recently can be divided into three categories: regulatory, fiscal or public financing incentives or policies. Among these policies are: Renewable energy targets which focus on the total energy production of a country, group of countries or region. Targets may specify total primary energy from renewable or minimum renewable energy shares of energy consumption. For example, The European Union collectively has committed to reach a 20% share of renewable energy in final energy consumption and a 10% share of renewable energy in transport by 2020, with individual member states having individual targets above or below that amount. Japan has adopted a target of having 20% of all energy from renewable energy by 2030. Morocco has set an ambitious plan to develop renewable energy, with target to increase the installed renewable energy capacity to 42% of total electricity capacity by 2020. The table in the Appendix 2 shows the main policies taken by governments worldwide, based on the results of the survey.

1 IEA, 2011, Interactions of Policies for Renewable Energy and Climate

Support to R&D and Reduction of Production Costs

Technology is a key to both increasing access to energy supplies and the public support for R&D which is essential for reducing the private costs of innovation, whose benefits are shared broadly by society. The role of direct government support can be large in the early stages of innovation and become smaller as technologies mature. In R&D, the general role of the public sector is in supporting high-risk, fundamental research with a long-term perspective, while the private sector tends to focus on near-competitive technologies and shorter-term demonstration projects.

The public sector can support research institutes and academic institutions, fund research programs targeted at specific technologies and supply grants to private-sector R&D efforts.

In developing countries, the focus should be on creating capacity to facilitate technology transfer, adapt technologies to local market conditions and support private-sector players that install, manufacture, operate and maintain the technologies.

In many developing countries, the national renewable energy sector faces many barriers to development, due partly to a lack of expertise and limited access to appropriate technologies and knowledge. Especially least developed countries (LDCs) are severely challenged with respect to the science, technology and innovation of renewable energy. LDCs also face the challenge of having to bridge the digital divide and technology gap in support of sustainable development and poverty eradication (UN 2012c).

Through the responses to the survey conducted among the INTOSAI community, it appears that government policies on R&D focus in particular on issues of funding and implementation of research facility and coordination of the research. The issue of cost reduction remains the main objective of most research programs. The table in the Appendix 3 shows examples of government's interventions to promote R&D in renewable energy sector (according to the survey results).

2.2 INCENTIVE MECHANISMS AND MARKET BASED INSTRUMENTS

Governments can improve the risk-return profile of renewable energy by assuming some of the financial risks. A wide suite of public incentive mechanisms such as national targets and feed-in tariffs are available. Each type of incentive mechanism has advantages and disadvantages. Hence, the choice of the incentive mechanism to be used will depend on the local circumstances of the country, the energy sector concerned, and the nature and ambition of the corresponding national renewable energy targets (UNEP, 2012).

The Purchase Rate

***Feed-in tariff**:* This scheme provides support for energy from wind power, solar power, hydro power, biomass and geothermal sources, among other technologies. This scheme is a key renewable energy support mechanism. The system is generally financed through the public contribution to the electricity service which is an amount added to the electricity bill of each electricity consumer. This mechanism provides security for investors by guaranteeing revenues with a long-term perspective to production capacity for renewable energy.

The eligible renewable electricity generators, including homeowners, business owners, farmers and private investors, are paid a cost-based price for the renewable electricity they supply to the grid. Under this scheme, a price is set, that is generally guaranteed over a certain period of time, at which power producers can sell renewable energy generated electricity into the grid. Feed-in tariffs are expressed in national currency per kWh or MWh.

Green Certificates

This is a tool for trading and meeting renewable energy obligations among consumers and/or producers, and also a means for voluntary green power purchases. A Renewable Energy Certificate, also known as Green Certificate, is a tradable commodity proving that certain electricity is generated using renewable energy sources. Typically one certificate represents generation of 1 MWh of electricity.

Green certificate markets allow producers or purchasers of renewable energy who earn green certificates to sell those certificates to those who need to meet obligations but have not generated or purchased the renewable power themselves. Those without obligations but who wish to voluntarily support green power may also purchase certificates. Several countries use green certificates as a mean to make the support of green electricity generation closer to a market economy instead of investment support as the feed-in tariffs. Such national trading schemes are in use in e.g. Poland, Sweden, the UK, Italy, Belgium and some US states.

Electric Utility Quota Obligation/Renewable Portfolio Standard (RPS)

The RPS mechanism generally places an obligation on electricity supply companies to produce a specified fraction of their electricity from renewable energy sources. Certified renewable energy generators earn certificates for every unit of electricity they produce and can sell these along with their electricity to supply companies. Supply companies then pass the certificates to a regulatory body to demonstrate their compliance with their

regulatory obligations. Because it is a market mandate, the RPS relies almost entirely on the private market for its implementation. Unlike feed-in tariffs which guarantee purchase of all renewable energy regardless of cost, RPS programs tend to allow more price competition between different types of renewable energy, but can be limited in competition through eligibility for RPS programs.

- Net metering: It allows a two-way flow of electricity between the electricity distribution grid and the customer with its own generation. The customer pays only for the net electricity used.

Tax Incentives

Taxes can be an alternative to subsidies or used in combination with them in order to shape the structure of incentives facing producers and consumers in energy markets. A tax is one of the most efficient measures for raising the externalities of carbon emissions in energy production and use.

Governments are now offering a wide variety of fiscal incentives and related programs to support renewable energy investment, including:

- Investment and production tax credits: These policies provide incentives in the form of lower investment costs via a tax relief or to offset costs through a stream of payments based on power production via production tax credits.
- Reductions in sales taxes, energy taxes, property taxes, carbon taxes, VAT and other taxes: These policies concern reduction in taxes which is applicable to the purchase or production of renewable energy technologies.

The List of State Subsidies for Renewable Energy Resources

Apart from feed-in tariffs – which are basically financed by cross subsidies among users – direct subsidies for renewable energy can also provide assistance in the early stages of market diffusion. Subsidies can be in the form of investment support, grants or rebates to reduce capital costs, cover a percentage of the capital cost of an investment or in the form of operating support.

Subsidies, however, need to be judiciously designed and applied for a variety of reasons. Subsidies will most likely need to be adjusted over time in order to be efficient, and such changes are likely to be opposed by businesses or consumers who benefit from them. Such support also needs to take into account requirements of international agreements, in particular the rules and regulations of the WTO.

Beside subsidies, there are other forms of **public financing** of renewable energy such as:

Public investments, loans and grants: Public investments and market facilitation activities, which offer a wide range of public policies that reduce market barriers and facilitate or accelerate renewable energy markets. This includes policies such as:

- public benefits funds to pay the differences between the cost of renewable and conventional generating facilities, providing renewable energy services, funding public education on renewable energy related issues and supporting research and development.
- infrastructure policies include policies for design standards, equipment standards, training and licensing.

Public competitive bidding/tendering: Under the tendering system, contracts to construct and operate specific projects or specific quantities of renewable capacity are awarded. Bidding for renewable power capacity can be done at the national or sub-national levels. By encouraging competition between utilities, the goal of the tendering system is to reduce the price of supplying renewable energy.

The table in the Appendix 4 shows examples of incentive mechanisms and market based instruments implemented by some countries to promote the development of renewable energy sector (according to the survey results).

Chapter 3

Role of International Cooperation in the Development of Renewable Energy

3.1 LEGISLATION ASPECTS OF INTERNATIONAL AGREEMENTS

Energy issues are gaining increasing importance at international level. The Commission on Sustainable Development[2] (CSD) and The United Nations Framework Convention on Climate Change[3] *(UNFCCC) platforms are focusing on energy* and climate change. Negotiations are underway for a post-Kyoto Protocol[4]

2 CSD was established by the UN General Assembly in December 1992 to ensure effective follow-up of United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit. From its inception, the CSD was highly participatory in structure and outlook, by engaging in its formal proceedings a wide range of official stakeholders and partners through innovative formulas. Since its establishment in 1992, the Commission has greatly advanced the sustainable development agenda within the international community.

3 UNFCCC is an international environmental treaty. The objective of the treaty is to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system». The treaty itself set no binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. In that sense, the treaty is considered legally non-binding. Instead, the treaty provides a framework for negotiating specific international treaties (called «protocols») that may set binding limits on greenhouse gases. The UNFCCC entered into force on 21 March 1994. As of March 2014, UNFCCC has 196 parties. The parties to the convention have met annually from 1995 in Conferences of the Parties (COP) to assess progress in dealing with climate change. One of the first tasks set by the UNFCCC was for signatory nations to establish national greenhouse gas inventories of greenhouse gas (GHG) emissions and removals

4 The Kyoto Protocol is an international treaty, adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. There are currently 192 Parties to the Protocol. The Kyoto Protocol implemented the objective of the UNFCCC to fight global warming by reducing greenhouse gas concentrations in the atmosphere to a level that would prevent dangerous anthropogenic interference with the climate system. The Protocol puts the obligation to reduce current emissions on developed countries on the basis that they are historically responsible for the current levels of greenhouse gases in the atmosphere. As a result, it sets binding emission reduction targets for 37 industrialized countries, mostly member states of the European Economic Area in its first commitment period. These targets add up to an average five per cent emissions reduction compared to 1990 levels over the five-year period 2008 to 2012. The Protocol's first commitment period started in 2008 and ended in 2012. A second commitment period was proposed in 2012, known as the Doha Amendment, which would commit only Europe to further CO2 reductions until 2020 but has yet to be ratified. Negotiations are currently under way to agree on a post-Kyoto legal framework that would obligate all major polluters to pay for CO2 emissions. The new framework will be negotiated at the December 2015 meeting of the Conference of Parties to the UNFCCC in Paris, France

(2012) international climate change regime. The G8 meetings seem to have a continuous focus on energy focusing more and more on renewable energy development issues. The international community has recognized the critical role that renewable energy can play in meeting its objectives of poverty alleviation and climate change mitigation.

Technology transfer is one good example of international cooperation in the development of renewable energy. It is the flow of knowledge, experience and equipment from one area to another, from an industrialized country to a developing country, but it can also be between developing countries or even from urban areas to rural areas. Like other new technologies, renewable energy faces barriers that related to technology transfer. Before a technology can be transferred successfully, enabling conditions need to be fulfilled, such as institutional and adaptive capacity, access to finance, and knowledge of the technology. In the spirit of promoting renewable energy adoption, international actors and institutions have played a prominent role especially through the institution of the International Renewable Energy Agency (IRENA)[5]. The IRENA is an intergovernmental organization dedicated to promote adoption and sustainable use of renewable energy. Through this kind of global cooperation, essential elements in promoting renewable energy, such as knowledge sharing, policies and capacity enhancement, investment flows encouragement and technology and innovation strengthening are provided.

Also, in terms of international cooperation, supporting renewable energy programs are at the forefront in terms of official development assistance (ODA). The majority of donor countries have either highlighted energy, access to sustainable energy or renewable energy development programs as one of their ODA priorities. Several initiatives were launched for Poverty Eradication and Sustainable Development.

Concerning legal aspects of what is so called international agreement, there are arguments that confront the implementation of international regulation of renewable energy, such as states' sovereignty over natural resources and energy security policies which can hinder the states' political well to implement international regulation. Bruce (2013) concluded that the sovereignty of a state over its resources is not entirely absolute; it should be followed by an obligation on the environment. This has prompted the international policy on renewable energy to become an important normative power which is guiding the development of the projects[6]. The principles and concepts of sustainable development have proven to be a useful analytical toolto design energy use in terms of environmental policy consequences.

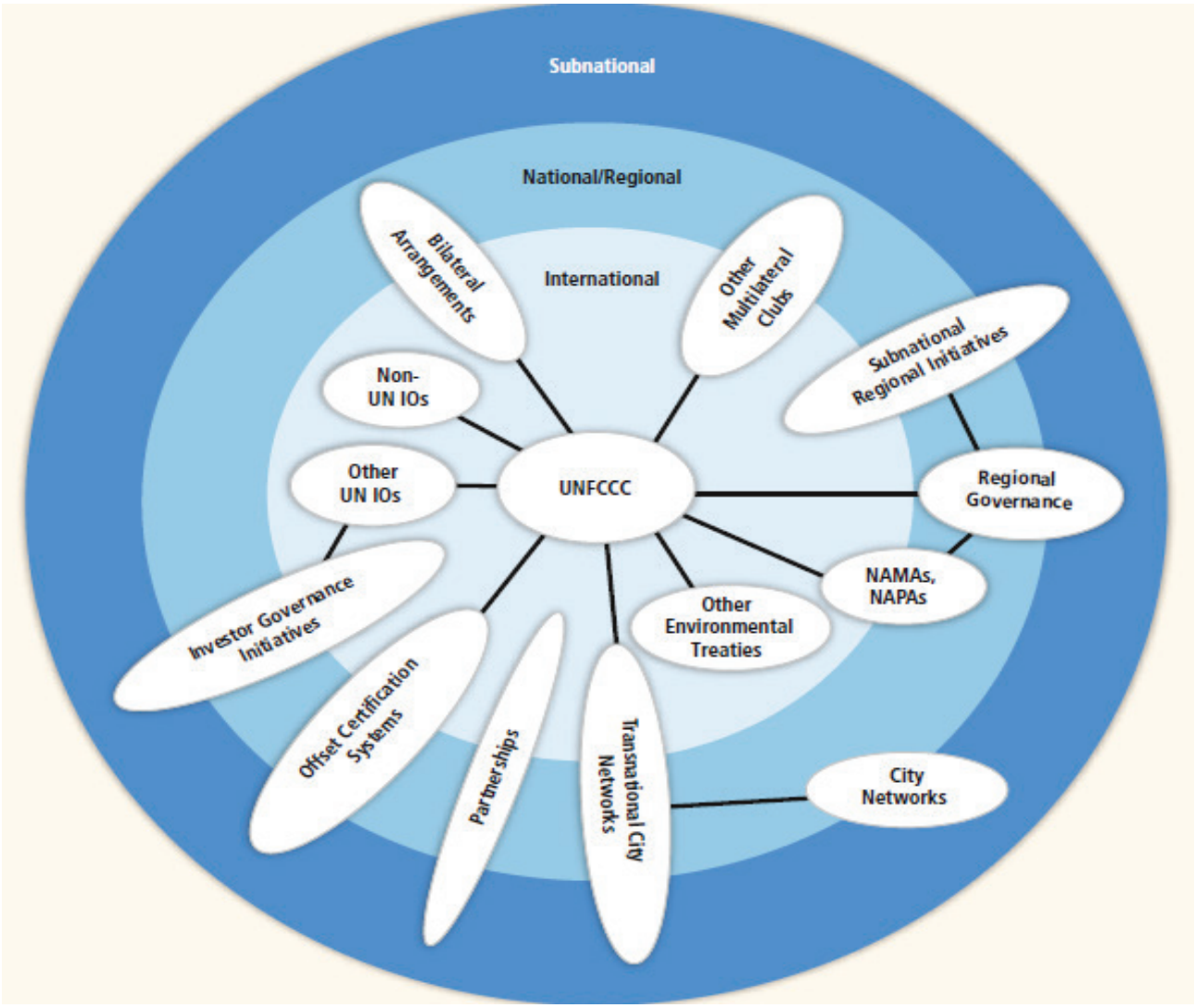
5 http://www.irena.org/home/index.aspx?PriMenuID=12&mnu=Pri

6 Bruce, Stuart (2013). International Law And Renewable Energy: Facilitating Sustainable Energy For All?. Melbourne Journal of International Law, International Law and Renewable Energy (Vol 14, 2013)

3.2 MOBILIZATION OF FUNDING AND THE IMPORTANCE OF INTERNATIONAL COOPERATION IN RENEWABLE ENERGY DEVELOPMENT

International cooperation has played crucial role in the development of renewable energy sources and technologies. Stavins R, et al (2014) mentioned several types of international cooperation under UNFCCC such as bilateral and multilateral arrangements, partnerships, city networks and several others. These types of cooperation could be illustrated in figure below:

Figure 12 Several Types of International Cooperation Under UNFCCC



Several examples of the International Cooperation in developing renewable energy sources and technology:

Table 1 Examples of the International Cooperation in Developing Renewable Energy Sources and Technology

UNFCCC	Kyoto Protocol, Clean Development Mechanism, International Emission Trading
Other UN Intergovernmental Organizations	Intergovernmental Panel on Climate Change, UN Development Programme, UN Environment Programme, UN Global Impact, International Civil Aviation Organization, International Maritime Organization, UN Fund for International Partnerships
Non UN IOs	World Bank, World Trade Organization
Other environmental treaties	Montreal Protocol, UN Conference on the Law of the Sea, Environmental Modification Treaty, Convention on Biological Diversity
Other multilateral 'clubs;	Major Economies Forum on Energy and Climate, G20, REDD+ Partnership
Bilateral arrangements	e.g. US and India, Norway and Indonesia
Partnerships	Global Methane Initiative, Renewable Energy and Energy Efficiency Partnership (REEEP), Climate Group, the Global Village Energy Partnership (GVEP), Renewable Energy Policy Network for the 21st Century (REN21) and the Global Network on Energy for Sustainable Development (GNESD)
Offset certification systems	e.g. Gold Standard, Voluntary Carbon Standard
Investor governance initiatives	Carbon Disclosure Project, Investor Network on Climate Risk
Regional governance	e.g. EU climate change policy
Subnational regional initiatives	Regional Greenhouse Gas Initiative, California emission-trading system
City networks	US Mayors' agreement, Transition Towns
Transnational city networks	C40, Cities for Climate Protection, Climate Alliance, Asian Cities Climate Change Resilience Network
NAMAs, NAPAs	National Appropriate Mitigation Actions (NAMAs) of developing countries, National Adaptation Programmes of Action (NAPAs)

The Landscape of Agreements and Institutions on Climate Change

Lines connecting different types of agreements and institutions indicate different types of links. In some cases, lines represent a formal agreements of a division of labour (e.g. between the UNFCCC and ICAO concerning aviation emissions). In other cases, lines represents a more simple mutual recognition (e.g. the accreditation of C40 cities by the UNFCCC). In other still, lines represent a functional linkage without any formal relationships (e.g. the relationship between the CDM and the NGO certification of carbon offset). This is rapidly-changing landscape and not all links may be captured.

CanREA (2006) explained that REEEP as a coalition of progressive governments, businesses and organizations committed to accelerating the development of renewable and energy efficiency systems**.** Initiated at the WSSD by the UK government, the partnership is supported by a number of governments with Canada recently coming on board and encouraged to further support.

GVEP brings together developing and industrialized country governments, public and private organizations, multilateral institutions, consumers and others to promote the linkages between energy and poverty reduction strategies as well as the MDGs. GVEP envisions a world in which access to energy services is provided for the unserved or underserved in a manner that enhances economic and social development and alleviates poverty.

The Renewable Energy Policy Network for the 21st Century (REN21) is a multi-stakeholders network that resulted out of Bonn and that aims at providing a forum for international leadership on renewable energy. Its goal is to allow a rapid expansion of renewable energies globally by bolstering policy development and decision-making on sub-national, national and international levels. REN21 has been instrumental in releasing studies on the global status of renewable energy.

The Global Network on Energy for Sustainable Development (GNESD) is a UNEP facilitated knowledge network of developing world Centers of Excellence renowned for their work on energy, development and environment issues. It is a capacity building, knowledge sharing and networking initiative. All GNESD activities are based on the firm belief that access to affordable, modern energy services is a pre-requisite for sustainable development and poverty alleviation.

Policy makers and project planners in developing countries (at national and local levels) can get access to information on potential sources of climate finance, inspiring best practice examples, research results and tools for better investment decision making, trough a web based knowledge platform that has been initialized by the World Bank and UNDP[7]. This growing menu of climate funds can be used to catalyze other sources for integrated investments

7 The web based platform is Climate Finance Options (http://climatefinanceoptions.org/cfo/), where users can find A harmonised description of types of funds available, Examples of successful cases of funding, knowledge centre with a glossary of terminology and a wide range of tools for users to analyse their projects and also disscussion forums where users can connect, share or plan projects.

in climate-resilient and low-carbon solutions. This platform is used by many UN agencies and multilateral development banks (MDBs) as a joint conduit of information on investment finance. In renewable energy sector, users can find funding sources offered by various agencies.

Considering climate change as a global and a common problem, promoting renewable energy could be an alternative to tackle this issue especially by promoting international cooperation whether through UNFCCC, G20, or bilateral negotiations.

In order to insure a succesfull international cooperation, several principles, mentioned and described in several international climate change forums, should be considered.

Stavins et al (2014) has mentioned the most important principles dealing with climate change international cooperation:

- Maximizing global net benefits makes the tradeoff between aggregate compliance costs and aggregate performance benefits explicit;
- Equity emphasizes distributive justice across and within countries, and across and within generations;
- Precaution which emphasizes anticipation and prevention of future risks, even in the absence of full scientific certainty about the impacts of climate change;
- Sustainable development, which emphasizes consideration of the socio economic needs of future generations in making decisions about current resource use.

3.3 PROMOTING RENEWABLE ENERGY THROUGH CLEAN DEVELOPMENT MECHANISM (CDM)

The Clean Development Mechanism (CDM), defined in article 12 of the Kyoto Protocol, allows a country with an emission reduction commitment under the Kyoto Protocol (Annex B Party) to implement an emission-reduction project in developing countries. Such projects can earn certified emission reduction (CER) credits, each equivalent to one ton of CO2, which can be counted towards meeting Kyoto targets.

The CDM is intended to be a mechanism for investment and technology transfer into developing countries. It aims to assist developing countries in gaining “sustainable development”. This way allows the economy growth, but at the same time reduces greenhouse gas emissions on global levels.

The mechanism stimulates sustainable development and emission reductions, while giving industrialized countries some flexibilities

in how they meet their emission reduction or limitation targets. The range of technologies considered under the CDM project is wide, and includes renewable energy technologies.

Currently, renewable energy contributes to the largest share of the global project portfolio of the Clean Development Mechanism (CDM), the Kyoto Protocol's main mitigation instrument for developing countries. It has mobilized significant investment and facilitated the market penetration of advanced renewable energy technologies in many countries (Hoch, 2012).

Under this mechanism, buyers in developed countries are allowed to offset their emission by purchasing emission reduction credits from projects in developing countries. According to "The New Climate Economy Report" (2014), since 2004 there have been 7,000 projects in 89 countries registered. It is estimated to have leveraged around US$315 billion in capital investment both in mitigation and sustainable development projects.

In recent history, The CDM is the most successful carbon offset mechanism of the world. UNFCCC secretariat analysis report in 2012 has showed that the CDM has provided more than what was initially designed to do in some areas[8]. The study described that the CDM has provided multiple sustainable development benefits, and there is also other benefits provide depend on the project type. Although, the most distinguished benefits provided by CDM project on renewable energy are the local economy stimulation through employment creation which results in poverty alleviation, pollution reduction and promoting renewable energy by giving people access to energy.

During 2006 to 2012, CDM has been known for its impressive growth, but it is suffering a sharp decline recently. The Annual report of the Executive Board of the CDM of 2014[9] has reported that the decline was due to external factors such as economic recession, restrictions of Certified Emission Reductions (CER)[10], and parties ambition in fulfilling its commitments. These factors resulted in CERs price impairment.

Despite all its imperfection, CDM has encouraged developing countries to shift into the use of low carbon energy sources. In the development of cost-effective renewables, CDM has provided with investment channel. With CDM that has international offset mechanism, the developing countries have an incentive to shift energy production from fossil fuels to renewables to fight against climate change.

8 The UNFCCC has conducted a study on more than 4000 CDM projects that was going on 2012. The study, Benefits of the Clean Development Mechanism 2012, is available on the UNFCCC CDM website <https://cdm.unfccc.int/about/dev_ben/index.html>.

9 United Nations Framework Convention on Climate Change (2014), 2014 Annual report of the Executive Board of the clean development mechanism to the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol. Retrieved from http://unfccc.int/resource/docs/2014/cmp10/eng/05.pdf

10 CERs are a type of emissions unit (or carbon credits) issued by the Clean Development Mechanism(CDM) Executive Board for emission reductions achieved by CDM projects and verified under the rules of the Kyoto Protocol.

Chapter 4
Auditing Renewable Energy

Currently, the issue of RE has become a very interesting field for the majority of SAIs around the world. The increasing number of audit operations conducted on RE during the last decade confirms this trend. Indeed, the audit reports database available at the WGEA website contains more than 40 audit cases related to the RE issues.

In order to study the SAIs' responses towards the auditing of RE, a questionnaire has been addressed to the WGEA community. 65 SAIs responded to the questionnaire and 24 SAIs (almost 37%) indicated that they had conducted audits on RE.

Based on the questionnaire results, the aim of this chapter is to explore the different SAI responses to the issue of auditing RE. Primarily, the analysis will be focused on a brief review of the auditing RE practices. Secondly, the discussion will be concentrated on identifying a hierarchy of recurring topics related to the auditing of RE.

4.1 OVERVIEW ABOUT AUDITING RE PRACTICES

As shown in the table below, the 24 SAIs, which have proceeded to the auditing of RE, have published 36 reports together during the period 2006-2015. Almost two-thirds of these reports (22 reports) were published by the SAIs of the North Europe countries (Finland, Denmark, Sweden, Germany and UK) and the SAIs of North America (USA and Canada). Each country has published

at least two audit reports during this period, except the SAI of Sweden which has elaborated only one report.

In addition, the temporary analysis of questionnaire results shows that 72% of 36 reports have been published over the past four years. This confirms that the auditing of RE begins gradually to become a full emerging issue for the different SAIs questioned.

In terms of the preferred types of audit on RE, the majority of SAIs (19 SAIs) has adopted performance audit, and only 3 SAIs have made the choice of the compliance audit. The general trend towards performance audit is explained by the fact that the SAIs are not restricted to a limited vision based on the verification of compliance and regularity aspects, but adopt a broader view based on the assessment of the 5E dimensions of politics and programs related to the RE.

It should be noted that there is also other types of RE audit that are rarely practiced by the asked SAI, for example: Special Issue Audit (SAI of Korea) and Value for money audit (Slovenia).

Table 2 Audit Reports on Renewable Energy Published by SAIs from INTOSAI Community

		Types of Audit			Total audit reports per year
		Compliance audit	Performance audit	Others	
Year of publication	from 2006 to 2009	Cyprus	Thailand, Canada, Malta		4
	2010		Finland, Lithuania	United Kingdom	3
	2011		Finland, Malta, Sweden	United Kingdom	4
	2012		Estonia, Australia (ANAO), United Kingdom, USA	Canada, Korea, Germany, United Kingdom, USA	9
	2013		Bhutan, China, Meldova, United Kingdom, USA	Germany, United Kingdom	8
	2014	Denmark, Czech Republic	Denmark, ECA, Norway, Poland, United Kingdom		7
	2015		Bostwana, Netherlands		2
	Total audit reports per type	3	25	9	36

4.2 AUDIT TOPICS ON RENEWABLE ENERGY

By analysing SAIs reports and reports summaries on the WGEA websites, four majors audit topics have been identified[11]:

- Public policy on the use of renewable energy sources potential;
- Relevance of public programs and projects on renewable energy;
- Efficiency and effectiveness of measures to promote production and consumption energy from renewable sources;
- Linking the use of renewable energy impact and climate change plan.

Topic 1: Public Policy on the use of Renewable Energy Sources Potential

According to the questionnaire results, many of the questioned SAIs provided a significant interest to assess public policy on the use of Renewable Energy Sources. The aim of this topic is to examine the state input into the use of RES Potential, especially through the quality of its objectives, implementation tasks and tools needed to ensure achievement of all its components.

There is an argument that providing government aid will cause a negative impact on competition in the market. However, Bartniczak (2014) argues that in terms of the development of Renewable Energy, the state aid is permissible, since the aid has an aim to protect the environment. On one hand, he provided a justification based on the fact that the production of energy from renewable sources is more expensive than the production of energy from conventional sources. On the other hand, the produced energy is more environmentally friendly.

For that reason, the state aid is considered as one of the policies to increase the development of the renewable energy sector. The examples of audit report that are directly related to this issue:

- **SAI of USA (2012): Renewable Energy: Federal Agencies Implement Hundreds of Initiatives**

  GAO collected information on initiatives that were funded, planned, or authorized related to renewable energy in fiscal year of 2010. The objectives of this audit were: 1) to identify federal agencies' renewable energy-related initiatives government wide, and 2) to examine the federal roles of these agencies' initiatives support. There were no specific criteria used within this audit. The first objective was achieved through judgement when there was no formal name for the initiative or through disaggregation of higher-level activities

11 See appendix 5 for links to examples identified among each topic.

that included multiple initiatives. Federal agencies' roles were examined through analyzing the initiative data collected based on four key roles, namely: 1) research and development; 2) commercialization and deployment; 3) regulation, permitting, and compliance; and 4) fleets and facilities.

Four federal agencies namely Department of Defence (DOD), Agriculture (USDA), Energy (DOE), and Interior were collectively responsible for almost 60 percent of total initiatives. The initiatives supported a range of renewable energy sources mostly bio energy, solar energy, and wind energy. Agencies' renewable energy efforts increased in the last years as a result of many factors such as the provisions of the American Recovery and Reinvestment Act of 2009. More than 80 percent of initiatives span four key federal roles mentioned above. Certain agencies were leading in different roles. Although DOE, DOD and USDA were leading in the research and development role, DOD was more forefronts in General Services Administration, DOE in fleets and facilities, and USDA in commercialization and deployment. GAO did not provide recommendation for this report. For further detail of the report, it is available at: http://www.gao.gov/products/GAO-12-260

- **SAI of Malta (2011): Renewable Energy in Malta – Follow-up**

  National Audit Office of Malta conducted a performance audit on various renewable energy initiatives which include penetration of photo voltaic, solar water heater, bio fuels, wind energy, and biomass. The European Union and National Targets were used as criteria within the audit which was conducted in 2010-2011. The audit found that despite the delays, there was significant progress in terms of broadening and strengthening the bio fuel operational and legal framework. The progress registered to date and revised plans indicate that Malta will fulfil its EU trajectory targets and ultimately exceed its obligatory 2020 EU Renewable Energy targets. However it is depending on the minimization of project implementation delays, the feasibility of major projects and the relevancy between the exploitation of renewable energy and its projection. This report did not provide recommendation and the implementation of the renewable energy which is still ongoing. For further detail of the report, it is available at: http://nao.gov.mt/page.aspx?id=85

- **SAI of Lithuania (2010): Use of Renewable Energy Sources Potential in Lithuania**

  National Audit Office of Lithuania conducted the performance audit on the use of renewable energy sources potential in Lithuania. The audit aims to examine and evaluate the state input into the use of potential of renewable energy (RES). The scope of the audit was the use of renewable energy sources typical of Lithuania and how it can be used for the production of green energy under the local condition. NAO of Lithuania found that the comprehensive use of RES was not ensured with several such as: 1) revised National Energy Strategy; 2) insufficient analysis of quantities and qualities; 3) insufficient

procedures for the provision of EU support; 4) insufficient promotion measures. The NAO of Lithuania recommended that the government should ensure more favourable conditions to promote the uses of RES. The NAO of Lithuania has specifically recommended that: 1) The government has to revise the National Energy Strategy and some of legal acts regulating this area; 2) The government should improve promoting use of RES system and increase the 'green' share in energy production. Following up this audit, the Prime Minister's office and the Ministry of Energy prepared a plan for implementing the audit recommendations. For further detail of this report, it is available at: http://www.vkontrole.lt/audito_ataskaitos_en.aspx?tipas=15

Topic 2: Relevance of Public Programs and Projects on Renewable Energy

Some SAIs preferred to conduct audit operations on the RE by focusing on programs and projects implemented by national and local governments in this field. The objective of this topic is to evaluate whether the audited programs and projects were implemented and provided results as planned, and whether they attained their targets.

The question of whether the renewable energy actually has a capability to replace the fossil energy is still going around today. Smith (2014) in their paper argue that the renewable energy has to be viable. In their definition, to be viable, the renewable energy need to able to work or function in a stage where the renewable energy form can replace conventional energy sources. The conventional energy sources refer to coal, natural gas, nuclear for electricity, and oil and natural gas for transportation.

For a country, the transition process from fossil based energy to renewable energy is not easy. Greiner et al. (2014) in their paper build up two kinds of transition scenarios. By using a socially optimal as a goal from their non linier model predictive control, they found that "If the available non-renewable energy resource is initially high, the extraction rate of the non-renewable resource is first high and then continuously declining, and it appears to be optimal to have for a long time period a low or even zero capital stock to produce the renewable energy." This model shows that the optimum transition process will be different for each country and depends on its initial level of non-renewable energy sources stock.

Based on this conclusion, many examples of government programs are conducted in order to push the transition process of renewable energy development as an alternative solution to meet the demand of conventional energy sources. Three cases of audits focused on programs and projects implemented in this field were identified:

- **SAI of Australia (2012): Administration of the Renewable Energy Demonstration Program**

  Australian National Audit Office (ANAO) conducted the performance audit on the administration of the Renewable Energy Demonstration Program (REDP) in 2012 to assess the effectiveness of this program including the progress towards achieving the program's objectives.

  This program was the first major program to be implemented by the Australian Government Department of Resources, Energy and Tourism's (RET's) which was being implemented during late 2008 and early 2009. An acceleration of this program also meant that grant applications, assessments and decisions had to be completed within a compressed time frame, adding to the program's implementation risks.

  The scope of the audit includes the examination of RET's documentation and interview of the staffs regarding the project. As the criteria of this audit, ANAO used the ANAO's Administration of Grants Better Practice Guide (2002) and Implementing Better Practice Grants Administration Guide (2010) which based on requirements of the Finance Minister's Instructions and the CGGs.

  The audit found several weaknesses in the RET's administration. Firstly, regarding program planning, the department did not complete an implementation plan for REDP, nor did it assess the risks facing the program until October 2009. Secondly, regarding probity arrangements, departmental records did not indicate the consideration of declarations by the Renewable Energy Committee (REC) members, nor did it involve them in discussing individual applications for which they had declared a potential conflict. Lastly, regarding the assessment of applications, the process administered by the department fell short of the transparent and accountable decision making process expected by government. Based on these findings, ANAO recommended an additional governance oversight and enhanced guidance better to effectively manage grant programs and a greater coverage of the requirements relating to the documentation of merit assessment process. The department accepted the recommendation and indicated that it had made an action on it. For further detail of the report, it is available at: http://www.anao.gov.au/Publications/Audit-Reports/2012-2013/Administration-of-the-Renewable-Energy-Demonstration-Program.

- **SAI of China (2013): Auditing of Energy Conservation and Emission Reduction (Auditing of Golden Sun Engineering Project)**

  China National Audit Office (CNAO) conducted the performance audit on the Golden Sun Engineering Project in 2013. This project was implemented by a Chinese province to install photovoltaic which has a capacity of 1000 kW. When CNAO has been conducting the audit, the project has

not been done yet and some of the finished photo voltaic installments have not been connected to the grid. Relevant laws and regulations, project approval materials, and national PV standard were used as criteria for this audit. The audit found that the project had not yet achieved its objective as the construction of local supporting facilities had not been finished. It also found that some installed PV could not be connected to the grids for power generation. Lastly, operating losses experienced by the PV enterprises which have completed the project have discouraged other PV enterprises from producing and operating. CNAO has recommended the implementing agency of this project to improve supporting facilities and speed up the project's construction. It has also recommended to have a standardized grid connection technology to ensure that the project and the funds achieve its best performance.

- **European Court of Auditors (2014): Cohesion policy funds support to renewable energy generation — has it achieved good results?**

  The cohesion policy fund was the European Union initiative to support the renewable energy generation in European countries. In 2014, European Court of Auditors (ECA) has completed an audit upon the effectiveness of this cohesion policy fund, whether the projects have attained the energy production targets. The scope of the audit was nine operational programs related to biomass, photo voltaic, solar thermal, and wind energy sectors which spread in Austria, Finland, Malta, Poland, and the United Kingdom. Criterion used within the audit was only the target achievements of each project in producing renewable energy.

  The ECA found that audited projects delivered outputs as planned and most of them were sufficiently mature and ready for implementation when selected. However, ECA also found that the energy production results were not always achieved or not properly measured. Based on these findings, ECA recommended the Commission to ensure that the future cohesion policy funds are guided by the cost effectiveness principle. ECA also recommended the Commission to promote the establishment by the member states of stable and predictable regulatory frameworks for renewable energy in general along with smoother procedures to integrate the electricity to the grid networks. Lastly, ECA recommended the member states to establish and apply minimum cost-effectiveness criteria adapted to the projects' circumstances and enhance the added value of cohesion policy fund through better implementation, monitoring and data base of measured data on energy generation costs. For further detail of the report, it is available at:

  http://www.eca.europa.eu/Lists/ECADocuments/SR14_06/SR14_06_EN.pdf

Topic 3: Efficiency and Effectiveness of Measures to Promote Production and Consumption Energy from Renewable Sources

Today, the field of RE has become a fully-fledged business. The development of this business depends on the involving of measures that aim to promote production and consumption energy from renewable sources. These measures take different forms: direct financial incentive, tax incentive. The efficiency and effectiveness of these measures can be an interesting topic of audit by an SAI.

The market competitiveness of renewable energy sources has a promising trend. According to the report by The Economist (2015), the Solar technologies have already made significant progress in a short amount of time to make their cost more affordable. The report also mentions the Global Apollo Program which has a goal to make the solar panel capacity cheaper than coal burning plant by 2015.

Furthermore, the success of the development of renewable energy to enter the energy market still depends on the role of the Government. Antonio and Giuseppe (2014) research on the OPEC countries shows that the key factors promoting investments in renewable energy sources are the grants and/or incentives to promote the installations of new renewable power plants. The lack of incentives from the Government could be a limit for the future and sustainable development of these countries.

The examples of audit report related to this issue:

- **SAI of United Kingdom (2014) : Early Contracts for Renewable Electricity**

  The Department of Energy and Climate Change has established contracts for different schemes, to set a price for the electricity low carbon generators (known as “strike price”). A newly formed “Counterparty Body” will pay generators the difference between the market price and the electricity generated strike price when it is higher. The Counterparty Body is funded by the electricity suppliers, which may pass their costs on to consumers. The Department expected to award the first contracts for different regime in December 2014.

  National Audit Office of United Kingdom completed the performance audit on early contracts for renewable electricity. The objective was to address the process in selecting the project’s awardees of the early contracts, and the outcome of the process in resulting the value for consumers. NAO used the United Kingdom’s Climate Change Commitments and Climate Change Act (2008) as the main criteria for the audit.

  The audit found that the early contracts gave certainty earlier than under the full contract. It also gave greater confidence in the near term for the UK’s renewable energy industry.

The audit also found that the early contracts awarded have administratively set strike prices which may provide higher returns than needed to secure the investment. Based on the findings, NAO has several important recommendations to the department such as : 1) ensuring price competition under the contracts for different scheme; 2) including the clauses in the future contracts to enable it to claw back excessive returns achieved by individual projects; 3) ensuring all the information from all contracts' awardees about actual costs and returns obtained; and 4) ensuring that all the contracts are contributing to the development of renewable energy industry in UK while also minimise costs to the consumers. For further detail of the report, it is available at: http://www.nao.org.uk/wp-content/uploads/2014/06/Early-contracts-for-renewable-electricity1.pdf

- **SAI of Thailand (2008) : Performance audit on Biodiesel productive system support for small community**

  Office of Auditor General (OAG) of Thailand conducted a performance audit on government's project to encourage the consumption of domestic renewable energy specifically in the development of bio-fuel. Bureau of Bio-fuel development under the Department of Alternative Energy Development and Efficiency (DEDE) was leading the project of "Biodiesel productive system support for small community" which supported the renewable energy consumption from the year of 2005 to 2007. There were 72 communities participating in producing biodiesel fuels from used lard and vegetable oil. OAG of Thailand conducted the audit in 2008 to determine whether the project has achieved its targets and to find out whether the project had faced any problems during the period of operation. Objectives and targets of the project became the criteria of the audit.

  The audit found that the project did not accomplish its objectives and targets as its productivity was lower than the target. OAG indicated that the absence of feasibility study, communities' unpreparedness, and lack of support of the operation from the DEDE as the reasons why the project could not achieve its targets. OAG recommended DEDE to prepare the communities and perform feasibility study before conducting the next project. OAG also expected the DEDE to monitor project implementation and the communities closely for the next project.

- **SAI of Bhutan (2013): System Audit of Hydro Electric Energy.**

  Royal Audit Authority of Bhutan completed the performance audit on the system of Hydro Electric Energy in 2013. The overall objective of the audit was to ascertain the economy, efficiency and effectiveness in the use of public resources in generating and distributing hydroelectricity. The audit was conducted on two different projects; one was the ongoing project, the Puna Tsangchu Hydro Power Plant, and the other was the completed project, the Tala Hydro Power Project.

Relevant acts and documents related to the Hydro Electricity project, such as the Electricity Act (2001) and the Power Sector Master Plan were used as criteria aside from the 3E principle and increasing the quality of people's life principle.

The audit found several key findings, such as 1) inadequacies in the Tariff Determination Rules and Regulations (TDR 2007); 2) high dependency on other forms of energy which may have possible negative impact to economy and environment; and 3) the current policy did not support the use of hydroelectricity to be more affordable to people at large and more sustainable use of water resources in power generation. Based on the findings, Royal Audit Authority of Bhutan has several key recommendations for the agency to be done, such as: 1) reviewing the TDR 2007 and updating it accordingly; 2) promoting the use of hydroelectricity to gradually reduce the use of other forms of fuel and pressure on environment; and 3) conducting study about electricity affordability or energy poverty study. For further detail of the report, it is available at: http://www.environmental-auditing.org/tabid/126/CountryId/284/Default.aspx

Topic 4: Linking the use of Renewable Energy Impact and Climate Change Plan

Besides economic and business considerations, the use of RE should lead to mitigate the effects of climate change, mainly by reducing emissions during the cycle of energy production and consumption. Several projects have been implemented in this perspective. A valid topic for auditing is how well RES's projects do, in fact, meet the necessary requirements established by the national climate change plan.

The examples of audit report that related to this issue:

- **SAI of Canada (2009) : Kyoto Protocol Implementation Act**

  Office of the Auditor General of Canada has completed one of the earliest audits regarding the renewable sector by 2009. The audit was performed mainly to determine whether Environment Canada can demonstrate that its annual climate change plans meet the requirements sets out by Kyoto Protocol Implementation Act. The audit was conducted pursuant to the requirements of the Kyoto Protocol Implementation Act which came into force in 2007. The OAG of Canada has set several criteria to be used within the audit such as the expectation that Environment Canada can demonstrate it has reported accurate information on the implementation of selected measures from the previous calendar year.

  The audit found several key findings such as: 1) the climate change plans of 2007 and 2008 did not include the specific information regarding emission reductions plan measures; 2) Environment Canada could not demonstrate that the expected emission reductions under the Regulatory Framework for

Industrial Greenhouse Gas Emissions were based on an adequate rationale; 3) There was no system for reporting the actual emissions reductions achieved from each measure in the annual climate change plans which was required under the Act. OAG of Canada has recommended the Environment Canada to ensure that the next annual climate change plan fulfils all the requirements of subsection 5. (1) of the Kyoto Implementation Act. It also expected to report the emission levels in 2008 – 2012 for each measure in climate change plan. Environment Canada and other responsible departments also expected to describe the uncertainties (quantitatively and qualitatively) related to emission reductions in the annual climate change plans. Lastly, OAG expected the Environment Canada to clearly indicate how the actual emission reductions will be measured within the plan. As one of the series of looking at the Kyoto Implementation Act, the OAG of Canada conducted the follow up audit in 2012. For further detail of the report, it is available at http://www.oag-bvg.gc.ca/internet/English/parl_cesd_200905_02_e_32512.html.

- **SAI of Finland (2011) : Support for energy and climate technology ;**

  National Audit Office of Finland has completed the performance audit on Government's support for energy and climate technology by 2011. The main objective of the audit was to assess the effectiveness of Tekes, the Finnish Funding Agency for Innovation aid for climate and energy projects in creating pre conditions for achieving the climate and energy objectives and promoting business in this sector. The scope of this audit included the examination on performance management and budget documents, international agreements, national climate strategy and other documents. The criteria used in the audit were the achievement of policy objectives and others derived from Acts.

  The NAO of Finland found that Tekes aid programs have created pre condition as expected. However, the aid granted by Tekes has not yet promoted the implementation of climate and energy objectives significantly due to the broad scope of the programs. NAO of Finland recommended the Tekes and supervising ministry to perform cost-effectiveness assessments to determine whether the achievement of climate and energy projects were in correct proportion to its input. The report has no follow up report yet. For further detail of this report, it is available at:

  \http://www.vtv.fi/files/2607/2272011_Support_for_energy_and_climate_technology_abstract_netti.pdf (abstract, report is only in Finnish)

- SAI of Sweden (2011): Biofuels for a better climate – how is the tax relief used?

  The Swedish government has been able to decide on tax relief for bio fuels since 1995 with the purpose of contributing to the

technological development of environmentally friendly fuels to reduce greenhouse gas (GHG) emissions from transport sector. The Swedish National Audit Office has audited the tax relief uses for bio fuels to examine the extent to which the tax relief has contributed to achieve the climate objectives and at what cost. The SNAO has reviewed the Swedish government's decisions on tax relief for bio fuels in the period of 1995 – 2000 and carried out several interviews and analysis on statistic data regarding the impact tax relief in reducing GHG emissions.

The audit found that the tax relief has contributed towards achieving the climate objectives but not at a reasonable cost. It also found that the government's management of the tax relief has not brought about long term and predictable conditions. The tax relief found to have side effects in terms of higher cost which lead to lower reductions in emissions. SNAO also found that tax relief monitoring considered inadequate and insufficient. Lastly, the tax relief was not structured so as to be sustainable in the long term.

Based on these findings, SNAO has recommended the Swedish government to improve the reporting and monitoring process on tax relief for bio fuels to increase transparency. Government also required having clear report on the tax relief and specifying the cases in which it can be granted to avoid a situation whereby different companies and bio fuels are treated differently. In longer term, government also expected to analyse which measures best achieve the climate objectives. For further detail of the report, it is available at: http://www.riksrevisionen.se/PageFiles/13896/RiR_2011_10_Biofuels%20for%20a%20better%20climate_Anpassad.pdf

Appendices

APPENDIX 1 SETTING UP AND / OR STRENGTHENING NATIONAL LEGISLATION (SURVEY RESULTS)

Countries	Setting up and / or strengthening national legislation
Brazil	A program to foster alternative sources of energy was created by law in 2004 and is the main initiative in this regard.
Canada	The two key pieces of Canadian federal legislation are: ▪ Energy Efficiency Act - provides for the making and enforcement of regulations concerning minimum energy-performance levels for energy-using products, as well as the labeling of energy-using products and the collection of data on energy use. ▪ Canadian Environmental Protection Act – provides for regulations to control greenhouse gas emissions, including a requirement to use renewable fuels. Note that legislation and regulations at the provincial level also influences renewable energy projects and plans.

China	Energy Conservation Law of People's Republic of China, Renewable Energy Law of People's Republic of China, Electric Power Law of People's Republic of China, and Recycling Economy Promotion Law of People's Republic of China
Costa Rica	Law No. 449, setting up of the Instituto Costarricense de Electricidad; Law No. 5961, public interest law declaring Geothermal Resources, December 6, 1976; No. 7447, Law on Regulating the Rational Use of Energy, December 13, 1994; Law No 7554, Environment Law, November 13, 1995. Regulation of bio fuels, Number DE-35091-MAG-MINAET. March 17th, 2009
Croatia	Republic of Croatia has established a basic legal framework for the promotion of renewable energy by adopting revised legislation on the electric energy market and by adoption of the package of secondary legislation for renewable energy which make basic preconditions for real development of renewable energy projects. Also, Energy Act defines the use of energy from renewable sources as national interests of the Republic of Croatia.
ECA	EU legislation Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources. This Directive establishes a common framework in the EU Member States for the promotion of energy from renewable sources, sets mandatory national targets for the overall share of energy from renewable sources in gross final consumption and lays down rules relating to administrative procedures and access to the electricity grid for energy from renewable sources.
Estonia	The Renewable Energy Directive 2009/28/EC adopted specific targets for renewable energy in EU Member States, and by 2020 Estonia must raise renewable energy as a share of total energy consumption to 25%, with 2005 as a reference year. More precise targets for renewable sources of energy were set by the Estonian government in Order No 452 of 26.11.2010 of the Government of the Republic of Estonia, 'The Renewable Energy Action Plan for 2020' The Electricity Market Act. Act defines renewable sources as water, wind, sun, waves, tidal energy, geothermal energy, landfill gas, sewage treatment plant gas, biogas and biomass.

Greece	Law 1559/1985 under which the Public Electricity Company of Greece (D.E.I.), installed 24 MW mainly small wind parks and some low power solar systems. Law 2244/1994, which determines the grid of country fixed prices for electricity produced from Renewable Energy Sources (RES). Law 2941/2001, which simplified the procedures for establishing and licensing companies producing RES and coped successfully with the issue of RES in forests and woodlands. Law 3175/2003, which introduced for the first time a comprehensive set of rules for the use of geothermal energy and introduced simplified procedures concerning expropriations that are necessary for the strengthening and development of electricity transmission lines, which also served the development of RES. Ministerial decrees Δ6/Φ1/οικ.19500/ 4.11.2004 (Government Gazette Β΄1671), οικ.104247/ΕΥΠΕ/ΥΠΕΧΩΔΕ/25.5.2006 (Government Gazette Β' 663) and οικ.104248/ΕΥΠΕ/ΥΠΕΧΩΔΕ/25.5.2006 (Government Gazette Β' 663) under which a) the small sized renewable energy plants switched to zero disturbance making it possible to integrate them in build up areas, b) the overall licensing of RES adjusted into the status of environmental consent process, c) the advisory bodies were limited and short deadlines were established, the lapses without which legitimizes the Agency to consider as positive the interim approvals and opinions of other entities regarding the licensing and installation of RES. Law 3468/2006 which a) established a national goal for the participation of electricity using RES for 2010 at 20.1% and in 2020 at 29% of the gross domestic electricity consumption, b) adopted shorter deadlines within which departments and agencies involved in the various stages of the licensing process of RES should have granted their approval, c) changed the previous single pricing scheme of selling RES, mainly for the benefit of solar systems in order to encourage investment in this sector that showed a significant delay, d) improved the terms of buying and selling of electricity from renewable sources in order to facilitate bank financing of projects, e) raised the limit up to which a hydroelectric project is characterized as a small of 10 to 15 MW, with the result hereinafter more such projects be placed under the guaranteed selling price of energy and priority in the allocation of cargo, f) allowed the licensing of hybrid stations intended to be established in the autonomous island systems without bidding process and enabled the direct billing of energy produced by them in order to avoid the cost of operation of conventional units, which replace the hybrid stations and to ensure the economic sustainability of these stations. Law 3734/2009, which among other established a) the simplification and standardization of licensing of geothermal energy for domestic use (shallow geothermal), b) the expanding of its use in agricultural facilities (greenhouses), c) the setting of a standard and single license and the use of closed systems in areas where boreholes for water are prohibited, d) the amendment of the Ministerial decree on the tendering process for leasing rights research in major geothermal fields, making clearer and fully transparent the procedure.

India	1. Electricity Act, 2003 of the Government of India provides for regulatory interventions all over India for promotion of renewable energy sources through: a. determination of tariff; b. specifying renewable purchase obligation; c. facilitating grid connectivity; and d. promotion of development of market. 2. National Policy on Bio fuels
Lithuania	Promotion of the use of renewable energy is one of the key objectives of regulating the activities of the state in the area of energy specified in the Law of the Republic of Lithuania on Energy. Long-term development of the use of energy from renewable sources is provided for in the National Energy Strategy approved by the Seimas of the Republic of Lithuania.
Morocco	Law 13-09 on renewable energy Law 16-09 related to the transformation of CDER (Center or Renewable Energy Development) into a National Agency for the Development of Renewable Energy and Energy Efficiency (ADEREE) Law 57-09 related to the creation of the Moroccan Agency for Solar Energy (MASEN)
New Zealand	New Zealand formed an Environmental Protection Authority to consider regulatory approvals for renewable energy projects. The aim was to speed up the decision making process for major projects of that kind. Previously, local authorities were responsible for regulatory approvals.
Norway	Main legislation ruling the Norwegian energy sector 1. EU legislation is relevant for Norway as part of the EEA Agreement (EU's third energy market package is not yet incorporated into the EEA Agreement). 2. The Act relating to acquisition of waterfalls, mines, etc. of 14 December 1917 No. 16 (the Industrial Licensing Act) and related legislation is to ensure that hydropower resources are managed in the best interests of the general public. New licenses and licenses for transfer of existing licenses are only granted to public-sector purchasers. (more than 95 % of Norwegian power production is hydro electrical) 3. The Act relating to the generation, conversion, transmission, trading, distribution and use of energy etc. of 29 June 1990 No. 50 (the Energy Act) sets the framework for organization of the power supply in Norway. 4. The Act relating to renewable offshore energy production of 4 June 2010 No. 21 (the Offshore Energy Act) relates to renewable energy production and conversion and transmission of electric energy offshore. 5. The Act relating to electricity certificates of 24 June 2011 No. 39 (the Electricity Certificate Act) is to contribute to increased production of electric energy from renewable energy sources. The Act establishes a Norwegian market for electricity certificates which, from 1 January 2012, was linked to the Swedish electricity certificate market.

Philippines	▪ Enactment of Republic Act 9513 or the Renewable Energy Act of 2008
	▪ Enactment of the Republic Act 9367 or the Bio fuels Act of 2006
	▪ Issuances of the following IRRs:
	  ▪ IRR of RA 9513
	  ▪ IRR of RA 9367
	▪ Issuances of the following Department Circular:
	  ▪ DC no. 2009-07-0010 (Guidelines for the Accreditation of Manufacturers, Fabricators, and Suppliers of Locally-Produced Renewable Energy Equipment and Component)
	  ▪ DC no. 2009-07-0011 (Guidelines for Governing a Transparent and Competitive System of Awarding of Renewable Energy Service/ Operating Contracts and Providing for the Registration and Process of Renewable Energy Developers

Poland	1. Act of 27 April 2001 – Environmental Protection Law; 2. Act of 10 April 1997 – Energy Law; 3. Act of 15 April 2011 on energy effectiveness; 4. Act of 25 August 2006 on bio components and liquid bio fuels 5. Act of 28 April 2011 on trade in rights to emit greenhouse gases; 6. Regulation of the Minister of Environment of 27 July 2009 on the types of installations included in the gas emission allowance trading scheme; 7. Resolution of the Council of Ministers of 1 July 2008 on the adoption of the national plan of division of authorizations to emit the carbon dioxide for the years 2008-2012 for the community gas emission allowance trading scheme; 8. Resolution of the Minister of Economy of 18 October 2012 on the specific scope of duties to obtain and present for discontinuation the certificate of origin, initial payment, purchase of electric energy and heat produced in the renewable energy resources and duty to confirm data on the amount of electric energy produced in a renewable energy resource; 9. Resolution of the Minister of Economy of 25 March 2014 on the conditions and course for the issuing of certificates and accrediting organizers of trainings in the scope of renewable energy resources; 10. Resolution of the Minister of Economy of 25 April 2013 on the conditions, way and course of the granting of funds for the execution of activities connected with the production of bio components and liquid bio fuels and other renewable fuels and their utilization in transport.

Slovenia	Action plan on renewable sources of energy for Slovenia from 2010 to 2020 Special provisions of the Energy Act providing: ▪ subsidies for investors of installations in which energy from renewable sources is produced; ▪ subsidies for investors to building in the devices run by energy from renewable sources; ▪ subsidized prices for suppliers of electricity from renewable sources.
Turkey	For the aim of increasing domestic energy production, it was found necessary to privatize generation; distribution and wholesale of the electricity and the first real steps of these privatization efforts were taken with the Electricity Market Law (EML) and Natural Gas Market Law which includes the establishment of an independent market regulation authority: Energy Market Regulatory Authority. The efforts mentioned above can be seen as prerequisites for Renewable Energy production but the most important development in this way is the enactment of the Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Renewable Energy Law) with Law No. 5346 on 10.05.2005.
United Kingdom	Climate Change Act 2008 – which has set Greenhouse Gas Emissions reductions targets in legislation Energy Act 2013 – which gave statutory basis for electricity market reform (EMR).
USA	At the national level, legislation provides tax incentives for production and investment in renewable energy, including production and investment tax credits for wind, solar, and other renewable projects and excise tax credits for advanced bio fuels production. In addition, many individual states have adopted renewable portfolio standards that require or encourage utilities to purchase renewable energy. Further, a number of states provide tax credits, grants, and loan guarantees for renewable energy projects.

APPENDIX 2 KEY POLICIES, PROGRAMS OR MEASURES ADOPTED IN THE INTOSAI COMMUNITY COUNTRIES

	Key policies, programs or measures adopted in the INTOSAI community countries based on the results of survey
Australia	**Programs** The focus on renewables in the ACT is currently driven by need to reduce the impact on climate change and to manage end user energy costs. **Main legislation and strategies** ▪ Climate change and Greenhouse Gas Reduction Act 2010 (ACT) ▪ Weathering the change 2007-2025 (ACT) ▪ Carbon Neutral ACT ▪ ACT Sustainable Energy Policy **Principle measures and policies** ▪ Government to be explicit and accountable, i.e promote and drive towards time bound targets (40% reduction of CO2 emissions on 1990 levels by 2020, 100% by 2060) ▪ Leading by example (Government to reduce its own CO2 footprint through greater energy efficiency and the move to cleaner energies) ahead of local community and other jurisdictions in Australia e.g. zero CO2 emissions by 2020 in its operations, via sustainable transport etc ▪ Provide community leadership on energy reform agenda at Territory and National level
Azerbaijan	In our Republic , State Program on the use of Alternative Energy sources was adopted in 2004. The State Agency on Alternative and Renewable Energy Sources under the Ministry of Industry and Energy of Azerbaijan Republic was established in 2009. For more rapid development of the use of alternative energy sources,The State Company on Alternative and Renewable Energy Sources of Azerbaijan Republic was founded in 2012 .
Bahamas	The Cabinet of the Government of The Bahamas (GOB) appointed the National Energy Policy Committee (NEPC) in 2012 to assess renewable sources of energy, to create public awareness, to develop, to implement a national energy policy and to curb greenhouse gases (GHGs) emissions to climate change.
Bangladesh	a. Solar system of Bangladesh in off grid area has been established. b. 500 megawatt solar power generation- solar park, solar mini grid has been established. c. Solar irrigation in low lift diesel plant has been established.

Bhutan	1. Draft Renewable Energy Policy 2012 under process of adoption. The draft policy document, holistically and comprehensively states both the long term as well as the short term objectives. The types of renewable energy technologies to be pursued, and the roles and responsibilities of different institutions and organizations are also specified in the document. The target for the generation capacity of electricity, through the mix of renewable energy resources is set at 20 MW excluding the power generation from the large hydropower sector. 2. The Alternate Renewable Energy Policy (AREP) was adopted in April 2013. This provides the long-term direction for the promotion and development of Renewable Energy in Bhutan, 3. The Economic Development Policy (EDP) was framed by the Government of Bhutan to create an enabling environment to carry out coordinated economic activities in the country. The policy states the need to create budget mechanisms to fund renewable energy initiatives and to protect the catchment areas. 4. Bhutan Sustainable Hydropower Development Policy 2008 was published. As per the policy, the government to meet the growing demand for energy, intends to develop at least 10,000 MW of electricity generation capacity by the year 2020. Apart from mega hydropower development, the policy also acknowledges the need for the development of clean and renewable energy resources. One of the objectives of the policy is to contribute towards the development of clean energy, to mitigate the problems related to global warming and climate change. In order to boost the uptake of renewable energy resource development in Bhutan, the policy specifically states the need to have a "Renewable Energy Development Fund". The fund shall be used for project development activities including project profiles and reports, site investigation and studies, processing of clearances, acquisition of land, promotion of projects, and facilitation for the accelerated development of hydropower resources". 5. Formulated Integrated Energy Management Master Plan for Bhutan in 2010.
Brazil	The National Energy Plan foresees that 45% of total energy consumption in Brazil will come from renewable sources by 2030. Today 80% of electric energy in Brazil already comes from hydropower.
Canada	In Canada's federal sustainable development strategy, there is a summary of the key policies and programs. It indicates that the federal government will: ▪ Invest $1.4 billion over 14 years to support renewable energy projects through the eco-energy for Renewable Power Program; ▪ Develop and implement energy efficiency codes, standards and labeling, information and benchmarking tools through the eco-energy Efficiency Program; ▪ Support clean energy research, development and demonstration projects through the eco-energy Innovation Initiative; and ▪ Encourage businesses, through the accelerated capital cost allowance for clean energy generation equipment, to invest in specified equipment."

China	the 11th and 12th Five-Year Plan of Energy Conservation and Emission Reduction; and the 12th Five-Year Plan of Energy Development, etc.
Costa Rica	National Development Plan 2010-2014: provides critical areas of national attention and possible long-term solutions in order to identify and remove the major obstacles to national development, including environmental and energy issues. b. Electricity Expansion Plan (PEGE) 2010-2021 Generation: programming power generation between 2012 and 2021, to meet growing demand for electricity in the country. It also presents estimates of long-term demand. c. Programming expansion of electricity transmission network between 2012 and 2030, to meet current and new generation of electrical products in the country: Expansion of Electricity Transmission (PETE) 2010-2030 Plan. d. National Energy Plan 2008-2021: presents an overview about the national energy matrix with its strengths and weaknesses, and the potential for future use and threats to the sustained growth of the sector.
Croatia	In order to achieve the interests of the development of renewable energy in the Republic of Croatia, the production of electricity from renewable energy sources is covered by the incentive system through preferential purchase prices of generated electricity ("Feed in" tariff system).
Czech Republic	Directive 28/2009 / EC on the promotion of RES committed CR achieve a 13% share of energy from renewable sources in gross final energy consumption. The main subsidy programs are: ▪ The Operational program Environment (Priority Axis 3 "Grants from the OPE for the Sustainable Use of Energy source") ▪ The Operational program Enterprise and Innovation (Priority Axis 3 "Efficient energy") ▪ The program Eco-Energy ▪ The Rural development program
Denmark	Binding target: ▪ 30 % renewable energy in 2020 ▪ 10 % renewable energy in 2020 within the transportation sector
ECA	EU key policies and financial support for renewables Cohesion policy instruments -the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) - are the most important funding source among the EU spending programs for promoting renewable energy. In the 2014-2020 programming period, Cohesion Policy support to the shift towards a low-carbon economy may reach at least EUR 23 billion from the ERDF. Further support can also be provided through the Cohesion Fund.

Estonia	The National Development Plan of the Energy Sector until 2020 describes the situation in the energy sector of Estonia, its future perspectives on energy markets, required measures and activities for achieving the targets. The overall objective of the plan is to ensure continuous, efficient, sustainable energy supply at a justified price and sustainable energy consumption in Estonia. The new development plan for 2016-2030 is being worked out at present. National Reform Programme 'Estonia 2020'.
India	1. The National Tariff Policy 2006 of the government of India requires the State Electricity Regulatory Commissions (SERC) to fix a minimum percentage of Renewable Purchase Obligation from renewable energy sources, taking into account availability of such resources in the region and its impact on retail tariffs and procurement by distribution companies at preferential tariffs determined by the SERCs. 2. Jawahar Lal Nehru National Solar Mission from January 2010: launched in 2010, the Mission has set an ambitious target of deploying 20,000 MW of grid connected solar power by 2022, reducing the cost of solar power generation in the country through (i) long term policy; (ii) large scale deployment goals; (iii) aggressive R&D; and (iv) domestic production of critical raw materials, components and products, as a result to achieve grid tariff parity by 2022. 3. National Solar Mission of the National Action Plan on Climate Change, 2008
Indonesia	In 2013, the Ministry of Energy and Mineral Resources commenced projects by assigning a state owned electricity company as well as private companies to build geothermal, steam and hydroelectric power plants spread over bigger islands.
Jordan	The production of renewable energy currently equivalent to 1%. National energy strategy in Jordan states for 2020 to generate at least 10% of renewable energy sources within the energy production.
Lesotho	▪ Rural renewable energy policy under development. ▪ The national budget address on a need for renewable energy. ▪ Consultancy involvement for feasibility study ▪ Establishment of 5 year renewable energy based rural electrification project funded by the government of Lesotho and GEF. The aim was to install 5000 solar Home systems in the 3 mountainous districts by the end of 2012. ▪ The current project aims at providing 10 villages which were affected by Metolong Dam Construction with stand alone solar PVC systems ▪ Future plan to develop hybrid plant that would generate 6000 megawatts of wind power and 4000 megawatts of hydropower.

Lithuania	The Law on Energy from Renewable Sources established a common system of promoting the use of energy from renewable sources in the Republic of Lithuania. The main tasks in the individual energy sectors in 2020 are as follows: 1. to increase the share of energy from renewable sources in all modes of transport at least up to 10 per cent as compared with the final energy consumption in the transport sector; 2. to increase the share of electricity generated from renewable sources not less than up to 20 per cent as compared with the country's gross final consumption of energy; 3. to increase the share of district heat produced from renewal energy sources in the heat balance at least up to 60 per cent, and to increase the share of renewable energy sources in households in the balance of energy sources used for heating at least up to 80 per cent.
Maldives	The government commissioned an expert to draft an environment and social management framework for the proposed solar PV projects under accelerating sustainable private investment program. In 2010, the then Ministry of Housing and Energy adopted the Maldives National Energy Policy and Strategy, which seeks to provide incentives for renewable energy technologies, energy efficiency and energy conservation. The government elected in 2008 set a target of 2020 for the Maldives to achieve carbon-neutrality. In 2013, the government set a target of ensuring 50 per cent of power generation by renewable sources in 2025. The Maldives is one of the six pilot countries participating in the Scaling up Renewable Energy Program (SREP) funded by donor agencies.
Morocco	Morocco has set an ambitious plan to develop renewable energy, with a 2020 target, of 2000 MW installed for each of solar, wind and hydro technologies. On energy efficiency side, Morocco has a target of 12% energy savings by 2020. The specific objectives are to (1) reduce energy consumption in buildings, industry and transport by 12% by 2020 and 15% by 2030 (2) increase the installed renewable energy capacity to 42% of total electricity capacity by 2020 (14% solar, 14% wind and 14% hydro). ▪ Wind energy: There is an ongoing national wind program, with an estimated cost of USD 3.5 billion, that aims at the development of wind farms with an installed capacity of 2 GW by 2020. The program will avoid 5.6 million tCO2 per year. ▪ Solar energy: The on-going Moroccan Solar Program, with an estimated cost of USD 9 billion, aims at the installation of 2 GW at five selected sites, with the first plant in Ouarzazate site will be operation on 2015. The global project will be commissioned by the end of 2019.
Moldova	▪ Energy Strategy of the Republic of Moldova until 2020. This Strategy covers the objectives, measures and activities aimed at achieving a more efficient energy complex, competitive and secure, ensuring also the country's energy security, modernization of existing energy infrastructure, improving energy efficiency, renewable energy use and integration into the European energy market; ▪ National Energy Efficiency Program for 2011-2020

Netherlands	(overlaps with incentive mechanisms) Since 2003: subventions for renewable energy. Since September 2013: agreement between a large number of stakeholders to carry out measures to get rapidly much more renewable energy (14% in 2020, in conformity with EU target for NL, 16% in 2023).
New Zealand	The key policy is New Zealand has a target of 90% of electricity generation coming from renewable sources by 2025, providing this does not affect security of supply. NZ is on track to meet this target, thanks to abundant renewable energy resources.
Norway	An action plan for renewable energy was submitted in 2012 by the Norwegian Water resources and Energy Directorate and lays out how Norway wants to achieve an overall renewable share of 67.5 % and a renewable share in the transport sector of 10 % by 2020. The common Norwegian-Swedish market for electricity certificates in 2012 has a combined goal of establishing 26.4 TWh new electricity production based on renewable energy in 2020. Norway and Sweden are each responsible for financing 13.2 TWh in the certificate system, regardless of the amount of production that is located in each of the two countries.
Poland	1. State Environmental Policy for the years 2009-2012 including the perspective until the year 2016 (M.P. of 2009 No. 34, item 501); 2. Poland's Climate Policy - Strategy to reduce greenhouse gases in Poland until the year 2020 (approved by the Council of Ministers on 4 November 2003); 3. State Energy Policy until the year 2030 (M.P. of 2010, No. 2, item 11) and sector programs; 4. Scenarios ("with activities" and "without activities") of the greenhouse gases emission for the years 2005, 2010, 2015 and 2020 (document prepared at the request of the Minister of Environment by the National Emission Centre, adopted in 2006); 5. Poland 2025 – Long-term strategy of a permanent and sustainable development (adopted by the Council of Ministers on 26 July 2000); 6. Strategy of the renewable energy development (prepared by the Ministry of Environment in September 2006); 7. Specification of the activities aimed at the improvement of energetic efficiency (M.P. of 2013, item 13); 8. Multiannual promotional program of bio fuels and other renewable fuels for the years 2008–2014 (M.P. of 2007 No 53, item 607); 9. Second National Work Plan concerning the energetic effectiveness of Poland 2011 (adopted by the Council of Ministers on 17 April 2012); 10. Notice of the Minister of Economy of 24 May 2011 on the report setting up goals in the scope of the share of electricity produced in the renewable energy resources located in Poland, in the national use of electricity for the years 2010-2019 (M.P. of 2011 No. 43, item 468).

Turkey	Government outlined ambitious overall targets in the May 2009 Electricity Market and Security of Supply Strategy for renewable electricity generation i.e. at least 30% of total electricity will be met by renewables in 2023. According to these targets, hydropower potential should quadruple its 2009 achievements; wind power capacity should increase to 20 GW which was 2,312 GW in 2010 in company with increases in solar and geothermal energy use. In order to obtain these results, large investments in grids and generating capacity are also needed together with revised and increased policy support.
USA	The Environmental Protection Agency administers a legislatively mandated requirement that sellers of petroleum products use ever-increasing volumes of bio fuels blended into gasoline and diesel fuel. The Department of Energy's (DOE) Loan Program Office has provided low interest loans to numerous renewable energy projects (for more information, see: http://www.gao.gov/products/GAO-14-367). The Department of Agriculture also provides grants and loan guarantees for renewable energy projects.

APPENDIX 3 SUPPORT TO R&D AND REDUCTION OF PRODUCTION COSTS

Countries	Support to R&D and reduction of production costs (based on the RE survey)
Australia	Indirectly investing in R&D by supporting, enhancing and leveraging R&D partnerships. Promoting clean economy through leadership in economic development (Clean technology business strategy 2011-2015).
Bahamas	The GOB has promoted policies and programs in the areas of energy efficiency to reduce the cost of electricity to consumers and those doing business in the Bahamas. Specific initiatives include: introduction of renewable energy (RE), review of waste to energy (WTE) options, introduction of alternative sources of fuel and private sector participation for the production of electricity.
Bangladesh	a. Independent energy institute has been established in Dhaka University. b. Independent Directorate has been set up in Bangladesh Power Development & Rural Electrification Board.
Brazil	Electric utilities must invest at least 1% of their net operating income in R&D and energy efficiency.
Canada	Several programs have been used by the Canadian federal government to support research and development and to reduce production costs (see the websites listed below and the OAG study described below for more details). They include programs and funding by Natural Resources Canada and Sustainable Development Technology Canada (http://www.sdtc.ca/index.php?page=home).

Chile	Strategies for renewable energy (ERNC): collaboration of public & private sectors, researchers and representatives of citizens in order to develop measures to address the obstacles of each of these technologies, specifically contemplating aspects such as research, development and innovation Sector (I + D + i), resource exploration, development instruments and financial and regulatory framework.
China	Increased capital input for research and development, reduced cost of production for demonstration and industrialized development.
Czech Republic	Tax exemptions for investors in producing energy from renewable sources.
Denmark	Approximately 1 Billion DKK – 135 Million pr. Year to R&D within the Energy sector.
ECA	EU Financial support: The 6th and the 7th Framework Programs, which are the EU's main instrument for funding research in Europe have earmarked 3.15 billion euro over the period 2000-2013. The bulk of the funds has been devoted to renewable energy sources and to the development of clean fossil fuels / CCS technologies.
Estonia	The hindrance to the development of the renewable energy sector is the fact that the oil shale energy is currently supported by the state more than the renewable energy sector. The subsidies for renewable energy depend on the technology (e.g different conditions for combustion of biomass and production of wind energy). Wind energy production is limited by the annual amount of electricity produced from wind, as the state pays subsidy annually totally for 600 GWh of wind energy production. If this goal is reached by the producers, the subsidy is not paid anymore. This makes the wind energy producers unsecure to make new investments.
Finland	Financial bodies: The Finnish Funding Agency for Innovation, the Ministry of Employment and the Economy, Ministry of Agriculture and Forestry, Ministry of the Environment.
India	1. Program on "Research, Design and Development of Solar Photovoltaic Technology (SPV) and Solar Thermal Technology (ST)" during the current financial year 2014-2015 implemented from July 2014 2. Policy Guidelines of Research, Design, Development, and Demonstration implemented from October 2010 3. National Solar Mission of the National Action Plan on Climate Change
Indonesia	Revolving funds provided by The Government investment center and the Ministry of Finance to support geothermal exploration.
Korea	New energy R&D (Wind, Solar, Hydrogen Energy): Supported by Ministry of Trade, Industry and Energy; Renewable Energy (Biogas, RDF) R&D : Supported by Ministry of Environment.
Morocco	To reinforce R&D activities at the national level, an institute called IRESEN was created in order to enable a favorable environment for the deployment of these activities.

New Zealand	New Zealand hydro and geothermal developments are amongst the country's greatest engineering achievements. NZ has well regarded expertise in geothermal and developing expertise in wind energy.
Norway	Energy21 was established by the Ministry of Petroleum and Energy in 2008 and is the national strategy for research, development and commercialization of new climate-friendly energy technology. ENERGIX is the name of the Research Council of Norway's successor to the R&D programme RENERGI – Clean Energy for the Future. The program was launched in 2013 and will run for ten years. In 2009, eight Norwegian research groups were declared Centers for Environmentally-friendly Energy Research (FME).
Philippines	▪ Based on the NREP, development of demonstration projects such as sea water pumped storage shall be conceptualized. A demo project on concentrating solar thermal power technology shall also be pursued. R&D activities will also be undertaken in cooperation with R&D institutions and technical centers, both local and foreign, as well as interested multilateral organizations, NGOs or private sector partners. ▪ Reduction of production cost is inherent to the provision of fiscal and non-fiscal incentives under RA 9513.
Poland	Financial support (out of the EU funds and national environmental protection funds) of enterprises aimed at the increase of the share of energy produced in the country, including the granting of preferable credits aimed at the limiting of greenhouse gases emission and the increase of the renewable energy production. This support concerns in particular the development of high performance cogeneration, technologic changes aimed at the decrease of energy demand, construction of new renewable energy resources, development of technology and construction of installation to gain renewable energy, develop scientific research and development works to implement the energy policy.
Uganda	International and local trainings Establishment of Uganda National Council of Science and Technology (UNCST), Uganda Industrial Research Institute (UIRI), Centre for Research in Energy and Energy Conservation (CREEC) SET up of demo systems in Renewable Energy Technologies Data collection and analysis

United Kingdom	Overall program for R&D coordinated by Low Carbon Innovation Co-Ordination Group. Various R&D schemes funded by government: ▪ Environmental and Physical Sciences Research Council (EPSRC) ▪ Department of Energy and Climate Change Innovation Program ▪ Technology Strategy Board ▪ Scottish Enterprise ▪ Government works with industry to identify how to reduce production costs through the Offshore Wind Cost Reduction Task Force
USA	Department of Energy has an office of energy efficiency and renewable energy to foster research and development (R&D) on a broad range of renewable energy areas. DOE's office of Science also does basic science research that supports renewable technologies, including material science and bio-science.

APPENDIX 4 INCENTIVE MECHANISMS AND MARKET BASED INSTRUMENTS

Countries	Incentive mechanisms and market based instruments (based on RE survey)
Australia	Influencing the market in order to encourage uptake of renewable energy ('Green power') and other clean energy products. Facilitate market (i.e. Government purchase) for carbon offsets from non-renewable energy users or producers. Support via subsidy (feed-in tariff) or grant the development of medium and large-scale renewable energy generation within the Territory.
Bahamas	▪ Reduce and/or exempt duty for the importation of energy efficient equipment and solar panels ▪ Launch public education campaign on energy conservation, changing customer behavior ▪ Promote energy efficient appliances and improve energy management in public buildings ▪ Installation of solar water heaters and photovoltaic systems in homes and replaced florescent bulbs with incandescent light bulbs. This initiative was a pilot project sponsored by the International Development Bank (IDB).
Brazil	Wind and biomass energy prices are subsidized in order to be competitive with other sources. This subsidy should span 20 years.

Canada	Several incentive programs and market-based instruments have been used by the Canadian federal government (see the website below for more details). Two examples of the programs include: 1. Green Infrastructure Fund - Through Canada's Economic Action Plan, the Government of Canada established the Green Infrastructure Fund (2009-2014). This program specifically targets projects that will improve the quality of the environment and lead to a more sustainable economy over the long term. Through the Green Infrastructure Fund, Infrastructure Canada supports projects that promote cleaner air, reduced greenhouse gas emissions and cleaner water. This includes new or rehabilitation infrastructure projects that fall into the following categories: ▪ Wastewater infrastructure ▪ Green energy generation and transmission ▪ Solid waste ▪ Carbon transmission and storage 2. Eco Energy for Biofuels - The Government of Canada is committed to expanding the production and use of cleaner renewable bio fuels such as ethanol and biodiesel. The Government has a four-pronged bio fuels strategy in order to: ▪ reduce the greenhouse gas (GHG) emissions resulting from fuel use, ▪ encourage greater production of biofuels, ▪ accelerate the commercialization of new biofuels technologies, and ▪ provide new market opportunities for agricultural producers and rural communities. On July 5, 2007, Prime Minister Stephen Harper announced one key aspect of this strategy, the eco ENERGY for Bio fuels Initiative, which will invest up to $1.5 billion over 9 years to boost Canada's production of bio fuels.
China	Industrial development directory of renewable energy, price tools, tax tools, capital support, etc.
Costa Rica	Selective exemption from excise, ad valorem tax and 1% of the customs value (equipment and materials in photovoltaic panels, wind and hydro generators AC). Law No. 7447, Regulation Law Rational Use of Energy, December 13, 1994, Article 38. Forestal Law No. 7575, February 13th, 1996; Biodiversity Law No. 7788, April 30, 1998. Cap and Trade Mechanism (Payment for Environmental Services Program). 3,5% tax on hydrocarbons.

Croatia	Croatian energy market operator performs activities in system for incentivizing electricity production from renewable sources and cogeneration and in system for incentivizing production of bio fuels. Main responsibilities in systems of incentives include: ▪ concluding contracts with incentivized eligible producers, ▪ concluding contracts with all suppliers regarding regulated purchasing of minimal share of electricity produced from renewables and cogeneration, ▪ collecting incentive fee from all suppliers on electricity market, ▪ financial settlement according to concluded contracts, ▪ collecting of incentive fee for production of bio fuels for transport from distributors who put diesel fuel or gasoline on the market, ▪ distribution of incentive fee to producers of bio fuels.
Cyprus	Based on the provisions of Law no. 33(I)/2003, a special Fund for promoting energy conservation and the utilization of renewable energy sources was established. The proceeds of the Fund, which are generated from the imposition of a special levy on kWh consumed on each electricity bill, are used to finance subsidy programmes for the promotion of RES and energy conservation. In the period 2004 (when the fund became operational) -August 2009 (the date of our last audit - see summary below), more than 43,500 applications were submitted for the schemes financed by the fund, and a total of €39.85 million were granted to beneficiaries.
Denmark	The EU-trade-able permit system on CO2 CO2-tax, Electricity-tax (tax exemption on certain renewable electricity) Feed in tariffs for renewable energy See also: http://www2.oecd.org/ecoinst/queries/#
Estonia	1. In order to promote the use of renewable energy sources, the subsidies in the Electricity Market Act are introduced. The subsidies are paid by the electricity consumers (electricity excise). 2. From January 1st, 2013, Estonia joined the Nordic-Baltic electricity market, which gives the advantages to the renewable electricity compared with electricity produced from fossil fuels. The first ones able to sell to the electricity market are the companies producing energy from renewable energy sources. 3. The increase of the price of electricity produced from fossil fuels (oil-shale) gives better opportunity for development the renewable energy sector. 4. The interconnection between Estonia and Finland - EstLink 2 was commissioned in February 2014. This has considerably increased the Cross-Border Electricity Flow in the Baltic Sea Region.

India	1. Scheme for Generation Based Incentive for Grid Interactive Power Projects: Government of India project 2. Scheme of Accelerated Depreciation for Investments in power plants based on renewable energy sources 3. Scheme for providing financial subsidy for installation of solar photovoltaic lights and water pumping systems
Indonesia	Fiscal incentives provided for green building projects including investment allowance, tax holiday and exemption of import duties.
Lithuania	The use of renewable energy sources is promoted by applying the specified support scheme consisting of one or several support measures. The following are considered as support measures: 1. fixed rate; 2. purchase of energy from renewable sources; 3. reimbursement of the costs of connection of renewable energy installations to energy grids or systems; 4. reservation of the capacity and transfer capability or other relevant technical parameters of energy grids or systems for connection of renewable energy installations; 5. priority of transmission of energy from renewable sources; 6. release of electricity generators from responsibility for balancing of generated electricity and/or reservation of electricity generation capacities during the promotion period; 7. support for production and processing of agricultural commodities, namely, raw materials for the production of bio fuels, bio fuels for transport, bio lubricants and bio oils; 8. the requirements in relation to mandatory use of renewable energy sources for energy production and/or mandatory consumption of energy from renewable sources, also the requirements for the use of bio fuels for transport; 9. Support of investments in renewable energy technologies.
Malaysia	Feed-in-Tariff (FiT) subsidy to consumers using electricity from renewable resources
Malta	Grants for installation of PVs (domestic and industrial), grants for solar water heaters, grants for wind turbines (domestic), grants when purchasing electric cars Introduction of Feed-in Tariffs.

Morocco	An Energy Development Fund (FDE) was created in order to: ▪ strengthen and preserve the production capacity from local energy sources including renewable ▪ provide financial support for efficiency energy projects ▪ provide support to energy services companies An Energy Investment Company (SIE) was created to: ▪ support the national development of renewable energy invest in energy production projects - ▪ valorization of renewable energy resources ▪ reinforcement of energy efficiency. Total abolition of subsidies to fossil fuels.
Netherlands	Most important now: subvention on production of renewable energy, changing with the energy prices, different for various techniques. Predecessors have existed since 2003.
New Zealand	The New Zealand Emissions Trading Scheme encourages renewables in preference to fossil fuels by introducing a price on carbon.
Norway	Enova SF was established in 2001 in order to promote environment friendly conversion of energy consumption and generation, as well as development of energy and climate technology. Enova is a state-owned enterprise that manages the assets in the Energy Fund. Transnova SF was established in 2009 in order to encourage sustainable mobility solutions by providing grants for pilot and demonstration projects. Disincentives for fossil energy: Fuel oil, kerosene and natural gas are subject to a carbon tax. The European CO2 Emissions Trading Scheme (ETS) which Norway is a part of influences power prices in Norway.

Philippines	▪ Under the RA 9513, its objectives are to accelerate the development of the country's renewable energy resources by providing fiscal and non-fiscal incentives to private sector investors and equipment of manufacturers/ suppliers. ▪ Fiscal Incentives: (Lowering of Investment Costs) ▪ Income Tax Holiday and Low Income Tax Rate ▪ Reduced Government Share ▪ Duty-free Importation of Equipment and VAT-zero Rating ▪ Tax Credit on Domestic Capital Equipment ▪ Special Realty Tax Rate on Equipment and Machinery ▪ Cash Incentive for Missionary Electrification ▪ Exemption from Universal Charge ▪ Payment of Transmission Charges ▪ Tax Exemption on Carbon Credits ▪ Non-fiscal Incentives: (Enhanced Competitiveness) ▪ Mandatory Utilization of RE Resources ▫ Bio fuels Mandate ▫ Renewable Portfolio Standard (RPS) ▫ Feed-In Tariff (FIT) ▪ Provision of Interconnection / Ancillary Services ▪ Other Market Options ▪ Net Metering Concept ▪ Green Energy Option
Poland	Information campaign conducted to the benefit of a rational use of energy, promotion of sustainable agriculture and forestry, issuing of energy resource certificates, development of the competition mechanisms as the main means to rationalize energy prices, introduction of market methods to shape the heat prices, obligation to buy energy produced in the renewable energy resources by companies conducting activity in the scope of production and trading of electricity and the exemption from the excise of the energy out of the renewable energy resources, reversing the excise or imposing fines for the introduction into trade of fuels and biofuels of features non-compliant with legal regulations.

Turkey	Renewable Energy Law currently presents the following incentives for renewable energy technologies: ▪ Wholesale price support (feed-in tariff system) with additional prices for technologies which are 100% domestic product; ▪ Exemptions from license fees and power transaction duties; ▪ Priority to grid access; ▪ Compulsory purchase for retail license holders (The amount that a retail license holder has to buy cannot be less than the market share that he acquired previous year); ▪ Support for land use (Forest lands or the properties of Treasury can be extended or leased out for renewable energy generators). Also the Environment Law with Law No. 2872 was amended by Law No. 5491 on 6.04.2006 and using incentives such as obligatory standard taxes, excise tax exemptions, carbon trading, and emission fees is legitimatized.
United Kingdom	▪ Incentives ▪ Large scale renewable electricity generators ▪ Renewables Obligation (pre EMR) ▪ Feed in Tariffs with Contracts for Difference for renewable generators (post EMR) ▪ Small scale renewable electricity generators ▪ Feed-in-Tariffs for small scale renewables (pre and post EMR) ▪ Renewable Heat Incentive ▪ Renewable Transport Fuel Obligation ▪ Plus tax and EU Emissions Trading Scheme disincentivising non-renewables

APPENDIX 5 LINKS TO EXAMPLES IDENTIFIED AMONG EACH AUDIT TOPIC

Topic 1: Public Policy on the use of Renewable Energy Sources Potential

2012 : SAI of the United States : Renewable Energy: Federal Agencies Implement Hundreds of Initiatives: Available on line at: http://www.gao.gov/products/GAO-12-260

2013 : SAI of the United States : Renewable Energy: Agencies Have Taken Steps Aimed at Improving the Permitting Process for Development on Federal Lands. The audit can be found on line at: http://www.gao.gov/products/GAO-13-189

2009 : SAI of Malta : Renewable Energy and Energy Efficiency in Malta. Available on line at: http://nao.gov.mt/page.aspx?id=85

2011 : SAI of Malta : Renewable Energy in Malta – Follow-up. Available on line at: http://nao.gov.mt/page.aspx?id=85

2010 : SAI of Lithuania Use of Renewable Energy Sources Potential in Lithuania. Available on line at: http://www.vkontrole.lt/audito_ataskaitos_en.aspx?tipas=15

2013 : SAI of Poland : Development and use of the renewable electric energy resources. Available on line at: www.nik.gov.pl

2012: SAI of Estonia : Alternatives for electricity production in Estonia. English summary is available online at: http://www.riigikontroll.ee/tabid/206/Audit/2264/Area/15/language/et-EE/Default.aspx

2014 : SAI of Denmark : The change of the support scheme for Photovoltaics. Available on line at: http://www.eurosaiwgea.org/Aboutus/Workplan/Documents/5_2404_Ostergaard_Denmark.pdf

Topic 2: Relevance of Public Programmes and Projects on Renewable Energy

2012 : SAI of Australia : Administration of the Renewable Energy Demonstration Program. The audit report is available from the ANAO's website at: http://www.anao.gov.au/Publications/Audit-Reports/2012-2013/Administration-of-the-Renewable-Energy-Demonstration-Program

2014 : ECA : Cohesion policy funds support to renewable energy generation- has it achieved good results? Website link to full report: http://www.eca.europa.eu/Lists/ECADocuments/SR14_06/SR14_06_EN.pdf

Topic 3: Efficiency and Effectiveness of Measures to Promote Production and Consumption Energy from Renewable Sources

2015 : SAI of The Netherlands : renewable energy, the role of SDE+. Audit report is available only in Slovene: http://www.rs-rs.si/rsrs/rsrs.nsf/I/KD87FA9E2A1CD2378C1257BAA003D570B/$file/UREnergijeSP08-11-A2.pdf

2014 : SAI of Norway : The Office of the Auditor General's investigation of renewable energy licensing. Available on line at: https://www.riksrevisjonen.no/rapporter/Documents/2013-2014/3_5.pdf

2013 : SAI of the United States : Wind Energy: Additional Actions Could Help Ensure Effective Use of Federal Financial Support. Available on line at: http://www.gao.gov/products/GAO-13-136

2012 : SAI of the United States : Solar Energy: Federal Initiatives Overlap but Take Measures to Avoid Duplication. Available on line at: http://www.gao.gov/products/GAO-12-843

2012 : SAI of Canada (Office of the Auditor General of Canada) : A Study of the Federal Support to the Fossil Fuel Sector. Available on line at: http://www.oag-bvg.gc.ca/internet/English/parl_cesd_201212_04_e_37713.html

2008 : SAI of Thailand : Performance audit on Biodiesel productive system support for small community. Department of Alternative Energy Development and Efficiency, Ministry of Energy.

2013: SAI of Bhutan : System Audit of Hydro Electric Energy. Available online at: http://www.environmental-auditing.org/tabid/126/CountryId/284/Default.aspx

Topic 4: Linking the use of Renewable Energy Impact and Climate Change Plan

2009 : SAI of Canada (Office of the Auditor General of Canada) : Kyoto Protocol Implementation Act. Available on line at: http://www.oag-bvg.gc.ca/internet/English/parl_cesd_200905_02_e_32512.html

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Renewable energy world website www.renewableenergyworld.com

The United Nations Framework Convention on Climate Change website: www.unfccc.org

The United Nations CSD Website: http://sustainabledevelopment.un.org/csd.html

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