



PROMOTING INNOVATIVE ENTREPRENEURSHIP IN RENEWABLE ENERGY

(PERSPECTIVES FROM THE PHILIPPINES)

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PHILIPPINE RENEWABLE ENERGY

1. Landmark Laws
 2. Policy Mechanisms
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QUICK FACTS

1. Renewable Energy Potential
 2. Renewable Energy Registered Projects
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CHALLENGES

INTERVENTIONS

1. Additional Support Legislations
2. Support for R&D on Renewable Energy
 - a. Renewable Energy Roadmap of the DOE
 - b. Harmonized National R&D Agenda of the DOST
 - c. Thrusts and Programs of the DOST to Promote and Sustain Entrepreneurships through Innovations
 - d. Programs and Beneficiaries of DOST-TAPI on Renewable Energy

LANDMARK LAWS

Republic Act No. 9367 or the Biofuels Act of 2006

Enacted to provide fiscal incentives and mandate the use of biofuel-blended gasoline and diesel



Biodiesel

2% biodiesel blend on 06 Feb 2009 in all gasoline stations nationwide

Bioethanol

5% by total volume on 06 Feb 2009;
10% bio-ethanol blend to all gasoline on
06 Feb 2009

LANDMARK LAWS

Republic Act No. 9513 or the Renewable Energy Act of 2008



POLICY MECHANISMS

Lowering of investment costs through Fiscal Incentives

- Income Tax Holiday and Low-Income Tax Rate
- Reduced Government Share
- Duty-Free Importation of Equipment & VAT-Zero Rating
- Tax Credit on Domestic Capital Equipment
- Special Realty Tax Rate on Equipment & Machinery
- Cash Incentive for Missionary Equipment
- Exemption from Universal Charge
- Tax Exemption on Carbon Credits

Increased Competitiveness

- Mandatory Utilization of RE Resources
- Other Market Options (i.e. Green Energy Option)



POLICY MECHANISMS

Some of the most important tax incentives granted by the Renewable Energy Act of 2008:

- ❑ Income Tax Holiday (ITH) for the first seven years of commercial operations, and subject to certain conditions — regular corporate income tax of 10% on net taxable income, thereafter
- ❑ Duty-free importation of RE machinery, equipment and materials that are directly and actually needed and used exclusively in RE facilities (in the first 10 years from issuance of certification of an RE developer)
- ❑ Zero percent value-added tax (VAT) rate on the sale of fuel or power from renewable sources of energy
- ❑ Cash incentive for RE developers involving missionary electrification projects
- ❑ Tax exemption of all proceeds from the sale of carbon emission credits





The Philippines is the first among the members of the Association of Southeast Asian Nations (ASEAN) to invest in large-scale solar and wind technologies



The Philippines registered an average renewable energy supply of 16.47 M tons of oil equivalent (MTOE) from 2000 to 2012, with an average share of 43.21 percent to the total energy supply



Based on the 2012 data of the International Energy Agency (IEA), the Philippines ranked high in the contribution of renewable energy to total energy supply among the ASEAN countries



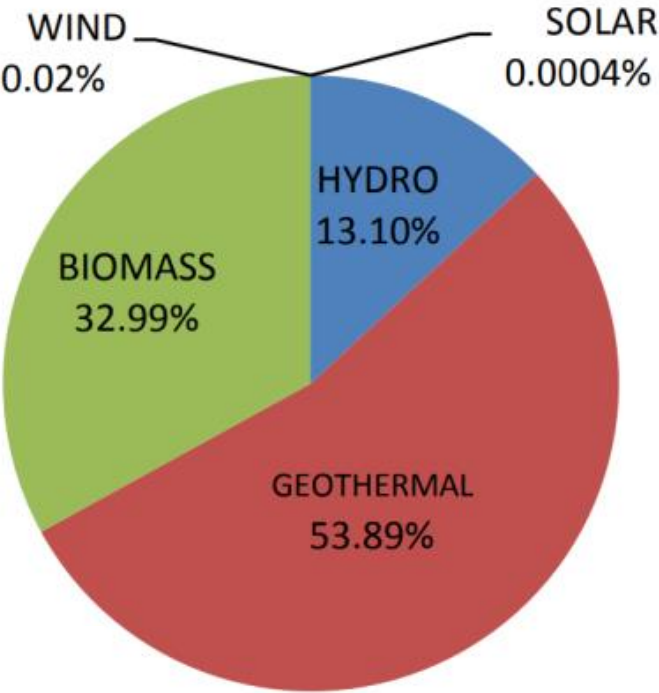


Philippines has the highest installed wind power generation in the ASEAN region. With an estimated wind power potential of 76,000 megawatts, it is expected to triple in 15 years

- ❑ Wind farms: Ilocos Norte, Rizal, and in some parts of the country
- ❑ Solar farms: Cagayan De Oro, Negros Occidental, and in Pampanga (the largest with 150 megawatts of power)



Average Percentage Distribution of Renewable Energy in the Philippines, 2000-2012



Source: Department of Energy (2010) as cited by the Senate of the Philippines

Summary Renewable Energy Projects Registered under RE Law (as of June 2016)

RESOURCES	AWARDED PROJECTS		POTENTIAL CAPACITY MW		INSTALLED CAPACITY MW	
	Grid-Use	Own-Use	Grid-Use	Own-Use	Grid-Use	Own-Use
Hydro Power	352	1	7,053.15	1.50	141.49	-
Ocean Energy	7	-	26.00	-	-	-
Geothermal	41	-	610.00	-	1,906.19	-
Wind	56	1	1,180.80	-	426.90	0.006
Solar	129	16	3,820.24	4.286	893.24	3.218
Biomass	39	25	163.38	3.92	260.57	166.18
Sub-Total	624	43	12,853.57	9.706	3,628.39	169.40
TOTAL	667		12,863.28		3,797.79	

BIOFUELS REGISTRATION / ACCREDITATION

RESOURCES	No. of Companies	No. of Projects
Bioethanol	10	10
Biodiesel	11	11
Total	21	21



The Philippines continued to rely heavily on coal and failed to meet its goal of doubling the installed capacity of renewable capacity, 10 years after the passage of the Renewable Energy Law (Flores, 2018). Renewable energy and natural gas power plants followed with respective shares of 24.6% and 21.8% to the country's gross power generation. Oil-based power plants contributed the least, at 4%.



The Philippines used to be the second largest geothermal developer in the world, next to US, but has now been overtaken by Indonesia. From 1,932 MW in 2003, installed capacity of geothermal even declined to 1,916 MW in 2017



Slow growth of solar energy in the country is blamed on the high cost of solar generation system. Research and development on high efficiency but low cost solar cells have not come into fruition (Lazcano, 2015)



SENATE BILL NO. 268

An Act Reducing the Cost of Electricity for National Government Offices by Promoting the Development and Utilization of Solar Energy in all Government Buildings and Offices

Status: Pending



RE ROADMAP OF DOE

- ❑ Acceleration of Renewable Energy Positioning
 - Conduct detailed renewable energy technology and resource assessment
- ❑ Creation of Conducive Business Environment
 - Provide technical assistance to lower investment cost;
 - Promote and incentivize local technology producers
- ❑ Reliable and Efficient Infrastructure
 - Enhance local technical capabilities;
 - Conduct R&D on the efficiency of renewable energy technologies on the Smart Grid System

- ❑ Promote and Enhance R&D Agenda
 - Continue conduct of renewable energy technology research and development studies;
 - Identify viability of new technologies;
 - Construct ocean pilot / demo energy projects
- ❑ Other activities
 - Continue technical capability building on renewable energy;
 - Conduct research and promote low-enthalpy geothermal areas for power generation and direct use/non-power application for development

HARMONIZED NATIONAL R&D AGENDA OF DOST

Renewable Energy and Energy Storage Solutions

- ❑ Energy efficiency or alternative fuels and conservation
- ❑ Renewable energy (RE) systems & bio-energy technologies – increase the adaptation and adoption of renewable energy systems
- ❑ Functional materials for alternative energy sources and energy conversion and storage – systems and processes for surface modification of various materials



HARMONIZED NATIONAL R&D AGENDA OF DOST



Based on Energy Type (2018-2020)

- Biomass – biofuel fuel analysis, stability and storage assessment such as performance testing, durability, fuel systems and engine components impact assessment
- Solar – establishment of PV laboratory (for certification)
- Micro-Hydro – localization of high-efficiency turbines, upgrading of micro-hydro power performance test facility, and assessment of industry capability to manufacture
- Ocean – assessment of ocean energy harvesting device and demonstration project on ocean energy for power
- Wind – establishment of wind energy laboratory
- Geothermal – resource and market assessment of lowenthalpy geothermal and heat pump technology development for low enthalpy application

RECENT DOST PROJECTS ON RE

Wind

- ❑ Bangui Bay Wind Power Project – Wind resource assessment on selected sites, 10 kW Wind Turbine Generator Demo (Pagudpud, Ilocos Norte), Philippine wind mapping atlas
- ❑ Wind Resource Assessment for Wind Power Systems – Wind monitoring instruments installed in selected sites and evaluation of techno-economic viability of wind power systems in selected sites



RECENT DOST PROJECTS ON RE (cont.)

Water

- ❑ Pico hydro System for Sitio Electrification – installation of 500 W pico-hydro system for sitio community electrification
- ❑ Tidal Current Integrated Resource Assessment and Spatial Planning Tool – tidal current resource map, tidal current development site suitability map, and web GIS marine spatial planning tool
- ❑ Establishment of Micro-Hydropower (MHP) – test Rig, and efficiency Improvement of Locally Designed MHP Turbines



RECENT DOST PROJECTS ON RE (cont.)

Biomass & Biogas

- ❑ Fluidized-bed combustor technology
- ❑ Extraction and Utilization of Landfill Gas in the Philippines (Carmona Landfill)
- ❑ 25 kW Waste to Energy Project using Direct Combustion Process – aid in the assessment and improvement of WTE technologies and possibly revive the direct combustion plants in the country
- ❑ Bio-Oil Production from Agricultural Waste – showcases pyrolysis and bio-oil/oil production to mitigate the problems on waste management while achieving energy sustainability in the country



RECENT DOST PROJECTS ON RE (cont.)

Solar

- ❑ Development of Grid Tied Inverter for the Electronics Company in the Philippines – Grid Tied Inverter designed to be used for solar photovoltaic system
- ❑ Micro-grid Solar PV System – Providing electricity to the rural area



Other Projects

- ❑ Smart Energy Program (SEP) – Implemented by a local energy management company: WattSmart Philippines Corporation (WattSmart)
- ❑ Disaggregated Electricity Consumption Baseline Measurement of Micro, Small, and Medium Enterprises in the Philippines and Behavioral Response Analysis to an Intelligent Energy Management Platform using Real-Time Electricity Monitoring with Integrated Analytics and Recommendations Engine

RECENT DOST PROJECTS ON RE (cont.)

Other Projects (cont.)

- ❑ First Renewable Energy-powered Roll-on Roll-off (RORO) Vessel in the Philippines
- ❑ Renewable Energy Facility: Fluidized Bed Gasification (FBG) System in Raw Brown Sugar



- ❑ Solar Energy Systems (SES) Project
- ❑ 15-year partnership agreement with the Philippine National Oil Company Renewables Corporation (PNOC RC) for the installation of 100kw solar photovoltaic facility



DOST PROGRAMS SUPPORTING RE

Science4Change Program

- ❑ CRADLE: Collaborative Research and Development to Leverage Philippine Economy
 - Private sector industry will identify a problem while its partner Higher Education Institution (HEI) or Research Development Institution (RDI) will carry out the necessary research and development (R&D) to solve it;
 - Priority R&D areas and industries identified by the DOST and Department of Trade and Industry

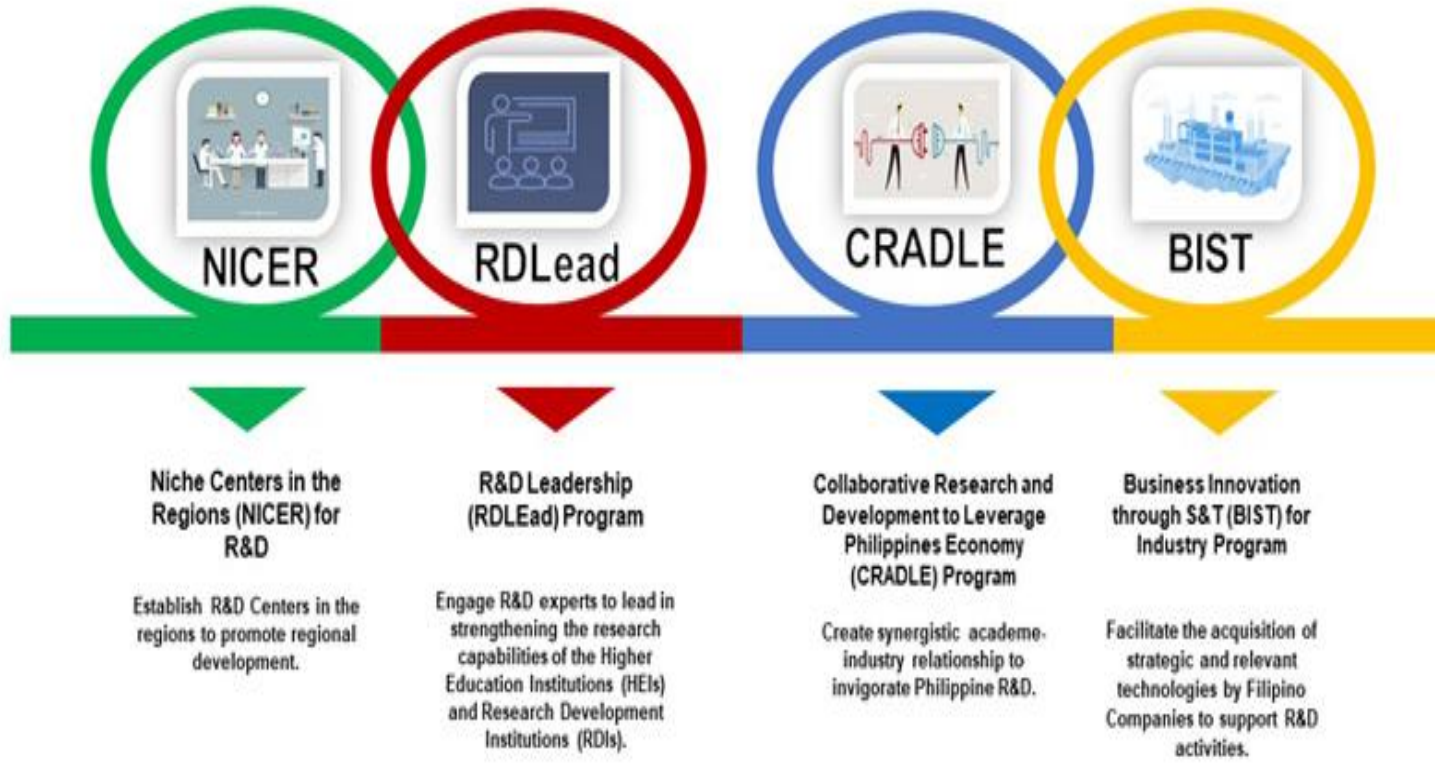
- ❑ BIST: Business Innovation through S&T
 - Helps private companies and industries acquire novel and strategic technologies for research and development (R&D), such as state-of-the art equipment and machinery, technology licenses, and patent rights among others;
 - Successful BIST proponents may receive up to 70 percent of the total eligible cost of the technology acquisition, which will be refunded to DOST at zero percent interest.



SCIENCE FOR CHANGE PROGRAM (S4CP)

Accelerated R&D Program for Capacity Building of Research and Development Institutions and Industrial Competitiveness

(NICER, RDLead, CRADLE, and BIST)



DOST PROGRAMS SUPPORTING RE (cont.)

SETUP: Small Enterprise Technology Upgrading Program

SETUP supports MSMEs (with at least 3 years of operation) by providing:

- seed fund for technology acquisition
- needed equipment and equipment upgrading
- technical trainings and consultancy services
- packaging and label design
- database information systems
- support for establishment of product standards, including t and calibration of equipment



DOST-TAPI PROGRAMS & BENEFICIARIES ON RE

Intellectual Property Rights Assistance Program (IPRAP)

- ❑ Fabrication and Characterization of Dye Sensitized Solar Cells (DSSC) made zNO-Cu-TiO_2 and *Rhizophra apiculata* Bark and Leaf Extract Incorporated on Glass Substrates – Philippine Science High School: Southern Mindanao Campus



- ❑ Solar Energy Collection Using the Thermoelectric Effect – Philippine Science High School: Southern Mindanao Campus
- ❑ Development of Corrugated Wind Turbine Blades Inspired by Dragonfly Wing Structure – Philippine Science High School

DOST-TAPI PROGRAMS & BENEFICIARIES ON RE

Tax and Duty Exemption Assistance Program

- Solar Water Heater (Copper-Tipped)
- Vacuum Tube Gravity-Type Solar Water Heater
- Vacuum Tube Coil-Type Solar Water Heater



DOST-TAPI PROGRAMS & BENEFICIARIES ON RE (cont.)

Industry-Based Invention Development & Invention-Based Enterprise Development

- ❑ Prototyping of Hydro Air Electricity Power Plant

Relates to power plants but more specifically to an air-hydro plant that combines the pressure coming from air and water to run a water turbine connected to a dynamo or generator to generate electrical power



DOST-TAPI PROGRAMS & BENEFICIARIES ON RE (cont.)

Venture Financing Program

- ❑ Purchase Order Financing Project of Edward Marcs Philippines, Inc. for the SEDNA AIRE Solar-Assisted Aircon

The SEDNA Aire Solar-Assisted Aircon works by utilizing heat from the sun with the use of Solar Vacuum tube collector system. Heat from the sun is stored in the Solar Vacuum tube collector system



DOST-TAPI PROGRAMS & BENEFICIARIES ON RE (cont.)

Venture Financing Program (cont.)

Phase I

BALI HOTEL - ILOILO



CEBU IWAKAMI PLANT - MEZ



DOST-TAPI PROGRAMS & BENEFICIARIES ON RE (cont.)

Venture Financing Program (cont.)

Phase II



DOST-TAPI PROGRAMS & BENEFICIARIES ON RE (cont.)

Venture Financing Program

- ❑ Adopting Appropriate Technology for a Zero Emission, Zero discharge Waste Management System for Gold Label Farm

Channel Digester is a new design of biogas digester similar to balloon type biogas digester. Channel digester is a reinforced concrete reactor with high-strength plastic cover for biogas storage


Channel digester is a new biogas digester in the Philippines. Most of the Channel Digesters are installed in Thailand, South East Asia and the United States. AVC is the sole authorized implementing partner for the Philippines



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