Republic of the Philippines
ENERGY REGULATORY COMMISSION
San Miguel Avenue, Pasig City

IN THE MATTER OF THE PETITION TO INITIATE RULE-MAKING FOR THE ADOPTION OF THE FEED-IN TARIFF FOR ELECTRICITY GENERATED FROM BIOMASS, OCEAN, RUN-OF-RIVER HYDROPOWER, SOLAR AND WIND ENERGY RESOURCES,

ERC CASE NO.____________

NATIONAL RENEWABLE ENERGY BOARD,
Petitioner.
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PETITION TO INITIATE RULE-MAKING FOR THE ADOPTION OF FEED-IN-TARIFF

Petitioner **NATIONAL RENEWABLE ENERGY BOARD ("NREB")**, by counsel, respectfully states:

1. NREB is a government instrumentality created under Republic Act 9513, entitled, *An Act Promoting the Development, Utilization and Commercialization of Renewable Energy Resources and for Other Purposes* (the "Renewable Energy Act of 2008" or "RE Act"). It holds office at 3rd Floor, DOE Building, Merritt Road, Fort Bonifacio, Taguig City. NREB may be served with notices, orders and other processes through counsel at the address indicated below.

2. RE-Act became law on 16 December 2008 and seeks, among others, to accelerate the exploration and development of renewable energy resources to reduce the country's dependence on fossil fuel (thereby

minimizing the country's exposure to price fluctuations in the international markets) and prevent or reduce harmful emissions in order to balance the goals of economic growth and development with the protection of health and environment, and to increase the utilization of renewable energy by providing fiscal and non-fiscal incentives towards institutionalizing the development of capabilities to use renewable energy systems, and promoting efficient and cost-effective commercial application.

3. Towards achieving these declared State policies, Section 7 of the RE Act mandates the formulation of a feed-in tariff (FIT) system (the "FIT System") for electricity produced from biomass, ocean, run-of-river hydropower, solar and wind, energy resources. This section further requires this Commission, in consultation with the NREB, to formulate and promulgate the FIT system rules. This requirement is further reiterated in Section 5 of Department Circular DC2009-05-0008, entitled *Rules and Regulations Implementing Republic Act 9513* (the "RE Act IRR") issued by the Department of Energy DOE pursuant to Section 33 of the RE Act.

4. Pursuant to Section 7 of the RE Act and Section 5 of the RE Act IRR, the Commission issued Resolution 16, Series of 2010 adopting the Feed-in Tariff Rules (the "FIT Rules").

4.1. The FIT Rules aim to establish the FIT System and regulate the method of establishing and approving the FIT and the Feed-In-Tariff Allowance ("FIT-All").[1]

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[1] Section 1.2, FIT Rules.

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4.2. Moreover, the FIT Rules provide that this Commission shall approve technology-specific feed-in tariffs ("FITs") based on such FITs to be recommended by the NREB.[2]

5. Pursuant to and in compliance with the RE-Act, RE-Act IRR, and the FIT Rules issued by this Commission, NREB hereby submits this Petition invoking the Commission's rule-making power[3], and recommends the adoption of the FIT for electricity generated from the following emerging renewable energy resources: biomass, ocean, run-of-river hydropower, solar, and wind.

I. THE FIT SYSTEM

6. A FIT is an energy supply policy focused on supporting the development of new renewable energy projects. The adoption of the FIT System is indispensable in achieving RE-Act's objectives. In essence, the FIT System accelerates the development of emerging renewable energy resources by providing for:

6.1. priority connection to the grid for electricity generated from emerging renewable energy sources;

6.2. priority purchase, transmission of, and payment for such electricity by grid system operators; and

6.3. a fixed tariff to be paid for electricity produced from each type of renewable energy resource over a fixed period not less than twelve (12) years.

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[2] Section 2.2, FIT Rules.

[3] Section 8, FIT Rules.

7. As emphasized in the RE Act IRR, the FIT System seeks to accelerate the development of emerging renewable energy resources by establishing, among others, a fixed tariff system for electricity generated from these sources. It involves mandating a guaranteed fixed price to be determined by this Commission for electricity generated from biomass, ocean, run-of-river hydropower, solar and wind energy resources for a given period of time, which for purposes of this Petition, shall be for 20 years pursuant to Section 4 of the FIT Rules.

8. Given the huge capital investment required to generate electricity from emerging renewable energy sources, and the inherent risks associated with them, the setting of an economically-viable tariff for each renewable energy resource is crucial to both the FIT System and RE-Act's success or failure.

9. The use of a well-adapted feed-in-tariff regime is generally the most efficient and effective support scheme for promoting renewable energy. A study conducted by the European Commission dated 23 January 2008[4] showed that eighteen out of its twenty-seven member-states used FITs as their national support scheme for the promotion of energy from renewable sources. The report concluded that the effectiveness of policies promoting renewable energy has been highest in countries using FIT system as their

[4] COMMISSION STAFF WORKING DOCUMENT "The support of electricity from renewable energy sources" (*Accompanying document to the* Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the promotion of the use of energy from renewable sources) Brussels, 23.1.2008 SEC(2008) 57

main support scheme.

10. Under the FIT Rules, the FITs to be established and approved by this Commission shall be specific for each emerging renewable energy technology. Subject to certain exceptions provided under Section 1.4 of the FIT Rules, the approved FITs under this Petition shall be applied only to generation facilities that enter into commercial operation after effectivity of such rates, or to such parts of existing facilities which have been substantially modified or expanded, as described in Section 3 of the FIT Rules.

II. PROPOSED FIT

11. The proposed FIT for electricity generated from the following emerging renewable energy resources are as follows:

Renewable Energy Resource	**Proposed FIT (Php/kWh)**
Biomass	7.00
Ocean	17.65
Run-of-River Hydro	6.15
Solar (ground-mounted)	17.95
Wind	10.37

Attached as Annex **A** is NREB's resolution setting the FIT for electricity generated from emerging renewable energy resources for recommendation to the Commission.

12. Pursuant to Section 2.2 of the FIT Rules, NREB may subsequently recommend to the Commission the adoption of differentiated FITs, based on the size of the eligible renewable energy plant, upon consultation with relevant stakeholders.

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13. Admittedly, the resulting FIT for electricity generated from emerging renewable energy resources may be higher compared to the generation cost of fossil-fuel power plants. But this is due primarily to the huge capital investment requirement for renewable energy technologies. It must be noted, however, that unlike power plants powered by fossil fuel, the fuel cost of renewable energy plants, with the exception of biomass, is practically zero. As such, the FIT for the emerging renewable energy resources is expected to be fairly stable throughout its operating period. Given the current price volatility in the world crude oil market, renewable energy power plants may realize grid price parity in the near future. Moreover, as will be discussed in detail below, the long-term economic and environmental benefits of renewable energy certainly outweigh the modest increase in the electricity cost in the short-term.

III. INITIAL INSTALLATION TARGETS

14. Pursuant to Section 5 of the FIT Rules, in proposing the FIT, NREB took into account the expected capacity for each renewable energy resource that it shall set as the initial installation targets and the years when the targets shall be achieved. These initial targets are not meant to be limits or caps, but rather, as basis for the Honorable Commission to review and re-adjust the FIT rates in accordance with Section 7 of the FIT Rules. The initial installation targets which shall be achieved within three years from effectivity of the FIT, are as follows:

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Renewable Energy Resource	**First Three Years after Effectivity of FIT**
Biomass	250 MW
Ocean Thermal	10 MW
Run-of-River Hydro	250 MW
Solar PV	100 MW
Wind	220 MW

Attached as Annex **A-1** is NREB's resolution adopting the initial installation targets.

15. The initial installation targets for the emerging renewable energy resources for grid connected systems were determined after consultations among NREB, DOE, renewable energy developers and other stakeholders, and took into account various factors, including probability of successful implementation of the projects in accordance with the work program approved by the DOE, likelihood of service contract approval by the DOE, the maximum penetrations limits as established in the study by the National Grid Corporation of the Philippines ("NGCP") or its accredited consultants for the projects, proximity to reaching financial closure, and compliance with the Renewable Portfolio Standards as well as the installation targets in the National Renewable Energy Plan (NREP).

15.1. While the readiness of the projects to go into commercial operation within the next three years is a primary consideration in setting the initial installation targets, it should be emphasized, however, that the initial installation targets may be subject to further adjustments. The adjustments may arise from the result of the ongoing study on the maximum penetration limit of renewable energy-based power plants to the national grid, and to ensure consistency of the initial installation targets with the renewable portfolio standards and the NREP.

15.2 The subsequent allocation of the initial installation targets to qualified developers will likewise be subject to DOE's guidelines governing the award of renewable energy service and operating contracts, and the compliance by the developers to the financial, technical and legal requirements set by the DOE and their approved work programs.

16. In order to minimize the cost impact of the initial FIT to end-users, investments in renewable energy sources with lower FIT such as run-of-river hydropower and biomass are likewise encouraged by allocating higher installation targets to them compared to the other renewable energy sources.

17. As previously emphasized, the installation targets adopted here shall be subject to DOE's final determination consistent with the Renewable Portfolio Standards, the National Renewable Energy Program and the NGCP's study on the maximum penetration limit capacity of the grid.

18. NREB shall submit the final installation targets as soon as DOE has determined and approved the same.

IV. FIT'S IMPACT TO THE FIT-ALL

19. Electricity consumers who are supplied electricity generated from emerging renewable energy resources through the distribution or

transmission network shall share in the cost of the FIT through a uniform charge (in PhP/kWh) referred as the FIT-All.

20. Under Section 2.5 of the FIT Rules, the Commission shall establish and set the FIT-All on an annual basis upon NGCP's petition and shall take into account the following: (i) forecasted annual required revenue of eligible renewable energy plants, (ii) previous year's over or under recoveries; (iii) NGCP's administration cost; (iv) forecasted annual electricity sale; and (v) such other relevant factors to ensure that no stakeholder is allocated with additional risks in the implementation of the FITs.

V. METHODOLOGY OF DETERMINING THE FIT

21. Pursuant to the FIT Rules, a representative project was selected for each of the renewable energy technologies after taking into consideration various factors, including availability and sustainability of resources, project viability and existence of similar projects. To the extent possible, the projects chosen were representative of the average conditions of the renewable energy power plant operating in compliance with or at par with applicable international technical standards and practices for such technologies, in compliance with the requirement under Section 5 of the FIT Rules.

22. With the representative project identified, the FIT for each renewable energy resource was computed based on a common methodology as described below:

22.1. In the determination of the FIT, the following key parameters have been identified for each of the renewable energy

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resources:

22.1.1. Gross Installed Capacity - the capacity expressed in megawatts measured at the generator output terminals of the power plant; also known as nameplate capacity.

22.1.2. Net Capacity Factor – the ratio of the net electricity generated, for the time considered, to the energy that could have been generated at continuous full Gross Installed Capacity operation during the same period.

22.1.3. All-in Project Cost per installed kW – expressed in US dollar per kW, it represents all costs incurred during development, construction periods up to Commercial Operations Date of the project divided by Gross Installed Capacity of the power plant project. Such costs include, among others, EPC costs, plant switch-yard and interconnection costs, development costs, interest and financing costs during construction, value added tax, allowance for contingency, and initial working capital.

22.1.4. Operations and maintenance (O&M) costs per year – costs that are necessary to operate and maintain the power plant in accordance with industry standards including, among others, technical services, consultancy, insurance, labor cost of operating personnel.

22.1.5 General and administrative costs (G&A) per year

– these are costs related to the administration of the project which includes, among others, salary of office personnel, office rentals, supplies, professional fees.

22.1.6. Rates and terms of financing (i.e. interest, commitment fee, and repayment period) – pertains to generally accepted terms in project finance that includes, among others, (i) interest rate on the loan obtained for a project, (ii) commitment fee payable on the balance of undrawn loan facility during construction period, and (iii) the repayment period over which the loan obtained is to be amortized or repaid.

22.1.7. Corporate Income Tax Rate – as provided under the RE-Act, it is a 10% tax on the net taxable income of the RE Developer after seven years of Income Tax Holiday.

22.1.8. Income Tax Holiday Incentive – pertains to an incentive under the RE-Act which exempts a duly registered RE developer from income taxes for seven years of commercial operations.

22.1.9. Duration of Construction and Operating periods – Construction Period pertains to the length of time from Financial Closing Date up to Commercial Operations Date while Operating Period is the period from Commercial Operations Date up to the end of the economic life of the project.

22.1.10. Debt to Equity Ratio – it is the proportion of

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equity and debt used to finance project development and construction costs.

22.1.11. Local and Foreign Capital Ratio – the ratio of Peso and US Dollar denominated capital cost items comprising all development and construction costs excluding financing costs.

22.1.12. Local and Foreign Inflation Rate – The assumed annual percentage increase in the price of local (Phil. inflation) and foreign (US inflation) goods and services which are used in estimating or projecting future Operating and Maintenance costs, General and Administrative costs, and the FIT, as applicable.

22.2. For the determination of FIT for Biomass resources, the following parameters were additionally considered:

22.2.1. Fuel cost per ton – cost of feedstock per ton.

22.2.2. Feed rate in kWh per ton – number of kilowatt hours produced per ton of feedstock

22.3. A detailed listing of all the parameters used in computing the FITs, including the unit of measurement for each parameter, is attached as **Annex B**.

22.4. The Microsoft Excel application was used to perform all the financial model calculations. The summaries of the key parameters and assumptions, as well as the Microsoft Excel files containing the

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FIT calculations, for each renewable energy resource are attached as follows:

Renewable Energy Resource	Key Assumptions for the Representative Project	Executive Summary and Financial Model (MS Excel file in compact disc)
Biomass	Annex C	Annex H
Ocean Thermal	Annex D	
Run-of-River Hydro	Annex E	
Solar	Annex F	
Wind	Annex G	

23. The key steps in formulating the financial models are discussed below:

23.1. Total construction costs and the required sources of funding such as debt and equity were calculated for each of the five renewable energy resources.

23.2. During the Operating Period, the annual Net Electrical Output NEO for each resource was calculated along with the required annual O&M costs, G&A costs, local and national taxes, and fuel cost (specifically only for Biomass).

23.3. Debt service payment (interest and principal) and depreciation cost were also determined. Initially, a hypothetical FIT expressed in Php/KWh was used as an input to the model, which then was multiplied to the NEO to obtain the annual revenues.

23.4. An income statement was prepared for each resource showing the revenues reduced by the sum of fuel cost (for Biomass only), O&M costs, spare parts, tools & equipment, G&A costs, local taxes, interest expense, depreciation and income tax.

23.5. The Net Cash Flow was calculated using a cash flow statement which shows cash flows from Operating, Financing and Investing activities. It was assumed that the annual Net Cash Flow would be paid as dividends to shareholders at the end of each year subject to availability of cash in excess of the assumed Required Debt Service Reserve Balance.

23.6. For each resource, the dividends assumed to be paid to shareholders and the equity investment amounts were then used in calculating the Equity Internal Rate of Return (EIRR) as of the Equity Investment Date.

23.7. The initial hypothetical FIT input was then adjusted such that the resulting EIRR target for each resource was achieved.

23.8. Lastly, each financial model also shows a computed pre-tax and post-tax Weighted Average Cost of Capital (WACC) based on assumed cost of debt and the assumed cost of equity or the EIRR.

VI. FIT FOR EACH EMERGING RENEWABLE ENERGY RESOURCE

A. Biomass Resources

24. Biomass Resources refer to non-fossilized, biodegradable organic material originating from naturally occurring or cultured plants, animals and micro-organisms, including agricultural products, by-products and residues that can be used in bioconversion process and other processes. It includes agricultural wastes and excess wood chips from lumber

production, bagasse (i.e., waste that is produced from sugarcane stalks), crop residues and wood. These resources are used by Biomass Energy Systems to produce heat, mechanical power or electricity through thermo-chemical, biochemical or physico-chemical processes, or through such other technologies. There are various technologies which transform biomass resources into various forms of energy. For solid biomass, the most established technology is direct combustion technology. In direct combustion, biomass is burned in the furnace to heat water in the boiler to generate steam. This steam then turns the turbine and causes the generator to create electricity. Except for fuel handling and feeding, the same principles and processes are observed in coal-fired power plants in the country.

25. Pursuant to Section 30 of the RE Act, waste-to-energy technologies which convert biodegradable materials such as, but not limited to animal manure or agricultural wastes into useful energy, shall be encouraged. As such, to be viable in the long term, feedstocks for biomass plants must not be considered as commodity; rather, these should be treated as wastes or by-products which are further utilized for useful purposes. Otherwise the competition for feedstocks would drive the prices up, leading to the shutdown of many biomass or waste-to-energy power plants. Countries in the region like Thailand had this experience. Thus, it is very important that the number of biomass power plants in a given location be limited to what is sustainable from the available waste materials in the area.

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26. There are distinct benefits and advantages of promoting and utilizing biomass resources to generate electricity through Biomass Energy Systems, as follows:

Quantitative Benefits

26.1. By displacing power generated from bunker and other fossil fuel, generation of electricity from Biomass Resources contributes to foreign exchange savings and to reduction of carbon dioxide and greenhouse gas (GHG) emissions to the atmosphere.

26.1.1. The generation of 1,577 GWh from the target capacity of 250 MW in the next three years will displace power generated from fossil fuel, using 969,000 barrels of oil equivalent per year. At a price of US$ 100/barrel, this translates to US$ 96.9 M per year or US$ 1.9 B of savings in fuel importation.

26.1.2. The total estimate of avoided GHG emissions from an installation target of 250 MW is 867,000 metric tons of carbon dioxide equivalent per year, by displacing electricity generated from the use of bunker fuel, and mitigating methane emissions from the decomposition of agricultural residues if these were not collected and fed to the boilers of Biomass energy systems.[5]

26.2. The benefits to national and local government in the form of government share, real property taxes, local business taxes, and ER

[5] Inter-Agency on Climate Change, Tacking Greenhouse Gases – A Guide for Country Inventories, 1999

1-94 contribution from the 250 MW target capacity in the next three years will also amount to PhP 460 M per year or PhP 9.5 B over the next twenty years.

Qualitative Benefits

26.3. The use of Biomass energy systems is suitable to all areas in the Philippines in terms of size, adaptability and safety. It is capable of providing reliable and sustainable power supply, given the volume of Biomass resources generated from agriculture every year. As such, it can be installed in most islands in the country, where Biomass resource is available.

26.4. Biomass energy systems are likewise suitable for baseload capacities, with much higher capacity factor and reliability compared to solar, wind and run-of-river hydro. Biomass energy systems has a 70-75% net capacity factor against only 25% for wind and 16% for ground-mounted solar.

26.5. The utilization of Biomass resources for power generation delivers direct socio-economic development to rural and farming communities as a new source of income and employment given that biomass fuel is sourced or taken largely from agriculture. Utilization of Biomass resources also offers an excellent solution to management and/or treatment of municipal/sewage wastes and agriculture residues.

26.6. Investment in Biomass energy systems will likewise give rise to related businesses such as construction and transport services, fabrication of biomass-related equipment and materials. Job creation will likewise result in cultivating, collecting, accessing, storing, transporting and preparing Biomass resources, as well as during the construction and operation of the power plants.

27. Utilization of Biomass resources for power generation also has distinct characteristics that affect the setting of its FIT. These factors were considered in formulating the financial model and the assumptions for its FIT computation.

27.1. High costs mark the feedstock making available at the plant site. Biomass, particularly agricultural residues, is usually scattered wide in the countryside. Owing to small landholdings in agriculture and inadequate mechanization, the collection and hauling of biomass resources are labor-intensive and costly, as hauling is mostly done manually *via* animal-drawn carts and motorcycles with very small capacities per trip.

27.2. Moreover, the availability of most Biomass resources such as those generated from rice and sugar production is seasonal. To allow a stabilized early operation requires investment in plantations in alternative feedstock and/or large storage areas, which require capital and operational costs.

27.3. Furthermore, biomass-fired boilers, turbo generators and accessories are not available locally and the cost of importation is high despite the duty-free incentive under the RE Act. Generally, biomass furnaces are larger in size and have additional features to prevent fouling and corrosion of boilers caused by biomass' low ash melting temperatures and high volatile matters. Hence, compared to fossil-fuel fired boilers, boilers using biomass resources are more expensive and require a higher investment cost. Moreover, Biomass energy systems require additional auxiliary facilities that are not needed nor are present in other renewable energy technologies, particularly facilities for biomass fuel transport, storage and handling, water treatment, air pollution mitigation/monitoring and ash handling, all of which add up to higher capital installation costs.

27.4. Moreover, the whole process of generating power through Biomass energy systems, from fuel logistics to burning of fuel in the boiler and generation of steam, is also more operationally complicated compared to other renewable energy technologies; thus, it is expected that the operation and maintenance costs of a biomass power plant are high.

28. These distinct advantages and key characteristics of utilizing Biomass resources to generate electricity are considered in determining the FIT for electricity generated from biomass resources and provide a strong justification for the adoption of the proposed FIT contained in this Petition. As specified in the FIT Rules, the proposed FIT is based on a representative project which is described in greater detail in Annex C.

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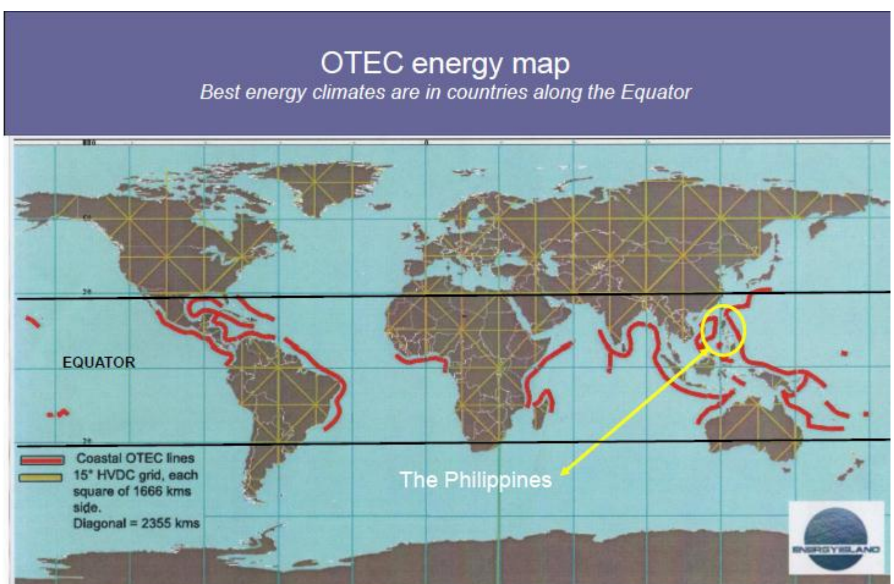
Attached are the following documents in support of the FIT determination for electricity from Biomass resources:

Annex	Document
C	Key assumptions for the FIT calculations
C-1 and series	Supporting documents for the key assumptions
H	Financial model in excel format (contained in compact disc)

B. *Ocean Thermal Energy Resource*

29. Potential energy resources from the ocean include wave, tidal (current) and ocean thermal gradient. Ocean Energy Systems convert these resources into electrical or mechanical energy.[6] Of particular emphasis in the instant Petition is the energy derived from conversion of ocean thermal gradient into electrical or mechanical energy, which is more commonly called Ocean Thermal Energy Conversion (OTEC). The illustration below shows that the Philippines is gifted with one of the world's best energy climates for OTEC.



Source: Energy Island Ltd.

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[6] Section 4(ii) of Republic Act No. 9513.

30. Briefly, OTEC energy systems extract energy from the temperature differential of the warm surface water and the cold water in the deep ocean. The process consists of pumping cold ocean water to the surface and using the temperature differential between this and the warm surface water to run a thermal engine and generate electricity.

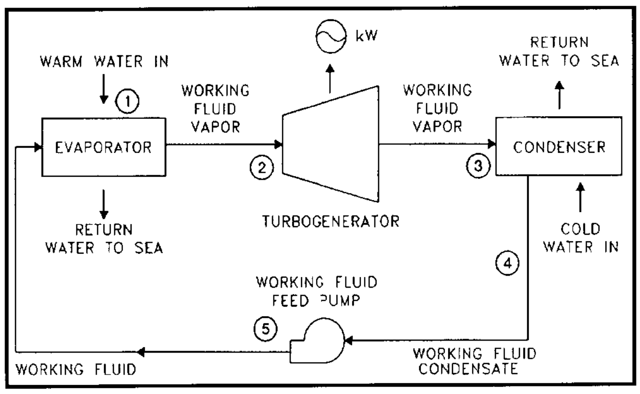

Diagram by Dr. Luis Vega

31. The following are the distinct benefits and advantages of promoting and utilizing ocean thermal to generate electricity:

<u>Quantitative Benefits</u>

31.1. Electricity generation from ocean thermal resource also reduces carbon dioxide and GHG emissions to the atmosphere through the displacement of power generated from bunker and other fossil fuel.

31.1.1. The total estimate on avoided GHG emissions from an installation target of 10 MW is 47,000 metric tons of carbon dioxide equivalent per year.

31.1.2. The generation of 85 GWh/year from the target capacity of 10 MW in the next three years will likewise displace power generated from fossil fuel with an equivalent amount of 52,000 barrels of crude oil per year. At a price of US$ 100/barrel, this translates to US$ 5.2 M per year or US$ 104 M over the next 20 years of savings in fuel importation.

31.2. The benefits to national and local government in the form of government share, real property taxes, local business taxes, and ER 1-94 contribution from the 10 MW target capacity in the next three years will also amount to PhP 120 M per year or PhP 3.1 B over the next twenty years.

Qualitative Benefits

31.3. OTEC's beneficial effects are not limited to power generation. Instead, it has multiple-product system potential that could bring further positive effects and social benefits. Foremost of these is OTEC's potential to produce fresh water – a by-product of the OTEC process – which would greatly alleviate the country from this increasingly scarce resource. The National Water Resources Board (NWRB) has declared water to be on the way to becoming the most critical resource in the country, and yet a large proportion of its urban and rural populations remain without access to main water supply. OTEC technology can help address or mitigate this problem.

31.4. Equally important will be the potential technology transfer, as the project will be a new source of engineering expertise in ocean, thermal, and material science, as well as in marine systems engineering. With the early adoption of OTEC systems, the Philippines can establish itself as a center of excellence for this technology. Since technology designs are developed elsewhere, the aim will be to maximize the potential for Filipino players to participate as suppliers of services to future developers, both local and overseas.

31.5. OTEC's potential to develop new industries and generate employment is far-reaching. Among these possibilities are the following:

31.5.1. In employment generation, the sole installation target until 2014 of 10MW, though small, will bring considerable employment within the town of the contract site which is a fourth-class municipality in Zambales. Middle- and low-skilled jobs, administrative, and general and support staffing requirements during full operation will conceivably triple the initial figure of around twenty (20) personnel.

31.5.2. During the construction phase, around US$20 M in investments is expected to be poured in Subic, Zambales for shipbuilding/drydocking, seawater pipe fabrication, testing and launch preparation, among others.

31.5.3. OTEC will likewise boost the country's aquaculture industry particularly within the vicinity of the contract site. In aquaculture, the pathogen-free cold water discharge from OTEC plants can be recycled to culture high-value temperate species such as Red and Japanese Abalone. It will also provide new knowledge and open new research programs in modern mariculture application.

31.5.4. In temperature-controlled agriculture, which involves passing cold deep water through pipes placed on the topsoil, the flow of cold water can be controlled in order to vary the temperature and rate of irrigation. This technique will allow plants normally native to temperate countries to grow quickly, due to relative high solar input in tropical climates such as the Philippines.

31.5.5. In air conditioning, the use of cold deep water as chiller fluid will provide air conditioning for buildings near the coast of a contract site. This will not only result in energy savings, but also, may lead to the acquisition of new knowledge and new ways of doing business. As an example, the Intercontinental Resort and Spa in Bora Bora utilizes OTEC technology for its air conditioning system.

32. Utilization of ocean resources, particularly OTEC, also has distinct characteristics that were considered in formulating the financial model and key assumptions in its FIT computation.

32.1. OTEC is ideally suited to warm tropical waters as those in the Philippines and countries along the equatorial belt, particularly those with deep ocean close to land and with legacy polar currents at depth. Given this site-specific requirement, the country's location is, therefore, ideal for OTEC development.

32.2. OTEC's main challenge is not technology or engineering but economics. To date, key major OTEC technologies such as offshore platform, turbines, mooring system and submarine power cables are relatively available while heat exchangers and cold water pipes are already developed as state-of-the-art components. But OTEC has high development costs and requires huge capital investments more than that of a fossil-fueled power plant. For instance, the capital required for OTEC is US$ 10,000/KW versus US$ 2,000/KW for similar fossil-fueled plants.

32.3. From an engineering and investment view point, it is more prudent to first build an OTEC plant at a pre-commercial scale of 10 MW, which is big enough to be scaled in the future to commercial-sized plants of over 50 MW. Given the site-specific requirement of OTEC, the initial design of 10 MW of an offshore plant is suitable to the marine weather environment of the western coast of Central Luzon. The projected expansion is justified by the fact that the economy of scale is such that a 50-MW OTEC plant would produce ten times more electricity than a 5-MW OTEC plant – but the capital cost requirement would only be around three to four times as much.

32.4. Scalability being one of OTEC's main advantages, it is estimated that the net cost per MWh of the full site scaled to 200 MW (including the 10 MW installation target) at the current proposed FIT rate will attain grid parity.

32.5. OTEC is a predictable energy source and is capable of producing base load electrical energy in large quantities.

33. These distinct advantages and key characteristics of utilizing OTEC to generate electricity are taken into consideration in determining the FIT for electricity generated from OTEC and provide strong justification for the adoption of the proposed FIT contained in this Petition. As specified in the FIT Rules, the proposed FIT rate is based on a representative project which is described in greater detail in Annex D.

Attached are the following documents in support of the FIT determination from OTEC generated power.

Annex	**Document**
D	Key assumptions for the FIT calculations
D-1 and series	Supporting documents for the key assumptions
H	Financial model in excel format (contained in compact disc)

C. Hydroelectric Power Resources

34. Hydroelectric Power Resources refer to water resources found technically feasible for the development of hydropower projects which include rivers, lakes, waterfalls, irrigation canals, springs, ponds and other water bodies. A particular type is Run-of-River Hydropower which utilizes the instantaneous flows of the river without substantial water storage and the kinetic energy of falling or running water between two locations with elevation differences, to generate electric power. Run-of-river Hydropower systems are classified as "intermittent " power sources owing to the

stochastic nature of the streamflow events, i.e., flow occurrences cannot exactly be predicted, but instead their occurrence, as well as the power generated, can only be described with a certain amount of probability largely dependent on historical events of flows.

35. There are distinct benefits and advantages of promoting and utilizing Run-of-River Hydropower to generate power, as follows:

<u>Quantitative Benefits</u>

35.1. Electricity generation from hydropower resources contributes to the reduction of carbon dioxide and other GHG emissions to the atmosphere, thereby mitigating the climate change impact of these emissions. This is through displacement of power generated from utilizing bunker and other fossil fuels.

35.1.1. It is estimated that the avoided carbon dioxide emissions from the generation of 1,073 GWh for an installation target of 250 MW is 590,000 tons of carbon dioxide equivalent per year.

35.1.2. Correspondingly, energy generated from the 250 MW will likewise save the Philippines from importing 659,000 barrels of crude oil per year, which is equivalent to the fuel utilized by a diesel power plant of the same capacity. At a price of US$ 100/barrel, this translates to US$ 65.9 M per year or US$ 1.3 B over the next twenty years of savings in fuel importation.

35.1.3. The benefits to both national and local

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government in the form of government share, real property taxes, local business taxes, and ER 1-94 contribution from the 250 MW target capacity in the next three years will also amount to PhP 520 M per year or PhP 8 B over the next twenty years.

35.2. In terms of energy efficiency, most Run-of-River Hydropower plants have a plant or capacity factor ranging from 43% (such as the 8 MW Villasiga hydropower plant in Antique) to 90% (as in the 900 KW Cantingas hydropower plant in Mindoro Oriental). The average capacity factor for most Run-of-River Hydropower plants stands at 47% which is high for a renewable energy plant.

35.3. Moreover, Run-of-River Hydropower facilities can have a useful life of 100 years or more. The Nagcarlan and Loboc plants, for example, have each been in operation for over 70 years. On the other hand, the dependable capacities of diesel-fired plants decrease significantly over time such that they have to be retired after about 15 years of operation.

<u>Qualitative Benefits</u>

35.4. The utilization of Run-of-River Hydropower will also greatly enhance forest cover for the watershed surrounding the power generating facilities, as the DOE requires the RE developer to adopt a watershed management plan, the implementation of which will be monitored by the DOE and the Environment Department.

35.5. The development of Run-of-River Hydropower also requires provision of access and road networks to remote localities. Construction of access roads is an integral part of the civil works component in the development of hydropower; thus, offering convenience and mobility in bringing agricultural produce from remote areas to the market centers. During the construction period, it is likewise expected that local employees/laborers will be hired, thus further contributing to the economic upliftment of the host communities. On the average, about 100 people will be hired for two to three years, the projected duration of the construction of a Run-of-River Hydropower plant.

36. Utilization of Run-of-River Hydropower also has distinct characteristics that affect the FIT setting, factors which were considered in formulating the financial model and the assumptions in the FIT computation.

36.1. Hydrologic uncertainty is the greatest risk, typically a characteristic of run-of-river diversion. This is due to the nature of Philippine climate. As the seasons shift from dry to wet and *vice-versa*, a broad and unpredictable range of water flow detrimentally affects the ability of Run-of-River Hydropower plants to generate power. The pronounced effects of climate change for this decade have contributed further to the adverse effects of normal seasonal variations. Extreme drought (during El Nino) and unusually high rainfall (during La Nina) are events which significantly and substantially alter the generation capability of hydro power plants.

36.2. Such hydrologic uncertainty limits the developers' ability to sign bilateral agreements with distribution utilities, given the latter's concern over water supply shortage during the dry season or low-flow periods.

36.3. Lastly, the inherent inability of Run-of-River Hydropower plants to provide a steady flow of power during the dry season and low-flow periods means that their full-rated capacity is not utilized during the entire year.

37. These distinct benefits, advantages and key characteristics of utilizing Run-of-River Hydropower to generate electricity are taken into consideration in FIT fixing for electricity generated from Run-of-River Hydropower and provide strong justification to adopt the proposed FIT in this Petition. As specified in the FIT Rules, the proposed FIT rate is based on a representative project which is described in greater detail in Annex E.

Attached are the following documents in support of the FIT determination for Run-of-River Hydropower resources:

Annex	**Document**
E	Key assumptions for the FIT calculations
E-1 and series	Supporting documents for the key assumptions
H	Financial model in excel format (contained in compact disc)

D. Solar Energy Resource

38. Solar energy refers to energy derived from solar radiation that can be converted into useful thermal or electrical energy. The most common

solar technologies currently used for power generation include solar photovoltaic (PV) using sunlight and solar thermal technologies (using the heat of the sun).

39. Solar PV development is booming. In a single year, it has reached a major global milestone with over 10,000 MW of PV installed.[7] It is a paradox, however, that "this growth is mainly driven by countries outside the world's Sunbelt; in fact the growth of PV could be accelerated tremendously, if the world's Sunbelt PV potential could be "unlocked".[8] The Philippines is part of the Sunbelt with one of the highest potentials compared to its neighboring Southeast Asian countries. Unlocking this potential could significantly contribute to reducing possible peak power shortages over the next few years and allow the country to hedge against volatile fossil fuel prices. Despite its location, there is, however, a significant lag in solar installations and manufacturing capacity of the Philippines compared to its neighbors.[9]

40. For this Petition, the proposed FIT covers a utility-scale 10 MW solar PV installation as a "representative" project which is interconnected to the transmission network at a voltage level of 69kV. It does not cover Solar PV systems which are integrated into building structures either as roofs, walls or cladding (more commonly referred to as building-integrated PV or

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[7] This is all the more impressive when it is considered that only 170 MW were installed in 2000 or a little over 10 years ago.

[8] European Photovoltaic Industry Association, Unlocking the Sunbelt Potential of Photovoltaics – second edition, October 2010.

[9] See Figure 20, page 32 of the "Unlocking the Sunbelt Potential of Photovoltaics – second edition", October 2010.

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BIPV).

41. There are distinct benefits and advantages of promoting and utilizing solar energy to generate electricity, as follows:

<u>Quantitative Benefits</u>

41.1. On a per kWh of energy generated, solar energy will significantly contribute to climate change mitigation and carbon emission reduction.

41.1.1. The total estimate on avoided GHG emissions from an installation target of 100 MW is 67,000 tons of carbon dioxide equivalent per year or 1.34 million tons for the 20-year life of the solar PV power plants, by displacing electricity currently generated by a mix of power plants that is predominantly fossil-fired fuel (e.g. 67%).

41.1.2. The generation of 139.3 GWh from the target capacity of 100 MW in the next three years will likewise displace power generated from fossil fuel with an equivalent amount of 85,400 barrels of oil equivalent per year. At a price of US$ 100/barrel, this translates to US$ 8.5 M savings per year or US$170 M over the next 20 years in fuel importation to the Philippines.

41.2. The benefits to both national and local government in the form of government share, real property taxes, local business taxes, and ER 1-94 contribution from the 100 MW target capacity in the next three years will also amount to PhP 201 M per year or PhP 5.2 B over the next twenty years.

Qualitative Benefits

41.3. Solar PV may be considered the most environmentally-friendly renewable energy technology. A solar PV plant emits nothing to the air, has no effluents to the land or to the rivers, does not need volumes of water for cooling and other purposes and generates very minimal noise.

41.4. Solar PV technology can be located almost anywhere and can be deployed easily even in urban areas and closer to the load centers. Moreover, a solar PV plant can be constructed and commissioned in roughly 6-8 months, compared to other conventional power plants whose construction can take anywhere from two to four years. Utility-scale solar PV plants are therefore seen as a credible solution in addressing the country's power shortage expected in the next year or two.

41.5. In addition to the deployment speed, PV power plants generate electricity during periods of high demand. The power it replaces is more valuable to consumers. Solar generation during periods of intense sun when air-conditioning loads are at a maximum can also help in improving the stability of the grid.

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41.6. Therefore, enhanced development of domestic manufacturing and large-scale utility applications of Solar PV is a big step toward achieving energy security and sufficiency initiatives.

41.7. The utilization of solar energy for power generation is likewise expected to boost the development of the entire value chain in the PV industry, generating alongside domestic employment in the industry. Experience in countries that have provided incentives for the wider deployment of utility-scale PV plants has demonstrated the numerous upstream and downstream business benefits as supporting industries are created.

41.8. The Philippines is home to Sunpower, a global giant in the solar PV industry that is capable of producing 575 MW per annum. Locally it employs 4,500 people. Despite this major manufacturing capability and local expertise, the Philippines has only one 1 MW utility-scale facility in Cagayan de Oro operated by CEPALCO. The 1 MW PV solar plant in Cagayan De Oro is the first utility-scale PV plant in the Southeast Asian region, the installation of which was only made possible by concession funding. Without such funding, plants of this nature are not feasible. This is supported by the fact that no other PV plant of this nature has been installed in the Philippines since the plant in Cagayan De Oro. Thus, the proposed FIT rate provides commercial certainty (e.g. fixed long-term tariff and priority off-take) for the PV developers and encourages more PV plants to be built and commissioned. The FIT scheme has also proven to be one of the most effective mechanisms for encouraging the growth in the PV industry.

42. These distinct advantages and key characteristics of solar PV power generation are taken into consideration in FIT determining for electricity generated from solar energy and provide strong justification to adopt the proposed FIT in this Petition. As specified in the FIT Rules, the proposed FIT rate is based on a representative project which is described in greater detail in Annex F.

Attached are the following documents in support of the FIT determination for electricity from solar energy:

Annex	Document
F	Key assumptions for the FIT calculations
F-1 and series	Supporting documents for the key assumptions
H	Financial model in excel format (contained in compact disc)

E. Wind Energy Resource

43. Wind energy refers to "energy that can be derived from wind that is converted into useful electrical or mechanical energy."[10] It is produced when wind turbines convert the kinetic energy in the mass of moving air into mechanical power, which is in turn converted into electricity by generators connected to the rotor blades of the turbines. Wind turbines are mounted on towers of 70 – 80 meters in height, and are manufactured with proven technologies in nameplate capacities of 1.5MW to 2.5MW. The generation of

[10] Section 3(iii), DOE Circular No. DC2009-05-0008.

wind power is energy efficient, entails no fuel cost and produces no hazardous waste.

44. The main source of commercially viable wind energy in the Philippines is the northeast wind or *amihan*, which is present in the country from October to February of each year, and is referred to as the "high wind" season. In these months, production from wind farms is at maximum capacity during daytime or peak demand hours, and in some instances may even continue into the night. The months from March to September comprise the "low wind" season, and production capacity typically ranges from 10% to 25% of installed capacity. Hence, on an annualized basis, the capacity factor of the representative wind farm project is 25%. Approximately 70% of the annual revenues of a wind farm are generated during the high wind season.

45. Wind energy is distinct among the emerging renewable energy resources in that it is capable of producing utility-scale power generation. The proposed wind farm projects range from 30MW up to 120 MW, and the 44 Wind Energy Service Contracts issued to date by the DOE total a potential of over 1,000 MW of capacity over the next five to seven years. These economies of scale account for the lower installed cost per MW of wind farms as compared to other emerging renewable energy resources.

46. Wind energy is also distinct among the FIT-eligible RE resources in that it can be extremely harsh on generating equipment, hence the substantial engineering technology that goes into the design, construction,

operation and maintenance of wind turbine generators. Wind turbines are presently designed to safely operate in winds of up to 60 meters per second (m/s) or 216 kph; structurally, however, they are designed to withstand sustained winds of up to 72m/s or 259 kph. In a typhoon-prone country such as the Philippines, the majority of the commercially viable wind resources are in Ilocos Norte and Cagayan, which likewise experience the majority of the typhoons which enter the Philippine area of responsibility.

46.1. These harsh operating conditions, therefore, require corresponding O & M costs which may, in the worst cases, require component replacement.

46.2. Most wind farm projects are also located in mountainous or remote areas which are not easily accessible, which require development and maintenance of access roads and interconnection facilities to the main grid.

47. At this time, all wind turbine generators and associated components are imported from abroad; even the equipment required to install these wind turbines, such as the crane to lift the nacelle into place atop the towers, are imported together with the wind turbine. The knowledge and technology for wind resource assessment are likewise sourced from abroad, and these form part of the representative wind farm project. Several manufacturers have expressed interest in setting up assembly plants in the Philippines in due course if the size of the industry allows for it.

48. Like run-of-river hydropower and solar energy, wind energy is

viewed as "intermittent" or variable by nature, meaning that while the wind regime can be estimated annually with some certainty, the generation from a wind farm cannot be predicted on a day-to-day basis. The behavior of a wind farm in respect of the grid, however, is like a conventional fossil fuel plant because, while the wind may stop in one wind turbine location, it will continue at other wind turbine locations within the wind farm, providing a more or less stable flow of generation for the duration of the presence of the wind. As the wind dies down for the day, the wind turbines also cut out of operation one by one, and there is typically no large scale outage of the wind farm.

49. There are distinct benefits and advantages of promoting and utilizing wind resources to generate electricity, as follows:

<u>Quantitative Benefits</u>

49.1. Generation of electricity from wind resources contributes to the reduction of carbon and GHG emissions to the atmosphere. This is through displacement of power generated from bunker and other fossil fuels.

49.1.1. The total estimate on avoided GHG emissions from an installation target of 220 MW is 265,000 tons equivalent of carbon dioxide per year, by displacing electricity generated from the use of bunker fuel (equivalent to the amount of carbon dioxide released by 88,000 cars per year).

49.1.2. The generation of 481 GWh from the target

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capacity of 220 MW in the next three years will likewise displace power generated from fossil fuel using 295,000 barrels of oil equivalent per year. At a current price of US$ 100/barrel, this translates to US$ 29.5 M per year or US$ 590 M over the next twenty years of savings in fuel importation.

49.2. The benefits to the national and local government in the form of government share, real property taxes, local business taxes, and ER 1-94 contribution from the 220 MW target capacity in the next three years will also amount to PhP 366 M per year or PhP 9.6 B over the next twenty years.

49.3. In view of their favorable wind conditions, around 600MW out of the 1,000 MW wind energy potential will be generated in the provinces of Ilocos Norte and Cagayan. This will bring in up to PhP 300 Million of additional revenues per year to the northern region and attract US$1.8 Billion of direct investment in the medium term based on the 600MW potential.

49.4. The total investment for 220 MW can likewise reach up to US$660 Million at a project cost of US$3 Million per MW. The impact on the gross Domestic Product (GDP) can reach up to US$990 Million based on a GDP multiplier of 1.5x for power sector covering economic activity, additional revenue and jobs generated.[11]

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[11] Based on Input/Output Multiplier Analysis for Major Industries in the Philippines by Madeleine Dumawa of the Statistical Research and Training Center, presented at the 11th Convention of Statistics, October 2010.

Qualitative Benefits

49.5. With the majority of the potential generation capacity of 600MW located in Ilocos Norte and Cagayan, the Philippine government has an additional reason to implement the looping of the transmission backbone to connect the Laoag substation in Ilocos Norte to the Tuguegarao substation in Cagayan. The northern loop has been mentioned in the transmission development plan for more than 10 years as a concept required by system security. With the planned implementation of wind power generation along the northern coast of the Philippines, the northern loop would also serve to evacuate this substantial generating capacity.

49.6. Relative to its ASEAN neighbors, the Philippines has a competitive edge in the production of wind energy in view of its favorable wind conditions which register a capacity factor of 25%; this is higher than the wind regime in certain areas in the south of India, where more than 3,000MW of wind turbines are installed. Given adequate financial and policy incentives, the Philippine wind regime is capable of supporting approximately 1,000 MW of wind generation in the next five to seven years, making the Philippines a potential leader in wind power development. In 2005, the Global Wind Energy Council in its Wind Force 12 Report has identified 13 countries around the world, including the Philippines, which can lead in unlocking the major market deployment in the wind sector. Despite being identified as a key country, the Philippines has not built any wind farm aside from the Northwind Project. On the other hand, most of the Wind Force 12 countries have achieved significant capacity growth since 2005.

49.7. The potential development of 1,000 MW from the country's wind power industry is likewise estimated to create 800 highly skilled direct jobs and 5,000 indirect support jobs. The direct financial impact is in the reduction of the cost of installing, operating and maintaining wind turbines. In the medium to long term, this new industry can supply the skills needed by ASEAN neighbors who are only beginning to explore the development of their own wind power industry. In addition, there is the medium term prospect of manufacturing wind turbines and its components for supply to other countries.

49.7.1. It must be recalled that, in the wake of the 1973 and 1979 oil crises, Denmark initiated programs and policies to encourage renewable energy for the two-fold purpose of ensuring energy security and cutting carbon emissions from conventional fuel plants. The policies led to the development of a local wind turbine manufacturing industry which, by 2003, accounted for 38% of the world turbine market, and a turn-over of around US$4.3 billion.

49.7.2. The Philippines has a similar experience with

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geothermal power. The country is recognized today as second only to the United States in technical competence and geothermal field development. The seeds of this globally recognized skill were planted in 1978 because of Presidential Decree 1442, or (An Act to Promote the Exploration and Development of Geothermal Resources).

50. In the absence of FIT, however, the absence of creditworthy off-takers that are willing and able to accommodate the non-baseload supply from wind generation and accept the higher price of wind power will be a major impediment to the utilization of wind energy for power generation. Furthermore, the lack of transmission infrastructure in areas where wind generation is located, which is needed to transport the power to the nearest load center, must also be addressed.

51. These distinct advantages and key characteristics of utilizing wind sources to generate electricity are considered in FIT determining for electricity generated from wind energy and provide strong justification to adopt the proposed FIT in this Petition. As specified in the FIT Rules, the proposed FIT rate is based on a representative project which is described in greater detail in Annex G.

Attached are the following documents in support of the FIT determination for electricity from wind resource:

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Annex	Document
G	Key assumptions for the FIT calculations
G-1 and series	Supporting documents for the key assumptions
H	Financial model in excel format (contained in compact disc)

VII. DEGRESSION RATE

52. As the various technologies that convert emerging renewable energy sources into electricity advance and mature over the years, lower engineering procurement and construction will likely result leading to lower generation costs from these sources. A degression rate, expressed as a percentage of the FIT, is, therefore, set on the premise that a diminishing premium will be paid for electricity generated from each of the emerging renewable energy sources, which premium is gradually eliminated as generation costs approximate market prices.

53. Pursuant to Section 2.11 of the FIT Rules, the FITs shall therefore be subject to degression rate. As degression is designed to encourage the developers to invest at the initial stage and hasten deployment of power plants utilizing renewable energy resources, eligible renewable energy power plants that may come into commercial operation after the effectivity of the initial FITs may be subject to such degressed FITs corresponding to the year when they started commercial operation. The Commission may approve a different degression rate for different technologies.

54. Degression rates, therefore, seek to reflect differences in the costs of renewable energy from the various technologies and power plants,

and assure that the FIT is reflective of the actual generation costs. This way, windfall revenues for developers are avoided and no unreasonable costs are passed on to electricity consumers. More importantly, the same is applied to immediately transfer to the consumers the benefit from a potential decrease in the costs of certain technologies, while giving developers the extra incentive to invest early.

55. It should, however, be noted that the generation cost does not always decline as renewable energy technologies mature due to a variety of factors, which can range from higher equipment costs, or change in the regulatory environment, among others. The degression rates proposed here factored in these contingencies as they were carefully calculated in order to balance the interests of both the developers and the consumers.

56. Based on the foregoing principles, NREB arrived at the degression rates for each emerging renewable energy resource and pursuant to Section 2.1.1 of the FIT Rules, respectfully submits the following degression rates:

Renewable Energy Resource	**Degression Rate**
Biomass	0.5% after year 2 from effectivity of FIT
Ocean Thermal	Zero degression rate
Run-of-River Hydro	0.5% after year 2 from effectivity of FIT
Solar (ground-mounted)	6% after year 1 from effectivity of FIT
Wind	0.5% after year 2 from effectivity of FIT

Please refer to Annex A for NREB's board resolution adopting the degression rates.

57. The degressed FIT's shall apply to the eligible renewable energy

power plants, as defined under the FIT Rules, corresponding to the year when they start with their commercial operation. However, in the event that the commercial operation of such power plant is delayed by the lack of the requisite transmission facilities or other similar factors beyond the control of the developer, the degression rate should not apply.

VIII. CONCLUSION

58. With the advent of the global challenge of climate change and the unpredictable supply and cost of fossil fuels, the future of energy will be anchored on the development of sustainable and renewable energy resources. In addition to addressing climate change, the RE-Act's enactment and the FIT System's introduction are the government's measures aimed at reducing the country's dependence on imported fuel and insulating end-users from the price volatility of fossil fuel in the world market.

59. As discussed, the development of the renewable energy sector is likewise expected to produce substantial economic benefits, as follows:

59.1. The development of renewable energy will add capacity to the Philippine energy sector, thereby promoting fuel diversification and improving fuel security, and at the same time ensure security of energy supply in the long-term.

59.2. A well-developed renewable energy sector will stabilize electricity prices in the long-term since fuel cost of renewable energy generation plants is practically zero. Considering that the marginal generation cost in the country is largely based on the diesel fuel costs, electricity prices are vulnerable to movements in crude oil prices in the world market.

59.3. Since most of the renewable energy plants will be located far from traditional load centers, this will result in the dispersion of electricity generation in the countryside. Moreover, the construction of renewable energy generation plants will promote countryside development and spur local economy. At the same time, the development of the renewable energy sector will likewise enhance the establishment of related renewable-energy industries, as explained above.

59.4. Renewable energy technologies are scalable to different capacities-- ranging from a few watts to hundreds of megawatts. In many cases, they are available in modular and standardized designs and sizes. This enables the renewable energy technologies to be matched closely with the end-user requirements, thus enabling decentralized deployment and avoiding the risk of failures and unauthorized access to large networks which leads to commercial losses.

59.5. Lastly, a robust and vibrant renewable energy sector will provide training opportunities to the country's technical workforce. Should the Philippines become the leader in renewable energy development in the Southeast Asian region in the medium-term, the country will be in a position to export its technical skills and expertise to its neighboring countries.

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60. With the long-term commitment of the FIT support scheme which creates a policy framework that fosters innovation, the adoption and development of the emerging renewable energy technologies become foreseeable. The FIT incentive will, therefore, allow the Philippines to develop a robust renewable energy industry and take the lead in the area of sustainable and clean energy in the Southeast Asian region.

RELIEF

ACCORDINGLY, NREB respectfully asks the Commission to exercise its rule-making power and subsequently Order the adoption of the Feed-in-Tariff and the degression rates for each of the emerging renewable resources, respectively, both as recommended by NREB detailed in this petition.

Other equitable reliefs are likewise asked for.

Respectfully submitted.

Quezon City for Pasig City, 12 May 2011.

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