



IT'S MORE SUN IN THE PHILIPPINES

Facts and Figures on Solar Energy in the Philippines
Project Development Programme (PDP) Southeast-Asia

www.renewables-made-in-germany.com

Supported by:



on the basis of a decision
by the German Bundestag

Imprint

1st edition June 2012

2nd edition August 2012

3rd edition September 2013

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This policy brief was developed by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in cooperation with Renewable Energy Developers Center (REDC) and WWF Philippines.

Publisher

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of the

German Federal Ministry of Economics and Technology (BMWi)

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This policy brief is part of the Project Development Programme (PDP) South East Asia. PDP South East Asia is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry of Economics and Technology (BMWi) under the “renewables – Made in Germany” initiative. More information about the PDP and about renewable energy markets in South East Asia: www.giz.de/projektentwicklungsprogramm.

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3rd Edition Foreword

Another milestone in the development of solar PV in the Philippines was achieved in July 2013 when the net metering rules and interconnection standards were released by the Energy Regulatory Commission and went into effect on July 25. Its significance does not only lay in the fact that it is the first mechanism prescribed in the Renewable Energy Law of 2008 which is fully implemented but also in the fact that it legalizes and thereby opens up the whole market of solar roof tops below 100KW in on grid areas for the country.

Secretary Petilla of the Department of Energy in his speech at the PV-Summit on August 16 described the net metering market as the one which has the highest potential in the country. In contrast to the Feed-in-Tariff (FiT) regime which currently targets only 50 MW, there is no target for the net metering market.

In expectation of the release of the net metering rules one could already observe a marked increase in activities in the industry and it is expected that this development will only accelerate as more and more customers take advantage of the rules and install a solar roof top.

The distribution utilities have been instrumental in developing the rules and standards to assure safety and stability of the distribution grid. It is now their task to operationalize the rules and process the applications as every customer of good standing has now an opportunity to be interconnected i.e. can install and connect a solar roof top.

According to the rules, there will be no subsidy involved. The customer receives a credit based on the KWh of electricity exported after own consumption and the average cost of generation to the DU of that month. The rules will therefore shape the size of the roof tops to be in line with the maximum consumption of the residential or commercial customer as the credit for exporting electricity to the distribution utility is far lower than the savings through own consumption.

The other important part of the rules is to be found in Annex A, the interconnection standards. They describe in detail the technical aspects of connecting a solar roof top to a distribution grid. GIZ, in the context of the “renewables – Made in Germany” initiative, has supported the development of the interconnection standards with workshops, seminars and expert advice. The learning was summarized in the “Manual for Interconnection – Report for supporting the interconnection of rooftop-PV systems in the Philippines”. It encompasses an analysis of the low and medium-voltage distribution grids the country, the net metering rules, the interconnection standards and the sizing of solar roof tops. The manual is available on the GIZ website:

<http://www.giz.de/Themen/de/dokumente/giz2013-en-manual-interconnection-rooftop-pv.pdf>.

With the net metering rules in place and the FiT rules on its final stretch of implementation the regulatory groundwork is laid to fully achieve the potential of “It’s more sun in the Philippines”.

2nd Edition Foreword

Since the publication of the first edition in June 2012 an important regulatory steps was finally taken on the path towards integrating solar energy into the Philippine power generation mix with the approval of the initial Feed-in-Tariffs by ERC on July 27. This policy brief has argued in its first edition for a rapid approval of the FiT as a crucial piece of regulation which will kick start the process of implementation of the RE Act of 2008 so that the Philippines can reap the benefits of the deployment of solar energy. However, the FiT rates are lower than proposed by NREB and it remains to be seen in the coming months whether the rates are sufficient for the project developers. According to ERC, it “arrived at FITs substantially lower than NREB's proposed FITs for Wind and Solar after it updated the construction costs of the representative plants for these technologies to reflect the downward market trend of the costs of putting up these plants. It also adopted higher capacity factors for these plants to ensure that only the more efficient plants will enjoy the FIT incentive For all the RE technologies, the ERC revised other project costs such as those for the switchyard and transformers, transmission interconnection cost and access/service road cost using the same benchmarks it had employed in approving similar projects of the regulated utilities. The ERC also adopted a lower equity Internal Rate of Return (EIRR) of 16.44% in calculating for the FITs, except for Biomass, which was allowed a higher EIRR of 17% to account for fuel risks.”

	APPROVED FITS (PhP/kWh)	PROPOSED FITS (PhP/kWh)	REDUCTION IN %
HYDRO	5.90	6.15	- 4%
BIOMASS	6.63	7.00	- 5%
WIND	8.53	10.37	- 18%
SOLAR	9.68	17.95 (14.50)*	- 46% (-33%)*

* Submission during ERC hearings

The FiT and also the Net-Metering Rules are the crucial first steps towards implementing the RE Act of 2008 and in this sense only the beginning of a process with many barriers and discussions still ahead before the Philippines will see a substantial solar installation base. For example, in the case of FiT, the allocation of the targets has to be decided by DoE and a process has to be devised on how to continue the process after the target has been reached, or after the time of the initial period of 3 years is over, whichever comes first. In the case of Solar, only 50MW were allocated. As of March, already nine projects with a potential capacity of 201.8MW were awarded and a further fifteen projects with a potential capacity of 168.07MW are pending approval, far outstripping the allocation of 50MW.

In addition to the FiT rules, the Net-Metering Rules and Interconnection Standards for low voltage small RE installations (<100KW) have been submitted by NREB to ERC and hopefully the process will be faster than with the FiT rules. Upon approval those rules will govern the distributed power generation landscape in the Philippines including the important segment of solar rooftops.

So the need for Facts & Figures on Solar energy remains and we hope you enjoy reading this policy brief.

Executive Summary

Solar energy is one of the most promising sources of energy and its share in the global energy mix has steadily increased over the past several years. Whereas other countries in South East Asia have embraced solar energy, the Philippines, despite its huge potential, is lagging behind in terms of policy implementation and deployment. This policy brief argues why solar energy should become an important part of the Philippine energy mix for economic, energy and environmental reasons.

- **Solar power creates an energy-secure Philippines**

Harnessing solar power is one way to decrease dependence on the increasing and volatile prices of fossil fuels.

- **Solar energy supplies significant power worldwide**

Solar technologies have been tried and tested worldwide, with global cumulative installed capacity topped 100,000 megawatts (MW) in 2012

- **Solar potential in the Philippines**

In the Philippines, the potential is even greater than the aspirational target of 1,528MW attributed to solar in the National Renewable Energy Plan until 2030

- **Solar energy makes sense for consumers**

Solar energy provides an immediate solution to the country's energy woes. It is the only cost-effective technology that can be installed and commissioned in as short as a few days to a few months

- **Solar rooftops as distributed generation**

Because of the steadily falling costs of equipment, solar PV systems are becoming popular with consumers.

- **Solar and the Wholesale Electricity Spot Market**

Solar energy reduces the price of power sold at the Wholesale Electricity Spot Market.

- **Solar is affordable - Feed-In Tariff vs. FiT-All**

- For the average household consuming 300 kWh a month, the price for getting clean energy is less than P1 a month, equivalent to a single candy

- **Solar energy creates jobs**

Solar technology can further contribute to inclusive growth by creating thousands of new jobs.

■ **Solar allows greater access to energy**

The deployment of solar power systems in rural areas, particularly in far-flung, off-grid barangays, will not only give rise to new job opportunities, but will also allow families to extend their activities to the evenings.

■ **Solar attracts investments**

New solar power deployments also mean new investments that, in turn, will result in millions of pesos in additional revenue for the government.

■ **Solar is the most environment-friendly power source**

Solar is not only a free energy resource, but it is also the most environment-friendly energy solution.

■ **Solar helps reduce GHG emissions**

The increased use of solar will help alleviate the harmful health effects of fossil fuel use and mitigate one of the causes of climate change.

■ **Solar is the future, now**

Let us capitalize on our country's innate advantages on the solar front. Solar is the future, and the future is NOW.

Solar Energy – The urgent need for policy implementation

The volatile prices of fossil fuel have prompted a search for more viable, sustainable means to produce power. According to experts, including the Philippine Department of Energy (DOE), the world's oil supply may only be good for another 30 years. Oil exploration is increasingly moving towards deep-water areas that are riskier and more expensive to explore. It is no wonder global oil prices have spun almost out of control, with levels beyond \$100-a-barrel now the norm.

On the other side of the economic equation, the world's population continues to grow. Global population increased by 1.09 per cent in 2011. This meant there were 145 net additions – births minus death – to the world's population every minute or 2.4 net additions every second. In the Philippines, annual average growth rate from 2007-2010, was placed at 1.7 per cent, beating the global average, according to World Bank data. The experts estimated the population of the Philippines to grow by an even higher rate of 1.87 per cent this year. As of mid-2010, data from the National Statistics Office showed that the country's population had already reached 92.34 million.

Economics dictate that the larger a country's population gets, the more infrastructure and resources it needs. Apart from needing more food and more water, growing populations and economies will also need more power. Unfortunately, some sources of energy, like fossil fuel, dwindle. Other energy sources, on the other hand, are renewable, like solar energy.

Harnessing the power of the sun is nothing new. From the introduction of solar-powered calculators in the late 1970s, the world never stopped searching for ways to use the sun to generate power for vehicles, homes, and industries. This is because solar power is free and clean: no drilling and exploration costs, no spills that can harm the environment, no greenhouse gas emissions. It is also inexhaustible.

Baker & McKenzie partner Paul Curnow, in an interview with Agence France Presse (AFP), said most RE investments in Asia had gone to China and India, with Southeast Asia lagging behind these two giants. This was mainly due to “gaps in terms of climate and renewables policy.” In Southeast Asia, including here in the Philippines, “the policy settings are not mature enough.”

In another AFP interview, Marc Lohoff, president of Asia Pacific and the Middle East at German solar power systems manufacturer Conergy, said RE growth in Southeast Asia was hinged on the issuance of FiT with long durations, such as the one provided for by the RE Law. Most investors, like those in the Philippines, were just awaiting Southeast Asian governments to announce and implement their FiT systems before letting go of their cash and implementing their planned RE projects.

ReEx Capital Asia associate Shiva Susarla, in a report by AsianPower, said the Philippines had failed to take advantage of its huge RE potential due to lack of financing and the presence of policy constraints, particularly referring to the delay in the approval and implementation of the FiT scheme. The country's policy, he said, was characterized by “uncertainty and delays” – something that investors did not appreciate. This was partly the reason the Philippines had the highest residential power rate and the third highest industrial power rate in the region.

Solar power creates an energy-secure Philippines

Harnessing solar power is one way to decrease dependence on the increasing and volatile prices of fossil fuels. The bulk of the country's supply of crude and finished petroleum products come from the Middle East. As seen in the past, conflicts in various parts of the Middle East adversely affect local fuel prices. Dwindling oil supply even threaten economic stability as huge oil demand from countries like China, India, and the United States siphon the bulk of oil reserves.

Being a small buyer, the Philippines is at a huge disadvantage, both in terms of access and price. But with more renewable energy (RE) sources in place, including solar, the Philippines becomes less exposed to external risks and less dependent on foreign oil. Hedging for the future reduces the country's exposure to geo-political conflicts as sunlight is accessible to all, both rich and poor countries.

Solar energy supplies significant power worldwide

Solar technologies have been tried and tested worldwide, with global cumulative installed capacity topping 100,000 megawatts (MW) in 2012. Last year alone, 31,100 MW of new solar power capacities were installed across the globe, with installations soaring in Asia which achieved the highest growth of all regions with +66%. In its PVBS report, the International Energy Agency (IEA) estimates that global solar PV installations have increased in total by 28.4 per cent in 2012.

The top three markets for solar technology in 2012 were Germany, China and Italy. With these new installations, the European Photovoltaic Industry Association (EPIA) reported solar was now the third most important RE in terms of global installed capacity, behind hydro and wind. Run over a calendar year, the total energy output of PV installations worldwide in 2011 came up to around 80 billion kilowatt-hours (kWh) – enough volume to supply the annual power requirements of more than 20 million households.

In the US, according to data from the US Energy Information Administration (EIA), installed solar capacity came up to 7.2 gigawatts (GW) as of end-2012. Energy consumption had also shifted, with demand for all major fuels in the US declining between 2008 and 2009, except for renewables. Renewable energy demand in the US actually grew by 5.4 percent in 2009, with 1 percent of total consumption coming from solar.

Solar technology is only beginning and there is still huge room for growth. According to electronics manufacturer Tokyo Electron, less than 1 percent of total electricity demand was being supplied by solar technologies. This offers immense opportunity for new investments in clean power.

Solar potential in the Philippines

In the Philippines, the potential is even greater than the aspirational target of 1,528MW attributed to solar in the National Renewable Energy Plan until 20130. According to the DOE's 2009-2030 Power Development Plan (PDP), the country's energy consumption is seen reaching 149,067 gigawatt-hours (GWh) by 2030, from an estimated demand of 86,809 GWh by 2018 and actual demand of 55,417 GWh in 2008.

Peak demand should hit 14,311 GWh by 2018 and go up to 24,534 GWh by 2030, from 2008's 9,226 GWh.

To ensure adequate power supply considering these demand projections, 17,000 MW of new capacities should be put in place. Luzon alone will need 12,500 MW in additional capacities in the next 20 years, while Visayas and Mindanao – both already experiencing power shortfalls – will need 2,150 MW and 2,500 MW in new capacities, respectively, during the same period.

A number of investors have committed to put up 1,338 MW of additional capacity in the three main island grids, with commissioning of these new facilities targeted for the 2012-2014 period. Of these committed capacity additions, the bulk will come from coal-fired power plants in Luzon and Visayas, while all capacity commitments in Mindanao will come from renewable sources, particularly hydro and geothermal.

According to the National Renewable Energy Program (NREP), the country's RE base should reach 15,304 MW by 2030; almost triple the current installed base. Of this total, 10% will be attributed to solar.

The projected installed base for solar can actually be increased and accelerated, considering the need to have additional capacities now. While coal, hydro, and geothermal can provide much-needed additional capacities, these technologies require time and, therefore, cannot avert rotating brownouts. Such facilities usually take three to five years to put up. Considering the current supply-demand scenario, especially in Visayas and Mindanao, a year lost without these additional capacities means lost opportunities.

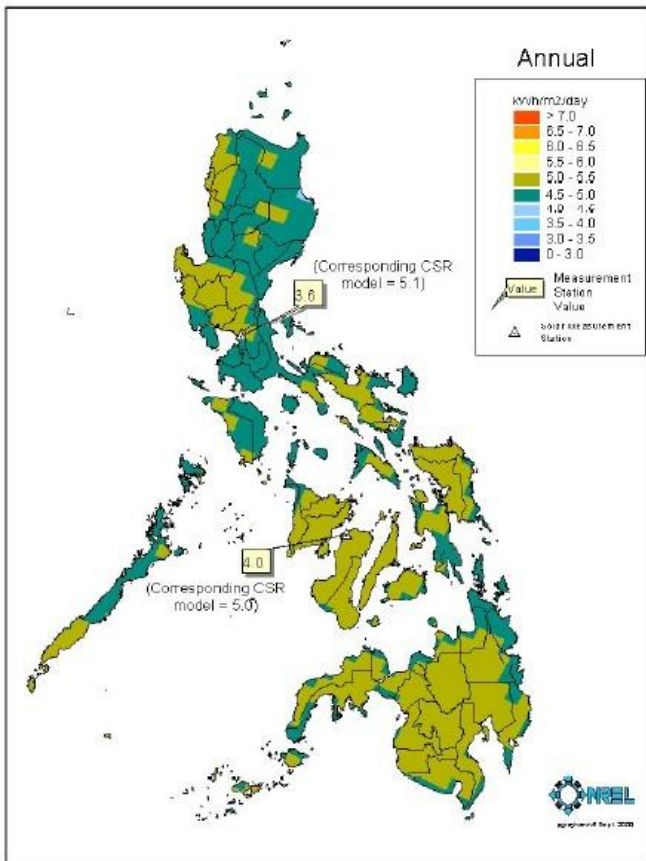


Figure: Annual Solar Potential in the Philippines Source: Assessment of Solar Resources in the Philippines, NREL 2000

Solar energy makes sense for consumers

Solar energy provides an immediate solution to the country's energy woes. It is the only cost-effective technology that can be installed and commissioned in as short as a few days to a few months. According to the EPIA, a 1-MW solar power plant can be installed in as short as six weeks, while smaller systems only take a day to install. A 70-MW solar power plant in Italy was built and commissioned in just nine months, less than a third of the time it took to construct and power up a coal-fired generation facility. Areas such as Visayas and Mindanao, which are already experiencing rotating brownouts, cannot wait three to five years before adequate power supply can be made available.

Solar facilities are also easy to put up, scalable, and relatively unobtrusive. Contrary to what some perceive, solar technology is not restricted to square and flat panels. Solar facilities can be shaped and bent, allowing these to be more easily integrated into housing and building designs. Solar panels can also be placed on rooftops and other parts of a building to provide power to such establishments without taking up too much space. These solar panels are also relatively maintenance-free.

The country can also take advantage of its abundant sunlight. According to the National Renewable Energy Laboratory, the Philippines' average solar radiation ranges from 128-203 watts per square meter, or an average of 161.7 watts per square meter, based on sunlight duration.

This translates to potential power generating capacity of 4.5-5.5 kWh per square meter per day. Both the northern and southern parts of the country provide ideal locations for installing solar power facilities. The northern part of the country has enough sunlight to generate an average of 4.5-5 kWh per square meter per day, while areas in the south can produce an average of 5-5.5 kWh per square meter of solar power per day.

The Philippines is well positioned for solar energy, not just in terms of geography. It also has a lot of room to take advantage of the investments and jobs that can be created by future solar power installations, as well as look forward to cheaper and cleaner power that is not affected by geopolitics. Reducing fuel consumption makes solar an economically viable electricity source for Philippine consumers and industries.

Over the past 30 years, the cost of solar power systems has significantly gone down. In 2011, the price of solar panels fell 48.4 per cent. According to Bloomberg New Energy Finance, the price of solar panels is seen declining by 55 per cent by 2020. Based on trends, prices of PV panels drop by as much as 22 per cent every time the cumulative installed capacity doubles. PV system costs have dropped by more than 30 per cent since 2008. In some countries, the IEA notes that the costs of solar PV systems have fallen by as much as 75 per cent in the last three years.

At the rate that solar installations is growing worldwide, experts note that grid parity – or the level at which the price of electricity produced by solar technologies meet prices of electricity currently being injected into the grid – is just around the corner.

Solar rooftops as distributed generation

Because of the steadily falling costs of solar power equipment and the short amount of time needed to complete such installations, solar PV systems are increasingly becoming popular with consumers and industries the world over.

According to research from Gartner Inc. and the Solar Electric Power Association (SEPA) done in 2011, solar PV systems are gaining increased popularity among utilities in Asia, US, and Europe. The technology is regarded as a

cost-effective means of adding distributed and central generation sources. In Asia alone, 4.8GW capacity was newly installed.

Solar power solutions are also now made easier to acquire, with more and more solar kits becoming available in the local market. These kits can readily be used in homes and commercial establishments in major urban locations to mitigate the rising cost of electricity and to reduce operating expenses.

A typical kit can displace 4-5 kW of electricity a day, translating to a savings of at least 30 per cent of monthly power bills. While the cost of a 1-kW grid-tied system amounting to about 200,000 pesos appears expensive today, the electricity offsets for seven years allow full recovery of the solar system. On the 8th year, savings generated from the 1-kW system provides additional money in the pocket of the consumers. By the beginning of the 9th year up to the 25th year, when the lifespan of a solar kit is fully expended, solar electricity provides economic relief.

To make solar power solutions even more affordable, House Committee on Small Business Chair and Bayan Muna party list Rep. Teddy Casino authored House Bill No. 5405, or the One Million Solar Roofs Act, which provides incentives and financing facilities to household and small commercial power users wanting to put up solar power systems. Under the proposed piece of legislation, homeowners and small entrepreneurs can take out loans from the Home Development Mutual Fund, more popularly known as the Pag-Ibig Fund, as well as from the Government Service Insurance System, Social Security System, and other financial institutions to purchase solar panels. The bill proposes to ease the upfront cost of solar power systems and allow the amortization for the loan to be derived from whatever homeowners and entrepreneurs will be able to save on their monthly power bills.

Should this bill pass, consumers need only shell out less than P1,500 a month to pay for a 1-kW grid-tied solar power system or a similar rooftop installation. They can then replace a portion of their energy needs using solar power during the day – energy that is free – and just revert to grid-fed electricity only in the night-time.

In Metro Manila, the avoided cost of a 1-kW solar rooftop installation is around P1,500 a month. Having one installed will entail no additional cost for the user, as the monthly amortization for the PV system is equal to the electricity that solar power will displace each month. Since solar power facilities can also be embedded, transmission charges are also avoided.

Solar and the Wholesale Electricity Spot Market

Renewable energy, in general, reduces the price of power sold at the Wholesale Electricity Spot Market (WESM) through the merit order effect. A study done by the National Renewable Energy Board (NREB) shows that the entry of 200 MW of FiT-supported RE, including solar energy, using the proposed feed-in-tariff (FiT) rate, can reduce WESM Luzon prices by between 59 centavos and P3.15 per kWh, or an average reduction of 17 centavos per kWh nationwide.

The RE impact assessment was performed using 2010 WESM Luzon prices. Applied to the actual amount of electricity purchased at WESM in Luzon in 2010, an estimated P9.47 billion in savings can be generated. The Melbourne Energy Institute of the University of Melbourne, which verified the NREB study, came up with an even higher annual savings projection of P11.3 billion.

While some may argue that WESM Luzon prices were particularly high in 2010, and so may not be representative of historical WESM prices, a sample that is more representative of past average monthly prices, or the P2.92 per kWh recorded in August 2010, still yielded possible savings of 59 centavos per kWh using the NREB model. This study proves that the injection of RE, including solar, into the grid will NOT jack up electricity prices and instead even cause power prices to go down.

Solar is affordable - Feed-In Tariff vs. FiT-All

More specifically, the FiT rate for solar will not add P9.68 per kWh, as claimed by some parties. For 50 MW of solar power installed, the actual impact to consumers is only 0.3 centavos per kWh. For the average household consuming 300 kWh a month, the price for getting clean energy is less than P1 a month, equivalent to a single candy!

The FiT scheme allows solar electricity prices to be fixed for 20 years, while the prices of power derived from fossil fuels remain volatile and are expected to continue increasing. As soon as the Energy Regulatory Commission (ERC) approves the FiT, solar electricity prices will stay pegged at 0.3 centavos for 20 years, compared with how the ERC-approved rates for Luzon increased by 11.3 per cent from 2003-2010, or by P1.58 per kWh, due to pass-through fuel charges. Every \$10-per-metric-ton increase in coal prices, on the other hand, results in a 21-centavo-per-kWh movement in electricity prices. Foreign exchange fluctuations also greatly affect power prices.

Considering these facts, the FiT can be better described as an investment and a hedge rather than a subsidy. The forward-looking scheme calculates the avoided fuel costs for the next 20 years. According to data from the DOE, the country's oil import bill in 2011 surged 26 per cent to \$12.57 billion from \$9.96 billion the year before, due to rising world market prices. The price of crude imports soared 37 per cent in 2011 to \$7.34 billion, while the value of finished product imports rose 13.6 per cent to \$5.22 billion – this despite a 7-percent drop in import volume to 113 million barrels. Using the proposed FiT, fuel cost avoidance is placed at a cumulative P116 billion until 2030.

Solar energy creates jobs

Aside from generating savings from avoided oil imports, RE can further contribute to inclusive growth by creating thousands of new jobs. Take Germany's case, for example. Solar alone created more than 100,000 new jobs over the last seven years, according to the German Federal Ministry of Environment. Another report done by the Solar Energy Industries Association (SEIA) stated that solar energy produced 93,502 jobs in the US in 2010, with a potential of growing to as many as four million jobs by 2030. Despite the recession, half the solar firms in the US added jobs in 2011. The same could be true for the Philippines.

The Semiconductor and Electronics Industries of the Philippines Inc. (SEIPI) have solar technology as one of its focus sectors moving forward. The local electronics sector currently employs more than 25,000 individuals. For solar technology alone, a 100-MW installation target promises to create at least 5,000 full-time jobs in three years. According to the electronics industry rule of thumb, each direct job in the sector gives rise to seven indirect jobs. This means that the industry provides livelihood to close to 175,000 people all over the country.

Jobs that can be produced by increased solar deployment will not just be on the manufacturing side, or the ones captured by the solar technology sub-group of the electronics sector. Most of the jobs will be on the installation side, effectively providing work to people in the rural areas, where solar installations are most viable and practical. The maintenance aspect of solar installations will produce additional jobs as well.

Since sunlight is accessible, investments in solar power are concentrated in manufacturing materials, capturing sunlight, and converting it to energy. Deploying these materials to end-users, however, is another key investment area that can generate more jobs for Filipinos, as competent manpower is required to undertake actual installation.

The Philippines possesses the basic assets to compete in this space. The country houses the manufacturing plant of the global leader in solar panel production. Besides, the Philippine semiconductor industry is the most vibrant

sector of the economy. Such a strong industry can usher in active solar manufacturing enterprises, create jobs, and spur economic growth. Furthermore, the country's trainable workforce can be tapped to install utility-scale solar power plants.

Solar allows greater access to energy

The deployment of solar power systems in rural areas, particularly in far-flung, off-grid barangays, will not only give rise to new job opportunities, but will also allow families to extend their activities to the evenings, including farming for the family breadwinners and studying for the children. Even small businesses such as retail or sari-sari stores can continue doing business at night, and not by the light of a candle.

Rural electrification using solar energy allows installation of charging stations for mobile phones in barangay halls, providing members of the community with better means of communication. These seemingly small things, taken collectively, lead to a more progressive community as a whole.

Solar attracts investments

New solar power deployments also mean new investments that, in turn, will result in millions of pesos in additional revenue for the government. While the Renewable Energy Law provides a wide range of fiscal incentives to the RE sector, proponents of solar power projects will eventually have to remit taxes when their tax breaks end. Their employees will pay their own taxes as well, again generating additional revenue for the government.

These new jobs and additional government revenue can only be produced, however, when investments in solar power finally start to come in. Investors with a combined portfolio of \$800 million, P9.4 billion of which has been earmarked for solar power projects in the next three years, have been waiting for the release of the FiT rates to start rolling out RE projects and provide added capacity to the entire country. According to a Gartner and SEPA report last year, government policies and regulation figured significantly in an investor's decision to deploy solar power systems.

Solar is the most environment-friendly power source

Solar's benefits extend beyond economics. Solar is not only a free energy resource, but it is also the most environment-friendly energy solution currently available to man. The power of the sun, used as a fuel for electricity generation, has zero emissions. Also, since it is readily available and does not require any other source but the sun itself, solar energy inflicts no damage on the environment.

Research shows that for every kWh of solar power produced, 0.88 kilograms of carbon dioxide are avoided. For every 1.5 kW of installed solar capacity, as much as 1,576 kilograms of carbon emission is prevented. That is equivalent to planting 256 square meters of forests.

Based on preliminary estimates from the IEA, global carbon-dioxide emissions resulting from fuel combustion hit an all-time high of 31.6 gigatons (Gt) in 2011, a 3.2-percent rise from 2010's 30.6 Gt. The bulk of these emissions came from coal, which contributed 45 per cent, followed by oil with 35 per cent and natural gas with 20 per cent.

According to data from the Department of Environment and Natural Resources Environmental Management Bureau (DENR-EMB), as of April 2011, the air pollution level in Metro Manila was pegged at 121 ug/Ncm

(micrograms/normal cubic meters), lower than the 138 ug/Ncm recorded in July 2010, but still above the 90-ug/Ncm maximum level of air pollutants as specified by the World Health Organization. The lowest particulate level in 2010 was recorded in September at 109 ug/Ncm, while the highest was in December at 152 ug/Ncm. The high pollution level that month was attributed to the larger-than-usual number of vehicles that took to the roads during the holiday rush. The average for the first half of 2010 was even higher than the December figure at 166 ug/Ncm, 84 per cent beyond the WHO standard.

According to the Metropolitan Manila Development Authority, Metro Manila's air quality "remains a constant health threat to its 11.6 million residents." DENR's latest accomplishment report attributed 80 per cent of pollution in major urban centers to vehicular emissions.

Solar helps reduce GHG emissions

Data from the Department of Health showed that respiratory ailments were among the top 10 diseases in the country. The 2000-2004 five-year average placed acute lower respiratory tract infection and pneumonia as the disease with the highest morbidity rate, or the frequency at which a disease occurs in a population. Bronchitis and tuberculosis were on second and sixth places, respectively.

With air pollution levels in Metro Manila and even the highly urbanized Metro Cebu remaining high, thousands die each year due to respiratory and cardiovascular diseases triggered by particulates in the air. With more than 18 million Filipinos exposed to air pollution, the World Bank estimates health cost and loss of income at a whopping P7.6 billion a year.

The increased use of RE, particular solar, will help alleviate the harmful effects of fossil fuel use and mitigate one of the causes of climate change. Generation facilities that run on coal or oil significantly contribute to an increase in greenhouse gas emissions in the atmosphere. The Intergovernmental Panel on Climate Change (IPCC), in its Fourth Assessment Report, said the "warming of the earth's climate system is unequivocal," and that this was due mainly to the surge in human-induced greenhouse gas emissions since the mid-20th century.

Sector	CO ₂ , Gg	CH ₄ , Gg	N ₂ O, Gg	*CO ₂ e Emission, Gg
Energy	62,499.10	304.14	2.52	69,667.24
Industrial Processes	8,604.74	0.24	-	8,609.78
Agriculture	-	1,209.79	37.41	37,002.69
LUCF	(104,040.29)	(46.28)	(0.32)	(105,111.37)
Waste	-	500.67	3.50	11,599.07
Totals	(32,936.45)	1,968.56	43.11	21,767.41

**LUCF is land use change and forestry

Figure: Greenhouse gas inventory, GHG emission per sector (2000) in Gt CO₂ e;
Source: National Framework Strategy on Climate Change 2010-2022.

The Philippines is prone to the adverse effects of climate change, as proven by the occurrence of super typhoons Ondoy and Sendong in 2009 and 2011, respectively. In the future, the country continues to face threats from stronger tropical cyclones, increasingly erratic rainfall patterns, drastic rise in sea level, and increasing temperature. These changes in climate behavior directly affect the country's food security and water resources, and even human health. According to the United Nations Development Program 2004 Global Report on Disasters, the Philippines is the most vulnerable country in the world to tropical cyclone occurrence, and the third highest in terms of people exposed to such events. Climate variability is also increasing, giving rise to intense periods of El Nino and La Nina.

Considering these, the country has to be more proactive in addressing climate change issues. How energy is produced and consumed is one way of mitigating the impact of climate change on the country. Solar power, as it has zero emissions, can help displace some coal-based and oil-based generation, thus helping mitigate the impact of climate change.

An April 10 study titled “A Strategic Approach to Climate Change in the Philippines: An Assessment of Low-Carbon Intervention in the Transport and Power Sectors,” conducted by Transport and Traffic Planners Inc. and CPI Energy Philippines Inc., showed that under a business-as-usual (BAU) scenario, greenhouse gas emissions will drastically increase from 2007-2030. Continued reliance on coal for power generation, under this scenario, will cause power emissions to rise from less than 30 metric tons of carbon dioxide equivalent (MtCO_{2e}) per year in 2007 to 140 MtCO_{2e} in 2030, or a 400-percent increase.

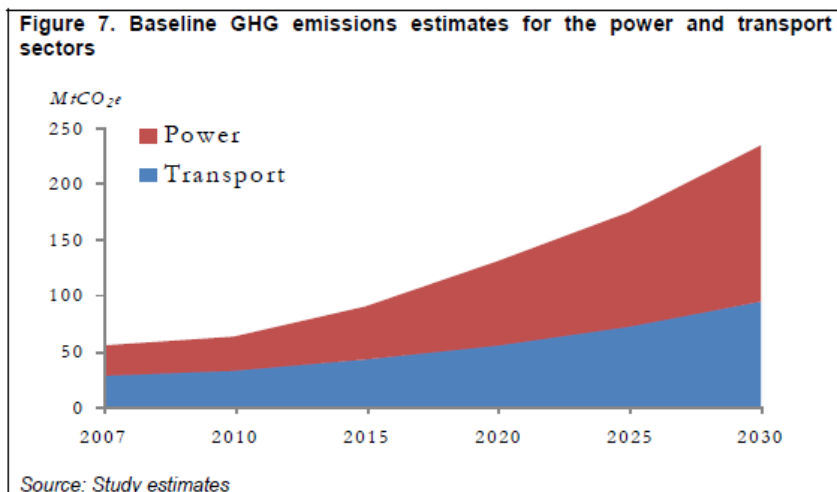


Figure: Baseline GHG emissions estimates for power and transport;
 Source: A Strategic Approach to Climate Change in the Philippines: An Assessment of Low-Carbon Intervention in the Transport and Power Sectors

Two alternatives to the BAU scenario were also evaluated in the study: the medium-carbon and low-carbon scenarios. Under the medium-carbon scenarios, power sector emissions will be 40 MtCO_{2e} less than the BAU scenario estimate for 2030. This scenario assumes a 10-percent decline in power demand, energy efficiency improvements, and a shift from coal to natural gas, hydro, geothermal, wind, and biomass. Under the low-carbon scenario, on the other hand, power sector emissions can be contained to just 30 per cent of the BAU level in 2030, assuming a 15-percent reduction in power demand, avoidance of 2,000 MW from coal, and the addition of 1,100 MW of geothermal, 4,500 MW of wind, and 2,000 MW each of biomass, hydro, and solar.

Figure 8. Power sector emissions scenarios, 2010-2030

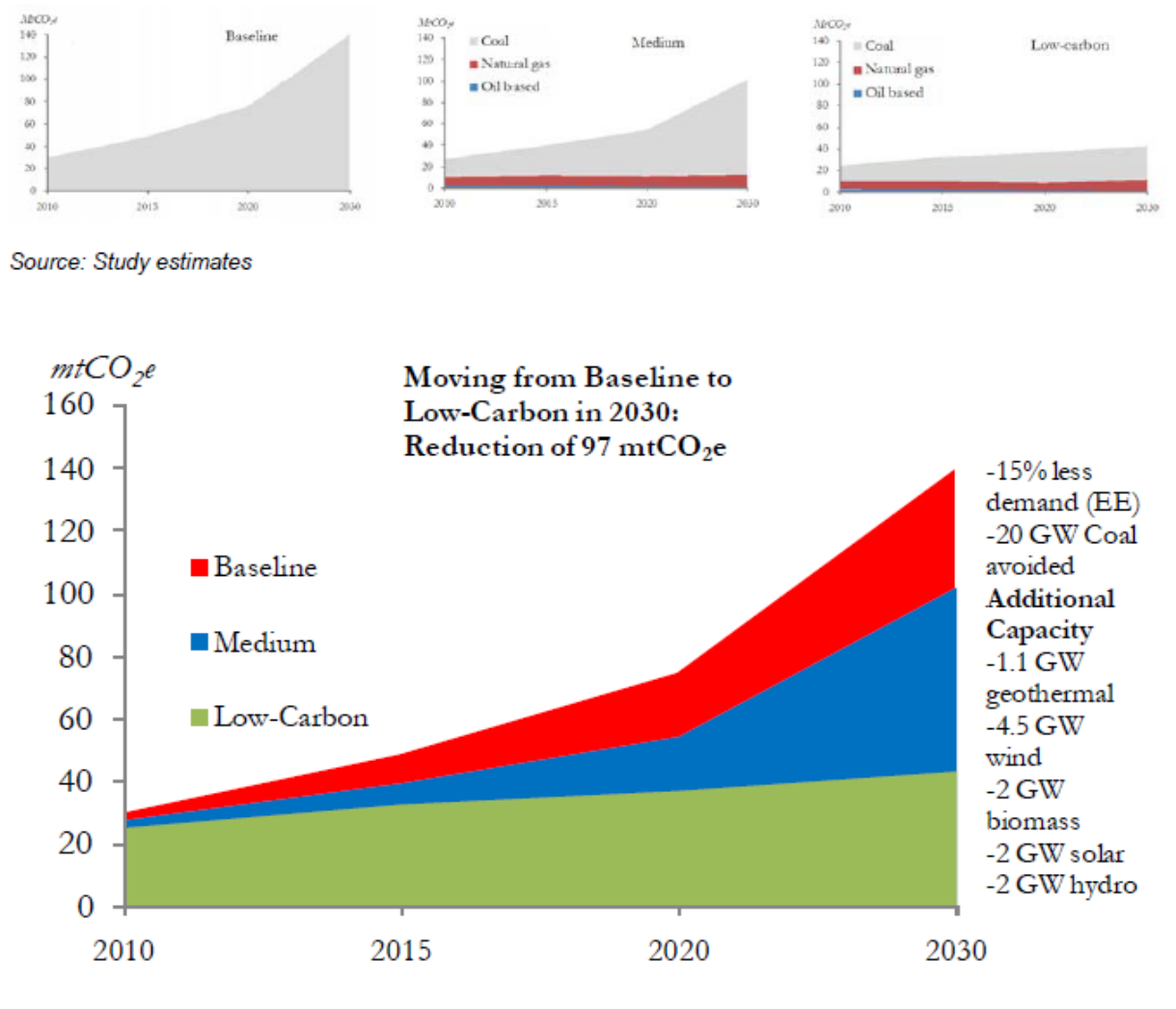


Figure: Power sector GHG emissions scenarios, 2010-2030;

Source: A Strategic Approach to Climate Change in the Philippines: An Assessment of Low-Carbon Intervention in the Transport and Power Sectors

The Climate Change Commission (CCC) also has sustainable energy as one of its seven strategic priorities, as identified in the National Climate Change Action Plan (NCCAP) 2011-2018. Under this particular strategy, the government aims to have sustainable renewable energy and ecologically efficient technologies adopted as major components of sustainable development. Some of the expected outcomes of this strategy include the formulation of a national RE program and roadmap based on the RE Law, the implementation of the RE Law’s rules and regulations, and the increased adoption of an off-grid, decentralized, community-based RE system that will generate affordable electricity.

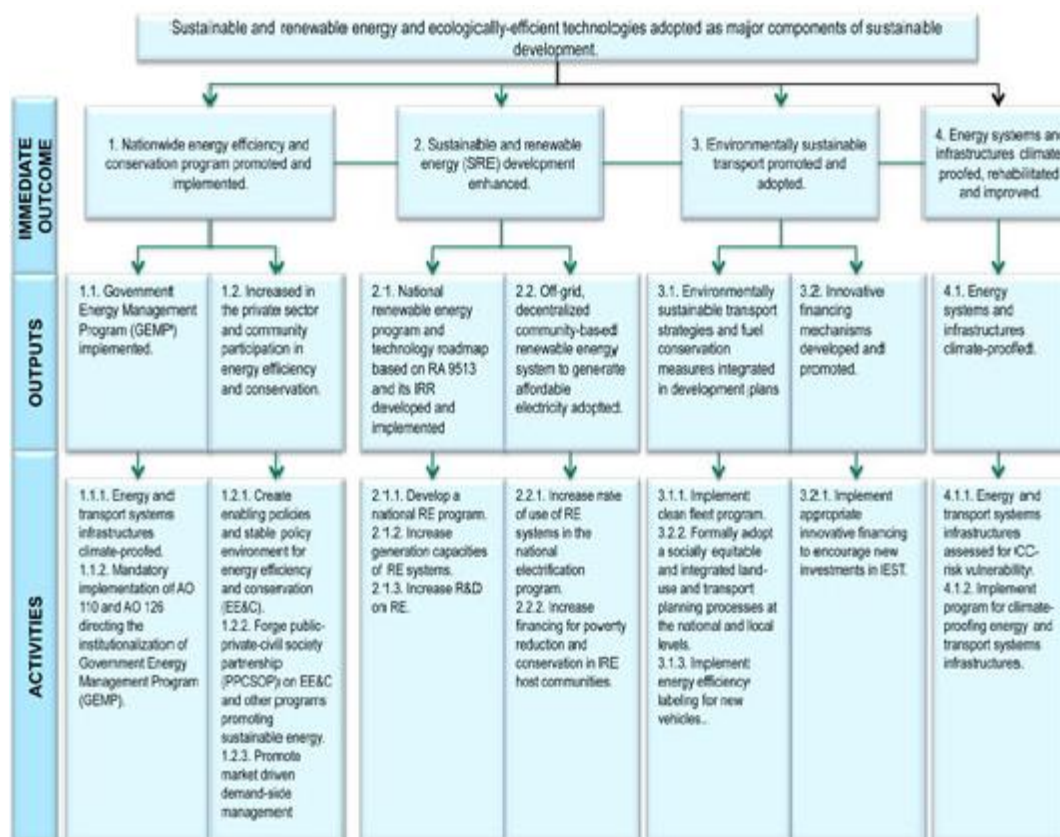


Figure: Sustainable energy strategy, NCCAP 2011-2018; Source: National Climate Change Adaptation Plan

Solar is one of the most sustainable energy sources currently available. Even members of the Senate acknowledge this fact. Sen. Miriam Defensor-Santiago has filed a Solar Roofs Act that seeks to provide competitive grants and incentives that will push local governments to promote the use of solar technology in their areas. According to Sen. Santiago, investing in solar power will not only result in greater energy stability and independence, create new jobs, and reduce electricity bills, but will also mitigate global warming and air pollution. Sen. Manuel Villar, on the other hand, proposed a bill that seeks to establish a Solar Energy Development Authority that will be tasked to conduct extensive research and formulate a comprehensive policy on solar energy.

Unlike other energy technologies, solar does not directly compete with food production and water resources. According to Cagayan Electric Power and Light Co. Inc., a Mindanao-based power distributor that has the biggest solar power installation in the country at 1 MW, ground-mounted solar installations can be put up on pieces of land that cannot be used for planting, grazing, or anything productive. No trees will have to be cut, and idle lands will be put to good use. Solar farms will also not have any by-product that is harmful to the environment.

Solar is the future, now

The world has always been heavily dependent on fossil fuels. Almost everything that makes the world go 'round is run by oil or coal. With Mother Earth going through a less-than-positive change, however, what with climate change making itself more visible in all sorts of ways, the world has started to take notice of cleaner, more environment-friendly energy sources.

The share of RE in the global energy mix has steadily increased over the past several years, and solar has shown itself one of the most promising energy types of the future. Even the Philippine government acknowledges the importance of RE with the passage of the RE Law.

While there has been some progress as far as advancing the development and use of RE is concerned, deployment still has been relatively slow – slower than necessary to reduce carbon-dioxide emissions and provide the world with a more energy-secure future, according to the IEA.

In its Tracking Clean Energy Progress report, the IEA said RE can be moved to the mainstream market at a faster pace if:

- A level playing field can be created for clean energy technologies. Energy prices should reflect the true cost of production and consumption.
- Policies on energy efficiency will be put in place. Energy should not be wasted and should be used in the most efficient manner. Formulating and implementing energy efficiency policies is the first step toward a sustainable energy mix.
- More support will be given for research and development. Strong government backing for R&D will help spur private sector innovation on the RE front, and ensure that RE technologies get to the market faster.

As shown by its three-pronged recommendation, the IEA notes the crucial role that government plays in advancing RE. In the Philippines, for example, putting in place an RE Law is not enough. The law should be implemented. The investment in RE should be made now so that the country can reap the rewards sooner.

For solar, in particular, stronger government support will mean a world of benefits: a quicker solution to power woes, millions of pesos in new investments, thousands of new jobs, and a cleaner environment.

Let us capitalize on our country's innate advantages on the solar front. Let us not wait for our more aggressive neighbors, such as Thailand and Indonesia, to catch up and snatch investment and job opportunities from our country and citizens. Let us not wait for the nightmare of the early 1990s, the rotating brownouts, to haunt us once again. Let us not wait. Let us do something now.

Solar is the future, and the future is NOW.

