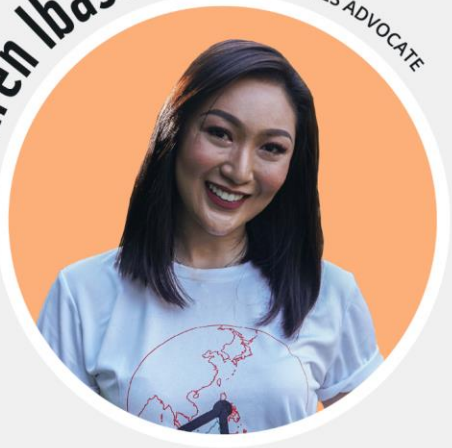
PANDA TALKS

Conservation Starts At Home

The Great REset: Energy in the New Normal

21 AUGUST 2020 | 5:00 PM

Karen Ibasco
WWF-PHILIPPINES ADVOCATE



Atty. Angela Ibay
WWF-PHILIPPINES
CLIMATE AND ENERGY PROGRAM HEAD

Energy cannot be created or destroyed, it can only be changed from one form to another.

1st law of Thermodynamics

Types of Energy

ENERGY

Energy is what makes matter move or change

KINETIC ENERGY

Energy of motion

Energy that comes from movement

Mechanical Energy

Energy due to motion of an object

Electrical Energy

Energy from flow of electric charge

Thermal Energy

or heat energy, involves vibration or movement of particles

Radiant Energy

or light energy is electromagnetic energy that travels in transverse waves

Sound Energy

Vibration transferred through an object in a wave to produce sound

POTENTIAL ENERGY

Stored energy

Energy that is stored for later use

Chemical Energy

Energy stored in bonds of atoms and molecules

Nuclear Energy

Energy stored in atoms' nucleus

Gravitational Energy

Energy stored in an object's height

Elastic Energy

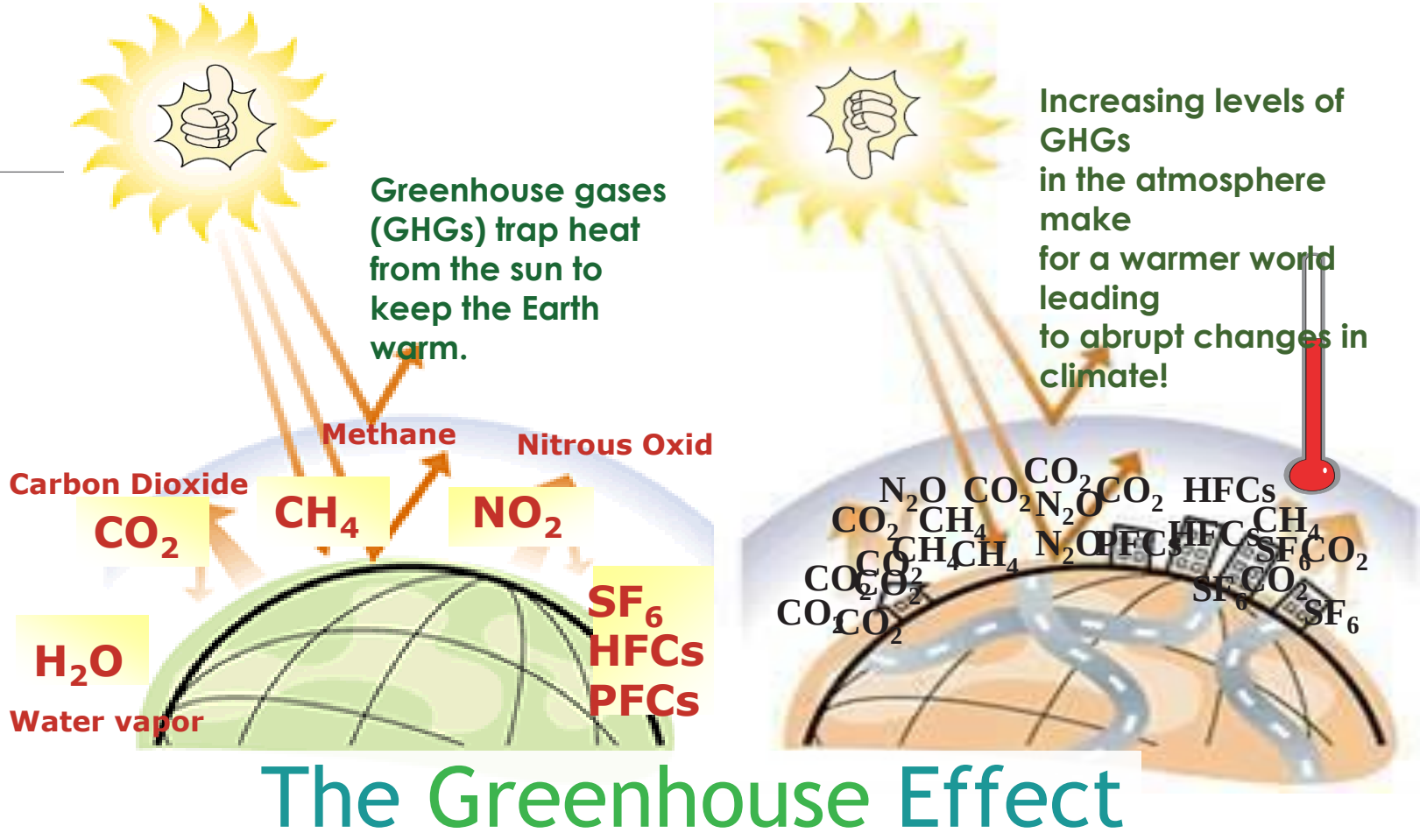
Energy stored in elastic objects

Adapted from steamism.com
Created with Canva

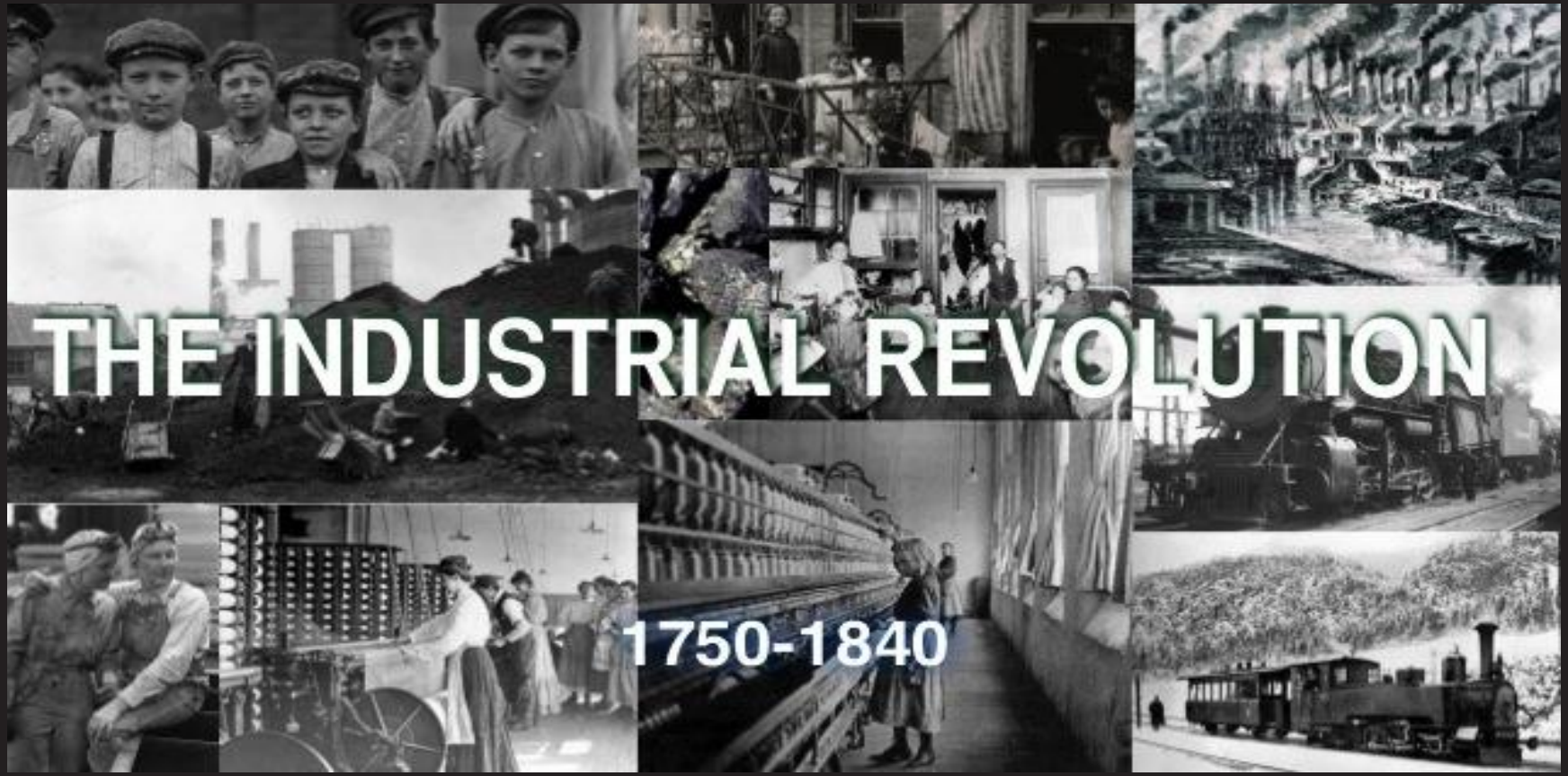
	Energy	Power
		
Definition	Energy is the capacity to do work.	Power is the rate at which work is done, or energy is transmitted, moved, used, or converted
Unit	Joules (J) = Watt - Seconds kilowatt-hour (kW)h Megawatt-hour (MWh)	Watt (W) = Joules / Second kilowatt (kW) Megawatt (MW)
Equation	E = Power x Time	P = Energy / Time

	Energy	Power
		
Features	Generate energy ✗ Save energy ✓	Generate power ✓ Save power ✗
Grid	Consumption and production	Installed capacity
Example	I left a 60W light bulb on for 30 days, which raised my electric bill by 43.2 kWh (kilowatt-hours)	My car's battery can provide 500 amps at 12 volts, which equals 6kW of power.

Adapted from Enffi.de (https://twitter.com/enffi_team/status/743081152026578944/photo/1)
Created with Canva



The Greenhouse Effect



Source: http://www.cheektowagak12.org/

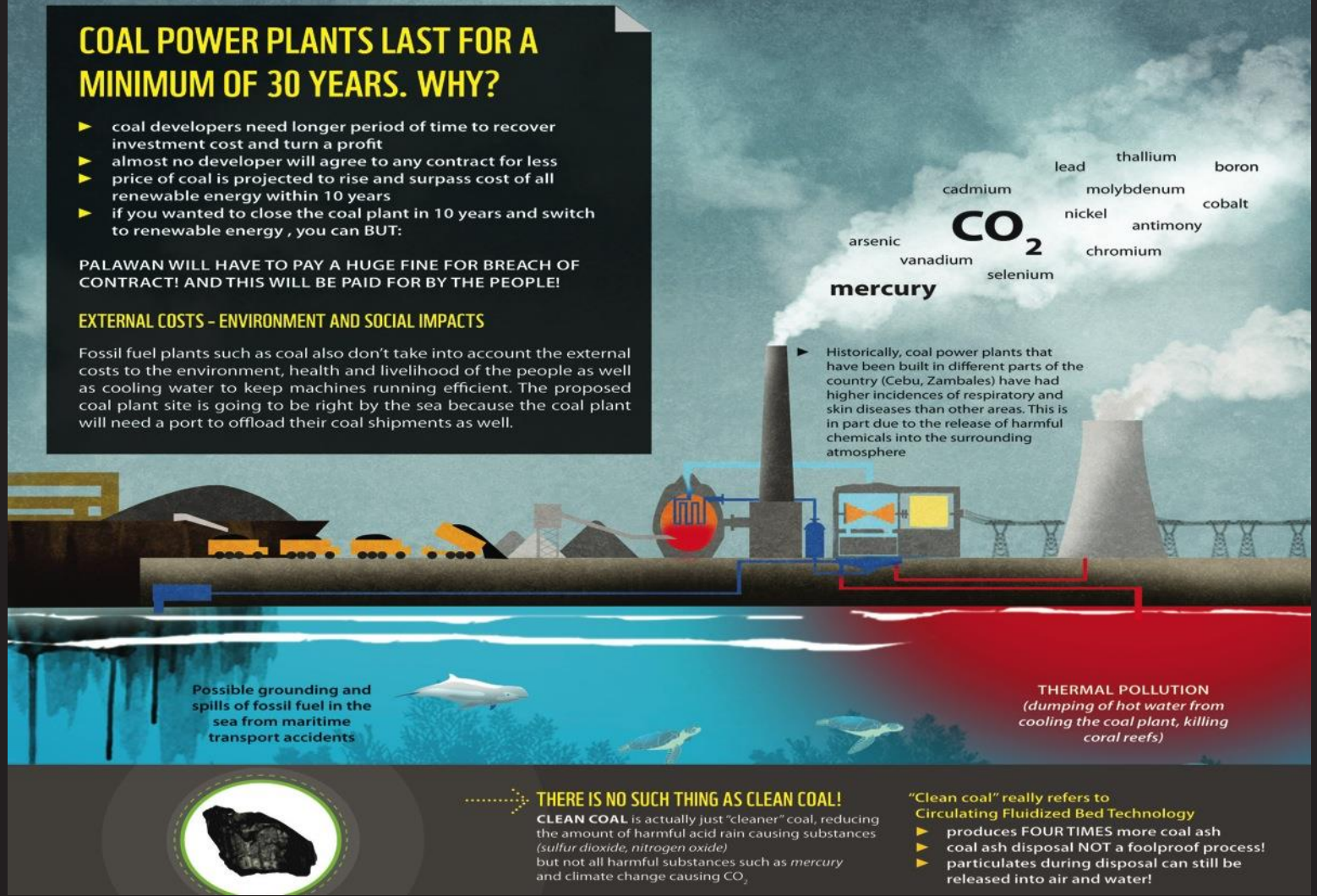
COAL POWER PLANTS LAST FOR A MINIMUM OF 30 YEARS. WHY?

- coal developers need longer period of time to recover investment cost and turn a profit
- almost no developer will agree to any contract for less
- price of coal is projected to rise and surpass cost of all renewable energy within 10 years
- if you wanted to close the coal plant in 10 years and switch to renewable energy , you can BUT:

PALAWAN WILL HAVE TO PAY A HUGE FINE FOR BREACH OF CONTRACT! AND THIS WILL BE PAID FOR BY THE PEOPLE!

EXTERNAL COSTS – ENVIRONMENT AND SOCIAL IMPACTS

Fossil fuel plants such as coal also don't take into account the external costs to the environment, health and livelihood of the people as well as cooling water to keep machines running efficient. The proposed coal plant site is going to be right by the sea because the coal plant will need a port to offload their coal shipments as well.

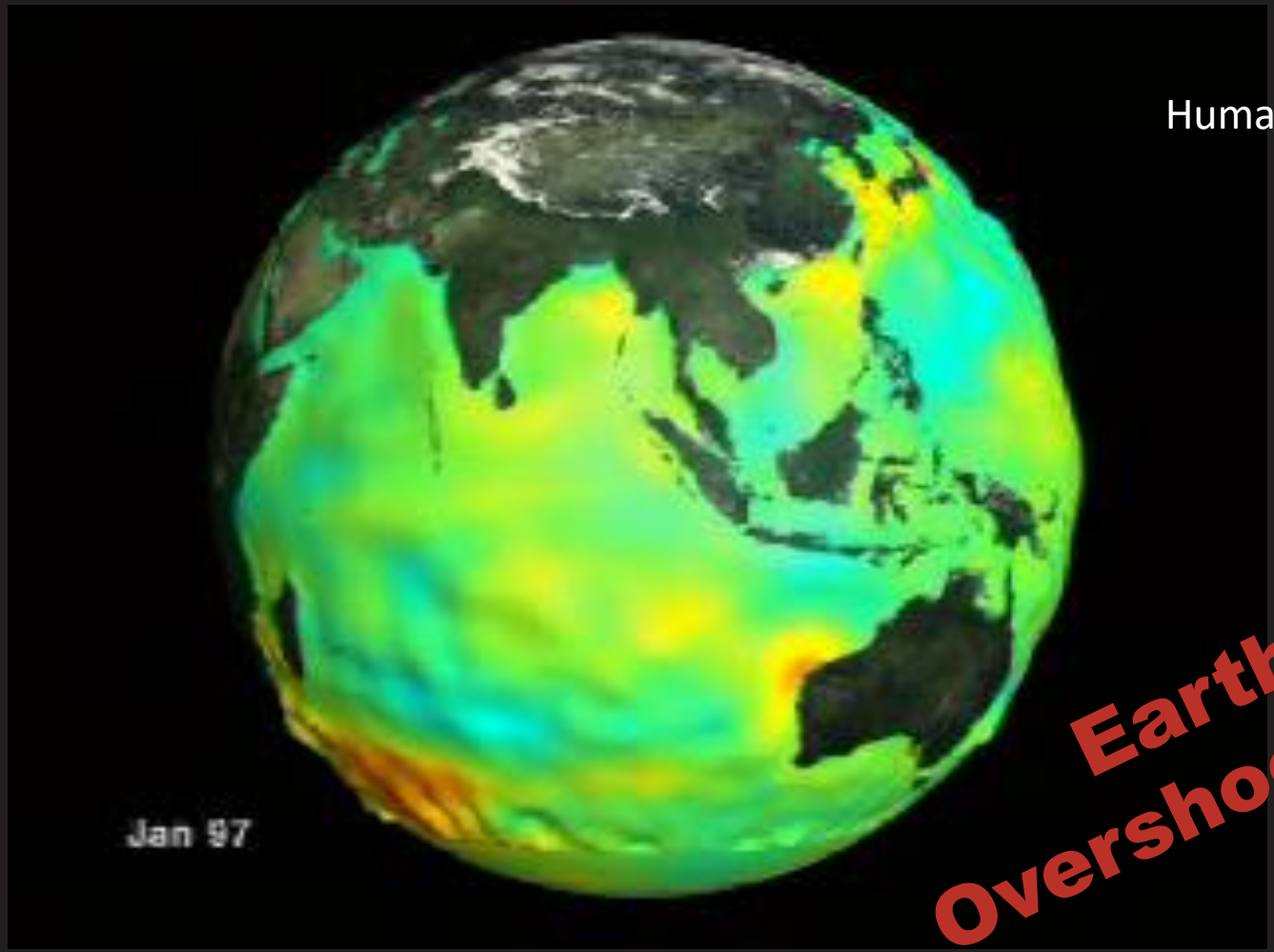


THERE IS NO SUCH THING AS CLEAN COAL!

CLEAN COAL is actually just "cleaner" coal, reducing the amount of harmful acid rain causing substances *(sulfur dioxide, nitrogen oxide)* but not all harmful substances such as *mercury* and climate change causing CO_2

"Clean coal" really refers to Circulating Fluidized Bed Technology

- produces FOUR TIMES more coal ash
- coal ash disposal NOT a foolproof process!
- particulates during disposal can still be released into air and water!



Humanity's Global Footprint

60%

Beyond the Planet's Sustainable Limits

Earth Overshoot Day

1.6 Planet Earths

For 2020, this day is 22 August

WHAT ARE THE DIFFERENT SOURCES OF RENEWABLE ENERGY?

There are now safer and cleaner ways of generating electricity! Newer technologies include Biomass, Geothermal, Solar, Hydro, Ocean and of course, Wind! These are called Renewable Energy (RE) sources.

GEOTHERMAL

HYDRO

BIOMASS

SOLAR

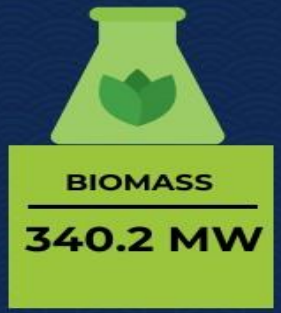
WAVE

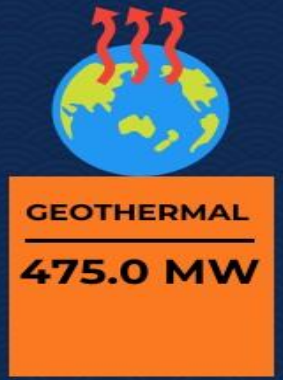
WIND

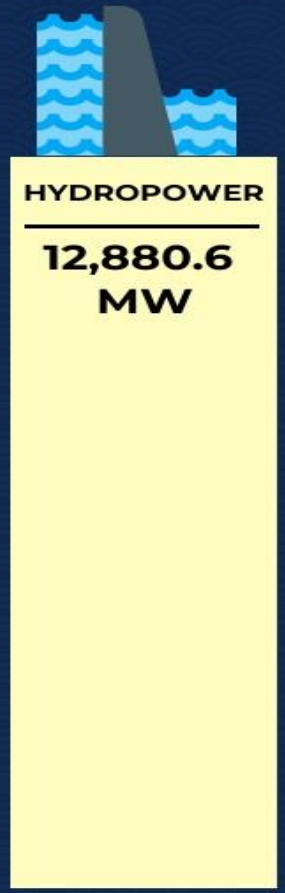
NREB

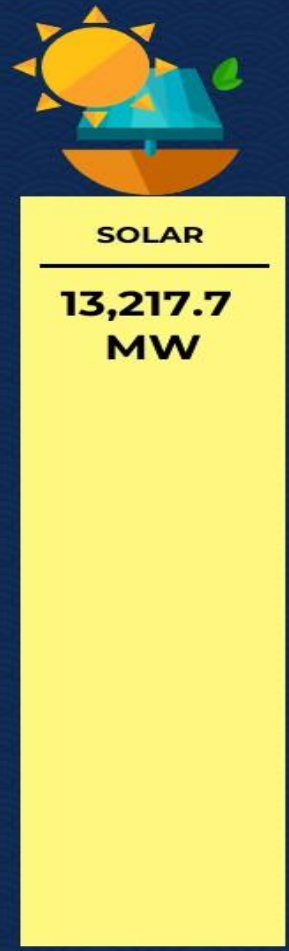
PHILIPPINES
RE POTENTIAL CAPACITY

Based on the Department of Energy Awarded RE Contracts as of June 2020










900 kW Catingas Run of River hydro, ROMELCO (Sibuyan Island)


20 MW Maibarara Geothermal Power Plant


22 MW San Carlos Solar Power


150 MW Burgos Wind Power Project


12 MW (Phase 1) San Jose City I Power Corporation


54 MW San Lorenzo Wind Power Project (Guimaras)

Source: DOE

What is electricity?

Electricity is the flow of electric charge that can power machines, appliances, and gadgets.

Electricity is conventionally generated by burning fossil fuels, such as coal, oil, or gas.

Steam produced by burning these fossil fuels is used to spin turbines. The mechanical energy produced is transformed by generators into electricity.

WHAT IS A WATT?

A Watt is the basic unit of power. It describes the capacity or size of electric generation or consumption.

Larger systems use the unit kilowatt (kW) or 1000 Watts and even larger systems use megawatt (MW) or 1 million Watts.

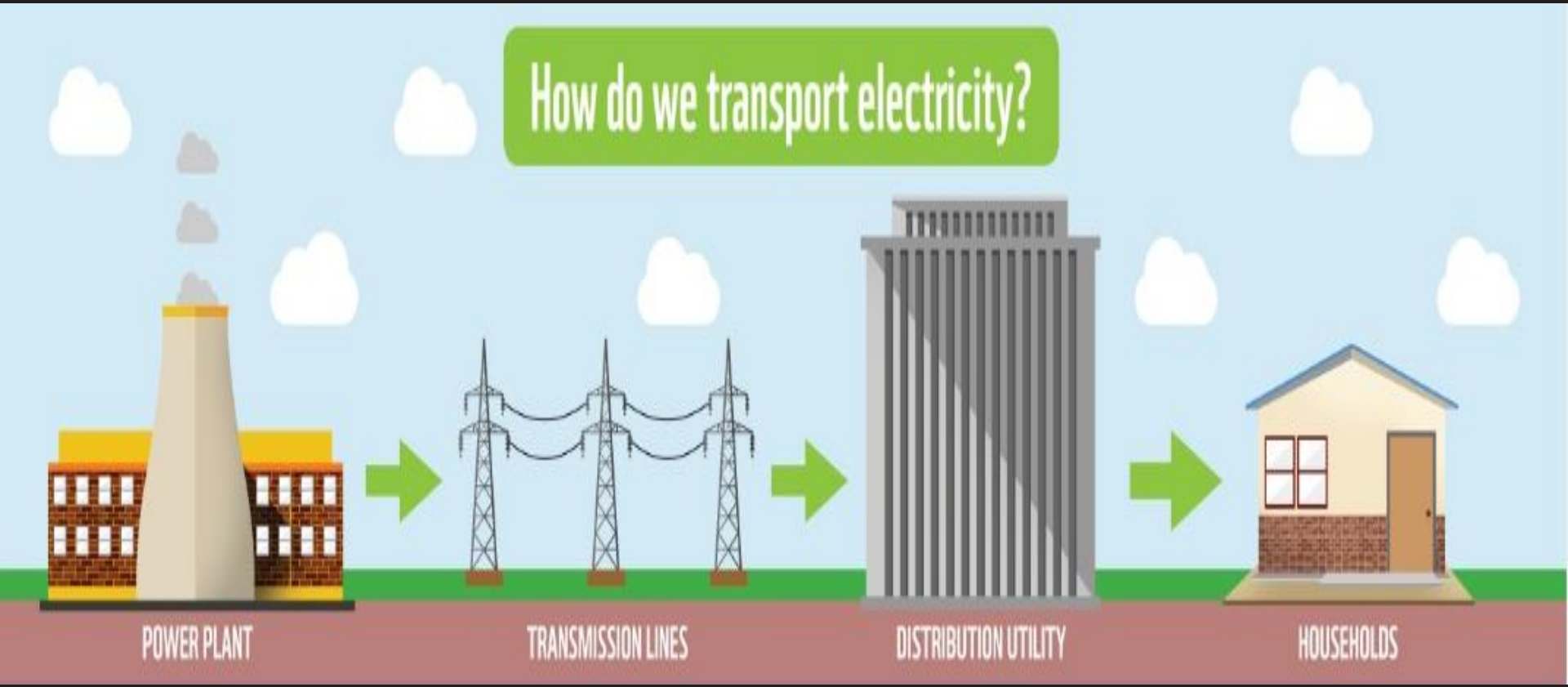
2 MW Wind Turbine = 2,000,000 Watts!

What is the difference between a kilowatt (kW) and kilowatt-hour (kWh)?

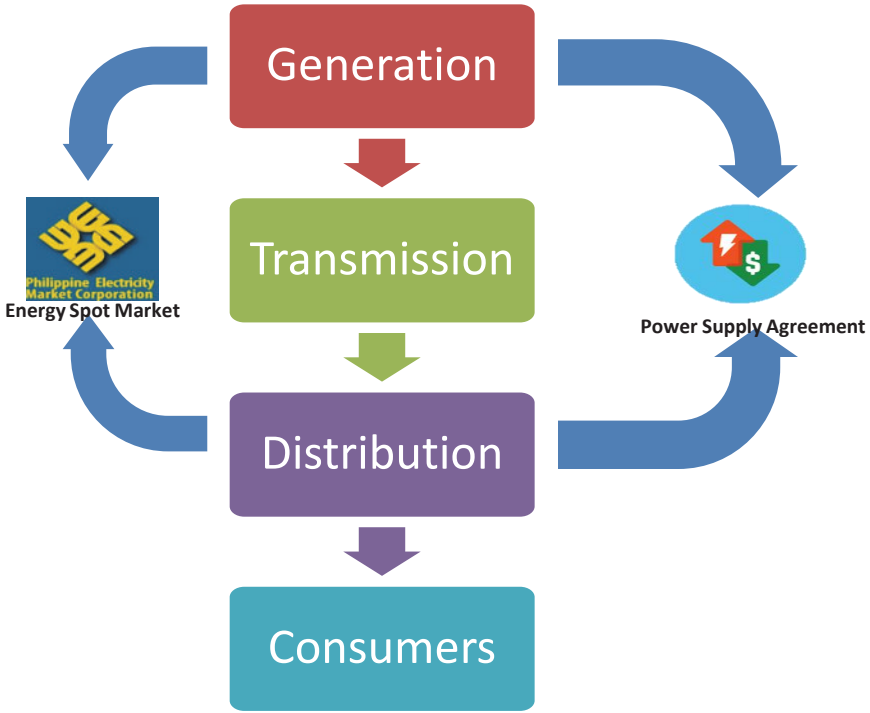
A kilowatt refers to the amount of electricity generated or consumed.

A kilowatt-hour refers to the amount of electricity produced or used over a period of time.

For example a typical light bulb is rated at a power of 100 Watts. If you turn it on for 10 hours, then you will consume 1000 Watt-hour of electricity!


How do we transport electricity?
POWER PLANT
TRANSMISSION LINES
DISTRIBUTION UTILITY
HOUSEHOLDS

Philippine Electricity Market Structure



Ensuring Adequate Supply of Energy during Pandemic

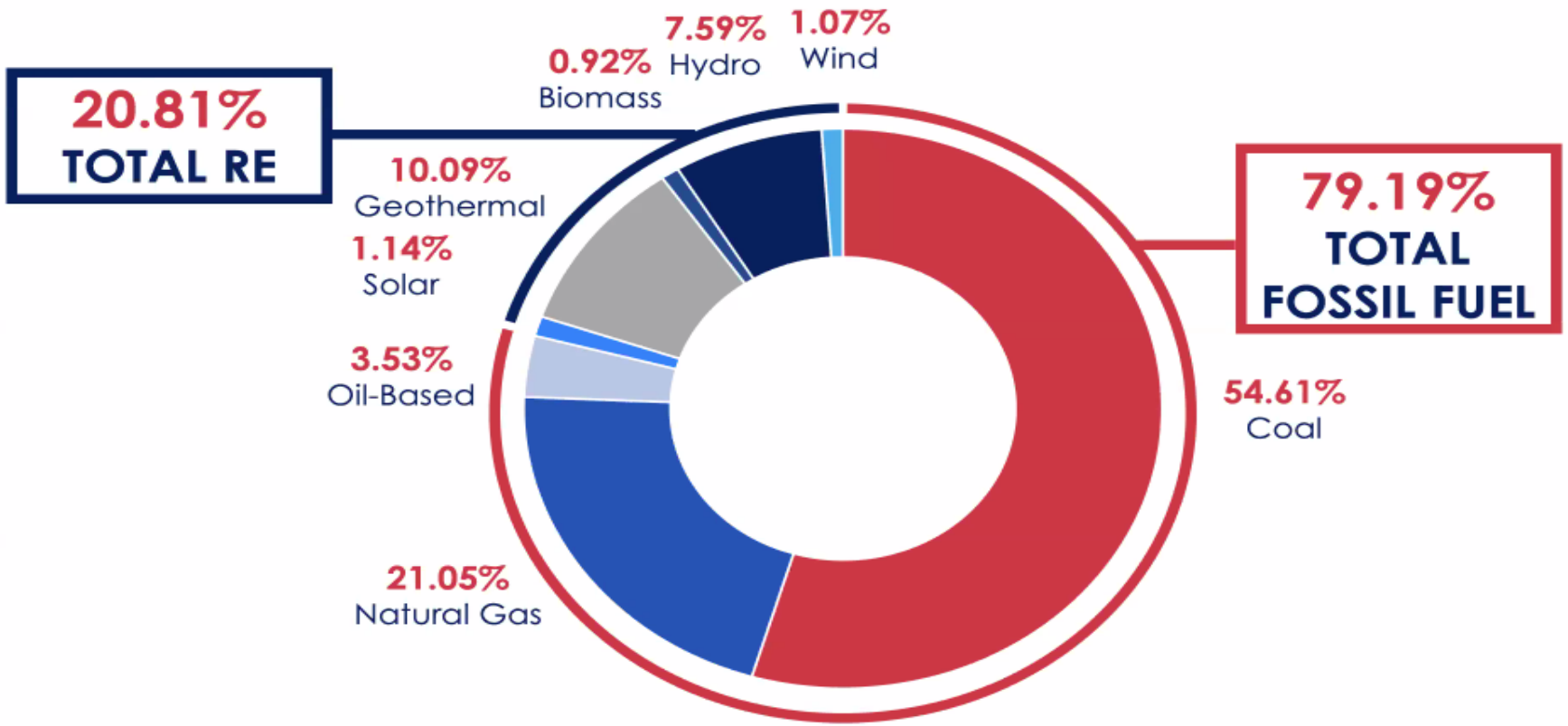
Demand-Supply Situation as of 7 June 2020

Grid	Available Capacity (MW)	Peak Demand (MW)	Excess Capacity (MW)	% Excess Capacity above Peak
Luzon	12,837	9,003	3,834	30%
Visayas	2,342	1,694	648	28%
Mindanao	2,567	1,467	1,100	43%

Photo source: NGCP

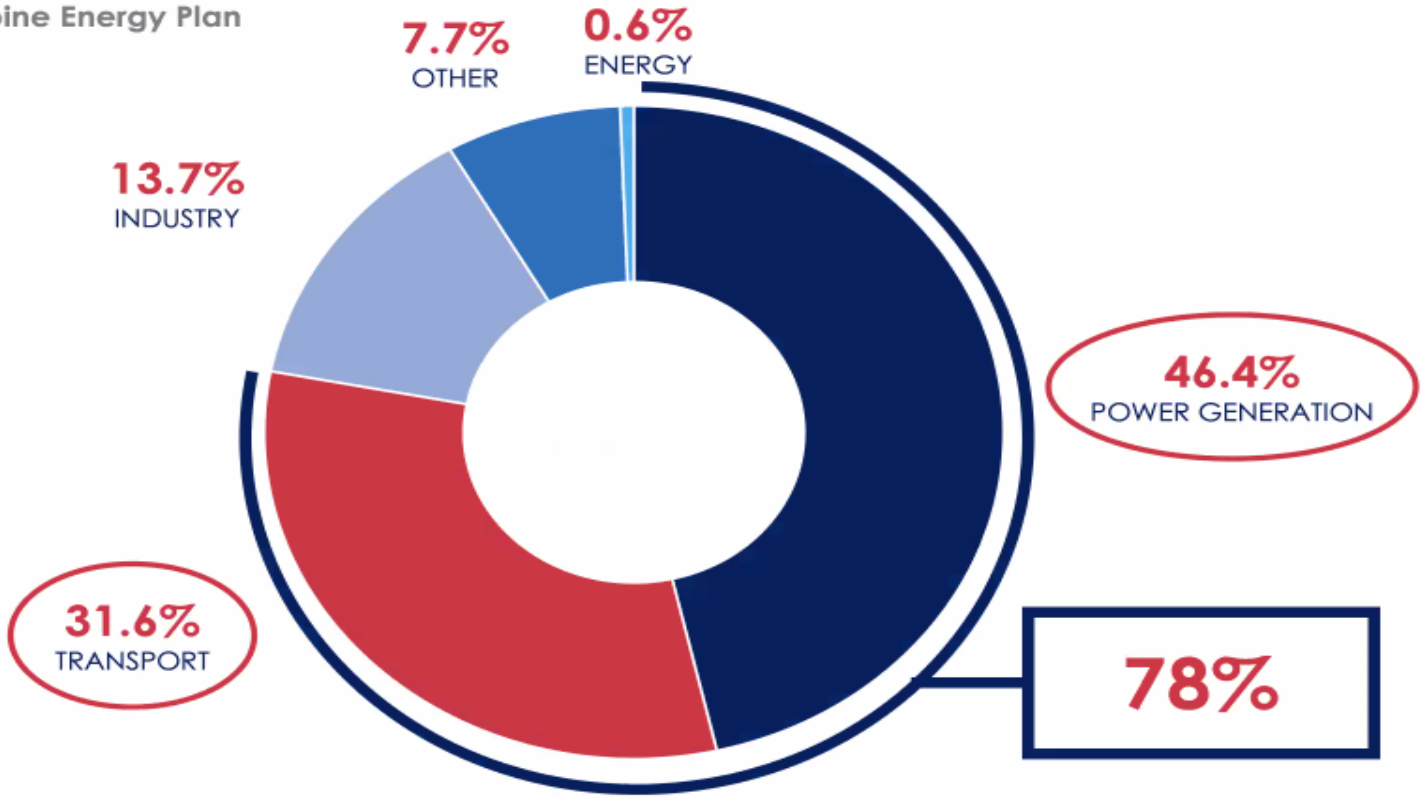
2019 POWER GENERATION MIX

Source: DOE (2019)



2017 GREENHOUSE GAS EMISSION PER ENERGY SUBSECTOR

Source: DOE Philippine Energy Plan



In line with *AmBisyon Natin 2040*

Source: DOE, 2017

SHIFTING TO RENEWABLE ENERGY

Harnessing and utilizing the country's huge RE resources is key to reducing its carbon emissions and addressing energy security.

Fossil fuel accounts for about **65%** of the world's GHG emissions resulting in global warming

In 2010, DOE had over

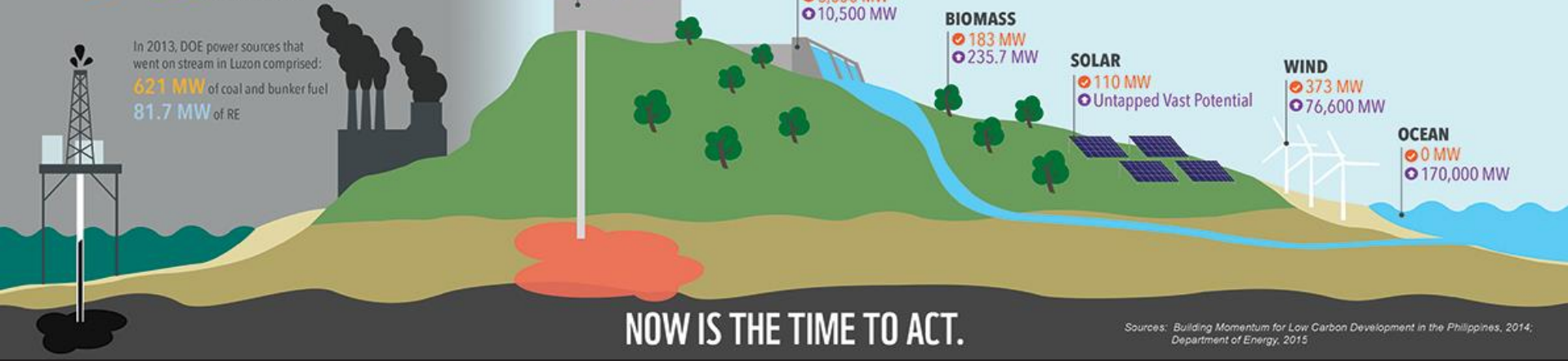
30 coal mine sites in the development and operating stages

42 oil and gas, and coal mine sites for exploration

In 2013, DOE power sources that went on stream in Luzon comprised:

621 MW of coal and bunker fuel

81.7 MW of RE



NOW IS THE TIME TO ACT.

Sources: *Building Momentum for Low Carbon Development in the Philippines, 2014; Department of Energy, 2015*

ACCELERATE EXPLORATION & DEVELOPMENT OF RE RESOURCES

To achieve self-reliance through adoption of sustainable energy development strategies. This will reduce dependence on fossil fuels, hence, minimize exposure to price fluctuations in the international markets

ESTABLISH NECESSARY INFRASTRUCTURE & MECHANISMS

RENEWABLE ENERGY ACT OF 2008

REPUBLIC ACT NO. 9513

EFFECTIVELY PREVENT OR REDUCE HARMFUL EMISSIONS

Balance the goals of Economic Growth and Development with the Protection of Health and Environment

INCREASE RE UTILIZATION

-Provide Fiscal and Non-Fiscal Incentives to promote RE's efficient and cost-effective commercial application.
-Institutionalize the development of national and local capabilities in the use of RE systems.

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RENEWABLE ENERGY ACT OF 2008

REPUBLIC ACT NO. 9513

FISCAL INCENTIVES

1. 7-YEAR INCOME TAX HOLIDAY
2. DUTY-FREE IMPORTATION OF MACHINERY, EQUIPMENT & MATERIALS
3. SPECIAL REALTY TAX RATE
4. ZERO VAT RATE
5. CASH INCENTIVES FOR MISSIONARY ELECTRIFICATION

NON-FISCAL INCENTIVES

market creation & promotion

1. RENEWABLE PORTFOLIO STANDARDS
   On-Grid & Off-Grid
2. NET METERING
3. FEED-IN TARIFF SYSTEM
4. RE MARKET
5. GREEN ENERGY OPTION PROGRAM

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2009 National Renewable Energy Program

TABLE 3. RE-BASED CAPACITY INSTALLATION TARGETS, PHILIPPINES[10]

Sector	Installed Capacity, (MW) as of 2010	Target Capacity Addition by				Total Capacity Addition (MW) 2011-2030	Total Installed Capacity by 2030
		2015	2020	2025	2030		
Geothermal	1,966.0	220.0	1,100.0	95.0	80.0	1,495.0	3,461.0
Hydro	3,400.0	341.3	3,161.0	1,891.8	0.0	5,394.1	8,724.1
Biomass	39.0	276.7	0.0	0.0	0.0	276.7	315.7
Wind	33.0	1,048.0	855.0	442.0	0.0	2,345.0	2,378.0
Solar	1.0	269.0	5.0	5.0	5.0	284.0[11]	285.0
Ocean	0.0	0.0	35.5	35.0	0.0	70.5	70.5
TOTAL	5,438.0	2,155.0	5,156.5	2,468.8	85.0	9,865.3	15,304.3

- CURRENT NREP DEVELOPED IN 2009
- COVERING THE PERIOD 2010-2030

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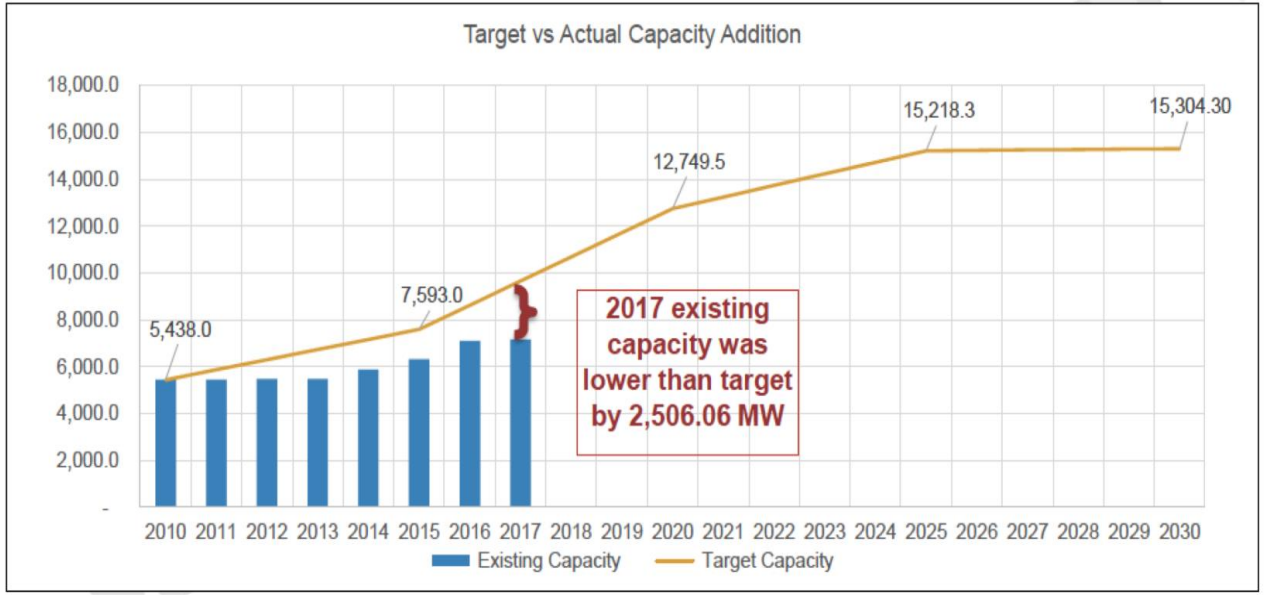
Findings from NREP review

Target vs Existing Capacity



Source: NREP 2011-2030, data from RE sectors

Philippine Generation Mix (GWh)

Resource	2014	2015	2016	2017	2018
Coal	42.78%	44.51%	47.69%	49.64%	52.05%
Oil-Based	7.39%	7.14%	6.23%	4.01%	3.18%
Natural Gas	24.19%	22.91%	21.87%	21.77%	21.38%
Renewable Energy	25.64%	25.44%	24.21%	24.57%	23.38%
TOTAL in GWh	77,261	82,413	90,798	94,370	99,765

Source: DOE, NREB

2019 REVIEW:

RE INSTALLATIONS WAY BELOW TARGETS

RENEWABLE ENERGY ADDITIONAL CAPACITY INSTALLATIONS UNDER RA9513 *(As of December 31, 2019)*

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	TOTAL
Total Installed Capacity, MW	**51.33**	**94.45**	**23.20**	**30.80**	**0.88**	**401.55**	**384.79**	**786.97**	**51.82**	**135.85**	**234.72**	**2,196.34**
Hydro	10.40	57.30	4.20	11.80		13.65	17.82	10.45	8.50	78.92	48.59	261.63
Geothermal						50.00	10.00			12.00	10.50	82.50
Biomass	40.93	37.15	19.00	19.00	0.88	12.00	124.50	40.80	18.12	41.74	130.08	484.19
Wind						303.90	90.00				16.00	409.90
Solar						22.00	142.47	735.72	25.20	3.20	29.55	958.13
Ocean	-	-	-	-	-	-	-	-	-	-	-	

RE CAPACITY ADDITIONS
(post 2008)

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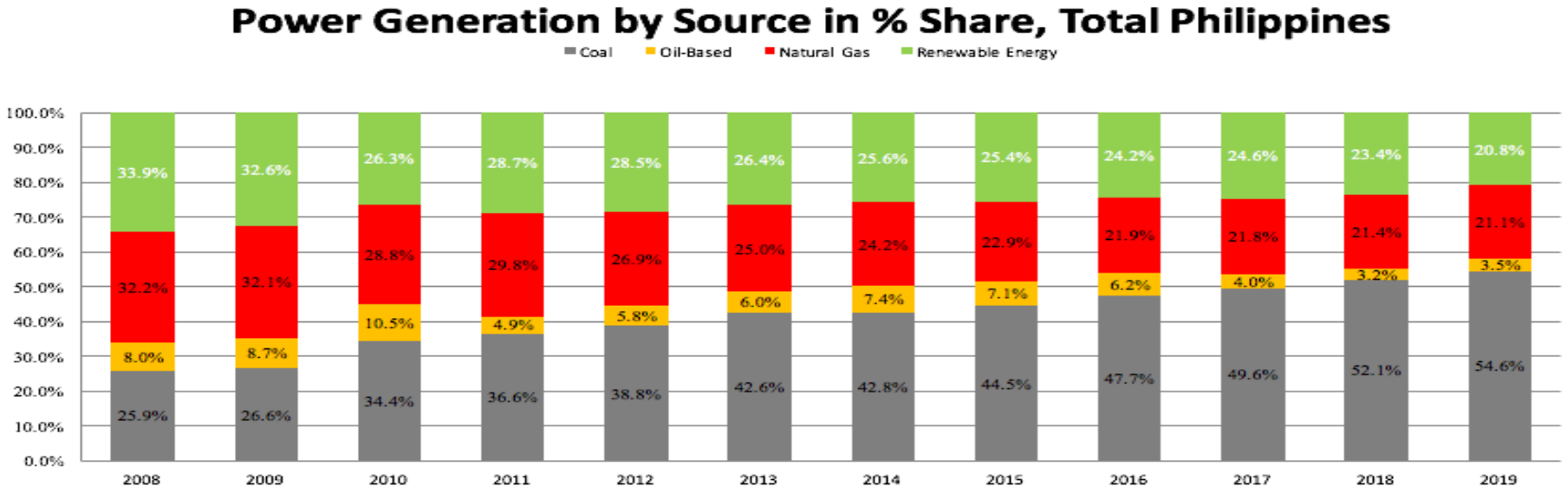
2019 REVIEW:

DIMINISHING RE SHARE IN SUPPLY



Source: 2019 Power Statistics, DOE

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2019 REVIEW:

DECLINING LEVEL OF SELF-SUFFICIENCY

Power Generation by Source in % Share, Total Philippines

Resource	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Coal	**25.9%**	**26.6%**	**34.4%**	**36.6%**	**38.8%**	**42.6%**	**42.8%**	**44.5%**	**47.7%**	**49.6%**	**52.1%**	**54.6%**
Oil-Based	**8.0%**	**8.7%**	**10.5%**	**4.9%**	**5.8%**	**6.0%**	**7.4%**	**7.1%**	**6.2%**	**4.0%**	**3.2%**	**3.5%**
Natural Gas	**32.2%**	**32.1%**	**28.8%**	**29.8%**	**26.9%**	**25.0%**	**24.2%**	**22.9%**	**21.9%**	**21.8%**	**21.4%**	**21.1%**
Renewable Energy	**33.9%**	**32.6%**	**26.3%**	**28.7%**	**28.5%**	**26.4%**	**25.6%**	**25.4%**	**24.2%**	**24.6%**	**23.4%**	**20.8%**
Geothermal	17.6%	16.7%	14.7%	14.4%	14.1%	12.8%	13.3%	13.4%	12.2%	10.9%	10.5%	10.1%
Hydro	16.2%	15.8%	11.5%	14.0%	14.1%	13.3%	11.8%	10.5%	8.9%	10.2%	9.4%	7.6%
Biomass	0.0%	0.0%	0.0%	0.2%	0.3%	0.3%	0.3%	0.4%	0.8%	1.1%	1.1%	1.0%
Solar	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	1.2%	1.3%	1.3%	1.2%
Wind	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.9%	1.1%	1.2%	1.2%	1.0%
Total in GWh	**60,821**	**61,934**	**67,743**	**69,176**	**72,922**	**75,266**	**77,261**	**82,413**	**90,798**	**94,370**	**99,765**	**106,041**
Self-Sufficiency	**67.09**	**65.81**	**57.49**	**61.14**	**58.78**	**56.24**	**53.47**	**53.15**	**51.02**	**53.85**	**51.04**	**46.85**

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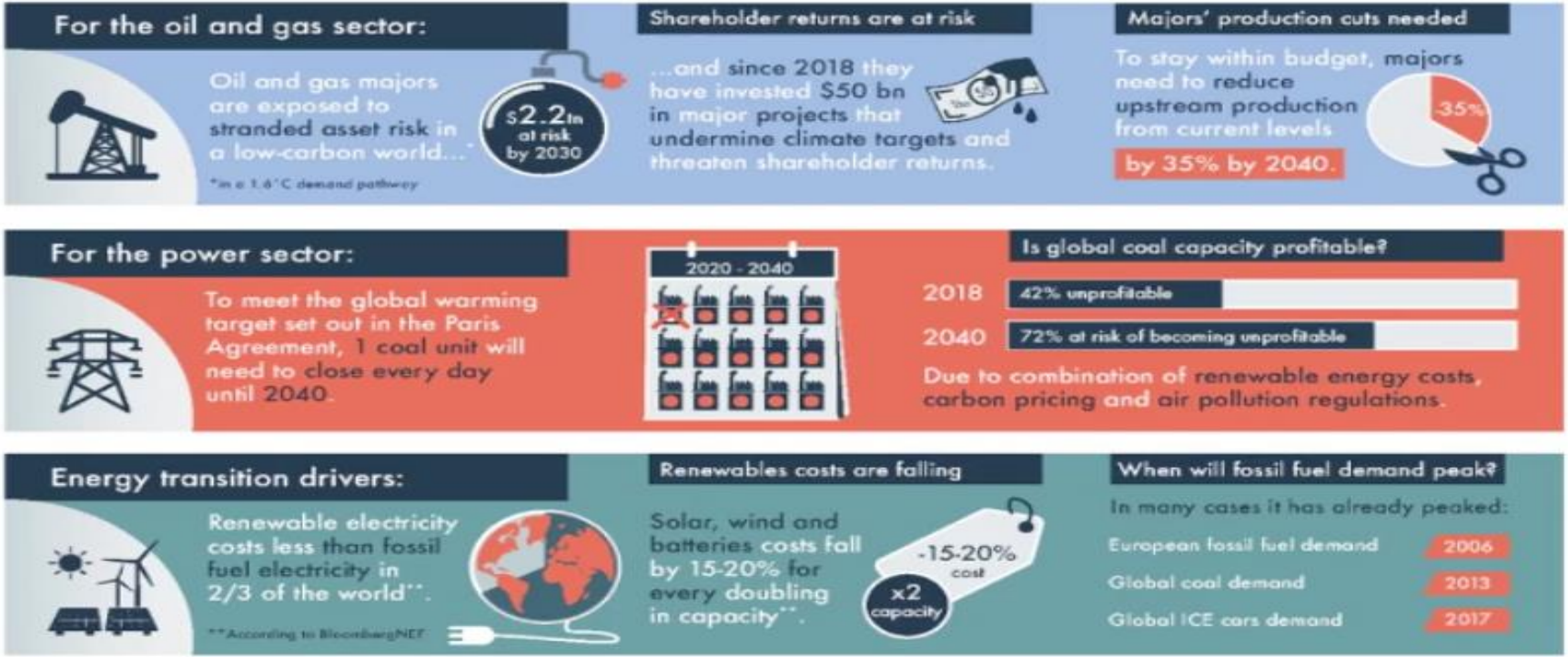
Stranded asset risks in the energy sector



Source: Carbon Tracker, January 2020

100% Renewable Energy Philippines

Transition to 100% wind, water, and solar (WWS) for all purposes
(electricity, transportation, heating/cooling, industry)

Source: Dr. Laurence L. Delina, Assistant Professor, Hong Kong University of Science and Technology

Why we should go RE?

Renewable energy is sustainable

It is clean and does not emit carbon and other greenhouse gases
Renewable energy does not cause air pollution
RE helps minimize the impact of climate change

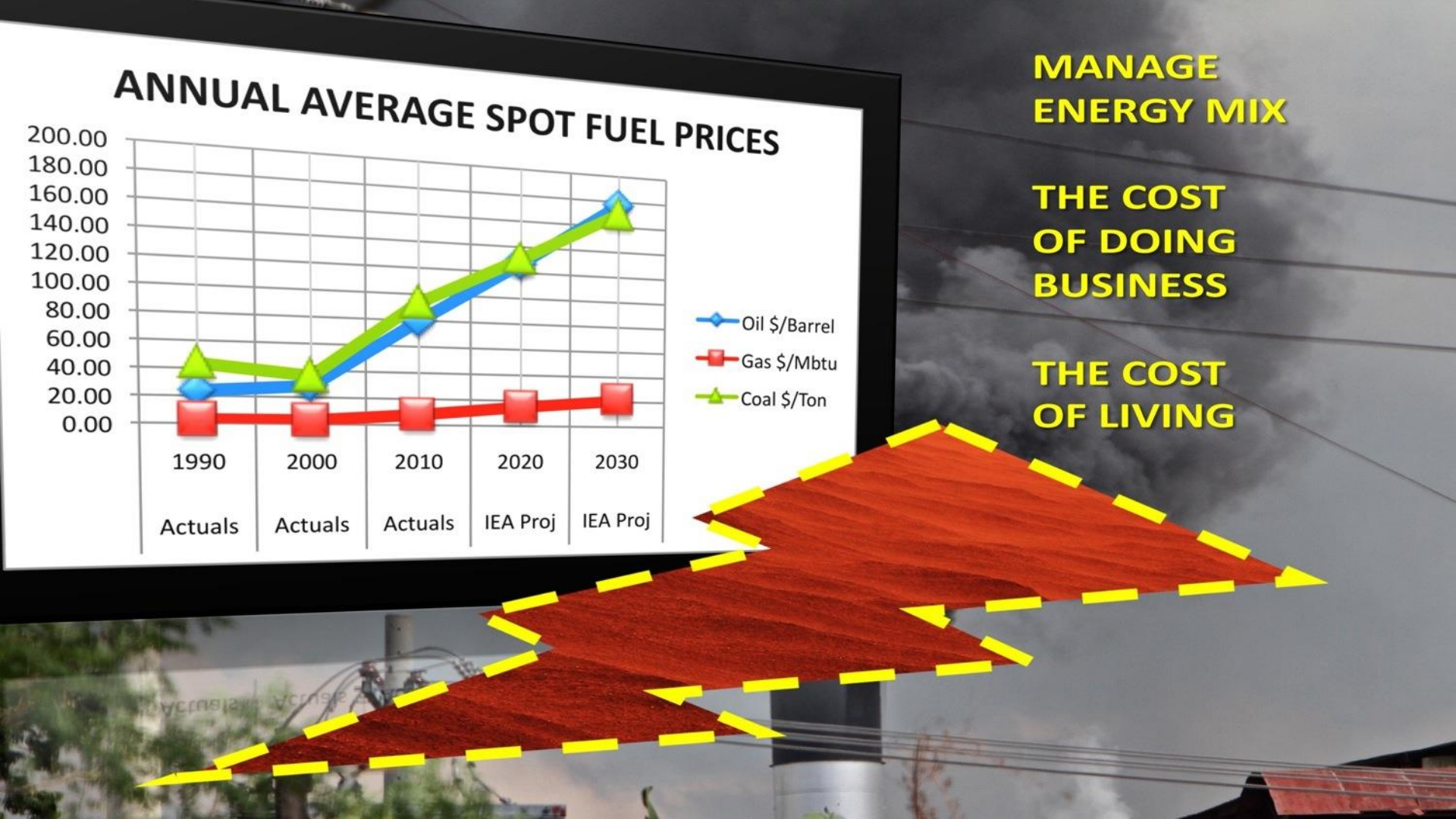
Renewables provides energy security

It is an indigenous resource
With RE, we don't need to import fuel from other countries
Renewable energy powers our remote islands with distributed energy systems

RE is good economically

Decreasing cost of renewable energy
Global investments in new RE is more than double than that of new coal and other fossil based generation
RE promotes local job generation
RE sources can lower the cost of electricity


BALANCE
ENERGY MIX


ANNUAL AVERAGE SPOT FUEL PRICES
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140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1990
2000
2010
2020
2030
Actuals
Actuals
Actuals
IEA Proj
IEA Proj
Oil $/Barrel
Gas $/Mbtu
Coal $/Ton
MANAGE ENERGY MIX
THE COST OF DOING BUSINESS
THE COST OF LIVING

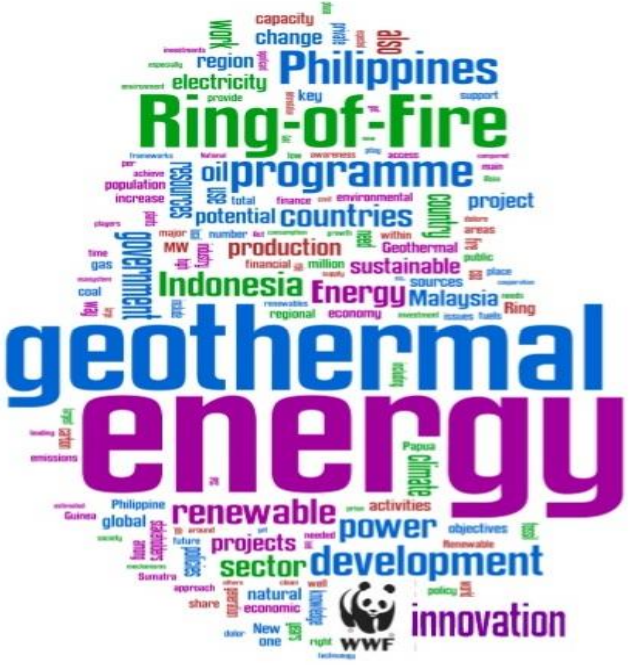
THE REALITY OF BASELOAD

ANCHORED ON FOSSIL FUELS

Do we have sufficient energy?
Do we control fuel prices? Supply?
Is it competitively priced? Or expensive?
Have we eliminated brownouts?

KRA

- Seize Control of your Energy Mix
- Reduce Grid Dependence
- Build Indigenous Energy Sources
- Acquire Prior Dispatch Rights


capacity
change
Philippines
region
electricity
Ring-of-Fire
programme
oil
potential
countries
project
production
Geothermal
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Indonesia
Energy
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Ring
geothermal
energy
renewable
power
projects
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development
innovation
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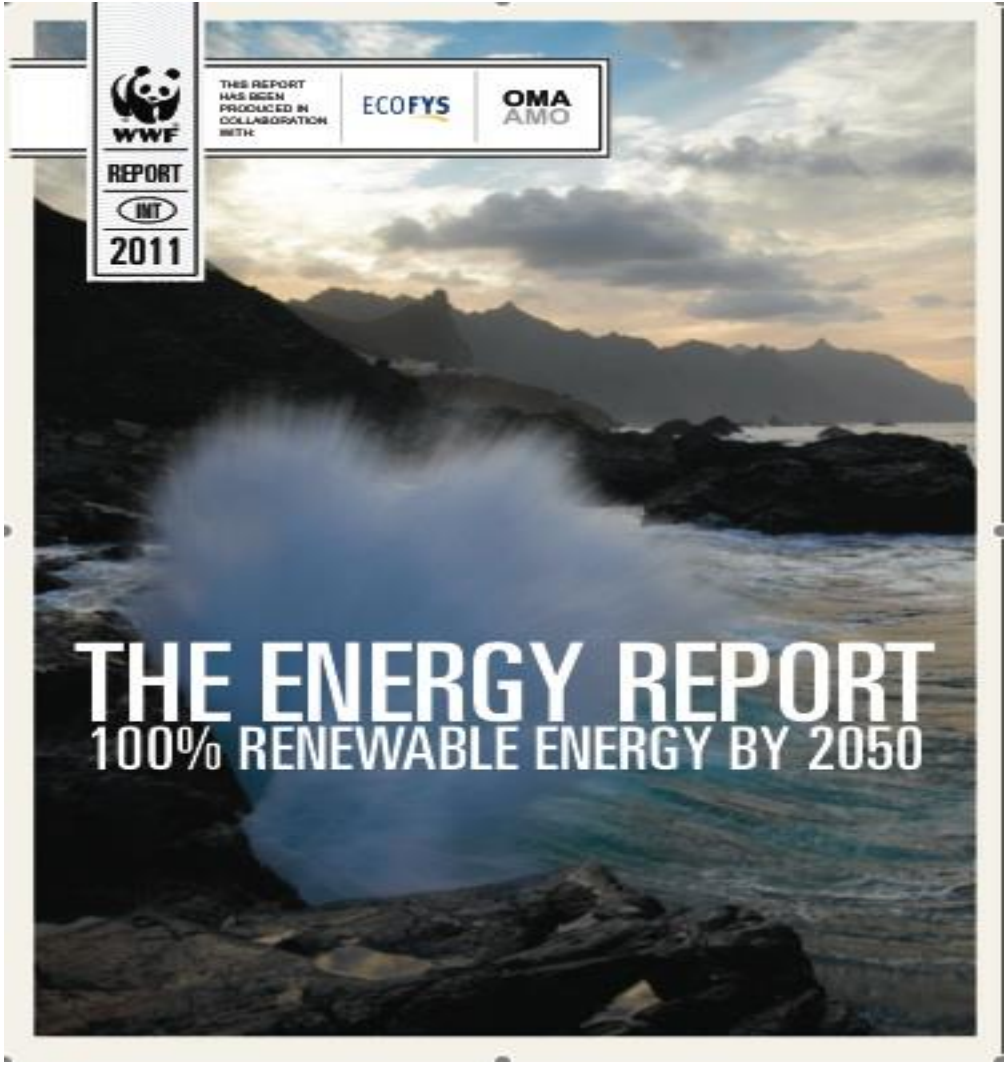
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100% RENEWABLE ENERGY BY 2050

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BUILDING MOMENTUM FOR LOW CARBON DEVELOPMENT IN THE PHILIPPINES

Increase in energy saving and efficiency, through:
A. Reduction of specific energy use in application
B. Distributed power generation
C. Combined power generation
D. Energy recovering through recycling

Fuel switch towards lower emission and safer fuels like Natgas.
Natgas to serve as back up and bridge energy source during transition process towards 100% RE based economy

Replacement of fossil energy with RE based energy

Increase RE based coverage through energy storage & buffering systems
A. Hydro storage
B. Battery storage
C. Physical phase change storage systems
D. Conversion of surplus RE energy from wind and PV to hydrogen (H2) and further into RE-methane (RE-CH4)
E. Thermal and cooling energy storage systems

SEIZE YOUR POWER

THE SHIFT TO INVESTING IN RENEWABLE ENERGY STARTS NOW

FinRE

FINANCING AND INTEGRATING
RENEWABLE ENERGY
IN THE CITY OF BUTUAN

Seize the Sun

To increase uptake and acceptability of solar development projects through multi-sectoral engagements and information education campaign.

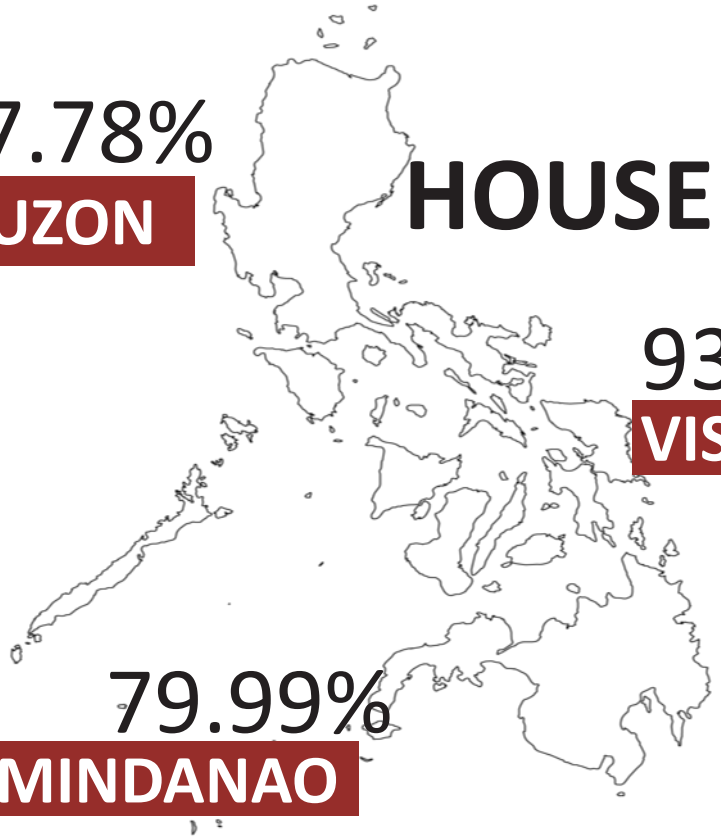

AWOC, Pililia WPP


Petrowind, Nabas WPP


TAREC, San Lorenzo WPP

Source: WWF Philippines

THE CHALLENGE OF HOUSEHOLD ELECTRIFICATION



97.78%
LUZON

93.88%
VISAYAS

79.99%
MINDANAO

92.96%
HOUSEHOLDS

1.6 Million households remain unserved out of 22.98 Million households in the country

DOE Estimate as of 31 December 2019

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Stories from the frontline CLIMATE

Solar-powered LED night landing and charging stations for Small-scale Fisherfolk

Source: WWF Philippines

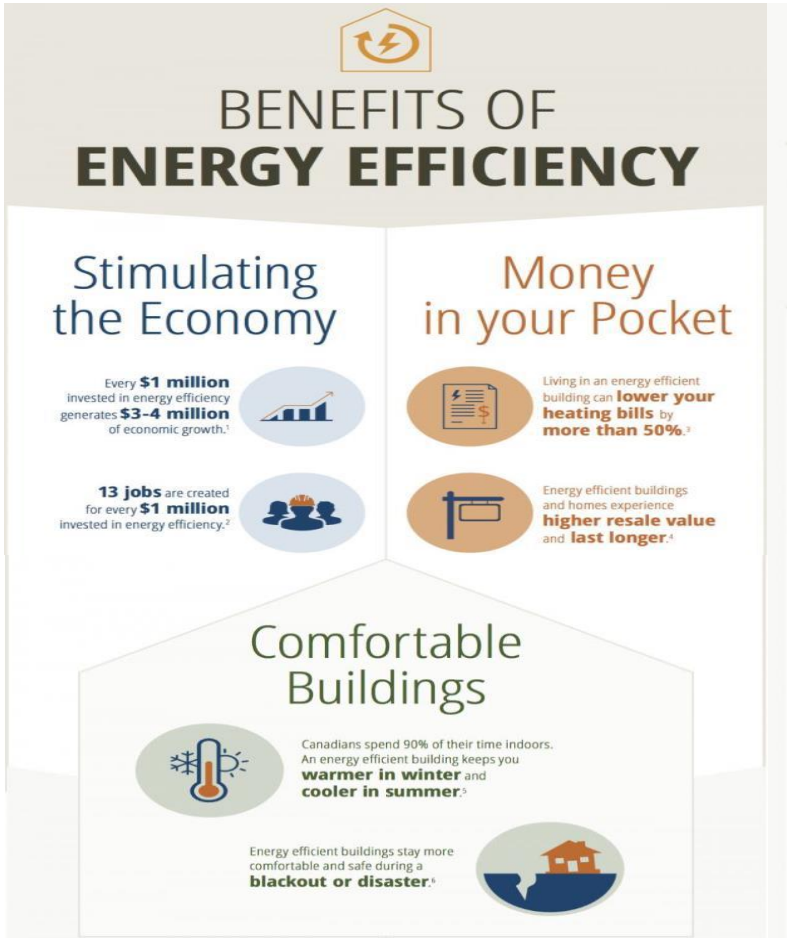
Earth Hour Gift of Light

Source: WWF Philippines

Earth Hour Village

Source: WWF Philippines

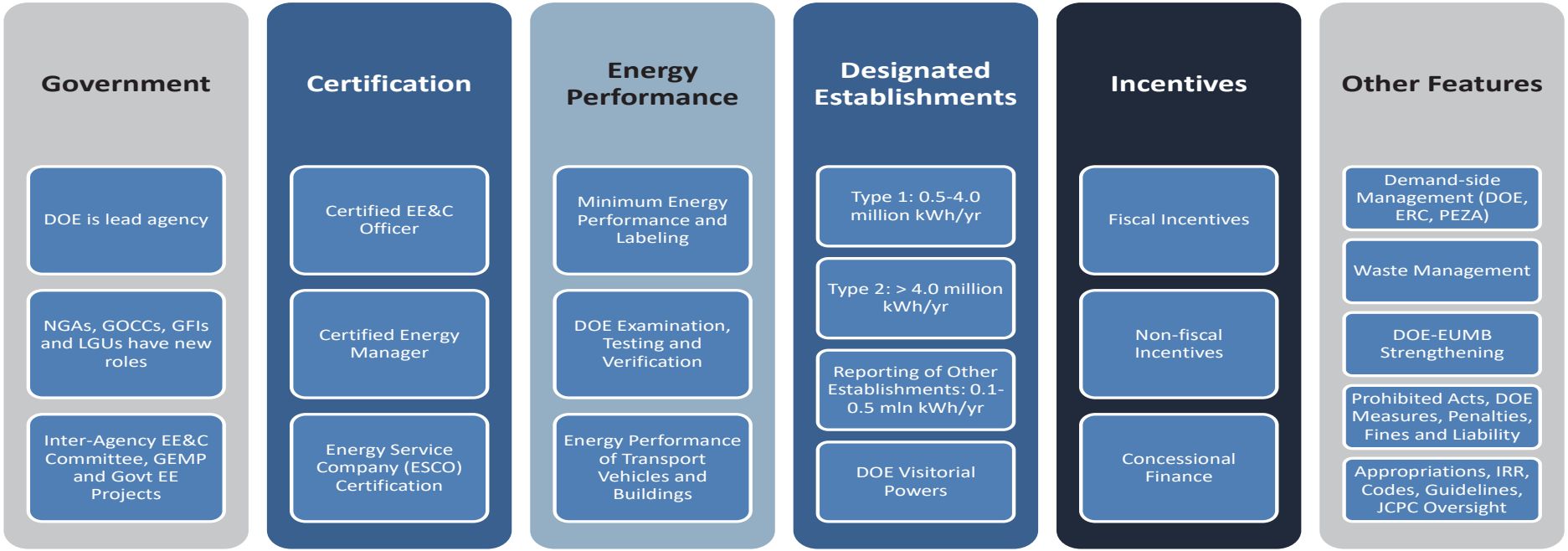
Solar coMmunity-based Island tourism and Livelihood Energizer Platform (SMILE)



Source: Pembina Institute

Republic Act No. 11285
Energy Efficiency and Conservation Act

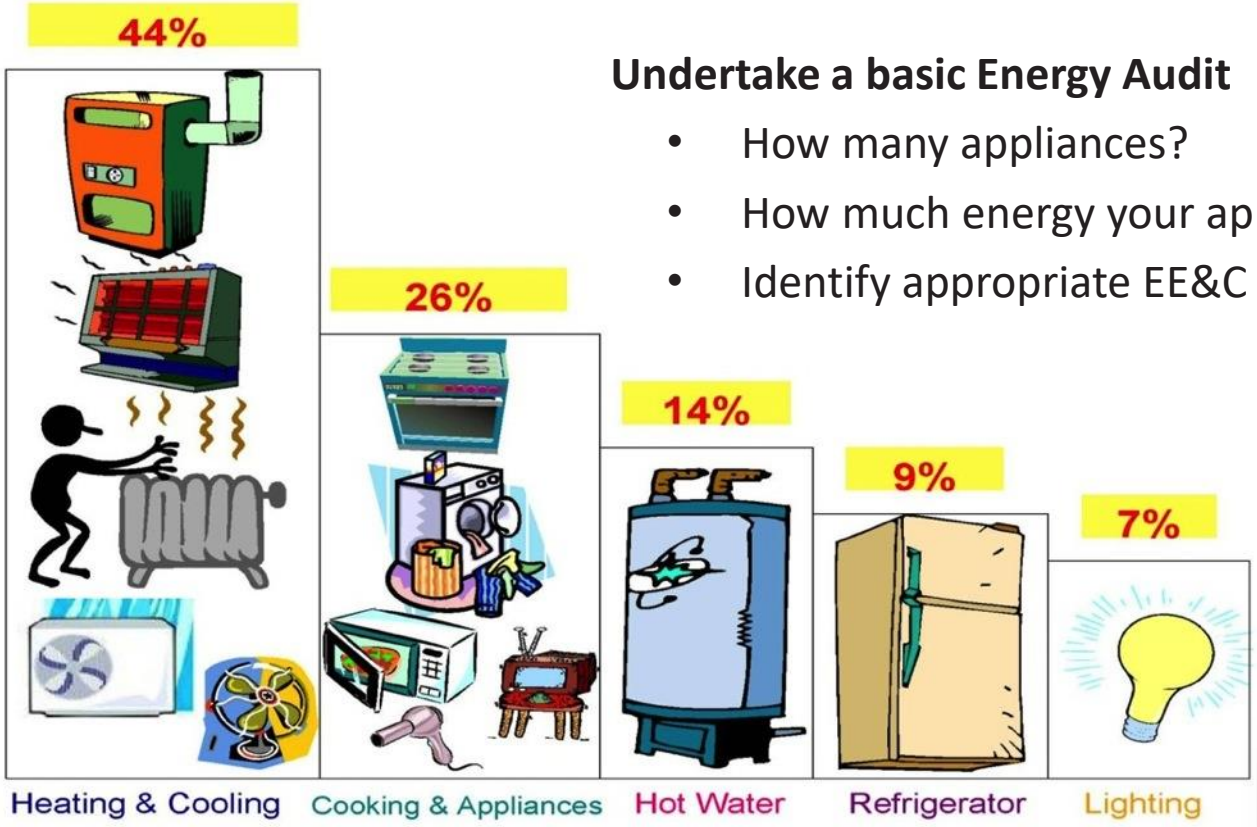
PE2
PHILIPPINE ENERGY EFFICIENCY ALLIANCE, INC.



Source: A. Ablaza, 2019

An Act Institutionalizing Energy Efficiency and Conservation, Enhancing the efficient Use of Energy and Granting Incentives to Energy Efficient and Conservation Projects

ENERGY EFFICIENCY & CONSERVATION TIPS

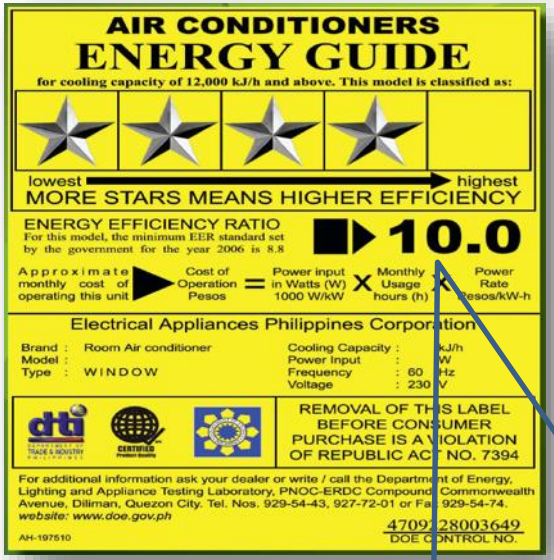


Undertake a basic Energy Audit

- How many appliances?
- How much energy your appliances use?
- Identify appropriate EE&C measures.

COOLING TIPS

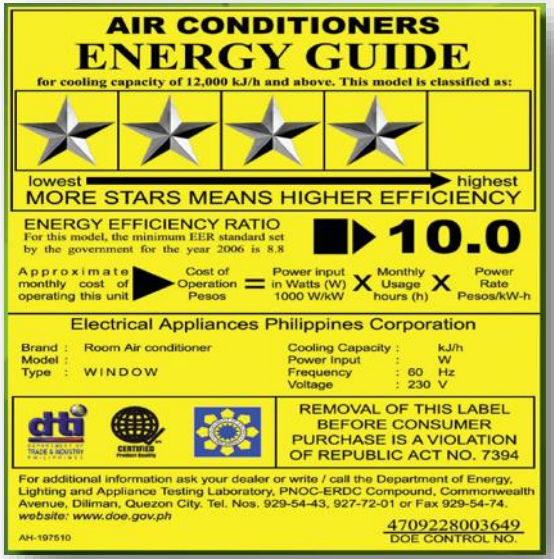
AIR CONDITIONING UNIT



- Purchase air conditioning unit with higher Energy Efficiency Ratio (EER);
- Install in coolest and shady part of the room
- Set the thermostat at comfortable temperature and use fans in conjunction with your air conditioning unit;
- Seal and insulate ductwork;
- Keep your air conditioning unit clean
- Have your cooling system checked annually.

Energy Efficiency Ratio (EER)

COOLING TIPS



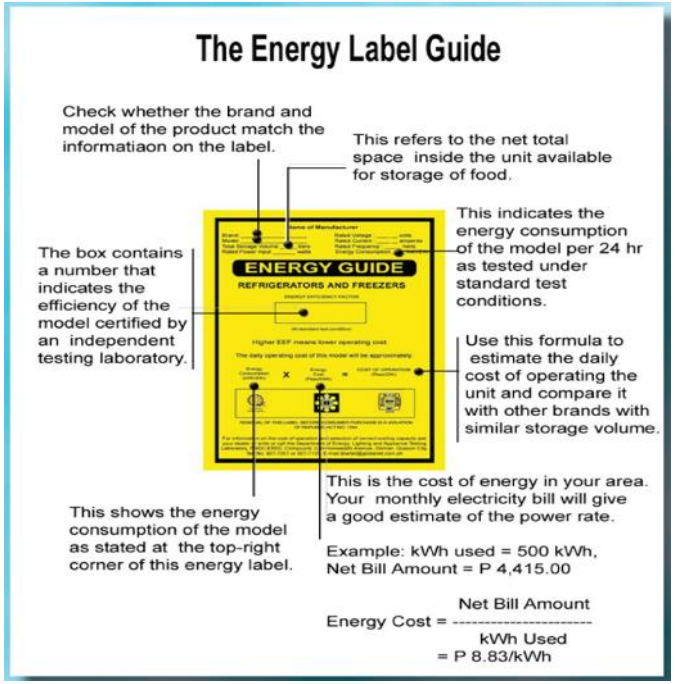
- **Match your aircon horsepower (HP) to the size of your room**

Room Size	Aircon Horsepower (HP)
6 to 11 sq. m	0.5 HP
12 to 17 sq. m	0.75 HP
18 to 22 sq. m	1.0 HP
23 to 27 sq. m	1.5 HP
28 to 40 sq. m	2.0 HP
41 to 54 sq. m	2.5 HP

Based on Meralco Power Lab tests on different aircon and room size scenarios at 25°C night time use.

- **Adjust according to the amount of sunlight your room gets**
- **Put into account the number of people using the room**

REFRIGERATOR /FREEZER TIPS



- Consider refrigerator that suits your need with a higher Energy Efficiency Factor (EEF).
- Keep the coils clean;
- Don’t keep the door open;
- Make sure the door seals are airtight;
- Set the temperature of the refrigerator between 3^{o} and 4^{o}C, set the freezer between -18^{o} and -15^{o}C;
- Keep the freezer full, even if you just fill it with containers of water; and
- Defrost freezer when the ice is ¼” thick.

LIGHTING TIPS

The Energy Label Guide

The rate at which light is emitted by a lamp or light source expressed in lumens.

The time rate at which electric energy is used by the lamp/ballast combination expressed in watts.

The ratio of light output to the power input expressed in lumens per watt.

The expected time in hours, at which half of a large group of lamps have failed under standard test conditions.

Lamp Specifications *

Brand Name :
Model/Type :

Light Output	900 lumens
Power Consumption	15 watts
Efficacy	60 lumens per watts
Average Life	8,000** hours

For lamps of similar light output, higher efficacy means more energy savings

* when tested at standard test conditions
** rated average life at 50% failure

dti
DEPARTMENT OF TRADE & INDUSTRY PHILIPPINES

Note : The values shown in the figure are arbitrary.

- Change incandescent bulbs (Ibs) to compact fluorescent lamps (CFLs) and LEDs
- Look for Energy Label Guide when buying CFLs
- CFLs use 1/5th of the energy of Ibs, last 8 times longer and are cost effective.
- Turn lights off in any room you're not using
- Use task lighting
- Keep bulbs and luminaires clean
- Take advantage of day-light.

BRIGHT NOW! DO RIGHT, BE BRIGHT. DOE

60+ EARTH HOUR

PHANTOM LOAD

- Phantom load is an electrical device that is operating 24 hours a day 365 days a year, even if you think the device is turned off.

Cordless Phone

PL = 4 watts
Electricity Cost per month
: P 25.43

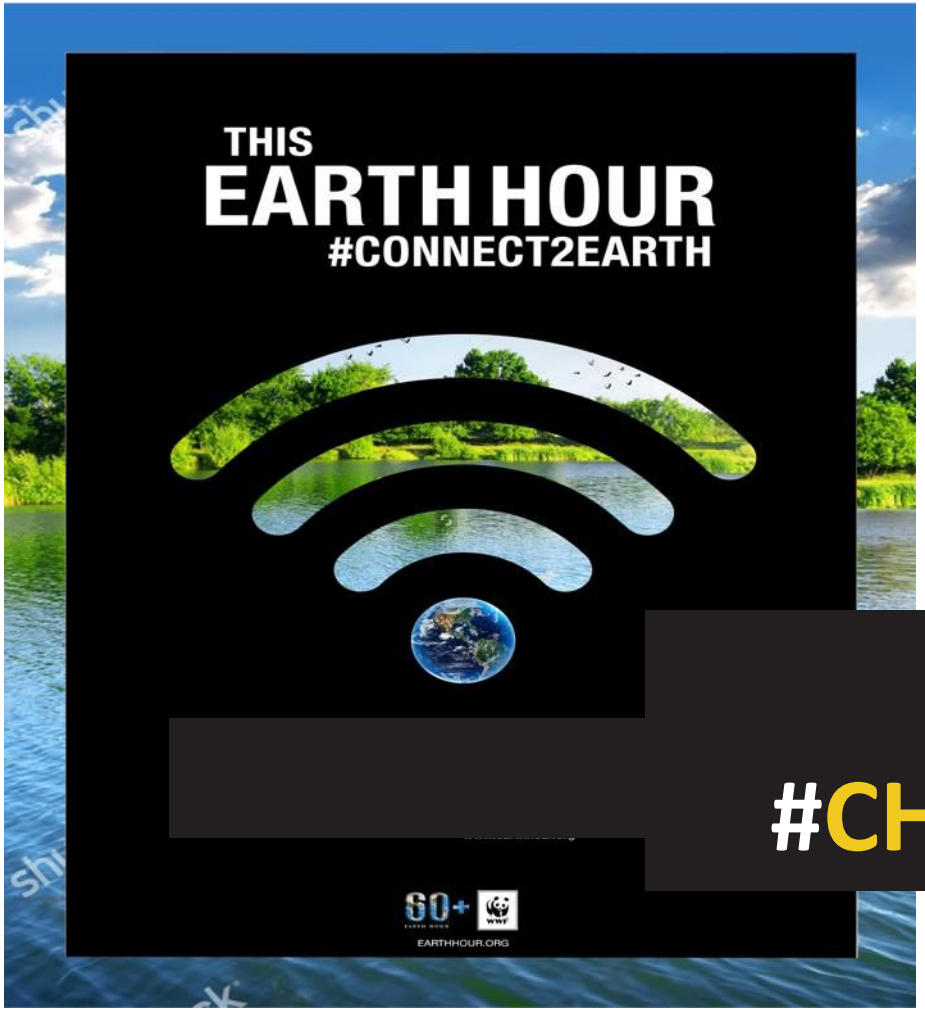
PL = 15 watts
Electricity Cost per month
: P 95.36

Microwave w/ clock

Instant-on TV

PL = 28 watts
Electricity Cost per month : P 178.01

- Set appliances and equipment to energy saving features



WE CAN STILL #CHANGETHEENDING


Humans can live in harmony with nature
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OPPORTUNITIES FOR GREEN RECOVERY IN THE NEW NORMAL

- Focus on long-term needs for a sustainable Philippines
- Need to be more self-reliant as a country, even in terms of our energy needs
- Tap into our bountiful renewable energy sources and implement stronger energy efficiency initiatives
- Invest in natural capital for ecosystem resilience and regeneration. Ensure protection and rehabilitation of our country's carbon sinks, forests, reefs
- Policies that integrate sustainability practices in the systems that provide our basic needs
- Promote low-carbon living, establishment of safe, inclusive and sustainable mobility solutions and green infrastructure, promoting circular solutions to address plastics
- Proper integration, implementation, consultation, and engagement in bringing economic, health, and environmental plans to fruition
- Robust financing and getting the banking sector involved to push for sustainable environmental impacts
- Integration of green/sustainability considerations in monetary policy

A FUTURE IN

BALANCE

WITH NATURE

SIMONE STAMMBACH / WWF-SWITZERLAND, GLOBAL WARMING IMAGES / W

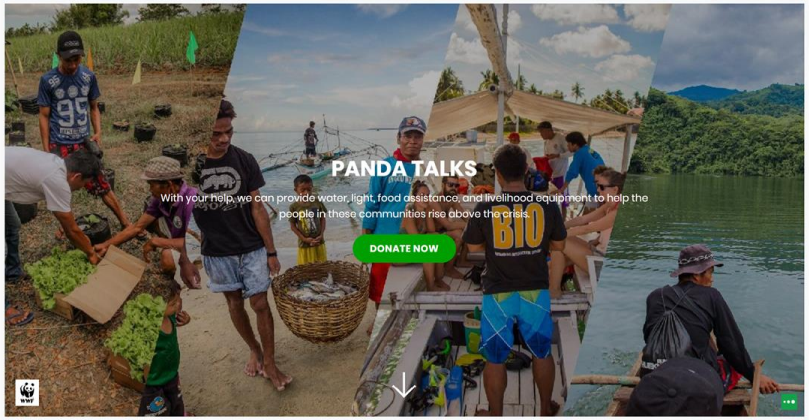

BUILD A FUTURE WHERE
PEOPLE AND NATURE THRIVE
#TOGETHER POSSIBLE

Thank you!

Source: http://revivedinteriors.com/

Resources:
https://energy.gov/eere/energyliteracy
https://www.doe.gov.ph
National Renewable Energy Board (NREB)
Philippine Energy Efficiency Alliance (PE2)

Visit **bit.ly/wwfpandatalks**



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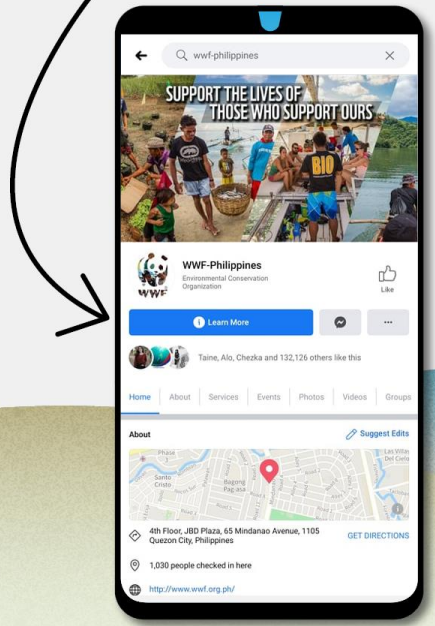


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Please support the lives of those who support ours.
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SCAN TO DONATE
WWF Philippines A
Together, we can help our fellow Filipinos rise above this crisis.

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ACCOUNT NUMBER: **4210003967**

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ACCOUNT NAME: Kabang Kalikasan ng Pilipinas Foundation, Inc.
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