

A publication on small-scale renewable energy and sustainable technologies

# microRenewables

Volume 5, Issue 13 2020

A portrait of Roberto Verzola, an elderly man with grey hair, wearing a light-colored plaid shirt. He is looking slightly to the right with a gentle smile. The background is blurred.

## Roberto Verzola (1952-2020) CROSSING OVER

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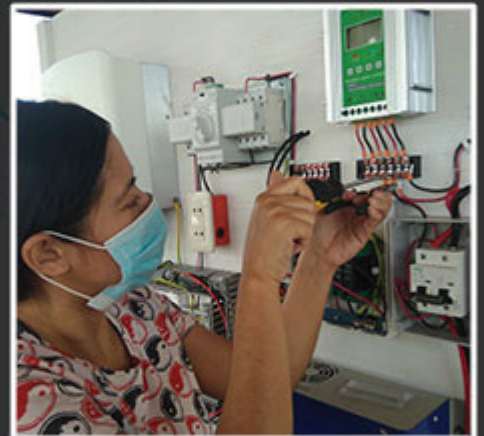
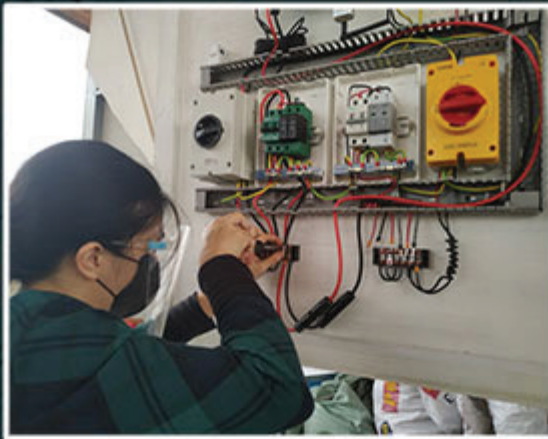
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# Roberto S. Verzola

## (Nov. 4, 1952- May 6, 2020)

Melissa F. Cardenas

*Founder of CREST, Father of Philippine email and IT pioneer, sustainable economist, human rights activist, environmental defender, social thinker, engineer and philosopher. Last September 28, 2020, he was posthumously recognized by the Center for Environmental Concerns as Bayani ng Kalikasan (Hero of Nature) for 2020. He was awarded alongside the late former DENR Secretary Gina Lopez.<sup>1</sup>*

*This piece is an updated version of a Facebook Note written by the author two days after his passing.*

### Roberto Verzola, crossing over

**I met Obet Verzola in June 2012, when a few alumni of Philippine Science High School were organizing a tribute for Martial Law activists from the PSHS community. At that time, there were many books being published about the Marcos dictatorship period, in time for its 40th anniversary. One of the essays that had affected me deeply was Obet Verzola's "Lest We Forget," which is part of the compilation "Not on Our Watch: Martial Law happened; we were there."**

### It was about his harrowing experiences as a political detainee.<sup>2</sup>

After a few texts, a long phone conversation, and some emails, I met him with another friend over lunch. At that first meeting, we asked his advice on how to research the history of the Marcos dictatorship period, how to invite alumni to nominate who among their peers should be included in the tribute, and the program flow. I also asked him about how to bring together old friends and former comrades who, to put it mildly, may have fallen in disagreement with each other, and the families of the martyrs who were likely still hurting, and some guests who might actually still be in witness protection programs. He gave very good advice, assuring us that those who will come are those that are ready to heal. At first I would call him "Sir Obet," but eventually this evolved to "Ka Obet," and later, "Kuya Obet." And, a few months later in September, we would hold the tribute for 21 PSHS activist alumni at the Bantayog ng mga Bayani. He gave the opening remarks during the ceremony.

It was in the context of being a Martial Law survivor that I met Kuya Obet. Only much later did I learn that to many people who have met him through his NGO



advocacies, they did not know about this side of him until he wrote about it, nearly 4 decades later. In retrospect, I realized that he lived in quiet defiance to be defined and limited by these horrific experiences he went through.

He shared his work and writings in his Wordpress blog "Ecology, technology and social change."<sup>3</sup> At that time, in 2012, he was giving training to farmers about the "system for rice intensification" - a brilliantly simple methodology of how to increase crop yield without intensive chemical fertilizers and pesticides by the basic concept of proper spacing between seedlings. He would sometimes be away on field work, travelling by bus to Ilocos, to Bicol, and all over,

1 "Mr. Roberto Verzola was one of the... - CREST - Center ... - Facebook." <https://ms-my.facebook.com/microrenewables/posts/2832603446969060>. Accessed 12 Oct. 2020.

2 He has made his chapter available for free downloading. "From NOT ON OUR WATCH, a book of martial law recollections." 17 May. 2012, <https://rverzola.wordpress.com/2012/05/17/from-not-on-our-watch-a-book-of-martial-law-recollections-the-full-text-of-lest-we-forget-by-roberto-verzola/>.

3 "Ecology, technology and social change - WordPress.com." 4 Nov. 2019, <https://rverzola.wordpress.com/>.



▲ Ka Obet during a RE workshop hosted by CREST.

giving lectures and workshops. “Sino po kasama ninyo? (Who joins you during these trips?)” I would ask, and he’d say matter-of-factly, “Ah, ako lang (Oh, just me).” I remember thinking, why is he doing it by himself and why is someone old enough to be my dad commuting alone on long bus rides.

appliances during peak energy consumption hours... simple things like doing the laundry not while there is an expected surge in electricity use. He proposed that the government should make this near-real time data available and alert the public when energy consumption was at critical levels. He looped me in to join this

program for it in one of his spare old Linux laptops. At that moment I caught a glimpse of why many of those who know him call him a genius... and there I was struggling to tweak settings on If This Then That for our FB page. I also caught a glimpse of his idealism - someone who, after all he has been through, still believed in collective action founded on the goodness of people.

*“His passion for energy and electricity for all led to a book called “Crossing Over: The Transition to Renewable Energy,” and the creation of Center for Renewable Energy and Sustainable Technology.”*

Eventually he turned his energies to the problem of energy and electrification. Some time in 2015, when there was a looming energy crisis that would lead to Luzon-wide brownouts, he came up with an idea of easing the strain on the grid by encouraging people to switch off their non-essential

crusade since he said he needed some help in the social media aspect of things... so we made a Facebook Page called Switch Off! #nobrownout that would mirror his energy consumption surge graphs. He would explain how the graphs were being automatically generated after he made a

His passion for energy and electricity for all led to a book called “Crossing Over: The Transition to Renewable Energy,” and the creation of Center for Renewable Energy and Sustainable Technology, together with his friends that included the late Isagani Serrano, another sustainable agriculture icon. Again, he recruited me to join the group, and I readily agreed. A side bonus was hearing Kuya Obet and Sir Gani reminisce about their old adventures while the latter would ironically smoke and drink beer while maintaining a strict vegetarian diet. And while I

became a board member, most of the heavy lifting was really done by Kuya Obet and our president Rei Panaligan. CREST and its partners from academe developed a renewable energy curriculum to be offered as a college-level elective. And even with his medical issues that were emerging in recent years, even when walking with a cane, Kuya Obet would still give talks and training sessions to rural LGUs and remote areas, teaching them how to develop their local mix of renewable energy solutions.

history. In 1986, it was the victims who were able to remove their oppressor, but now that period needs a third party, a detached jury, to look at the facts of the case, go over all evidence, and listen to testimonies presented by both sides. Whatever the decision, it will affect how this period of Philippine history will be taught to the next generations. He went on - "For many of us who survived it with scars, it is a bitter pill to swallow if another Marcos, or another dictator, comes back to

your own sense of direction. My advice to you is to develop within you a strong sense of what is right and wrong, a set of values that you will not surrender. And when things become muddled, these are what you go back to during times when you need to make a moral decision." How important it is to have intergenerational conversations such as these!

He later wrote too, about how he has forgiven Marcos and his torturers: not because he accepted what they did as forgivable, but more to let go of the anger and hatred, and to find peace. I remember having a conversation with him once about it while waiting in line at the MRT, and it led to discussions about Zen meditation and Buddhist concepts of justice and Japanese war criminals still receiving garlands at Yasukuni Shrine. I said to him, a Japanese friend explained that in their culture, once an enemy dies, they still honor him for being their enemy, and that there is a saying that in the afterlife, their enemy is their friend. I sheepishly told Kuya Obet that I understood that because it's a common theme in anime, to which he said, as the train finally arrived - "You should read James Clavell's 'Shogun.' I

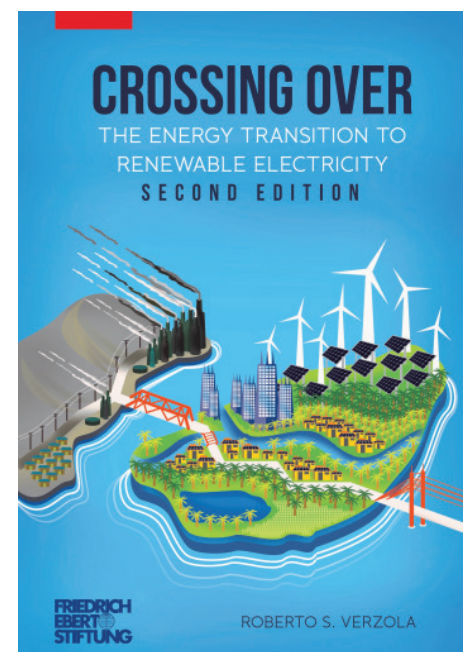
*"My advice to you is to develop within you a strong sense of what is right and wrong, a set of values that you will not surrender. And when things become muddled, these are what you go back to during times when you need to make a moral decision."*  
– Ka Obet

Kuya Obet was also a staple resource person of the Diliman Book Club, a group of voracious bookworms where members would share what they have learned from their latest reads. Most of the members there are Martial Law era veterans. Kuya Obet would present topics, summarizing about a dozen books that he would read on topics such as transhumanism, artificial intelligence, the Singularity. One of his last presentations was, "Is There a Grand Omnipotent Designer?"<sup>4</sup>

When indignation was high after Marcos was buried at the Libingan ng mga Bayani, we asked about his thoughts on it. He shared his analysis of the situation leading to 2022, which he later wrote down: about how the younger generations who have not witnessed or lived through the Marcos dictatorship period would serve as a jury to pass judgment on that period of Philippine

power. As victims, it is our duty to make sure that our testimonies are recorded. But it is the moral duty of the jury - the Filipino people - to listen." At that point, everyone who was listening felt the gravity of what needed to be done.<sup>5</sup>

Kuya Obet later on returned to Pisay as one of the guest speakers during the showing of the documentary "Iskolar: Aktibista," made by one of the PSHS teachers, Brian Villanueva. He talked to the graduating Batch 2019 - Pisay students who were exactly 50 batches younger than him. I was privileged to introduce him as a speaker and noted that we literally had three vgenerations of PSHS scholars in the room, with Kuya Obet coming from the First Batch, myself coming from a batch 25 years his junior, and the students in the room being 25 batches younger than mine. His closing message to the batch was - "Sometimes when you join a crowd, there is a tendency to lose



4 "Is there a Grand Omnipotent Designer? | Ecology, technology ...." 21 Feb. 2019, <https://rverzola.wordpress.com/2019/02/21/is-there-a-grand-omnipotent-designer/>.

5 "Millennials: rendering judgment on martial law, choosing ...." 25 Sep. 2017, <https://www.bworldonline.com/millennials-rendering-judgment-martial-law-choosing-advocacies/>.

read that while I was detained - they had a library and it was one of the books there.”

Kuya Obet once said that as a former ML activist, ironically he probably is now somewhat of an anarchist, and that he wants to help small communities be self-sufficient and survive in spite of/despite whoever is in power. He felt that he was at a stage of his life that he is more of an “ultra-marathon runner” rather than a “sprinter” - that the problems he’d like to tackle are the long-term problems of food security,

One of the last times I saw Kuya Obet in person was during our PSHS alumni homecoming. It was our batch’s 25th anniversary, which meant it was Batch 1969’s golden year. I took a selfie with him, probably the only time I did. The last few times I got to speak with him was in March, before his back surgery that was already scheduled before the lock down was declared (he said he was feeling worried and wanted to be able to go home as soon as possible), and afterwards when he was sent home (his speech was impaired then, and his sentences

hosted a Thank You lunch for our high school teachers, we were able to write notes of gratitude to them - and shortly after, one of our teachers died. I am glad to have been able to write those letters, but now I wish I wrote one for Kuya Obet. A little over two months later, another dear mentor died, but this time, I was able to write a letter to her, thank her and tell her what her guidance meant to me. This pandemic has brought so much uncertainty in our lives, and I hope we take time to truly appreciate our life-teachers.

How did you do it, Kuya Obet? How were you able to go past the hate and anger to plant seeds? I wish I spent more days as an apprentice: how foolish to not spend more time to learn from a Sage. How will we do it? How do we catch up to what you have been able to do, the ideas you were able to pluck? How is it that a man who spoke softly can voice out foundation-shifting words? How is it that a man who walked slowly untiringly runs an ultra-marathon? Is it fitting that you crossed over during a time of a paradigm-shifting pandemic? Will the world now be more ready for what you have envisioned? That sometimes, an act of resistance is in making bread?

I don’t know. For weeks I’ve been trying to make bread and have been failing tremendously. It was either too sticky, too flat, too burnt, too wet, too dry... because I was too impatient, too excited, too anxious, too confident. Too distracted because of everything going on, too sad because of your passing. But eventually, all those mistakes gave rise to a good-enough loaf. That is a start.

Maraming salamat, Kuya Obet. I hope more of us become your padawans. Because Jedi don’t die, they just cross over.



▲ Ka Obet with the author

providing electricity to those who have none, the economics of abundance rather than scarcity. There are those that are needed for the “sprint” - current and pressing issues, oppression from the current administration, those that need immediate responses. There are also the “marathon” socio-economic and political issues that would take a longer time to solve. And then there are those that are “ultra-marathon” issues, those that would take generations and major paradigm shifts to solve. And those that run the “ultra-marathon” are not meant to see it finished in their lifetime, but make sure that the baton is passed.

took some time to complete since he had electrolyte depletion). I found out that he was hospitalized again a little more than a week ago, and sent him a text, testing if it was okay to call him, but did not receive a reply. I’ll let him rest and recuperate, I thought. Until it was too late.

During that last phone conversation, when he called out of the blue, I already felt that it was the start of a farewell, which my mind quickly dismissed. But in refusing to acknowledge that, I also missed the opportunity to thank him for all that he has taught me. Last year, when we



# 2018-2040 Philippine Energy Plan: A Long Path to Energy Sustainability

**The Department of Energy of the Philippines (DOE) recently released its second energy plan under President Rodrigo Duterte’s administration. The 2018-2040 Philippine Energy Plan (PEP) showcases DOE’s key policies, programs and development strategies for the energy sector in the next two decades.**

The PEP projects two energy outlooks- the Reference scenario (REF) and the alternative Clean Energy Scenario (CES). The REF or the business-as-usual scenario projects that the country’s total energy consumption will increase from the 2018 level of 34.3 million tons of oil equivalent (MTOE) to 96.7 MTOE by 2040 at an average annual rate of 4.8%. The energy demand growth will be used to fuel the Build, Build, Build Program and NEDA’s Ambition Nation 2040. On the other hand, under the CES, energy consumption will be at a much lower annual rate of 4.4%. Higher renewable energy shares, fuel diversification, higher efficient technologies that will lead to more savings in energy and fuel consumption, and other factors contribute to this slower energy consumption.



How relevant is the PEP to local energy planners and energy consumers? Does the plan address the high electricity cost? Does it provide a clear path towards a clean, low-carbon energy transition?

CREST aims to analyze the PEP and how it fares in addressing the fundamental concerns in each of the three core energy dimensions or trilemma: energy security; energy equity; and environmental sustainability.

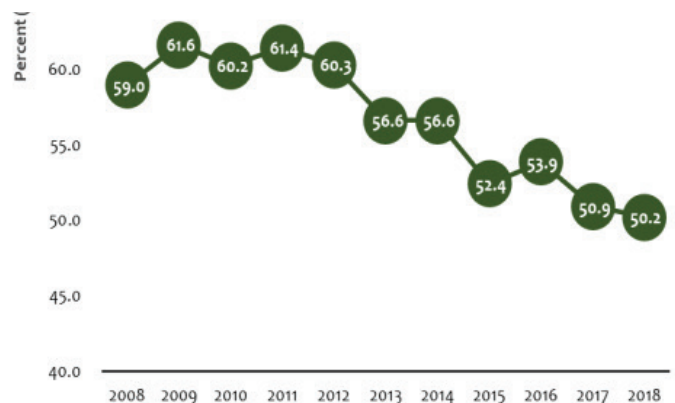
## Energy Security

The World Energy Council defines energy security as the capacity of a country or nation to meet current and future energy demand reliably. Increased utilization of domestic energy sources and less reliance on import means less fuel supply interruptions and more price stability.

The country’s energy security is at the downward trend from 2008, the year of the passage of Renewable Energy Act. The PEP doesn’t address this since both the REF and CES projections maintain a high dependence on imported fossil fuel especially coal and oil.

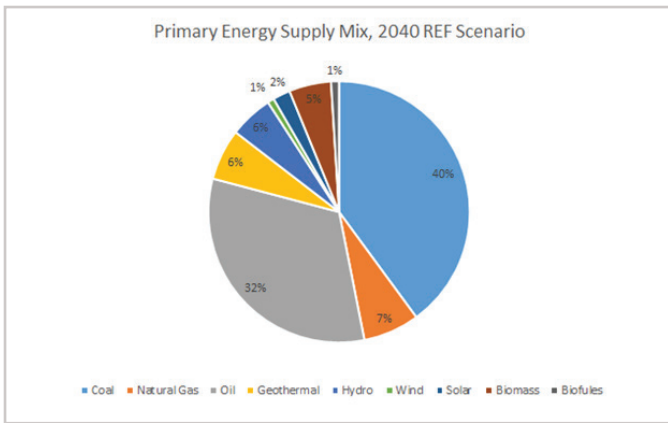
In REF, the self-sufficiency scenario is expected to reach 58% by 2040 but this is still far below the country’s self-sufficiency in 2008. The PEP failed to recognize an energy future dominated by cheap but highly efficient renewable technologies. And this RE trend is already happening now! Solar power generation started in 2005 but it has an average annual growth rate (AAGR) of 4734.62% in the past five years. Wind generation, which also started in 2005, has a 514.03% AAGR.

As far as 2007, DOE already recognized the need for the country to maintain 60% energy self-sufficiency beyond 2010<sup>1</sup>. DOE has failed miserably in achieving this goal.

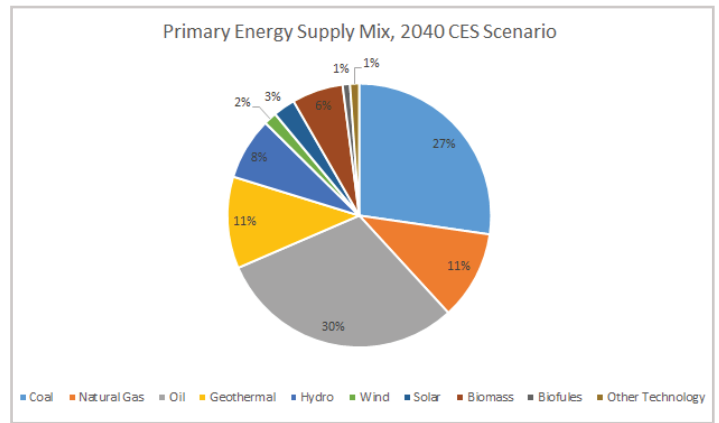


▲ Philippine Energy Self-sufficiency





▲ Energy Supply REF



▲ Energy Supply CES

## Energy Equity

Filipinos should have access to reliable and affordable electricity. Electricity rates in the Philippines is among the highest in Asia no thanks to a high reliance on imported fossil fuels.

The introduction of more renewables into the electricity mix also leads to lower electricity rates. According to a report by the Institute for Energy Economics and Financial Analysis (IEEFA), the feed-in-tariff (FiT) program that prioritize dispatch of variable renewables (e.g. solar, wind) has led to reductions in wholesale electricity spot prices by \$0.028 (PHP1.47) per kWh for consumers. This has led to savings or avoided

costs of \$850m (PHP44.3b) from November 2014 to October 2015.<sup>2</sup>

According to DOE, more than 12 million Filipinos lack access to electricity, mostly those living in islands and far-flung communities. Despite this, the PEP is mum on how to address this very critical concern.

Renewable energy (RE) can provide electrification to these last-mile communities. The DOE should have included in its PEP concrete plans to develop a robust policy framework and proactive program to support off-grid electrification and microgrids in our islands and countryside.



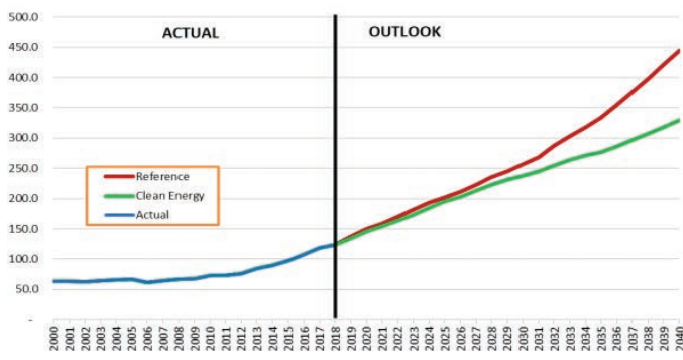
▲ Household Electrification, December 2018

1 \*All graphs and tables are from Department of Energy 2018-2040 Philippine Energy Plan Department of Energy, 2007-2014 Philippine Energy Plan, 2007. Accessed 14 Nov 2020: [https://www.doe.gov.ph/sites/default/files/pdf/pep/2007-pep\\_update.pdf](https://www.doe.gov.ph/sites/default/files/pdf/pep/2007-pep_update.pdf)

2 Asian Power, Renewables may cut Philippines' electricity rates 30%, October 2019, Accessed 14 Nov 2020: <https://asian-power.com/power-utility/news/renewables-may-cut-philippines-electricity-rates-30>

## Environmental Sustainability

Total greenhouse gas (GHG) emission from energy-related activities is 123.3 million tons of CO<sub>2</sub> equivalent (MtCO<sub>2</sub>e) in 2018, while power generation contributed to more than half of the emissions at 51.7%. This high figure is very alarming since power generation accounts for only 41% of energy-related GHG emissions at the global level.



▲ Total GHG Emission 2000-2040

Under the REF, GHG emissions from fossil fuels increase at 6% annually and will reach a total of 444.5 MtCO<sub>2</sub>e by 2040. Coal will account for 56.9% of these emissions while oil share is at 39.1%. CES also projects an increase in GHG emission but lower levels compared to REF, at 329.1 MtCO<sub>2</sub>e.

Both scenarios do not align with the 1.5°C temperature goal of the Climate Paris Agreement. The IPCC Special Report on Global Warming called on nations to implement drastic and urgent actions to cut GHG emissions. The Philippines, one of the most vulnerable countries to climate change, has been battered repeatedly by extreme typhoons in the past months and years. A world beyond a temperature increase of 1.5°C will be catastrophic!

To help meet the 1.5°C goal, coal-fired power generation must peak by 2020 and be reduced afterwards. Coal-fired power generation must be then reduced to 80% below 2010 levels by 2030 and phased-out by 2040.<sup>3</sup>

The PEP should be aligned as well with our commitment under the Climate Paris Agreement instead of promoting a continuous reliance on coal and imported fossil-fuel.

## The Future Energy: More RE, Fewer Baseloads

The COVID-19 pandemic exposes the inflexibility of the country's power sector to absorb abrupt changes in demands and shocks. DOE has always insisted that 70% of the total electricity demand should be covered by baseload plants such as coal, that must be operated 24/7.

When the enhanced community quarantine (ECQ) was imposed in Luzon and rest of the country, electricity demands dropped rapidly. Baseload plants like coal were forced to operate as marginal/flexible plants (rump up and down) to adjust for lower electricity demands. Coal has limited flexibility which, if operated outside of its designed conditions, will increase equipment wear and inefficiencies, making it costlier. In contrast, solar and wind power plants operate without fuel and require less active management, naturally giving them operational resilience during disasters.

*“Coal has limited flexibility which, if operated outside of its designed conditions, will increase equipment wear and inefficiencies, making it costlier. In contrast, solar and wind power plants operate without fuel and require less active management, naturally giving them operational resilience during disasters.”*

In a “new normal” posed by climate change and the pandemic, there is a need to introduce more flexibility in the power sector. This reality compelled DOE Secretary Alfonso Cusi to declare a moratorium for new coal last October.

Innovations in renewable energy technologies are shifting to decentralized systems. More and more electricity consumers are opting to put up their own solar PV at home, offices or businesses. In an era of cheap renewables, the role of coal will be less important, making these facilities stranded assets.

3 Climate Analytics, Global and regional coal phase-out requirements of the Paris Agreement: Insights from the IPCC Special Report on 1.5°C, September 2019. Accessed 14 Nov 2020: [https://climateanalytics.org/media/report\\_coal\\_phase\\_out\\_2019.pdf](https://climateanalytics.org/media/report_coal_phase_out_2019.pdf)

# Why WTE Incineration has No Place in Circular Economy

Ruth Anne Larracas

**When Philippine Congress with civil society groups successfully passed the incineration ban under the Clean Air Act (1999) and Ecological Solid Waste Management Act (2000), it was a remarkable achievement: this was the world's first national ban against waste burning, and it happened at a time when most developed countries in the world were relying heavily on incineration to treat waste.**

Both legislations helped lay down a path towards “circular economy”, decades before the words became the buzzword as it is now. The passage of these laws demonstrated that a developing country with far less superior infrastructure for waste management can have the extraordinary foresight to aim for something better.

Two decades after, the government's approach to waste management is regressing. The incineration ban has always been a target for revision but the most currently-proposed incineration bill, Senate Bill No. 1789, aims to completely repeal current laws prohibiting incineration and instead develop a national regulatory framework to promote “waste-to-energy” incineration. If the bill is passed, WTE facilities will be classified as a renewable energy source and entitled to incentives under the Renewable Energy Act of 2008.

Are thermal “waste-to-energy” incinerators renewable sources of energy? Can they contribute meaningfully to the Philippines' waste avoidance, energy security, climate reduction and sustainable development goals?

## WTE incineration in Asia

It is a fact that many countries in Asia are facing a waste crisis, and WTE incinerators<sup>1</sup> are being aggressively promoted as a “solution” to manage waste in the region. Waste generation is on the rise, as well as disposable plastic products and packaging which

cannot be absorbed by immature and inadequate waste management systems in the region. In the last couple of years, there also has been an alarming rise in waste exports from developed to Asian countries like the Philippines.

In addition, issues such as WTE overcapacity in older, more traditional markets in the EU, and falling gas prices in the US are pushing WTE companies from developed countries to find new markets --- and emerging economies in Asia seem to be a lucrative target.

In the Philippines, there are WTE facilities being proposed in the town of Laoac in Pangasinan, Davao City, Puerto Princesa City and Quezon City.

## WTE incineration is in a downward trend

Many countries are now embracing circular economy principles. While the Philippines has yet to come out with a definitive circular economy agenda, it made a commitment in 2015 to achieve the 17 Sustainable Development Goals. A circular economy entails “gradually decoupling economic activity from the consumption of finite resources, and is based on 3 principles: designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.”<sup>2</sup>

When viewed against circular economy principles, it is clear that WTE incineration is neither circular nor sustainable, and countries that have historically depended on burning waste clearly agree, if incineration trends in these countries are any indication. An incinerator's success depends on a never-ending supply of materials. Burning waste permanently destroys resources that should be fed back as long as possible into the production cycle, and burning waste releases GHG and harmful emissions into the atmosphere.

1 “Waste-to-energy” or WTE incineration is the process of direct controlled burning of waste in the presence of oxygen to generate electricity and/or heat. WTE technologies include gasification, plasma arc, pyrolysis, co-incineration of waste in combustion plants (e.g. power plants) and in cement and lime production.

2 Ellen MacArthur Foundation, Circular Economy – Concept, last accessed December 2, 2020 <https://www.ellenmacarthurfoundation.org/circular-economy/concept/schools-of-thought>

## WTE failures at a glance:

In the United Kingdom, a Fortune 500 US gas company called Air Products spent over \$1B to develop 2 plasma gasification technology with mixed-waste feedstock, but backed out of these projects after failing to make the technology work. The company also decided to exit from the “waste-to-energy” business permanently. In addition to Air Products, at least 10 other companies abandoned over 20 WTE projects around the UK due to emission problems, failure to produce enough energy, or inability to make their technologies work. These 10 companies went into administration and at least 2 have decided to exit the WTE business for good.

In India, the country’s flagship WTE project in Timarpur-Okhla has been dogged by technical failure, pollution issues and numerous violations, despite millions of investments and years of development.

In 2017, the EU’s communication on WTE recommended that incineration should be made more expensive through taxes, that public funds should be diverted away from WTE and into waste reduction, recycling and composting, and that a moratorium on new WTE facilities must be put in place<sup>3</sup>. And in the 2020 EU Taxonomy Regulation, WTE incineration was excluded as a sustainable economic activity, or an activity that contributes to climate change mitigation. The European Union recognizes the damaging environmental and financial impacts of incineration, and acknowledges that WTE does not contribute to climate change mitigation as it “causes harm to the environmental objectives of the circular economy.”

As a result, “incineration countries” are now moving away from burning waste. Denmark, which has the highest per capita incineration capacity and the highest waste generation per capita in the EU, has announced that it will reduce its incineration capacity and waste imported for incineration, and remove 80% of plastic from their residual waste stream.

These developments are significant, as incinerator promoters in the Philippines have always pointed to European countries’ reliance on incineration as vindication that WTE is good.

## Incineration will take away jobs

One of the most important aspects of a circular economy is local sustainability and the creation of jobs. Any waste management program that includes incineration limits circular strategies like materials recovery for repair, reuse, repurpose and remanufacture. These are activities which are the backbone of many communities in developing economies like the Philippines, and which are

populated by a large informal waste sector. This sector’s lifeblood is the access to and availability of materials suitable for recycling and composting – the same materials destroyed by incineration.

According to the Institute for Local Self-Reliance, sorting and processing of recyclables supports ten times more jobs than incineration or landfilling on a per-ton basis.<sup>4</sup> In addition, data from an International Labor Organization study that includes Quezon City shows that materials recovery supports thousands of jobs in the city; the same study shows that the informal waste sector is more efficient at recovering materials for recycling compared to the formal waste sector.<sup>5</sup>

If the Philippine government is truly serious about creating jobs, strengthen the waste sector – particularly the informal waste economy – by providing institutional, economic and social incentives for waste reduction, recovery, composting and recycling.

Table 7.4 Comparison of materials recovery by the formal and informal sector, five cities<sup>1</sup>

	Materials recovered (1,000 tons)	By sector		Informal sector employment (Jobs)	Formal sector employment (Jobs)
		By formal sector	By informal sector		
		(Recovered as percentage of total waste generated)			
Cairo, Egypt <sup>2</sup>	1,413	13	30	33,000	8,834
Lima, Peru	539	0.3	19	17,643	13,777
Quezon, Philippines	157	2	23	10,105	5,591
Pune, India	118	0	22	8,850	4,545
Cluj, Romania	24	5	8	3,226	330

▲ Figure 1. ILO, Working Towards Sustainable Development: Opportunities for decent work and social inclusion in a green economy, 2012

## WTE incineration is expensive and can lead to bankruptcy

It is alarming that incinerator proponents continually gloss over the high capital and O&M costs of WTE facilities. Incineration, whether mass-burn or more especially WTE, is the most expensive way of treating waste: it costs \$200,000-\$500,000/ton to build and between \$38-\$365/ton to operate a WTE facility.<sup>6</sup> In contrast, the City of San Fernando spends PHP 15M/year (~\$315,000) for its entire zero waste program.

Despite industry PR that incineration is compatible with waste reduction and recycling, incineration will absolutely encourage the production of waste in order to recoup substantial capital and operational costs, and any WTE investor will prolong the use of a facility for as long as possible to recover investments. This reality has locked host cities or municipalities in a WTE contract for 20-25 years, and has driven cities such as Harrisburg into bankruptcy. “Lock-in” WTE contracts will remove any other waste management option for the same amount of time, and typically have “put-or-pay” provisions, wherein host cities must meet daily waste quota, or pay the difference.

3 Zero Waste Europe, Zero Waste Europe welcomes the European Sustainable Finance Platform, October 22, 2020

4 Institute for Local Self-Reliance, <https://ilsr.org/recycling-means-business/>, last accessed December 8, 2020

5 International Labour Organization, Working Towards Sustainable Development: Opportunities for decent work and social inclusion in a green economy, 2012

6 Global Alliance for Incinerator Alternatives, Technical critique of “Stemming the Tide”, 2015

## “Waste-to-energy” or waste of energy?

WTE incineration’s top selling point is the supposed benefit of using waste as a renewable source of energy, which, supposedly decreases carbon emissions by offsetting the need for fossil fuel sources and reducing methane generated from landfills.

Waste is certainly not a renewable resource, and materials most suitable for incineration such as plastics that are found in any municipal waste stream, are derived from fossil fuels. Burning plastic is the same as burning fossil fuels. WTE is promoted by the plastic industry as a viable solution to address the global plastic problem, but in 2019 alone, the global production and incineration of plastic released more than 850 million metric tons of GHG to the atmosphere, almost equal to the emissions from 189 five-hundred-megawatt coal power plants<sup>7</sup>. Burning of plastics also increases its climate impact, as it releases carbon stored in the plastic into the atmosphere. Therefore, investing in WTE to address plastic waste is a lose-lose solution, for one incentivizes the other in a perpetual and destructive loop.

Despite SBN 1789’s aim to classify WTE as a power plant, WTE technologies differ significantly from power plants that use fossil fuels because of several things: WTE is the most expensive way to generate energy<sup>8</sup>, waste is not a homogenous fuel unlike coal or natural gas, and the amount of power generated by a WTE facility will depend on the quality of the waste feedstock. If the feedstock does not meet calorific requirements, a WTE facility will fail to generate the expected amount of electricity or be inoperative.

To recover energy, the feedstock’s calorific value must be at least 7,000 kJ/kg and never fall below 6,000 kJ/kg.<sup>9</sup> This will be difficult to achieve, considering that over 60% of the country’s waste stream is organics.

If WTE is reviewed from a purely energy-generation perspective, the question that begs to be asked is: are there better, less expensive, more climate-friendly sources of electricity? What alternatives are WTE displacing? Surely, the comparison shouldn’t be WTE vs coal, as dependence on coal is on a sharp decline and coal mines are swiftly becoming stranded assets in the US and worldwide. If not coal, what is WTE displacing? The clear answer seems to be: sources of energy that are truly renewable, such as solar, wind, geothermal and hydro.

If the Philippines is truly intent on pursuing its GHG reduction commitments, then it is essential that a more progressive approach to waste management should be

	Plant Characteristics		Plant Costs (2012\$)			
	Nominal Capacity (MW)	Heat Rate (Btu/kWh)	Overnight Capital Cost (\$/kW)	Fixed O&M Cost (\$/kW-yr)	Variable O&M Cost (\$/MWh)	NEMS Input
<b>Coal</b>						
Single Unit Advanced PC	650	8,800	\$3,246	\$37.80	\$4.47	N
Dual Unit Advanced PC	1,300	8,800	\$2,934	\$31.18	\$4.47	Y
Single Unit Advanced PC with CCS	650	12,000	\$5,227	\$80.53	\$9.51	Y
Dual Unit Advanced PC with CCS	1,300	12,000	\$4,724	\$66.43	\$9.51	N
Single Unit IGCC	600	8,700	\$4,400	\$62.25	\$7.22	N
Dual Unit IGCC	1,200	8,700	\$3,784	\$51.39	\$7.22	Y
Single Unit IGCC with CCS	520	10,700	\$6,599	\$72.83	\$8.45	N
<b>Natural Gas</b>						
Conventional CC	620	7,050	\$917	\$13.17	\$3.60	Y
Advanced CC	400	6,430	\$1,023	\$15.37	\$3.27	Y
Advanced CC with CCS	340	7,525	\$2,095	\$31.79	\$6.78	Y
Conventional CT	85	10,850	\$973	\$7.34	\$15.45	Y
Advanced CT	210	9,750	\$676	\$7.04	\$10.37	Y
Fuel Cells	10	9,500	\$7,108	\$0.00	\$43.00	Y
<b>Uranium</b>						
Dual Unit Nuclear	2,234	N/A	\$5,530	\$93.28	\$2.14	Y
<b>Biomass</b>						
Biomass CC	20	12,350	\$8,180	\$356.07	\$17.49	N
Biomass BFB	50	13,500	\$4,114	\$105.63	\$5.26	Y
<b>Wind</b>						
Onshore Wind	100	N/A	\$2,213	\$39.55	\$0.00	Y
Offshore Wind	400	N/A	\$6,230	\$74.00	\$0.00	Y
<b>Solar</b>						
Solar Thermal	100	N/A	\$5,067	\$67.26	\$0.00	Y
Photovoltaic	20	N/A	\$4,183	\$27.75	\$0.00	N
Photovoltaic	150	N/A	\$3,873	\$24.69	\$0.00	Y
<b>Geothermal</b>						
Geothermal – Dual Flash	50	N/A	\$6,243	\$132.00	\$0.00	N
Geothermal – Binary	50	N/A	\$4,362	\$100.00	\$0.00	N
<b>Municipal Solid Waste</b>						
Municipal Solid Waste	50	18,000	\$8,312	\$392.82	\$8.75	N
<b>Hydroelectric</b>						
Conventional Hydroelectric	500	N/A	\$2,936	\$14.13	\$0.00	N
Pumped Storage	250	N/A	\$5,288	\$18.00	\$0.00	N

Figure 2. USEIA, Updated Capital Cost Estimates for Utility Scale Electricity Generating Plants, April 2013

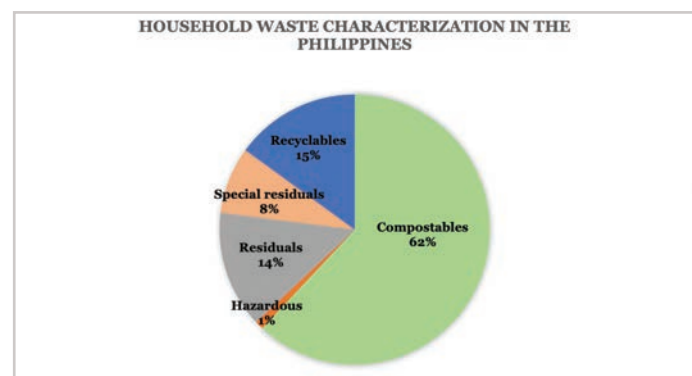


Figure 3. Global Alliance for Incinerator Alternatives, Plastics Exposed: How Waste Assessments and Brand Audits Are Helping Philippine Cities Fight Plastic Pollution, 2019

pursued – one that does not include expensive burners.

The Philippines once dared to be a world leader in waste management. The country is still in a unique position to leapfrog over the burning mistakes of countries in the global north, and has the added advantage of having hundreds of zero waste communities already in place, proving that a circular economy is attainable for the fraction of the cost of an incinerator.

*Ruth Anne Larracas has been supporting the development of zero waste communities in the Asia Pacific region for nearly two decades.*

7 Feit, S. et al. (2019). Plastic and Climate: The Hidden Costs of a Plastic Planet. Center for International Environmental Law. www.ciel.org/plasticandclimate

8 In a 2013 report by the US EIA, incineration had the highest capital cost at \$8,312/kW among all reviewed electricity-generating plants including coal, nuclear, solar, hydroelectric, geothermal, wind, biomass and natural gas. In the same report, incineration’s operational and maintenance cost was at \$393/kW-yr, which is 10x more expensive than coal and 4x more expensive than nuclear.

9 Liu, C., Nishiyama, T., Kawamoto, K., Sasaki, S. (2020). CCET guideline series on intermediate municipal solid waste treatment technologies: Waste-to-Energy Incineration.

# Moving Forward with Net-Metering

Paolo Miguel Bartolo

**S**even years have passed since the Energy Regulatory Commission (ERC) released net-metering guidelines for the adoption of distribution utilities and electric cooperatives, and yet the program remains underutilized. This article examines the current barriers to net metering implementation and proposes policy actions to move net-metering forward.

Net-metering is a non-fiscal incentive under the Renewable Energy Act of 2008 that allows consumers who generate their electricity through solar photovoltaic (PV) systems and other renewable energy installations to pass excess power to the distribution grid in exchange for credits. The program allows end-users to become producers and consumers, or prosumers,

of electricity, as well as generate savings on their electricity bills and protect themselves against rising electricity prices.

In 2013, the ERC released its first set of net-metering rules. However, the said rules introduced a pricing methodology that deterred participation and metering charges that became burdensome for

of the upfront costs for installing a solar rooftop system. These additional charges dissuade many end-users from even considering net-metering.

Another issue raised by CREST and other renewable energy advocates is that the existing net-metering program in the country is a form of net “billing”, given that exported electricity is valued

*“Costs for residential-scale solar PV have dropped for the last decade by 47-90%. The declining cost trend for solar PV makes netmetering essential in supplying end-users with clean and cheap electricity.”*

would-be participants. ERC issued amendments to correct questionable provisions from its initial regulations, including the prohibition of DUs from charging additional costs for Distribution Impact Studies (DIS) and the setting of a maximum processing time of 20 days for applications.

However, renewable energy developers are saying that these amendments are not enough to push forward the adoption of net-metering.

According to Engr. Melvin Romano, owner of EASI Solar, costs associated with net-metering, such as permitting, purchase of additional meters, and other fees, account for 10%

differently from imported energy. DUs price exported energy based on their blended generation costs, instead of the full retail price.

According to Romano, our government treats net metering customers as power generators, in the same category as utility-scale power plants. In reality, the primary goal of these prosumers is just to offset their electricity consumption. Romano states that any excess electricity that participants produce is incidental, given that oversized solar PV systems would exceed voltage and current ratings and are not allowed for safety reasons.

In 2019, Meralco warned against a proposal to compensate



▲ Electric meter

net-metering exports at retail rates, given that the additional charges will be passed onto their non-participating customers<sup>1</sup>. This mirrors a journal article by Romeo Pacudan in 2018, which argues that true net-metering will increase rates of return for participants at the cost of higher electricity prices for everyone else<sup>2</sup>.

To resolve this issue, regulators should interpret the export of electricity as an exchange, not as a sale. The excess electricity produced by participants is consumed by their on-grid neighbors, offsetting their own energy consumption.

The overall effect is a reduction in demand during peak daytime, allowing DUs to reduce electricity purchases. In turn, this decreases the generation charges passed onto customers.

There is no inherent difference between imported and exported electricity, so they should be priced equally. Treating net metering as an exchange allows participants to benefit without increasing prices for everyone else.

According to a 2019 USAID study, distributed solar PV systems can provide other benefits for DUs, such as lower energy purchases from WESM and peak load generators<sup>3</sup>. Given the proximity of PV systems to consumers, net-metering can also reduce system losses and increases the portion of energy output utilized by end-users.

As for stability concerns, a 2018 grid integration study by USAID concluded that the Luzon-Visayas grid can stably achieve 50% RE share by 2030, with additional capacity over the base case coming from solar and wind



▲ Solar PV rooftop

Cost Breakdown	Portion of Total Upfront Costs
Equipment costs	~70%
Labor and installation costs	~20%
Administrative costs (net metering)	8-10%

▲ Breakdown of cost for solar PV installation

energy<sup>4</sup>. Much of this additional RE capacity can be met by net-metering applications.

Globally, installed costs for residential-scale solar PV have dropped for the last decade by 47-90%<sup>5</sup>. The declining cost trend for solar PV makes net-metering essential in supplying end-users with clean and cheap electricity.

Hence, current regulations should encourage greater adoption of net-metering by removing pass-through charges, rationalizing requirements, and decreasing barriers to entry. Only

then would end-users get to reap the full benefits of participating in renewable energy generation.

*Paolo Miguel Bartolo is a licensed chemical engineer and magna cum laude graduate from the University of the Philippines Diliman. He currently does policy research for CREST and is a participant of the Renewable Energy Boot Camp (REBOOT), a Friedrich-Ebert-Stiftung program for developing renewable energy ambassadors.*

1 Accessed 14 Nov 2020: <https://businessmirror.com.ph/2019/11/18/meralco-nixes-bid-to-compensate-net-metering-customers-at-full-rate/>

2 Accessed 14 Nov 2020: <https://www.semanticscholar.org/paper/The-Economics-of-Net-Metering-Policy-in-the-Pacudan/4edd712271c2d7a62f662313cb755cd6335d14f5>

3 Accessed 14 Nov 2020: <http://usaidecleanpowerasia.aseanenergy.org/resource/distributed-photovoltaic-economic-and-technical-impact-analysis-in-the-philippines/>

4 Accessed 14 Nov 2020: <https://www.doe.gov.ph/electric-power/greening-grid-report>

5 Accessed 14 Nov 2020: <https://www.irena.org/publications/2020/Jun/Renewable-Power-Costs-in-2019>

# Malabon City Biogas Project

**The Center for Renewable Energy and Sustainable Technology, in partnership with the zero waste group Mother Earth Foundation, established the first community-scale anaerobic biodigester project in Metro Manila.**

Anaerobic biodigesters are units in which the digestion of organic matter by organisms happen in an anaerobic or no-oxygen condition. The system produces two useful products- a flammable biogas that can be used as an alternative fuel for cooking or electricity generation; and digestate, an organic slurry which is an excellent soil conditioner.

The Malabon Biogas project is located in the Materials Recovery Facility (MRF) of Barangay Dampalit, Malabon City, a multi-awarded community for its exemplar performance on ecological solid waste management. The system has

a six-cubic meter (6,000 liters) capacity and daily caters to kitchen and biodegradable waste from more than 100 households.

The said system produces cooking fuel equivalent to 24 kgs of LPG per month. The fuel is used by the MRF staff and waste workers for their daily cooking. The digestate is then diluted in water and sprayed to the nearby gardens. The system also promotes waste segregation practices and support the Zero Waste program of the barangay. It diverts more than 14 metric ton of kitchen waste away from landfill annually and thus prevent more than 37 metric ton of carbon dioxide equivalent (CO<sub>2</sub>e) per year.

The use of biodigesters is very popular in many Asian countries such as India, Cambodia and Vietnam. Large-scale biogas systems also exist in many parts of the world such as United States, Europe and China.



▲ MRF staff demonstrated the proper feeding of biodigester to Malabon barangay officials.



▲ The six-cubic meter biodigester system



# RElief for Typhoon-affected Communities

**T**he Philippines was hit by six typhoons in the past three months causing destruction to thousands of communities. The most recent typhoon alone, TS Ulysses, affected more than 425,000 families. Support from fellow Filipinos and the international community were mobilized by different government agencies, humanitarian groups and individuals to provide emergency aid and relief to all communities affected by these extreme weather events.

CREST supported the bayanihan efforts and deployed emergency solar photovoltaic (PV) systems to typhoon affected communities. The solar PV systems provided adequate electricity to residents of communities that has power interruption days and weeks after the typhoon. Barangay officials, frontline responders and affected residents were then able to have power for lighting at night, operate emergency devices and provide charging for mobile phones and other devices.

The typhoon-affected communities that were reached by CREST were the flood-prone Barangay Meysulao of Calumpit, Bulacan; San Miguel Island of Tobacco City, Albay and the upland community of Barangay Daraitan of Tanay Rizal.



▲ CREST provided solar home system to the barangay hall of Daraitan, Tanay.



▲ Portable solar generator set for emergencies.



▲ CREST installed an emergency solar PV system to power Meysulao DRR Center.

# How Energy Startups can Accelerate the RE Transition

Mariah Brenda Valerio

**I**nnovation has been a buzzword in any industry and sector in the past few years. In energy, there have been multiple studies that highlight how technology and innovation can accelerate the clean energy transition. In a 2017 IRENA report, even with the current readiness and level of scalability of existing clean energy technologies and solutions, population growth and rising energy demand could still outdo our decarbonisation efforts without urgent investments and support for research and development (Accelerating the Energy Transition through Innovation, 2017)<sup>1</sup>. In the same report, IRENA highlighted that technology innovation cannot just be limited to R&D, but has to be accompanied by innovations in infrastructure, regulation and business models; and this is where energy startups play an important role.

While startups may be similar in some ways with traditional small businesses, they are different in nature. Startups are companies or businesses that offer innovative products, services or models and they can scale fast-- usually through technology. Famous startups we know are Grab, a Singapore-based startup which started as a ride sharing service and booking platform; Waze, a GPS navigation software application originally from Israel; and Coins.ph, a mobile wallet that allows people to send money, receive remittances and pay bills from the Philippines. In the energy sector, we have Exora Technologies, a startup that originated from a local university, paving the way for energy startups.

*“There still is a lot of work that needs to be done to build a strong pipeline of promising energy startups catering to different sectors and communities in the Philippines.”*

Exora is a platform that links businesses or contestable customers<sup>2</sup> to retail electricity suppliers to help these customers manage and lower their energy costs and increase efficiency (Exora | Save more on your electricity bill, 2018).

## The Energy Startup Ecosystem

Ecosystems and communities are necessary for startups to grow. These ecosystems are composed of (1) enabling environments such as policies, regulations and incentives; (2) financing and investment mechanisms such as public and private banks and loans and grants; (3) institutions or companies that support or collaborate with energy startups; (4) clean energy indicators such as patents, research laboratories and startups; and (5) networking assets which include organizations and events that provide interaction and engagement between startups and other energy stakeholders<sup>3</sup> (Lin & Chinthavali, 2016).

<sup>1</sup> Accelerating the Energy Transition through Innovation. (2017). Irena.Org. <https://irena.org/publications/2017/Jun/Accelerating-the-Energy-Transition-through-Innovation>

<sup>2</sup> Exora | Save more on your electricity bill. (2018). Exora.Ph. <https://www.exora.ph/news/how-the-retail-electricity-market-works-part-2>

<sup>3</sup> Lin, J., & Chinthavali, S. e. (2016). Ecosystem discovery: Measuring clean energy innovation ecosystems through discovery and mapping techniques. The Electricity Journal, 64-75.

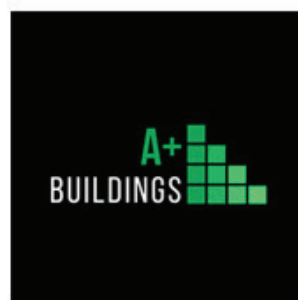
In the Philippines, there are several policies and incentives that promote renewable energy and open competition in the energy sector. However, these are designed to be more favorable to established energy companies and foreign technologies. There are also several funding and financing opportunities and mechanisms for energy project developers and off-grid electrification programs and also energy-focused venture capitalists and investors. On other indicators, with more than 200 energy-related patents and six research laboratories that are supported by the Department of Science and Technology, there are still not enough energy startups compared to other countries and sectors. There are also several networking assets, startup incubators and competitions that accommodate and support clean energy innovations and startups.

For energy startups, there are a few companies working on different energy categories such as energy efficiency, energy access and biogas. Smartermeter and A+ Buildings are startups that came from academe which offer solutions to energy management and efficiency. Light of Hope is an impact-driven startup that provides low-income residential communities with renewable energy

technologies that they can use to replace their diesel generators and kerosene lamps and for phone recharging. There are also startups that help farming and urban communities with waste management such as Circular Solutions and Straw Innovations that offer biogas solutions.

In comparison with developed countries and even with our neighboring countries, there still is a lot of work that needs to be done to build a strong pipeline of promising energy startups catering to different sectors and communities. As advocates of clean energy, we are inviting everyone to take part in strengthening the country's energy startup ecosystem and support our local energy entrepreneurs. Interested organizations and companies can get in touch with New Energy Nexus Philippines, a non-profit organization that supports energy entrepreneurs and startups with programs, training and networks, at [philippines@newenergynexus.com](mailto:philippines@newenergynexus.com).

*Mariah Brenda Valerio is the Program Manager of New Energy Nexus Philippines. She is also a certified Startup Accelerator Manager. She took her MBA at the Ateneo Graduate School of Business.*



# Raising Climate Ambition

Melissa F. Cardenas

**The Center for Renewable Energy and Sustainable Technology (CREST) joined a study to document the civil society perspectives in four countries and determine how policies and actions can bring national ambitious targets amid the ongoing climate crisis. The study, titled Raising Climate Ambition and led by Climate Action Network and Friedrich Ebert Stiftung (FES), focuses on the Philippines, Kenya, Morocco and Kyrgyz Republic.**

CREST documented the analysis of various national government agencies, international organizations, and civil society organizations involved in the crafting of the country's National Determined Contribution (NDC) as part of its commitment to the 2015 Paris Climate Agreement.

Björn Surborg and Melissa Elsa Cruz, members of the Climate Change and Disaster Risk Management Cluster of the German institution Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in the Philippines, pointed out there are realistic and inexpensive options are available to reach mitigation targets, such as micro renewable energy. Surborg pointed out that mitigation strategies should not inherently be considered as limitations towards economic development. Cruz added that the Philippines, as one of the most climate-vulnerable countries, should have a paradigm shift to develop via a low carbon path

turning mitigation as a function of climate adaptation.

Renee Tumaliuan, Climate Program Manager of FES Philippines, emphasized that a people-centered NDC should consider the kind of technology use, scale, scope and purpose since even clean technologies might still affect marginalized communities. In order to address this, Renee said that communities must be involved in all decision-making processes, for example, the affected indigenous communities by proposed large-scale hydroelectric power plants.

Rex Barrer of the Institute for Climate and Sustainable Cities sees the ongoing NDC crafting process as an opportunity to challenge fellow actors from civil society to rise to the challenge and demand a larger role in policy-making. For the government to recognize how much civil society can bring into the table, he said that civil society organizations

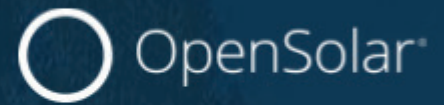
also need to acknowledge the technical nature of the NDC and appreciate the plan as a strategic tool for both mitigation and adaptation actions.

Civil society action in the Philippines has a long and proud history. Grassroots organizing has been a vital part of resilience and resistance throughout centuries of colonial rule and the country's struggle for independence and sovereignty. It is in this tradition that civil society has been able to push for independence, human rights and environment and climate justice. It is in this spirit that civil society pushes for stronger commitments for positive action on climate change.

*Melissa F. Cardenas is an environmental consultant, teacher, and a Trustee of CREST. The full report of Raising Climate Ambition will be made available at the CREST website by January 2021.*



▲ An unidentified man tries to push his bicycle at the waist-deep flood in Marikina City during the height of typhoon Ulysses. Photo from Philippine News Agency



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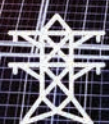
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# A publication for the microRenewables industry

The renewable energy industry is now taking off. In the Philippines, solar PV rooftop has already achieved grid parity and it is now the cheapest electricity source. Increasing awareness of global citizens on climate change and favorable market and investments are bound to create new opportunities for other renewables like wind, hydro, biomass, geothermal, storage and ocean.

CREST sees the industry today in a similar stage as the computer industry when microcomputers were starting to be used by techies and increasingly by businesses. When these products reached a certain market volume, economies of scale began to take effect, resulting in a virtuous cycle of steady price reductions and continuing market growth.

The spread of microcomputers was greatly aided by the rise of industry publications, where new developments were covered in detail and which

enthusiasts read avidly. Many of these enthusiasts eventually became the business tycoons of the industry.

The renewables industry today needs such publications. This publication, whose focus is microrenewables, will be one of them.

CREST wants to grow this publication with the microrenewables industry ecosystem: suppliers, contractors, retailers, installers, maintenance people and- most important of all- the users. We invite everyone to submit stories about actual installations, new product descriptions and other things that you expect a regular publication to contain.

Together, we will build the microrenewables industry and help turn this industry, like the microcomputer industry before it, into a deep economic and social game-changer.

