



LET THERE BE LIGHT (A SPECIAL REPORT ON SAVING POWER)



BY
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Secretary Petilla has asked for emergency powers to address the looming power shortages. Those emergency powers are intended to handle the near term problem of probable shortages over the next couple of years. The longer term doesn't need emergency powers only the real political will to speed action through the normal bureaucratic processes. For the short term power barges, modular plants using diesel or bunker fuel are being proposed, but these should only be a last resort, a wise contingency perhaps but a last resort. It's an expensive, pollutive solution that should be avoided if at all possible. On top of that they are needed for only a couple of years, so you need to recoup that cost in that too short a time.

There are three things that can be done instead to resolve the shortage without resorting to emergency powers—

1. Reduce demand, which is what this report is all about. This costs next to nothing.
2. Rehabilitate the Malaya plant more quickly to be able to operate reliably and reasonably efficiently, which is now being done. But unless repair work can be speeded up it won't be in time for possible blackouts in the second quarter next year. And think ahead—it takes 8 to 13 hours to bring the plant into operation. Perhaps privatize it with conditions on how it must operate. Discussion is going on now to do this.
3. Convince the courts not to accept "Writs of Kalikasan"; override objectors, approve national and local permits in days, not months even years. More than 160 signatures are needed now! Absurd. Strong political will to force action is all that's needed. The bureaucracy needs its butt kicked to perform quickly and eliminate the complex, unnecessary procedures that maintain now.

If anyway, it's decided to grant emergency powers they should be for a very limited time and for very specific, detailed purposes.

Is there enough electricity, or not? Let's just stick to Luzon so as not to too complicate an already very complicated subject. The government had been saying for a long time there's enough, now it seems to be agreeing with those of us who have been saying equally as long, no there's not. Whether there is or not all hinges on "reserves".

There are 53 generators on Luzon that are connected to the grid. The smallest is 0.2 MW, the biggest has a capacity of 1,294 MW. Their ages range from 1 to 72 years. They can reliably supply an average of 8,100 MW to the grid daily, with 650 MW available from CBK (a reverse cycle hydroelectric plant in Caliraya) at peak load times and 650 MW from bunker fuel-fired Malaya (an old, expensive plant to run in emergencies).

Demand is from a low of 6,000 MW to a high of 8,700 MW, generally averaging 7,300 MW but growing. On average supply and demand there's a reserve of about 800 MW or 10 percent of total, which means if any of the major plants unexpectedly goes off-line we're short of power. It is generally accepted that you should have a reserve of 20-25% to be safe. We don't have it as the aftermath of typhoon Glenda showed.

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The demand for power is growing at 4.8 percent per annum (on an annual GDP growth of 6 percent) but the faster the economy grows the quicker we approach shortages, and if the government's desire to attract more manufacturing eventuates the depletion of the country's energy reserves will be even faster.

There are 17 plants planned for Luzon but they will provide only 1,876 MW of power. Five (477 MW) will be commissioned this year: four (386 MW) in the first half of next year; five (331 MW) in the second half of 2015; three (682 MW) have yet to start. And all this assumes they proceed as scheduled—a not too regular occurrence in the Philippines. We don't get to the 20-25% reserve level until around 2017/2018. And then only if the power plants are actually built as scheduled. So more blackouts (I can't find "brownouts" in my dictionaries. And anyway when I have no power the rooms in my house are black, not brown) as we've already seen.

PROPOSED PLANTS FOR LUZON

Of the 17 power facilities, 5 (477 MW) are to be commissioned this year: 300-MW SLPGC coal-fired power plant Phase 1 Units 1&2; the 135-MW Puting Bato coal-fired power plant Phase 1; the 24-MW San Jose City I Power Rice Husk-fired Biomass power plant; and the 18-MW Bangui Bay Wind Power Project Phase 3.

Four (386 MW) are expected for testing and commissioning within the 1st half of 2015, which are: 87-MW Burgos Wind Power Project Phase 1; 81-MW Caparispisan Wind Energy Project; 18-MW IBEC Biomass Plant; and Unit 1 (200 MW) of Energy World Corp.'s 600-MW Pagbilao Combined Cycle Gas-fired plant.

Five plants (331.3 MW) are ongoing construction activities which are expected to complete in the 2nd half of 2015. These are: 67.5-MW Pililia Wind Power Phase 1; CJ Global's 18-MW Biomass Project; Green Innovation's 10.8-MW Biomass Project; South Luzon Thermal's 135 MW Puting Bato Coal Power Project Phase 2; and 100-MW Avion project.

Three projects (682 MW) that have yet to move forward to the construction stages: Units 2 and 3 of the 600-MW Pagbilao plant, and Anda Power's 82-MW Coal power plant.

The maintenance shutdown of Ilijan (1,200 MW) led to rotating blackouts in mid-July and typhoon damage to Quezon Power (460 MW) followed by a breakdown of Masinloc (630 MW) placed many parts of Luzon in long hours of blackout the following week. With more typhoons expected, blackouts would seem inevitable.

I could delve into this in a lot more detail (as our ancillary report "The Story of PH Power Woes" does) but the bottom line is it's tight. We could be OK—just OK, IF all goes well and as planned but as Robert Burns said "*The best laid schemes o' mice an' men, gang aft agley (often go awry)*" and they certainly do in the Philippines. It was maybe here he was thinking of when he wrote that. With depressing regularity power plants don't get built on time, they don't even get approved for years. Old plants breakdown unexpectedly. And there's another thing: power plants like motor cars don't last forever, maybe 25 to 30 years reliably. And we have about a dozen (and they are among the larger ones) that are within that age range with little talk of replacing them. All plants, regardless of age, must shut down for annual maintenance. While natural calamities and international disruptions of fuel supply can take many megawatts out of the system. So we'll have blackouts from time to time if urgent action is not taken.

That's why Secretary Petilla is asking for emergency powers from Congress to quickly bring in additional power-generating capacity. The idea is to rent, or maybe buy modular generators for the immediate term and rush contract of new plants for an early start of construction. The Electric Power Industry Reform Act of 2001 (EPIRA) bars the government from putting up power facilities. However, Section 71 of the law stipulates that the President, upon the determination of an imminent shortage of power supply (which we have), may ask Congress for authority to establish additional generating capacity.

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This was done by Ramos when he inherited a nation in darkness, so the model is there. Certainly something needs to be done to break out of the bureaucratic inertia that is slowing growth today. But we don't favor using those powers for the longer term problem because although new plant must be built, and built fast, it can be done within the existing system. All it needs, as we said at the beginning, is the resolve to force decision and actions quickly. And override objectors, what's needed is the (in) famous "political will". But ordinary Filipinos can also contribute: conserve power.

There are four parts to power: generation, transmission, distribution and consumption. Generation, the building of plants, the reserves needed, the cost, and on and on has been discussed interminably with recommendations made, but insufficiently done as the above shows. So with too few new plants being built sufficient supply reliably remains at considerable risk.

For some reason all the focus has been on supply, I've seen far too little said about demand. Yet demand is flexible, it can be reduced taking pressure off supply. Rina David beat me to it (I was half way through this research) by coming up with some good suggestions a few weeks ago. But let me expound on them some more as it's an important area that can reduce, if not eliminate the risk of blackouts over the next couple of years. Because by reducing consumption it can give us the reserves that are essential to reliability. That means the power plants we have now will better handle supply of the power needed. The beauty of that is that it also reduces your power bill. It's environmentally beneficial too.

A first step could be taken by government. I think it was Mon Paje who suggested to me once we go to "daylight saving". Advance our clocks one hour. Australia does it in summer, we could do it year round. It would mean one hour less of darkness, of the need for power consuming lights. It's easy, it's costless, it saves electricity.

There are three main groups of users: Industrial, commercial and residential. Big users are better treated, fair enough they're certainly paying for it. Also the kind of load they have is different. More inductive power, motors and so on where power factor becomes an important issue. One that is irrelevant to households. And their systems are more complicated, where more things can be done to lessen the load and where regular, even daily or hourly monitoring can make a difference.

Let me start with residential because it affects us all. The key to using less electricity is, quite obviously, to know where it's being used. But that's not quite as obvious as you'd think. Take just one, aircons. Starting the air conditioner with the lowest possible temperature setting will not cool the room any faster. The speed at which an airconditioner cools is a fixed rate, it's just where it stops that varies. And if you forget to reset it the room gets too cold. Adjusting the thermostat to 23 or 24 degrees Celsius is about right. Every degree (Celsius) down results in P0.48 per hour added to your bill for a 1 HP aircon, that could be at least P110 per month saved.

On the commercial side malls and restaurants should set the temperature to be comfortable with no need to wear a jacket, as you need to in some places. 23-24 degrees Celsius is comfortable, the 20 degrees Celsius that some malls and restaurants are set at is not. Design is important too. Some SM malls, due to cube design, consume sometimes up to 40% less electricity than similar sized but more elegant malls from other groups. Government needs to set standards here, and ensure they're complied with.

And when we do need light shift to CFL's that use only 20% of the power an old-fashioned fluorescent does. Incandescents are gone, beautiful as they were. For fluorescents replace the thick T12 with a thin T5, they fit right in and use approximately 30% less power, that's around P35 in savings per month for eight hours a day. Which at a cost of P350 (for T5) means you get your money back in less than a year.

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But the new shift is to LED's, Light Emitting Diodes. They consume half the power, or less than a CFL does. These incredible creatures turn electricity into the same amount of light with almost none of it lost to heat while consuming only 10% of the energy of an equivalent incandescent bulb. Touch an incandescent bulb that's on some time and you'll see. A baby could cuddle an LED (its only 3.5 volts too, so it won't kill the baby).

The trouble is they're expensive and for a populace that won't spend P1,700 for an E-Pass but will sit in toll traffic consuming gas at a far higher annual cost they aren't an easy sell. An idling car typically consumes 0.6 liters/hour per liter of displacement. So if you have to wait an extra 15 minutes a day, and that's on a good day, and you have a 2 liter engine it will cost you P16/day or P5,000/year. This assumes you stay home on Sundays. You've paid for an E-pass in 4 months! For me the cut-off point as to whether to buy an LED is 10 hours on per day. But costs will come down and they will become ever more sensible to shift to. And I must admit this 10 hours per day calculation hasn't taken into account the much longer life.

But there are LEDs and LEDs. The cheap Chinese ones look like a great deal. They're not. One, they too often don't last the promised "up to 50,000" hours (which is about five times the life of a CFL), I've had them go out in a year and their light output (called Lumens) reduces over time, you get less light but you still use the same energy. A romantic glow perhaps, but I want to see what I'm doing. GE, Philips, Osram—these are names with a solid reputation I trust.

Solar switches so you don't have to remember to turn a light off in the morning. Motion detectors to turn lights on only when you're there. And that one simple thing: Consciousness, being aware, turning off lights as you leave the room. Or fans, they use power too. Remember TV's and stereos use power too, don't leave them on.

Also, some appliances consume power even while they are turned off. This is called *phantom load*, *standby power* or, an even more negative term, *vampire load*. It can represent as much as 10% of your total bill. Your TV cable tuner, for example, consumes approximately 30 Watts while just sitting there. That is about P220/year, excluding the time you spend watching TV! Add TV's and any other electronic device and the saving can be substantial. Do disconnect them from the wall socket as even when switched off modern electronics consume power. Actually what I do that is cheap (P120) and simple is buy a switch adaptor. These little boxes plug into the wall, then your gadget plugs into that and there's a switch on the side. So a simple flip of a switch is all that's needed. Most hardwares have them.

Go to inverter refrigerators and aircons. Electric motors consume most on startup, like getting a car moving from the kerb. Older refs and aircons are stopping and starting all the time. Inverter type aren't. There's a 20-50% saving in electricity consumed in both aircons and refrigerators. And with refrigeration better insulated today they need to be cooling for less time daily. It makes money sense to replace units that are more than 4 or 5 years old.

Shift from an electric stove to gas, the oven too, or an induction cooker. Induction cookers use approximately 58% less energy, and with the cost of gas this may be the way to go. It's safer too. Creating heat with electricity is a very expensive thing to do. When cooking your adobo, use enough heat to simmer. Turning up the power or increasing the flame with gas will not make the sauce any hotter, or thicker any quicker. Water boils at 100 degrees Celsius and this is a property of water that will not allow itself to be changed no matter how much heat you apply. When cooking stews, use a pressure cooker. It will save you time and energy. Dry your clothes under the sun or use a gas-fired dryer. Anything that uses electricity to produce heat does so very inefficiently. These include ovens, hair dryers, irons, and clothes dryers, use them as little as possible.

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Add rubber gaskets or silicone sealant to the air gaps of your doors, windows, and window air conditioners. Add insulating film and/or heat reflective film on your large glass windows or use blinds on the windows to reduce the warm sunlight coming in. Venetian blinds are good as they let in the light, but not the sun if angled correctly. All little things that will bring the monthly bill down. Grow a tree or vines to provide shade to the side of your house facing the sun.

To take that further a better building code requiring better insulation of buildings as they are built to save on energy is needed. Apartments at present, for example, are optimized for low initial cost rather than energy efficient design. Other countries have much better building standards, and regulation of them. We should adopt those standards.

An easy one to take advantage of is time-of-use (TOU) pricing. Meralco varies its cost depending on when and what day. Highest during peak demand times, lowest when demand is low. But you need to change your meter to one that records time too. A one-time installation fee for residential customers ranges from P1,092 to P1,490. If you've installed a TOU meter, it's much cheaper to do your power intensive chores, e.g. laundry, etc. during off-peak periods especially on Sundays when the off- peak rates are extended to 22 hours while peak rates are applied for 2 hours only from 6 to 8 pm.

You can also take advantage of using appliances with high power demand by enrolling in the peak/off-peak program of MERALCO (see table) since you will be able to manage your electricity usage and be charged accordingly .

According to its website, the Meralco POP *"is designed to help corporate partners lower their total electricity expenses through rates based on peak and off-peak periods. Peak periods are hours of the day when demand for electricity and energy costs are high, while off-peak periods are when less plants require electricity and costs are low. With this pricing scheme, corporate partners can avail of lower generation costs by operating even at full capacity during pre-defined off-peak hours, when electricity is cheapest."*

MERALCO'S PEAK/ OFF-PEAK (POP) PROGRAM

Meralco's Peak /Off-Peak (POP) rates program (formerly known as "Time of Use" or "TOU" is an alternative energy pricing scheme that is based on the time of day electricity is generated and on the cost of supplying electricity during that time. With this pricing scheme, Meralco customers can avail of lower generation costs in their total electricity rate during pre-defined off-peak hours:

| | PEAK | OFF PEAK |
|--------------------|----------------------------|----------------------------|
| Monday to Saturday | 8 am to 9 pm (13 hours) | 9 pm to 8 am (11 hours) |
| Sunday | 6 pm to 8 pm (2 hours) | 8 pm to 6 pm (22 hours) |

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b) Wet/rainy (July to December)

| | | PEAK (Php/kWh) | OFF-PEAK (Php/kWh) |
|-----|---------------|-------------------|-----------------------|
| DRY | POP rate | 7.48 | 3.55 |
| | Non- POP rate | 5.69 | 5.69 |
| | Difference | 1.79 | -2.14 |
| WET | POP rate | 7.28 | 3.55 |
| | Non- POP rate | 5.57 | 5.57 |
| | Difference | 1.71 | -2.02 |

**With approval from ERC*

Under the POP program, the peak rate will be Php 1.80/kWh more expensive than Meralco's default non-POP rate, but to encourage customers to consume electricity during off-peak hours, the off peak rate will be lower than the non-POP rate by Php 2.14/kWh.

If there were mandatory Times Of Use Rates for larger accounts, as there are in a number of countries peak capacity could be reduced significantly. In Asia the Philippines is the only major country without mandatory Time of Use Rates for large loads. Factories with power hungry machinery that is operated by only a few staff could be run during off peak times.

For techies, Meralco recently launched an updated version of its mobile application MoVe App. The app is equipped with a Usage Tracker feature that allows consumption monitoring of multiple appliances. The app can also help customers estimate their monthly bill. The app is free for Android and Apple iOS users. Just visit Google Play or Mac App Store using your smartphone or tablet.

A good friend of mine, Bert Lina, recognized ahead of many of us that the future lay in renewable, clean energy. He went into solar power when it seemed quite uneconomic to do so. Since then panel prices have fallen by around 30-50% and efficiency improved by about a third. And this trend will continue. Solar power is free and has zero negative impact on the environment. What more could you want? It all comes down to the initial capital cost, and with that coming down the rationale to shift that way is growing rapidly. Already Canberra in Australia produces enough solar power to supply the equivalent of 4,400 homes. The solar power facility is built on a 50-hectare plot of land.

With net metering you could connect directly to the grid with no need for expensive, short life batteries.

It's like electric cars, they are the future and the future is upon us. Solar power will be a major source of electricity with other sources picking up the absence at night, when demand is low. So less polluting, costly power needed for the grid.

With Bert's help I'm installing solar panels in my country home, I'll let you know the result. It costs P240,000 for a 2-kw system that can connect directly to the grid. On a conservative basis it generates about 150-200 kWh a month which saves you about P1,500-P2,000 per month. So you get your money back in about 8-10 years. One of my friends there runs solely on solar the complete house, successfully. The battery pack for a 2 kw unit costs P60,000. For rural communities far from any grid it's the obvious way to go, no expensive transmission lines needed. 7,107 islands can be energized.

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Government could help by removing the duties and taxes on solar panels and their peripherals. That could reduce cost by over 20%. To promote the use of this environmentally-desirable system that's something government should do.

In researching this column for industrial users I asked Meralco because they're the experts. You'd think they'd be the last people to ask seeing as how they make their money from distributing electricity. But, for me, they were one of the first because I've known them a long time and know they want to help people get the best deal. They have a whole team, the Energy Solutions Team dedicated to helping large users in analyzing and managing power consumption. Knowing where electricity is being over-used is a service Meralco provides.

For large users (with an average demand of at least 500 kW) and SME's they can conduct an audit of your system to identify where savings can be made and to do this they appoint a Relationship Manager.

Meralco has a subsidiary, Meralco Energy Inc. (MEI) that has a program that can do an audit of power usage and recommend where savings can be achieved. An interesting one is a Shared Savings Scheme where MEI buys the equipment and fittings that will reduce power and you pay back in the monthly billings until such time the total cost of retrofit has been recovered.

For factories they can do the same on load profiling to determine how to get savings. Of particular benefit is an analysis of electric motors, which are big power consumers, on how to get greater efficiency. Power factor improvement can help where there's a lot of inductive power (motors, etc.). Properly-sized capacitors are normally used to improve this, and they can bring your cost down. For you at home, there's an electronic version being peddled on the market, don't be fooled by it, it doesn't work. Using a lux meter they can determine the best lighting arrangement i.e. using the least number of lights and lowest wattage to give just the illumination you need.

For those with their own generators the government has introduced what's called an **Interruptible Load Program** where if you use the generator during peak hours Meralco will reimburse you a portion of your fuel and maintenance cost to ease pressure on the system. There's apparently some 1,500 MW available from standby generators. This is certainly something socially responsible companies should consider in coordination with the DOE as to when it is really needed. During typhoon Glenda 110 MW was de-loaded from the grid through the use of self-generation. A negative to be taken into account though is that these units are diesel driven so, pollutive. Hence using only when blackouts seem inevitable should be the goal. Then there's no blackout.

Petilla says he needs emergency powers to mandate that generator owners must switch on when necessary. I don't agree, tell us who won't co-operate, we'll shame them. But I can't imagine any reasonable company not wanting to help. Failing that I can think of many ways to force participation. If the President and Petilla sit down with the owners of standby generators and power companies I'm quite sure they'll be able to persuade them all to co-operate for a few short months.

And that raises the point that the DOE needs a comprehensive, computerized system that can monitor power production, transmission and usage on an on-going basis and call for private sector action to reduce load or turn on generators. Hopefully eventually it's a system that is wholly automatic—a technical possibility today.

Consumption in case of unexpected plant shutdown can be quickly reduced by allowing utilities (such as Meralco) to remotely shut down not so important loads, such as large air-conditioning systems etc. The right for the utility to do so is usually fixed in contracts with large factories etc. and offers some power rate reductions in return. Implementation of automated short time load shedding is very cost efficient since few accounts can offer substantial load reductions. With implementation of mandatory time of use rates for larger accounts peak capacity could be reduced significantly.

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If you're a major user and interested in more detail Meralco regularly conducts lectures on how to reduce consumption, etc. that last half a day. It's by invitation, but I'm sure if you express interest you'll get that invitation.

All of this will help get your bill down. But it will still be high compared to our neighbors. It is because the government is acting sensibly —it doesn't subsidize cost, other ASEAN countries do at anything from 36% to 54% of cost. This is unfair, and the wrong thing to do. What the Philippine government could consider is reducing or removing taxes, if all are added up, there are about a dozen from VAT to real property taxes, they come to a tenth of Meralco's bill. This needs a study with the basic goal of finding out if the direct loss to government in needed revenues is more than compensated for by the increased economic activity that could occur. I believe it could be because the high cost of power is one reason, a principal one in some industries, we get the lowest level of FDI. The cost of such a study is well justified, and something the DOE should do.

The beauty of all I've suggested is that it reduces our power bill, obviates power shortages, reduces pollution, costs very little to do. What more could you want?

All it needs is for the government to adopt it and actively promote, even enforce it. Will they?

And let's get everyone to co-operate, let's all find ways to reduce our power, even a little bit. An estimated 54 million Filipinos on Luzon doing it adds up to a lot of power saved.

Social cooperation for the good of all. Let's do it.

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There will be power shortages in the summers of 2014/15
-> 500 MW in 2015; Is it genetic?

Sec. Petilla wants emergency powers for PNoy. But to do what? Buy or lease power barges? Expensive and inefficient

The following can be done to resolve the power shortage without resorting to emergency powers:

1. Reduce demand. This costs next to nothing.
2. Rehabilitate the Malaya plant.
3. Convince the courts not to accept Writs of Kalikasan
4. Streamline application process for power projects



Reduce Power Demand

WBF proposals for residential and commercial users:

1st advance clocks by 1 hour

Commercial and Residential:

- ✓ Use CFL's or, better LED's, quality ones
- ✓ Replace T12 fluoros with T5
- ✓ Use solar switches and motion detectors – turn things off
- ✓ Unplug appliances – Phantom load
- ✓ Use gas (e.g. for stoves and ovens)



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Reduce Power Demand...

- ✓ Shift to induction cookers
- ✓ Minimize use of electricity for heat – ovens, dryers, irons, etc.
- ✓ Insulate your house, use venetian blinds
- ✓ Have better building codes
- ✓ Go to Time-of-Use metering
- ✓ Take advantage of off-peak rates (night-ti
- ✓ Install solar panels



Reduce Power Demand...

Industrial:



- ✓ Conduct an energy audit
- ✓ Take advantage of the Shared Savings Scheme → Meralco buys the equipment, you pay the differential in your monthly bill
- ✓ Address power factor loss → install capacitor systems
- ✓ Run your factory in off-peak times – if you can
- ✓ Join the Interruptible Load Program – run your generator when the grid is under System Yellow, Distribution utilities will shoulder a portion of your cost

If all done = no black (brown) outs