

# Fostering Green Growth for Malaysia, Energy-Wise



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## ***Ir. Prof. G. Lalchand of the Institution of Engineers, Malaysia's Consulting Engineers Special Interest Group, shares his thoughts on the country's green environment***

“Green Growth” has become the global mantra for developed and developing economies as critical strategies to mitigate the adverse effects of climate change around the world.

The vast majority of global weather scientists have produced irrefutable evidence to convince humanity that climate change is caused by human activities. Virtually unrestrained use of fossil fuels such as oil, coal and natural gas over the last couple of centuries, has resulted in global warming emissions such as carbon dioxide, methane and other gases that contribute to global warming.

Current scientific projections have set an upper limit of 450 ppm (parts per million) of carbon dioxide equivalent (CO<sub>2eq</sub>) content in the atmosphere to limit the global temperature rise to not more than 2°C. These issues have assumed greater urgency during this century as the carbon dioxide (CO<sub>2</sub>) and its “equivalent green-house gases (GHGs or CO<sub>2eq</sub>)” content in the atmosphere has exceeded 400 ppm.

Fortunately, in December 2015, the global community managed to achieve consensus at the Conference of Parties 21 (COP21) in Paris, to initiate concerted action to reduce GHG emissions in efforts to limit global temperature rise to 2°C.

Malaysia was a leading negotiator for the group of developing nations in the COP21 session and made finite commitments as its contribution. Before that, at the COP15 in Copenhagen in 2009, Malaysia had committed to reduce its “carbon intensity” (CO<sub>2eq</sub> emissions to GDP) by 40% from its 2005 value by 2020. Its commitment was enhanced to 45%

carbon intensity reduction by 2030 at the COP21, subject to conditions regarding financing assistance and transfer of technology.

Meanwhile, the Institution of Engineers, Malaysia (IEM) is also doing its part to foster green growth through the upcoming International Green Energy Workshop and Exhibition (IGWE) that it is organising in October, 2016, to showcase green energy generation technologies as well as appliances, products and technologies that use energy efficiently.

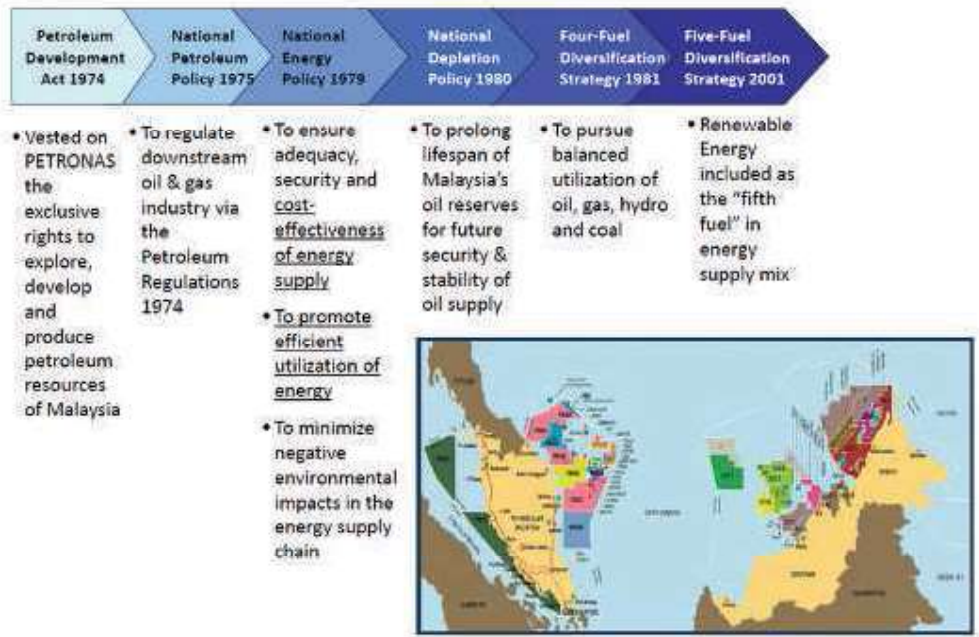
While it's better late than never, it's even better sooner rather than later when it comes to reducing global warming.

On what elements of GHG emitting sources should the government address to accomplish the desired carbon intensity reductions, Ir. Prof. G. Lalchand (or Ir. Lal as he prefers to be called) began by explaining that the burning of any material containing carbon, such as fossil fuels (including coal, oil and natural gas) will produce GHG.

On the other hand, electricity-powered transport such as express rail link, mass and light rail transit and electric buses don't produce “tail-pipe” emissions. Emissions from electric transport occur at the power stations which generate the electricity used by these modes of transport. Even the burning of food waste produces carbon dioxide, while its decomposition produces methane.

So what has Malaysia done so far, is doing now and can do in the future, to ensure that it “honours” its commitment at COP21?

**Figure 1: The need for Energy Efficiency (EE) is embedded in Malaysia's National Energy Policy**



**NATIONAL POLICIES AND LEGISLATION**

According to Ir. Lal, Malaysian government policies for energy, especially electricity supply, have traditionally been based on "supply-side" considerations.

Malaysia plans for adequate energy supply to meet the projected energy demand, with enough reserve capacity to cater for plant breakdowns and other utility emergencies. Most of the electricity supply (over 90% nationally) still comes from fossil fuels and a little bit from renewable energy (RE) resources like hydro, biomass from oil palm plantations and biogas from palm oil mills. However, as feedstock for power generation waste, especially from plantations, biomass has now become a valuable commodity and is too costly to burn for power generation due to its several alternative uses.

The government has formulated policies, legislation and promotional activities to promote green growth to meet the ambitious targets set. Figure 1 Suruhanjaya Tenaga (ST or the Energy Commission) lists some of the key energy policies that reflect the national planning perspectives.

Policies promoting "green energy" really started from 2006 when the National Bio-fuel policy was formulated to encourage the use of bio-diesel (mixed with mineral diesel) for the transport sector. This was followed by the formulation of the National Green Technology Policy in 2009 and the Renewable Energy Policy and Action Plan (REPAP) which led to the enactment of the RE Act in 2011 to develop RE powered electricity generation for supply to the national electricity supply network.

Ir. Lal decried the absence of any dedicated EE policy or enactment in Malaysia, indicating that "the need for Energy Efficiency (EE) is embedded in Malaysia's National Energy Policy". Why is this a concern for Malaysia?

Ir. Lal pointed out that both the International Energy Agency's (IEA) projections as shown in Figure 1 and Figure 2 that efficient use of energy is the single most significant component of GHG emission reductions in the projections to achieve a 450 ppm CO<sub>2</sub> limit in the atmosphere, as shown in the slides below.

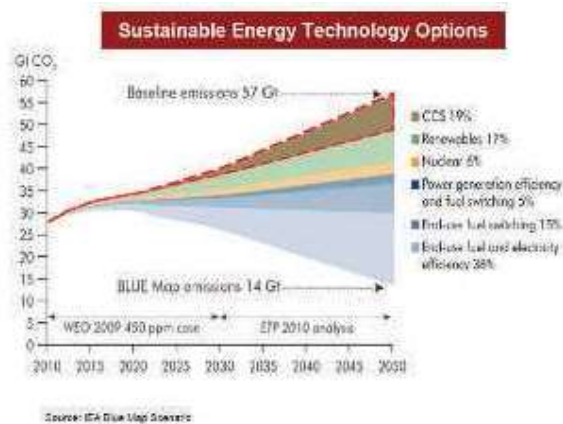
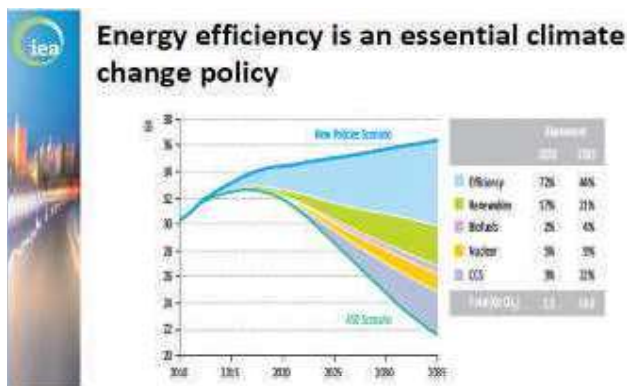


Figure 2

So, the lack of an EE policy makes the possibility of achieving the desired GHG emission reductions somewhat unlikely for various reasons as mentioned below.

**RE IN MALAYSIA**

Ir. Lal said that globally, the renewable sources to meet energy demand include biomass (for heating, electricity, transportation), hydro-power (electricity), geothermal (heating, electricity), wind (electricity), solar (light, heating, electricity) and others, such as marine resources like wave, tidal, OTEC or Ocean Thermal Energy Conversion (for electricity and other by-products).

However, some of these RE resources have little or no potential in Malaysia. These include wind, wave and tidal power generation due to their very limited capacity in the region. In Malaysia, the economically viable renewable sources are solid waste, plantation waste biomass (empty fruit bunches), palm oil mill effluent (POME), small hydro and solar (PV), as shown in Figure 3, using their respective power generation technologies.

For example, Singapore is producing energy from municipal waste, so very little of it goes to landfills. In Malaysia, it's the other way round, partly because no waste-to-energy project has been implemented here successfully.



Figure 3

National RE development plans have changed over the last few Malaysia Plans from year 2000, as per the Sustainable Energy Development Authority's (SEDA) as shown in Figure 4.



Figure 4

Ir. Lal said that SEDA's RE capacity development, including the EPP-10 target of about 1.25 GW from PV by 2020, is difficult to achieve with the present size of the RE Fund based on the RE levy of 1.6% on electricity bills of the affected consumers. He quoted a previous SEDA statement which implied that the Feed-in Tariff (FIT) for PV was more to develop human capacity in PV, not so much as alternative to fossil fuel power source for Malaysia.

Ir. Lal noted that although SEDA has attempted to promote overall development of electricity generating capacity from all the designated RE sources, its efforts have not seen much success, except for the PV sector. This has been caused partly by some external influences such as the high cost of biomass feedstock (empty fruit bunches from palm oil plantations) as a commodity with alternative uses, highly "convoluted approval" processes for small hydro projects, lack of successful examples of municipal waste to energy conversion projects, and remoteness from the power supply grid of projects to use biogas from POME.

He said PV generated electricity can only contribute about 25% of the energy that can be generated by the other RE technologies and as required by the consumers. Thus, additional fossil-fuelled power plants will be needed to satisfy the total power and energy demand of consumers. He said solar PV provides what can only be termed as "tiga-suku kosong" capacity, and he doesn't think it can satisfy the country's energy demand.

As a result, the bulk of the RE levy has been dedicated to pay the tariff "top-up" for FIT for PV, which has actually produced a disproportionately lower energy generation, in spite of its much higher share of installed capacity in MWs.



Figure 5

He continued to say that "many people don't realise that energy generated from PV is much less than that generated from other RE resources for the same power generating capacity installed. But PV is useful in certain aspects as it can reduce peak demand and can be a good option for the country to a limited extent".

He quoted as examples the sample load profiles for the national power grid in Peninsular Malaysia (Figure 6).

These show that adequate PV capacity installation can help to "smoothen" the electricity supply demand profile, which will reduce the need for the use of fossil fuel power plants to meet the daily peak load.



## Potential PV capacity Can be Used BUT Without FiT



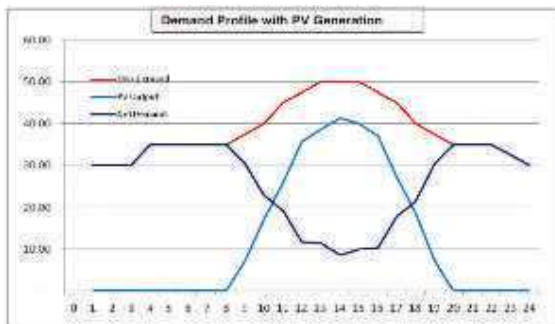
Figure 6

It can also help to reduce the need to reinforce the electricity supply distribution network to meet increasing consumer demand.

As an extreme example, in Peninsular Malaysia, even with, say, 15,000 MW of PV system capacity against the 15,000 MW of power demand, the fossil-fuelled (or other) power plants will be needed to meet the energy and net demand shortfall (of the order of 70%) which can amount to about 10,500 MW.

### Can PV Satisfy Energy Demand?

Example:- even with, say, 15,000 MW of PV system capacity against the 15,000 MW of power demand, the fossil-fuelled (or other) power plants will be needed to meet the energy and net demand shortfall (of the order of 70%) which can amount to about 10,500 MW.



So, should Malaysia plan to develop PV Farms when they cannot satisfy user energy needs, SEDA itself has admitted these shortcomings of PV power plants as shown in the next slide.

Figure 7

## ENERGY EFFICIENCY (EE)

Ir. Lal noted that EE is the most prominent option for reducing global GHG emissions for the future to achieve the 2°C temperature rise limit. Greater emphasis on EE is therefore an essential element for the national climate change policy.

But policies are sometimes not consistent and cost effectiveness not always adequately addressed. This includes more efficient use of natural gas in co-generation mode but this option is hampered by some “administrative constraints” which the relevant industry regulators don’t appear to be able to resolve.

EE doesn’t mean not using energy when necessary, but rather using it more efficiently, thus reducing waste. After all, the “cheapest kWh is the one that you don’t use”, and adoption of EE helps to reduce the energy used without compromising on the desired benefits of using it.

In this respect, Ir. Lal said the relevant government agencies had made attempts to encourage the efficient use

of electricity over several Malaysia Plan periods. The table 8 shows the initiatives as presented by the ST recently.

Table 8

### EE Promotion Initiatives In Malaysia Over The Years

- EE rating and labelling of equipment (2002)
- Green Technology Financing Scheme (2010)
- Subsidy rationalisation plan (2010)
- Competitive bidding for new generation capacity plant-ups (2011)
- EE equipment rebate scheme (2011)
- UNDP-GEF Building Sector Energy Efficiency Project (BSFFP) (2011)
- MS 1525 provisions in Uniform Building By-Laws (2012)
- Minimum energy performance standards (MEPS) regulations (2013)
- UNIDO-GEF industrial energy efficiency project (2013)
- Energy Performance Contracting (EPC) for government buildings (2013)
- Incentive-based tariff regulation (2014)
- 5% energy reduction target for government buildings (2014)

It did not include the EMEER (Efficient Management of Energy Efficiency Regulations) that ST enacted for implementation from December 2008.

Ir. Lal had been involved in promoting EE under various local and internationally supported programmes from 1999, and confirmed that the list shown was only for the more recent initiatives. He added that there had actually been other initiatives from earlier years such as:

- EE awards for different categories of the larger consumers (early 1990s)
- Japanese (JICA) and French (ADEME) government projects to conduct and inculcate energy audit practices and programmes (mid-1990s)
- Feasibility study for an EE policy (by Danish consultants in 1999/2000)
- Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP, a UNDP/GEF project from 1999 to 2007)
- Capacity Building in EE/DSM at the ST (Danish consultants from 2002 to 2005), which started the appliance EE labelling scheme for refrigerators and electric motors

All these initiatives had varying degrees of success during the periods that the foreign consultants executed the programmes, usually as joint-ventures with local consultants (as partners and “under-studys”). Unfortunately, there was little or no follow-up to continue with those initiatives after the projects ended.

In addition, the “EE equipment rebate scheme” mentioned in the list above was the Sustainability Achieved Via Energy Efficiency (SAVE) programme, which was a part of EPP-9 (Oil, Gas and Energy Lab) of the Economic Transformation Programme (ETP) to catalyse EE adoption via purchase of EE appliances such as five-star refrigerators and EE air-conditioners. This programme was an unmitigated success as its end result achievements went well beyond its planned targets. Sadly, it was not continued after its “one-off” implementation.

Ir. Lal was rather sad that one of the most promising government initiatives on EE by the Ministry of Energy, Green Technology and Water (KeTTHA), the NEEMP (National EE

Master Plan), formulated from mid-2008 to 2010, had not been “allowed to see the light of day”. The Plan was peer-reviewed by an Asia Pacific Economic Cooperation (APEC) team of industry experts at the end of 2010, and endorsed as a good policy, but the Malaysian government never implemented it.

Ir. Lal said “KeTTHA had also been formulating an Energy Efficiency & Conservation (EE&C) Act, which was scheduled to be implemented by 2014 (as a part of the NEEMP), to enable adoption of EE in Malaysia”. However, KeTTHA later came out with a “watered down” version (as an NEEAP, i.e. an Action Plan) in January 2014, which removed any reference to the need for legislation for EE. The “watered down” NEEAP failed to get the stakeholders' support that KeTTHA sought for at the end of the year.

He noted: “It’s now 2016 and there is no legislation yet to mandate the adoption of EE&C initiatives nor is there any dedicated agency to implement the initiatives.” He believes that electricity consumers would be only too happy to help the national EE objectives if, by doing so, they can also save on their electricity costs.

He said the Public Works Department (JKR) had done a lot more in EE, adding that it had improved its building designs to become more energy efficient. JKR had also retro-fitted some large government buildings in Putrajaya and achieved energy savings of up to 14% (about RM2 million to RM2.5 million) a year.

In the private sector, Ir. Lal said the Malaysia Association of Energy Service Companies (MAESCO) is doing retrofits to help companies save energy. Some of these activities have been conducted under an Energy Performance Contracting (EPC) concept, where the energy service companies (ESCOs) invest in the energy saving installations for their clients. MAESCO members have been active but their success is limited because energy is cheap, so companies are not so keen on investing to be more energy efficient. Companies are also not getting as many incentives and EE support from the government as are given in some other countries.

The EMEER which came into force in December 2008, required consumers who used more than an average of 500,000 kWh a month, to practise formal energy management. MAESCO has been approaching them to start saving energy with its EPC system. It’s a form of financing energy equipment upgrades from cost reductions, as is being practised at Serdang Hospital.

However, the good news is that the Economic Planning Unit (EPU), under the Prime Minister’s Department, has taken on the task of formulating a new “EE/DSM” study which is expected to override the NEEAP.

“It now remains for us to see whether the adoption of EE&C initiatives will be implemented effectively and according to realistic timelines. We will have to see if the targets and timelines set are realistic and to make sure adequate resources are made available for effective implementation,” he said.

Ir. Lal strongly supported the need to encourage widespread adoption of co-generation, as it can be easily and quickly adopted with minimal public investment. Co-generation can achieve energy conversion efficiency of up to 85% compared with “only power generation” efficiency of 60% at best. This issue had been raised by potential consumers (who would also be investors) for many years, but the administrative hurdles, which have been partly “lowered”, still remain.

He insisted that for Malaysia to truly succeed in reducing its carbon-intensity through “green growth”, especially for the energy supply and use segment, appropriate legislation is needed to make it work. He added that Malaysia needs an “EE Champion” to achieve the benefits that EE can bring. He supported the impact of national adoption of EE by quoting the following excellent example relating to the US as shown in the box below.

The USA is considered a nation of “Energy Guzzlers”. No doubt they consume far more energy per capita than most developing countries. But look at the following recent post in “Green tech efficiency” web page - [http://www.greentechmedia.com/articles/read/energy-efficiency-americas-most-important-resource?utm\\_source=Efficiency&utm\\_medium=Headline&utm\\_campaign=GTMDaily](http://www.greentechmedia.com/articles/read/energy-efficiency-americas-most-important-resource?utm_source=Efficiency&utm_medium=Headline&utm_campaign=GTMDaily) where NRDC’s Peter Lehner explains how efficiency has been a vital hidden resource for America.

Extract from article by Peter Lehner, dated October 2013:-

America May Be an Energy Hog-But It’s Not as Bad as You Think

Which energy source has had the biggest impact on meeting America’s energy needs over the past 40 years?

It’s not coal. It’s not oil. Not wind or nuclear. Believe it or not, it’s even bigger than all of those combined.

Our greatest energy resource is energy efficiency - wasting less energy and making the most out of the energy we already have.

According to the Natural Resource Defense Council’s **groundbreaking, comprehensive analysis** of key indicators, America’s energy position, in terms of security and reliability, has never been stronger. That’s reassuring, and perhaps surprising, in a time when bad energy news (turmoil in the Middle East, fracking, oil spills) seems to dominate the headlines. For nearly 40 years, our economic growth has been rapidly outpacing our energy consumption. Our businesses and industries are producing and selling more stuff, and using less energy to do so. We used less energy last year than we did in 1999 – despite running an economy that’s 25 percent bigger.

Ir. Lal is amazed that, after its commitment on carbon intensity reductions at COP15 in Copenhagen (2009), the Malaysian government has failed to support an EE culture for the country for over half a decade.

### GREEN TRANSPORT

Ir. Lal stated that the promotion of hybrid vehicles mentioned under the EPP-9 of the ETP was, in fact, a move towards promoting green transport, even though it was not termed as such. In addition to that for hybrid vehicles, Malaysia has now provided incentives for energy efficient vehicles (EEVs) in a bid to make the nation a regional hub for EEVs.

Both hybrid vehicles and EEVs help to reduce GHG emissions as they consume less fuel. The excise duty exemption for hybrid cars under the EPP-9 achieved great success, as the sale of such vehicles “exploded” from a few hundred vehicles a year to some 15,000 vehicles a year. Sadly again, this incentive was withdrawn after a couple of years and the sale of such hybrid vehicles dropped significantly again.

What Ir. Lal found disconcerting about this is that subsequently, the same incentives have been given to “locally assembled” hybrid vehicles, which include costly high-end models (such as Audi, BMW, Mercedes Benz and Volvo) which are beyond what most people can afford. Thus, the numbers sold would be much lower than that of models which benefited from the EPP-9 in the first place which applied to vehicles in the more affordable price range such as Honda, Lexus and Toyota models which had petrol engines of less than 2,000cc capacity per km travelled than the conventional internal combustion engine (ICE) vehicles.

Ir. Lal also expressed surprise that the government is promoting battery electric vehicles (EVs) as low-emission (or even wrongly “as zero-emission”) vehicles and granting these fiscal incentives, through the Malaysia Green Technology Corporation.

He said EVs in Peninsular Malaysia are NOT zero-emission vehicles as the electricity used to charge the batteries comes from the national power supply grid. About 95% of the electricity in Peninsular Malaysia is generated from fossil fuels which emit substantial emissions. So, EVs DO contribute to emissions, though not at their “tail-pipes”.

He said electric traction for public transport systems, whether as rail (MRT, LRT, monorail and so forth) or buses (BRT, intra-city buses, etc) can be considered as low emission and hence, “green” transport due to the much lower emissions per passenger-kilometre travelled. The same does not apply to individual passenger EVs as these are still costly (not affordable for the majority of people) and are not likely to achieve mass market sales due to affordability and “range-anxiety” concerns.

He is not in favour of incentives for such high cost vehicles as these are likely to end up as “toys” for the

wealthy rather than commuting vehicles for the middle- and lower-income working people.

As a consultant in green environment, Ir. Lal relates to the “low hanging fruit first” approach as mentioned by Dr Rajendra Pachauri of the International Panel on Climate Change when he visited Malaysia in April 2011 to give his views on nuclear power and climate change, post-Fukushima Daiichi nuclear disaster. Dr Rajendra had advocated “adopting EE first, developing RE generation next, and then only going for more fossil fuelled or nuclear powered generation plants”.

### SO WHERE DO WE GO FROM HERE?

Last but not least, Ir. Lal offered some ideas on what the government should/could do to contribute more significantly to the GHG emission reduction aspirations.

One of the most significant initiatives with almost immediate returns is to remove the administrative barriers to allow greater adoption of co-generation in industries.

It is also essential to expedite the EPU's efforts on the EE/ DSM study, the enactment of any necessary legislation, the provision of adequate resources (financial and expert human capital) and to set challenging but pragmatic targets.

In addition, ST could extend the minimum energy performance standards (MEPS) to more products as well as raise the efficiency levels of the products coming into the country.

The government can also extend perks to owners of old buildings and industries to become more energy efficient. EE fiscal incentives have been around since 2001, in the form of sales tax and import duty exemptions for designated products. For industry players and ESCOs, there is investment tax allowance or pioneer status for those embarking on energy conservation or EE projects.

The government can also provide incentives for hybrid cars, not only for the buyers of luxury marques, but also for those within the affordability range of the majority of the people. It can also ensure better public transport and improved traffic management so we don't have “car parks” with fossil fuel engines caught in city jams and thus wasting energy and increasing emissions, he added.

He also said Malaysia should not try to “chase impossible dreams” by promoting activities that have little realistic benefits for the national GHG emission reduction aspirations, such as trying to harness wind energy, wave or tidal power, or other non-viable marine energy generation, or EVs which may be just “ego-trips” for their promoters.

According to him, there's a need to facilitate productive use of POME to increase the use of RE, by extending the electricity supply network to oil mills which are willing to generate electricity from POME and sell it to the grid. ■