

Ignore the Sun and Miss Yet Another “Bus”

International Energy Agency, Medium Term Renewable Energy Market Report

Power generation from hydro, wind, solar and other renewable sources worldwide will exceed that from gas and be twice that from nuclear by 2016. “As their costs continue to fall, renewable power sources are increasingly standing on their own merits versus new fossil-fuel generation,” said IEA Executive Director Maria van der Hoeven as she presented the report at the Renewable Energy Finance Forum in New York. “This is good news for a global energy system that needs to become cleaner and more diversified, but it should not be an excuse for government complacency, especially among OECD countries.”

Ms. Van der Hoeven warned that “policy uncertainty is public enemy number one” for investors: “Many renewables no longer require high economic incentives. But they do still need long-term policies that provide a predictable and reliable market and regulatory framework compatible with societal goals,” she stated. “And worldwide subsidies for fossil fuels remain six times higher than economic incentives for renewables.”

This is also true in Sri Lanka where government guarantees loans for and subsidies coal power generation. Even for Sampur, the Treasury has agreed to pay for the additional cost increasing the heat rate and reducing O&M costs and not pass it through to the rate payer. IMF reports that coal has received subsidies up to 0.03% of the GDP in year 2011, when Norochcholai has just started operations. Obviously this would be higher in 2012 and 2013.

Sri Lanka is well known for missing several opportunities in the past decades to make use of emerging technologies. In that respect Sri Lanka missed the IT, Bio Technology buses so to speak. While there is some lukewarm moves to target the new emerging nano –technology, one more great opportunity is starring us in the face with no takers. That is the opportunity to maximize the harvesting and the Utilization of Solar Energy, at a time when the country is facing severe challenges of future energy security.

The main reason for missing the windows of opportunity presented by the technological advances in the past was the woeful lack of appreciation and understanding by our ruling politicians and the administrators, of the importance of Science and Technology for the development of the country. Successive governments paid only lip service for development of our Science and Technology infrastructure and human resource base, resulting in Sri Lanka being totally unprepared to grasp the various opportunities as they presented themselves. Some unscrupulous scientists and engineers make use of this lack of knowledge to lead the decision makers down the garden path for their own ends and commit the country to unsustainable and patently disadvantageous projects with very long term adverse repercussions.

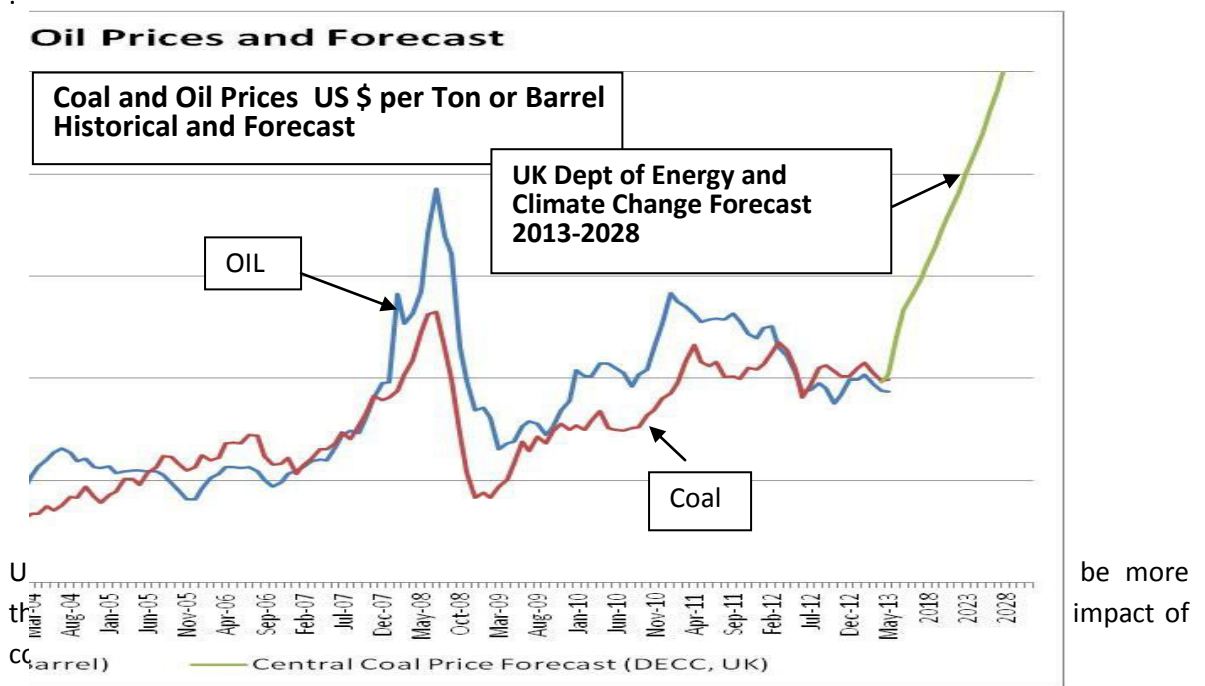
Sun - The source of All Energy and A Frog in the Well Mentality

Unfortunately, in the present context, in case of harvesting the unlimited resource and ensuing development offered by the “Sun” the primary source of all energies used by mankind, it is the scientists and the technocrats, both in the energy sector and outside, who are exhibiting a most lamentable lack of vision and knowledge of the vast achievements already realized internationally in this field. Their lack of insight is evident in the various objections raised and the barriers erected for the large scale utilization of Solar Energy in the country. There has been a series of opinions expressed in recent newspaper articles to even discourage those willing to pioneer this change,

by making use of the “net metering” facility offered by the CEB. The arguments put forward in these articles clearly demonstrate the erroneous assumptions on cost of solar technologies and equipment currently available in the international commercial markets even at retail scale.

The danger of these uninformed opinions is to pave the way for unfettered commitment to more and more coal power plants for the country’s energy supply. In addition to the environmental, health and economic down side of overdependence on coal power, it has the most dangerous potential to block the development of indigenous renewable sources of energy, in order to justify continues operation of such plants, on which billions of rupees are committed, irrespective of the ever rising cost of operation. This danger was highlighted in a recent front page news item that once 900 MW at Norochcholai is operational the CEB will not be able to operate even the major hydro plants optimally. It will be recalled that coal power was offered at a mere Rs 3.50 per unit when the first plant at Norochcholai was proposed. It is already at Rs 13.00 per unit by CEB’S own publications. The cost of power from Sampur is presently estimated as Rs 18.00 per units. What will it be when the plant is ready to operate? The already discredited myth of cheap coal power would be used to overtly or covertly block the development of indigenous sources of renewable energy. Other important arguments are that the foreign exchange spent in purchasing fuel does not add to the GDP thus making it harder to achieve middle income status by 2020.

It still subjects Sri Lanka to price shocks as coal prices do escalate and importantly the escalation is highly correlated with oil price escalation. See chart below which shows that coal price variability tracks oil price variability and if there is a spike in price of coal as happened in mid-2008, and as Sri Lanka’s coal dependence is high as per CEB plans it will result in large rise in cost of generation of electricity and/or further losses to CEB if the PUCSL/GOSL does not permit the cost increase to be passed through to the consumers



The Abundance of Indigenous Renewable Energy

The abundant availability of such sources and the feasibility of their development is well documented by the SEA and several other studies carried out in the past by international organizations such as the ADB, NREL and IFC.

The targets of 20% of NCRE set by the “Vision for the Future” of the Mahinda Chinthanaya calls for 2222 MW of new renewable energy by year 2020. The SEA has proposed following mix of technologies to meet this target.

Small Hydro	602 MW
Wind	1010 MW
Bio Mass	360 MW
Solar	250 MW

This proposed mix needs to be examined critically in the light of the fears of system stability often expressed as the barrier for increased penetration on renewable. It would be prudent to increase the contribution by biomass initially, which is as firm and (dispatchable) as any other fuel based generation. In the meanwhile the CEB can learn how to deal with Wind and Solar as is presently done world over.

However, this target is fast slipping away due to complete lack of interest by the energy authorities, the CEB and the Ministry of Power and Energy to heed this target and the hurdles placed in the way of the private sector developers, knowingly or otherwise. The current long term generation plan of the CEB has no significant place for the renewable resources at all. There is even a seemingly arbitrary limit of 100 MW for Wind and 30 MW for solar for development by the private sector for integration to the grid. Many countries have found ways and means to integrate much larger contributions of these technologies to their grid and have very ambitious programs to substantially increase same.

In this scenario, it is essential Sri Lanka urgently comes up with an intermediate strategy to get back on track for an energy portfolio not dominated by oil or coal. It does not take much effort to understand the foolhardiness of sacrificing the future energy security and the economic well being of the country, by dependence on sources over which we have no control at all, both in security of supplies and price levels.

Such an intermediate strategy is now on offer by targeting the “Sun” if we have the will to accept it as shown below.

Trees the Ultimate Solar Panel

The best option to harness the bounty of solar energy, which is both renewable and indigenous is biomass, which has much more spin off benefits than just as a source of energy. It has the added advantage of being able to store the solar energy and thus overcome the often repeated lament that solar energy is non firm. There has been enough documentation to illustrate these attributes

and is therefore not repeated here. What is important to note is that Sri Lanka is blessed with a ready and excellent means of tapping the ample solar energy with the advantage of being able to store it in the wood. More over we have proven methodologies to counter the many arguments put forward against use of biomass for energy.

But as usual being Sri Lankans we are not ready to recognize what we have in our own back yard and go looking for imported sources of energy at enormous cost and invite economic and environmental disaster.

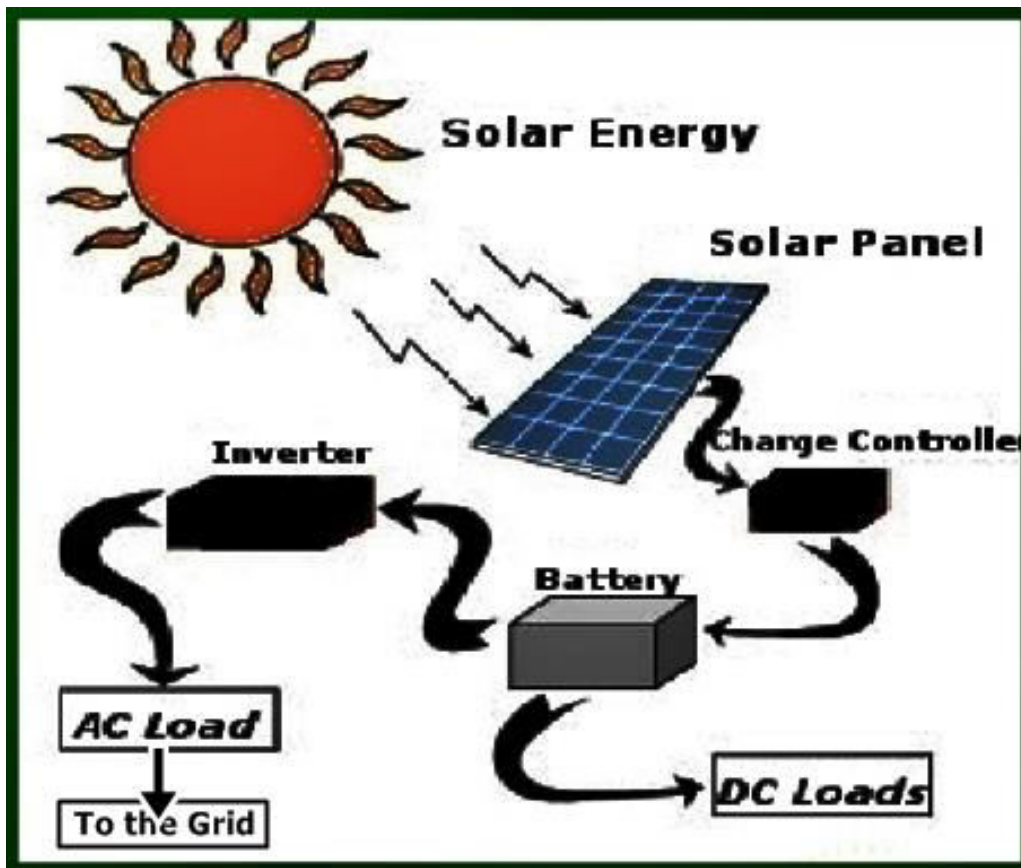
The experience over the past several decades has demonstrated the difficulty in development of the biomass resource, particularly the sustainably grown SRC species, to a level to impose adequate pressure on the energy authorities, who are taking the position that this resource is presently inadequate to meet the emerging energy demands for electrical power. Therefore while to push for development of the biomass resource and maximizing its use must continue to harness its full benefits, an intermediate solution to tap the ample solar energy is now at hand.

Roof Top Solar – now at affordable prices

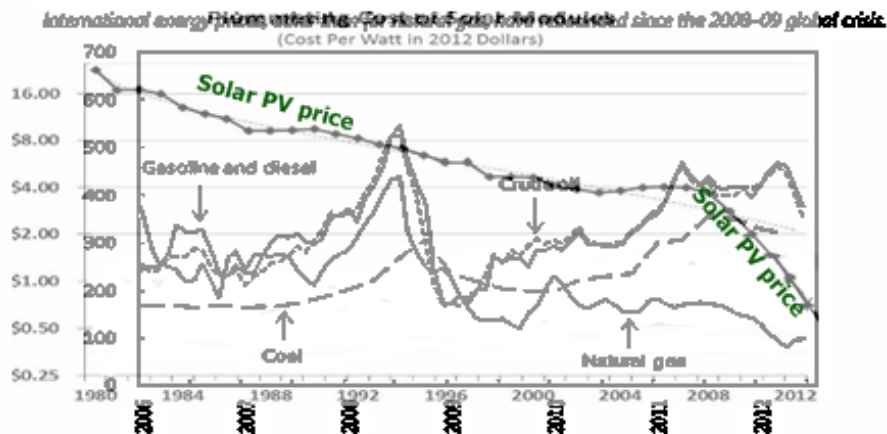
Over the last few years the cost of solar PV has reduced drastically and has now reached levels well affordable by many as shown below.

Solar PV Module Price Movement in Germany

Metric	Q4'12	2012
Production (MW _{DC})	512	1,875
Capacity Utilization	84%	78%
Conversion Efficiency (Average)	12.9%	12.6%
Cost/watt ⁽¹⁾ ⁽²⁾	\$0.68	\$0.70
- Excluding underutilization & upgrades	\$0.67	\$0.66
- Best plant, ex-underutilization & upgrades	\$0.64	\$0.63



**Figure 1. International Prices of Oil, Coal, and Natural Gas, 2006–2012
(Indexed January 2000=100)**

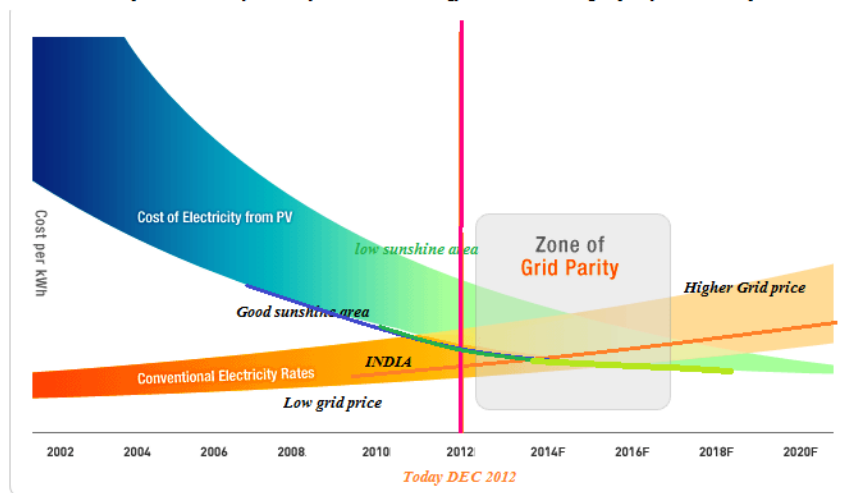


Sources: IMF World Economic Outlook (WEO), U.S. Energy Information Administration (EIA), and the Organisation for Economic Co-operation and Development (OECD).

Note: Coal price is average of quarterly U.S. import prices (EIA) and quarterly OECD import price (EIA/OECD). Natural gas price is average of the monthly U.S. import and export prices (EIA); these prices are weighted averages for LNG and pipeline natural gas. Crude oil price is average of Brent, Dubai, and WTI monthly prices (MEQ/Primary Commodities Price System). Gasoline price is monthly New York Harbor conventional gasoline spot price (EIA). Diesel price is monthly Los Angeles ultra-low sulfur CARB diesel spot price (EIA). Gasoline and diesel prices are then averaged.

Grid Parity

Grid parity is the point at which electricity can be generated at the same cost (or less) than by burning fossil fuels. If renewable energy is not cheaper in the short or long term, governments and industry will continue to lack the motivation to invest in renewable power. It is likely that the first renewable energy source to achieve grid parity will be solar power.



The way forward is to encourage the high end consumers of electricity, both domestic as well as others to opt for even partial generation using solar pv. There is no advantage for the industrial consumers who continue to enjoy below cost electricity from the national grid. We can take a very important lesson from India which has a very ambitious target of 20,000 MW of solar. Already the installed cost of Solar PV in the retail market, including battery storage is at levels of IRs 145,000 per kW, (US \$ 2.05/ Wp) Recently the NTPC announced a project to develop 1000 MW of solar power with a predicted cost of generation of only IRs 5.30

The cost of a 1 kW PV systems already available in India in retail market excluding installation charges is I Rs 95,000. This just works down to < \$1.6/Wp installed, less labour charges. These are quality Products. No subsidy involved.

The potential for an immediate change in Sri Lanka is illustrated by an examination of the domestic customer base shown below.

Table I – Potential Customer Base

Category Month	Units per	No of Consumers millions 2011data	Energy Consumed annually GWh 2011 data	Tariff (in 2013) with FAC
91-120		0.507	666	21.00
121-180		0.344	588	28.00
181-210		0.146	592	33.60
211-300				36.40
301-900				44.80
>900				47.60
Total		0.997	1,846	

Source: PUCSL

Thus, there are 997,000 customers using more than 90 units per month who might be potential generators of electricity, who can contribute to lower the peak load with limited battery storage. This cohort of customers consumes 1,846 GWh of electricity. Based on the assumption that 30 per cent of their consumption is during the three peak hours this demand will consume over 500 MW of generation capacity.

With the peak demand at about 1700 MW and an average daily demand of around 1400 MW only against the 4000 MW of installed capacity that will be available by the end of 2013, all the proposed new coal power plants including Sampur are meant to meet the peak demand. There appears to be scant regard as to how such large thermal plants can be run throughout the day. What if the increase in the peak demand can be met from Solar and other renewables by suitable strategies?

Perhaps even now the proposed Sampur power plant costing over \$ 500 million?? could be reconsidered or at least deferred if adequate number of high end customers can be made to install roof top solar with adequate storage to manage their own peak hour consumption. They can recover the cost within 5 years and after that for the rest of the life of the system of over 20 years, their electricity bill will be a minor fraction of the current cost.

Thus the number of consumers who will need to be changed over is 500,000 out of the 997,000 potential customers to avoid the need for the controversial Sampur Coal Power Plant. This number coincidentally is equal to the two highest segments of the above table adding to 483,000 consumers. This is not an impractical task considering that Australia already has more than 2.5 Million PV systems installed and USA is installing a unit every 4 minutes.

ONGC is expected to invest up to Rs 5,000 crore in this project, Tarun Kapoor, Joint Secretary, Union Ministry of New and Renewable Energy (MNRE) told *Business Line* on the sidelines of the 'Solarcon India 13' meet.

"Currently, the company is in talks with the Karnataka Government for issuance of Renewable Energy Certificate (REC), power purchase rates and land to set up the 1,000-MW solar power project," he said.

Foreign Exchange Cost of Solar Power.

It has been argued that the foreign exchange cost of solar PV is high and is not affordable by the country and various other arguments have been brought forward to show that the consumers are not benefitted. However, all these arguments are based on the exorbitant prices currently charged by the few solar PV suppliers in the country, and does not reflect the true market situation. Also these arguments exhibit a remarkable lack of vision for the future. If the equipment are made available at the level of prices currently available in many outside markets, even for retail sales, all these arguments fail. Some links to such prices are given below.

www.vrmenergy.com

With respect to the issue of the foreign exchange cost of Solar PV, while development of indigenous sources such as biomass are assuredly more advantageous, it is necessary to examine carefully the comparative costs of Solar against coal power which appears to be the only solution promoted by the authorities. In addition to the initial capital cost the continuing cost of the imported fuel, which can only increase annually (In the past 20 years, in LKR terms, coal price increased about 11 percent per annum. See the chart inserted earlier) and the cost of maintenance largely governed by the cost of imported spares , will easily override any difference in the initial capital cost would indicate. Even such excess is in doubt if the additional cost of the transmission lines needed to link the large coal power plants are added. Unfortunately the Sri Lankan public is kept in the dark in respect to the actual costs incurred, for example in Norochcholai. In addition the need to commit large investments needed for the scale of coal power plants, the interest costs , the losses in transmission and many other direct and indirect costs will have to be considered before a generalization is made of the comparative costs. The roof top solar which can make a distinct dent in the demand growth will be by the consumers themselves without a burden on the state.

In the meanwhile such loose arguments lend support to the plans for the large scale development of coal power plants, which will effectively block the development of solar and other renewable sources even in the future.

At the same time we will be ignoring the positive trends that have been developing in recent years by taking an Ostrich attitude and a lack of visionary approach which was the hope of the country based on the Mahinda Chinthanaya. The projections for Germany which has far less solar intensity on one hand their own coal resources, is most revealing.

If the correct decision is made and if the vision of the Mahinda Chinthanya is applied pragmatically without being limited to a document, there is every potential to make substantial local value additions and even partial manufacture. The Sri Lanka entrepreneurs will ensure that the cost to the consumer will be even less. While countries such as Australia and Germany provided initial impetus to the development by way of subsidies etc, such are not needed in Sri Lanka now. What is needed however, it to ensure that unfair duties and other levies are not imposed or other hidden barriers are erected, to block the progress which will certainly threaten the vested interests of many.

Solar cheaper than coal foreseen by German CEO

By **Tina Casey** on 11 July 2013

In a new interview with *Deutsche Welle*, the CEO of a Germany-based global solar developer BELECTRIC made a good case for the potential for solar power to become cheaper than coal sooner rather than later. In the interview Beck had some interesting things to say about the direction of the global solar market and the potential for growth in large-scale solar power generating plants, and if anything, we think his forecast could come true even sooner than he thinks.

Solar Power Cheaper Than Coal

BELECTRIC specializes in utility-scale solar power plants as well as rooftop solar, and the former area is where the focus of the *Deutsche Welle* interview takes place.

According to Beck, large scale solar power in Germany is already “approaching the costs” of conventional power, at 10 euro cents per kilowatt-hour (kWh)

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