RETHINKING THE FOSSIL "POOR COUNTRY EXCEPTION"

Financial cost as barrier for RE in developing countries

Request for the World Bank to analyze if high cost of capital remains a barrier for deploying cost effective renewable energy in developing countries. Depending on the outcome of the analysis the bank is invited to recommend policy measures and best practices that will address the problem in line with the SE4All goal.

Coal financing ended except in poor countries

World Bank announced in 2013 that it stop financing new coal power projects, *unless the developments take place in poor countries where alternatives like renewable energy would be too expensive*[i].
At the same time and with the same exception Obama announced that US Export Import bank and other US public financing would end support for new coal plants overseas, except… *in the world's poorest countries in cases where no other economically feasible alternative exists*[ii]

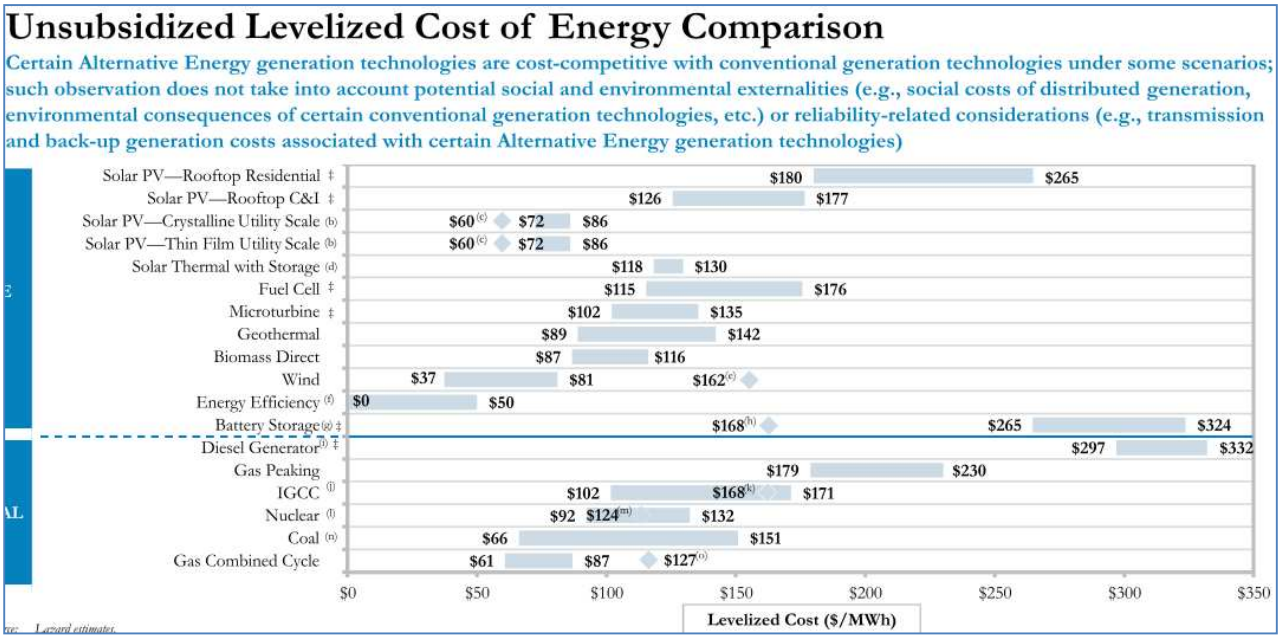

Figure 1: Cited from Lazard's Levelized Cost of Energy v.8, 2014, p2

Renewable Energy increasingly cheaper than fossil

The "poor country exception" carries a major contradiction since renewable energy (wind and solar) is now among the most cost effective type of power generation compared to <u>all types of fossil</u> (figure 1). Since solar PV is less dependent on centralised grid, the decline in the LCOE of renewable power is a historic opportunity to provide modern energy to the 1.3 billion people who are currently without[iii].

The declining LCOE[iv] of wind and solar is likely to continue. Why cheap wind and solar electricity should especially be made available to poor countries, rather than leaving them stuck with expensive fossil power.

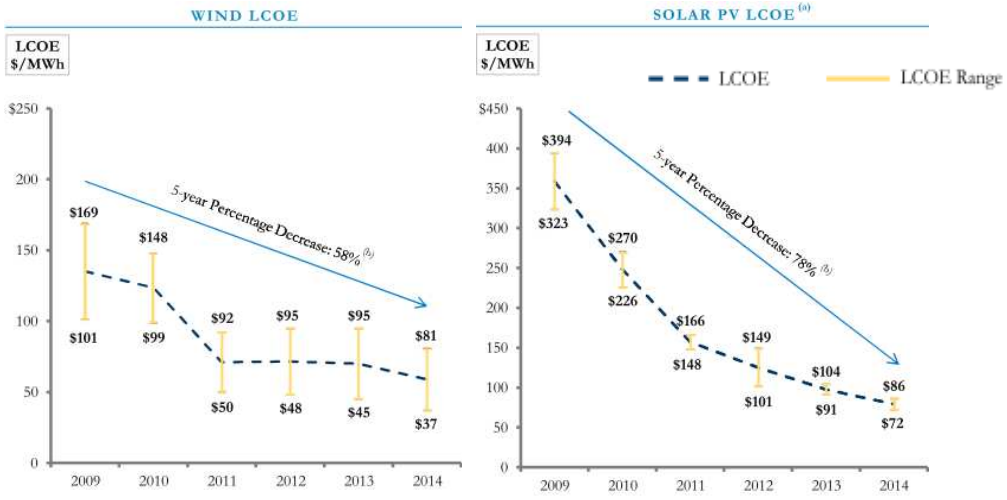

Figure 2: Cited from Lazard's Levelized Cost of Energy v.8, 2014, p9.

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Real reasons for the fossil "poor country exception".

Producing power from solar and wind is a capital-intensive power-generation technology, which requires a high upfront investment. Therefore the cost of capital has a large effect on the total LCOE-cost. Differences in the cost of capital between rich and poor countries means, that otherwise identical RE-installations will result in much higher LCOE-costs in poor countries. Two main reasons why expensive fossil power remain more cost effective than cheap RE-power for poor countries is (1) that emerging countries have high cost of capital and (2) that RE is relatively more capital intensive than fossil power.

1 High cost of capital.

RE-projects in low risk countries like Denmark and Germany can have weighted average cost of capital (WACC) of 3-5%[v]. However in developing countries WACCs will often be 10% and above (see example in figure 3[vi]). For RE-power projects in Africa WACC is typically 15-20%[vii]. Country by country figures of weighted average cost of capital (WACC) are not publicly available. However interest rate on countries' long term bonds can be used as an indicator of "risk free rate". Denmark and Germany both pay interest <1%, while many emerging economies pay 7-9% on long term bonds, indicating a WACC of 12-15%. This difference in cost of capital have massive effect on the LCOE-cost of renewable energy (figure 4[viii]).

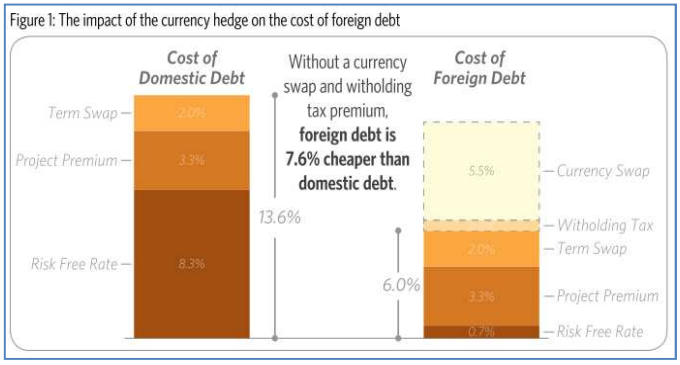

Figure 3: Cited from Climate Policy Initiative 2014

2 High cost of capital affects RE-power-projects much more than it affects fossil projects

For solar and wind power 85-95% of total costs consist of upfront capital costs (equipment and construction). In contrast operation and maintenance amount to only 5-15% of the cost of electricity.

The opposite is true for gas-power-plants where running costs for fuel, operation and maintenance represent 65-75% of the LCOE-cost of power. While upfront capital costs only amount to 25-35%[ix].

Consequently, in countries with high cost of capital, the relatively expensive fossil power plants will remain more *economically feasible* than RE-power financed at 10-15% WACC. However, as the LCOE-cost of both solar and wind seems to continue to decline (see figure 2) it is clear that the real solution is not a fossil "poor country exception", that helps poor countries building new fossil power. The solution is to develop solutions that address the cost-of-capital barrier for RE-power in developing countries.

Example: Cost of solar power at varying capital costs	Production cost per kWh LCOE USD/kWh	Financial cost as % of LCOE
3% WACC	0.08	25%
5% WACC	0.10	31%
10% WACC	0.14	53%
15% WACC	0.19	65%
20% WACC	0,24	72%

Figure 4: Solar PV example adapted from Solar Roadmap International Energy Agency, 2014, figure 12

Nordic/Baltic recommendation to the World Bank

Despite remarkable and ongoing progress in making RE cheaper high cost of capital remains for many developing countries a significant barrier for choosing RE over fossil power. Nordic/Baltic region therefore request the World Bank to analyse the role of WACC as a barrier to the deployment of wind, solar PV and other types of cost effective renewable energy and to consider:

- What is the WACC in countries with high need for additional power supply?
- What financial solutions are already being used in countries with high WACC to overcome the barrier to deployment of RE?
- The analysis should, if appropriate, be accompanied by a proposal containing concrete recommendations and policy measures to make RE-power cost effective in developing countries

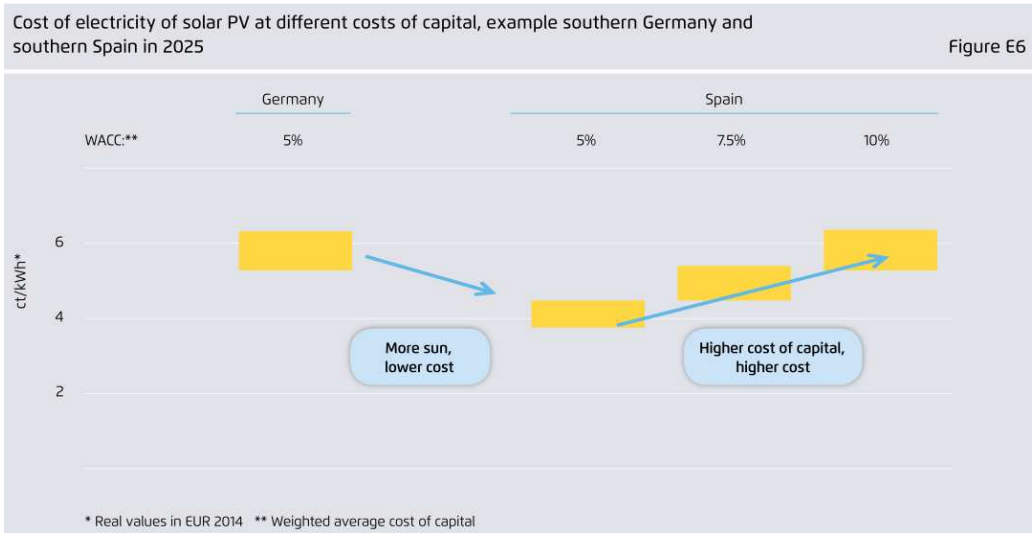

Figure 5: Cited from Fraunhofer ISE (2015): Current and Future Cost of Photovoltaics, p10

[i] http://uk.reuters.com/article/2013/07/16/us-worldbank-climate-coal-idUKBRE96F19U20130716
http://www.rtcc.org/2013/06/27/world-bank-to-stop-financing-coal-projects/

[ii] p20, http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf
http://www.bloomberg.com/news/articles/2013-06-25/obama-s-overseas-coal-pledge-to-curb-ex-im-bank-financing

[iii] P30 http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Power_Costs_2014_report.pdf

[iv] http://www.lazard.com/PDF/Levelized%20Cost%20of%20Energy%20-%20Version%208.0.pdf
Levelized cost of electricity (LCOE) represents the per-kWh cost of building and operating a generating plant over an assumed financial life. Key inputs to calculate LCOE include capital costs, fuel costs, fixed and variable operations and maintenance costs, financing costs, and an assumed utilization rate for each plant type. For technologies with significant fuel cost, fuel significantly affect LCOE

[v] International Energy Agency (2014) Technology Roadmap - Solar Photovoltaic Energy, pp24-25
http://www.iea.org/publications/freepublications/publication/technology-roadmap-solar-photovoltaic-energy---2014-edition.html
Fraunhofer ISE (2015): Current and Future Cost of Photovoltaics. Long-term Scenarios for Market Development, System Prices and LCOE of Utility-Scale PV Systems. Study on behalf of Agora Energiewende.Pp9-10, 55-65.
http://www.ise.fraunhofer.de/en/publications/studies/studie-current-and-future-cost-of-photovoltaics-long-term-scenarios-for-market-development-system-prices-and-lcoe-of-utility-scale-pv-systems

[vi] Cited from Climate Policy Initiative (2014) Finance Mechanisms for Lowering the Cost of Renewable Energy in Rapidly Developing Countries, p2. http://climatepolicyinitiative.org/wp-content/uploads/2014/01/Finance-Mechanisms-for-Lowering-the-Cost-of-Clean-Energy-in-Rapidly-Developing-Countries.pdf

[vii] p25 http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Power_Costs_2014_report.pdf

[viii] Adapted from figure 12, pp24-25, in IEA (2014), Technology Roadmap - Solar Photovoltaic Energy
http://www.iea.org/publications/freepublications/publication/technology-roadmap-solar-photovoltaic-energy---2014-edition.html

[ix] Page iii, http://climatepolicyinitiative.org/wp-content/uploads/2014/01/Finance-Mechanisms-for-Lowering-the-Cost-of-Clean-Energy-in-Rapidly-Developing-Countries.pdf