



Integrating Externalities into Electricity Supply Decisions: META Catches On

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How to make decisions when the number of variables is growing rapidly and longstanding assumptions are being overturned? That is the situation that many energy policymakers in the developing world find themselves today.

At one time, the formula for increasing the power supply was simple: meet projected energy demand at the lowest possible cost. In the process, the economy would grow, and energy services would be expanded to underserved populations.

But decades of price shocks, exploding urbanization, resource shortages, and the growing threat of climate change have upended this simple calculus. Energy price volatility has made security of supply a major concern. This in turn has introduced further complexity, as diverse sources of supply need to be integrated into national grids. And reducing pollution and carbon emissions are now imperatives for most governments.



The Model for Electricity Technology Assessment (META) is one step towards helping energy policymakers negotiate this difficult terrain. Developed by ESMAP, META provides a comparative assessment of costs for a range of electricity supply options, including renewable energy. To make effective comparisons, META uses “levelized” costs—the price at which electricity must be generated from a specific source to break even over time. One of the advantages of META is that it covers a comprehensive range of technologies, ranging from solar, wind, and geothermal, to fossil fuel-based

power.

One of the most prominent features of the model is that it integrates environmental externalities. This gives energy ministries a simple way to see the cost of adding or expanding generation from a particular power source if the health costs of local pollution and a carbon price are factored in.

Thanks to this and other features, META has already proved popular even though it has not yet been publicly rolled out. At the KTH Royal Institute of Technology in Sweden, META has been integrated into a course on energy systems analysis. At the Wharton School of Business in the US, it was used to assess energy supply costs as part of a class on energy investments in developing countries.

META is being implemented by a team led by the Worldwatch Institute to support government ministries in two countries—Haiti and Jamaica. In both cases, the team looked at the current cost of electricity supply, surveyed renewable energy resources, and analyzed fossil fuel use. That country-specific data was combined with META analysis to determine the projected cost of electricity from various sources over time. These findings were then packaged into various scenarios, allowing the ministries to make better informed decisions about their electricity future. In Jamaica, the Ministry of Energy has requested the use of META for continuing work in this area.

“This analysis of different options is presented to the government—often at the ministerial level—and they then decide how to use it,” said Pedzi Makumbe, Energy Specialist at ESMAP. “META makes it very clear what the economic benefits and additional costs are for low carbon options, which governments then can use to seek concessional financing to scale up renewable energy or energy efficiency.”

Conversely, META also makes it easier to calculate the economy-wide costs of higher-carbon generation options over time. The tool estimates negative externalities based on the demonstrated healthcare costs for local pollution,

plus international carbon prices. All such assumptions are transparent, and adjustable depending on local costs and conditions.

META takes into account changes in capital and operating costs over time, and can also factor in transmission and distribution costs for different power supply options. It can be used in conjunction with commonly-used power system planning tools, by enabling preliminary technology screening and by providing detailed technical and cost breakdowns. Users can look at options categorized by scale: off-grid, mini-grid, and grid-connected.

META was **rolled out** to the World Bank Group and selected partners and clients in June 2012. It is now being field tested by almost a dozen teams in academia, government, and the private sector. The tool will be made publicly available in mid-2013, along with a report detailing the development of the model, its data sources and assumptions.

For more information, contact Pedzi Makumbe at esmap@esmap.org

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