

Renewables rollout needs price guarantees

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Power generation from renewable sources such as wind turbines, solar cells and biomass plays a small but important part in satisfying total electricity demand around the world, and is growing at an exponential rate thanks to generous public subsidies and government support.

Renewable sources have increased their share of worldwide generation from just 0.4 per cent in 1980 and 1.1 per cent to 2.3 per cent in 2006. In its "World Energy Outlook 2008", The International Energy Agency (IEA) projects their share will double to 4.9 per cent by 2015, and then almost double again to 8.7 per cent by 2030.

Policymakers are relying heavily on renewable generation to meet projected growth in the electricity demand over the next 20 years while limiting growth in the emission of greenhouse gases.

Unlike reserves of oil and gas, which may be exhausted within the next 70 years, renewables will remain a source of power indefinitely. Much the same could be said of coal, but renewables do not contribute to increased carbon dioxide concentrations in the atmosphere.

But with renewable sources still costing more per kilowatt hour than conventional power from nuclear or fossil fuel plants burning gas and coal, renewables have not yet reached "grid parity" with other power producers and are struggling to penetrate the power market.

Market penetration depends on subsidies, price support and quota schemes mandating power suppliers buy a minimum share of their electricity from renewable. But widespread variations between countries and even within them suggest uptake is sensitive to the form in which support is offered. In particular, guaranteed prices for renewable producers have been more effective than quota systems in encouraging widespread development of wind and solar power.

Since all Organisation of Economic Cooperation and Development (OECD) governments are committed to increasing the share of renewables in total output, it makes sense to rank policy effectiveness in terms of market share rather than absolute watt hours generated.

On this measure, penetration ranges from 25 per cent in Iceland, 20 per cent in Denmark and 9 per cent in both Germany and Spain, to 1.6 per cent in the United Kingdom, 1.3 per cent in Sweden and 0.6 per cent in Japan.

In absolute terms, the United States is the world's largest producer of renewable energy with 72,000 gigawatt hours (GWh) last year. But historic policies and natural resources cannot explain why Denmark, Germany and Spain generate six times more renewable power (proportionately) than the United Kingdom, the United States and Sweden.

The main factor determining policy success is the structure of the programme. Price-support systems (used in Denmark, Germany and Spain) have been more effective than quota-based systems (used in the United Kingdom, Sweden and parts of the United States):

(1) Price-based feed-in-tariffs (FITs) guarantee renewable power producers the right to sell electricity into the grid at a fixed rate set by law, or in some variants at a premium over the peak market price or some average of the prices in a previous period:

(2) In contrast, renewable obligation certificates (ROCs) and renewable portfolio standards (RPS) are quota systems. They require power sellers to buy a minimum number of megawatt hours (MWh) or a minimum percentage of total sales from renewable sources. Power sellers receive credits for every MW of renewable power they buy and must acquire a set number of credits by the end of the compliance period, buy surplus credits from others, or pay a financial penalty.

Quotas have been adopted by the United Kingdom, Sweden and most state-level governments in the United States that have set renewable targets.

Because quota systems do not guarantee a price for the power being sold to the grid, prices remain highly variable, determined by supply and demand in the wider power market, which can make it hard to obtain project financing.

The most common objection is that FITs may not be efficient because they do not promote the sequential uptake of lowest-cost options first. Most FITs are designed so higher-cost forms of renewable generation receive higher guaranteed prices to encourage the uptake of a diverse range of technologies. But there is a risk that power consumers can be forced to pay high prices for extended periods even if the generation cost eventually declines.

Most FITs have some flexibility built into them. While prices for existing producers of renewable energy are guaranteed for the lifetime of the FIT, the terms on which new FITs are offered to new projects can be adjusted periodically in response to changes in uptake rates and costs.

The need to recover high upfront capital costs over long timescales in volatile power markets means that large-scale renewable power generation may not be consistent with private financing unless some form of price support is forthcoming.

If policymakers want to encourage it, with all the associated costs, recent experience suggests feed in tariffs and price guarantees will prove far more effective than the quota systems favoured so far in the United States and United Kingdom.

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