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Time to Rethink US Renewable Subsidies



Ivanpah Solar Electric Generating System

Government energy subsidies are standing in the way of a clean US electricity system — and US nuclear.

Nuclear power in the United States is struggling, with well-maintained plants closing early and few new projects in the works.

At the heart of these struggles lies a failed gamble: regulators and policy makers bet that market forces in de-regulated electricity markets would lead to the electricity sector that best served the needs of society.

Sadly, deregulated electricity markets have fallen well short of this target. When markets fail, economic theory recommends prudent regulation. Instead, we have US energy subsidy policy, a poor replacement.

The Logic of Energy Subsidies

Energy subsidies are intended to steer markets away from a course considered bad for society. During the early years of a technology's commercialization, subsidies are often used to increase investment and development, as well as to protect nascent industries from competition. Starting in the Carter administration with the creation of the Department of Energy, support for alternative fuel, and later renewable energy, often had this second goal in mind. Any technology that could diminish US reliance on imported oil had value, over and above its costs to consumers. It was in the best interests of the US to support these industries and help them develop.¹

Proponents of renewable subsidies often present a cut-and-dried case of resolving market failure: Renewables provide clean energy, but the extra benefit that renewables provide (very low greenhouse gas emissions) is never incorporated into the market price of electricity, making renewable projects less profitable than they should be.

US federal and state governments step in, providing investment tax credits, production tax credits, feed-in tariffs, renewable portfolio standards, and other subsidies to address this market failure. Such subsidies to renewable energy projects drive investment in these projects; indeed, renewable energy has seen significant growth over the period of subsidization, with increasingly competitive renewable generation costs compared to conventional energy sources. Renewable energy subsidies seem to have delivered.

Problems with Energy Subsidies

Dig deeper, however, and there are significant problems with these subsidy programs, many of which become clear when the impact on nuclear power is considered. In brief, US energy subsidy policy is inefficient, misguided, and often downright harmful.

Take first the aims of energy subsidization. US government support for renewables is often framed as an effort to reduce greenhouse gas (GHG) emissions, but it does so poorly, if at all.

The goals of renewable subsidy are narrow, and unhelpful: they aim to shortsightedly maximize renewable construction. Counterintuitively, this often *hinders* the proper target of reducing emissions, largely because of the intermittency problem of many renewables: they're not predictable or all-day power sources, so no matter how many wind farms and solar stations are built, the grid will still rely on base load generators. Too often, these take the form of fossil fuel plants, given the market's failure to deliver sufficient nuclear capacity and technological barriers to large-scale energy storage. Subsidies fail to resolve underlying market failures, and so narrowly favor one piece of the zero-carbon puzzle (renewables) while leaving another (nuclear) to wither.

Researchers writing in *Energy Economics*² find purely economic arguments (though possibly not political ones) favor narrowing the policy space significantly: grant-based subsidies that are paid based on physical outcomes upon completion of a project can best leverage the interaction between government and market to maximize environmental outcome for government subsidies.

However, solar investment tax credits and federal loan guarantees have led to solar energy projects that failed to deliver the expected output, including the Ivanpah project, pictured above. These federal solar incentive programs, coupled with California state renewable energy incentives, led to a boom in solar power generation in California linked to recent blackouts.

On the pollution front, the US government's left hand doesn't know what the right hand is doing. Current federal subsidies to fossil fuels run to \$20 billion a year, according to the Environmental and Energy Study Institute,³ including around \$4 billion for heavily polluting coal industries. Energy subsidies have always been more focused on safeguarding energy security and entrenched economic agents than reducing harmful pollution.

Energy subsidies can also distort electricity market outcomes. Some forms of quantity-based renewable subsidies, like production tax credits (mainly for wind) and feed-in tariffs can increase the effective revenue earned from renewable project output. This, coupled with the design of electricity spot markets, results in distortions to market prices. Generators bid into electricity markets with the price they are willing to accept, and bids are accepted from lowest to highest, with every generator being paid the value of the last bid accepted (the spot price).

Renewable generators often have incentive to bid negative prices: paying electricity markets to take their power. This counterintuitive outcome is the result of production-tied subsidies that are paid to generators only when they operate. The net effect of such subsidies is to put downward pressure on the spot price, squeezing all producers. Renewable producers benefit from this situation, as evidenced by strong investment in new renewable projects. Renewable subsidy schemes are delivering their goal, but the unintended consequences can be severe.

Collateral Damage

A significant problem with current renewable subsidies is the harm they deal to other producers. Nuclear power plants operating in electricity markets, for instance, are economically sensitive to spot prices, on which they depend to cover their fixed costs. When prices fall below break-even, nuclear plants lose money. The typical response of owners is to close nuclear power plants to stop financial losses (e.g. Kewaunee and Vermont Yankee).⁴ US nuclear power plants, once closed, have no path to re-start later, even when the physical plant could safely operate for decades more. Downward pressure on spot prices, like that caused by quantity-tied renewable subsidies, can be fatal for nuclear plants.

This should be worrying. A nuclear power plant is a valuable physical asset, a provider of high-quality jobs, a reliable source of generation capacity, and a significant provider of emissions-free electricity. Nuclear power can go toe to toe with wind and solar for lifetime GHG emissions, as well as providing reliable output that intermittent renewables cannot. Reactors provide baseload electricity, operating with capacity factors above 90%, rain or shine, wind or calm.

Practically speaking, this means that when a nuclear plant closes, its generation isn't replaced by renewables; it simply can't be. Instead, displaced nuclear generation is replaced by the cheapest available *reliable* generating technology: carbon-emitting natural gas. Thus, whenever a nuclear plant closes, GHG emissions go up.

A Better Way

There are known solutions to the problems created by US renewable subsidies. While the challenges facing nuclear power are not wholly reducible to errors of subsidy policy, the fact remains that current subsidy design is inefficient and sometimes explicitly harmful to the goal of reducing GHG emissions.

Federal and state governments should undertake a systemic review of renewable subsidies, focused on developing subsidies that reduce *total* electricity sector GHG emissions, rather than the blinkered goal of simply getting more renewable projects built. Then, the federal government should phase out subsidies for fossil fuels; earmarking these funds for financing a national nuclear build program would be a step forward.

Crucially, that will mean a harmonious set of overlapping and mutually reinforcing programs that are non-distorting, technology-specific, long lasting, and predictable. Long-term predictable subsidies are especially important for nuclear power, where projects operate for many decades.

A key part of this approach should be a price on GHG emissions nation-wide, through a carbon tax or an emissions trading scheme. Such a policy could effectively internalize the negative externalities that have been benefiting fossil fuels for as long as energy has been priced, to the benefit of nuclear and renewable generators and to society at large.



High Time for Change

It is well past time to re-think US federal energy subsidy policy. The federal government seems to have no clear goal, and the market approach currently in effect is failing to deliver the best for society. Government action is needed to resolve this failure, but it must be the right action. Current subsidy policy is falling short.

This NECG Commentary was written by James Boucher.⁵

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Contact: Edward Kee, CEO; +1 (202) 370-7713; edk@nuclear-economics.com; www.nuclear-economics.com

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- ¹ Mona L. Hymel and Beth S. Wolfson, “Americans and their “Wheels”: A Tax Policy for Sustainable Mobility,” *Arizona Legal Studies*, Discussion Paper 06-15, (2006).
 - ² Richard G. Newell, William A. Pizer, and Daniel Raimi, “US federal government subsidies for clean energy: Design choices and implications,” *Energy Economics*, Vol. 8, (May, 2019).
 - ³ Clayton Coleman and Emma Dietz, “Fact Sheet: Fossil Fuel Subsidies: A Closer Look at Tax Breaks and Societal Cost,” *Environmental and Energy Studies Institute*, (July 29, 2019).
 - ⁴ See [NECG Commentary #27](#).
 - ⁵ James Boucher is an NECG Associate that is completing coursework at the London School of Economics.