INTENDED AND UNINTENDED CONSEQUENCES OF US RENEWABLE ENERGY POLICIES

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Overview

Over the past four decades, the US has employed a range of policies aimed at moving the US energy mix towards more renewable and domestic resources. The objectives of doing that have been to reduce GHG emissions, to reduce dependence on foreign oil, and to increase rural incomes (Tyner 2008b). While most economists might suggest a more generic carbon pricing mechanism such as a carbon tax so that the market decides the mix of technologies that would be utilized to achieve emission reductions, policy makers have chosen subsidies and mandates targeted directly at different forms of renewable energy. The sizes and mechanisms differ, but the mechanisms have been basically government deciding what technologies will be favored.

For biofuels, the US and governments around the world initially used government subsidies or tax breaks to advance biofuels, but as the budgetary cost of those approaches became clear, most governments (e.g., US, EU, and Brazil) moved to mandates of one sort or another (Tyner 2008a). Mandates, of course, pass the cost on to consumers instead of the government budget. In this paper, we will review the intended and unintended consequences of the two main biofuel policies in the US – the Renewable Fuel Standard (RFS) and the California Low Carbon Fuel Standard (LCFS).

For wind and solar energy, a mix of subsidies and mandates have been employed. About 30 states have some form of Renewable Portfolio Standard (RPS) requiring some minimum fraction of renewable energy in the electricity generation or consumption mix (U.S. Department of Energy 2017). The federal government has tax credits for both solar and wind energy that have stimulated quite a bit of investment in those technologies. We will also evaluate the consequences of US policies in these areas.

In doing the evaluation, we will assess the policies using the following criteria:

1)To what extent did the policy achieve the objective of increasing production and consumption of the targeted renewable energy.

2)What was the cost of achieving the renewable energy increase, and how does it compare with the government estimated social cost of carbon (around $40/ton) or with the implicit carbon price often associated with achieving the aims of the Paris accord ($160/ton or higher).

3)To what extent did the policy reduce US dependence on foreign energy?

4)What were the unintended consequences of the policy, and how could we deal with them?

Methods

Various tools have been used ranging from excel models to energy sector modelling (MARKAL) to CGE modelling (GTAP) have been used in the analysis.

Results

All the forms of renewable energy have achieved market penetration far above what would have happened in the absence of the policies. The real question is at what cost? The currently estimated social cost of carbon (SOC) is about $40/ton, and the implied carbon cost to achieve the COP21 Paris agreement is about $160/ton. The biofuel emission reductions clearly cost more than the SOC and even generally more than COP21. If we use the estimated social cost of carbon (SCC) of about $40/ton (Interagency Working Group on Social Cost of Carbon 2013), that translates to about $0.19 cents per gallon of gasoline or $0.27/gal. of biodiesel (U. S. Environmental Protection Agency 2017). Current estimates are that ethanol reduces emissions by about 25%, and biodiesel about 60%. Thus, the savings would be equivalent to about $0.05/gal. for ethanol and $0.16/gal. for biodiesel. Those social cost of carbon values translated to $/gal. are far lower than May 2017 Renewable Fuel Identification Number (RIN) prices, which reflect the “cost” of the RFS. The biodiesel (D4) and ethanol (D6) RIN prices as of May 20, 2017 were $0.92

and $0.67/gal., far above the value of emissions reduction based on the SCC. We also estimate that the carbon price equivalent for wind energy subsidies amounts to $32/ton, and to $79/ton for solar. Thus, the wind energy subsidy is actually less that the social cost of carbon estimate. Solar is more than the carbon cost, but less than the carbon tax equivalent estimated to achieve the COP21 Paris accord emission reductions.

For forest carbon sequestration (FCS), it is a very effective means of sequestering carbon – so effective, in fact, that it could lead to very large food price increases due to land conversion from crops to forestry at large scale. For FCS or biofuels, the ultimate constraint is land, and, of course, if both were to grow significantly, then the consequences would be even more severe. The food-fuel issue has been important for biofuels at least since the commodity and food price spikes in 2008 at low levels of penetration and could increase at higher levels of penetration. The recent fall of the import share US oil consumption was during the period of the rapid increase in US biofuels, but biofuels are only part of the story. The big story is US shale oil production growth and the recession following the financial crisis of 2008 reduced oil demand considerably. For renewable electricity, the issue is intermittency, which requires costly backup once renewable electricity becomes a significant fraction of the power generating system. At low levels of penetration, these issues may not impose significant costs on the utility or on non-solar or wind customers. However, there is clearly an added cost for non-renewable customers. In essence, the current system in most states subsidizes renewable energy supplying customers with higher fees from other customers.

Conclusions

There are three important conclusions that emerge from this literature review and analysis. First, it is clear that policy makers based on their actions have a preference for regulation as opposed to pricing mechanisms like carbon taxes. Second, there is clearly a difference between low levels of renewable energy penetration and high levels. Third, as evidenced by this article and many others, it is much easier to quantify costs of renewable energy policies than benefits. Perhaps the most important unintended consequence is the difference between impacts at low levels of penetration and high levels. Most of the analysis done to date has only examined impacts and costs at low levels of penetration. To achieve the goals of COP21 (Paris accord), we will need much more aggressive climate policies, and that means we will be forced to deal with the high penetration level consequences.

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