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Energy efficiency as a resource in state portfolio standards: Lessons for more expansive policies

Autumn Thoyre

Department of Geography, Colgate University, 321 Ho Science Center, Hamilton, NY 13346, USA

HIGHLIGHTS

- Energy efficiency in 36 U.S. state portfolio standard policies was analyzed.
- Such standards were found to incentivize mainly demand-side energy efficiency.
- Supply-side energy efficiency was rarely incentivized by portfolio standards.
- Such framings likely limit the carbon mitigation potential of these policies.
- Recommendations are made for more expansive portfolio standard policies.

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ABSTRACT

In this paper, state electricity portfolio standards in the U.S. are analyzed to examine how energy efficiency is being created as a particular kind of resource through this type of climate change governance. Such policies can incentivize energy efficiency by requiring or encouraging electricity providers to meet a certain percentage of their demand through energy efficiency measures. North Carolina's portfolio standard is used as an in-depth case study to identify factors that are then compared across all 36 states that include energy efficiency as part of a portfolio requirement or goal. The main finding of this study is that state portfolio standards tend to emphasize demand-side energy efficiency, or energy efficiency on the customer's side of the electricity meter, and only rarely incentivize a full range of both demand-side and supply-side efficiency changes. As a result, the amount of energy efficiency and climate change mitigation benefits that are likely to result from this type of portfolio standard policy tool are limited. From this analysis, lessons are drawn out for crafting stronger portfolio standards that incentivize a wider range of efficiency changes across electricity networks.

1. Introduction

Energy efficiency, or using less energy to result in the same level of a desired service, offers diverse benefits to societies and individuals. Given the high levels of energy wasted in the U.S. economy, which have been estimated at 59% (LLNL, 2014) to 86% (Laitner, 2014), saving energy has significant potential for low- or zero-carbon ways of meeting demand for energy services. At a net economic savings, energy efficiency could reduce an estimated 40% of U.S. and global greenhouse gas emissions (Granade et al., 2009), lowering projected 2020 energy consumption by 20–24% (Beinhocker et al., 2008). Energy efficiency measures have been proposed to meet rising future energy demands without the construction of new power plants Farrell et al., (2010), to "buy time" for a transition to renewable energy technologies (Creyts et al., 2007), to lower the overall costs of mitigating climate change (Lenard, 2009), and to save economies money (Wilkinson et al., 2007) while meeting energy demand with minimal security concerns (Schweitzer and Tonn, 2003).

For these reasons and others, many U.S. state legislatures have passed laws incentivizing energy efficiency improvements. The current study examines a particular kind of such environmental governance, the energy efficiency portfolio standard (EEPS)[1], a policy tool that requires or encourages electricity companies to meet a certain percentage of their electricity demand through energy efficiency measures. The reduction of greenhouse gas emissions is one of many goals that the inclusion of energy

[1] This study uses the term "portfolio standard" (RPS, or Renewable Portfolio Standard, and EEPS, or Energy Efficiency Portfolio Standard) to include both requirements (denoted in this article as "portfolio requirements" or PRs: RPR or EEPR) and goals ("portfolio goals" or PGs: RPG or EEPG).

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efficiency in portfolio standards can seek to accomplish (Downs and Cui, 2014). Renewable energy and energy efficiency portfolio standards have diffused across the U.S. electricity regulation landscape, becoming a "trendy" policy tool in recent years (Chandler, 2009). This study focuses on the case of North Carolina's portfolio standard and widens to compare across 35 other state policies. Although there is no federal portfolio standard in the U.S., Congress has considered such policies; for example, the proposed Waxman–Markey American Clean Energy and Security Act of 2009 (H.R. 2454) would have included a renewable energy and energy efficiency portfolio standard of 20% by 2020. Both renewable energy and energy efficiency portfolio standards are potential tools for the U.S. to meet post-Kyoto Protocol international climate treaties, among other goals.

Many electricity stakeholders, including environmental organizations, electricity companies, policymakers, and researchers, have framed energy efficiency as a "resource" in portfolio standard policymaking. In discussing NC's portfolio standard, a variety of state environmental NGOs[2] called energy efficiency a "low cost resource"; the electricity company Duke Energy[3] referred to it as a "'fifth fuel'…along with coal, nuclear, natural gas, or renewable energy" and a "virtual power plant"; and the energy consulting firm GDS Associates (2006) referred to it as a resource with a supply curve like any other resource (a framing that can be seen beyond the case of NC: e.g. in Granade et al. (2009) and Lovins (1989)). This treatment of energy efficiency as a resource is common in other states' portfolio standards, as when IN's (Ind. Code § 8-1-37) and VT's (Vt. Stat. Ann. Tit. 30 § 8001 et seq.) policies call it a "clean energy resource," NM's (N.M. Stat. § 62-17-1 et seq.) policy calls it a "cost-effective resource," or DE's (Del. Code tit. 26 § 1500 et seq.) policy calls it an "energy supply."

Although such framings of energy efficiency as a resource occur far beyond portfolio standards, the current study examines these policies because the way they define energy efficiency delimits what kind of efficiency changes will be promoted – and likely result - from such standards. The objectives of this paper are to examine how state portfolio standards have defined energy efficiency as a particular kind of resource and the implications for the extent to which such policies can maximize the energy efficiency they are incentivizing. This study's main finding is that current laws limit the amount of energy efficiency that is incentivized through this type of environmental governance because they focus on, and frequently explicitly limit changes to, demand-side energy efficiency. From this analysis, lessons for crafting stronger, more expansive energy efficiency-promoting portfolio standards are drawn out.

1.1. Energy efficiency under traditional electricity regulation

Under traditional regulatory structures, Investor-Owned Utilities (IOUs)[4], the most common type of electricity provider in the U.S. and NC, face disincentives to encourage or implement energy efficiency measures on two time scales. In the short-term, IOUs in NC and many other states face the throughput incentive, because once prices in regulated states are set by a state regulatory body every few years, the utility loses revenues if energy efficiency measures are implemented by customers (Croucher, 2011; RAP, 2011a). IOUs sometimes refer to the resulting perceived threat to profits as "regulatory lag" (e.g. Duke Energy, 2012). In the long-term, the disincentive for IOUs to encourage or implement energy efficiency measures results from the Averch–Johnson Effect, whereby profits for IOU shareholders stem from a rate of return on investments (the rate base), for example in new power plants (Shively and Ferrare, 2004: 174–175). IOUs thus experience an incentive to expand this rate base (Shively and Ferrare, 2004: 175) by investing in new power plants and other infrastructures to meet perceived or actual increasing demand by customers. This effect can result in long-term disincentives for IOUs to encourage their customers to save energy because lowered demand can make it difficult to justify the investments upon which profits are based (RAP, 2011b).[5]

1.2. Policies to incentivize IOU energy efficiency

Multiple policy tools have been used to encourage electricity providers to implement energy efficiency changes in the face of these disincentives, starting with demand-side management programs in the 1970s (Gillingham et al., 2006; Hirsch, 1999: 136). State policies have put in place energy efficiency programs administered by state agencies, third parties, or, as in NC and other states using portfolio standards, the utilities themselves (Hausauer, 2009). Many states have laws requiring IOUs to meet demand through "least cost" methods (e.g. N.C. Gen. Stat. § 62-2(3a)), which is often energy efficiency measures, rather than building new power plants (e.g. Molina, 2014). Yet because this requirement alone is often not sufficient to maximize cost-effective energy efficiency, states often use other policy tools. Decoupling, for example, allows the price of electricity to be adjusted more frequently than traditional rate cases in order to adapt to, and even incentivize, implementation of energy efficiency programs (RAP, 2011a); it has been adopted by sixteen states (NRDC, 2014). NC has decoupled natural gas but not electricity (Morgan, 2013). Decoupled states also often implement portfolio standards; both deregulation and decoupling are likely to mainly reduce the throughput disincentive to energy efficiency, leaving the Averch–Johnson disincentive intact.

Portfolio standards are sometimes seen as a limited form of decoupling, but they are considered distinct policy tools because of their different compensation mechanisms for incentivizing energy efficiency (NCUC, 2008). Through the rulemaking process for the state portfolio standard, the NC Utilities Commission ruled that IOUs that encourage their customers to use less electricity can file for riders (small additions to the base price of electricity) between rate cases to compensate the IOUs for their energy efficiency programs through two main mechanisms. First, IOUs can increase the price of electricity to pay for implementation of the energy efficiency programs themselves. A high rate of return for shareholders on such energy efficiency investments can incentivize them over traditional investments (RAP, 2010), potentially reducing the Averch–Johnson incentive toward greater investments in traditional power plants. Second, IOUs in NC can apply for compensation for "net lost revenues," or sales of electricity that do not occur because the energy is saved instead[6], reducing the throughput disincentive to energy efficiency.

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[2] In official comments on La Capra Associates' pre-RPS NC study (01.19.07).

[3] In docket E-7, sub 831 (05.07.07).

[4] IOUs are private entities owned by shareholders; the other two main types of U.S. electricity providers are municipalities and co-ops, which face somewhat different dis/incentives than IOUs and are sometimes assigned less stringent requirements in portfolio standards. The current study focuses on IOUs, but many of the findings also apply to these other types of electricity providers.

[5] However, because under some circumstances (even in the absence of regulations promoting it) demand-side efficiency can reduce the costs of producing electricity more than it raises electricity rates (Hirst, 1992), IOUs may sometimes view it as a profitable way to meet demand, particularly peak demand (Lenard, 2009), without raising rates, which can be politically unpopular (Lovins and Lovins, 1996).

[6] E-100, sub 113 (02.29.08).