The Chilling Effects of Administrative Burden on Efficiency Policy Uptake: Examining the Case of Federal ESAs

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ABSTRACT

Utilizing policies and programs which incentivize energy efficiency or on-site renewables is difficult. The challenges and costs associated with researching these policies, interacting with their providers, and ensuring regulatory compliance can be collectively referred to as *administrative burden*. To better understand the impact of administrative burden on energy efficiency policies, we investigated the administrative burden associated with *energy sales arrangements* (ESA). ESAs are a contracting vehicle related to energy savings performance contracts where an energy services company designs and constructs a renewable energy system at a federal site, transferring ownership of those generating assets to the site after a 20-year term. We conducted a series of in-depth interviews with a variety of relevant ESA stakeholders, including federal project managers, subject matter experts, and energy service companies. We then augmented these interviews with a review of the relevant literature. This research indicated that the current level of administrative burden decreases the adoption of renewable energy through ESAs by the federal government by raising upfront costs, depressing project attempts due to complexity, and introducing delays and challenges in successfully implemented projects. This chilling effect is especially pronounced in new policy vehicles and with inexperienced implementers. Findings from the specific case of ESAs can be generalized to other types of energy policy including efficiency programs. Policy makers decrease the efficacy of initiatives through increased administrative burden, and these effects will be most pronounced in programs with novel design or targeted at unfamiliar audiences.

Introduction

Federal procurement of on-site renewable energy systems is complicated. The challenges of financing these systems, interacting with utility companies, and ensuring regulatory compliance can be collectively referred to as administrative burden. Generically, administrative burden refers to the work, effort, time, and other resources required to execute a policy or project, including but not limited to financial resources. Our research focused on the administrative burden borne by federal actors to implement onsite renewable energy systems. This burden is multifaceted and evolving as the regulatory environment changes. Some regulations are legislated by Congress, such as the Energy Policy Act of 2005, which requires the federal government to acquire 7.5% of its power from renewable sources (US Government 2005). Other regulations occur at the chief executive, federal agency, state, or local level. Balancing these varied, and sometimes in direct tension, pressures can be challenging. This research seeks to investigate what effect does this administrative burden have on federal adoption of on-site renewable energy systems?

We'll begin with a general discussion of administrative burden, including a brief review of the relevant literature, followed by a characterization of the specific administrative burden facing federal stakeholders in implementing on-site renewable energy projects through the ESA contracting vehicle. We'll then discuss the results of our structured interviews with relevant ESA stakeholders, concluding with a discussion of our findings which can be generalized to broader energy policy

Administrative Burden – Definitions and Literature

The last decade has seen the development of a robust literature on the effects of administrative burden on policy uptake. Research into the effects of public procurement regulations found that the additional compliance costs associated with new rules caused some purchases to be avoided altogether (Carril 2019). Another investigation found that as perception of administrative burden increased, likelihood that a policy would be executed by public actors decreased (Burden et al. 2012). Public employees possess finite time, resources, expertise, and energy; as the costs of implementing a policy increase, the frequency of that policy being implemented decrease.

Some forms of administrative burden directly raise financial costs, one canonical example being "buy American" requirements which raise the costs of government projects or purchases (Platzer and Mallett 2019). We'll refer to these financial cost increases of administrative burden as *accounting costs*. The non-financial resources which are required to comply with policy, the other major component of administrative burden, we'll refer to as *non-financial costs* or *compliance costs* (Herd and Moynihan 2019). Additionally, perception of associated administrative burden can reduce adoption of a policy as potential beneficiaries perceive the cost of compliance as exceeding the benefits of the policy or their capacities, a phenomenon known as a *chilling effect* (Mimler 2018).

Much of the existing literature on administrative burden focuses on citizen state interactions (Masood and Azfar Nisar 2021; Moynihan, Herd, and Harvey 2015). While often invoked as "policy making by other means" in the case of federal energy efficiency programs, there is theoretically broad alignment between policymakers and federal facilities in the benefits of reduced site energy costs. Accordingly, our research sought to investigate whether the existing conceptual regime of administrative burden would be applicable to governmental actors as well as private citizens through the specific case of energy sales arrangements.

Large scale retrofits and on-site renewable energy installations carry significant up-front capital costs and can have long payback periods. To compensate for these challenges, in 1992 congress required the Federal Energy Management Program to develop an alternative contracting vehicle for federal purchasers. This contract, what become known as an energy services performance contract or ESPC, involved an energy services company (ESCO) who work routinely with the federal government. As defined by the Department of Energy, ESCOs "develop, design, build, and arrange financing for projects that save energy, reduce energy costs, and decrease operations and maintenance costs at their customers' facilities" ("Energy Service Companies" n.d.). ESCOs assume the technical and performance risks of a given energy conservation project, receiving payment based on the actual energy savings. The general structure of an ESPC is as follows: an ESCO performs a site audit to determine the energy use of a facility, the ESCO then purchases and installs more efficient technologies (LED lights etc.), and receive a guaranteed portion of the realized energy costs savings.

There is a financing vehicle related to an ESPC known as an energy sales arrangement (ESA) where an ESCO constructs a renewable energy system on a federal site, and owns the power generating asset for a term of twenty years. This allows the ESCO to take advantage of any available tax incentives, boosting the overall financial viability of the project. The federal facility will then pay the ESCO on a per kilowatt-hour (kWh) basis for the power generated, as well as financing a reserve account to buy the generating assets at the end of the contract. ESAs are additionally related to more general power purchase agreements (PPA), but were formally defined by an Office of Management and Budget (OMB) memo, OMB M-12-21.

It is worth overviewing how the origin and value proposition of PPAs, and how they differ from ESAs. Both are energy-as-a-service contracts, where over the life of the contract an ESCO owns and operates the generating assets. PPAs have been purchased by both private and public facilities since 2007. The value proposition of a PPA is straightforward: installation and operation of the renewable generating assets is handled by an entity with domain expertise who then sells the power to the purchaser at a discounted rate owing to government financial incentives. Public purchasers are especially well served by this contract as the financial incentives are exclusively delivered through the tax code. These tax incentives include accelerated depreciation for generating assets which was introduced in the Energy Policy Act of 2005 as well as the renewable energy tax credits originally introduced in the American Recovery and Reinvestment Act of 2009. Additionally, ESCOs can classify all costs associated with the project as business expenses for tax purposes. What this means in practice is that for private purchasers, the upside of a PPA is mostly the minimal up-front cost and external management of operations and maintenance; private actors can (and often do) take advantage of the incentives in the tax code to build their own renewable energy systems. In contrast, tax exempt entities cannot access these incentives and so require a PPA or an ESA to internalize this fiscal externality.

From this piecemeal sequence the PPA contracting vehicle emerged, and in 2011 executive branch stakeholders convened to determine how it could be implemented at the federal level. There was not consensus among these stakeholders that federal facilities had the statutory authority to engage in PPAs, but federal facilities are unambiguously capable of ESPCs. Accordingly, modifications were made to the underlying PPA contract to make it consistent with the structure of ESPCs, namely the purchase of the generating assets by the facility at the end of the contract with that purchase pre-financed over the life of the contract. While legally unambiguous, the resultant ESA contract structure is complex and unlike typical federal service contracts. It is also more challenging to implement compared to conventional PPAs, requiring multiple fair-market audits, and an interest-bearing reserve account. For our purposes, state and local government PPAs serve as a useful control case for ESAs: both contracts are a mechanism for tax-exempt entities to capture renewable energy tax incentives. The main difference between the contracts is the administrative burden we outline. Our hypothesis was that the regulatory complexity and high administrative burden of ESAs would act as barriers to federal renewables adoption.

Methods

We drafted formal questions on our research topics which were reviewed by internal stakeholders, then conducted a series of semi-structured in-depth interviews in spring of 2021 and 2022. These questions were augmented with opened ended conversation to allow our subjects to provide greater depth. Each interview was conducted by two researchers who took detailed notes while audio was recorded. We converted these recordings to transcripts with the

Otter.AI software package. We compiled the researcher notes and transcripts in a shared database. We then compared these findings to clarify discrepancies and cross reference researcher notes to relevant transcript quotations.

The interview subjects included a variety of stakeholders in the implementation of ESAs including ESCOs, a federal project manager, and renewable energy subject matter experts. The ESCO stakeholders included members of both the project management and project structuring groups and had collectively worked with multiple federal agencies on a variety of projects. Another interview was conducted with a group of federal renewable energy project subject matter experts. They provided technical expertise and project management guidance on the implementation of energy efficiency and renewable energy projects to federal agencies, including the implementation of ESAs. We interviewed a project manager of a federal agency who had successfully shepherded an ESA through planning and implementation. We also interviewed a state government renewable energy subject matter expert, whose work supports state agencies in implementing PPA contracts. The breakdown of interview subjects is shown in table 1.

Table 1

Organization Type	Stakeholder Type	Number of Participants
Public	Federal Renewable Energy SME	3
	Federal Project Managers	1
	State Renewable Energy SME	1
Private	Energy Service Company	4

Interview subject backgrounds. The federal and state renewable energy subject matter experts differed slightly in discipline, though both were ultimately responsible for providing support to respective agencies in the execution of these energy-as-a-service contracts. Note that all government stakeholders were drawn from civilian agencies. This includes the project manager, though the site in question is a shared facility with an agency of the Department of Defense.

Our interviews indicated that the current level of administrative burden decreases the adoption of renewable energy by the federal government by raising upfront costs, depressing project attempts due to complexity, and even in successfully implemented projects introducing delays and challenges. This results in fewer on-site renewables and a less energy efficient federal

government, raising the cost to taxpayers for federal energy consumption and compliance with the federal renewable energy standard.

Findings

From our analysis of the interviews, stakeholders identified two major themes relating to administrative burden of ESAs: cost increases and chilling effect.

Cost Increase – Accounting Costs and Administrative Capacity

Public procurers are highly sensitive to initial costs when making purchases (Wang et al. 2020). Accordingly, any policy which directly raises upfront costs will bring some projects beneath the break-even point economic viability. Even in projects which remain life cycle cost effective with the costs of administrative compliance included, anything which narrows margins depresses project implementation by making their investment less attractive. Our ESCO interview subjects highlighted the up-front cost increase imposed by OMB M-12-21 as a key barrier to further federal adoption of renewables. They noted that on-site renewables compete directly with local utility costs, making even small increases in the per-kWh price potentially highly impactful to project viability. The ESA structure increases cost through the end-of-contract asset purchase requirements. This purchase is required to make the contract consistent with the structure of ESPCs, where more efficient products are purchased rather than leased, and executive agency budgetary statute where scheduled purchases must be prefinanced. In an ESA, the required prefinancing of the purchase amounts to an increase in the per-kWH cost of the energy purchased through the contract.

Further, as the assets are purchased at fair-market-value, they require financial projection and appraisal during the planning stage of the project, and this appraisal is updated periodically over the life of the project. According to our interview "appraising asset depreciation requires expertise external" to the federal facilities where the projects are implemented. This expertise is expensive with total auditing costs totaling "five to six figures". The depreciation appraisal process requires significant planning and delays project implementation "up to doubling the duration of the planning phase". In the case of one project "the planning phase extended a full three years before installation could begin". The uncertainty of asset deprecation was also identified as an issue, as "future-cost variability is interpreted as a cost increase". Federal agency budgets are appropriated by congress, and costs of underestimation exceed those of overestimation, leading federal project managers to interpret a range of costs as functionally the highest cost estimate. The financial and compliance burden imposed by the asset purchase requirement was rated by one of our interview subjects as "one of the top three" barriers to federal adoption on renewable energy.

In addition to directly raising costs, the administrative burden of the ESA contracting structure can also make financing more difficult to obtain. One of the interview subjects indicated that entire blocks of investors "won't touch [these types of projects] due to administrative complexity". Another interviewee scaled the hesitance at "three out of five external financiers avoid these projects as they don't want to act as owner of the asset, even temporarily". Access to capital is crucial to meet the high up-front cost of energy efficiency and renewable energy projects. Our interview subjects indicated that general unfamiliarity by investors with ESA projects and a small number of completed projects contributed to hesitancy. These factors compound on one another to drive down rates of renewable energy adoption: the

higher up-front cost shrinks the pool of viable projects, the project development delays defer ESCO project revenue, the asset-ownership model raises investor skepticism. The resultant scarcity of ESA projects then compounds investor skepticism, and delays the broad familiarity and learning-by-doing which could alleviate these barriers to adoption. We'll now explore this theme of the compounding chilling effects of project rarity as identified by our interview subjects.

Chilling Effect

Our interview subjects emphasized the compounding interaction between cost increase and project rarity. One example of this interaction highlighted was state-level regulatory inconsistency. ESAs are not universally perceived as legal by agency council, and in some states PPAs and related contracts are explicitly prohibited as shown in figure 1. Further, even in states where they are not expressly prohibited, their legal status can be murky, and "agencies will express concern that the legality of the contract will be challenged". The amount of effort and resources which would be required to navigate these questions of legality disincentivizes projects, and the lack of projects raises the cost of navigating these legal obstacles. This keeps stakeholders unfamiliar with the process and deprives them of relevant examples. The elements of administrative burden mutually reenforce and compound on one another. The legal inconsistency is driver as well as a byproduct of project rarity. This feedback effect makes the whole chilling effect imposed by administrative burden greater than the sum of the constituent parts.

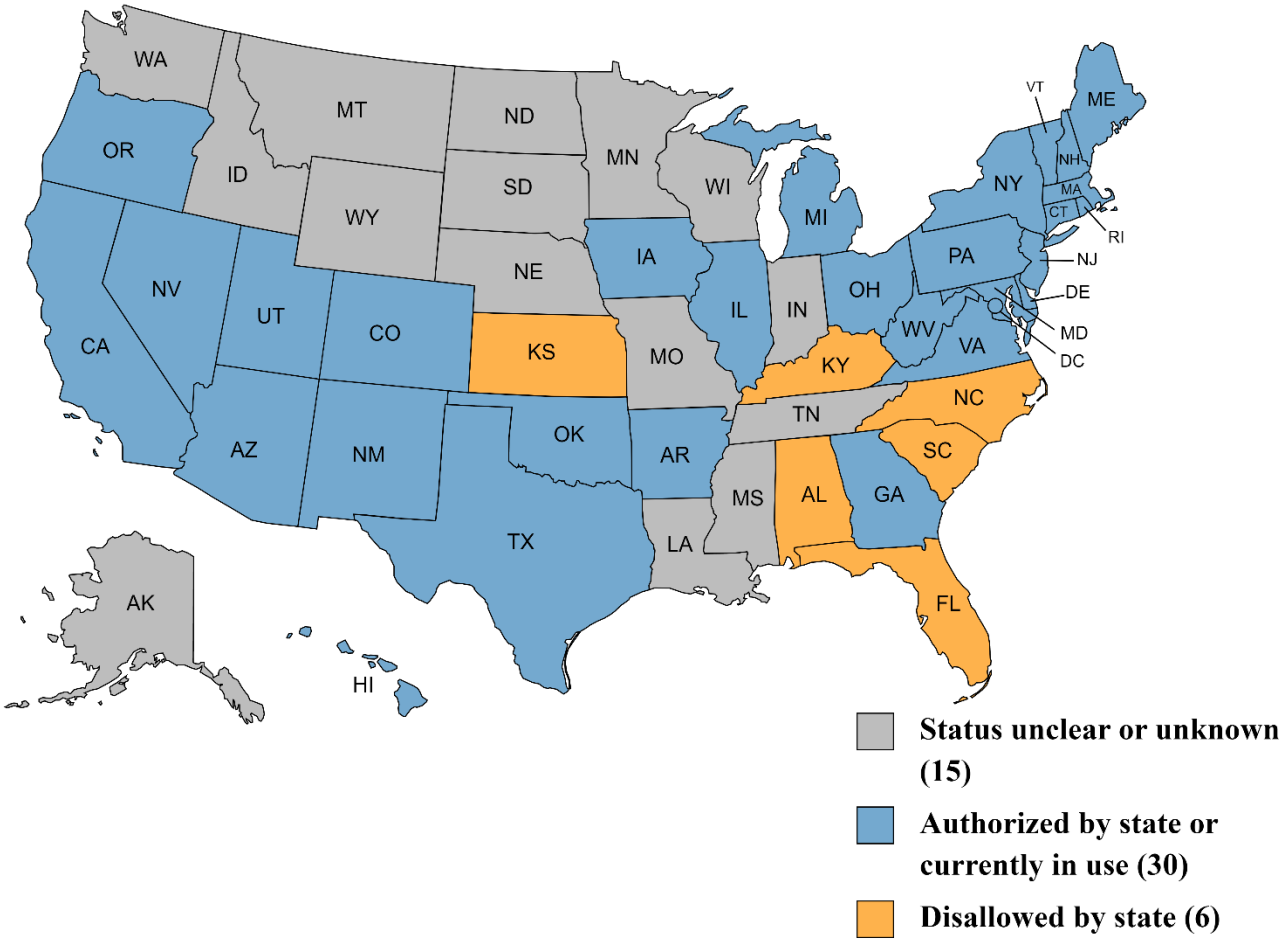

Figure 1: Legal Status of 3rd Party Power Purchase Agreements in U.S. States, and the District of Columbia. Figure reflects legal status as of August 2021. Note that third party power purchase agreements are authorized in Puerto Rico, though their status in the other US territories is unknown. *Source:* Database of State Incentives for Renewable Energy (DSIRE) web portal.

Returning to federal adoption of on-site renewables through ESAs, expertise is not evenly distributed between federal agencies, with "siloing presenting a significant source of administrative burden". ESAs do not have universal buy-in, and some agencies remain skeptical, "the very concept of the reserve account is controversial" within federal agencies, as different legal departments had differing views on its agreement with existing statute. Interactions with utilities was another source of friction brought up as inconsistent across geography, with some utilities being highly cooperative while others expressed opposition. Taken together, these findings describe a regulatory environment where installing distributed solar on federal sites using an ESA contract requires significant levels of time, money, and effort. The skills and expertise to overcome this administrative burden is siloed both between and within federal agencies. The resultant rarity of installed renewable energy systems via ESA contracting compounds the challenges associated with these projects. This is not to say successful projects are impossible, but suggests instead that they require favorable conditions beyond simple life-

cycle cost justification. To discuss these findings, we will now turn our attention to a successful ESA case study.

Case Study and Discussion

Our interview with the federal project manager was narrower in scope than our other interviews, focusing on their implementation of an ESA at their facility. Additionally, this interview reflects a case study which can have more generalizable insights into how administrative burden can be overcome. Accordingly, the findings from this interview merit a more focused presentation alongside our discussion. The site of the project in question is shared with another agency of the federal government. The interview subject found this relationship key to the project's success. The site in question had previously implemented an ESPC retrofit and installed distributed solar, so was already familiar and enthusiastic towards energy efficiency and renewable energy projects. There was also an on-site champion in addition to the project manager interview subject, ensuring institutional buy-in. The enthusiasm from the site-partner was also invaluable in interacting with the serving electric utility. The electrical utility of the site was opposed to the installation of the solar project and applied pressure in opposition to installation, a tactic sometimes employed by utilities. This opposition was diffused by the site partner agency, with "[the site partner] shielding us from the utility [opposition]…and ultimately settling the dispute on our behalf".

The interview subject emphasized the economic viability as a key concern, though acknowledged that cost savings were one among a variety of motivations for federal implementers of energy projects (Hess and Lee 2020). Life-cycle cost effectiveness and ESPC economic viability were "necessary but not sufficient" for projects to move forward. The subject cited an example of solar shaded carports as an installation which elicited enthusiasm both on-site and at the agency level, but which could not be made cost effective at their facility. Economic viability as a communications tool to foster buy-in was another point raised in the interview. During the planning phase of the project, the interview subject applied for and received a buy-down grant from the Department of Energy to help finance the project. The subject stated that while the grant was not "required for the project to be economically viable" in practice it "shortened the payback period which made the project more attractive". Further, the signaling effect of the grant helped build support for the project in stakeholders both on-site and at the agency, with the grant receipt "showing the meaning and importance of the overall project". While not required economically, the grant sent a clear message of the importance and value of on-site renewables.

This is not to say that the case discussed in this interview was straightforward or free from administrative burden. In one memorable anecdote, a form had to be physically walked between "twenty-two offices of approval on-site" for signatures to meet an end-of-fiscal-year regulatory deadline. Further, the grant receipt perversely raised the administrative burden for the agency. The interview subject recalled that the accounting department suggested "not taking [the grant money] as they lacked an accounting method to intake it", i.e., they did not have a valid accounting category for non-appropriated revenue. Thankfully, coordination between the on-site facility manager, the contracting officer, the project manager, the ESCO, and both site-partner and agency management allowed intake of the grant and kept the project running smoothly. This case should not be understood as a straightforward example of financial viability overcoming administrative burden. While economic viability is certainly important, the interview subject

emphasized that the grant receipt sent a message of project worth which persuaded stakeholders necessary to overcome the hurdles to project implementation.

What generalizable insights can be applied from these findings to other energy and efficiency policy beyond the federal sector? It's worth noting that the stakeholders we interviewed represent actors uniquely equipped to overcome administrative burden, being institutional actors with non-trivial resources at their disposal. Accordingly, the effects described by our interview subjects are likely to be less dramatic than on the general population. All our interview subjects highlighted novel policy design as imposing a chilling effect on project uptake. This occurred across a variety of axes: from financing skepticism of the ESA contract, to disagreement among federal agencies about the legality of the OMB-12-21 reserve account, to even in the successful case the site accounting department not having a category to receive the grant. Obviously increases in both accounting and non-financial costs also depress policy adoption, a finding consistent with the existing citizen-state interaction-oriented literature. A novel finding of our interviews was the positive feedback loop interaction of chilling effects and cost increases associated with administrative burden. The increased accounting costs imposed by the reserve account reduce the number of viable projects, which in turn further increases costs by making relevant expertise scarcer.

Policy makers can help to reduce these burdens through internalizing the administrative burden. This is in practice the policymaker, or a related agency, shouldering some of the administrative burden themselves. Generally, this takes the form of policy standardization. There are of course costs to standardization, as policy vehicles become less flexible. Accordingly, a common happy medium is to provide a low-burden standardized option, but allow for end-users to opt out.

Local agencies in California have recognized the opportunity to save time, carbon, and taxpayer dollars through aggregating the procurement-related administrative burden of PPA contracts. We interviewed a renewable energy subject matter expert who provides support to state and local agencies purchasing PPAs. Since 2014, the subject stated that they and their group had "supported dozens of agencies" across "over two hundred projects" at "school districts, city and county governments, and a state university campus". This support took the form of project and contracting standardization, as well as education and outreach to state and local agencies. This subject estimated the administrative burden avoided with this standardization support to be "months-to-years of time savings compared to in house". For comparison, since the 2012 OMB memo, combining projects known through publicly available federal ESA case studies, the LBNL eProjectBuilder database, and documents shared by our interview subjects combine for a total of four ESA projects across the entire federal government.

Interestingly, these four projects are all above megawatt scale, a contrast to the state level PPAs which "ranged from small installations up to multi-megawatt projects". This skew in size of ESAs is likely a byproduct of financial effects of fair market value purchase. Ultimately, the costs of the audit and pre-financed purchase must be amortized over the life of the contract, and the per-kWh savings decrease means only the largest projects remain financially compelling. There are too few ESA projects to draw confident quantitative conclusions about project duration and expense, but the structural similarities between state and local facility PPAs and federal ESAs allows us to scale the chilling effect. In a shorter amount of time, the simpler aggregated approach to contract procurement has been implemented orders of magnitude more frequently.

Other potential ways for policy makers to address administrative burden beyond standardization include supporting first movers within communities, which can drive broader

adoption through peer network effects (Bollinger and Gillingham 2012). Finally, efforts to signal the importance of policy goals can support efforts to overcome administrative burden. Certifications such as LEED and recognition programs are examples of this kind of signaling alignment.

Limitations and Future Work

Investigating the effect of administrative burden on the behavior of public sector actors is challenging for a variety of reasons. ESAs are a novel contracting vehicle with a long lifespan, very few have been implemented to date. The small quantity means collecting data is challenging, and it would be unwise to draw definitive quantitative conclusions from such a small sample. Further, the precise effect of administrative burden compares to a counterfactual, though one closely modeled by state and local PPAs. While a potential method to address this would be to compare before and after the implementation of a rule, the small number of projects precludes this method. Instead, we have compared to implementation of ESAs to the control case of state and local PPAs, where the main difference between the two contracts is the marginal administrative burden we describe.

The long-time duration of projects and relative youth of ESAs as a contracting mechanism also reduces the overall amount of data there is to investigate. While the skew of the scale of ESA projects towards larger project scale is consistent with our hypothesis, there may be confounding factors, namely the scale characteristics of federal facilities compared to state sites. Evaluating this confounding factor would require examining a state level dataset for contract frequency by facility characteristics and comparing that against the frequency of those facilities at the federal level. Finally, administrative burden is a systems-based emergent phenomenon. It arises out of the interaction between a system of rules, behaviors, and expertise. Accordingly, disentangling the effect of any individual component of this system is challenging at best and non-sensical at worst. All network nodes contribute to the observed effect, but no node can be said to be conclusively uniquely responsible.

The interviews subjects did suggest some other topics of inquiry. One was the effect of ESA contract duration on economic viability. Some subjects discussed the mismatch between ESA contract duration (twenty years) and the typical life cycle of the generation assets (~twenty-five years), though other subjects discounted this as inconsequential. Another topic which was discussed briefly was the disposal concerns to the assets at the end of their lifecycle. Finally, several interview subjects brought up Department of Defense agencies as leaders within the field of federal deployment of renewables. Though they don't use the ESAs or related contracts, they are subject to financial constraints similar to civilian agencies and so could be an informative comparison. Concretely characterizing the savings from learning-by-doing of defense agency renewables purchase or PPAs at the state and local level could allow for modeling of the deadweight costs imposed by the chilling effect of the ESA contract structure. There is precedent for scaling learning-by-doing related cost reductions from process optimization and in other service industries (Hatch and Mowery 1998; Zhang and Joglekar 2016). These represent opportunities for future research.

Conclusions

This work reports the findings of an investigation into the effects of the administrative burden of implementing ESA on-site renewable energy projects. The authors conducted a series of interviews with a variety of stakeholders from across the ESA ecosystem, including ESCOs, DOE and state level renewable energy subject matter experts, and Federal Project Managers. These interviews indicated that the financial cost of compliance with the ESA structure and administrative burden to implement an ESA shrinks the pool of viable projects. Further, the regulatory inconsistency, unfamiliarity, and rarity of these types of projects also reduces implementation, and these effects mutually compound. The barriers described are not insurmountable as evidenced in our case study, but did require fertile conditions and individual excellence by key staff. Through standardization of the simpler PPA contract structure, state level agencies were able to deploy dramatically more projects over a similar timescale. When designing efficiency programs, policy makers will reduce uptake if they employ novel policy designs.

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