NATIONAL RENEWABLE ENERGY LABORATORY

Procurement Options for New Renewable Electricity Supply

Claire E. Kreycik
National Renewable Energy Laboratory

Toby D. Couture
E3 Analytics

Karlynn S. Cory
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National Renewable Energy Laboratory
1617 Cole Boulevard
Golden, Colorado 80401
303-275-3000 • www.nrel.gov

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List of Acronyms

ERCOT	Electric Reliability Council of Texas
FERC	Federal Energy Regulatory Commission
FIT	feed-in tariff
IOU	investor-owned utility
IPP	independent power producer
IRP	integrated resource plan
ISO	independent system operator
LSE	load-serving entity
PBI	performance-based incentive
PPA	power purchase agreement
PUC	public utility commission
PURPA	Public Utility Regulatory Policies Act
PV	photovoltaics
RAM	renewable auction mechanism
REC	renewable energy certificate
RFP	request for proposals
RPS	renewable portfolio standard
RTO	regional transmission organization

Executive Summary

State renewable portfolio standard (RPS) policies require utilities and load-serving entities (LSEs) to procure renewable energy generation. Utility procurement options may be a function of state policy and regulatory preferences, and in some cases, may be dictated by legislative authority. Utilities and LSEs commonly use competitive solicitations or bilateral contracting to procure renewable energy supply to meet RPS mandates. However, policymakers and regulators in several states are beginning to explore the use of alternatives, namely feed-in tariffs (FITs) and auctions to procure renewable energy supply. A FIT is a procurement mechanism that offers guaranteed grid access and guaranteed energy payment over a long-term contract to all developers within a set of eligible technologies, project sizes, and locations. FIT contract prices are typically set administratively based on location-specific cost criteria. Renewable energy auctions and competitive solicitation are bidding processes, in which developers submit project proposals. The difference between auctions and solicitations is that solicitations include a number of non-price criteria, while auctions select bids based on price alone (although potential bidders must meet a set of criteria in order to submit a bid).

As compliance obligations expand, there may be an increasing emphasis on the effectiveness and efficiency of different procurement mechanisms and their best applications. This report does not make recommendations about what approaches (or combinations of approaches) LSEs and states should adopt to procure renewable energy. Rather, it evaluates each approach while assessing a number of important tradeoffs that affect how risks are assigned between developers, utilities, and utility customers.

This report evaluates four procurement strategies (competitive solicitations, bilateral contracting, FITs, and auctions) against four main criteria: (1) pricing; (2) complexity and efficiency of the procurement process; (3) impacts on developers' access to markets; and (4) ability to complement utility decision-making processes. These criteria were chosen because they take into account the perspective of each group of stakeholders: ratepayers, regulators, utilities, investors, and developers. The primary conclusions of the report are summarized below.

Pricing

Competitive solicitations and auctions select for cost-effective projects. A policymaker seeking to promote least-cost generation may want to consider using one of those options. Additionally, in competitive wholesale electricity markets with regional transmission organizations, bilateral contracts may result in cost competitive contracts. However the bilateral contracting approach does not always result in the lowest cost contracts because there may not be other projects to compare against. FITs set prices paid administratively, and consequently may not result in least-cost projects. It can be challenging to design FITs that adjust to market realities and keep prices accurate over time. This can lead either to over-compensation, which can trigger a boom, or under-compensation, which can cause development to halt. Recent FIT policy innovations attempt to address these possibilities, but it is too early to access their relative success. However, there are several benefits of FIT policies. FITs provide price certainty and price transparency, which can increase the investment pool and encourage sustained deployment. Additionally, scheduled declines in FIT payment level may place increased pressure on manufacturers to lower cost of generation (Couture et al 2010).

Complexity and Efficiency of the Procurement Process

Competitive solicitations are generally considered an efficient way of selecting between projects; however, a significant amount of time and resources are required of utilities, regulators, and developers under this approach.[1] The complexity of using a bilateral contract approach depends on the level of regulatory oversight required for the LSE, but bilateral contracts may be faster and less costly for utilities and regulators to implement than contracts resulting from a competitive solicitation. Bilateral contract negotiation may also reduce contract failure rate. Auctions and FITs require extensive upfront analysis on the part of regulators and policymakers,[2] but these approaches can allow for rapid deployment of renewable energy. Auctions must meet a complex set of conditions in order to function properly. Markets must be sufficiently deep and liquid to lead to accurate prices, and there has to be homogeneity of product and of project completion risk to ensure that the process is fair.

Impact on Developers' Access to Markets

During the competitive solicitation process, obligated LSEs select for technically proficient and creditworthy independent power producers (IPPs). Small developers who are new to a market may not be able to contend in a competitive solicitation. The bilateral contracting approach may in some cases increase access to markets for new developers but may also select for established market players. Auctions typically set pre-conditions for technical aptitude and then contracts are awarded on the basis of price alone, so new developers may not be able to qualify or to compete. Due to the non-discriminatory nature of a FIT standard offer, the FIT approach can increase market access for a number of participants and encourage traditionally risk-averse investors to begin investing in renewable projects. By providing standard contract terms at attractive payment levels, FITs can be seen as a way to increase market access to a wide array of potential developers.

Issues Raised for Utilities

Utilities are comfortable with procurement strategies that allow them to balance their priorities of cost and reliability. Competitive solicitations, auctions, and bilateral contracting allow utilities to exert control over factors like quantity procured, generation profile, project siting, and reliability. Under a FIT procurement program, LSEs may have less control over project siting, timing, and quantity procured. However, there are ways to

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[1] Time spent by government, utilities, and developers in each type of procurement may vary greatly. This selection criterion focuses mostly on time spent by regulators and utilities. Yet, the amount of time and money that developers must invest is greatest under competitive solicitations, especially if measured by the total of all developers' money per megawatt actually installed.

[2] Due to the specificity of utility procurement practices and a host of jurisdiction-specific factors, comparing or quantifying the administrative costs of each of the procurement mechanisms is beyond the scope of this paper.

design FITs to mitigate some of these concerns (Corfee et al. 2010). FITs can also "over-deliver" leading to a greater volume response than expected, which can create challenges for LSEs, ratepayers, and system operators. In response to this problem, some jurisdictions are beginning to introduce FIT capacity caps, while others are exploring auction-based mechanisms to control the rate of development. However, underbidding may be a significant concern for LSEs that are implementing auctions, as bidders compete for market share.

Conclusion

Regardless of the type of procurement approach used, utilities are unlikely to move aggressively on procuring new electricity supply (both renewable and conventional) without having the right to rate recovery. States could choose to use different procurement mechanisms in concert with some benefits. For example, holding a competitive procurement could provide utilities with a competitive price benchmark upon which to set FIT payment levels. Additionally, several procurement mechanisms could be used to help meet different policy objectives (e.g., auctions and FITs could be used to support distributed generation). Ultimately, using these mechanisms with a greater awareness of their strengths and weaknesses can provide utilities with greater flexibility in meeting renewable electricity targets on time and at low cost.

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1 Introduction

This report explores utility-driven procurement options for incremental supply of renewable generation. It attempts to provide U.S. policymakers and regulators with information, analysis, and special considerations about policy options for renewable electricity procurement. The report compares four contrasting mechanisms[3] for contracting with independent power producers (IPPs):

1. Competitive solicitations
2. Bilateral contracting
3. Feed-in tariffs (FITs)
4. Auctions.

This section provides background on renewable portfolio standard (RPS) mandates and how renewable energy generation is commonly procured across different regulatory contexts. Section 2 identifies criteria against which to evaluate these four different procurement mechanisms. This evaluation framework is used to draw conclusions about relative advantages and challenges with each procurement mechanism. Section 3 describes competitive solicitations and bilateral contracting mechanisms and applies the evaluation criteria. Section 4 describes FITs and auction-based procurement of new renewable supply and applies the evaluation criteria. Section 5 discusses the approaches best suited for particular applications in the United States. Section 6 offers broad conclusions about the merits and drawbacks of each procurement approach and the ones best suited for various applications.

1.1 Background on RPS Mandates

In the United States, 29 states and the District of Columbia have implemented mandatory RPS policies to promote renewable energy generation, while another 7 states have adopted non-binding goals (DSIRE 2011a). Although their designs differ considerably from one state to another, RPS policies typically establish an obligation for utilities or load serving entities (LSEs) to procure a certain proportion of renewable energy by a specified date (Wiser and Barbose 2008). In recent years, a number of federal proposals for renewable energy standards have also been advanced (Berry and Jaccard 2001; Sullivan et al. 2009). RPS policies will remain an integral part of the U.S. renewable energy policy landscape for years to come, as most RPS requirements carry through to 2020 or longer.

While their design varies, RPS policies have the common objective of delivering a quantity of renewable energy as cost effectively as possible. The competition between

[3] This report does not address procurement under Public Utility Regulatory Policies Act (PURPA) contracts, which represents a fifth species of procurement for small (< 80 MW) qualifying renewable facilities. The reason that PURPA is not addressed as a distinct procurement option is that PURPA contracts are rarely signed today. The vast majority of PURPA contracts were signed in the 1980s; most have either elapsed or been terminated (Wilson et al. 2005). In today’s policy dialogue, PURPA has been identified as a potential mechanism to enact feed-in tariffs (Hempling et al. 2010)

renewable developers may reduce the cost of compliance by driving the most economical projects to the top, though it may also allow for speculative project bidding that can result in contract failures and stranded development costs.

Since RPS policies were first enacted by states in the late 1990s, many have been strengthened and refined to meet evolving state objectives. RPS policies have been identified as one of the most important factors driving new renewable deployment in the United States (Wiser and Barbose 2008). Mechanisms for promoting specific technologies or applications, limiting ratepayer impacts, and encouraging in-state generation have also been incorporated into RPS policy design. These new policy objectives underscore the importance of evaluating different procurement mechanisms so that their contribution to the RPS target, as well as their anticipated interaction with each other, can be clarified.

1.2 Renewable Procurement to Meet RPS Mandates

Depending on the regulatory environment, a regulated entity's compliance with RPS mandates can be satisfied through ownership of renewable generation, purchase of tradable renewable energy certificates (RECs),[4] entry into long-term binding contracts, or a combination of these approaches. This report primarily focuses on procurement of long-term contracts, which can either be signed for the RECs generated by a new renewable project ("REC contract") or the generation output bundled with the RECs ("bundled contract" or "power purchase agreement") (Wiser et al. 2005; Cory et al. 2008). Power purchase agreements (PPAs) signed between an LSE and an IPP usually include energy payments, capacity payments, and REC payments and may include a fixed-price escalator. Power sold under a PPA with a fixed escalator will increase in price at a predetermined rate—usually 2%–5% per year—though there are variations in this structure (Cory et al. 2009).

In most cases, procurement is conducted by the obligated LSE, but some states have experimented with central procurement administered by a special purpose agency. This approach is currently used in New York and Illinois (Wiser and Barbose 2008). Some states have established "tiered" targets or set-asides within their RPS, often for resource types and vintages that may not be least-cost. These RPS design provisions may impact what procurement mechanism is used.

Competitive procurement (through **competitive solicitations** or RFPs) is the most common way that LSEs select renewable generation for RPS compliance in the United States (Tierney and Schatzki 2008; NESCOE 2010). Under some circumstances, LSEs use **bilateral contract negotiation** to secure long-term contracts for electric generation from renewable projects (Wiser and Barbose 2008; Grace 2010, personal communication). These two mechanisms can also be used in concert with one another

[4] Some renewable development has also taken place on a quasi-merchant basis, where private developers undertake projects and do not secure power or REC purchase agreements to cover their entire expected output. While selling a portion of their power or RECs on the spot market to interested buyers, these developers often use electricity or natural gas derivatives to cover the lower-end revenue risks, while also providing potential for increased upside earnings (Cory et al. 2008).

(e.g., projects are selected by means of a competitive solicitation and then enter into a bilateral contract negotiation to establish a PPA). These procurement mechanisms will be discussed in detail in Section 3.

In the last four to five years, several U.S. jurisdictions have experimented with **FIT policies** as a means of procuring renewable generation, particularly from small-scale generators.[5] FIT policies, as developed and refined in Europe, require utilities to offer open and standardized contracts to renewable energy producers for the electricity they produce for a predetermined period of time. There is no single definition of a FIT, but versions typically will include a standardized long-term contract on the order of 15–20 years, the assurance of grid access, and an administratively set payment level that can be based on the cost of renewable generation or the avoided cost of electricity (Mendonça 2007; Couture et al. 2010). While their use has been limited in the United States, FITs are the predominant renewable energy support policy in the European Union[6] and have been implemented in over 60 countries worldwide as of early 2011 (REN21 2011).

Finally, the concept of using **auctions** for RPS procurement is emerging as an alternative to traditional long-term contracting mechanisms. Auction structures are variable, but for the purpose of this report they are defined as a formal process in which—after meeting pre-bid qualifications—the winners are determined by price (sometimes price and volume). As with other contracting mechanisms, auctions can also be conducted for RECs or bundled energy. Section 4 will discuss the recent rise in interest in the use of auctions to procure bundled electricity contracts in the western United States (Vote Solar Initiative 2009; CPUC 2009a; Oregon PUC 2010; Arizona Corporation Commission 2010).

FITs and auctions may be explored as options for utilities or LSEs to meet RPS mandates. Regulators may have to approve the special use of auctions for renewable procurement or auction-based contracting. Legislative or regulatory action is typically required before utilities can employ FITs.[7] Note that in RPS markets with retail competition, implementing mandatory alternative supply procurement strategies (e.g., a FIT must-take provision) may require further regulatory change. This point will be further explored in Section 4.

1.3 Market Contexts and Procurement

Electric industry structure and state policies related to procurement of electricity supply have a sizeable impact on how LSEs purchase renewable generation.

[5] For example, Hawaii's project size cap is 5.0 MW, California's is 3.0 MW, and Vermont's is 2.2 MW (DSIRE 2010c; DSIRE 2010d).

[6] By 2009, the majority of countries in the European Union (EU) (20 out of 27 EU member states, covering over 88% of the total EU population) chose to use FITs as their primary procurement mechanism (REN21 2009; EUROSTAT 2009).

[7] Regulatory action needs to be exercised under PURPA and not state law. See Cory 2011 for more details.

In traditionally regulated markets,[8] utility-driven procurement is typically conducted for incremental supply. Many of these states have chosen to issue rules or policy guidelines that specify when and how LSEs should undertake procurements (Tierney and Schatzki 2008). Here, LSEs largely rely on long-term contracts for RECs bundled with electricity. A reason for this is that these vertically integrated utilities are generally responsible for electricity supply decisions through integrated resource planning (IRP). Integrating the utility's RPS compliance into resource planning helps to ensure planned additions are consistent with the size, type, geographic location, and timing of resources needed by the utility. Furthermore, in some states, including Colorado, Iowa, Montana, Nevada, and North Carolina, policymakers encourage or require utilities to enter long-term contracts with renewable energy suppliers as a strategy to facilitate financing and improve RPS compliance (Wiser and Barbose 2008).

On the other hand, in states with retail electric generation competition, electricity suppliers have greater latitude for complying with RPS as they see fit. Often these areas overlap with competitive wholesale electricity markets, managed by a regional transmission organization (RTO) or independent system operator (ISO). In organized RTO markets, the approaches used to procure renewable electricity include competitive solicitations, centralized auction or exchange, and bilateral contracting. Where there is a sufficiently competitive supplier market, bilateral contracting through forward or future trading can be used in addition to competitive solicitations (Yu et al. 2010; Kirby 2007).

Unbundled RECs are more commonly used to demonstrate RPS compliance in deregulated and RTO markets. Renewable electricity may be procured either independently of, or in combination with, basic non-renewable service (often called full requirements service) (NESCOE 2010). Since the future load obligations of LSEs may be uncertain, REC contracts tend to be shorter in duration than in states with traditional utility structure; often LSEs buy RECs on the spot market to retire for RPS compliance (Wiser and Barbose 2008).

Frameworks concerning renewable procurement are still evolving in some states with deregulated utility markets. For example, Illinois and New York have vested power in central state authorities to conduct specialized procurements of renewable power on behalf of LSEs (Wiser and Barbose 2008). Connecticut, Delaware, New Hampshire, and Rhode Island have new requirements for IRPs, which may lead to requirements for their LSEs to procure new renewable generation to add to their portfolio (NESCOE 2010; Tierney and Schatzki 2008). Furthermore, distribution utilities are often encouraged or required to enter long-term contracts to bring on new renewable generation (see Connecticut, Maryland, Massachusetts, and Rhode Island.)[9] Remaining states may not

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[8] These statements also apply to markets, such as California and Montana, that previously underwent restructuring but currently do not have retail choice or full divestiture of power plants.

[9] Connecticut's "Project 150" requires the Connecticut Clean Energy Fund to solicit long-term contracts on behalf of the two LSEs for 150 MW of Class I renewables (CCEF 2010). Maryland's requirement is limited to solar REC contracts (Wiser and Barbose 2008). Massachusetts' electric distribution companies must conduct at least two solicitations for long-term contract proposals from renewable energy projects between July 1, 2009, and June 30, 2014, under the Green Communities Act (NESCOE 2010). Beginning July 1,

have mandatory requirements for long-term contracts, but their regulators may encourage long-term contracts or at least have statutory authority to approve long-term contracts (NESCOE 2010; Union of Concerned Scientists 2008). The Federal Energy Regulatory Commission (FERC) has adopted actions to support the use of long-term contracting in organized RTO markets; for example, they do this by assuring long-term transmission rights (FERC 2009). FERC Order No. 719 highlighted proposed actions that would facilitate long-term contracts but not compel buyers and sellers to enter long-term contracts (FERC 2009). Most recently, FERC Order No. 1000 requires that RPS requirements be taken into account as regions plan for new transmission (FERC 2011).

2010, Rhode Island's electric distribution companies must solicit proposals annually from renewable energy developers (NESCOE 2010).

2 Evaluation Framework

This report does not make recommendations about the approaches (or combinations of approaches) LSEs and states should use or adopt to procure renewable energy. Instead, the report considers the interaction between important tradeoffs that affect how risks are assigned between utilities and their customers. Criteria were developed to evaluate the procurement strategies and the implications of their tradeoffs. The criteria below were selected because they look at procurement from the perspective of all the stakeholders: ratepayers, regulators, utilities, investors, and developers. How a jurisdiction weights the importance of each stakeholder's perspective is dependent on state objectives and other factors (e.g., staffing constraints at the regulatory commission). After evaluating the procurement mechanisms against the following criteria, general conclusions are made about advantages and challenges of each approach.

Pricing is an umbrella category that considers:

- *Cost effectiveness:* Does the procurement mechanism select for least-cost generation?
- *Ability to capture current pricing conditions:* Do prices track market conditions? Are they indicative of local supply and demand?
- *Underbidding:* Does mechanism design allow for or mitigate speculative bids that may ultimately fail to deliver successful projects?

Complexity and efficiency of contracting processes is a broad category that evaluates:

- *Administrative burden:* How involved is the process (in terms of time and expense) for utilities and regulators?
- *Speed of contract negotiation:* How long is the bid-to-contract duration?
- *Need to "over-procure":* Does a procurement mechanism necessitates *"over-procurement"* of renewable resources in order to meet targets?

The impacts on developers' access to market criterion addresses how procurement mechanisms impact market entry and supplier concentration. The following elements may impact ease of market entry, the size of the pool of investors and developers, and market concentration of executed contracts:

- *Transaction costs:* How much will developers have to expend in order to obtain a contract?
- *Price transparency:* Are awarded prices public information?
- *Timing of project financing*: How does the procurement mechanisms affect when financing occurs in the development cycle?
- *Access:* Are particular classes of developer or sizes of projects excluded from particular procurement approach?

The final criterion is how well the procurement mechanism is suited to address utility concerns and to work within **utility decision-making** processes. The following questions are addressed:

- *IRP processes:* Do contracting mechanisms fit with long-term IRP processes?
- *Build v. buy:* Do procurement mechanisms allow utilities to choose between *building and buying* generation resources?
- *Rate recovery:* Are utilities granted rate recovery for procurements of this type?
- *Grid reliability:* Do contracting mechanisms allow utilities to select resources that best fit with current and projected load (and allow them to maintain grid reliability)?[10]
- *Project siting and integration*: Can utilities exert control over project siting and integration as to reduce transmission and distribution costs?
- *Consideration of non-price factors:* What are the non-price factors that should be considered when evaluating a project (e.g., developer experience, site control, and location)?

These criteria are applied in a qualitative manner, based on case studies and review of existing literature. While a few of the criteria would be amenable to some kind of empirical measurement, this analysis was not undertaken.

The goal of this report is to provide a conceptual framework about RPS procurement, and in doing so, allow readers to formulate their own conclusions about the best uses and inherent limitations of each procurement type. The authors argue that a qualitative approach remains valid because the purpose of this work is to encourage readers to think about implications and tradeoffs in a novel way. The authors try to acknowledge any outliers and tee them up for discussion.

[10] Note that this may not be an issue in markets that are managed by an RTO.

3 Current Procurement Strategies

3.1 Competitive Solicitations

Competitive solicitations are widely used in the electricity industry for new renewable resource procurement. Solicitations are designed to encourage competition between project developers, so as to secure new renewable supply at the lowest cost to ratepayers (Rader and Norgaard 1996; Menanteau et al. 2003; Lauber 2004; Wiser et al. 2007).

A competitive solicitation is a formal process under which the procurement agent (usually the LSE) issues a request for proposal (RFP), collects and evaluates qualifying bids, and executes contracts with winning bidders. The approach typically involves contract negotiation either with the highest-ranking bidder or with a short list of bidders. Weight is given to both price and non-price criteria, and regulators are typically involved in creating evaluation metrics and ultimately approving contracts (Tierney and Schatzki 2008). Competitive solicitations for new renewable supply are often tied to the entity's near-term RPS requirements (Cory and Swezey 2007).

3.1.1 Application of Evaluation Criteria

3.1.1.1 Pricing

Since price terms are commonly the principle selection criterion under an RFP, competitive solicitations will usually select projects based on their cost effectiveness. If issued frequently, RFPs can be effective at tracking market price trends, as each new solicitation provides a snapshot of prevailing market prices. However, due to the competitive nature of RFPs, some developers are reported to underbid in the solicitation process to secure a contract (Wiser et al. 2005; CEC 2006; Grace 2010, personal communication). Underestimation of development costs—particularly cost, complexity, and time required to address transmission, interconnection, and permitting issues—may lead to contract failure. Contract failure is a veritable resource drain on both utilities and developers and can compromise a state's achievement of its RPS targets (Wiser and Barbose 2008).[11] Moreover, consistent underbidding on the part of the developers could skew the utilities' and regulators' pictures of prevailing market prices.

Conversely, the competitive procurement process can also lead to overestimation of pricing, as developers may incorporate added transaction costs and risk premiums into their bids. Developer risk at this stage derives from the uncertainty about how long contract approval will take, whether or not the regulator will enforce the rules requiring fairness and objective processes, and whether or not the regulator will reopen the process, throw out solicitation results, alter the rules, or allow utilities to circumvent the procurement (Tierney and Schatzki 2008).

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[11] Based on a 2006 survey of 21 North American utilities, KEMA, Inc., consultants suggested that a minimum overall contract failure rate of 20%–30% should generally be expected for large solicitations conducted over multiple years (CEC 2006). More recently, California's three investor-owned utilities claimed historical failure rates of 30%–50% in their own jurisdictions (CPUC 2011a). The California Energy Commission records indicate that 14% of contracts from utility RFPs (representing 8% of expected gigawatt-hours) have failed (DRA 2011). Notwithstanding these estimates, the exact rates of contract failure are unknown across all utilities and regulatory contexts.

3.1.1.2 Complexity and Efficiency of the Contracting Processes

Procurement through competitive solicitation places an administrative burden on both the LSE, who receives the bids and manages selection, and the regulator, who monitors the solicitation process. Evaluating bids is inherently complex because of the vast array of technical details in each project proposal and the critical differences in contract structure, risk, and benefits profiles. LSEs and regulators may find it challenging to be both rigorous and efficient in assessing the bids with respect to non-price factors (Tierney and Schatzki 2008). It is possible to simplify bid comparisons to a certain extent by either specifying desired project characteristics (e.g., size, technology type, or commercial operating date) or by standardizing contract terms and structures.[12]

However, in spite of this complexity, competitive solicitations may still be a favored approach because in-depth project analysis allows LSEs to select the best projects with respect to cost and viability. Additionally, screening projects carefully may reduce the incidence of contract failure.[13]

The level of scrutiny that is typical of bid evaluation may mean that the process takes a number of months from solicitation to execution of contracts. Tierney and Schatski (2008) suggest that the whole cycle takes three to four months on average and sometimes significantly longer. In certain cases an unintended consequence might be that the lapse of time between the launch of the RFP and the actual time of construction may surpass the shelf life of the bid itself, and the contract may require renegotiating (CEC 2006). Moreover, RFP processes tend to occur on an as-needed basis and sometimes do not have predictable timing. This unpredictability can be challenging for developers and investors, planning their activities.

3.1.1.3 Impact on Developers' Access to Markets

An implicit requirement of a competitive solicitation is that bidders demonstrate creditworthiness and technical ability. For this reason, competitive solicitations favor experienced, well-capitalized players. Furthermore, project financing typically occurs after PPAs are negotiated and signed, so smaller, less-established players may have trouble covering the costs of conducting due diligence and of submitting an attractive bid. Also, provisions are occasionally included that require the developer to have a portfolio of previously built renewable energy projects. Combined, these and other factors can make it difficult for new players to gain a foothold in the market.

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[12] In some cases, utilities include in their bid submission documents a formatted/standardized pro forma for bidders to use (CPUC 2009b; NV Energy 2010; AEP 2009). This does not mean that contract terms are always standardized. Often, bidders can request exceptions to standard form agreements in their submission, or post-bid negotiations may further modify terms and conditions (NV Energy 2010; AEP 2009).

[13] Some analysts suggest that contract failure remains a significant problem in competitive procurement. Based on a 2006 survey of 21 North American utilities, KEMA, Inc., consultants suggested that a minimum overall contract failure rate of 20%–30% should generally be expected for large solicitations conducted over multiple years (CEC 2006). Exact rates of contract failure are unknown across all utilities and regulatory contexts.

If developers are tied up in a lengthy bid evaluation process, they may be constrained from offering their resources into other markets. While their offers are being considered, they may need to maintain firm price terms in spite of market changes. Therefore, delays in the RFP evaluation stages can increase a bidder's opportunity costs for participating in the procurement (Tierney and Schatzki 2008).

A competitive solicitation approach may not effective at encouraging diversity of project size or ownership. For example, small, distributed generation projects may not be selected in an RFP because of their higher cost profiles. Distributed generation historically has not been represented in RFP short lists and is instead incentivized by rebates and other support mechanisms (for a discussion of how California is addressing this problem, see the text box in Section 4.3). Additionally, several classes of potential developers may not have the resources to compete in an RFP. Utility customers (e.g., homeowners or small businesses) may be interested in their own distributed generation projects but may not have the time, money, or inclination to submit a bid (this issue is addressed further in Section 5). If diversity of project sizeor ownership structure is a state objective, other procurement mechanisms should be considered.

Local and community investment in renewable energy projects has been limited to date in the United States (Bolinger 2004; Mendonça et al. 2009; Wiser and Bolinger 2010). For example, the "community wind"[14] market represented less than 2% of the overall U.S. wind market at the end of 2009 (Wiser and Bolinger 2010). Bolinger (2011) emphasizes that raising seed capital (to be spent on development costs) may be a significant hurdle for community wind projects, particularly those of smaller size. Due to the expense required to conduct due diligence and submit a bid, community-based developers may not be able to compete with larger IPPs in competitive solicitations.

Accordingly, the competitive solicitation approach may form a barrier to small customer-sited projects or community-owned projects. If these are considered policy objectives of the state's RPS, an alternative procurement mechanism may be advisable.

3.1.1.4 Utility Decision Making

In general, RFPs correspond well to utility planning and decision-making processes. After IRP informs the need for new generation resources to fit future load, utilities will typically issue RFPs for particular types of generation or capacity (e.g., meets a seasonal load or a need for dispatchable or baseload power). RFP issuance is variable by state and utility. California's three investor-owned utilities (IOUs) hold annual RFPs for the procurement of renewable power. Other utilities may issue RFPs on an as-needed basis, contingent upon their compliance with the RPS.

Beyond cost, utilities are highly concerned with selecting resources that can be well integrated into the utility system. Conducting an RFP allows utilities to rank bids based on a host of other ancillary characteristics, including dispatchability, siting with respect to

[14] Generally "community wind" refers to relatively small utility-scale wind power projects that sell into the wholesale electricity market and that are developed and owned primarily by local investors (Bolinger 2011).

load centers, permitting with respect to site control, time of delivery, and cost and ease of integration. California has codified these ancillary services in a 2004 public utility commission (PUC) decision adopting the "least-cost, best-fit" selection criteria that utilities must employ when procuring renewable resources. These resources must be "least-cost" in their energy delivery (relative to other resources) and "best-fit" in terms of their compatibility with utility system needs (CPUC 2004).

Finally, competitive solicitations are a fairly flexible approach to procurement. LSEs can define the product solicited as broadly or narrowly as they wish. More open and flexible solicitations may allow the market to come up with creative alternatives to meet LSEs' needs most cost effectively (Tierney and Schatzki 2008). Additionally, an LSE could theoretically request that bidders submit prices for transferring ownership outright to the utility, so that they can own and operate it themselves. Examples of recent RFPs demonstrate that utilities are requesting bids for buying projects outright (NV Energy 2010; Sustainable Business 2010).

3.1.2 Summary

Competitive solicitations have the benefit of procuring least-cost renewable electricity generation independent of technology type. The approach is central to renewable electricity procurement in most regulatory environments and may provide utilities or LSEs with some flexibility and control over the type, size, and timing of renewable additions to a utility system. However, the RFP process may have significant administrative costs associated with the length of the solicitation and contract negotiation process. RFPs may not have predictable timing, which could limit developer and investor interest. RFPs can also foster non-trivial rates of contract failure, which have afflicted RPS states, such as California and Nevada.

Table 1. Application of Evaluation Criteria to Competitive Solicitations

Criteria	Advantages	Challenges
Pricing	• RFPs select competitively priced projects (and are technology neutral) • The approach can be effective at tracking market prices if RFPs are issued frequently enough	• Developers may underestimate development costs when submitting a bid; this may factor into contract failure •
Complexity/ Efficiency of Contracting Processes	• Competitive procurements can be as broadly or narrowly designed as the LSE requires • LSEs can ask bidders to submit standardized pro formas, which may reduce the time and expense of evaluating bids	• Significant administrative burden (on both LSE and regulator) to issue RFP, evaluate bids, negotiate contracts, and seek PUC approval • Contracts are negotiated on an individual basis • The time between the RFP launch and construction may surpass the shelf life of the bid itself, meaning that contracts may need renegotiation • RFPs may not have predictable timing, which could limit developer and investor interest
Impact on Developers' Access to Markets	• RFPs favor creditworthy developers with technical capability • Competitive solicitations are open to all who can submit a bid • RFPs are often open and flexible, allowing for bidders to develop creative, mutually beneficial proposals	• RFPs do not facilitate market entry for less established players • Being tied up in a bid evaluation process may present developer opportunity costs • RFPs generally do not allow for diversity of size and ownership
Utility Decision Making	• RFPs may be issued as needed to complement integrated resource planning • LSEs can tailor RFP issuances as to encourage bidders to submit project proposals that fit their needs and preferences, which can mitigate reliability issues • RFPs allow for a high degree of consideration of non-price factors	•

3.2 Bilateral Contract Negotiations

Under the bilateral contract approach, contracts for new renewable capacity are signed between the two entities without resorting to an official competitive solicitation (Wiser et al. 2005). Bilateral contracts are private, two-party transactions used in both regulated and competitive RTO markets. Either the developer or the LSE can initiate bilateral contract negotiation.

In regulated markets, bilateral contract negotiation may occur on a case-by-case basis if an LSE solicits a bid from a particular developer or if a developer approaches an LSE with a proposal to develop new electrical capacity within a utility's service area.[15] As with contracts resulting from RFPs, bilateral contracts are subject to approval by state utility regulators. Municipally owned utilities, cooperatives, and other electricity service providers are sometimes given greater latitude to engage in bilateral negotiations, depending on the market structure (Grace 2010, personal communication). Some states allow the bilateral contract approach for IOUs but encourage the use of competitive bidding. For example, Massachusetts requires that competitive procurement processes be used to "the fullest extent practicable" (Massachusetts 2008). This rule likely stems from policymakers and regulators preference for lowest cost contracts. Our literature review did not uncover any data sources that compare contract prices achieved through competitive solicitations versus bilateral negotiations.

Bilateral contracts are sometimes signed in extraordinary situations with a high level of regulatory oversight. An example of this is the contract negotiations for the Deepwater Wind offshore wind facility in Rhode Island. In addition to the typical parties involved (utility, developer, and regulator), the Rhode Island governor and legislature played a major role in pushing through a bilateral contract between the offshore wind developer Deepwater Wind and the utility National Grid (Providence Business News 2010). The PUC rejected the initial PPA on the basis of cost. In response, the legislature, backed by Governor Carcieri, submitted a bill to clarify the intent of the state's long-term contracting requirement (Gov Monitor 2010). The passing of this bill was a key step leading to PUC approval of the contract. The bill caps the price of the power to the level in the PPA previously filed with the PUC. The renegotiated PPA was approved on the condition that it contains an "open book" approach that requires Deepwater Wind to disclose (and the Division of Public Utilities and Carriers to verify) the construction and development costs of the project. If the Division of Public Utilities finds that the project costs less to develop, the PPA price shall be adjusted downward (GovMonitor 2010).

In competitive wholesale electricity markets, LSEs sometimes enter bilateral contracts if the RTO market is sufficiently competitive. Using the bilateral contract negotiation approach, utility buyers can shop around for the best price without the formality of an RFP (Hurlbut 2011). However, a lack of market competition or a propensity towards collusion among suppliers could limit the effectiveness of bilateral contracting.

[15] If utilities find that the proposals are of reasonable cost and feasibility and are desirable additions to their generation mix, they may pursue bilateral contract negotiations.

In the New England ISO and the New York ISO, competitive solicitations are most often used, and bilateral contracts are scarce (NESCOE 2010; Wiser and Barbose 2008). As mentioned previously, in New York and Illinois, central agencies hold competitive procurements on behalf of LSEs. On the other hand, bilateral energy trades are common in the Electricity Reliability Council of Texas (ERCOT), where the bilateral electricity market volume far exceeds the hourly market (Kirby 2007).[16]

The bilateral contract negotiation approach has different advantages, challenges, and considerations than the RFP approach. The next section explores the evaluation criteria as applied to bilateral contracts.

3.2.1 Application of Evaluation Criteria

3.2.1.1 Pricing

With bilateral contracts, the parties agree upon PPA pricing through negotiations. In regulated markets, although utilities and regulators may be cognizant of prevailing market prices from recent RFPs, the lowest price projects may not be selected because bilateral contracts are infrequent and do not open the market to competition. The lack of competition between project developers is likely to result in less accurate price discovery, as no concurrent comparison is being made between different market players. On the other hand, underbidding is less likely to be a concern.

3.2.1.2 Complexity/Efficiency of Contracting Processes

Since contracts are negotiated individually, this approach may reduce the chances of contract failure (Grace 2010, personal communication), thereby reducing the overall administrative burden on utilities and regulators. However, capacity additions via bilateral contracting may still be a lengthy process in the case of regulatory oversight and may hinder a utility's ability to move rapidly on renewable targets. In RTO markets, on the other hand, bilateral contracting can be efficient. If the market is robust and it is easy for the utility to take its business elsewhere, a bilateral contract could actually be concluded more quickly than would be the case in an RFP (Hurlbut 2011).

3.2.1.3 Impact on Developers' Access to Markets

The bilateral contract approach may or may not facilitate entry by new market players in regulated markets. If the objective of bilateral negotiations is to add capacity expeditiously, the LSE may still decide to select experienced developers with strong track records to develop projects. It is possible that these bilateral negotiations would occur between firms that have prior business ties. On the other hand, some LSEs use the approach to support projects with technical risks that may not be competitive in an ordinary RFP. In this way, bilateral contracting may increase access to markets for certain developers rather than decrease it. Bilateral negotiation can be particularly

[16] Note that since the publication of this report, the ERCOT market has undergone structural changes (i.e., the introduction of a day-ahead and real-time locational-marginal-pricing-based nodal market) (Smith et al. 2010), but the majority of ERCOT electricity sales are brokered through bilateral agreements (Yu et al. 2010).

valuable for these types of projects because it is more likely that they will obtain the terms needed to be viable (Grace 2010, personal communication).[17]

Similar to the competitive solicitation section of this report, utilities go through official negotiated contracts with IPPs providing utility-scale generation. The bilateral contracting approach would not be used for small project sizes or for working with small utility customers seeking to develop renewable energy systems.[18] Additionally, a developer must be technically skilled with comparable experience to be considered by a utility for a bilateral contract. Certain classes of developers, such as community investors, may not have the resources to initiate these financial negotiations.

Bilateral contracting is often applied in a competitive environment, like in an RTO market. As with an RFP process, developers seeking bilateral contracts in RTO markets must be creditworthy, have technical ability, and also be well versed in wholesale electricity market dynamics.

3.2.1.4 Utility Decision Making

The bilateral contract approach can be initiated on an as-needed basis or as developers approach the utilities. The approach may be desirable because capacity can be added incrementally without the administrative cost and long timeline of an RFP. Bilateral contracting provides flexibility to the utility to select projects that meet utility-defined targets for resource acquisition as defined by an IRP. The approach may provide an outlet to procure supply that may not be least-cost but may have grid benefits.

3.2.2 Summary

Bilateral contracting provides flexibility for an LSE to choose desirable resources. A bilateral contract may take less time to implement than issuing a solicitation and executing a contract with a bid winner. However, since regulators may not provide a guarantee of cost recovery for utilities initiating bilateral contracts, some utilities in regulated markets may be dissuaded from using the approach. Additionally, time and resources are invested in negotiating each contract individually.

[17] However, the bilateral approach does not guarantee that projects will reach completion, especially for unproven or expensive technologies, because obtaining a PPA is only one step in the project development process.

[18] These projects use other mechanisms like net metering, for example.

Table 2. Summary of Application of Evaluation Criteria to Bilateral Contract Negotiation

Criteria	Advantages	Challenges
Pricing	• PPA terms are subject to negotiation • Developers may be more likely to receive the price that they need to develop a project •	• Bilateral contracts may not result in lowest-cost PPAs • In regulated markets, pricing is not competitively derived • Bid or offer pricing may not be disclosed, potentially impacting developer participation •
Complexity/ Efficiency of Contracting Processes	• Bilateral contracting may be efficient in competitive RTO markets	• Individualized contracts may take longer to negotiate and approve than standard offer contracts • An iterative process may be needed to settle on PPA terms and conditions
Impact on Developers' Access to Markets	• In extraordinary situations with regulatory oversight, developers of emerging technologies who cannot compete in RFPs may be able to obtain contracts through bilateral contract negotiations	• Unsolicited bids may not be accepted by LSEs depending on need for generation capacity, bid pricing, and other variables • Bilateral contract negotiation may favor established market players • Bilateral contract negotiation is generally not feasible for small projects
Utility Decision Making	• Utilities may choose to accept or reject unsolicited bids based on resource planning needs • Bilateral contracting allows for full consideration of non-price factors	• In some jurisdictions, cost recovery from bilateral contracts may not be guaranteed

4 New Procurement Strategies in the U.S. Context

New market players emphasize that it may be difficult to enter the market given traditional utility renewable energy procurement strategies. In the interest of supporting a robust renewables manufacturing sector and rapid deployment of renewable energy, some market players have come out in support of new mechanisms for utilities to procure renewable energy—those that utilize standardized contracts and open access to all developers with viable projects. This outlook has been aligned with the support of FIT policies and auctions.

In the last few years, some U.S. states have begun to debate whether or not FITs should be used to support renewable projects, specifically small- to mid-scale projects in their jurisdictions. Proponents, including industry groups like the Clean Coalition,[19] suggest FIT policies as a mechanism for obligated utilities to meet their RPS compliance requirements, in addition to or replacing the need for competitive solicitations. Mostly, support for FITs has come from solar market stakeholders and is emphasized in the context of small to mid-sized projects.

While FIT policies are relatively new in the United States, they are beginning to be implemented in a number of states, often as a means to accomplish limited policy objectives, such as in promoting distributed generation or specific technologies, such as solar photovoltaics (PV) (Couture and Cory 2009). U.S. implementers have exerted caution regarding the scope of their programs, and the boom-bust cycles in Spain, France, the Czech Republic, and other nations has potentially deterred some domestic interest in the policy mechanism. Additionally, FERC jurisdictional issues (i.e., whether states can set rates that exceed utility's avoided costs) have added uncertainties (Hempling et al. 2010). However, recent FERC rulings have clarified states' abilities to set special avoided-cost rates for renewable generators under the Public Utility Regulatory Policies Act (PURPA) (Cory 2011).

In Vermont, FITs are beginning to be used as a primary mechanism to meet the state's RPS goal, which may become mandatory by 2013 (DSIRE 2011b). The Vermont FIT program solicits PV, landfill gas, wind, biomass, hydroelectric, municipal solid waste, and anaerobic digestion projects up to 2.2 MW in capacity (DSIRE 2011b). Similar proposals have been made for the states of Indiana, Michigan, Minnesota, Washington, and Wisconsin, as well as at the federal level (Grace et al. 2009; Couture et al. 2010).

The United States has also recently seen growing interest in auction programs for procuring new renewable supply. Section 4.3 and 4.4 evaluates the use of auction-based procurement for new renewable electricity generation and describes auction preconditions and design considerations. The California PUC's new Renewable Auction Mechanism (RAM) program will also be discussed.

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[19] Clean Coalition. http://www.clean-coalition.org/. Accessed October 6, 2011.

4.1 Feed-In Tariffs

FIT policies encourage the development of new renewable energy generation by offering open access to long-term purchase contracts for the sale of renewable electricity (Lipp 2007; IEA 2008). The obligation to purchase electricity is established in law and enforced by the respective PUC or other regulatory body.

Much like RPS frameworks, FITs have taken a number of different forms at the state and municipal levels (Rickerson et al. 2008; Couture and Cory 2009). Some U.S. FIT policies set payments based on estimated generation costs of representative projects,[20] while others base payments on a utility's avoided cost. Some FITs are available only for solar PV, while others have been extended to other technologies (California 2009; DSIRE 2011b; DSIRE 2011c; DSIRE 2011d; Couture and Cory 2009). For the most part, FITs in the United States are only available for behind-the-meter projects or projects feeding into the distribution grid (e.g., California's FIT is offered to systems up to 3 MW in size).

4.1.1 Application of Evaluation Criteria

4.1.1.1 Pricing

Typically, FITs are administratively set standard offer rates for the procurement of new renewable energy generation. Most jurisdictions with FITs review and adjust payment levels periodically, every one to four years.[21] However, annual review may not be enough to keep payment levels in line with cost trends (particularly for modular technologies like PV). Thus, in the interim between program reviews, policymakers have created secondary payment level adjustment mechanisms. One common policy design is degression, whereby payment levels decline by a predefined percentage annually. Degression ensures that projects coming online at a later date receive a lower payment, in accordance with cost declines that result from technology advancements and economies of scale (Mendonça et al. 2009; Couture et al. 2010). Alternatively, for technologies with rapidly evolving costs (e.g., solar PV), "responsive" payment level adjustments have also been used. Jurisdictions, including Germany and Spain, adjust FIT payment levels based on how much capacity has been installed during a predefined period of time (Kreycik et al. 2011).

Interestingly, the price transparency of a FIT may have a positive effect on component pricing. Scheduled declines in payment level may place increased pressure on manufacturers to lower cost of generation (Couture et al 2010).

Also impacting cost to ratepayers, policymakers often differentiate the payment levels offered to different projects according to their characteristics—that is, a different set of payment levels can be offered for different technology types and project sizes or for projects benefiting from higher resource quality (Mendonça 2007; Couture et al. 2010). By differentiating projects in this way, a wider variety of project types can be financed,

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[20] Since payment levels are based on representative projects, the price offered might be either higher or lower than the level that any specific project needs to be economically viable. Since projects volunteer to participate in a FIT, presumably all of those projects believe the rate is higher than what they need.

[21] Policymakers may require IPPs receiving FIT payments to report on generation costs to inform future rate setting. This can help in keeping payment levels accurate over time.

built, and operated in a given jurisdiction. Many RPS policies have set-asides for a targeted amount of generation from a specific technology or project type (e.g., customer-sited). Differentiated payment levels may facilitate reaching a set-aside.

Most FITs not only target low-cost technologies but also provide contracts to higher-cost technologies. Resulting contracts may increase costs to utility ratepayers relative to procurement mechanisms that target only least-cost technologies (Elliott 2005; Lesser and Su 2008). Compounding this effect, experience in Europe suggests that high tariffs can trigger rapid deployment and lead to more deployment than targeted by policymakers and regulators (Couture et al. 2010).

4.1.1.2 Complexity/Efficiency of Contracting Processes

Regulators administering FIT programs must invest time into setting FIT rates and adjusting them on an ongoing basis. Whereas a lot of work goes into establishing FIT policies and payment levels, the actual contracting process can be more streamlined and efficient than under RFPs or bilateral contracts because contracts are standard and non-negotiable. Time between FIT contract application, evaluation, and acceptance may be significantly shorter because contract terms are standard. This can relieve administrative burden on developers, LSEs, and administrators and help accelerate the pace of renewable deployment.

One important consideration is that FIT programs can be subject to "speculative queuing" issues. If developers perceive that a FIT program cap will soon be reached or that an administrative change impacting project economics is eminent, they may attempt to reserve a spot in the queue without doing due diligence on their projects. Careful design of queuing protocols can help alleviate this problem (Couture et al. 2010).

4.1.1.3 Impact on Developers' Access to Markets

FIT policies may positively impact developers' access to the market. First of all, providing a consistent support framework through a FIT can play an important role in fostering a stable and growing renewable energy market (Deutsche Bank 2009). Also, FIT policies typically support a wide variety of developers including: homeowners; business owners; federal, state, and local government agencies; private investors; non-profit organizations; and sometimes utilities (Hvelplund 2005; Mendonça et al. 2009). Wide eligibility can significantly increase the investor pool and increase the overall amount of activity and liquidity in the market.

As described previously, FIT policies provide long-term purchase obligations, transparent prices, and standardized contracts. All three of these elements increase investment security and reduce risk, thereby improving developers' access of project financing (Couture et al. 2010).[22] Additionally, the availability of financing may be clear early on in the project development cycle, which may not be the case under other procurement

[22] Furthermore, the overall revenue stability provided by the fixed-price contract can reduce the risks of renewable energy investments and provide a regulatory environment that enables participants to make use of lower-cost debt to finance projects, rather than relying solely or primarily on equity (Deutsche Bank 2009; Couture and Cory 2009).

mechanisms. Contract standardization may also reduce transaction costs for developers and eliminate the need for multi-party negotiations and complex financial structures (Lewis 2010). Standard contracts make renewable energy financing easier for a wider number of prospective investors. By extension, this can facilitate market entry by new developers.

However, the fact that the renewable energy incentives in the United States are built into the tax code may still inhibit new market players. Even with a FIT, tax equity will still be required to monetize the investment tax credit, production tax credit, and accelerated depreciation benefits in order to achieve cost-effective project economics. Developers must have knowledge of how to syndicate tax credits, as well as the ability to partner with tax equity investors, in order to make the most of their investment.

Finally, queuing under a FIT may impact developers' access to the market, especially where caps are imposed. Developers may object on the basis of fairness if protocols for accepting or rejecting new projects are not transparent.

4.1.1.4 Utility Decision Making

Many utilities have voiced concerns about the FIT approach. One concern is that FITs might promote projects that provide lower value to utilities and their customers, in terms of cost, reliability, and production efficiency, relative to projects that are procured via competitive solicitation (Bull 2010a). Standard offers can result in less-than-optimal site selection, when viewed from a utility's standpoint, as developers typically seek out the sites with the best resources first (Couture et al. 2010). Utilities see FITs as conflicting with IRP processes that place great emphasis on obtaining the desired mix of generation capacity in the areas where generation is needed most (Bull 2010b). However, it is possible to design FITs to work in parallel with transmission planning and mitigate this concern (Corfee et al. 2010).

Additionally, from the utility perspective, FITs may exacerbate utilities' concerns over renewable integration and grid reliability (Bull 2010b). Utilities obligated to buy from sellers under the FIT may have less flexibility in selecting projects or load profiles that best fit with their specific needs. Under a FIT, developers apply for and receive contracts on a first-come, first-served basis, and utilities must respond by planning for transmission build-out and dispatchable capacity to help balance load. This can lead to transmission bottlenecks, creating issues particularly in areas where grid requirements are projected to grow and where utilities are not assured rate recovery on grid upgrades. Clear provisions dealing with accepting and rejecting projects based on generation profile can help mitigate these issues.

Moreover, FITs can potentially lead to system-wide electricity price decreases, as has been the case in Germany and Spain (Mendonça et al. 2010). When decisions are made about electricity dispatch, units with near-zero marginal costs are dispatched first. Due to the typically low variable costs of renewable generators, their dispatch has contributed to lower system wide costs in countries using FITs, a phenomenon known as the "merit-order effect." German and Spanish industry analysts reported declines in average-market price of electricity on the order of €6–8/MWh in 2006 due to the FIT (Mendonça et al. 2010).

4.1.2 Summary

FIT policies provide an alternative procurement mechanism for utilities to add renewable generation capacity quickly. Contract standardization may expedite the development of new renewable capacity. FIT policies open the market to a wide variety of developers and can promote technology diversity by providing revenue certainty for many different types of projects. However, policymakers and utilities are concerned that FIT policies do not target least-cost generation and may have higher ratepayer impacts than other approaches. Concerns over the inability of FITs to closely track market pricing trends have led to interest in auction-based pricing mechanisms and other ways to adjust payments more responsively to market trends.

The FIT approach can lead to queuing issues (especially if caps are imposed) (Kreycik et al. 2011) and create tensions if protocols for accepting or rejecting new projects are not transparent. The geographic distribution of renewable electricity development under FITs can also require investments in new grid capacity, which can reduce the willingness of utilities to cooperate unless rate recovery is assured.

Table 3. Summary of Application of Evaluation Criteria to Feed-In Tariffs

Criteria	Advantages	Challenges
Pricing	• FITs can be designed to provide a targeted rate of return to developers of many kinds of renewable generation projects • FITs can be used to support distributed generation, often left out of RFPs and bilateral contracting •	• Aligning the FIT contract price with actual technology costs over time may prove to be challenging • FIT policies seek to encourage a variety of technology types and applications and do not target least-cost generation • There can be significant price risk (over- or under-compensation) when FIT contracts are provided to large projects; this risk can be mitigated with good policy design • Because FIT prices are set based on generic projects, they are very unlikely to be appropriate for any specific project • Administratively-set prices will lag the market price
Complexity/ Efficiency of Contracting Processes	• Contracting is streamlined because FIT contracts are standard and non-negotiated •	• Administering FIT programs requires a time investment on the part of regulators for setting FIT rates and conducting ongoing analysis • Open-ended standard offers may lead to queuing issues; projects in the queue may not represent viable projects unless screening and evaluation measures are taken
Impact on Developers' Access to Markets	• The consistent support framework of a FIT can play an important role in fostering a stable and growing renewable energy market • FIT policies explicitly widen developer eligibility and may provide bonus incentives for certain ownership configurations • FIT purchase obligations tend to increase investment security and reduce risk for developers • Standard offer contracts may reduce transaction costs and increase access to finance	• Queuing under a FIT may impact developers' access to the market, especially where caps are imposed
Utility Decision Making	• FIT policies can include clear provisions dealing with accepting and rejecting projects based on grid availability	• FITs might promote projects that provide lower value to utilities and their customers, relative to projects that are procured via other methods • FITs may exacerbate utilities' concerns over renewable integration and grid reliability • FITs could lead to sub-optimal geographic selection from the utility's perspective (unless policy is designed to mitigate this effect)

4.2 Auctions

Auctions are another potential option for new renewable electricity procurement. Under a formal auction framework, IPPs bid into the auction expressing a willingness to sell a given product at a given price, soliciting from others their willingness to buy at that price. Auctions have been used in bid-based energy markets, where electricity producers effectively "bid" into a marketplace at a price that approximates their marginal cost (Sioshansi 2008). For example, New Jersey electricity distribution companies employ "descending-price clock"[23] auctions to procure three-year contracts for "basic generation service" (Tierney and Schatzki 2008). By extension, auctions could potentially be used to procure renewable electricity (or RECs).

Renewable energy auctions are similar to RFP processes; the difference being that auctions generally rely on the price criterion only after bidders are qualified. Most electricity market auctions are conducted as sealed-bid auctions, meaning that no contract negotiation is permitted. Eliminating all non-price bid factors, procurement agents obtain a pared-down competitive process, which may take significantly less time to administer. Historical experience with conducting auctions for incremental renewable supply in the United States includes early PURPA implementation in some states, such as Virginia (Hirsh 2001).[24] An auction approach has also been used occasionally to procure RECs, but evaluation of these programs is outside of the scope of this report.

Several jurisdictions in the western United States are currently considering or implementing renewable energy auctions for long-term bundled electricity contracts for small to mid-sized renewable energy generators (so-called "wholesale distributed" generators). The California PUC is in the midst of implementing the Renewable Auction Mechanism (RAM) program for systems between 1 MW and 20 MW in size (see the text box in Section 4.3; CPUC 2010). Oregon's Volumetric Incentive Rate program is employing a similar methodology for solar projects between 100 kW and 500 kW (Oregon PUC 2010). The Arizona Corporation Commission has also expressed interest in the use of this type of auction in lieu of a FIT policy (ACC 2010).[25]

[23] A process whereby the auction's initial bidding level is lowered in increments until the amount of the product offered equals the amount sought (NY PSC 2006).

[24] In 1986, Virginia Power began issuing auctions for specific blocks of new capacity as part of its implementation of PURPA. In that year, it issued an auction for 1,000 MW of electrical capacity to come online by 1990. In this particular case, it received offers from 53 companies for over 5,000 MW of new capacity. By 1989, seven states (Connecticut, Colorado, Maine, Massachusetts, New Jersey, New York, and Virginia) had adopted auction mechanisms, and by 1991, over half of the states in the United States had experimented with or allowed auctions to be used to satisfy the requirements of PURPA (Hirsh 2001, p. 342).

[25] It is important to note that former Arizona Corporation Commission Chair Kris Mays was a driving force behind this decision and Arizona renewable energy policy. Mays's term expired in January 2011 (ACC 2011), and there is no clear successor for her leadership on renewable energy.

California Renewable Auction Mechanism

In December 2010, the California PUC adopted the RAM, which establishes a technology-neutral, reverse auction program to be implemented by the state's three IOUs—Southern California Edison, Pacific Gas & Electric, and San Diego Gas & Electric. The RAM program requires each of these utilities to conduct biannual auctions over the course of two years to streamline the procurement of an aggregate capacity of 1,000 MW of "wholesale distributed generation" (projects between 1 MW and 20 MW in size) (CPUC 2011c).

Each utility is responsible for establishing bidding protocols and providing solicitation materials, including standard contracts, to potential bidders. Auctions are to be held biannually (with a cap fulfillment timeline of two years) for the solicitation of three different products: baseload, peaking as-available, and non-peaking as-available renewable electricity supply.

Bids are to be selected on the basis of price alone. Selected projects will receive their proposed payment level and standard contract terms with no negotiation permitted. In order to create a reasonable level of financial homogeneity, the California PUC has established minimum project viability criteria, including proof of site control, documented developer experience, the use of commercial technologies, and an interconnection agreement filed by the date of the auction. Once a bid is selected, there is a stringent requirement for placing the project online within 18 months of executing the contract, with a 6-month extension for regulatory delays. Development and performance deposits are also required for winning bidders, creating further product homogeneity through equivalent repercussions for non-performance (CPUC 2011c).

In order to maximize competition, the California PUC ruled that each utility's auction must be held concurrently, and project developers are permitted to submit bids into all three auctions. Proposed and existing projects are eligible for bidding, though they must be within one of the three IOUs' service territories. The first auction under the RAM program is slated for the last quarter of 2011 (CPUC 2011c).

4.2.1 Auction Preconditions and Design Considerations

There are multiple challenges with implementing auctions for new renewable supply. Some of these challenges are inherent to adopting an auction-based method of procurement, while others could potentially be mitigated through better auction design. First, in order to yield a functionally competitive auction, the marketplace must be liquid; that is, the market size must be sufficiently large (Grace 2010, personal communication). Policymakers can influence market size by controlling the frequency of auctions and quantity of renewable energy being procured. Additionally, a technology-neutral design can increase the pool of investors but may produce imbalanced outcomes (i.e., if bids of only one technology are liquid and price competitive). An insufficient pool of players can readily lead to collusion effects, which risks decreasing the economic efficiency of the mechanism and can ultimately corrupt the price discovery process. Indeed, New York considered the creation of an auction for its centralized procurement mechanism but abandoned the approach because they concluded that the market was not sufficiently competitive to yield cost-effective outcomes (Grace 2010, personal communication).

Second, in price-only auctions products, homogeneity is critical because there are no factors other than price upon which to compare bids. The homogeneity concept extends to homogeneity of product and homogeneity of project completion risk (Grace 2010, personal communication). Auctions can be designed to make bids more uniform in several ways, including by auctioning long-term contracts for RECs, by requiring electric generation to be firmed or shaped, or by creating separate auctions for baseload, peaking, and variable-output electricity products (Kreycik et al. 2011). Achieving homogeneity of project completion risk in an auction is challenging because permitting, developing, and financing risk can vary significantly from project to project (Corfee et al. 2010). It is difficult to achieve financial homogeneity between bidders with projects that have not yet reached commercial operations. Therefore, auction design must include preconditions that establish developer experience and project viability or financial repercussions for nonperformance (Kreycik et al. 2011).

4.2.2 Implementation Example: Auctions in Brazil

Other countries have used renewable electricity auctions extensively in recent years, including Brazil and China. In Brazil, auctions are carried out for resource adequacy purposes and standardized contracts are awarded for electricity delivery beginning three or five years after the bid selection. The auctions are held centrally—that is, electric distributors determine their demands for future delivery, and these estimates are aggregated into a large market block indicating new electricity requirements (Moreno et al. 2010). From 2004 to 2009, Brazil carried out 16 long-term contract auctions for renewable energy, contracting 37,000 average MW[26] of firm energy (from both new and existing generators) (Moreno et al. 2010).

The auctions are conducted in two rounds: a descending price clock auction and a final pay-as-bid round (Moreno et al. 2010). In the first round, the auctioneer initiates the auction with a high-energy price that is anticipated to create excess supply. Generators bid in the quantity they would supply at this price. As the clock advances, while there is still excess supply, the auctioneer decreases the energy price. This phase is known as the classification phase, as it aims to provide price discovery. In the second round, generators bid a final sealed price, which cannot be higher than the price disclosed by the classification round (Moreno et al. 2010).

After a 2010 auction, Brazil's distribution utilities signed contracts with 89 projects representing 2.9 GW of potential installed capacity (Zindler 2010). Contract prices were competitive: winning biomass developers received PPA prices averaging US$83.50/MWh for 713 MW of potential capacity, and winning wind developers received on average US$74.40/MWh for 2.1 GW of potential capacity (Zindler 2010). Bloomberg reports that though these wind contracts are well within the range of current wind levelized cost of energy (LCOE) estimates, the average price for wind contracts represents a 42% decrease from those signed under Brazil's PROINFA renewable energy subsidy program, which ran between 2002 and 2005 (World Resources Institute 2010;

[26] An average megawatt is 1 MW of capacity produced continuously over a period of one year. 1 MW_a= 1 MW x 8,760 hours/year = 8,760 MWh = 8,760,000 kWh.

Zindler 2010). Furthermore, some winning bidders projected annual average capacity factors as high as 55% for their wind projects, which may be considered optimistic. These results suggest that some underbidding by wind developers (Zindler 2010).

4.2.3 Application of Evaluation Criteria

4.2.3.1 Pricing

Theoretically, pricing under an auction-based system is more likely to approximate market prices, all else being equal. The California proposal has drawn interest because it is anticipated that such auctions could be effective at selecting lower-cost projects and that they could efficiently capture pricing changes in installed costs over time (CPUC 2010; Vote Solar Initiative 2009). Additionally, if there is transparency of awarded prices, an auction system could strengthen the quantity of public data about the cost structure of renewable energy plants, as compared to competitive solicitations and bilateral contracting.

If financial repercussions for non-performance are not strict, under-bidding can be a problem in auction-based procurement (Crider 2010; Grace 2010, personal communication). Additionally, because bids are non-negotiable, administrators may find that projects are not built if market pricing for renewable systems shifts subsequent to the auction. Auctions with an insufficient number of players are also susceptible to gaming, which could undermine the competitiveness of the process.

4.2.3.2 Complexity/Efficiency of Contracting Processes

Contracts resulting from "sealed-bid" auctions are typically standardized and non-negotiable, so bid evaluation and approval under auction procurement is relatively simple for LSEs and regulators. Thus, bid-to-contract length may be shorter under auctions than under competitive solicitations, where disparate contract structures, risks, and benefits profiles make an apples-to-apples comparison more difficult. Additionally, auctions can be conducted via online platforms, where automation can reduce transaction costs. The California PUC staff expects that an auction-based approach may reduce transaction costs for buyer, seller, and regulator, though this has yet to be shown in practice (CPUC 2009a).

4.2.3.3 Impact on Developers' Access to Markets

Auction-based procurement is likely to negatively impact access to markets, particularly for smaller and less-established players (Crider 2010). Such participants, particularly those without access to large volumes of capital, may have trouble meeting minimum project viability criteria since financing occurs later in the project development process (CPUC 2009a). These developers might also be deterred by the cost of mounting a bid, as in other procurement mechanisms discussed in this report.

One possible issue with a price-only auction is that winning contracts may be concentrated within the hands of a few larger players. Market concentration could be mitigated through better auction program rules, but by virtue of the design, more experienced developers are likely to have a distinct advantage. Under the California RAM proposal, concerns have been expressed that the resulting contracts would be skewed towards large projects developed by large developers since smaller projects might not be competitive strictly on price (Woody 2009).

If the state's objective is to promote smaller distributed projects or specific technologies, the administrator might consider creating separate auctions for those project types. This would foster greater homogeneity in the auction products and could create different bands of activity in projects at different scales and in different technologies.

Part of the challenge of implementing auctions is to strive for the correct frequency to ensure that auctions are functionally competitive. Regulators may require utilities to hold a certain number of auctions per year or according to a pre-established schedule. Providing a predictable schedule that is publically available can ensure that developers have fair access. Holding regular auctions can help continuity in project development and can draw more developers and investors into a particular region.

4.2.3.4 Utility Decision Making

Auctions can take a number of forms (e.g., auctions for specific technologies, specific project sizes, or specific load characteristics). LSEs can customize the type of generation that they solicit and use auctions to meet specific utility load requirements. The California RAM proposal bases its auctions on the load profiles the capacity will solicit, and as such meshes with utility IRP (Bull 2010a). For projects under 10 MW, the California PUC has proposed setting up auctions for (1) peaking "as-available" renewable products, (2) non-peaking "as-available" products, and (3) baseload products (CPUC 2010).

Nonetheless, auctions could expose LSEs to supply or price risk if auction administrators do not conduct thorough analyses on demand and supply markets beforehand. Conducting initial analysis on costs and market dynamics can inform price or quantity caps. To reduce price risk, administrators can set "reserve prices" to represent the maximum amount buyers will pay for the generation, capacity, and RECs. Alternatively, to reduce supply risk and contain program costs, administrators can set revenue requirement caps or quantity caps (CPUC 2009a).

4.2.4 Summary

Auctions for new renewable capacity are not guaranteed to work. They have not yet been proven in the U.S. and have additional market requirements. In order for an auction to be functionally competitive, there must be market liquidity and sufficient homogeneity (Grace 2010, personal communication). If these conditions are met, well-designed auctions could potentially result in low-cost contracts that can be executed relatively quickly. Auctions can be integrated into utility decision-making by designing the auction to target specific project features (e.g., on-peak supply). However, auctions may also exclude a number of participants from entering the market, partly by design and partly due the high upfront costs of putting forth a bid (though this may not be singular to just auctions).

In theory, project viability requirements can help reduce contract failure and help ensure that LSEs meet their targets on schedule, but developers may run into difficulties meeting requirements or may find that a previously viable bid is no longer economic given changing market conditions. Administrators may want to review contract failure rates and the time it takes winning bidders to place projects in service and adjust requirements accordingly.

Table 4. Summary of Application of Evaluation Criteria to Auction-Based Mechanisms

Criteria	Advantages	Challenges
Pricing	• The potential for market-based price discovery • Auction procurement provides an additional competitive process for LSEs to use to enter contracts	• Auctions must be functionally competitive in order to lead to accurate price discovery • Under-bidding may be a problem if financial repercussions are not strict
Complexity/ Efficiency of Contracting Processes	• Bid-to-contract length may be shorter than under competitive solicitations • Contracts resulting from auctions are standardized and non-negotiable	• It may be difficult to ensure that there is homogeneity and liquidity in the market
Impact on Developers' Access to Markets	• Auctions are open, transparent processes	• There is upfront cost/risk in preparing a bid, with uncertainty of receiving a contract, so less experienced developers may be excluded from participating • Financial homogeneity screens will limit the developer pool • There is potential for market concentration unless mitigated by auction rules
Utility Decision Making	• Auctions can be held as needed by the LSE to ensure that renewable targets are reached • Auctions can be structured to obtain particular types of generation products (e.g., baseload and peaking)	• There is potential for price and supply risks • Contract failure rates could potentially be significant; there are no data from the California program available yet

5 Policy Objectives and Procurement

State statutes and regulations directly influence how utilities go about renewable electricity procurement. State legislatures can set up purchase obligations for certain types of renewable energy generation, or they may foster market mechanisms to promote specific policy objectives. FITs and auctions are potential alternatives to utility RFPs or bilateral contracting (mechanisms that have historically been used to select least-cost renewable energy generation). Each option has distinct advantages and challenges and may be well suited for a specific purpose.

In this section, we compare options for promoting specific types or quantities of renewable energy generation. As determined by a state's policy objectives, states may want to encourage:

- Customer-sited distributed generation
- Wholesale distributed generation
- Utility-scale generation

5.1 Customer-Sited Distributed Generation

Some states seek to promote customer-sited generation at the residential and small commercial scales (typically project sizes up to 1 MW in capacity). Specific strategies for encouraging on-site generation have been net-metering policies, loan programs, tax assessment programs, and the creation of tax incentives, rebates, or performance-based incentives to reduce payback periods and eliminate barriers for property owners. For solar PV, the Department of Energy-funded Solar ABCs project[27] focuses on policy analysis and barrier reduction for this market segment. A recently published report provides an in-depth analysis of the policy options for promoting distributed PV (Fox and Varnado 2010).

State policymakers have also promoted distributed generation using market mechanisms, such as RPS set-asides or multipliers, allowing utilities to dictate what programs to use. Often utilities establish specific programs to promote and manage the development of customer-sited renewable energy systems. Utility programs may provide further financial incentives for the sector so that they can meet their distributed generation compliance requirements. Incentive availability, and its exact level, are based on how much distributed generation the LSE wishes to interconnect.

Customer-sited distributed generation is not typically procured in the same way that utility-scale generation is procured. Competitive solicitations and bilateral contracting are not particularly feasible procurement options for distributed generation due to the high administrative costs per megawatt of capacity procured by the LSE. Furthermore, this class of developer typically does not have the expertise, time, or money to reply to a

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[27] Solar America Board for Codes and Standards. http://www.solarabcs.org. Accessed October 6, 2011.

competitive solicitation or to negotiate a bilateral contract. This is not to say that aggregators could not potentially compete in RFPs or sign contracts with utilities to develop a portfolio of small projects.

For distributed generation procurement, state-mandated FITs or auctions could be an alternative to other utility-managed distributed generation programs. The following table compares the use of:

- Traditional incentives (rebates, performance based incentives, or REC compensation) and net metering
- Utility buy-back programs (FITs).

The pivotal difference between rebates and FITs is that rebates reduce upfront costs, while FITs make projects bankable through steady, and typically profitable, revenue streams. Consequently, the subset of the market that policy attempts to reach would be a crucial determinant of whether a FIT or rebates would work best. Some market players may be more comfortable with a rebate structure, but more behavioral analysis would be needed to draw any conclusions about the market acceptance of rebates versus FITs for the residential and small commercial sectors, for example.

Table 5. Comparison of Procurement Approaches for Customer-Sited Distributed Generation

Mechanism	Advantages	Challenges
Financial Incentives and Net Metering	• Only 1 meter is required, and customers consume the energy they produce; self-generation of electricity motivates consumer investment in the market (Fox and Varnado 2010) • These incentives can be targeted towards specific submarkets • Rebates reduce upfront costs of installing systems • Production-based incentives provide a revenue stream that can help obtain financing	• Effective program implementation relies on a wide range of incentives, regulations, and policies •
Feed-In Tariffs	• FITs provide a revenue stream that can help obtain financing • Distributed generation FITs can be administered cost effectively due to standardization	• Changing cost profiles of renewable energy technologies may require frequent payment level revisions • If several neighbors participate, there could be local balancing/ reliability issues

5.2 Wholesale Distributed Generation

There are distinct considerations if the policy objective is to promote larger distributed generation systems on the supply side (as opposed to the customer side) of the utility meter. These facilities, typically on the scale of 1 MW to 20 MW, may not require new transmission or substantial distribution upgrades. There may be a variety of players in this emerging market, and there may be interest in stimulating diversity of participants.

Recently it has been argued that competitive solicitations may be limited in their ability to stimulate the development of wholesale distributed generation systems and that auctions may be a more effective procurement mechanism for this market. For example, in California the market for wholesale distributed generation has not yet been tapped; over 60% of RPS projects under development or pending approval in California are greater than 20 MW in capacity (CPUC 2011b) despite California's transmission constraints. The advocacy group Vote Solar has argued that the California RAM program could stimulate immediate development activity in California by establishing a market for smaller renewable projects, which may be easier to finance and build (Vote Solar Initiative 2009).

Further considerations, advantages, and challenges are summarized for each RPS procurement option in supporting the development of wholesale distributed generation facilities.

Table 6. Comparison of Procurement Approaches for Wholesale Distributed Generation

Mechanism	Advantages	Challenges
Competitive Solicitations	• Smaller system-side generators are increasingly cost competitive • The mechanism might spur developers to reduce costs of wholesale distributed generators to compete with utility-scale generators	• Projects of this size have not yet been competitive in RFPs (might require a separate solicitation) • RFPs typically do not weigh the benefits of wholesale distributed generation very highly •
Bilateral Contracts	• Developers may be more likely to obtain the PPA terms they need to develop a project • LSE can clearly relay location preferences to developer	• Fewer procedural efficiencies than under an RFP • Due to project size, LSEs may want to procure more than one of these types of facilities concurrently
Feed-In Tariffs	• FIT policies could specifically target this type of generation and provide cost recovery to these generators • FIT policies may lead to an immediate boom in the market	• Changing cost profiles of technologies may require frequent payment level revisions • LSEs may need to specify where these facilities would have the most benefit to the utility system, so that these generators are optimally located
Auctions	• Projects of this scale may be conducive to auction procurement because they are not yet competitive with utility-scale projects, but costs may be changing rapidly for this sector • Auctions could lead to faster ramp up of small projects, which can provide immediate benefits, such as alleviating grid congestion • There are likely to be more potential project developers in wholesale distributed generation space than in larger/central station utility market	• Even with small projects, project completion risk may not be homogeneous • Auctions may not be the best mechanism to increase the diversity of participants because of the selection criteria and cost of mounting a bid

5.3 Utility-Scale Generation

As stated earlier, competitive solicitations and, less often, bilateral contracts are used most often to procure utility-scale generation in the United States. In Europe and around the world, FITs have been used to support utility-scale generation. In the United States, no proposals have been made to replace competitive procurement with FIT policies for large-scale generators. In states with RPS policies, LSEs have been directed to procure least-cost renewable generation.

Auctions could be a potential way to procure utility-scale generation supply, although the approach has not been used in the United States. However, large projects are complex, and the lack of homogeneity in the utility-scale market makes it risky to limit the bid evaluation criteria to price only. Proponents of FIT policies argue that FITs are a cost-effective mechanism for reaching renewable energy targets (e.g., Klein 2008), while opponents find that FIT policies are inherently limited because they are not market-based mechanisms, and there is too much risk of getting the payment levels wrong. Table 7 summarizes the relative advantages and challenges of the different procurement approaches addressed in this study.

Table 7. Comparison of Procurement Approaches for Utility-Scale Generation

Mechanism	Advantages	Challenges
Competitive Solicitations	• RFPs are effective at procuring least-cost utility-scale projects, while also considering non-price factors • Competitive solicitations mesh well with IRP processes • An RFP can clearly indicate quantity of supply required • RFPs can be issued as needed to meet a long-term renewable energy target	• RFPs are complex and time intensive • It may be difficult to make a fair comparison between different project proposals for selection • Traditionally high contract failure rates might undermine the effectiveness of an RFP to reach a renewable energy target • LSEs may have to compensate for contract failures by “over-procuring” • Between solicitations, opportunities to develop renewable projects may be limited
Bilateral Contracts	• Developers may be more likely to obtain the PPA terms they need to develop a project (especially important for innovative technologies) • LSEs can choose to pursue a contract or not, according to need • In competitive RTO markets, utilities can shop around for the best prices for bilateral contracts, without the formality of an RFP	• In regulated markets, bilateral contracts are not competitively derived and could see fewer procedural efficiencies than under an RFP •
Feed-In Tariffs	• FIT policies are effective at spurring rapid deployment of renewable energy, which will help jurisdictions reach their renewable energy and climate goals • FIT policies can include interim targets/caps that will help an LSE in the pursuit of a longer-term target • Projects receiving a FIT rate may be more attractive to debt lenders, which may reduce financing costs	• In the absence of interim targets/caps, FITs might lead to a rush in development in the near term, which could lead to high ratepayer impacts • There is greater price risk when FITs are applied to larger projects
• Auctions	• Auctions are effective at procuring least-cost projects	• The lack of homogeneity in the utility-scale market makes it risky to limit the bid evaluation criteria to price only; there are a myriad of complex considerations for large-scale generators (e.g., transmission requirements, siting, permitting, ownership structure), which may necessitate careful examination on the part of the LSE and regulator • There is no relative advantage of introducing price-only auctions in the place of traditional RFPs

6 Conclusions

LSEs have a variety of mechanisms at their disposal when seeking to procure new renewable capacity. State policy and regulatory structure influence what procurement options are used in a jurisdiction. The four procurement approaches evaluated in this report have distinct advantages and challenges and affinities to particular markets, policies, and applications. Decision makers may want to weigh the following criteria in evaluating the optimal procurement approach to achieve their goals: pricing, complexity/efficiency of contracting processes, impact on developers' access to markets, and interaction with utility decision making. Summarized here are primary conclusions about each procurement approach under each criterion.

6.1 Pricing

Competitive solicitations, bilateral contracts (in competitive RTO markets), and auctions can select cost-effective, competitively priced projects. A policymaker seeking to promote least-cost generation may want to consider using one of those three options. FITs set prices paid administratively and consequently may not result in least-cost projects. It can be challenging to design FITs that adjust to market realities and keep prices accurate over time. This can lead either to over-compensation, which can trigger a boom, or under-compensation, which can cause development to halt. However, one benefit of FIT policies is that they can be used to provide support to projects of a variety of sizes, resource qualities, and technologies.

6.2 Complexity and Efficiency of the Procurement Process

Competitive solicitations are considered an efficient way of selecting projects; however, RFP implementation time can be protracted. The complexity of using a bilateral contract approach depends on level of regulatory oversight required for the LSE. Bilateral contract negotiation may reduce contract failure rate. Auctions and FITs require extensive upfront analysis on the part of regulators and policymakers, but these approaches can allow for rapid deployment of renewable energy. Auctions require a complex set of conditions in order to function properly. Markets must be sufficiently deep and liquid to lead to accurate prices, and there has to be homogeneity of product and of project completion risk to ensure that the process is fair.

6.3 Impact on Developers' Access to Markets

During the competitive solicitation process, obligated LSEs select for technically proficient and creditworthy IPP counterparties. Small developers who are new to a market may not be able to compete in a competitive solicitation. The bilateral contracting approach may in some cases increase access to markets for new developers but may also select for established market players. Auctions typically set pre-conditions for technical aptitude and then contracts are awarded on the basis of price alone, so new developers may not be able to qualify or to compete. Due to the non-discriminatory nature of the standard offer, FITs can increase market access for a number of participants and encourage traditionally risk-averse investors to begin investing in renewable projects. By providing standard contract terms at attractive payment levels, FITs can be seen as a way to increase market access to a wide array of potential developers.

6.4 Issues Raised for Utilities

Utilities are comfortable with procurement strategies that allow them to balance their priorities of cost and reliability. Competitive solicitations, auctions, and bilateral contracting allow utilities to exert control over factors like quantity procured, generation profile, project siting, and reliability. Under a FIT procurement program, LSEs may have less control over cost, siting, reliability, timing, and quantity procured. FITs can also "over-deliver" leading to a greater volume response than expected, which can create challenges for LSEs, ratepayers, and system operators. In response to this problem, some jurisdictions are beginning to introduce FIT capacity caps, while others are exploring auction-based mechanisms, which introduce a capacity limit into the standard offer structure.

In summary, decision makers may want to evaluate procurement success in their jurisdictions and consider key tradeoffs in accessing alternative procurement methods. As the debate in the United States continues concerning the ways in which alternative procurement mechanisms can be used to help meet RPS policies, experience elsewhere in the world suggests that different procurement options can function together, and that they can even do so synergistically (Rickerson et al. 2007; Grace et al. 2009; Couture and Cory 2009; Cory et al. 2009).

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