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Purchasing Renewable Power for the Federal Sector: Basics, Barriers, and Possible Options

W. M. Warwick

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Prepared for
U.S. Department of Energy
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Executive Summary

One of the expectations accompanying electric utility deregulation was an increase in opportunities to purchase power directly from renewable resources. Renewable power purchases require actual power delivery in contrast to purchases of renewable energy credits (RECs). RECs represent the environmental attributes of electricity produced from renewable energy sources and are often sold separately from commodity electricity. RECs are simply certificates that verify they are backed up by power that was produced from a renewable resource somewhere. RECs do not require physical power transmission, power billing, or other utility services. The ability to purchase renewable power was expected to provide Federal agencies with a much broader range of options to meet Congressional, Administration, and agency renewable energy objectives. It also held out the promise of being able to use the buying power of the government to negotiate more favorable terms. While the emerging REC market has become a vital tool for Federal agencies, purchasing renewable power has turned out to be more complicated than expected. This paper describes some of the challenges Federal agencies have had purchasing renewable power as a means to meet renewable energy objectives established by Congress, the Administration, and their agencies.

The ability to purchase renewable power sits within the broader context of utility regulation, energy market deregulation, and the transition of the electric utility industry that is underway in response to the changing energy marketplace, global climate change, and associated policies. In brief, prior to industry deregulation, retail electricity customers were <u>unable</u> to choose the source of power supplies or suppliers. Instead, they were served by a “system mix” of power resources. On a national average basis, these were predominately non-renewable resources fueled by coal, uranium, natural gas, and fuel oil, although a significant fraction of the Nation’s power was derived from large scale hydropower projects, a renewable resource.

The deregulation of electric utilities is proceeding on two levels. The first is deregulation of wholesale power supply markets and associated transmission. This provides access for wholesale power customers to power resources and wholesale power customers across a large regional market. Wholesale power customers include utilities, power marketers, and retail power providers that are authorized to resell power directly to retail customers. This generally excludes retail power customers provided with power delivery services by local utilities. Wholesale deregulation is under the jurisdiction of the Federal government and extends across the continental U.S., excluding most of Texas, which follows Federal practices using state authorities. In contrast, retail deregulation is under the jurisdiction of each state and is proceeding on a state-by-state basis. It currently extends to only half the lower-48 states, and is being reconsidered in several of these. Retail deregulation does allow retail customers to purchase renewable power if they wish; however, the rules for doing so vary across the deregulated states.

The complexity of retail deregulation and its limited scope have frustrated widespread use of renewable power procurements by Federal agencies. In addition, Federal authorities to procure power competitively and state regulation of aggregation of purchases across customers have limited the ability of agencies to use their purchasing power in ways they anticipated.

Unfamiliarity with competitive power procurements has also slowed the contracting process for renewable power. This paper provides a review of major Federal electricity procurement authorities and how they have been used in selected cases to procure renewable power. For most of these cases, the process has been unsuccessful; nevertheless, each case provides useful lessons to modify and improve the process until success is realized. Federal acquisition of RECs has not confronted the same barriers as renewable power procurements and has been highly successful, with the Federal government leading recent national lists of REC purchasers. Potential ways to address renewable power procurement goals using RECs to increase Federal participation in renewable power markets is also discussed in the paper.

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Introduction

Procuring renewable power for Federal facilities seems like it should be relatively easy in today's competitive wholesale power markets and utility deregulation. However, this is not the case. There are many reasons for this. Some have to do with the nature and structure of the electric utility industry, such as:

- how electricity is produced
- how energy trades in competitive wholesale markets
- how new power projects are financed
- how competitive retail markets work and where they are available
- what options are available to retail customers in non-deregulated areas.

And some reasons have to do with the way Federal agencies are budgeted and how utilities are procured, such as:

- the nature of how retail electric service is used at Federal sites
- acquisition authorities
- procurement practices
- the role of budget adequacy and certainty in procurement decisions.

As this host of reasons illustrate, the underlying issues are complex. Further, they vary across agencies and state boundaries. This document is a high level summary that examines these complexities of directly purchasing renewable generation at retail locations and provides examples of different retail supply arrangements that currently exist at Federal sites. It also provides an overview of renewable power procurement challenges, many of which are specific to Federal agencies.

How Electricity is Produced

The difference between renewable *energy* and a renewable energy *credit* (REC) is basic to this paper. Central to that difference is how power is produced and delivered to retail customers, including how the power flows from generators to customers and how the financial transaction that covers those costs is processed. A couple of useful adages can be used to describe both. The first is that power flows like water: It seeks its own level, or alternatively, follows the path of least resistance. The second is that money flows in the opposite direction from energy. In reality, the correlation between the two is imperfect.

In a simplified market with one generator and one customer, power flows from the generator to the customer. In the real world, there are many generators and many customers. To minimize the number of power lines connecting generators to customers, the generators connect to a transmission grid, which is a complex network of power lines and substations of various voltages. Extending the plumbing analogy, the power system is similar to a municipal water supply that comes from reservoirs fed by many water sources. Because energy is not stored like water in a reservoir, energy to your home may not come from the closest power plant, but from one hundreds of miles away. As a result, power at the outlet originates from multiple sources, where the sources themselves and the contribution of each to the end user's outlets is unknown. This surprises some people, but it makes both engineering and economic sense.

Although the real power system is composed of many generators and customer loads, because it is a closed system, the electrical reality is similar to the one generator, one customer analogy. In other words, all energy produced in the system flows from generators to end uses. This is a simplification because some energy is "lost" in the process of transmitting the power through the grid. The financial reality is a similar closed system, because production is known, as are sales. As a result, as long as generators are paid for their output by consumers, it doesn't really matter where the power flows in the closed system. The generator's costs are allocated to individual customers through markets and utility rates. When consumers pay their power bills, their money flows back to the owners of the utility, transmission lines, and generators, opposite the way it came. This greatly simplifies the financial aspect of the power business because generators and consumers only need to be concerned with how much they produced or consumed, not where the energy went or where it came from. Exactly how the energy flows from the power plant to the consumer is irrelevant. However, this situation changed when utilities and retail customers began to rely on energy purchased from specific power suppliers and specific generating sources.

How Power Costs and Customer Demand are Matched Up

Power projects have two primary sets of costs: construction and associated financing, and fuel and ongoing operations and maintenance (O&M). Different types of power plants have different but characteristic construction costs. Similarly, they have characteristic fuel and O&M costs, which make up a different fraction of power production costs for each type of plant. For example, renewable power plants have high initial construction costs but low fuel and O&M costs. In contrast, natural-gas-fired power plants have relatively low construction costs, but fuel costs vary with the price of natural gas, which is currently very high. Different power plants also have different operating characteristics. Coal and nuclear power plants run most efficiently if they are operated near maximum capacity. Similarly, wind farms only produce power when the wind blows; therefore, they need to run whenever they can. Plants that operate best under unique circumstances are called “must run” plants, which include both nuclear plants and wind farms. In contrast, the efficiency of a natural gas power plant is less sensitive to changes in output and is typically operated to provide power during peak demand periods and to respond to normal variations in demand.

Prior to deregulation, most power was produced by the utility to serve the needs of its captive customers. Utilities chose power plants based on projected need for base load or peaking power, and estimated life-cycle costs based on assumed construction, financing, and fuel costs. Regulators permitted utilities to recover these costs through utility rates. When a new power plant was needed, the costs were rolled into rates by averaging the new plant costs in with the costs of all the other existing power plants. This is called “average cost pricing.” Under regulation, utility costs are known, customer demand is metered, and the utility’s costs are prorated to customers based on their consumption practices. Because all costs are accounted for by the utility, allocation of the specific costs for transmission and each generator do not need to be precise.

One reason some states opted to open up the power supply portion of electric markets to competition was that serious errors were made by utilities and regulators in their assumptions of power plant construction, financing, and fuel costs. When the new higher cost resources were added to the generation mix, it resulted in substantially higher rates in some regions of the country, in what has been referred to as “rate shock.” Deregulation was adopted to take generation acquisition decisions out of the hands of regulators and monopolist utilities, thereby allowing that need to be met through competitive power markets in the belief that it would ultimate result in lower prices to consumers. Although deregulation did stimulate new power plant construction, especially of renewable power plants, it required fundamental changes in the way the power system was operated, both to allow non-utility owned generators to use the system, but also to track use of the system by all generators. As a result, market mechanisms were adopted to allocate costs among all generators. These costs were then used to price the power that each generator supplied to its customers, wholesale or retail.

In competitive markets, power prices are set through an auction-like process that settles on a single price that satisfies the needs of buyers and sellers. This price is the highest price acceptable to the buyers and sellers at the time and is called the “market clearing price.” Establishing prices this way is called “marginal cost pricing” because all bidders are paid the same price (the market clearing price) irrespective of their bid. Bidders with low costs compared to the market clearing price make large profits. Profits are used to pay off the fixed costs of plant ownership, either new plant construction costs, or the cost of power plants purchased from others. The introduction of competitive power markets makes it no longer possible to simply allocate actual generation and transmission costs across all customers. Instead, power bills need to reflect the price each customer, or its representative, pays for power from specific generators and for use of the power grid.

Competitive Market Realities for Renewables

Competitive power markets allow buyers to choose among supply sources. This has enabled development of renewable power projects to serve the needs of customers who have a requirement for power from renewables. It also allows customers to negotiate power prices for the duration of a contract, be that very short term, or over multiple years.

Competitive market structures favor power producers with plants that have both low fixed costs and low fuel and O&M costs. In contrast, renewable power projects have high fixed costs and low O&M costs. Because profits from competitive power sales are used to repay construction costs, competitive markets are not well suited to the financing requirements of renewable project developers because they require secure profits to retire financing costs for a long period of time. This can provide an opportunity for buyers to negotiate long-term supply contracts with renewable power project developers on favorable terms, including terms that fix prices over the duration of the contract. This helps insulate the customer from future power price increases. Government agencies typically have long-term power requirements and can benefit from the budget stability a fixed power price provides. However, governmental agencies require reliable power, which some renewable resources do not provide.

Wholesale power buyers purchase power from a variety of sources including potentially renewable resources. They also trade power in various “spot” markets. As a result, they are able to sell reliable power to retail customers by drawing on a portfolio of generation to meet the specific needs of each customer. A retail customer that wants to rely on renewable power has to be able to duplicate this process, because it has to match its unique demand with the output of specific generating resources and/or markets. If it purchases too little, it runs the risk of a power outage. If it purchases too much, it wastes money. To strike the right balance, a retail customer needs to procure a set amount of power from a renewable resource and have in place a process to match that resource with actual power demand using available power markets. In other words, a retail purchase of renewable power requires two components: a renewable power supply contract and a power marketing contract that can be used to match renewable generation output to real-time demand by trading in wholesale power markets.

Matching Renewable Energy and Load Requirements

Assume a customer wants to purchase 10 MW of power for every hour in a year. In terms of the power market, this is called a 10-MW "block". A 10-MW wind farm could supply power only when the wind blows, which is roughly 33% of the time. For a wind farm to meet these terms, it would have to provide power from some other source for the remaining 66% of the block. Because the wind farm owner has no idea exactly when the wind will blow, the customer has no idea when it will have to purchase power from the market. That makes it very difficult to enter into a comparable long-term contract with a conventional power supplier for a fixed price. Instead, it is forced to purchase power as needed from the "spot" market at prevailing prices, including during market peaks. The wind farm can hedge some of these risks by over-producing and using the revenues from producing in excess of the 10-MW contract amount to offset the cost of market purchases when the wind isn't blowing. For example, the farm could supply 100% of the contract requirements from a 30-MW wind farm (recall wind farms only produce power about one third of the time, so a 30-MW farm is needed to provide an average of 10 MWs). The wind farm supplies all of its output to meet the contract terms up to 10 MWs. When more power is available, it is sold into the spot market and the revenues earned from those sales are used to offset the costs from spot market purchases when output is less than 10 MWs. This situation is illustrated in Figure 1. As this figure shows, the benefit the renewable power producer enjoys by not having fuel costs gets diluted when it tries to sell power directly to a customer, instead of into the market at prevailing market prices. Similarly, when it tries to deliver 100% renewable power to a customer, the transaction requires the skills of a power marketer to trade in and out of the competitive market; skills many renewable resource developers lack.

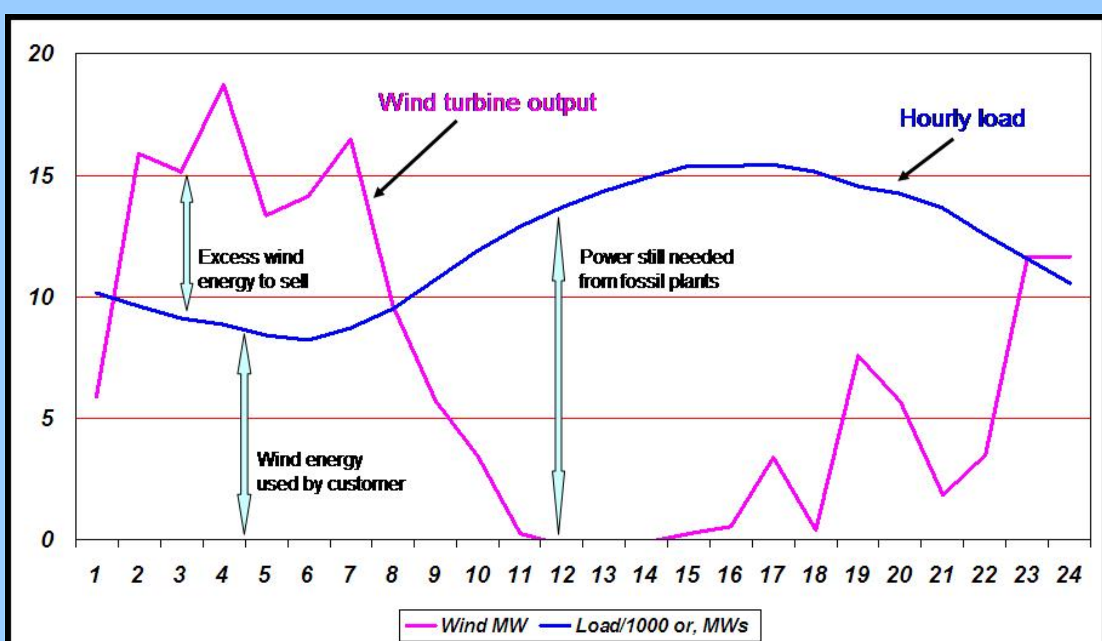

Figure 1: Lack of correlation between wind turbine output and load requirements.

Renewable Power, Markets, and Federal Goals

Renewable power can be priced at a fixed price on a long-term contract because renewable power projects have no fuel costs. In essence, the cost includes the price of "fuel" for the life of the project. This "fuel price" is part of the project's financing. Again, it is as if you are paying for a lifetime of "fuel" upfront. Consequently, renewable power is typically more expensive initially than conventional power. As a result, it typically requires a long-term power supply contract to secure construction financing.

Because renewable power is not cheaper than most conventional power sources, at least on a first-cost basis, there are two basic sources of demand for renewable power today; the voluntary and compliance markets. The voluntary market is older and provides an environmentally preferable power source for utilities and firms that want to reduce reliance on conventional power resources and their associated environmental impacts. This includes enlightened utilities that see renewables as a resource with the lowest life-cycle cost and therefore, preferable to conventional power plants. The voluntary market has been eclipsed by the "compliance" market, which is sustained by renewable resource content requirements imposed on utilities and retail power providers by state regulators and/or legislatures. Typically, these take the form of renewable portfolio standards, or RPSs. An RPS mandates that covered entities provide a specific fraction or amount of power from specific renewable resources. Over half of the states have adopted some form of RPS to date.

Federal agencies are one of the earliest and largest participants in compliance markets as a result of legislative requirements and Executive Orders dating to the 1970s. Most recently, requirements in the Energy Policy Act of 2005 (Public Law 109-58) and Executive Order 13423 (72 FR 3919-3923) represent the primary Federal drivers. The purpose of these requirements is to stimulate renewable power development above and beyond that directed by compliance markets, especially through development of renewable potential on Federal and Indian lands for use by Federal agencies. Renewable power purchases and RECs can be procured for both voluntary and compliance markets, although certain criteria may be applied for resources that are certified for these markets. Most RPS markets require actual renewable power purchased, rather than purchase of RECs. Typically, these purchases have to be within a specific geographic area, and at minimum, within the regional transmission grid.

Use of voluntary markets by Federal agencies or other retail customers must confront the difference between a renewable power purchase and a REC. This is largely because retail customers do not have the same access to wholesale power markets and transmission as do power retailers and marketers. For a consumer to purchase renewable power, the renewable resource has to be part of the same "closed" electrical grid as the consumer. Otherwise the power cannot be delivered to the customer. The price the consumer pays for the renewable power will have to include the cost of the power itself and the costs for using the power grid to get the power to the consumer, including the costs incurred to match the output from the renewable power project to the customer (transmission, firming, shaping, ancillary services, and other reliability reserves). As noted previously, this type of transaction typically requires two parties; the renewable power producer and a power marketer to handle power delivery and associated reliability services. A REC is created when a renewable power producer sells "commodity power" into the competitive market for the prevailing power price and splits off the environmental attributes to form the REC. The REC for that power trades independently of where the power goes once it enters the grid. Consequently, the REC represents the premium associated only with the renewable resource and not the additional costs of transmission and associated services to deliver power to specific customers. As a result, RECs are easier to contract for, and can be cheaper when all costs are considered. They are also "footloose," meaning they can be produced anywhere, irrespective of regional transmission grid boundaries.

RECs are also purchased voluntarily by individuals, businesses, and institutions to meet their individual environmental goals. In contrast to compliance markets for RECs (to meet RPS mandates), voluntary RECs can have widely varying characteristics in terms of location of the power resource, renewable resource type and age, and date of REC production. Accordingly, Federal agencies need to purchase RECs that are consistent with current guidance regarding resource location, type, and age to ensure their efforts meet Federal and agency renewable and other energy goals. Similar care must also be taken for renewable power purchases.

Although voluntary REC purchases initially stimulated development of new renewable resources, it is more likely that current RPS mandates facilitate a parallel voluntary REC market on its margin as a result of the much large size of the RPS market. The reason for this is simple. An RPS creates a demand for renewables that must be satisfied by the covered entities, whereas the voluntary market is subject to the whims (and budgets) of consumers that are not compelled to purchase RECs. As a result, the voluntary market may not stimulate significant new renewable resource development because it doesn't provide sufficient assurance to renewable developers that they will be able to recover their costs. That said, the voluntary market has proven itself over the years and continues to grow. Therefore, it may be possible to provide long-term financial assurances if a "forward" market in RECs develops.

Forward markets consist of futures and options contracts that allow buyers and sellers to fix prices for commodities in the future. In general, formal forward markets are created by financial institutions once a robust commodity market is established. A case in point is the Texas compliance market, which is primarily implemented through a REC market. The Texas transmission operator manages the Texas REC market, which is open to REC buyers from anywhere, including retail customers who want to purchase RECs voluntarily. To date, the Texas approach has stimulated the largest amount of renewable generation development in the Nation, so this approach appears to work well. Other states with RPS requirements have interest in adopting a similar model, including California and states in the Pennsylvania, Jersey, Maryland Interconnection (PJM), which also includes the District of Columbia and Delaware. This approach works in these areas because the RECs must come from generating sources within the local interconnection.

In other words, as long as the RECs originate from the same closed transmission grid, the exact location of the generation or buyer is not important because the renewable resource acts to displace conventional generation that would otherwise be required to meet demand. As a result, the RPS creates an assured market for RECs into the future, which appears to be satisfactory for developers to arrange long-term financing. As this practice spreads, or if a national RPS is adopted, it may stimulate development of a more stable environment for financing renewable power projects that do not have a long-term sales agreement in place.

In the interim, it may be possible to accomplish the same goal, namely renewable power price stability, via a REC hedge agreement. In this scenario, RECs could be purchased in advance from projects under construction. This "forward" purchase would provide the developer with financial assurances it could use to facilitate more favorable financing terms, while the REC buyer would obtain a potentially more favorable fixed REC price. If the REC price was indeed favorable, that REC could be sold for the prevailing power price and the additional revenues could be applied to the actual power bill. This scenario borders on speculation, which Federal agencies cannot engage in. However, if the intent was to hold the RECs rather than to sell them, and at some future time the RECs became a fungible asset that was better used to cover current expenses, which would appear to avoid their use as vehicles for speculation. Of course, sale of the RECs would negate their value for meeting current and future renewable energy goals.

In summary, Federal agencies have renewable energy goals that current guidance allows to be satisfied through on-site projects, renewable power purchases, or purchase of RECs. Of these, on-site projects and renewable power purchases provide physical power to the site and may provide price and budget certainty depending on the nature and duration of the contract. Many states have adopted renewable portfolio standards. An RPS stimulates development of renewable resources, typically within the states or nearby. It also stimulates interest in development of renewable resource potential on Federal lands and facilitates the development and sale of power from projects that are being developed to meet the RPS but could, instead, be purchased by Federal agencies. Federal entities are only able to purchase renewable power directly from the producer if they are in a deregulated state, or if the producer is the serving utility. Purchases directly from a producer do not ensure reliable power delivery comparable to that of the utility or other conventional power providers. Many renewable resources cannot produce power so that it exactly matches the use of a prospective Federal customer. As a result, the customer will require the services of a power marketer or similar service to manage the output from the renewable power resource and the customer's demand using competitive power markets and conventional power sources. On the other hand, Federal entities are free to purchase RECs anywhere and do no require any additional services. However, RECs are unlikely to provide an agency with the price stability and budget certainty a long-term renewable power purchase agreement can provide.

What Options are Available to Retail Customers in Non-deregulated Areas

Customers in areas that have not deregulated have more limited options than customers in states with competitive retail markets. One option that may be available is participating in a utility green pricing program. Green pricing is an optional utility service that allows customers to support a greater level of utility company investment in renewable energy technologies. Participating customers pay a premium on their electric bills to cover the incremental cost of the additional renewable energy. To date, more than 600 utilities, including investor-owned, municipal utilities, and cooperatives, offer a green pricing option. One advantage to Federal agencies of participating in utility green pricing programs is that it may be procured on a sole source basis from the local utility with the premium included as an added line item on the utility bill. Additionally, local utility green pricing programs often directly support the development new renewable generation resources in the local area. However, the quality and costs of the programs varies greatly and the programs are often considerably more expensive than competitive power procurements or the purchase of RECs. Another option that is emerging is negotiation between the Federal agency and the serving utility for a special renewable power supply option. Typically this requires a new tariff and/or modification of current utility service agreements. It also usually costs more for the renewable portion of the power supply. The decision whether or not to support a local utility program must be done on a case-by-case basis based on the quality of the program, the additional costs and budget available and the objectives of the agency.

Federal Renewable Goals, Acquisition Barriers, and Potential Solutions

Federal agencies have been directed to use some renewable energy for over a decade, as is evident in Executive Order 13123, now replaced by Executive Order 13423 (72 FR 3919-3923). A Federal renewable requirement is also included in the Energy Policy Act of 2005 (42 USC 15852 as amended). While progress has been made, limited access to renewable power and ineffective market structures in deregulated states has posed barriers to renewable power procurements. Both renewable resource availability and access to it through tariffs or markets are necessary for agencies to make significant progress, <u>but neither alone is sufficient if appropriate budgets, acquisition authorities, and agency directives to procure renewable power are not in place</u>. As a result, a majority of agencies currently rely on purchasing RECs to meet their renewable energy objectives. Renewable power purchases, in the form of power purchase agreements (PPAs) or other mechanisms, may be more beneficial than RECs because they often ensure a predictable price for renewable power for a long term, thereby stabilizing power costs and increasing budget certainty. Life-cycle cost (LCC) directs agencies to consider such agreements even if they are more expensive today, so long as they provide a lower cost over the life of the contract. This section reviews the environment within which Federal agencies consider renewable power procurement.

Acquisition Authorities

The authorities for purchasing renewable power are the same as those for purchases of power from conventional sources, namely the Federal Acquisition Regulations (FAR; 48 CFR 1) and Defense Federal Acquisition Regulations (DFAR; 48 CFR 2). At present, electricity is treated differently in the FAR and DFAR depending on whether it is purchased as a "commodity" or a "utility service." This distinction was unimportant prior to deregulation because all electricity in a given service area was governed by a single provider and delivered as a utility service. As deregulation has become more widespread, this distinction, while inexact, has gained in importance. Accordingly, customary interpretations differ from agency to agency, as well as within the Department of Defense (DOD) among the services. Typically, a utility service includes power and delivery bundled into a single product and based on standardized prices and terms of service. Based on the previous discussion, this would include the purchase of power and its delivery to the agency as a single transaction.

Deregulation "unbundled" standard utility service into two components, standard utility service for power <u>delivery</u> that is only available from the local utility, and <u>commodity</u> power that can be purchased from competitive suppliers. In the FAR and DFAR, contract terms for commodities are limited to 5 years, while utility service contracts are limited to 10. There are exceptions to these authorities for Federal customers of a Federal power marketing authority (PMA), such as the Bonneville Power Administration (BPA) or Western Area Power Administration (WAPA), and for DOD. Other exceptions may exist as well. Referring to previous discussions of how power markets work, a renewable power contract essentially re-bundles the purchase of power from a renewable resource (arguably a "commodity") with the specific delivery services necessary to match output from the renewable resource to the loads of the customer in accordance with applicable utility regulations. In other words, a deregulated customer may purchase “system mix” power from a competitive power market provider as a commodity, because the power marketer can supply this demand from a portfolio of resources without regard to the source or cost of each. However, renewable power must be purchased as a bundled product, which more closely resembles a utility service, because the renewable power has a specific source that needs to be supplemented with conventional resources and delivered to a specific customer location. It is no wonder procurement professionals, who are not utility professionals, get confused!

The two major issues facing Federal agencies trying to purchase renewable power are getting the price down to a reasonable level and determining the applicable acquisition authorities sufficient to not only do so, but to actually attract a supplier. Given the financial hurdles presented, these issues are usually too much to overcome. Attracting a reasonably priced supply offer most likely requires a contract term that is long enough to cover the debt repayment period, typically 10 to 15 years. Moreover, the bulk of the economic benefits from such a contract typically accrue after the debt repayment period. As a result, a 15-year contract term would allow a renewable project developer to finance its project based on charging the Federal agency a premium price. Then, after the contract ended, the developer would be able to earn windfall profits on the resource the agency’s contract paid for. Accordingly, the ideal contract length should be long enough for the agency to get the advantages of lower power costs after the debt repayment period, typically 25 to 30 years.

One exception to the FAR and DFAR is a PMA contract. PMAs are Federal entities that operate as a utility and have the authority to enter into contracts consistent with utility practice. Their authority also allows them to offer their customers, including Federal customers, 20-year or longer supply contracts. However, PMA power supply contracts are often limited to available resources. Once these are exhausted, the PMA has to supplement their resources with purchases from wholesale power markets and other sources. Most of the PMAs’ Federal customers are DOD facilities. DOD has been working with two PMAs, BPA and WAPA, to provide supplemental power from renewable resources rather than “system mix” purchases from wholesale markets. It was successful working with WAPA to provide 100% renewable power for Edwards Air Force Base, but has been unsuccessful in other transactions. This is primarily a result of uncertainties in the conventional power market and supplier inability to provide reasonable indications of prices to firm and shape renewable power supplies. Although the PMAs serve a number of large Federal customers, primarily in the West, they are not generally accepting new Federal power supply customers. Nevertheless, WAPA has been willing to provide power procurement services under the FAR subpart 17.5, general referred to as the Economy Act (31 USC 1535), to non-WAPA Federal customers that are in the WAPA service area *and* are eligible to purchase power from competitive suppliers. WAPA has also been willing to offer power procurement services to facilitate development of on-site power projects, as described in a subsequent section.

DOD itself is the second exception because it has the authority under 10 USC 2922 (a) (formerly 10 USC 2394) to enter into contracts up to 30 years in length for power from "energy facilities." However, it is restricted under 40 USC 591 (formerly section 8093 of the Department of Defense Appropriations Act of 1988, Public Law 100-202) to transactions that are consistent with state utility regulations. In other words, it cannot be used to bypass service provided by regulated utilities unless state law allows retail choice. The Economy Act (31 USC 1535) allows non-DOD Federal facilities to piggy back on DOD contracts using this authority, although contract terms for those agencies would have to be consistent with authorities applicable to them under the FAR. In other words, if DOD had a 30-year contract under 10 USC 2922 (a), a non-DOD Federal facility may be restricted to a 10-year term as a "utility service" under the FAR. DOD also has special authority to purchase power from geothermal power projects developed on its lands, but this authority cannot be extended to other sources, sites or agencies.

Case study 1 – Advantages of Long-term Power Purchase Agreements

A military facility had an opportunity to purchase a large amount of power from a proposed wind farm. The Federal purchase contract would have enabled the project developer to obtain the necessary bank financing for a project that was permitted and ready to go. The underlying financing provided for power costs was to be fixed at roughly 5 cents/kWh for the first 10 years, and then decreased to 4.5 cents for the next 5. Both equity investors and the bank loan would have been repaid after 15 years, and the power cost would have dropped to the cost of ongoing O&M, expected to be between 1.5 and 2 cents/kWh (in 2020!). The simple average power costs for 10 years would be 5 cents, for 15 it would be 4.83, but for the 30-year expected project life, only 3.1 cents! In this case, as with most, a 30-year contract would be more beneficial to the government. Unfortunately, most agencies cannot enter into such long-term contracts, with two exceptions noted.

To date, DOD has not used 10 USC 2394 or 10 USC 2922 (a) to enter into long-term power purchase agreements for renewable power. The lack of precedent is a major reason why this authority has not been used. Committing an agency to longer term contracts is risky and thus far, procurement professionals have been reluctant to do so. Their reasons are many and varied. One of the major stumbling blocks is inherent to the "ideal" renewable power contract model. As discussed, the best terms appear to be available by entering into a contract with a developer needing a power purchase contract to obtain construction financing. In other words, the contract is a promise to provide power from an as yet unbuilt project. There are limits to how far in advance the government can enter into contracts for future delivery of products and services. This also raises questions about how to pick a "winner." To comply with Federal procurement requirements (10 USC 2922 (a) and 41 USC 253), the procurement should be competitive, which opens the door to offers from proposers and projects that may not be equal. Unfortunately, most procurement professionals feel (and are) unqualified to assess the merits of such proposals. Similarly, the power supply has to be synchronized with the current supplier's contract termination. What happens if the new provider's project isn't operational when the current contract ends? Finally, what is the government cost estimate for a project like this? That requires a projection of future power costs, which does not exist and would be imperfect if it did. Available projections are not site specific enough to answer this question, and none extend out to the 30 plus years needed for the economic analysis. The National Institute of Standards and Technology (NIST) determined that LCC procedures are also inadequate for markets that are as volatile as energy and power markets have been and are likely to be into the future. Similarly, although the renewable power price can be forecasted with some precision, the necessary firming, shaping, and other services cannot. This point can be illustrated using the wind farm example cited previously (Figure 1). Finally, use of 10 USC 2922 (a) requires approval of the Secretary of Defense (SecDef). This means a contract will need to pass up the chain-of-command within a Service, through the Service Secretary, and then on to the SecDef. According to an Army general, decisions for SecDef approval pass through over 20 inboxes before they reach the SecDef. Because energy contracts are often time sensitive (many price offers expire within a day), this process may be too unwieldy to be effective.

On-site Renewable Project Development

Development of on-site energy resources presents its own issues. Renewable power projects enjoy significant tax-based Federal and state financial incentives that are not available to Federal agencies that develop projects with appropriated funds. In addition, appropriated funds are not generally available for renewable projects and certainly not in quantities needed to develop much of the available resources. For example, a recent DOD assessment of wind, solar, and geothermal potential on DOD lands estimated (U.S. DOD 2005) billions of dollars would be required to develop projects expected to be cost-effective today. Further, construction and operation of renewable power projects is not a core mission for any Federal agency, other than some of the PMAs. As a result, these resources are best owned and operated by third parties on land leased from the government, with the power being sold directly to the agency. This approach permits private parties to benefit from tax-based and other incentives, protects the agency from project performance risk, and ensures proper maintenance of the facility on an on-going basis.

There are several mechanisms for implementing a third-party ownership model, although most still require some kind of PPA. Any third party use of Federal assets, including land or rooftops for renewable power projects, requires a real estate transaction. There are several mechanisms that facilitate use of real-estate including a lease, an easement, and a franchise. A lease is the most secure mechanism for a prospective power project developer because it provides the strongest assurance to the developer and its financial partners of access to the site on a continuing basis, and for termination rights in case such access is denied. Many project financiers want a lease agreement as a loan condition. The transaction that is most familiar to power project developers is a lease combined with a PPA. Federal procurement regulations prohibit “connecting” the PPA and the lease. Accordingly, each needs to be executed separately, although that may done simultaneously.

Case study 2 – The Economics of Wind Farms

In the case of the wind farm proposal, future renewable power costs could be estimated fairly precisely because the majority of wind farm costs are fixed costs based on construction and financing costs that are well known at the time an offer is submitted. Turning power from a wind farm into reliable power requires power purchases from available power and transmission markets contemporaneously. Although "futures" markets can be used to estimate these costs, those markets extend no further than 5 years into the future and estimates beyond 12-18 months are highly volatile. Firm pricing for transmission and related services is largely unavailable. Consequently, the wind farm offer was based on an estimate using projected wind farm costs and costs the previous year for market services. That was deemed appropriate because the alternative to the wind farm proposal was simply market prices. In other words, the primary unknown was the same in the wind farm case and the conventional power case, namely future market prices. This raised another procurement issue. As noted at the beginning of this section, renewable power itself is a type of commodity, but the delivery of the power is a service. As this discussion indicates, the vendor could provide a firm price for the renewable power commodity for 30 years, but couldn't do so for the delivery and other services for more than 5. A 30-year renewable power contract has no value to a retail customer unless it is bundled with the delivery service. A utility service however is a "service" under the FAR and DFAR, and can't be contracted for a 30-year period. A legal opinion determined that 10 USC 2394 covered the entire set of transactions. Nevertheless, the fact that a comparable 30-year price quote could not be obtained for the delivery services troubled the procurement staff. Potentially, this could have been resolved by awarding the contract with a provision to recompete the service component, but the process never got that far.

In this analysis, the economic risks of the wind farm offer were less than with the business-as-usual approach of purchasing from an uncertain and volatile market. There was, however, one exception, and that was if future market rules changed in such a way to disadvantage wind power compared to conventional supplies. As it turns out, that is exactly what happened. Of course, these conditions could reverse just as easily, but the lack of certainty and the complexities of the market make procurement professionals nervous about long-term contracts. Delays in responding to the wind farm offer (over 1 year thus far) have also resulted in significant upward revisions in the renewable power price. The initial price offer was fixed based on wind turbine prices current at the time. Had the government accepted the offer, these prices would have been guaranteed. Instead, while the facility dithered, turbine prices increased nearly 100%.

This proposal was also evaluated to supply General Services Administration (GSA) loads. While the initial proposal was less expensive for military loads, it was more expensive for GSA loads. The difference resided primarily on the fact GSA loads are "8-to-5" weekdays, whereas military loads are "24-7." Because the wind doesn't blow on an 8-to-5 schedule, the benefits are greater for loads that are more constant.

Another option is a simple lease with a proviso that the agency "may" exercise an option to procure power from any project that results. This allows development to be planned based on a sale into the competitive power market with an option for the Federal entity to purchase power if the terms and conditions are acceptable. This type of transaction is sometimes referred to as a public-private venture (PPV), although in reality that term has much broader application, including the lease/PPA arrangement described previously. One of the most successful leases in the Federal sector is the Navy lease of land for geothermal power development at China Lake in California. This project resulted in passage of special legislation (section 803 of Public Law 95-356) that grants DOD the authority to enter into similar agreements on DOD lands specifically for geothermal power project development. This authority allows DOD to negotiate royalties in lieu of a lease, with those royalties dedicated to funding energy projects in DOD.

The final major mechanism is an enhanced use lease (EUL). Although provisions for EULs vary among agencies, they typically allow a lease of government assets in exchange for an in-kind contribution in lieu of a lease payment. For example, a local university may lease land to construct training facilities on Federal land. In exchange, the Federal facility may get free use of a portion of these facilities. This mechanism has been used by several agencies to develop central heating, cooling, and/or generating facilities that provided heating, ventilation and air conditioning (HVAC) or other services to adjacent non-agency properties. This allows the development of facilities that are optimally sized, but larger than needed for the Federal facility. The benefit to the government is lower service costs.

One of the major benefits of on-site resource development is that it does not require firming, shaping, and transmission services if the power is all used on-site (it may if the power ever flows off-site). However, displacement of purchased power by on-site projects may trigger new utility rate clauses. Not only can the utility charge for back-up and standby power, the reduced consumption may push the customer into a lower use, higher cost rate class. Another advantage of on-site projects is they are "behind the meter" and are competing with retail rather than wholesale prices. Retail prices are higher than wholesale prices. For Federal agencies this may represent a way to "fix" a significant portion of their utility bill at reasonable cost and avoid the market volatility previously discussed. Unfortunately, power sales to agencies from on-site projects may violate state prohibitions against sales of power to retail customers by non-utilities. This risk has to be evaluated on a case-by-case basis.

Budget Adequacy and Certainty

A number of budget concerns trouble Federal procurement staff as well. Long-term contracts can create future year payment obligations that the Office of Management and Budget (OMB) would "score" as a current year expense. Fortunately, this is an issue that agencies have had to confront with respect to current multi-year power and natural gas supply contracts. Typically these contracts have explicit termination and damage provisions that limit the government's financial risk to the difference between the contract rate and prevailing power prices. The industry finds these terms to be acceptable, and they appear to address OMB concerns.

Another factor that weighs heavily on the process is the lack of adequate energy budgets and budget certainty. Recent energy prices have increased faster than the inflation rate allowed in utility budgets. Some agencies deliberately underfund the utility budget believing it provides an incentive for facility managers to conserve. Understandably, procurement professionals are reluctant to enter into long-term contracts even when current budgets are inadequate because this obligates the agency to an expense it is currently not budgeted for. Fortunately, once a long-term contract is executed, the agency is forced to budget for it. An unusual twist on this concern occurs during continuing resolutions when budget authority is limited to weeks or months at best. One DOD renewable power transaction fell apart because the contract could not be issued while the procurement agent, a PMA, was under the restraints of a continuing resolution. Although the agency had authority to enter into multi-year budgets, it did not have the budgetary authority to enter into obligations that exceeded its current budgetary authority, namely the duration of the continuing resolution.

A final issue has to do with what qualifies as a utility expense. Some agencies have determined that RECs are not a utility expense because they do not actually provide "electrical service." As a result, they claim funding for REC purchases cannot come from the "utility" account. This seems at odds with how RECs are discussed in executive orders and the Administration's renewable guidance documents. Nevertheless, this is another issue that needs to be addressed.

Summary, Observations and Conclusions

To recap:

- All Federal agencies can purchase renewable power as a “commodity” on a 5-year contract if they are in deregulated states.

- All Federal agencies can purchase renewable power as a “utility service” on a 10-year contract if such service is available from a “utility.” The utility definition has been extended to include retail power providers in deregulated markets by some agencies.

- All Federal agency customers of PMAs may be able to obtain renewable power on contracts as long as 30 years from their PMA supplier if the PMA is willing to do so. Not all PMAs are willing to accommodate these requests, and each has to be dealt with on a case-by-case basis. Typically, the Federal agency would only ask the PMA to procure renewable power for its “supplemental” (non-PMA) power requirements to preserve the maximum benefit of low-cost PMA power.

- Federal customers in the “footprint” of a PMA may be able to request power procurement services from a PMA under the Economy Act (31 USC 1535) if the PMA is willing and the customer is eligible for retail choice, retail wheeling, or a wholesale customer under state and Federal regulations.

- PMAs may, acting under the Economy Act (31 USC 1535), procure power from power projects on Federal facilities using their long-term contracting authority, as long as the entity is within the PMA’s “footprint.”

- PMAs may, acting under the Economy Act (31 USC 1535), procure RECs for Federal facilities in the U.S.

- DOD facilities may procure power for up to 30 years, using authority in 10 USC 2922 (a) (formerly 10 USC 2394), if the facility is allowed to procure power from competitive power markets under state and Federal regulations. DOD facilities may use this authority for power purchased from on-site projects as well.

- Non-DOD Federal agencies may be able to piggy-back on a long-term DOD renewable power contract under the Economy Act (31 USC 1535), as long as the facility is allowed to procure power from competitive power markets under state and Federal regulations. The resulting contract must also conform to the customer agency’s procurement regulations regarding contract type, utility versus commodity, and length.

Furthermore,

- Long-term contracts (15 to 30 years) provide Federal customers with the best opportunity to minimize renewable power price premiums, if any.

- Long-term contacts can be structured such that renewable power prices decline significantly over time.

- Obtaining favorable pricing will likely depend on partnering with a developer of a project that has been permitted, but lacks financing. As a result, the contract may not provide renewable power initially and the customer may have to bear some performance risk (that the project won't be completed or won't produce power) that could result in a recompetition.

- Prospective development partners will probably require a contract for a large amount of power given the scale of most renewable power projects. To cite an example, bids to install a single large turbine were two times the average cost quoted by industry for a wind farm of 60 MW or larger.

- Renewable power obtained through physical contracts that require delivery of power to specific customer delivery points are complicated because they require arrangements for transmission and reliability reserves at a minimum, which will increase costs and may not be available on the same terms (duration) as the renewable power contract. In addition, many renewable resources are intermittent and require supplementation with other resources to firm and shape the power to match the customer's actual power usage. The price for these services in the future is uncertain and therefore difficult, if not impossible, to fix in a long-term contract.

- It is unlikely that the renewable power provider will want to provide the necessary firming, shaping, and reliability reserve services the customer needs for reliable power. Accordingly, these services may have to be provided by another vendor.

Given this summary, why has the acquisition of renewable power proceeded so slowly? With few exceptions, energy procurement decisions are delegated to very low levels in most organizations. The goal of this report is to illustrate the complexities involved in procuring renewable power for Federal agencies. Contracting staff that procure energy, let alone renewable power, are often untutored in these complexities. A different procurement staff is frequently assigned to each new contract, frustrating attempts to educate them. It follows that training a core of procurement professionals could alleviate many of the problems that are slowing progress today. This may require centralization of energy procurement activities in proximity to a staff of utility professionals, such that staff become educated in executing renewable power contracts and have room to innovative.

Clarification of long-term contracting authorities is needed within DOD to facilitate use of authorities under 10 USC 2922 (a), and Federal agencies should be more aggressive about challenging utilities that do not provide reasonable access to affordable renewable power consistent with the provisions of 40 USC 591. GSA is the procurement agent for all Federal agencies, although it has delegated energy procurement authority to the Departments of Defense and Energy. GSA has a well trained energy procurement staff, and should therefore be provided with authority similar to 10 USC 2922 (a) to procure renewable power on behalf of its remaining customer agencies, which at times have included individual DOD and DOE facilities.

This document focused on renewable power purchasing in part because it is assumed renewable power purchases are the best way to stimulate additional new renewable resource development. However, as the discussion of the power system hopefully made clear, there is little difference between renewable power and a REC if they both come from resources located in the same “closed” transmission grid. The report should also have made it clear that purchasing renewable power is extremely complicated. It may be possible for large customers to execute contracts for delivery of power from renewable projects, but the costs and complexities for small customers are often considered not worth the hassle. There may be ways to reform how RECs are purchased to achieve the stimulative effects of renewable power purchases. For example, long-term contracts for RECs from unbuilt projects could be used to help secure project financing. Admittedly this does not provide the same fixed energy price a renewable power contract would, but it would reduce complexity and the requirement of a large scale purchase, which opens it up to smaller Federal facilities.

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