White Paper on

INTEROPERABLE TRANSACTIVE RETAIL TARIFFS

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INTRODUCTION

This white paper summarizes many challenges faced by some cost of service and competitive retail jurisdictions. The paper's purpose is to (1) outline *transactive retail tariffs* that may help parties address these challenges and (2) ask how the SGIP may help advance the interoperability and adoption of transactive retail tariffs.

The paper is focused on transactive retail tariffs (rates) that support:

1) Buy and sell transactions between customers and their energy commodity and distribution service providers,
2) Forward and spot transactions,
3) Unbundled energy commodity and distribution products, and
4) Interoperation of all types of usage, supply, storage, distribution services and parties.

A *transactive retail tariff* is an agreement among two parties (i.e. a retail energy provider and a retail customer) that enables buy and sell transactions at specific prices, quantities, time intervals and delivery locations. The tariff may be subject to regulatory oversight. In this paper we outline only a model tariff that does not specify the numerical prices, quantities and duration of transactions; numerical tariff elements are determined by the business and regulatory processes of the parties.

There are many model retail tariffs currently used in the electricity industry; examples include flat price, increasing block price, time-of-use (TOU) price, critical peak price (CPP), and real time price (RTP) model tariffs. In some cases, energy ($/kWh) and demand prices ($/kW) are specified. Block-and-index tariffs are used in some jurisdictions.

We propose a model *interoperable transactive retail tariff* that may be used for all retail sectors including residential, commercial, industrial, government, agricultural, and electric vehicle sectors. An interoperable tariff must be understandable to people, organizations, and machines in any jurisdiction or geography. Many current retail tariffs can be modeled as special cases of a transactive retail tariff, but not all support both buy and sell transactions and forward and spot transactions.

Interoperable transactive tariffs may be deployed by investor owned, public power and municipal utilities, community choice aggregators, cooperative, competitive, and microgrid retailers. Such tariffs also would support peer-to-peer transactions, and retail exchange markets; however, the focus of this

paper is on tariffs for conventional retailers and distribution operators providing service in cost-based and competitive jurisdictions.

This is *not* a general paper on Transactive Energy. The paper employs Transactive Energy concepts and standards as previously developed by OASIS under the direction of the Smart Grid Interoperability Panel (SGIP) Priority Action Plans 03 and 09 [1], [2].

This paper does not address wholesale transactions; retailers offering transactive retail tariffs will interface with existing wholesale bilateral and exchange forward energy and transmission markets and ISO/RTO spot markets, or with their own balancing and transmission services. Transactive tariffs can be applied for parties taking wholesale, transmission level service, but the focus of this paper is retail parties with facilities on a distribution grid.

CURRENT RETAIL ELECTRICITY CHALLENGES

Both cost of service and competitive retail jurisdictions may face many challenges. These challenges can be viewed from the perspective of the retail parties: customers, retail energy providers (REPs), distribution operators, owners of distributed generation, regulators, and technology and system providers.

CUSTOMER PERSPECTIVE

CUSTOMERS HAVE DIFFERENT PREFERENCES AND NEEDS

There are many types of customers, from those who want no change to those who want to participate at the cutting edge of innovation. Some want to be passive; some want to automate the energy management of end devices. Those customers who actively manage their usage and those who own distributed generation and storage may seek to lower costs or to increase revenues.

NEED TO SUPPORT AUTOMATED RETAIL ENERGY MANAGEMENT

Some residential customers are installing smart thermostats and buying smart appliances. Some building owners have energy management systems. Some electric vehicle owners can automatically manage their car charging.

CONSUMERS ARE BECOMING PROSUMERS

In a number of jurisdictions, some customers are installing PV, combined heat and power, fuel cells, storage, backup generators, and other technology that enables them to be both consumers and producers (prosumers). There may be times when the net energy flow reverses the normal flow of power from the distribution grid to the customers.

RETAIL ENERGY PROVIDER (REP) PERSPECTIVE

INCREASING NEED TO MANAGE LOADS TO FOLLOW RENEWABLES SUPPLY

REPs working with wholesale suppliers and markets must increasingly deal with the impacts of variable distributed and centralized renewables.

CONTINUING NEED TO MANAGE PEAK LOADS

Not all jurisdictions currently have or may have high levels of variable renewables and balancing the cost of reliably serving peak loads with the willingness of customers to pay for peak usage will need to continue.

FIXED ENERGY COSTS ARE INCREASING RELATIVE TO VARIABLE COSTS

The fixed costs of energy are increasing as more renewables with high capital costs and low variable costs are deployed and as the capacity factors for fossil plants decrease as more of the energy is provided by renewables.

NEED FOR INTERFACES TO BOTH RTO AND NON-RTO MARKETS

REPs also must buy and sell energy from various wholesale markets and captive generation. The wholesale markets include forward and spot bilateral markets and RTO and ISO spot markets.

DISTRIBUTION OPERATOR PERSPECTIVE

Distribution operators who serve customers with self-generation (such as CHP and PV), net-zero buildings, and net metering tariffs also face challenges.

DISTRIBUTION COSTS ARE MOSTLY FIXED

Distribution operators are typically regulated cost-of-service providers. They are challenged to recover the fixed costs of distribution services with mostly flat, per kWh prices, or with demand charges and fixed charges.

DISTRIBUTED GENERATION AND NET ZERO BUILDINGS MAY SHIFT COSTS

Distributed generation by customers and highly efficient buildings reduce energy revenues to REPs and distribution revenues to distribution operators. While reductions in energy purchases may be offset by sales to others, the fixed costs of distribution services not paid by such customers may need to be recovered by higher charges to other customers.

NET METERING MAY INCREASE COST SHIFTS

Net metering is a tariff that pays prosumers at retail prices for any net production in each interval of time and charges them at the retail price for any net usage in each interval. When distribution services are paid for on a net metered basis, the distribution revenues from net metered customers may be lower and the distribution costs may increase for other customers.

DISTRIBUTED GENERATOR AND STORAGE PERSPECTIVE

Providers and owners of rooftop PV and other distributed generator systems want to be paid for the energy they produce and must pay for the energy they use. Additionally, their use of the distribution grid may be less because of self-supply or may be two-way because the customer's self-supply at times may be less than or more than their usage at various times. Self-supply by customers introduces new issues in cost recovery for distribution services as such customers may believe that they should not pay for distribution services they do not use as much as other customers.

REGULATORY AND POLICY PERSPECTIVE

Competitive retail markets require continued state oversight, as do cost-of-service REPs. NERC and FERC have oversight over wholesale markets and their adequacy, and reliability. In this section we outline some of the regulatory issues affecting interoperable retail transactive tariffs.

PROLIFERATION OF TARIFFS

Investor-owned and public utilities often have many tariffs. Tariffs for each customer class and special cases within each class may be very different. For example, Pacific Gas and Electric and Portland General Electric each have over seventy tariffs in their tariff book.

COMPLEXITY OF TARIFFS

Many tariffs combine many elements. For example, a full-requirements tariff with increasing block prices for monthly energy, combined with time of use and a fixed monthly charge is very difficult for a customer to understand and for regulators to evaluate. A time of use tariff, combined with a demand charge and a fixed charge is very difficult for a customer to work with; peak usage in a 15-minute interval may increase a customer's bill for the entire month or year. And neither of these examples provides dynamic pricing information, event-based demand response and net metering which are often layered on top of other tariffs.

TECHNOLOGY PERSPECTIVE

NEED FOR SOLUTIONS THAT SCALE

Retail markets address hundreds of millions of end points and customers. With the advent of the Internet-of-Things and more networked and grid-connected electric energy producing and consuming devices, the industry needs solutions for the challenge of scaling and interfacing to these customers and devices.

NEED FOR INTEROPERABLE SOLUTIONS AND BUSINESS PROCESSES

Owners, manufacturers and service providers that provide facility energy management systems and devices need interoperable interfaces to REPs and distribution service providers so that they can sell appliances, products, and systems with more capability that just work in any jurisdiction at the lowest possible cost.

AN EXAMPLE INTEROPERABLE TRANSACTIVE TARIFF

In this section we illustrate interoperable transactive tariffs for cost-of-service and competitive commodity energy providers and cost-of-service distribution providers that address the retail electricity challenges highlighted in Section II. This section presents one example of how such tariffs would work from the perspective of customers. Many variations on this example are possible.

You are a retail customer (residential, commercial, or industrial). You buy or sell commodity energy from or to a retail energy provider (REP). In competitive jurisdictions you select your REP; in cost-of-service jurisdictions there is one REP.

You also are served by a cost-of-service distribution service provider that owns and operates the wires and other equipment that transports electric energy between your retail facility (home or business) and a location on the transmission grid.

Your REP tenders (offers) *subscriptions* for energy that specify the net amount of energy to be delivered by the REP to the customer in each time interval within a subscription period. A subscription is a fixed profile over a period of time for energy delivery from one party to another. The payment for the subscription is also fixed and paid monthly, for example. A subscription may be the result of a number of transactions or a single transaction.

For instance, a commercial building that operates primarily during weekday work hours will desire a subscription with more energy during these weekday work hours than other hours. Customers that are net producers of energy in a given period will desire a negative subscription amount in that period. Typically a subscription is uniquely defined to fit the needs of each customer.

Similarly, your distribution provider may tender subscriptions for distribution services that specify a fixed amount of distribution service for a fixed monthly payment.

A. AN EXAMPLE OF CUSTOMER INTERACTIONS WITH TRANSACTIVE TARIFFS

You as a customer or your automated agent may interact with your REP and distribution provider as much as you want to; you can be “Passive” or “Automated” or somewhere between. Passive interactions may appeal to customers with small bills and little interest in management of their electricity usage. Automated interactions may appeal to larger customers who desire to have more self-control over their energy usage or production and want to lower the cost of usage and increase any payments from any net production.

PASSIVE CUSTOMER INTERACTIONS

1) Your REP tenders (offers) to you (perhaps on a private web page for your account) a subscription for the next year or the next several years for the approximate quantity of electricity you used in each hour of last year for a fixed monthly payment for years tendered.
2) Your distribution provider also tenders to you a subscription for the next several years for the approximate quantity of distribution services you used in each hour of last year for a for a fixed monthly payment for all years tendered. You may be required by your regulator to subscribe to

minimum levels of distribution services based on your service connection capacity or your historical usage of distribution services.

3) You may accept all, none or a percentage of the tendered subscription. Or you may simply accept a default subscription recommendation of your REP, distribution provider, or an independent third party.
4) You may decide to lower your usage of electricity when you hear on the radio or the internet that the total price of energy and distribution is forecast to be very high and increase usage when the total price is very low.
5) At the end of each 15-minute interval (for example), your meter is automatically read to determine your actual net usage or net production (negative net usage if you have PV self-generation, for example) for the 15-minute interval.
    - If you use less than your subscribed energy in the 15-minute interval you get a payment for the difference (possibly based on the current 15-minute spot price for electricity).
    - If you use more than your subscribed energy in the 15-minute interval you pay for the difference (possibly based on the current 15-minute spot price for electricity).

AND

- If you use less than your subscribed distribution service in the 15-minute interval you get a payment for the difference (possibly based on the current 15-minute spot price for distribution services).
- If you use more than your subscribed distribution service in the 15-minute you pay for the difference (possibly based on the current 15-minute spot price for distribution services).

AUTOMATED CUSTOMER INTERACTIONS (expands on PASSIVE step (4) above, other steps are the same)

4.1) At any time, you or your automated energy management system may decide to reduce or increase energy use, by shifting or reducing some load, or discharging or charging storage depending on the prevailing tender prices in forward intervals or your personal or business schedules. The forward tenders will be from your REP and distribution provider. Accepting tenders results in transactions that adjust your subscription quantity in the forward interval for the transaction.
4.2) You might also buy more if you have recently installed some new energy-consuming loads, or sell if you have recently reduced loads, plan a vacation, or installed your own generation such as PV.
4.3) On the day of energy use, your REP and distribution operator continuously post forward buy and sell tenders for all 15-minute intervals in the next 24 hours. You may have an intelligent energy management system that monitors weather and your business or personal schedules.
4.4) Your smart appliance can display to you the cost of running the appliance now or later. When you select when you want the appliance to run, your automated energy management agent may be able to lock in the forward price of energy and distribution with a forward purchase or sale transaction to align your usage and subscription amounts.
4.5) Or your smart agent or appliance determines when to run appliances, HVAC, refrigeration, pumping, generation or other devices based on your cost, comfort, and other parameters that you provide.

Q&A ABOUT THE EXAMPLE TRANSACTIVE TARIFF

While this is just one example of a transactive retail tariff, some typical questions and potential answers about this tariff are:

1) What if my usage this year is different from last year? You may either receive larger payments if you oversubscribed, or pay more if you undersubscribed. At any time you or your automated agent can increase or decrease your subscribed amounts and you may pay more or get paid for these changes.
2) What if the spot prices are volatile? In general this shouldn't affect your total bill much, but if you can adjust your usage automatically to take advantage of high or low prices then you may save more money.
3) Isn't it too complicated to bill all of these transactions? No, think of this like a phone billing system where each call or text message is a transaction. You only look at the billing detail if you want to verify the correctness of your bill.
4) Why not eliminate the forward subscriptions and just use 15-minute spot prices. You could, but then your total bill may be much more variable. And REPs and distribution operators need forward subscriptions, for example, to reduce their cost of financing investments; a cost saving which may be passed to consumers who buy forward subscriptions.
5) Can't I stay on a flat, full-requirements tariff? Sure, but you may pay more than with the transactive tariff because your REP may pay more for expensive and seldom used resources to supply you when both prices and your usage and other's usage are very high at the same time.
6) Could this be done with hourly or 5-minute spot transactions, if a customer asks? In theory, yes, but there may be metering and other considerations.
7) How do I know that the energy prices I am charged or paid are fair or correct? If your REP is a cost of service, regulated REP, then it is the role of a regulator to assure that the energy prices are proper. If your REP is competitive, then such REPs still have some oversight, but if you don't like your REP's energy prices you can change your REP. Or if the regulations allow, you could combine subscriptions and transactions from multiple REPs. Additionally, REPs may be required by the tariff to offer both buy and sell forward tenders for each delivery interval with a relatively small spread between the buy and sell price. This way a REP trying to increase its sell price too much will have to also buy at prices only slightly less than their sell price.
8) How does the system guarantee that there will be power available? You can guarantee that you will get power (subject to system failures) by purchasing forward subscriptions for delivery to your facility and/or self-supply (ultimately within your own islandable microgrid). Regulators may also require certain customer classes to subscribe to minimum levels of service. However, for those who over rely on spot purchases they can expect to pay very high costs for electricity service when demand is high relative to supply. And those with adequate forward purchases may have the opportunity to sell some of their purchases at very high prices.
9) Can someone "corner the market" or "manipulate the market"? Continued oversight of transactive tariffs is necessary. Parties may be subject to position limits and all parties may be required to provide collateral appropriate to the risk they place on counterparties. Forward subscriptions held by millions of customers and many suppliers could limit the ability of parties to corner and manipulate the market. Also a tariff obligation requiring REPs and large sellers and buyers to continuously offer both buy and sell forward tenders with a relatively small price spread could help mitigate market manipulation.
10) How are customers protected against high charges because of a mistake or a system glitch? Customers could protect themselves against high charges for any reason by sufficient forward subscriptions. If there is a high price, their automated agents and devices may be able to sell at those high prices. Default prices,

default device control rules, and settlement rules can help deal with system glitches and failures. Transaction systems need to be designed to be simple, distributed, redundant, and secure.

11) What system gathers prices from various suppliers to determine the lowest cost supplier? In the case of a single cost-of-service REP, the REP determines its supply portfolio subject to regulatory oversight. In the case of a competitive REP, each REP determines its lowest cost supply portfolio, and the customer selects a REP. In the case where subscriptions and transactions can be combined from multiple competitive REPs each customer determines their lowest cost portfolio of suppliers.
12) What system assesses potential delivery problems because of feeder capacity limits? For each delivery interval (15-minutes, 5-minutes, or hour, for example) the distribution service provider is responsible for monitoring the loading of feeders and other equipment in relation to capacity limits in both directions. The distribution provider supports an algorithm which issues forward buy and sell tenders to all customers. For intervals where forward subscribed usage approaches feeder capacity limits the algorithm increases buy and sell prices for tenders, which will induce some customers to sell distribution services to those customers who are willing to pay more. If there is a surplus of distribution capacity the algorithm sets buy and sell prices very low to allow customers to take advantage of excess distribution capacity.
13) How does this transactive tariff work for net metered customers with roof top PV or self-generation? Because this tariff unbundles distribution and energy commodity services and uses both forward and spot transactions there may be more flexibility than with current tariffs to create tariffs that recover distribution fixed costs and still provide incentives for self-generation and efficient use of the distribution grid. For example, with transactive tariffs the spot prices of commodity energy in each interval may vary significantly, thus rewarding customers able to sell at high prices and buy at low prices -- perhaps also using their own storage. The forward subscriptions for both energy and distribution services can be designed to increase the assurance of the recovery of fixed costs without the inefficiency of lowering spot prices by imposing large fixed charges to recover increasing fixed costs.

BENEFITS OF RETAIL TRANSACTIVE TARIFFS

In Section 0 we outlined some of the current retail electricity challenges. In this section we consider how transactive retail tariffs might help address some of these challenges.

A. CUSTOMER PERSPECTIVE

1) Customer bills will be relatively stable if they forward subscribe for most of their usage.
2) Customers may pay lower prices for subscribed electricity because their REP could save money knowing how much is subscribed.
3) In the long-run customers may pay less for distribution services because all customers will have an incentive to shift usage away from periods when the distribution grid is congested in either direction; this may reduce future needs for the distribution providers to invest money that they must recover from customers.
4) Customers, who shift usage from times when the price is high, to times when the price is low, may get bill credits to reduce their overall bill. New smart automated thermostats, appliances and energy management systems could help them do this.
5) Customers who want to buy automated energy management systems and smart appliances and other equipment could use the forward tender prices to save money.
6) Prosumers with PV, other self-generation and storage, could use the forward tender prices to maximize their profits from energy production and storage.

RETAIL ENERGY PROVIDER (REP) PERSPECTIVE

1) REP revenues should be relatively stable if they sell forward subscriptions with fixed payments to most of their customers to recover the increasing fixed costs of energy.
2) The prices of spot tenders could follow the volatility of spot wholesale markets (including ISO and RTO markets) while reducing risk to REPs.
3) Net Energy Metering customers can be metered and settled on 15-, 5-minutes, or shorter intervals. They could be offered buy and sell tenders that reflect the actual value to REPs of energy in each interval. If expensive generation is needed in an interval then the tender prices for energy in that interval could be high. If there is surplus solar in a given interval then the tender prices may be very low or may reflect the costs of storing energy to another interval with a higher price.

DISTRIBUTION OPERATOR PERSPECTIVE

1) Regulated cost of service distribution operators with large fixed costs could lock in recovery of their costs with forward subscriptions with their customers where each customer essentially subscribes to a slice of the distribution grid for a stream of fixed payments.
2) Distributed generation such as roof-top PV by customers and highly efficient buildings may change the pattern of the distribution grid usage towards more two-way flows to such customers or flows only needed by the customer for backup. Net metering of distribution services on a monthly basis may not properly compensate distribution operators for the usage by such customers. However, subscriptions for distribution service with a fixed monthly subscription payment could assure recovery of costs. And spot transactions at variable prices could help reduce the need for new grid investments by paying customers who do not use their subscribed service level when the local distribution grid is congested and charging customers who use more than their subscribed service level.

DISTRIBUTED GENERATOR AND STORAGE PERSPECTIVE

1) Providers and owners of rooftop PV and other distributed generator systems could sell their generation and storage services to other parties using both long-term and spot transactions that recognize their location and time of generation.
2) Spot tender prices for energy and distribution services could help value the flexibility of storage behind the customer meter or on the distribution grid.

REGULATORY AND POLICY PERSPECTIVE

1) Transactive retail tariffs would continue to require legislative and regulatory oversight.
2) Interoperable transactive retail tariffs could apply equally well to various customer sectors, thus possibly reducing the number of tariff types. This could increase transparency with customers and regulators while reducing information technology costs.
3) Transactive retail tariffs based on straight forward concepts of forward and spot transactions could simplify tariff administration.
4) Transactive retail tariffs could be implemented on an opt-in basis by customers, so customers could learn over time the benefits of transactive tariffs to them.
5) Transactive tariffs could provide the benefits of real-time pricing that many regulators desire while also providing customer bill and supplier revenue stability.

6) Legislation could provide subsidies for low-income customers for minimum subscription levels.

TECHNOLOGY PERSPECTIVE

1) Addressing hundreds of millions of device end points and customers using standard communications and messages and processing such transactions is within the capabilities of properly designed IT systems.
2) Providers of intelligent devices and energy management systems could use interoperable transactive tariffs to design and sell products and systems in many jurisdictions with more capability at a lower cost.

TRANSACTIVE ENERGY AND THE TEMIX PROFILE STANDARDS

As described in Section 0, this white paper outlines a model interoperable transactive retail tariff based on the transactive energy standards previously developed by SGIP and entered in its Catalog of Standards. These standards are open and free. Specifically, the Transactive Energy Market Information Exchange (TeMix) profile of the Energy Interoperation and Energy Market Information Exchange standards specified by OASIS [1], [2] may be used. The TeMix profile is a simplified subset of these OASIS standards. OPNADR is also a profile of these OASIS standards. The TeMix profile is especially designed for automated messaging of tenders and transactions for electricity services which could provide the messaging for interoperable transactive retail tariffs.

A. PARTIES TO TRANSACTIONS

Within the TeMix profile, parties to transactions may be (1) owners of end-use devices, generation, and storage taking or making physical delivery of energy, (2) financial parties providing risk management with no intention of delivery, (3) suppliers (transmission and distribution operators) and consumers of physical energy transport services, or (4) suppliers and consumers of financial transport hedges. Any party may take the buy or sell side of a transaction. A consumer can sell by reducing a purchased position or by self-generating. A supplier can sell more or buy back from a sold position.

TRANSACTIONS

TeMix transactions are for current and forward delivery intervals, each with a start date/time and duration. For example, forward buy and sell transactions may be for 5-minute, 15-minute or hourly energy over the next 24 hours, daily transactions over the next month, and monthly or yearly transactions over the next 10 years. Each transaction has a quantity of energy delivered over the duration of the delivery interval. The price of the transaction multiplied by the energy quantity in each interval determines the payment between the parties to the transaction.

TENDERS

TeMix tenders are an offer of a transaction by any party to any potential counterparty. A tender specifies the price, quantity and product (see below) offered. A forward tender is an offer made at a specified time before the start of the delivery interval for the tender. Generally, the tender will have an expiration time, and new tenders may be issued from time to time. Tenders can be accepted by the tender counterparty at any time before their expiration. Tenders could be issued and accepted after

delivery for delivery imbalances. Subject to regulatory policy, two parties with collateral or other assurances acceptable to both can accept a TeMix tender from one of the parities to the other.

PRODUCTS AND INTERFACES

The TeMix profile has two products: Energy and Transport as used in the example retail transactive tariff in Section 0. TeMix energy transactions occur at *interfaces* (areas, hubs, locations or nodes) on the grid. TeMix transport transactions could allow buyers to pay for transport or hedge the price difference between an injection interface (where energy for a transaction enters the grid) and a takeout interface (where energy for a transaction leaves the grid). A transport transaction may be for high voltage transmission or lower voltage distribution services. Transport transactions may be managed by the distribution and transmission operators. In this white paper we address only distribution services.

TeMix transport and energy transactions could be used to balance supply and demand and account for losses and grid constraints. A party could purchase energy from another party at a given delivery interface at a price that includes transport; or a party could purchase energy at another interface and also purchase transport from that location to the delivery interface. The price of TeMix transport is intended to be an all-in, point-to-point price that covers marginal losses, congestion costs and other fixed and variable costs between two grid locations.

SUBSCRIPTIONS

A subscription is simply a compound transaction for a pattern of transaction quantities in various sub intervals of a longer subscription interval of time. For example, a subscription for a year might be tailored to match the typical patterns of hour of day, day of week, and month of year usage of a particular customer. The cost of the subscription would simply be based on the price and quantity of each transaction that makes up the subscription. Customers would generally pay similar transaction prices for the same sub interval and interface, but the costs of their subscriptions could differ because of their different usage patterns. A subscription can be a useful construct in communicating the concept of forward transactions to customers.

CONTROL OF DEVICES AND SYSTEMS

The TeMix profile supports self-control of generation, load and storage devices by parties that receive the benefits and pay the costs of their operation. Based on the prices of forward tenders, parties could control devices that make, use, or store energy for their own net benefit and accept forward buy and sell tenders at levels indicated by their proposed operation. Parties could also post buy and sell tenders at prices and in amounts that would be to their benefit.

Operators of distribution systems could similarly plan and self-control the operation of their systems based on forward tenders they receive for distribution transport products while satisfying reliability and physical constraints. They could also post buy and sell tenders for transport products at prices and in amounts that would implement their optimal plan of operation. Ideally, distribution operators would not be permitted to buy and sell energy, except for the energy needed by their systems to cover losses.

HOW CAN SGIP AND OTHERS ADVANCE TRANSACTIVE RETAIL TARIFFS?

This white paper outlines how an interoperable transactive retail tariff would work and how they might help meet some of the challenges in some retail jurisdictions. The paper is silent on many details related to actual implementation by the participants in a jurisdiction and the associated regulatory agencies and governmental bodies, such as legislators, state public utilities commissions, and municipal and coop boards. Questions remain as to how to advance transactive retail tariffs and what role SGIP 2.0 can play.

IS A NEW SGIP PAP USEFUL?

A new SGIP Priority Action Plan (PAP) could focus on identifying the gaps in standards, commercial practice, regulations, technology, outreach and education that may need to be closed to support parties in a jurisdiction with an interest in interoperable transactive retail tariffs. Once the gaps are identified, standards development, regulatory, utility, supplier, technology and other interest groups might be enlisted to help close the gaps.

CAN TRANSACTIVE RETAIL TARIFF PILOTS AND DEMONSTRATIONS GET SUPPORT?

Pilots and demonstrations may help close some of the gaps for implementation of transactive retail tariffs. Bringing parties together within a PAP or other process could help identify parties and develop alliances with an interest in leading, participating in, and funding such pilots and demonstrations.

REFERENCES

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