DSMSpotlight

The Newsletter of the International Energy Agency Demand-Side Management Programme December 2006

ieadsm energy efficiency

Essential Functions of any Demand Response Technology

In order for a DR resource to be useful in the energy market it must have the ability to react when needed and its response must be measurable. Tools and systems have been developed that range from metering and telecommunication infrastructures able to activate a DR asset, to software products that manage a DR asset portfolio. These and other DR related technologies help provide the business process mechanisms that connect the resource to the energy marketplace. The primary reason for using any DR technology is to improve the speed, accuracy, and ease of use.

If a DR product is to be successful, it must have ways to trigger DR opportunities, measure the consumer performance, and properly settle the event (potentially with both the consumer and the wholesale marketplace). Based on these needs, it can be inferred that the following basic functionalities need to be incorporated into a DR product: Notification, Measurement, Compliance, Settlement, and Automated controls. Let's explore each of them in more detail.

Notification

In order for a DR event to be activated, there must be a way to notify the consumer. Notifications can be direct, such as telephone calls or electronic messaging, or they can be passive, such as a including a signal on a residential thermostat. The important things to consider here are the speed in which notifications are required, the volume of notifications that must be produced, and whether actions are required by the consumer.

If a DR product only has a few participants, a manual solution may be best. However, if there are dozens, hundreds, or even thousands of participants, it may be best to utilize an automated system. An automated solution can send out automated phone calls to hundreds or thousands of individuals almost instantaneously via today's Internet telephony communications. These services also provide the ability to track when the notice was sent, the person that received the notice, and provide them with the option of accepting or rejecting event participation (subject to product rules). The record keeping and event tracking function of some automated notification systems can provide useful documentation when a DR product requires mandatory compliance. This back up could be very helpful when significant amounts of money are on the line.

Measurement

There are a variety of ways in which to measure consumer loads. Usage data can now be transmitted via power line carrier, radio frequency signals, telephone, and/or Internet. There are certainly pluses and minuses to each of these options, but fact that the variety of communication mediums exist allows the DR product designer to utilize the right solution(s) for their DR product portfolio. It is also likely that the type of DR product used will help establish the speed in which the data need to be communicated. For example, when DR is used for spinning reserves, the control room may desire to have near-real time data transfers. On the other hand, if it is a residential load control product, monthly data acquisition may be sufficient. The point here is that it is important to make sure the technology's functional capabilities are able to support the data needs.

It is also important to ensure that the right data are being collected. As a general rule, the electric industry tends to operate in hourly intervals (e.g. wholesale price per MWh, retail cost per kWh). This indicates that the usage data should at least provide hourly intervals as well, but 15-minute intervals are more of an industry

continued on page 2

PARTICIPATING COUNTRIES

Australia
Austria
Belgium
Canada
Denmark
European Commission
Finland
France
Greece
Italy
Korea
Netherlands
Norway
Spain
Sweden
United Kingdom
United States

technology

continued from page 1

standard. Some DR products may require 5-minute intervals, so it is important to make sure the communication mechanism and the metering devices are able to support it when needed.

Compliance

Compliance is closely related to measurement, but the concept is so important that it warrants its own category. As previously noted, DR assets come from the energy consumer. Therefore, it is necessary to determine the methodology for calculating the consumer's compliance (that is the DR event performance level).

There are three basic ways this is done today:

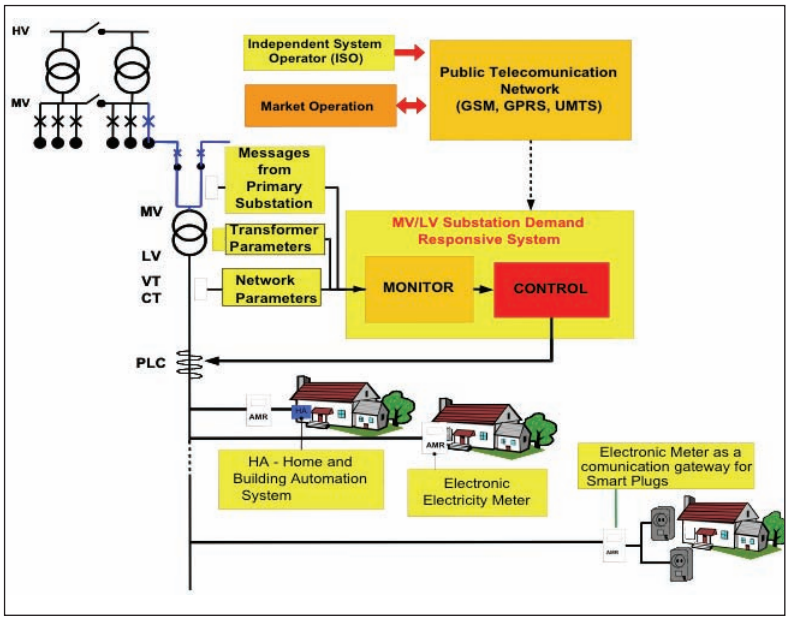
■ ***Baseline.*** This methodology is used to pay consumers for load variations with respect to their expected level of consumption. In other words, a consumption forecast algorithm is used to estimate what the consumer would use for each hour of the day based on normal operation. This is then compared to the actual meter read for that hour. The facility's DR performance would then be the delta of the two numbers. It is common today for this methodology to be based on the usage of the 10 previous business days less weekends and holidays. However, since this methodology is based on expected consumption levels it is open to calculation error and/or "gaming." Those using this methodology have developed business rules and monitoring techniques to mitigate and discourage such activity.

■ ***Direct Resource Metering.*** It is possible to directly meter the asset responsible for lowering usage at the facility meter. For example, a consumer may have an onsite generator for emergency backup purposes. With deference to the local environmental rules, this asset could be activated when the DR event is triggered. If the asset was directly metered, then the genset's actual output could be used to establish its compliance level. This strategy is generally reserved for onsite generation assets, but it can be used in a variety of other scenarios as well.

■ ***Real Time Pricing.*** The purest form of consumer response may be real-time-pricing tariffs. This strategy basically matches the hourly market price to the consumer's actual consumption for that hour. In the previous two cases, the consumer is basically selling their load reduction or onsite generation production to the market. They are compensated based on the baseline delta or the metered output. In this case, the consumer is simply charged the hourly energy price based on their hourly consumption. This strategy is an excellent way to directly match consumer demand with market supply. However, it may also be difficult for some regulators to endorse for all classes. Electric tariffs are derived from complex calculations, often times the tariffs are used to protect some classes (e.g., low income) and encourage others (e.g., industry). They also help to normalize costs over a 12-month period. This could cause some public discontent. Nonetheless, real time pricing is an excellent way to match actual demand with actual supply.

Settlement

While it's a bit of an over simplification, settlement is basically a cash management system, that is a process for managing cash receipts and properly crediting the consumer, either via a check or bill credit. The system should maintain meter usage, market pricing, event compliance levels, and individual contract terms. Unless the consumer is directly connected with the wholesale market, which is usually reserved for the very large consumers, there are two primary settlement categories: 1) wholesale market to the DR Service Provider (e.g., aggregator, distribution company, energy supplier, etc.); and, 2) DR Service Provider to consumer. The settlement function should be able to delineate between these two levels.



Automation Architecture for Demand Response in a Low Voltage network

continued on page 4

south korea

Korea Takes on DSM

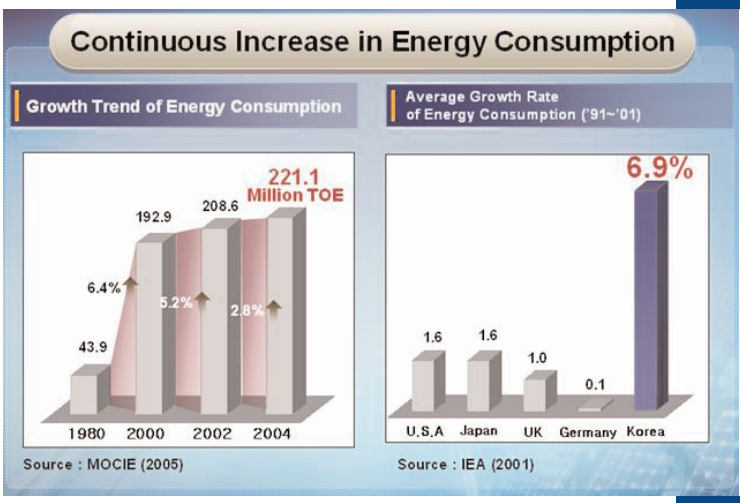
South Korea is currently using DSM measures to manage the sustainable development of end-use energy efficiency and the strategic reduction of greenhouse gas emissions from energy use. To expedite the enhancement of end-use energy efficiency, KEMCO, a government agency for the energy sector, has implemented many programs such as renewable energy and energy conservation technology development, energy efficiency standards and certificates, voluntary agreements (VA), energy inspections and technical audits, energy service companies (ESCO), financial loans, and tax exemptions and financial incentives.

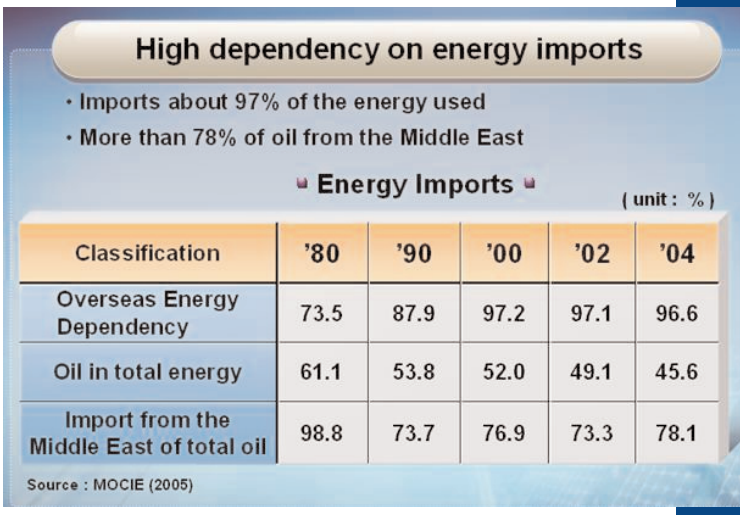
South Korea imports more than 97% of its fossil fuel from overseas, ranks 10th in energy consumption in the world, and is rapidly increasing its annual use of electricity. With few natural resources and a growing demand for energy, the energy import costs are placing a huge burden on the national economy. For sustainable development of the country, it is vital to have a stable energy supply and conservation measures. It is for these reasons that the implementation of national Demand Side Management (DSM) programs is so important.

The national energy market is governed by the mandatory Rational Energy Utilization Act. Restructuring of the electric power industry is directed by the Electric Power Business Act, which also guides governmental investment in DSM. Key players in implementing DSM are the Ministry of Commerce, Industry and Energy (MOCIE), Korea Energy Management Corporation (KEMCO), the grid company, Korea Electric Power Corporation (KEPCO), the power system operator, Korea Power Exchange (KPX) and six generation companies.

The demand side management of electricity can be used as a tool either to change the demand for energy or to use it more efficiently and compensate scarce resources when utilities install capacity savings and effective manage their load. South Korea currently is using DSM measures to manage the sustainable development of end-use energy efficiency and the strategic reduction of greenhouse gas emissions from energy use. Current DSM programs are being developed to cope with the needs of rational energy consumption by end-users in domestic industries and in commercial and residential buildings.

The scope of South Korea's DSM programs covers the utility-side load management and the customer end-use energy efficiencies. Load management programs, typically conducted by the electricity companies, curtail peak demand by demanding charges based on the maximum demand during the previous twelve months, seasonal pricing, discounts for repair adjustments, and discounts for voluntary curtailment. Electricity companies also have developed DSM programs to shift peak demand by using, time-of-use rates, midnight power services, subsidies for the installment of ice storage cooling systems,





Classification	'80	'90	'00	'02	'04
Overseas Energy Dependency	73.5	87.9	97.2	97.1	96.6
Oil in total energy	61.1	53.8	52.0	49.1	45.6
Import from the Middle East of total oil	98.8	73.7	76.9	73.3	78.1

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south korea

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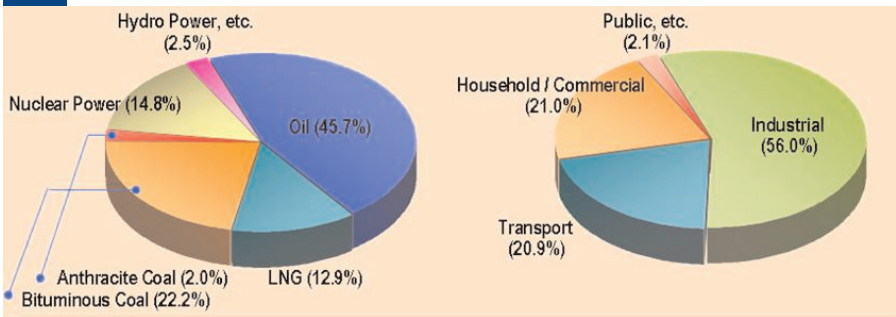
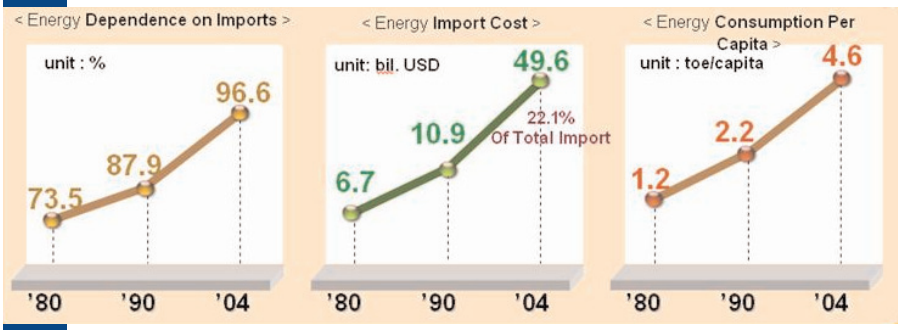




and discounts for requested load adjustment.

The electricity company, KEPCO, has designed electricity tariff schedules that are based on TOU (time-of-use) pricing. The TOU rates set different prices for electricity used during different time periods to encourage changes in electricity use in response to the price signal. As part of TOU pricing, KEPCO has a night thermal-storage power service tariff schedule for customers using appliances or equipment operable only during specified hours of the day, usually from 10 p.m. to 8 a.m. the next day. In addition to the daily TOU rates, KEPCO has seasonal rates that set different price levels for each season whose time periods are different from months of common seasons. KEPCO's electricity services cover residential, commercial and office buildings, industrial and educational facilities, the agricultural sector, and street lighting.

Energy efficiency programs in South Korea, in general, promote the use of government subsidies. Both the load management and energy efficiency programs are designed and executed using government subsidies. In addition to the programs, technology standards and certifications for end-uses are indispensable for the effective marketing of DSM.

South Korea's DSM programs are being implemented to cut the country's long-term energy demand and to reduce the investment burden in new electricity plants. Overall, the programs are to reduce consumer's energy consumption.

This article was contributed by the Korean Executive Committee member, Mr. Sang-kug Im of The Korea Energy Management Corporation.

technology

continued from page 2

Automated Controls

Some consider this last category optional, while others consider it mandatory. There are a number of technologies available today that can remotely and automatically control predetermined loads. For example, residential load control technologies exist that modulate HVAC, electric water heaters, pool pumps, lighting, etc. These technologies allow a DR Service Provider to instantly load shed many loads at one time. The concept has also been expanded into many commercial facilities in recent years. For example, several firms market remote lighting dimmers. These devices will either lower light levels or turn off predetermined light banks. In addition, a number of building automation control contractors are working with facility managers to program the systems to respond to market prices instead of just demand levels. By doing this, they are able to make the building operate based on predetermined comfort vs. cost strategies.

This article is based on the paper, "DEMAND RESPONSE: technology requirements for an emerging business," written by C.Chemelli and W.Grattieri of CESI RICERCA, Power System Economics Department, Milan, Italy. (Work financed by the Ministry of Economic Development with the Research Fund for the Italian Electrical System under the Contract Agreement established with the Ministry Decree of March 23rd, 2006). The work was conducted as part of IEA DSM Task XIII, Demand Response Resources.

results

White Certificates

The results of IEA DSM Task XIV, Marketing Mechanisms for White Certificate Trading, can be found in the Task's final report. This report synthesizes the contributions made and materials collected at five national workshops held in 2004-2006.

Six countries participated in DSM Task XIV – France, Italy, Netherlands, Norway, Sweden and the United Kingdom. The objective of the work was to gather experiences gained in operating White Certificates or White Certificates-like schemes in countries where this policy is or will be practiced (as in Great Britain, France and Italy) or discussed (as in the Netherlands). To complement these schemes, knowledge gained through focused research projects was also included.

The key issues addressed were:

- Whether, and how, a scheme involving the issuing and trading of White Certificates has effective chances of attaining previously identified and assigned targets of reduction of primary energy consumption.
- What the possible different formats are for such a scheme.
- What implementation problems are involved, at national and international levels.
- How it can interact with other energy efficiency policies.

Considering that relatively little experience involving the implementation of White Certificates schemes exists, the Task experts could not rely on the synthesis of past experience. Instead they relied on themselves and those with expertise in subjects as diverse as tradable certificates theory, demand-side management policies in the residential, transport and tertiary sectors, and the existing British, Italian and French White Certificates schemes. To foster this exchange, the Task was organized around five workshops. Each workshop was structured the same – one day of open discussion with national practitioners (e.g., top policy makers in ministerial and regulatory organizations) and national Experts and one day reserved for Task experts to process, discuss and synthesize the workshop results. Each workshop also explored the same set of issues – expectations, policy/principle issues, organization/practical issues, and interaction with other trading schemes and with other EE policies.

Who Benefits

White Certificates offer a number of practical benefits for all parties involved. For regulatory authorities, they provide an easily verifiable means to track compliance with policy targets. For parties obliged to comply with targets, they offer a means to achieve compliance at least cost, and also offer the flexibility to comply either through 'in-house' action, by contracting with other obliged parties of with other market parties for their supply. For those able to create and sell certificates, they offer an additional revenue stream which is independent of their other business activities, thus offering hedging and risk-management benefits in addition to direct financial rewards.

When To Use

The most effective and profitable applications of White Certificates schemes are expected to be in connection with the following circumstances:

- Where energy taxation mechanisms are less effective in encouraging savings; this typically occurs in the residential and in the tertiary/service sectors, which are outside the context of heavy industry.
- Instead of investment subsidies and tax deduction options; this alternative worked:
  - when these policies showed not to be successful or effective enough, or
  - in national contexts where a subsidiary role of an institutional body could be considered inappropriate/unfair in energy savings policies.
- Together with or instead of detailed performance standards (the White

White Certificates

These are certificates issued by a regulatory or other public Agency, against the fulfillment of obligations on energy savings targets. These targets are expressed in terms of an amount of energy that should be saved as a result of energy efficiency programs, promoting and facilitating the provision of energy services and energy efficiency measures to all end-use sectors (including the domestic and commercial sectors, the public sector, and small and medium-sized enterprises).

continued on page 6

ireland

Ireland Considers IEA DSM Membership

Earlier this year Sustainable Energy Ireland, SEI, published 'A Scoping Study: Demand Side Measures for Small Business and Residential Customers on Ireland's Electrical System.' This study was completed in collaboration with the UK Department of Trade and Industry. The report concluded that Demand Side Management (DSM) programmesprograms could deliver a number of potential benefits to stakeholders, including reduced costs of electricity, increased security of supply at times of network stress, deferred network investment, and simplified outage management, as well as important non-financial benefits, such as carbon savings and increased energy efficiency.

Following on from the scoping study, a further report, designed to provide an in-depth examination of the DSM options relevant to Ireland has since been commissioned, with the co-operation and support of the SEI established DSM Advisory Group. This Group includes representatives from key stakeholders: Department of Communications, Marine and Natural Resources (DCMNR); Commission for Energy Regulation (CER), Eirgrid (Ireland's transmission system operator), Electricity Supply Board (ESB), electricity industry suppliers, and knowledgeable consultants. The Group was tasked with identifying the most suitable and appropriate DSM programmesprograms that could be implemented in Ireland and to recommend specific actions that could be taken by the government/regulator to facilitate investment in DSM programmes programs.

The Ireland DSM study includes the following tasks:

- Estimate the national potential for DSM in Ireland;
- Conduct a benchmarking study to examine DSM programmesprograms adopted in other international markets;
- Recommend a number of DSM Programmesprograms appropriate to the Irish market;
- Review the costs and benefits of selected DSM programmesprograms;
- Examine the barriers preventing the adoption of the selected DSM programmesprograms;
- Develop an implementation strategy for the selected DSM programmesprograms.

At this stage, Ireland is assessing its possible participation in a number of IEA Implementing Agreements, Demand Side Management being one.

white certificates *continued from page 5*

Certificates mechanisms are focused, in principle, to optimize mixes of highly effective versus cheap measures), though labeling and minimum standards for new products are useful in standardized Monitoring & Verification procedures.

- In conjunction with voluntary agreements (but it must be assured that there are coherent assumptions on the energy savings targets, baselines, etc.)
- In the presence of an intensive policy in support of energy audits, in order to identify actual and responsive segments of energy savings and to encourage actions of the specialized operators as ESCOs.

Conclusion

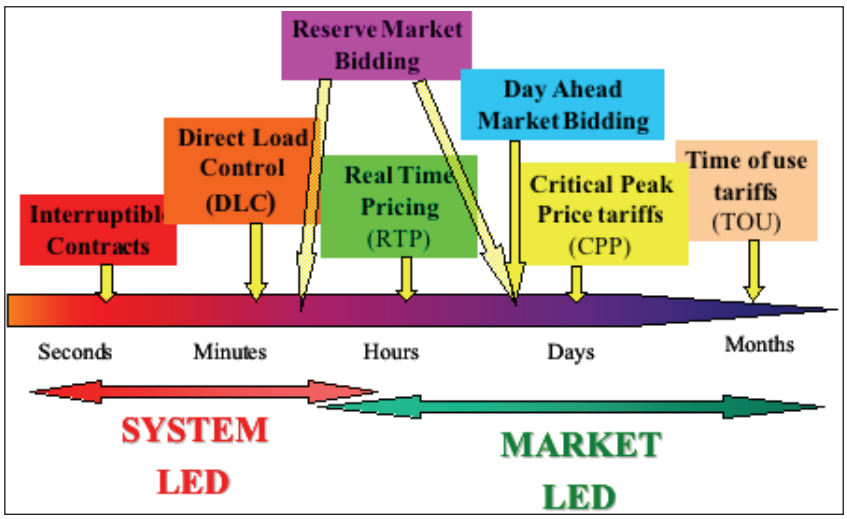
White Certificates offer a number of practical benefits for all parties involved, and proved to be a way to help align supply and demand. In practice, this approach has shown to be more dynamic, more effective and more efficient than legal obligations alone, notably in the field of Renewable Energy Commitment trading.

The complete final report of DSM Task XIV can be downloaded from the publications page under Task XIV on the IEA DSM web site, dsm.iea.org.

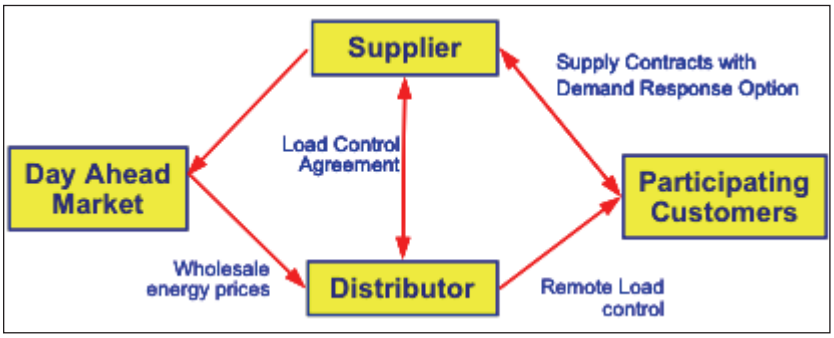
demand response

Who Benefits From Demand Response Activities?

Liberalized energy markets have opened a range of opportunities for market actors. One of these opportunities is Demand Response. What is meant by Demand Response is the changes in electric load profile by end-use customers from their normal consumption patterns in response to electricity price variations over time, or to signals forecasted by the system when security or reliability is jeopardized, according to programs designed to obtain lower electricity use by incentive payments.



Interactions among Demand Response market actors



Classification of Demand Response actions with respect to the operational time interval after signal receipt

continued on page 8

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Visit the DSM Programme's new web site for easy access to reports, news and contact information.

benefits

continued from page 7

The table below breaks down the benefits and challenges for each market factor.

MARKET FACTOR	BENEFITS	CHALLENGES
Participating Consumers End use consumers that provide a resource to the grid by selling back demand reductions/increases, or activating onsite generation.	**Direct financial reward** for participating during a given event. The financial reward could be some percentage of the energy market price, a regular capacity reservation payment/call option, a reduction in energy rates, a combination of the above, and/or some other structure. In general, an incentive is given to earn their participation. However, there is growing interest by many consumers to participate in DR efforts because it is a good thing to do as a "**corporate citizen**." In this case, they may be willing to forgo financial rewards in exchange for the image it bestows on the firm as a good community partner.	**Weighing the benefits** of participation with the responsibilities of doing it. To do this the consumer may create a simple business case analysis or a very sophisticated analysis one that considers things such as labor expense, technology costs, opportunity costs/ production downtime, and relative comfort.
Local Distribution Companies (LDCs) Firms that tend to be natural monopolies responsible for distributing power to the local community. Depending on the market structure, these entities could be vertically integrated (e.g., own generation and sell electricity) or they may just be responsible for the distribution wires network.	A means to **improve grid efficiency and/or to strategically target specific distribution** challenges. DR can be one of, if not, the most inexpensive resource, so it provides an excellent hedge to "high cost, but low frequency" events (e.g., top 100 hourly prices). A **strategic resource** to defer the development of new substations. If properly implemented, this strategy can shave years off of costly upgrades thereby improving the overall financial performance of the firm.	If the LDC is a pure wires company, they may not have the retail sales **staff needed to properly market** a DR product. DR must be **properly communicated to consumers**. It may prove difficult to do that without a properly trained staff.
Energy Retailers Firms that are responsible for the procurement and scheduling of electric commodity for their customers. Again, depending on whether the market is liberalized or not, this responsibility could be included in a vertically integrated firm or it may be a stand alone retail marketing firm.	In a great market position to offer DR services to their clients. By including it as a **resource in their supply portfolio** it can help lower operating costs. Can use DR as a **customer acquisition/ retention tool**. By offering the service to their customers and prospects, they are enhancing their product portfolio and increasing their attractiveness to consumers that wish to provide the service.	Energy Retailer must be committed to making DR work. Often, this means a serious **financial commitment** to metering, meter data management systems, DR event management systems, and related staffing levels. **Changing the focus** of the firm away from commodity service management and marketing.
Energy Service Companies (ESCOs) These firms market and sell products and services that can help the participating consumer manage, monitor, and activate DR capabilities. Many of these firms have also expanded their service offering to include the DR Service Provider role.	Many of their **existing energy related products and services** can be used to provide DR capacity/performance. For example, control systems to manage equipment and/or lighting, energy audits to assess facility level DR implementation strategy, and onsite generation installations and maintenance.	To have **DR capacity valued by the market** so that the technology does not need to build its business case on improving facility efficiency. However, if this is not possible then it simply means that the ESCO will not receive additional revenue from DR to help with payback of the equipment.

MARKET FACTOR	BENEFITS	CHALLENGES
Demand Response Service Providers These firms may be a LDC, Energy Retailer or Aggregator. **Aggregators combine DR capacity by entering into contract with the participating consumer. In some cases, the aggregators have bilateral agreements with the LDC or Energy Retailer to market and manage DR activities. In other cases, these firms are able to aggregate DR capacity and offer it directly into the wholesale power market like any other generation resource.**	Since DR has a relatively low operating cost when compared to other peaking sources (e.g., combustion turbine), these firms are able to **operate "virtual power plants"** with lower operating expenses. They also tend to **provide other services** to their customers in conjunction with or as an Energy Service Company.	One of the biggest challenges is **selecting target markets** that will yield a predictable cash flow. Some of the most successful markets have a way that the DR Service Provider can forward sell the asset. For example, Norway has a reserve option market in which a Service Provider can sell into daily. Some markets in the United States have capacity payments. A little more risky and complicated option is Energy Only payment. A DR Service Provider in Australia has found ways of structuring this through bilateral agreements with an LDC or Energy Retailer.
System Operators They are responsible for managing transmission systems. In some cases, the System Operator also manages a formal wholesale power exchange. In other cases, the wholesale power exchange is a separate entity. It should also be noted that many markets do not have either of these formal institutions. In these situations, grid management and power "trading" are handled bilaterally with some type of regional operating agreement/rules.	With proper market rules, incentives, and infrastructure, System Operators can use DR to strategically **address system reliability issues** such as congestion. DR can impact demand elasticity thereby causing more efficient market pricing. ESCOs could develop a way to **incorporate DR resources into its reserve markets** as done by Statnett, the Norwegian System Operator.	System Operators may have to **integrate new communication and meter data systems.** Some System Operators would prefer that DR be developed and managed at the retail level. They are willing to work with the market to establish proper business rules for DR inclusion in the appropriate markets.
Regulators They set policies that the industry must abide by. It is unlikely that they would have any direct involvement in DR business models.	Regulators tend to **seek solutions that benefit society and reduce market power.** DR can provide lower energy cost when used to impact demand elasticity. This helps to mitigate market power that supply side bidders may have during peak pricing events. And, regulators receive positive marks from consumers for promoting DR.	Regulators ability to identify ways to **promote DR in new institutions** that were not originally designed to support such activities.
Society It is important to recognize Society as a market actor when discussing DR. Society will almost certainly be an indirect beneficiary of DR by way of lower total energy costs.	Each of the other categories discussed DR's impact on a specific type of firm or organization. However, it is important to recognize that society as a whole benefits from DR by **reducing the overall cost of energy supply**. This can be good and potentially bad at the same time. The value that any individual participant receives, whether it's the consumer, the utility, a retailer, will establish the basis for their interest level for participating.	It may be easily demonstrated that robust DR in a given marketplace can have dramatic impact on societal energy costs, but if individual actors do not receive the **proper incentives to participate** the societal benefits may be lost. In economic circles this is known as the "tragedy of the commons."

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new publications

Time of Use Pricing & Energy Use

These three reports can be downloaded from the publications page under Task XI on the IEA DSM web site, dsm.iea.org.

Smaller Customer Energy Saving by End Use Monitoring and Feedback
This report quantifies energy end use monitoring and feedback (EUMF) activities for smaller customers, those that do not use time of use metering, that were carried out in seven countries. Why is this important? Because domestic energy use has risen sharply over the past few decades, and is likely to continue to rise. Motivating customers to save energy can reduce this projected rise and EUMF is a means to motivate smaller customers to achieve a 10% saving in energy use. The monetary savings resulting from the application of EUMF to direct electric heating customers have been estimated to be worth 100 Euro per year per customer.

▸ *Download the report and read about successful EUMF programs, what further measures can be implemented, whether EUMF has an economic role to play in current thinking for energy saving, and what motivates end use behavior changes.*

Time of Use Pricing for Demand Management Delivery
Time of Use (TOU) electricity pricing is one mechanism for encouraging energy demand profile and shape change. It already is a normal practice for larger customers. This report examines the costs and benefits of TOU for customers for whom this is not normal practice. The financial incentives needed to mobilize specific end use demand changes are largely unknown. It is probable that specific end use profiles can be modified with the right financial incentives, however, the scale of the required incentives, the specific end uses which can be influenced and the size of the resulting demand changes will be different for different households.

▸ *Download this report and learn about the quantified potential, value, and cost of modifying smaller customer end use demands using TOU pricing.*

Demand Side Bidding for Smaller Customers
The study shows that there is a role for customers that do not use time of use metering to bid demand to assist system operation, improve supply security and reduce supply costs. Savings in CO^2 may also be possible. Conclusions from field trials carried out in participating countries show that there is a positive attitude among many smaller customers to saving energy and making financial savings provided the inconvenience is small. Incentives need not necessarily be financial as long as additional costs are not incurred by customers. Environmental incentives and the belief that they are doing the right thing are sufficient for many customers in some countries.

▸ *Download this report to understand the feasibility and viability of DSB for smaller customers.*

For more information or if interested in joining the two new projects being undertaken 1) quantifying the potential for existing "profile" settlement systems for smaller customers to deal with dynamic profiles and 2) evaluating the demand "available" and demand "shift" validation mechanisms for aggregated demand of smaller customers, contact the Task XI Operating Agent, Richard Formby of EA Technology, United Kingdom, richard.formby@eatechnology.com.

The DSM Spotlight is published several times a year to keep readers abreast of recent results of the IEA Demand-Side Management Programme and of related DSM issues. The viewpoints or policies expressed in this newsletter do not necessarily reflect those of the International Energy Agency, the IEA Demand-Side Management Programme member countries, or the participating researchers.

For more information on the Programme, its work and contact addresses, please visit our website at ***http://dsm.iea.org***

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