Demand Response Dispatcher

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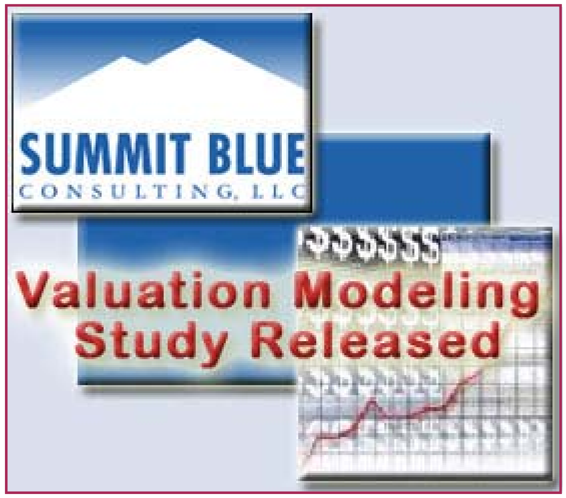
Newsletter of the IEA DSM Task XIII Project

"Connecting Electricity Customers to Markets"



Valuing Demand Response Resources: A Resource Planning Construct

Daniel M. Violette, Ph.D.
Rachel Freeman, M.S.
Chris Neil, M.S.

Summit Blue's modeling effort for Subtask 4 developed an approach for valuing DRR using a resource planning context. This approach was compared with other methods commonly used to provide estimates of the value of DRR and we examined changes in system costs with and without DRR included in a portfolio of resources. The difference in system costs over a 19-year time horizon provides an estimate of the value of DRR for the electric system. The specific model used for this effort was New Energy Associates' Strategist® Strategic Planning Model.

The base case for the model was developed to realistically represent an electricity market which allows for appropriate trade-offs between resources – both supply-side and DRR – and is able to address issues such as off-system sales/purchases and system constraints (e.g., transmission constraints). The base case system model used data compiled by New Energy Associates, used publicly available information for the Mid Atlantic Area Council of the National Electric Reliability Councils (NERC). The initial data came from the Platts-McGraw Hill Base Case

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database with some adjustments to the data based on NewEnergy and Summit Blue's experience.

One hundred scenarios were created to represent a variety of possible situations. Monte Carlo methods created different outcomes representing uncertainty in key inputs. The key input variables were: fuel prices – natural gas, residual oil, distillate oil, and coal; peak demand; energy demand; unit outages; and tie line capacities.

The model included four DRR products as potential resources to meet future system needs, in combination with the full range of supply-side options generally anticipated in resource plans. The DRR products were Large Industrial Interruptible, Mass-Market Direct Load Control, Dispatchable Purchase Transaction, and Real-Time Pricing. Real-Time Pricing was added to the model as a reduction in peak or general energy demand, rather than as a callable program.

Four sets of model runs addressed the following DRR and pricing options:

1. A base case resource option

2. A resource option with three new DRR callable programs

3. An option with the three callable DRR programs and a peak-period pricing program which reduces peak demand and shifts load to off-peak hours

4. A resource option with the three callable DRR programs and an aggressive Real-Time Pricing (RTP) product that produces a greater reduction in peak demand together with an energy efficiency effect consistent with the RTP literature

Results from these analyses include:

1. In the base case, the overall uncertainty in total system costs for each year quite large across the 100 cases — indicating that the uncertainty in the modest number of variables selected does result in a wide potential range of net system costs for each year in the 20-year planning horizon. On average, the range was 100%, i.e., the highest cost in the range was roughly double the lowest cost for almost every year in the planning horizon.

2. On a peak demand day with additional system stresses, such as 10% of generating capacity being offline, savings in marginal production costs are substantial. The addition of DRR to the system greatly reduced the "peakiness" of the hourly prices, reducing the maximum price by more than 50%. For example, in one peak day in July the total cost savings were $24.5 million.

3. A substantial percentage of new capacity charges were deferred by the model because of the DRR availability. This amounted to savings of $892 million (2004 dollars) over the 20-year period.

4. While DRR provides considerable amounts of benefits on select days, there is a cost to building and maintaining the DRR capacity even if DRR is not used. This results in cases where there are costs but no savings from

DRR. In scenarios with DRR but no RTP, 36% of the 100 cases showed savings in total system NPV compared with the base case. With the very aggressive RTP scenario, 97% of the cases showed savings.

5. DRR provided significant benefits when used. The model showed large amounts of DRR were used about once in every four years, but small amounts of DRR were used in a most of the years. Nearly the total DRR capacity was used infrequently (i.e., about 1 in 4 years).

6. There was a change in the risk profile associated with the planning scenarios with the addition of DRR. There were significant savings when looking at value at risk (VAR) at the 90th percentile (VAR90) and at the 95th percentile (VAR95). Results for the three scenarios are shown below. *

7. DRR decreases the estimated loss of load hours substantially across all cases. The base case had an average value for loss of load hours of 7.64 hours across the cases, but values for some individual cases were as high as 30 hours. For the DRR with Peak Pricing, the average loss of load hours averaged across all cases was lowered to 0.33 hours. The magnitude of the savings due to enhanced reliability across all the years in the planning horizon could be quite high, but no estimate has been calculated at this time and this estimate may vary by customers impacted and the characteristics of different systems.

In conclusion, this case study shows that a Monte Carlo approach, coupled with a resource planning model, can address the value of DRR even with uncertainties in key variables. This approach can assess the value of DRR in reduced costs associated with extreme events as well as likelihood of those events. Moreover, DRR reduced the NPV of total system costs over the planning horizon.

* Lessons learned and areas for future research include:

- Methods for developing estimates of the dollar value of the increase in reliability is important. These benefits might be large – possibly larger than the decrease in net system costs found in this case study.
- Improvements can be made to the model including the specification of DRR products and pricing products. This attempt made considerable progress with incorporating uncertainty by combining a Monte Carlo with a resource planning model.
- Future efforts should incorporate feedback loops to account for the ability of DRR to ramp up or go into a maintenance mode as needed. This can avoid “over building” DRR. This would reduce the costs of DRR without affecting its system benefits.

With over 20 years’ experience in the power and networked industries, Daniel Violette is a recognized industry leader in the development of effective market strategies, the use of quantitative methods to support utility decisions and providing executive-level management consulting.

Masoud Almassi, Director, Ontario Power Authority
Ross Malme, Operating Agent, IEA DSM Task XIII

This summer has been particularly difficult for the Northeast part of the United States and Canada as the region has endured sustained near-record temperatures and set several new peak electrical demand levels. For example, the Province of Ontario, Canada, set an all time record peak on June 27th of 26,157 MW, more than 600 MW higher than the previous peak in 2002. Since this is several thousand MW above the existing generation capacity, Ontario had to import substantial amounts of power from neighboring provinces and from the United States. This comes at a time when Ontario is contemplating how it will comply with its greenhouse gas emission requirements associated with Kyoto and a commitment by the government to shut down over 7500MW of coal fired generation.

To address these urgent issues, the provincial government of Ontario recently created a new entity called the Ontario Power Authority (OPA), http://www.powerauthority.on.ca/index.taf . The OPA is a non-profit statutory corporation with an independent board of directors who reports to the Legislature of Ontario through the Minister of Energy. Its mandate covers four critical areas of Ontario's electricity sector:

- **Power System Planning** –developing and maintaining a long-term plan for coordinating the supply and transmission of electricity in Ontario.
- **Generation Development** – contracting for investment in new generation projects and demand management initiatives to reduce the demand-supply gap for electricity.
- **Conservation Bureau** – facilitating the management of demand by developing conserva-

tion programs for electricity users.

- **Retail Services** – assuring smooth prices to residential and other designated customers, while recovering the full cost of electricity.

Peter Love, the OPA's Chief Energy Conservation Officer, has some very aggressive objectives in conservation and demand side management.

We are pleased to announce the Province of Ontario along with Natural Resources Canada will partner to join Task XIII. Masoud Almassi, Director of Commercial and Institutional Programs from the Conservation Bureau will serve as one of Canada's Country Experts on the project. Additional Expert(s) are expected to be named shortly.

Since Canada will be joining Task XIII roughly one year after the project start, the Operating Agent Team will be working closely with the Canadian Country Experts and stakeholders to apply the Task XIII methodology to assist Ontario and Canada in meeting its demand response objectives.

Hans Nilsson, Chairman of the IEA DSM Executive Committee says, "Canadian participation in Task XIII is an excellent example of how we build upon the work of IEA DSM Tasks to address urgent needs of our member countries. The IEA DSM program is becoming recognized by the global community as the centre for innovation on managing our growing power needs while respecting the environmental needs of our planet."

__Ross D. Malme__ is the President, CEO and Founder of RETX. He has been a senior manager in the energy industry for twenty years, and is recognized as a national expert in uniform business rules and retail energy issues. Prior to starting RETX, Ross held executive management positions with several major energy and energy technology companies. He created a coalition of retail energy suppliers, vendors and end-users instrumental in unbundling revenue cycle services in California, and pioneered the development of automated meter reading technology. Ross can be reached at rmalme@RETX.com.

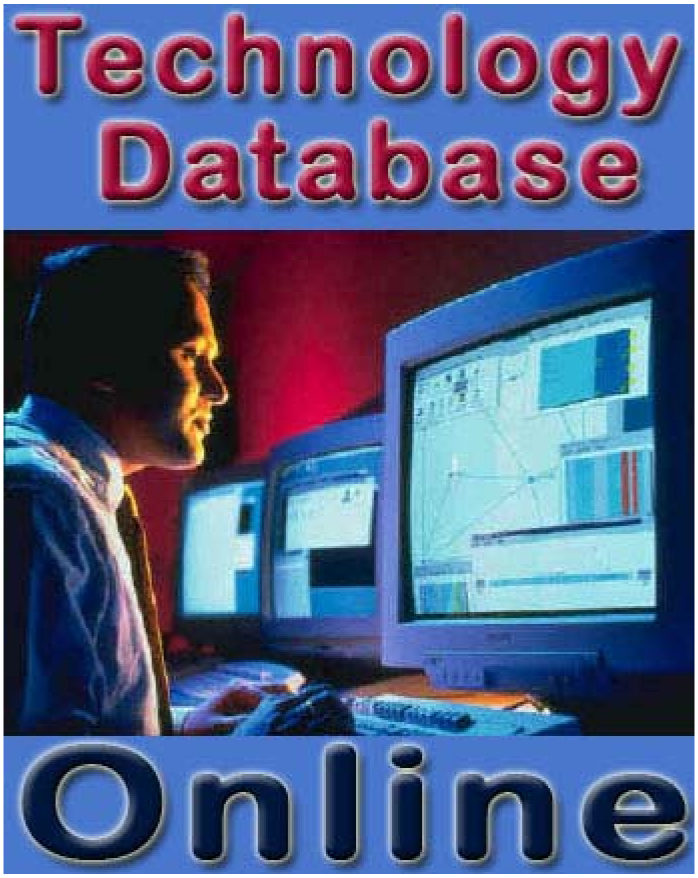
Participating Countries in Task XIII

and How to Join the Task XIII Project Team

Participating Countries:

Australia
Denmark
Finland
Italy
Korea
Japan
Norway
Spain
Sweden
USA
Canada

To find out more information about the IEA DSM Programe visit their website at http://dsm.iea.org/. To find out more information about the Demand Response Resources project visit the project Internet Portal at http://drrtask13.retxbeta.com/ or contact the Ross Malme, the project Operating Agent at malme@retx.com or call him at 770-390-8510.



Mark Wright
VP and CIO of RETX

The IEA DSM Task XIII project portal now has a new online tool to assist in evaluating and selecting appropriate technologies for demand response programs. The tool is located in the Online Tools menu of the portal and is only available to registered users. The tool organizes the available case studies into a grid which shows the type of technology in the rows of the grid and the types of DR programs in the columns. This organization of the information facilitates the comparison of a given type of technology for a specific type of program across a variety of countries and markets.

As an example, if you were considering the use of energy management systems to support a TSO Load Curtailment or Shifting DR Program, you could find the intersection of the Energy Management System row and the TSO Load Curtailment & Shifting column and browse through seven technology case studies currently available from four countries who have experience using that technology for such DR products.

There is also included at the bottom of the Online Tool's webpage an index to clearly define the abbreviations used in the grid.

The Online Tool includes a handy quick reference of the five basic components of a successful demand response program:

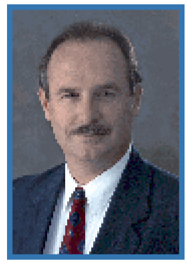
1. Notification
2. Real-time/non-real-time metering
3. Compliance of performance
4. Baseline calculation

5. Settlement

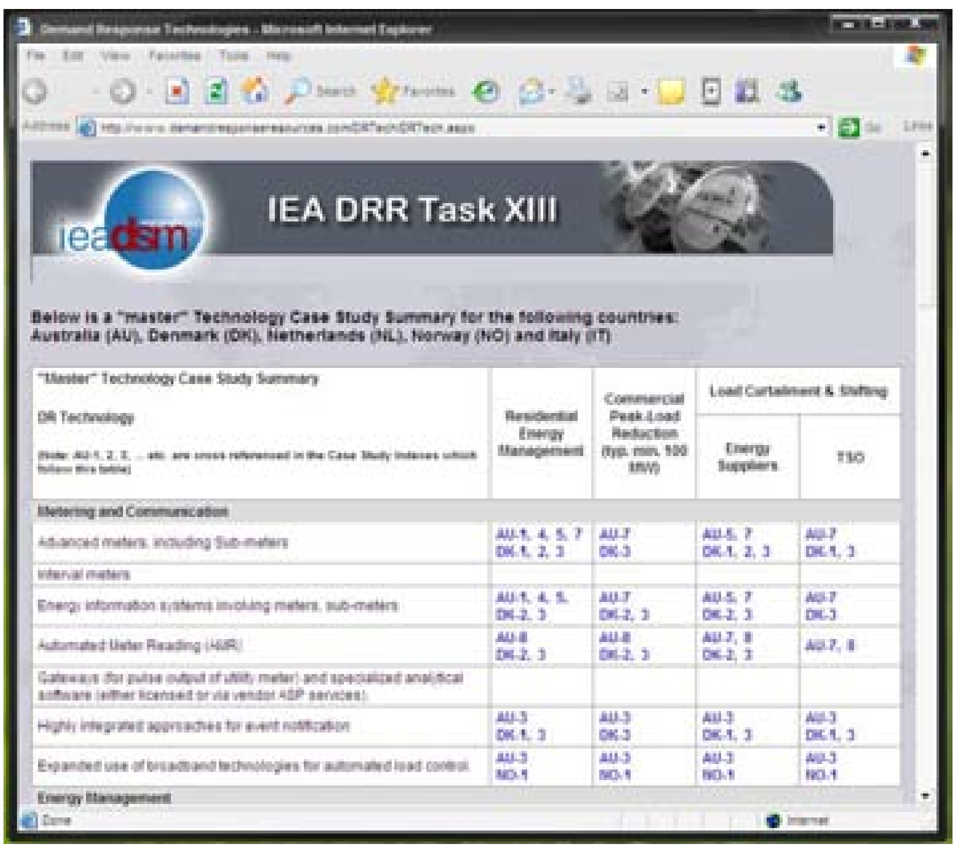
The tool also includes a list of recommended systems and tools used to implement demand response programs:

- Automated meter reading (AMR) equipment
- AMR software
- Load curtailment management system software
- Meter verification editing & estimation systems
- Settlement systems
- Advanced billing systems
- Load information systems
- Load profiling systems
- Distribution & transmission load planning tools
- Next day forecasting tools
- Customer demand response forecasting tools

As participating countries supply additional case studies, the grid will continue to expand to make those studies available in this easily cross referenced method.



__Mark Wright__ is Vice President and Chief Information Officer for RETX. He is responsible for all research, development, deployment, and support of information technology including the ground breaking ePath suite of demand response solutions. He has previously served as CTO for an internet-based logistics company, and in a variety of director level infrastructure and applications positions at Atlanta Gas Light, Computer Sciences Corporation, and Pratt and Whitney. Mark can be reached at mwright@RETX.com.



Below is a "master" Technology Case Study Summary for the following countries: Australia (AU), Denmark (DK), Netherlands (NL), Norway (NO) and Italy (IT)

"Master" Technology Case Study Summary DR Technology (Note: AU-1, 2, 3, ... etc. are cross referenced in the Case Study Indexes which follow this table)	Residential Energy Management	Commercial Peak Load Reduction (typ. min. 100 MW)	Load Curtailment & Shifting	
			Energy Suppliers	TSO
Metering and Communication				
Advanced meters, including Sub-meters	AU-1, 4, 5, 7 DK-1, 2, 3	AU-7 DK-3	AU-5, 7 DK-1, 2, 3	AU-7 DK-1, 3
Interval meters				
Energy information systems involving meters, sub-meters	AU-1, 4, 5, DK-2, 3	AU-7 DK-2, 3	AU-5, 7 DK-2, 3	AU-7 DK-3
Automated Meter Reading (AMR)	AU-8 DK-2, 3	AU-8 DK-2, 3	AU-7, 8 DK-2, 3	AU-7, 8
Gateways (for pulse output of utility meter) and specialized analytical software (either licensed or via vendor ASP services)				
Highly integrated approaches for event notification	AU-3 DK-1, 3	AU-3 DK-3	AU-3 DK-1, 3	AU-3 DK-1, 3
Expanded use of broadband technologies for automated load control	AU-3 NO-1	AU-3 NO-1	AU-3 NO-1	AU-3 NO-1
Energy Management				

Just as a reminder, the project portal is continually being updated with presentations, documents, and new project deliverables on a continual basis. Just in the last month we've added material from the US National Town Meeting on Demand Response and more entries in our research library. Check back often and read the Breaking News, New for Members, and New Project Releases on the front page to keep up with the latest releases and updates.

Pete Scarpelli

Our next Country Expert meeting is scheduled to take place in Melbourne, Australia, on November 9-10, 2005. The meeting will be hosted by the Sustainable Energy Authority Victoria (SEAV) and will take place in their office (near the city center). We are currently finalizing the lodging arrangements and will provide the details very soon.

The Australian Expert Team is also arranging a joint Task XIII and local stakeholder meeting for Friday, November 11. This meeting will take place at Nauru House which is the home of the Department of Infrastructure and just a short distance from SEAV's office. We hope you will join us at this session as well.

This Expert Meeting will focus on five main topics:

1. Review All Finalized Task XIII Deliverables
2. DR Market Barriers
3. DR Technologies
4. Developing DR Business Cases
5. Subtask 8: Market Implementation Strategies

We are working on the meeting agenda and will coordinate with our Australian friends on their Local Stakeholder Meeting. We will likely ask many of you to prepare presentations for the meeting. However, if there is a specific topic on which you would like to lead a discussion, please let Pete Scarpelli know at pscarpelli@retx.com.

We will be releasing several new project reports in the next few weeks. Some of these will be final versions of previous documents and some will be draft versions of new documents. As part of the ExCo project approval process, we will be seeking everyone's approval and sign off on the finalized documents when we are in Melbourne. We will provide more information on this in a cover letter when we send out the documents.

I'm told that this will be a great time of year to visit Australia. Since they are located in the Southern hemisphere, it will be spring time with (hopefully) favorable weather conditions. I'm also told that the Melbourne Spring Racing Carnival will take place around the same time. If any of you are horse racing fans, you will want to check this out while you are in town. There are many other great things to see in the area and our local friends are preparing a brief list of suggestions for you to consider.

We look forward to seeing you "Down Under!"

***Pete Scarpelli** is Vice President, Marketing and Business Development at RETX. Pete is responsible for driving the strategy and business development efforts for RETX. He is the inventor of RETX's Load Management Dispatcher (LMD) application and the co-inventor of RETX's Regional Negawatt Hub (RNH) application.*

Upcoming Events

Event	Date	Location
Nordel / IEA DRR Coordination Meeting	October 13, 2005	Helsinki, Finland
26th ExCo Meeting	October 19-21, 2005	Madrid, Spain
PLMA Fall Conference	October 31 - November 1, 2005	Los Angeles, California, USA
Experts Meeting	November 9-11, 2005	Melbourne, Australia
3rd National Energy Efficiency Conference	November 22-23, 2005	Melbourne, Australia
16th National Energy Services Conference & Expo	February 6-8, 2006	San Diego, California, USA
DistribuTech Conference & Expo	February 7-9, 2006	Tampa, Florida, USA