Balancing generation and demand has always been a fundamental challenge for grid operators throughout the world. Traditionally, the utility industry has addressed any growth in load by investing in new generation capacity. But what about managing demand? Can Demand Response (DR) be a significant contributor to the equation and in the case of New Zealand, also help to address problems arising from transmission constraints and help to defer, or avoid new transmission investment?

Electricity consumers are becoming increasingly proactive and savvy. They would like to actively control their electricity use and costs, shifting their consumption in real-time to the most favorable tariff. The industry has also seen a significant increase in households wishing to sell power back to utilities from their own solar panels, wind turbines or other installations. The ‘market’ is ready to actively engage and grid operators now have access to the technology to make it happen.

POTENTIAL LOAD REDUCTION
Alstom’s DRBizNet’s wholesale and retail demand response management solution captures a customer, or an aggregator’s combined curtailable load by location and potential load reduction, which then can be bid into the wholesale market. DRBizNet records and manages curtailment program information and aggregates the demand resources as virtual power plants, and when the grid’s capacity requirements are better served through load reduction, DRBizNet is able to automatically communicate the requirement to contracted resources. The aggregated DR offer therefore becomes just another generator in the wholesale market.

Like supply-side resources, demand-side resources must be managed through efficient execution of business processes. Any DR platform should have an open architecture that can seamlessly integrate with various DR hardware devices such as building energy management systems, programmable thermostats and in home displays, as well as utility enterprise applications. Alstom’s DRBizNet achieves this and therefore not only has the ability to operate in the wholesale market as a pseudo generator, but also in the retail market responding to consumer demand reduction offers in real time.

TWO-WAY MANAGEMENT OF ELECTRICITY
Integrating these technologies means moving beyond the traditional centralised structure to a highly dynamic grid, where the electrical network is intertwined with information and telecommunication flows. Today’s electrical networks are evolving into Smart Grids, intelligent infrastructures that enable real-time, two-way management of electricity and information.

Alstom Grid is at the heart of this Smart Grid revolution, with solutions combining key technologies to provide immediate benefits to energy producers, utilities, industries and end-users. DRBizNet is a comprehensive, integrated and flexible software for simplifying management of demand resources and programs while protecting utilities’ investments in DR infrastructure. DRBizNet is the result of a decade of R&D and was successfully demonstrated in California in 2006 in a field simulation involving three utilities and the California ISO. Over 1,000 users in more than 200 organisations are using DRBizNet to enable more than 10,000 MW of demand response. This represents over 1,000,000 end-use residential customers and over 10,000 commercial and industrial customers.

COMMUNICATE IN REAL TIME
The recent introduction of Alstom’s DR platform to New Zealand grid operator Transpower, will become the new benchmark for the rest of the world due to the unique manner in which the DR platform will seamlessly integrate with Transpower’s Energy and Market Management Systems and communicate in real time with end use consumers.

The introduction of the DRBizNet solution to New Zealand demonstrates its successful inclusion as part of Alstom’s wider Smart Grid offering said, New Zealand Sales Director Kevin Hart.

“DRBizNet has been in production for years in the United States, but Transpower’s vision and direction are pulling our technical solution and the market mechanics in an exciting positive direction,” says Hart. “It’s a complex problem that we’ve managed to solve through our expertise and positive working relationship with Transpower.”

Alstom Grid expects to build on the successful Transpower deployment, particularly in Europe and Asia, where its ability to provide a DR platform is less well-known than in Alstom’s North American market.

“New Zealand is a good environment as its grid is small and nimble enough to have opportunities like our DRBizNet introduced rather quickly,” Hart says. “But it is also large enough to test DR’s viability for larger jurisdictions.”

“This is a robust system that at last will actually deliver what DR initiatives have always promised.”

MEET 10% OF PEAK NATIONAL DEMAND
“Demand Response and electricity generation should effectively be the same thing, and invisible to end-users and the industry itself”, says Transpower Demand Response Manager Quintin Tahau.

Tahau’s goal is to make DR part of the New Zealand state-owned electricity grid owner and operator’s DNA – to become part and parcel of what Transpower does.

Tahau had the overview of Transpower’s DR tendering, testing and implementation across the project, which was managed by Alstom Grid. His observation is that the conversation across electricity customers, distributors, generators and the system operator has changed since phase one of the project was introduced in early June 2012.
“Typically discussions were focused around who owns the load,” Tahau says. “It’s shifted to how do we make this work for everyone’s benefit? That was the desired outcome and there really does seem to be a willingness to collaborate.”

PROVIDE A SEAMLESS INTEGRATION
Tahau is also delighted with the comparative smoothness of the project and is confident that, as Transpower enters phase two of the project, the learning and adaptive process employed by Alstom Grid will provide a seamless integration into the grid-owner’s Energy Management System and Market Management System platforms.

“Alstom Grid had experience with DR markets across the USA and also had an overall maturity of product,” Tahau said. “They had a track record to show they were successful and were likely to succeed with us as well.”

One interesting aspect for Transpower’s DR project was taking off-the-shelf Alstom Grid DRBizNet products, with its own business rules and making New Zealand specific changes.

This month-long remote configuration process was followed by Alstom engineer’s travelling to New Zealand for an intensive two weeks with Transpower’s business owners, configuring requirements in greater detail.

“They did a great job and knew their product inside and out,” Tahau said.

In June, the DR project changes were delivered to Transpower and its standalone electricity data provider and business unit, Energy Market Services.

It stood up immediately and was running without anyone from the States being here,” Tahau said. “By the time the Alstom engineers returned on their second visit, we could start training staff, using the system, and installing and uninstalling the program.

USER ACCEPTANCE TESTING
In mid-August, Transpower began user acceptance testing to assess whether the configuration changes have worked and whether the business rules provided to customers are accurate.

“One of our selection criteria was the response by vendors when there is an issue to be resolved,” Tahau says. “Alstom certainly passed on this, and it’s been a positive experience for all of us.”

Transpower will soon move onto a beta test of its DR project, which will be a true test of the platform’s capability.

“Our ultimate goal is for demand response playing in the market with the same even-handedness as generation,” says Tahau. “That’s the holy grail.”

Quantitatively Transpower’s target is to meet 10 per cent of peak national demand (6500 MW) through DR.

Its beta and market pilot phase will also seek to understand customers’ price points, and how much one megawatt of DR reduction in power use is worth to them.

“The fact that customers receive a cheque or credit for the power use they forgo during peak load requirements is a huge incentive for them to participate in the project,” Tahau says.

SMARTER APPLIANCES
Smart appliance manufacturers can now see a DR consumer benefit.

One noteworthy benefit of Transpower’s introduction of Alstom Grid’s DRBizNet technology has been a new ability to have a different conversation with home appliance (i.e. fridges, freezers, dishwashers) manufacturers.

“With DR though, the explanation’s simple. There’s a consumer benefit.”

Manufacturers are keen to be involved and the quality of thinking they’ve done in the area is indicated by the fact that a smart fridge will soon be available.

“Appliance manufacturers needed a framework to build smart machines to,” Tahau says. “We’re giving that to them.”

DR EQUIVALENT TO HAVING A VIRTUAL GENERATOR
Demand Response ticks many boxes for electricity grid operator Transpower as it can bid into the market as if it were a virtual generator. But, the difference between DR and actual generation includes:

• No new land, extra consents or easements required
• No new connections to the grid
• No long-term construction, with connection only taking place once a new power plant is commissioned
• As little as 100kW of DR can be allocated
• Organically using existing infrastructure to best possible effect

Demand response is already proving to be a cost-effective method of balancing generation and demand.

ALSTOM

For further information, please contact
Alstom Grid, Network Management Solutions
Tel: 02 9739 3000