

New Zealand Energy Conference 2002
“The way forward”



**Electricity Demand-Side
Participation**

-Its role towards a sustainable energy future

Ewan Gebbie and Stephen Drew

What we will cover

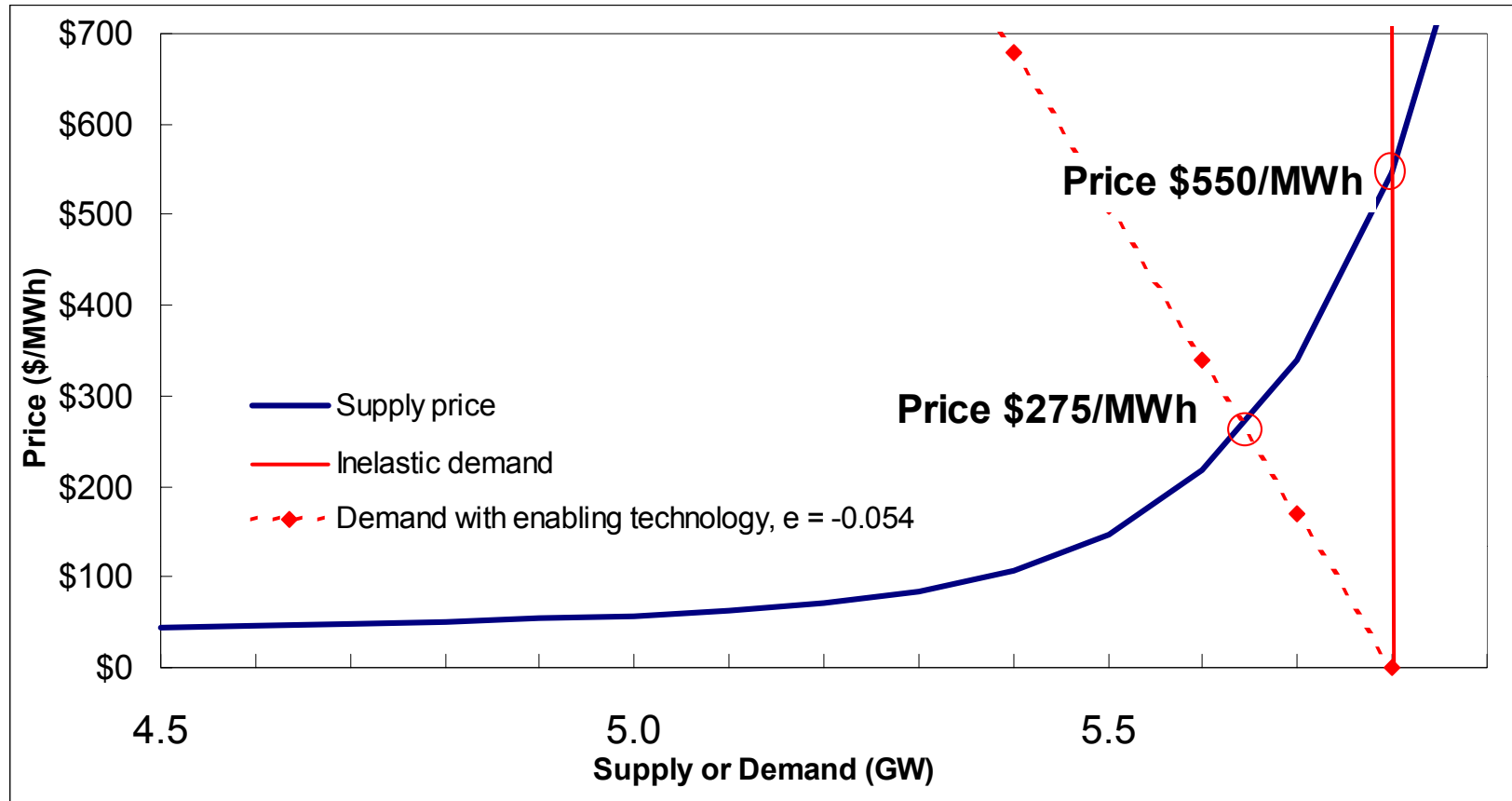
- ❑ **Demand-side participation - basic concepts**
- ❑ **Voluntary demand response – fixed and spot prices**
- ❑ **Consumer demand response to network prices**
- ❑ **Challenges ahead**

Demand-Side Participation can provide a balance

“Competitive markets are based on the interaction of supply and demand in response to appropriate price signals. Failure to harness the ability of customers to change their demand in response to prices reduces overall market efficiency.”

Peak Load Management Alliance, February 2002

Even a little Demand Response goes a long way



For this case, a consumer demand response to price reducing demand by 5%, cuts the price by 50%. This price reduction benefits all customers.

In an efficient market

**Demand-Side Participation
is the Price Safety Valve**

Benefits of Demand-Side Participation

- ❑ Enhances market efficiency
- ❑ Cost reduction
- ❑ Enhances system reliability
- ❑ Potential environmental improvements
- ❑ Opportunities for risk management
- ❑ Customer service and choice
- ❑ Market power mitigation

In an efficient market

Long-term energy efficiency and short-term demand responses are complementary resources.

The Demand-Side Participation portfolio

- ❑ **Peak load management** – load shifting from high to low priced periods
- ❑ **Voluntary demand response** – reacting to day-ahead exchanges or real-time prices
- ❑ **Direct load control** – peak load avoidance on distribution networks
- ❑ **Interruptible** - as one of the ancillary services

Demand Response is a portfolio of options

- ❑ **The portfolio goes far beyond a single company perspective.**
- ❑ **The participating opportunities are diverse - from simply turning things off to the operation of stand-by generators.**
- ❑ **This resource can mirror all supply-side options.**

Voluntary Demand Response

- ❑ **Voluntary Load Curtailment in the day ahead period**
- ❑ **The Meridian Energy Exchange uses the Demand Exchange™ platform which is being used for the first time outside the United States.**

The Demand Exchange™ platform

- ❑ Customers on the Demand Exchange™ platform are contacted automatically on the internet or by pager.
- ❑ Traders are able to buy a load reduction portfolio to suit their market position.



A trader posts prices

Demand Exchange - Microsoft Internet Explorer

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Address https://www.demx.com/multi_pricer.asp Go Links

Represented by: Stephen Drew

Review/Post Prices

as of 17:28, Tuesday, July 16, 2002

Please review the prices and make all necessary changes.
Remember that all prices are per Megawatt Hour (MWh).

Prices

Activity

Roster

Support

Message

Logoff

Hour Ending	Day Of	Day Ahead	2-Days	3-Days	Multi-Day
	Tuesday, July 16, 2002 (\$/MWh)	Wednesday, July 17, 2002 (\$/MWh)	Thursday, July 18, 2002 (\$/MWh)	Friday, July 19, 2002 (\$/MWh)	Start: 7/22/2002 End: 7/28/2002 (\$/MWh)
	Enter for all hours Day Of	Enter for all hours Day Ahead	Enter for all hours 2-Days	Enter for all hours 3-Days	Enter for all hours Multi-Day
1am	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
2am	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
3am	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
4am	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
5am	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
6am	\$ 0.00	\$ 0.00	50	\$ 0.00	\$ 0.00
7am	\$ 0.00	\$ 0.00	50	\$ 0.00	\$ 0.00
8am	\$ 0.00	\$ 0.00	50	\$ 0.00	\$ 0.00
9am	\$ 0.00	\$ 0.00	50	\$ 0.00	\$ 0.00
10am	\$ 0.00	\$ 0.00	50	\$ 0.00	\$ 0.00
11am	\$ 0.00	\$ 0.00	50	\$ 0.00	\$ 0.00
12pm	\$ 0.00	\$ 0.00		\$ 0.00	\$ 0.00
1pm	\$ 0.00	\$ 0.00		\$ 0.00	\$ 0.00

Done Internet



A customer pledges

Demand Exchange - Microsoft Internet Explorer

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Address <http://www.demandexchange.com/demx.asp> Go Links



CARSON MANUFACTURERS, LTD.

Site: **SOUTHERN NORTH ISLAND** Represented by: Greg Carson Driver Carson

Home
Profile
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Support
Logoff

It's 5:46:49 PM on Tuesday, July 16, 2002. Compile your Load Reduction Plan for ...
Wednesday, July 17, 2002

Please make your selections carefully. Use the **CALCULATE** Button as often as necessary to make your final choices. The Pledge Button will be available only after you **CALCULATE** at least once.

Hour	Price (\$/kwh)	Generation (2000kw)	Process (0kw)	HVAC (0kw)	Other (0kw)	Total kW Reduction	Hourly Benefit
5-6am	\$0.0500	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	0	\$0.00
6-7am	\$0.0500	<input type="text" value="0"/>	<input type="text" value="1000"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	1000	\$50.00
7-8am	\$0.0500	<input type="text" value="0"/>	<input type="text" value="1200"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	1200	\$60.00
8-9am	\$0.0500	<input type="text" value="0"/>	<input type="text" value="1200"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	1200	\$60.00
9-10am	\$0.0500	<input type="text" value="0"/>	<input type="text" value="1200"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	1200	\$60.00
10-11am	\$0.0500	<input type="text" value="0"/>	<input type="text" value="900"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	900	\$45.00

CALCULATE Estimated Total Benefit >> **\$275.00** <<

Enter your intended load reduction actions in this form. Indicate what load(s) you think you will be turning off / reducing / you will be using a standard computer in each hour (between now and ...)

Internet



A trader sees the pledge

Demand Exchange - Microsoft Internet Explorer

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Address https://www.demx.com/multi_pricer.asp Go Links >>

Represented by: Stephen Drew

Customer Activity and Pledges

Tuesday, July 16, 2002 through Friday, July 19, 2002
 This page will update Customer Activity every three minutes.

To view the details of an individual bid and/or accept that bid, click on the customer name.
 To view ONLY significant customer activity in detail, click [HERE](#).

Reduction Date: Wednesday, July 17, 2002

Bid Type	Status (date/time*)	Customer	Total MWh	12-1am	1-2am	2-3am	3-4am	4-5am	5-6am	6-7am	7-8am	8-9am	9-10am	10-11am	11a-12pm	12-1pm	1-2pm	2-3pm	3-4pm	4-5pm	5-6pm	6-7pm	7-8pm	8-9pm	9-10pm	10-11pm
Day Ahead	Pledged 7/16/2002 5:48:20 PM	Carson Manufacturers, Ltd. Southern North Island	5.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.2	1.2	1.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total MW in Play for Wednesday, July 17, 2002 >>			5.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.2	1.2	1.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NOTE: Current Multi-Day Activity, if any, has been included in each day's summary.
 *date/time indicates the date and time the described action took place.

[Roster](#)

Done Internet

The Meridian Energy Exchange

- ❑ **11 sites provided a demand response capability close to 70 MW**
- ❑ **2.6 GWh was traded over 1,000 hours at prices varying between \$15/MWh and \$150/MWh**

Voluntary Demand Response

- ❑ **Consumers on fixed priced contracts do react when exposed to appropriate day-ahead price signals**
- ❑ **Many consumers are willing to reduce demand once the savings and control issues are understood**
- ❑ **The resource is 'green' and cost effective**
- ❑ **Feedback and adequate notice helps gain full cooperation**

Reacting to the spot market

- ❑ **Market efficiency requires some consumers to face changing spot prices.**
- ❑ **This suits the larger industrials rather than mid-range or smaller consumers.**
- ❑ **Alerts, feedback and rewards for taking action – all have to be right**

Contributors to the market research

AFFCO NZ Ltd

Carter Holt Harvey Whakatane

Dunedin City Council

Fletcher Building Steel Group

Fletcher Wood Panels Ltd

Golden Bay Cement Company

Heinz Wattie Australasia Ltd

Leiner Davis Gelatin

Massey University

The Chateau on the Park

New Zealand Steel Ltd

Comalco New Zealand Ltd

Feltex Carpets

Fletcher Challenge Forests

General Cables

GRD Macraes Ltd

Independent Fisheries

Lion Breweries

Solid Energy New Zealand Ltd

The Warehouse

Market research results

- ❑ **Voluntary demand response was preferred.**
- ❑ **Most preferred at least day ahead notice to plan load changes.**
- ❑ **Responding to spot prices was seen as risky without firm future prices.**
- ❑ **Price certainty in forward markets, they all saw day ahead as essential.**

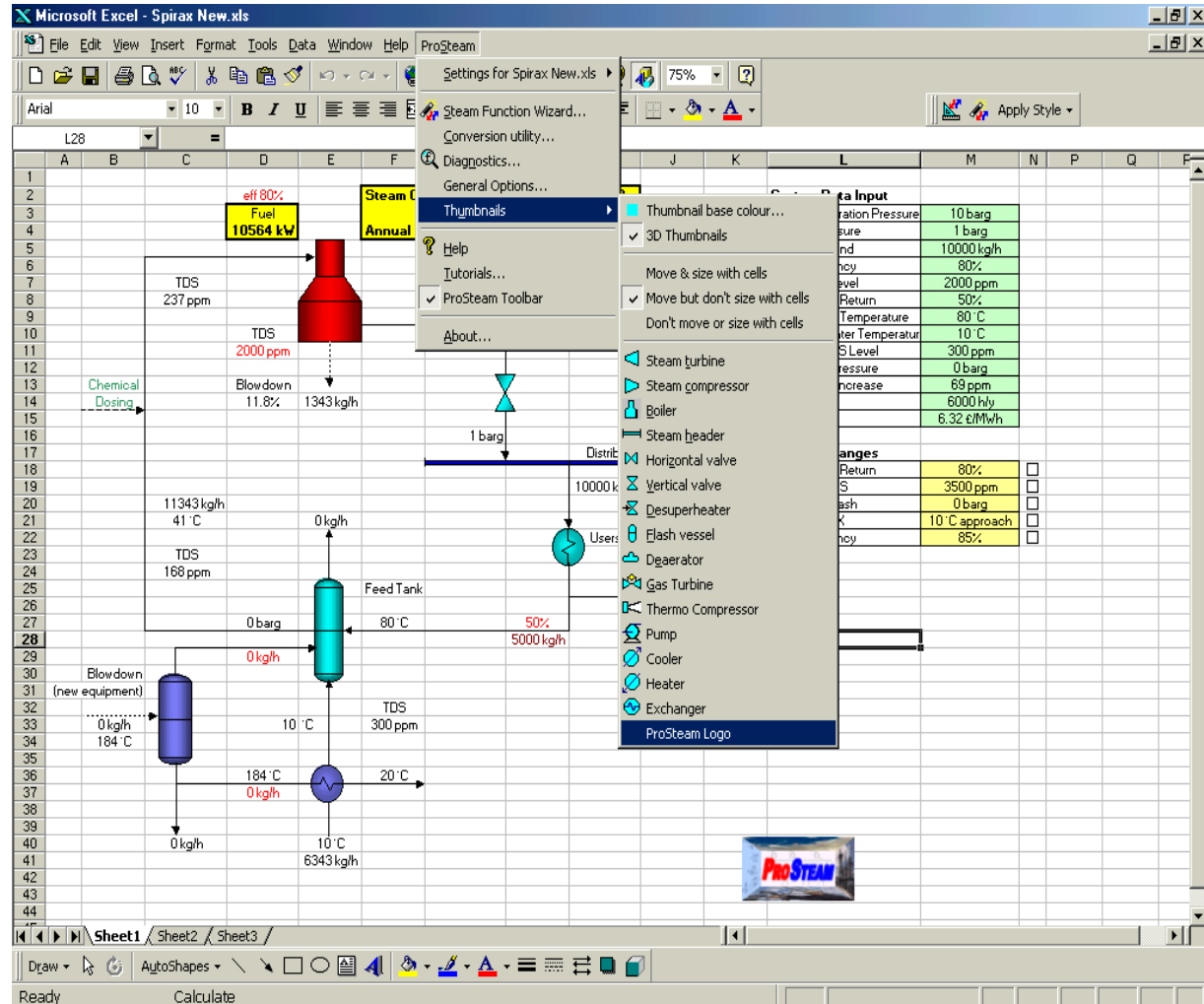
Market research results

- ❑ **Electricity market information should be free.**
- ❑ **None had been approached recently by electricity retailers with demand-side participation matters.**
- ❑ **All reported making progress in energy efficiency initiatives.**
- ❑ **There was genuine interest in the national benefits of the increased reliability by using demand-side resources.**

Optimisers will be the key



ProSteam Optimum Utility System Design and Operation



Direct Load Control

- ❑ **Historically, ripple control equipment has dominated our distribution industry for DLC.**
- ❑ **These ripple control assets are undervalued by many industry participants.**
- ❑ **Ripple signals are used to indicate congestion periods**
- ❑ **Many consumers are not seeing or reacting to these signals. In many cases the pricing signals are not transparent.**

Market research results

- ❑ The preference was again for voluntary demand response.
- ❑ More notice is preferred for voluntary action.
- ❑ Few consumers now understand how their lines charges are calculated and what action is needed to reduce charges.

National benefits

- ❑ **The expected load growth is 150 MW per year up to 2005**
- ❑ **Most of the economic demand response will come from the top 300 consumers in the industrial sector.**
- ❑ **Allowing for diversity, we believe 400 MW is a practical target.**
- ❑ **This demand-side reservoir is significant.**

National Benefits

- ❑ **Assessing economic value is not straight forward.**
- ❑ **Financial benefits will exceed programme costs by several times.**
- ❑ **400 MW will provide between \$10 and \$100 million per year of benefits.**
- ❑ **A 400 MW peaking station will cost \$340 million.**

The way forward

- ❑ **New thinking is required for market reform.**
- ❑ **Consumers are the sellers and the supply-side is the buyer.**
- ❑ **Bringing in more potential requires a multi-settlement market – settled first day ahead and then adjusted for real-time conditions.**
- ❑ **The demand-side can then participate.**

The way forward

Constructive discussion and debate of the principles important for the greater use of the demand-side resources is needed.

New Zealand Energy Conference 2002
“The way forward”



will ensure

Demand-Side Participation

**fulfils its critical role in complementing
energy efficiency in the National Strategy**