



2009 GITA Geospatial Infrastructure Solutions Conference

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facilitating a more sustainable future

This session

- ▶ **Demand Side Response (DSR)**
- ▶ **Smart grids, smart meters**
- ▶ **Other major changes in energy and related issues**
- ▶ **How to make it work (solutions oriented)**

Objective of the Australian National Electricity Market (NEM)

“To promote efficient investment in, and efficient use of, electricity services for the long-term interests of consumers of electricity with respect to price, quality, reliability, and security of supply of electricity of the national electricity system”

- The NEM was 10yo on 13 December 2008
- Time it seriously considered how to fully achieve this excellent objective

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Why our electricity supply is not meeting this objective?

25% of our electricity costs occur in <0.5% of the year

ie, \$6bn pa of consumers money is 'burnt' in less than 40 hours pa

How our market is failing!!

▶ Wholesale prices

- Extreme high prices provide excellent value for generators
- Consumers who are prepared to reduce their demand at low value – so not motivated to change their behavior

▶ Peak Network capacity

- Regulatory price caps
- Excessive investment in new capacity

▶ R

- Inadequate investment in new capacity
- Inadequate investment in transmission
- Inadequate investment in demand response

- Inadequate investment in demand response – equipment failures both days
- Demand response turned off - NEMMCO direction – about half million off supply

Raising VoLL to \$12,500 (up 25%) will not help market perform at extreme times
Massive spending will be necessary to meet growing peaks in physical demand
OR
Provide mechanisms for consumers to readily participate in DSR for good value

What's missing

A fully effective Demand Side Response to the existing supply side market

- ▶ Mechanisms for consumers to change their energy behaviour
- ▶ Meters that will support that change (commencing this week in Victoria)
- ▶ Smarter homes and smarter supply systems

What are we starting with?

- ▶ 100 year old approach to energy supply
- ▶ Using up 300 million years worth of fossil fuels in 300 years
- ▶ Relatively new electricity and gas markets (with their own inefficiencies and inadequacies)
- ▶ Energy consumers (all of us) are un-informed and feel un-empowered
- ▶ Significant cost increases already – more to come
- ▶ Environment with greater climate extremes

It works - except when it fails

What we are facing?

- ▶ Rising oil and gas prices
- ▶ Climate change
 - Clearer leadership now in the carbon debate but can it be afforded and at what impact on Australia's economy?
 - Rising demand for cleaner products (**lose exports if do not reduce CO2 and if costs rise**)
- ▶ Rising cost of infrastructure to supply consumers
 - US\$1200Bn in electricity infrastructure by 2020: APP Forum
 - AU\$47+Bn in electricity infrastructure by 2020 (>>2 times current)
 - Will be significantly worse in Australia with recharging electric vehicles
- ▶ Ongoing major growth in China and India (**opportunity**)
- ▶ Still ~2 billion people without electricity (**risk, opportunity**)
- ▶ Continuing growth in peak demand (**1.5x average growth**)
- ▶ Ways to minimise the cost increases? (**DSR, engaging consumers, smart solutions**)

Electricity Cost Trend Drivers

Electricity costs have and will continue to increase significantly due to

- Extreme climate impacts (drought, heat/cold)
- Wholesale gas price rises
- Costs of reducing our carbon outputs
- Continuing tightening of supply and demand
- Increasing network (infrastructure) constraints
- Increasing “Peakiness” in electricity (50% above average)
- Increasing the price of VoLL by 25% to \$12,500/MWh

DSR is currently the only mechanism in electricity markets to offset these cost increases

DSR of Supply Side for peak management

Incremental business case for Demand Side:

- **Setup cost of 1000MW of DSR = \$40 million**
- **Operating cost = \$50m pa**
- **Outcome = Savings of \$1.5 billion per year**
- **Reduction in GHG**

NPV (10 years) = +\$10 Bn

Compared with

Incremental business case for Supply Side:

- **Setup cost of 1000MW of peaking plant = \$900m**
- **Operating cost = \$60m pa**
- **Outcome = Continuing price increases**
- **Adds to GHG**

NPV (10 years) = -\$1 Bn

Matters of concern

- ▶ 25% of the retail costs occur from <40 hours pa
 - Very difficult for consumers to respond with any major benefit
 - If they do they pass most of the benefit to the retailer
 - And there is a decision to raise VoLL by 25% - **WHY?**
- ▶ We require \$47+bn of capex on network infrastructure plus generation at \$1m per MW by 2020
 - To ensure we have enough supply for 40 hours pa - **WASTEFUL**
 - Proven in that reliable DSR can
 - Cover peaks at lower cost
 - Engage consumers who receive a benefit
 - Benefits for Australian economy
- ▶ Reliability and Security
 - Only generators can provide Reserve and FCAS - **WASTEFUL**
 - This is a NEM Rules problem
 - Proven that DSR in USA, EU, NZ and WA can provide all year round

Matters of concern

- ▶ The NEM is now over 10 years old
- ▶ Interval metering has been available but little has changed in the demand profile
- ▶ The NEM Rules generally do not positively encourage reduction in demand
- ▶ Individual companies – take small actions to suit themselves (DM, Energy Efficiency)

Need organised fast acting reliable DSR to

- Peak Prices, Network Peaks, Emergency Events, etc
- Consumers must receive good value for their participation

What is Demand Side Response (DSR)?

- ▶ DSR is provided by electricity users reducing demand during periods of high prices, peak demand or supply shortfalls – and being paid for doing so
- ▶ Most of the 8 million electricity consumers in Australia can provide some DSR through
 - Load curtailment
 - Load shift in time (earlier / later)
 - Localised generation (standby, emergency, distributed and co/tri-generation)
- ▶ In response to price signals, physical peaks, to provide reserve capacity or emergency events

>4000 MW of DSR in Australia (~10% of peak demand)¹

1. Energy Response estimates in NEM and WEM

What can consumers do?

- ▶ Large Industrial / commercial consumers (100's are already getting involved)
 - Do not commit to a demand / curtailment clause in your supply contract
 - If you have load that can be shed an aggregator will provide the best overall value
 - If you have a standby generator it can be used to greater advantage and get paid for it
- ▶ SMEs and Residential consumers
 - Do not commit to a demand / curtailment clause in your supply contract
 - Use your new smart meters to maximum effect
 - Question anyone trying to sell you green energy, solar panels, etc to ensure that you are being told the real facts

Consumer benefits from DSR

- ▶ Consumer's direct benefits
 - Paid for DSR participation (up to 20% off electricity bill)
 - Want to be seen to be doing the right thing
 - Being sensible about their energy usage
 - Advance warning of high price events or supply issues & other information from Energy Response
- ▶ Community benefits
 - Lower overall electricity prices
 - Improved reliability – less likelihood of load shedding
 - Environmental – significantly less CO2 emissions and less water used

Market Benefits from DSR

Firm DSR products provide

- ▶ Retailer benefits
 - Competitive alternative to financial derivatives
 - Electricity customers happier
- ▶ Network benefits
 - Strong business case meet peaks in demand
 - But Regulatory issues still to be resolved
- ▶ IMO/ISO benefits
 - Competition to supply side Reserve by generators
 - Improved reliability – less likelihood of load shedding

DSR also benefits non-market, vertically integrated power supply systems

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What's missing

A fully effective Demand Side Response to the existing supply side market

- ▶ Mechanisms for consumers to change their energy behaviour
- ▶ Meters that will support that change (commencing this week in Victoria)
- ▶ Smarter homes and smarter supply systems

Remote Monitoring and Control of DSR

- ▶ Telemetry Gateway Controller
 - Remotely monitors billing meter output (in near real time)
 - Remote switching of remote generators and loads



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Automation of DSR for Fast Response

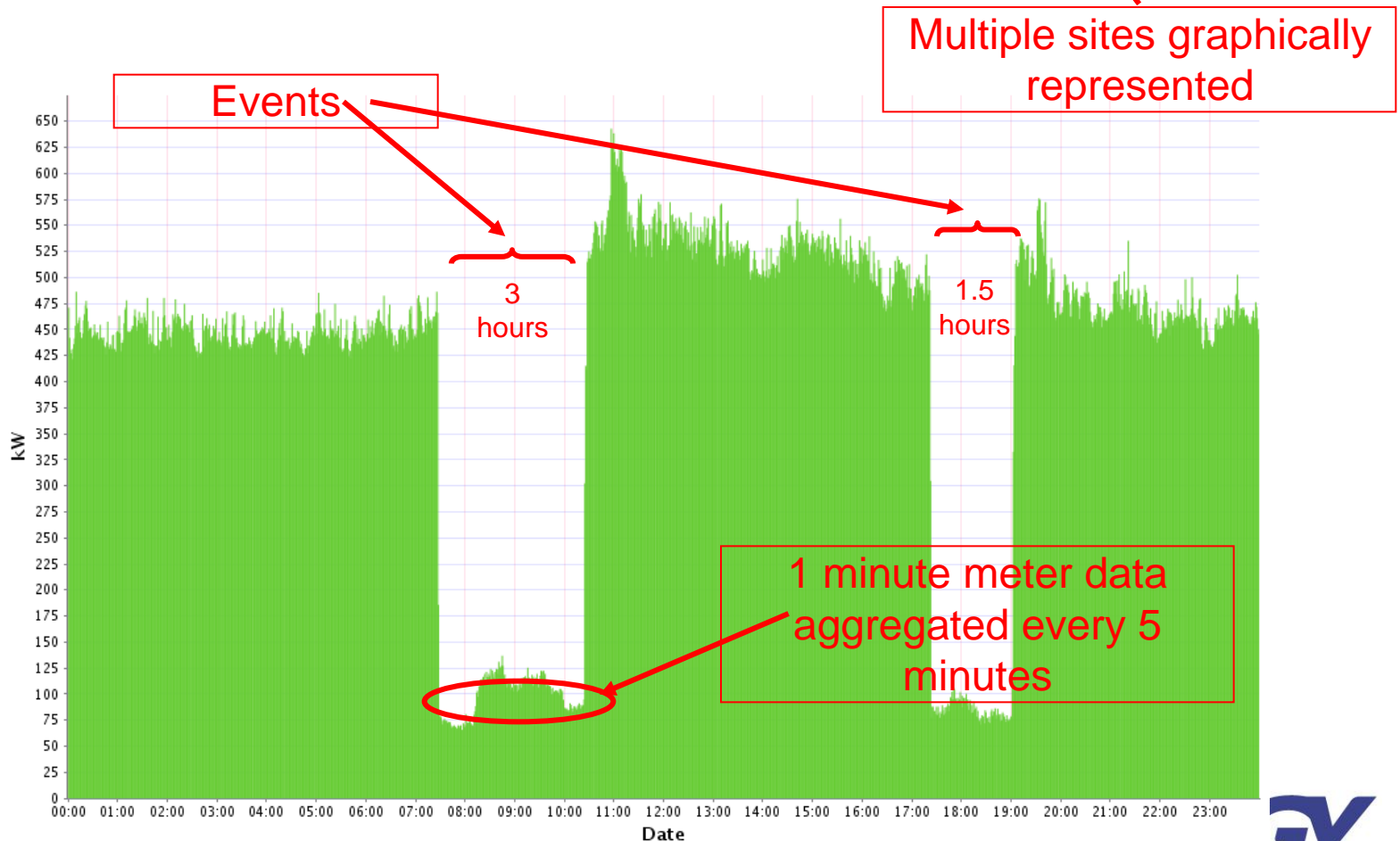
Use of frequency sensitive metering and high speed switching units, eg, at a cold store, to turn load off automatically at low frequency trigger - monitored over the internet



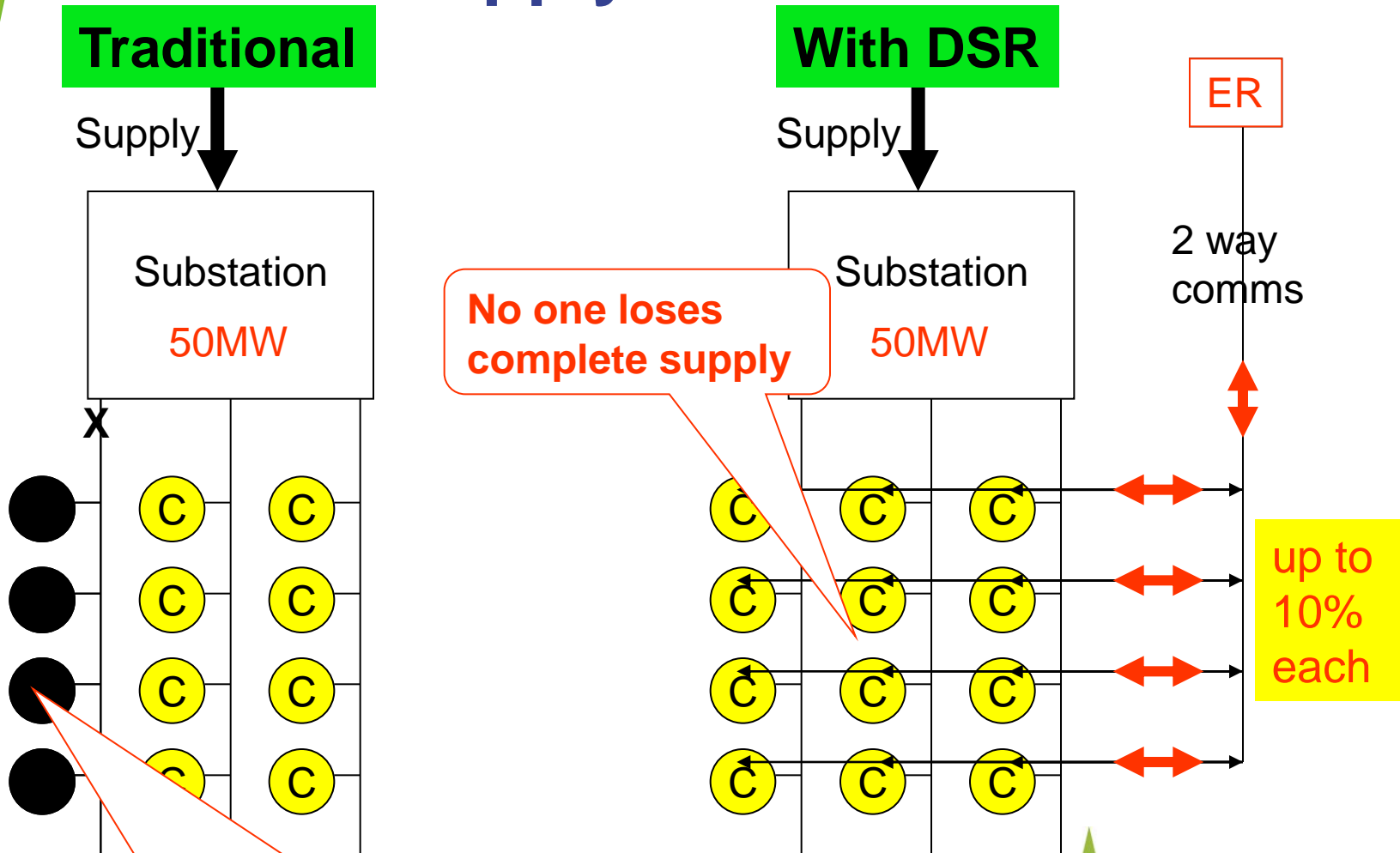
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ENERGY
RESPONSE

Measurement of DSR - 4 Cool Stores in New Zealand 24 July 2008



What happens without DSR when the supply fails?



Consumers lose all supply at a cost of up to \$100k / MWh

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Compare cars with houses

Function	Car	House
Lighting, heating, cooling	Yes	Yes
Automation	Yes	No
Security	Yes	Yes
Safety	Yes	Yes (but not special)
Integration of systems	Yes	No
DSR	Yes (surprisingly)	No (but coming)
Comfort	Yes	Yes
Cost	\$20k to \$60k	\$200k to \$500k

Compare roads with networks

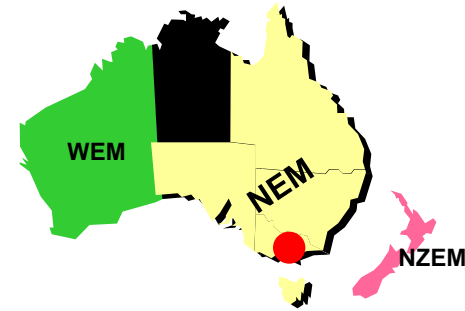
Function	Road infrastructure	Electricity networks
Safety	Yes	Yes
Automation	Some	Little
Utilisation	Extremely peaky	Very peaky (less with DSR)
Cost	\$500 pp pa	\$200 pp pa
DSR	No	No (but coming)
Reliability	Alternative routes if failures	No alternatives

The opportunities for Geospatial

- ▶ Consumers must have open access real time data about their energy consumption
- ▶ The energy industry cannot meet the market objective without consumer involvement
- ▶ Governments need to be aware of the benefits and provide support (and leadership?)
- ▶ Geospatial businesses need to create integrated intelligent solutions for utilities, third party suppliers **and consumers**
- ▶ Need is for smart integrated technologies in the supply system, **businesses and homes**

About Energy Response

**Victorian founded and based, Australian owned
Getting world wide recognition**



- ▶ Australia's only and New Zealand's most successful independent Demand Side Aggregator
- ▶ 18 staff (all new jobs and growing)
- ▶ Developed from Government sponsored National DSR Trial (2002/3)
- ▶ Operates in 4 significantly different electricity markets that broadly represent all major market models (NEM, WEM and NWIS, and NZEM)
- ▶ Four years experience has proven that Energy Response's DSR based products are commercially viable (where market mechanisms allow)
- ▶ Source electricity consumers' DSR capacity for market opportunities they cannot achieve on their own
- ▶ We use this DSR to:
 - Improve efficiencies in electricity markets and create benefits for end use consumers
 - Reduce Climate Change impacts on electricity peaks and contributes to reduced carbon pollution

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