Presentation to EPRI Pre-Conference Workshop

9 December 2008

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About Ergon Energy

- **$8 billion in assets**
- **1 million poles**
- **150,000 km of line**
- **35 power stations**
- **600,000 retail customers**
- **Highly radial & sparse network**
  - 70% zone subs and 50% feeders are radial
  - 4.2 connections per line km (nat. avg 24)

Vision: World class, customer driven energy services business.

Purpose: To enhance the economic and lifestyle aspirations of our customers and community.

Where World-class is defined in the context of customer expectations including price, safety, quality, reliability and availability of supply.

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Strategic Challenges

- **Increasing load** and increasing **peak demands** on the network leading to declining **asset capital efficiency**
- An **ageing network**, with significant **performance challenges** which is approaching tipping point of refurbishment, augmentation or replacement
- Increasing **customer expectations** and **regulatory requirements** for service quality, access and choice
- Demands for improving **cost of supply**
- Increasing **climate change** impacts and need for credible climate change response
- **Emerging technologies** will result in discontinuous change in the energy industry (including cultural change)
- Migration to **national regulatory framework**

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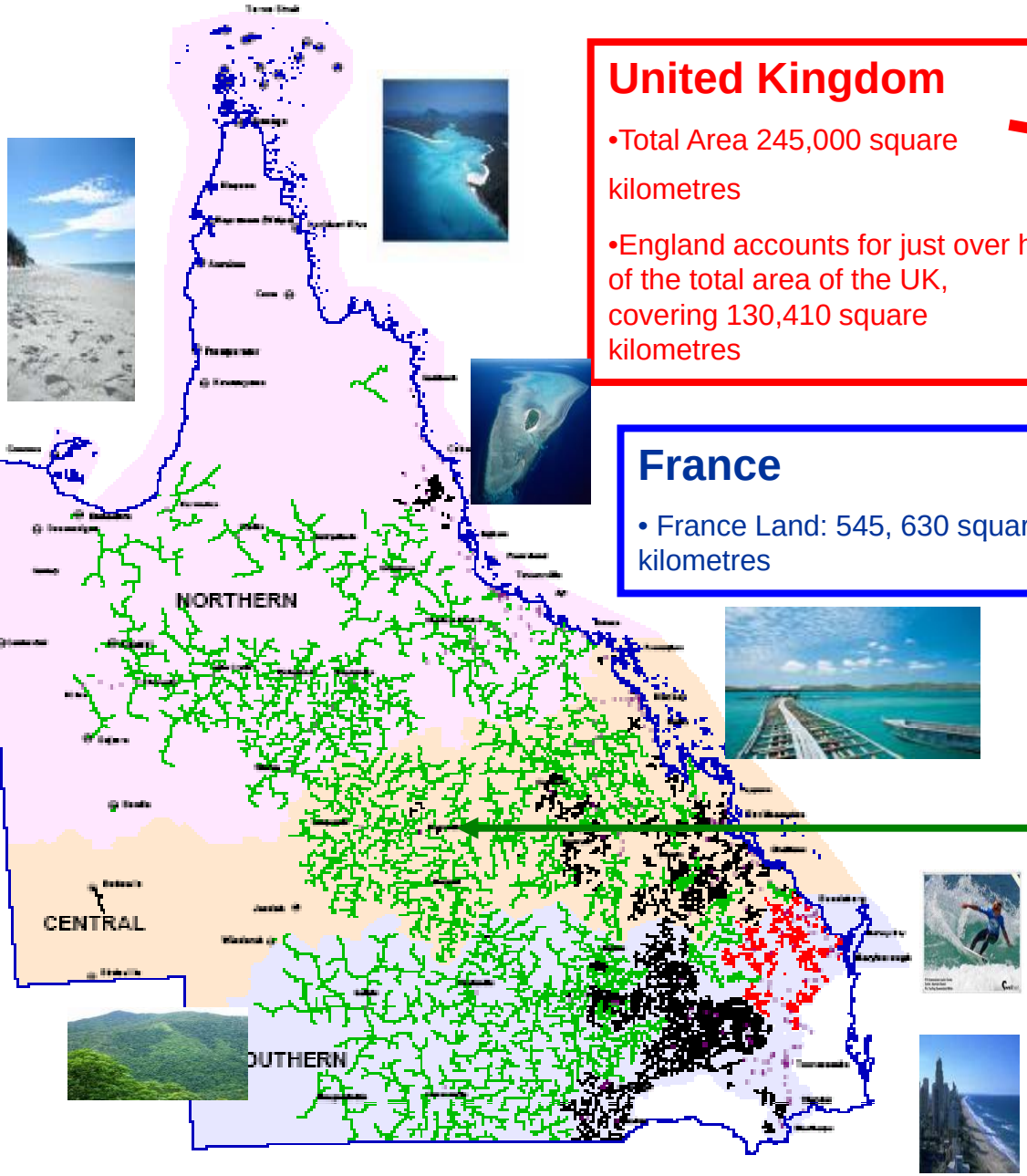
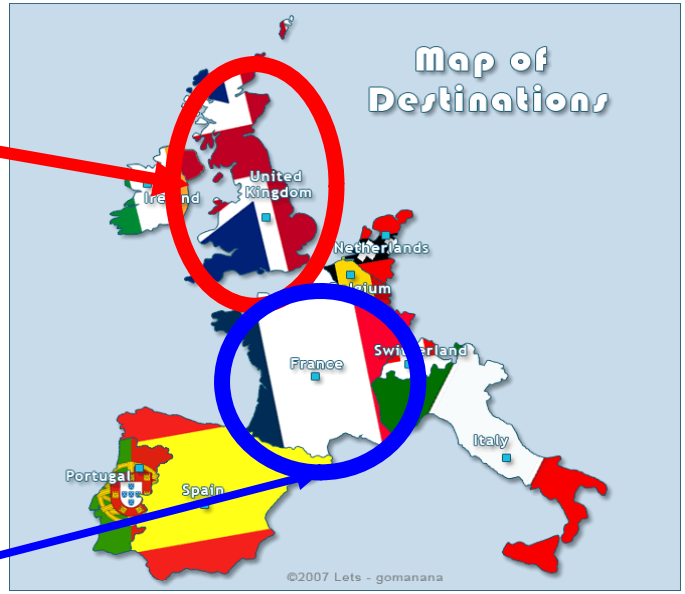


United Kingdom

•Total Area 245,000 square kilometres

•England accounts for just over half of the total area of the UK, covering 130,410 square kilometres



France

• France Land: 545, 630 square kilometres

Queensland

•Queensland is the second largest of Australia's states and territories (after Western Australia), covering about 1,727,200 sq km (666,880 sq mi), or 22.5 percent of Australia.

Queensland – Land Area

12 x the land area England

7 x the land area UK

3 x the land area France

Meeting the challenge

A suite of solutions around …

- Resilient network
- Network automation / Smart Grid
- Distributed energy resources esp **demand management** and **energy storage**
- Energy management systems

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Solar City Project – Objectives

- Townsville solar city project is a very exciting and innovative initiative that will use:
  - ❖ renewable generation,
  - ❖ demand management,
  - ❖ energy efficiency,
  - ❖ pricing,
  - ❖ community based social marketing; and
  - ❖ 2-way communication enabled smart metering
- To change the shape of Magnetic Island demand, reduce greenhouse gas emissions, save customers money and defer investment in the distribution network.

Key metrics

- 2550 kW peak demand reduction
- 900 kW solar PV capacity
- 50,400 tonnes GHG savings
- 11 GWh solar generation
- 2,200 Magnetic Island trial participants
- 150,000 people across Townsville area
- 2000 audits
- 2500 smart meters

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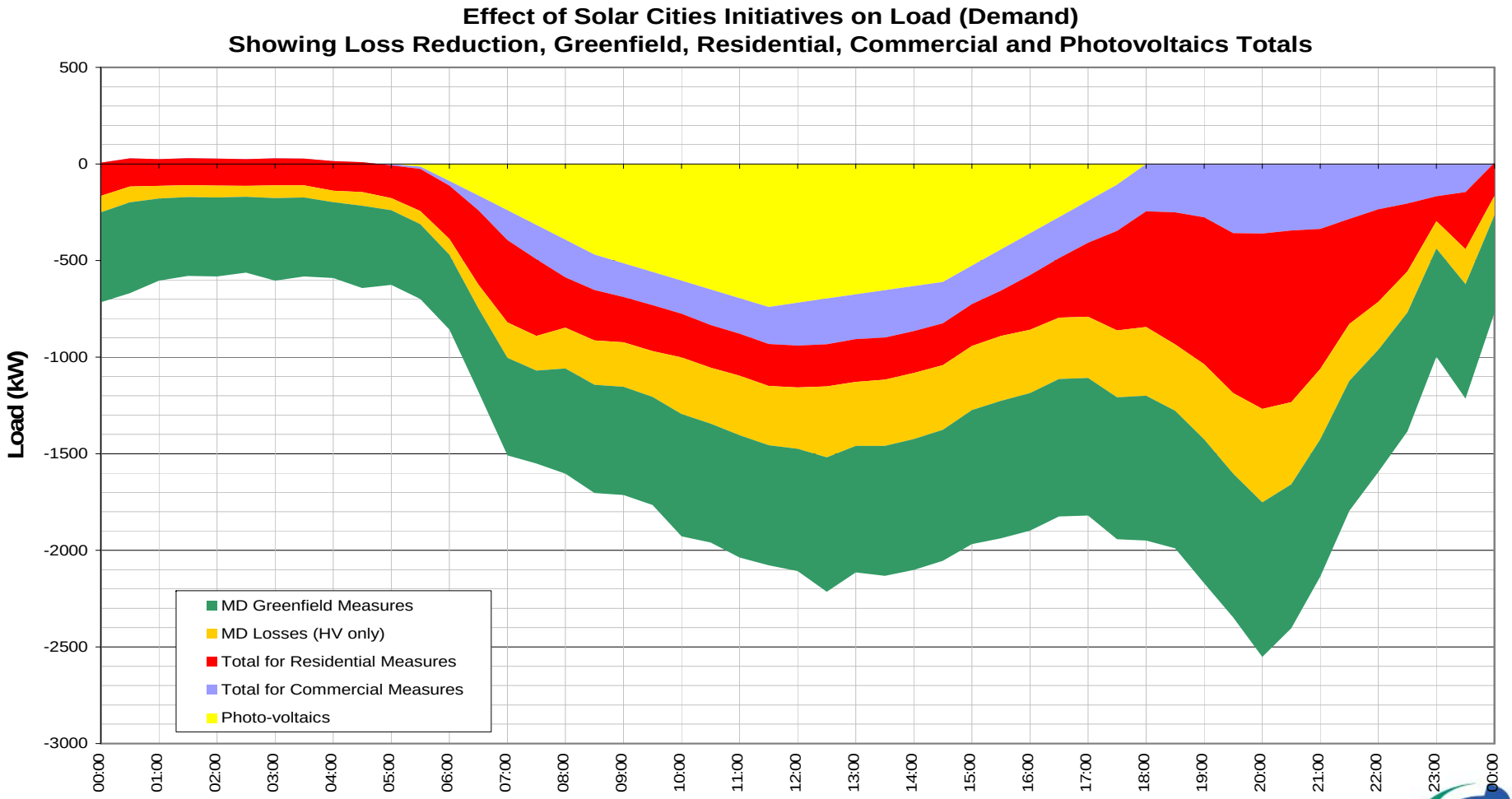
Solar City Initiatives Impact On Demand - 2013 Forecast



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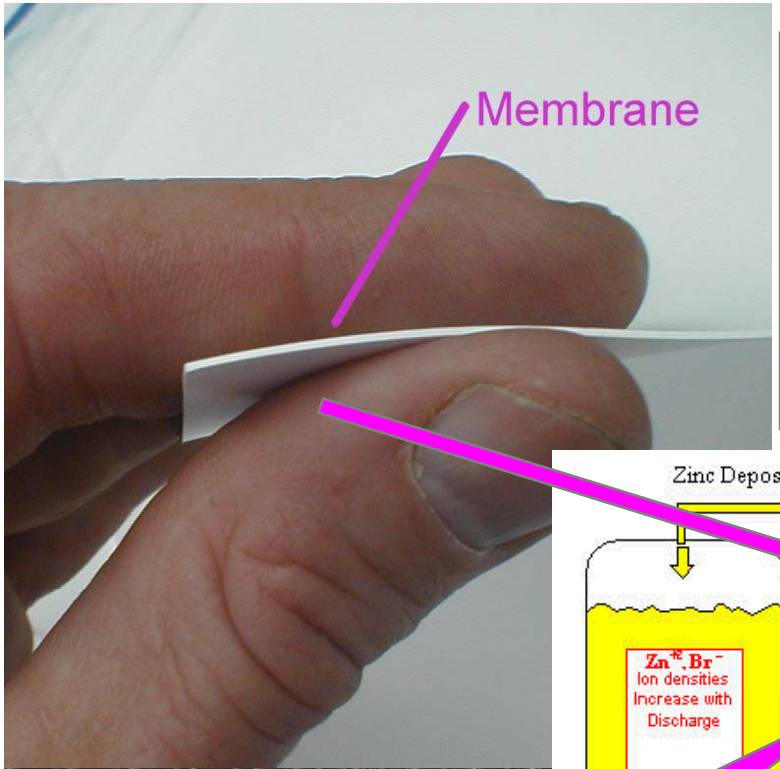
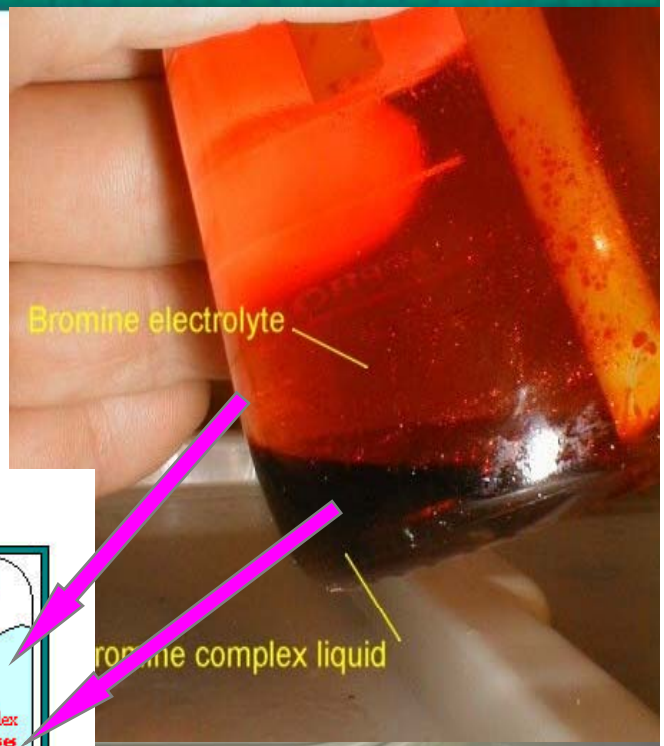
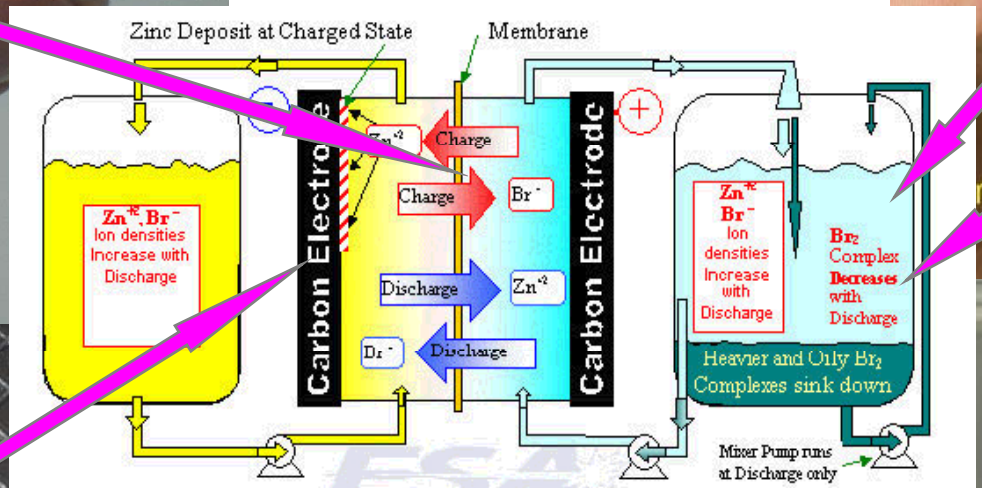
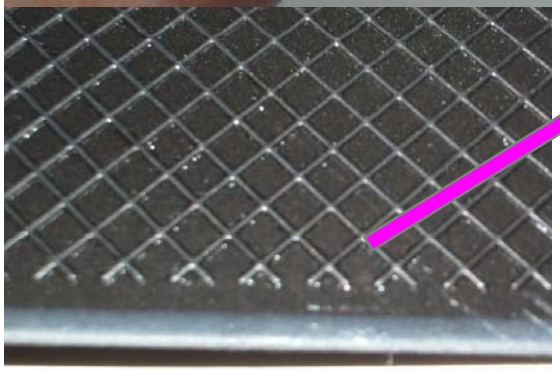
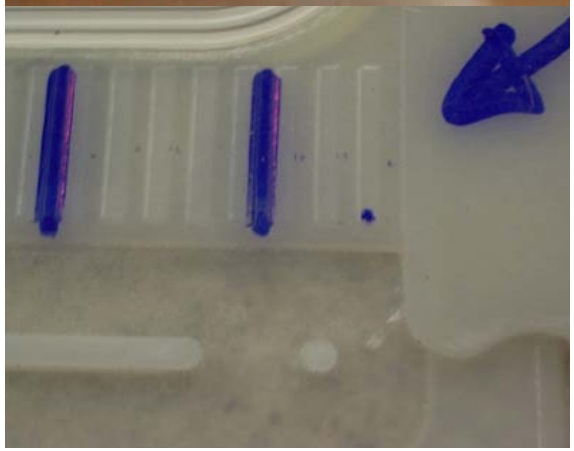
RedFlow - Zn-Br Flow Battery











At Charge:

Neg. electrode side: $Zn^{2+} + 2e \Rightarrow Zn^0$ (Zn plated on neg. electrode)

Pos. electrode side: $2Br^- \Rightarrow Br_2\,(aq) + 2e$

(Br, complexed into a thick, oily sludge, is stored in a separate location inside container)

At Discharge:

Neg. electrode side: $Zn^0 \Rightarrow Zn^{2+} + 2e$ (Zn ions dissolved in **both** electrolytes)

Pos. electrode side: $Br_2\,(aq) + 2e \Rightarrow 2Br^-$ (Br ions dissolved in **both** electrolytes)

RedFlow's Operational Prototypes

GridBoss
(5kW,
30kWh,
utility apps)

PowerBoss
(5kW, 10kWh, customer apps)

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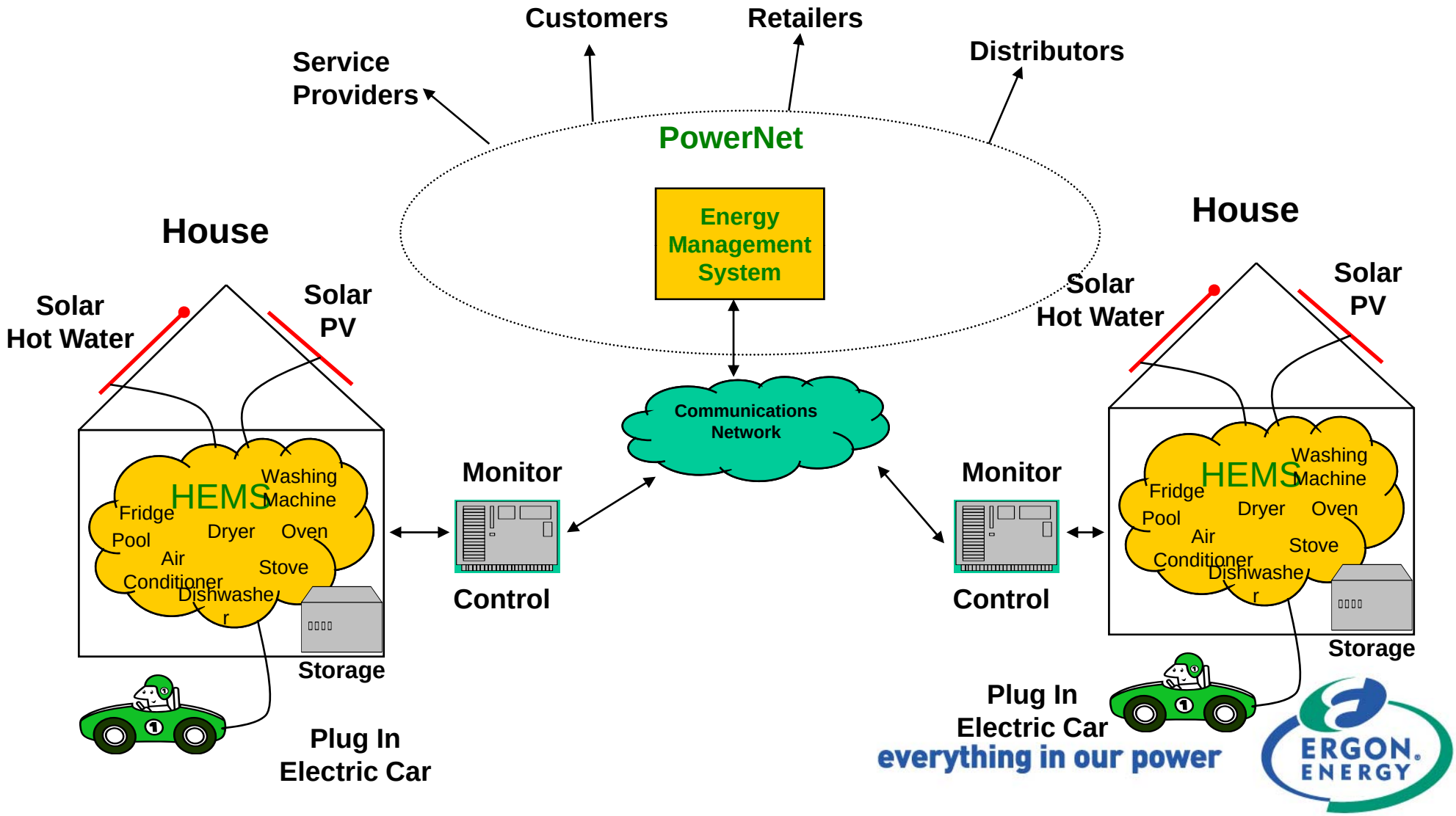
PowerNet


Customers
Retailers
Service Providers
Distributors
PowerNet
Energy Management System
House
Solar Hot Water
Solar PV
HEMS
Washing Machine
Fridge
Pool
Dryer
Oven
Air Conditioner
Stove
Dishwasher
Storage
Plug In Electric Car
Communications Network
Monitor
Control
Monitor
Control
House
Solar Hot Water
Solar PV
HEMS
Washing Machine
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Stove
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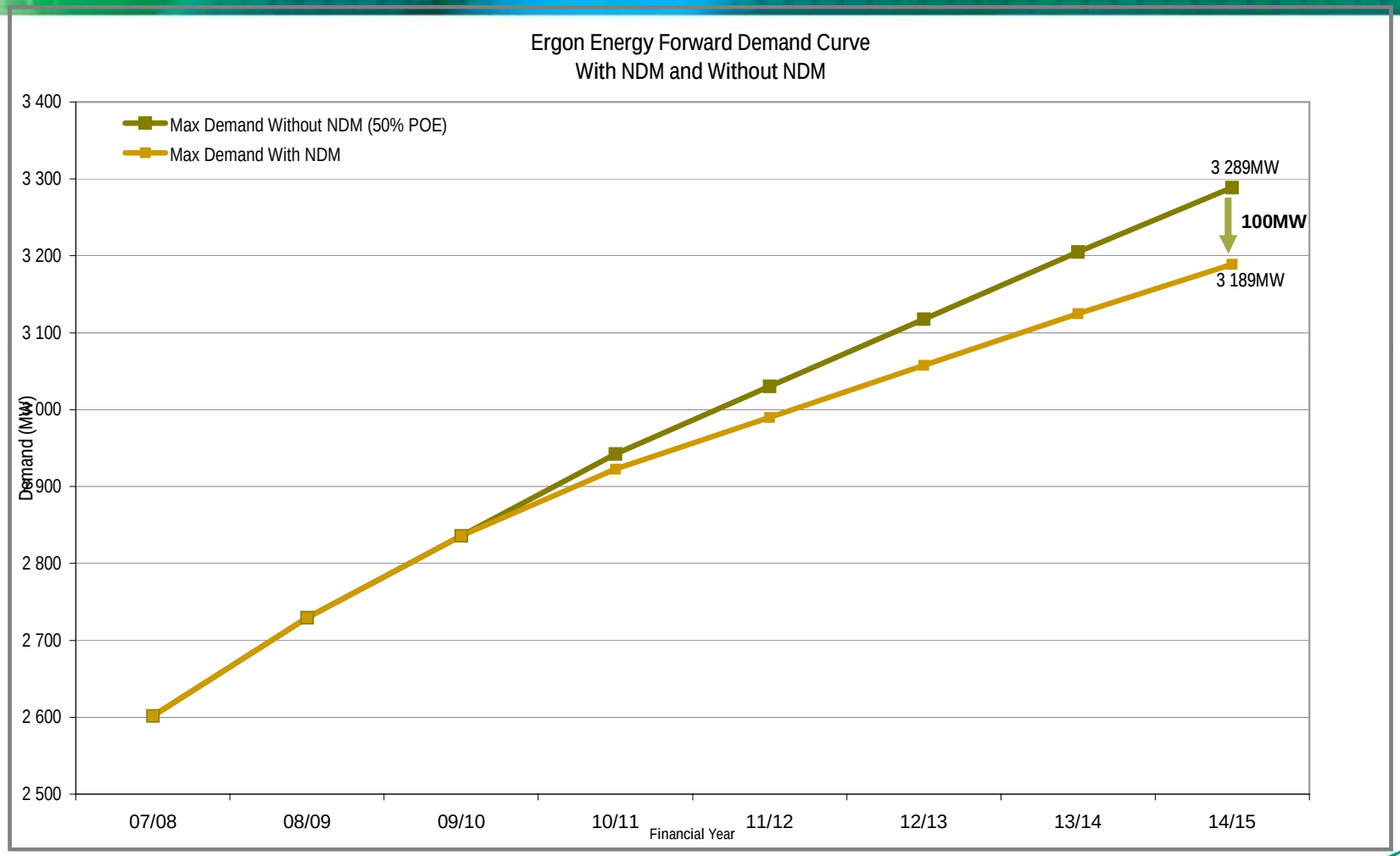
Bending the Forward Demand Curve



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Residential Peak Load Control

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What are we focussing on?

- **Air-conditioning trials**

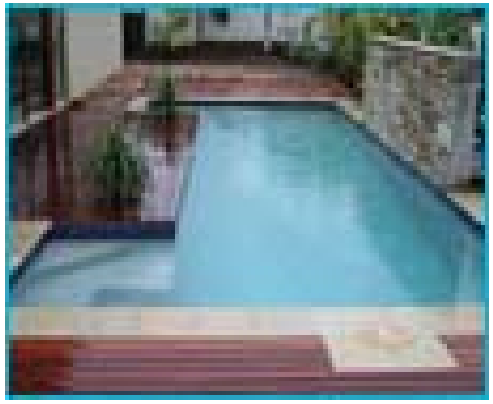
– reduce load with no customer detriment

– anticipate average 0.7MW peak load reduction over 1,000 customers

- **Pool pump control**

– generate industry backing for pool pumps on Tariff 33

– shed an average of 1kW peak load per customer



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What are we focussing on?

- **Building Developers**

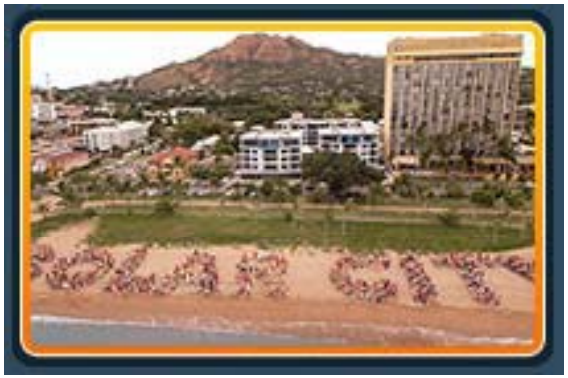
– learn from the past to improve for the future

– no peak load reduction anticipated for 09/10 (a longer term goal)

- **Solar Cities**

– testing new opportunities of load control through innovation

– anticipate >1.2MW of load under control, and more



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Large Customer & Embedded Generation

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NDM C&I Pilot Project

- Target 20MVA demand reduction, 20kT CO^2e reduction PA
- Achieved to date 6MVA, 12kT of CO^2e abatement contracted and under construction
- Project running ahead of time and under budget
- Highlight JCU Thermal Storage Project plan won the Institute of Engineers Excellence Award for “Reports, Procedures and Systems” (the $6 billion Brisbane Airport Link and Northern Busway Environment Impact Statement and Concept Design and Impact Management Plan was placed second)
- 2009/10 – 20 MVA contracted by 30 June 2010 and under construction by 30 June 2011

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Thank You

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Cloncurry Solar Thermal Project

- Successfully facilitated a deal whereby DME are paying $1.3 million to Lloyd Energy for them to build a test module at Cloncurry
- 2009/10 - Target to have the Cloncurry module up and running and the commercial viability of the Lloyd technology demonstrated (or proven to be not viable) by August 2010

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Technology Innovation 2008-2009

Strategy

- Network Technology Roadmap
- **Corporate R&D Strategy**

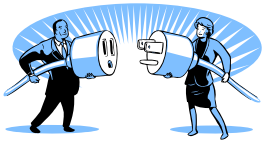
Resilient Network - champion, support and facilitate network R&D

Distributed Energy Resources

- **Storage – GUSS & RedFlow**
- Demand Management
- Energy Conservation

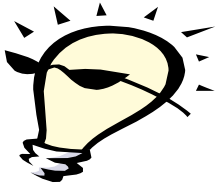
Plug-in electric Vehicles

- **Smart Charge / Garage Charge / Vehicle-to-Grid**



Energy Management Systems

- **EcoVision / GridPoint / OpenWay / Trillion …**



Network Modernisation

- **Smart Feeder … demonstration**

GUSS

25kW / 200kWh

Lead acid battery

Ergon systems

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Energy Storage

- Balance with other solutions
  - Demand management
  - LVR / Switched regulator
  - Network automation
- Schedulable load shifting … cost reduction
- Performance improvement …
  - Reliability (outage ride through)
  - Quality (voltage regulation)
- Customer choice … off-peak power et al
- Renewables penetration … buffer intermittent resources

Conceptually (in time) utilise customer owned PEVs in urban settings and network owned storage in remote rural settings for network support.

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High Level Plan

H1	H2	H3
Conduct trials and pilots	Ramp up projects & continue to develop capability & products	NDM is now business as usual Continue to develop new products
Seek funding and regulatory support from Qld Govt		
Seek changes to National Elec. Rules		

2007 — 2010 — 2015 — 2020

Demand Management not funded

DM funded through National Electricity Rules & State Regulations

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