



Perth Solar City and the Western Power AMI Trial

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Manager

Outline of presentation

- **Background – the energy market in Western Australia**
- **Challenges facing Western Power**
- **How a Smart Grid can help**
- **AMI as the enabling platform**
- **Solar City Program taking us beyond ‘Poles & Wires’**
- **Transforming the business**
- **Scope of our Smart Grid Trial**
- **Next Steps**



Map of Western Power's South West Interconnected System (SWIS)

One of the largest 'islanded' systems in the world

322,000 sq km (About 10% of India)

~ 1.5 million people

Almost 1,000,000 meters

96,000 km of powerlines

58,000 transformers



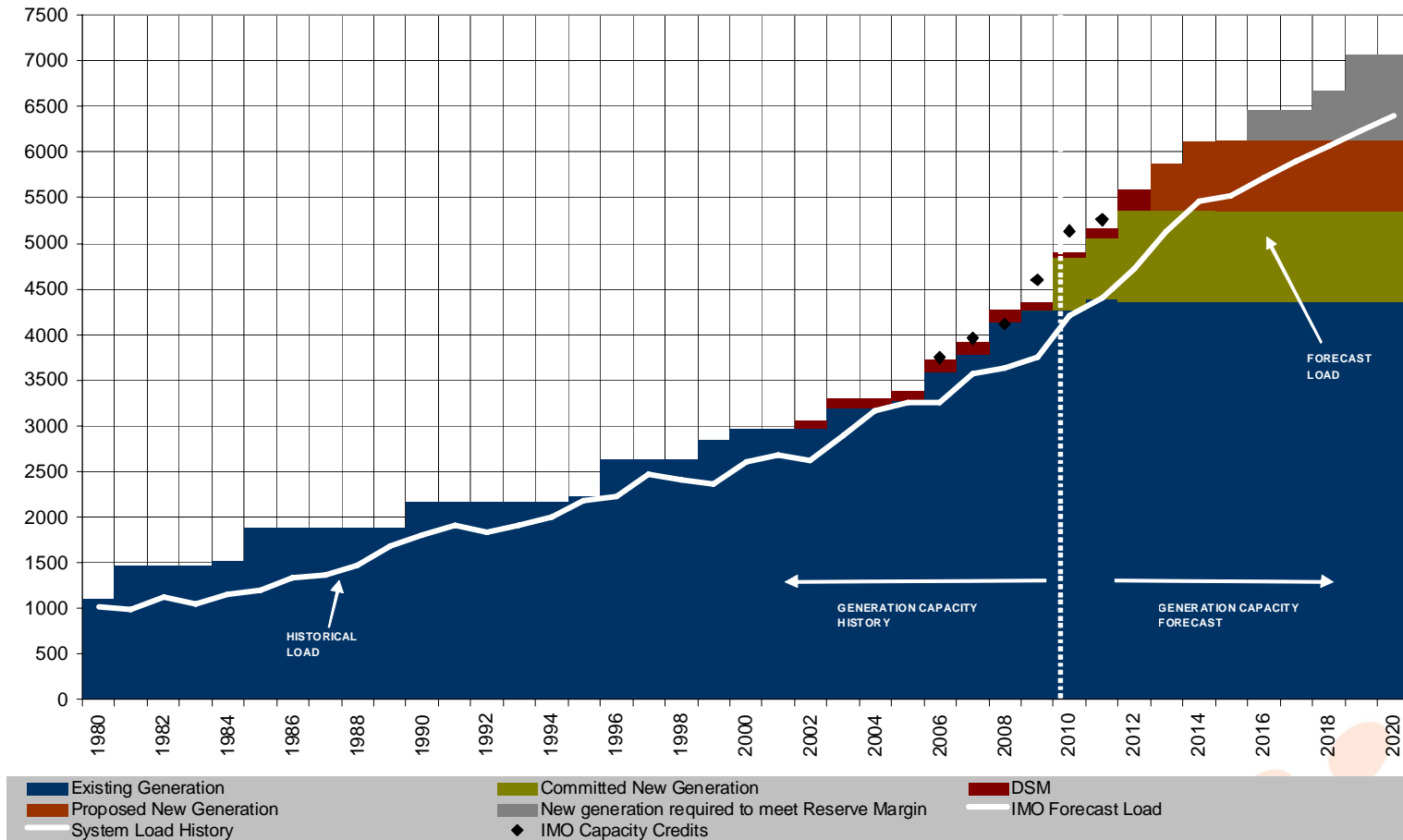
Why the WA Market is different

- **No connection to the eastern states of Australia and probably never will be**
- **A much smaller electrical load – economies of scale in generation, transmission and distribution not realised**
- **Small night-time base load limits opportunities for renewables**
- **A transmission network that serves a very sparse area compared with the NEM**
- **Exposure to international gas prices from the NW Shelf compared to lower gas prices for generation in the NEM**
- **A very large range between annual minimum and maximum peak (approx 1500MW to >4000MW) means expensive peaking generators**
- **A limited number of participants**

The effect is higher wholesale prices, which provides opportunities for demand side management, connection of renewable energy at appropriate points etc.

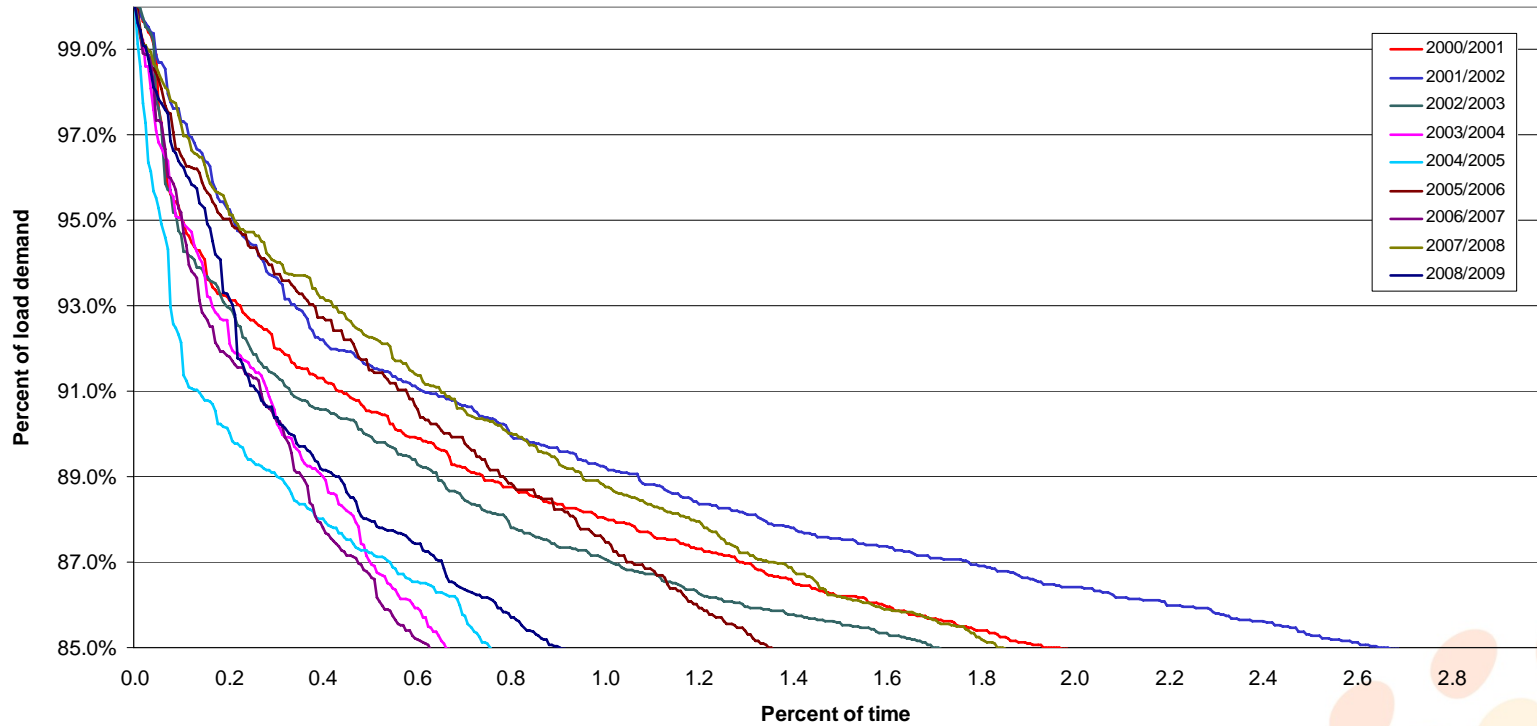


Western Australians have an unquenchable thirst for energy



WA has an increasingly 'peaky' demand

Demand (load) Duration Curves



There are multiple challenges in the electricity market

Transformation or chaos? – The challenge of balancing core drivers

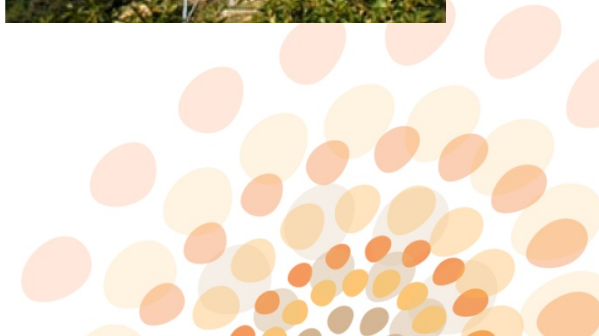
Enormous
capex

Rising
costs and
Prices

Climate
Change

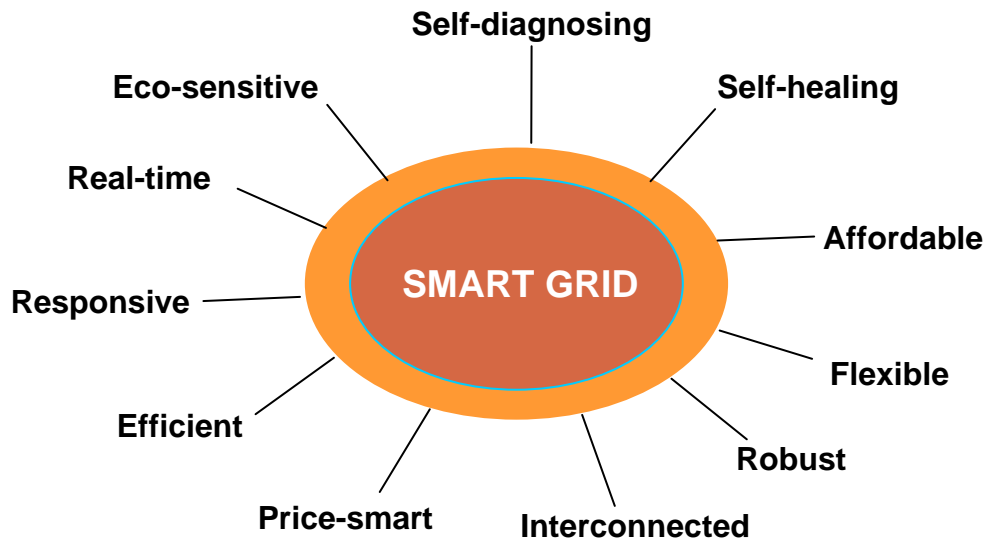
Energy
Efficiency

- **Customers and regulators are seeking:**
 - **Significantly increased service standards**
 - **Information about their energy use**
 - **More choice about service and service features**
 - **Transparent and accurate bills**
 - **Integration of renewable energy**
 - **Energy efficiency and conservation**
 - **Innovative alternatives to traditional poles & wires solutions**



WP believes a Smart Grid can address these energy challenges

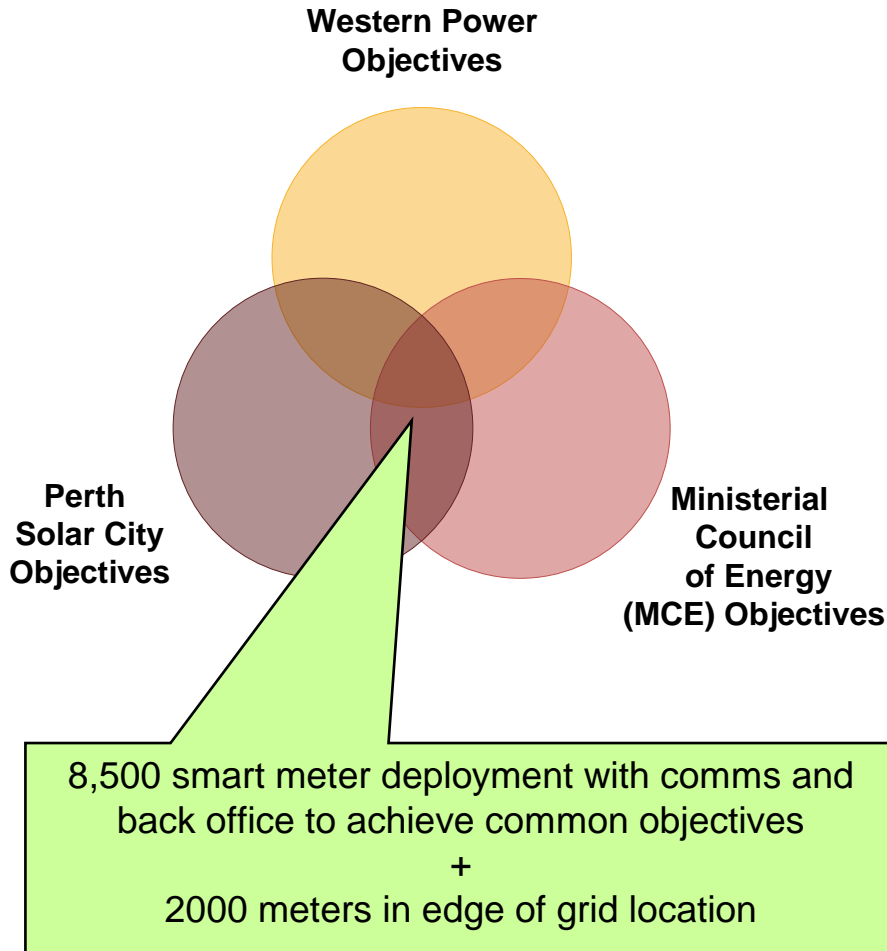
Bringing the electricity system into the information age



Smart Grid

- A two-way network that can incorporate millions of sensors all connected through an advanced communication and data acquisition system.
- This system will provide real-time analysis by a distributed computing system that will enable predictive rather than reactive responses

SmartGrid/AMI & PSC program have common objectives and drivers



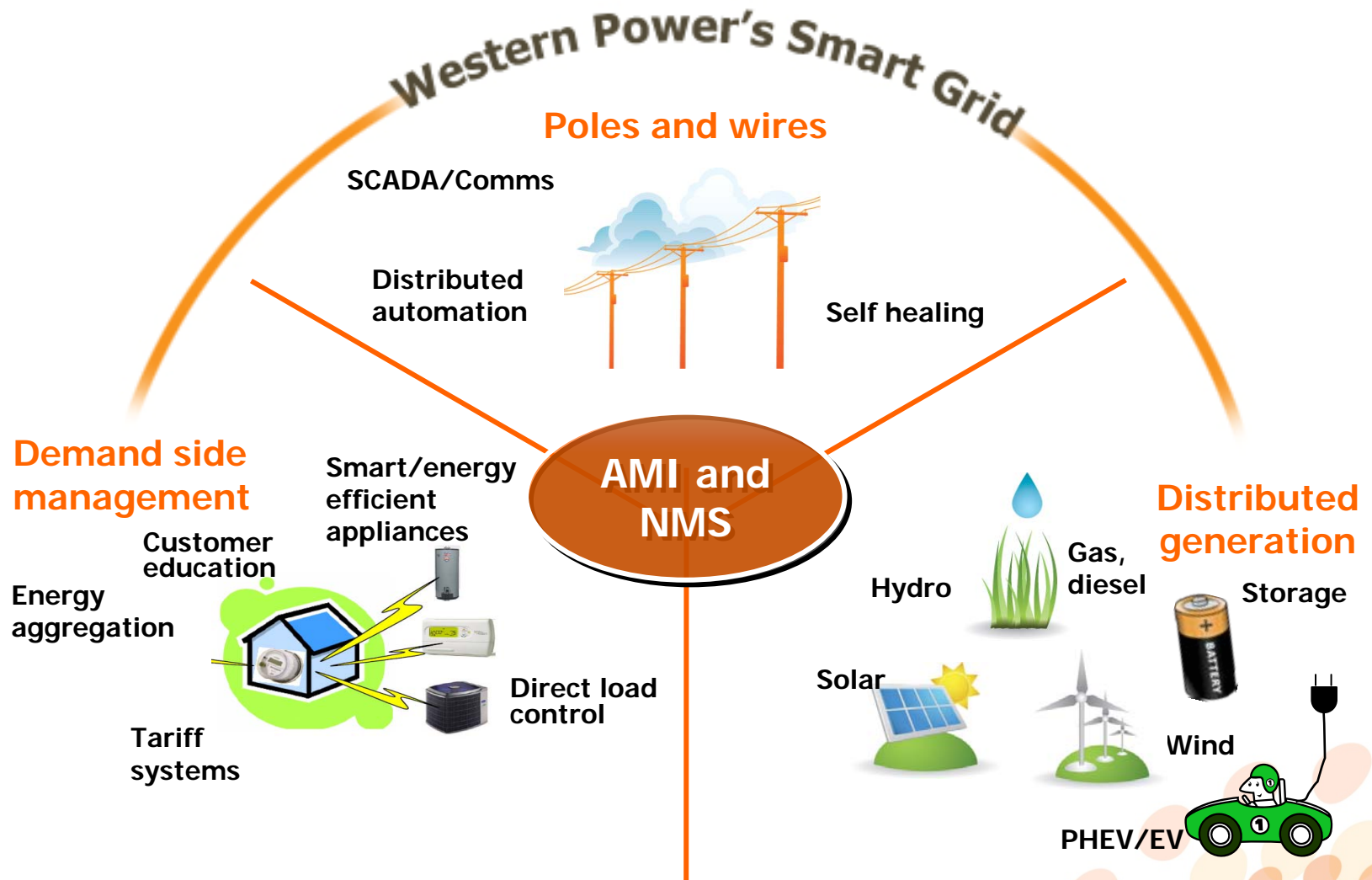
Our AMI Trial leverages the Australian Government Solar Cities Program

Solar Cities program aims to:

- **demonstrate the environmental and economic effects of combining cost reflective pricing with the widespread use of solar technology, energy efficiency and smart meters**
- **explore barriers on energy efficiency, electricity demand management and the use of solar technology, among businesses and households in different parts of Australia, and test ways to deal with these barriers**



Solar Cities fits WP's Smart Grid Vision



Aware, engaged customers with visibility into and control over their energy use

What a Smart Grid means to Western Power # 1

A major business transformation - both challenges and opportunities:

- **Manage risk through a “bite size” smart grid trial with Australian Government support**
- **Provide exciting new careers: re-skill, retain and develop our people**
- **Explore innovative alternatives to traditional poles & wires solutions**
- **Develop partnerships and understand end-to-end benefits and risks for all stakeholders in the value chain**
- **Provide more choice and meet increasing customer expectations**
- **Grow our build experience, skills and knowledge in new technologies**
- **Demonstrate that the business is doing what the Regulator expects us to do: alleviate network capacity constraints and reduce the overall long-term cost of electricity supply by exploring alternatives**



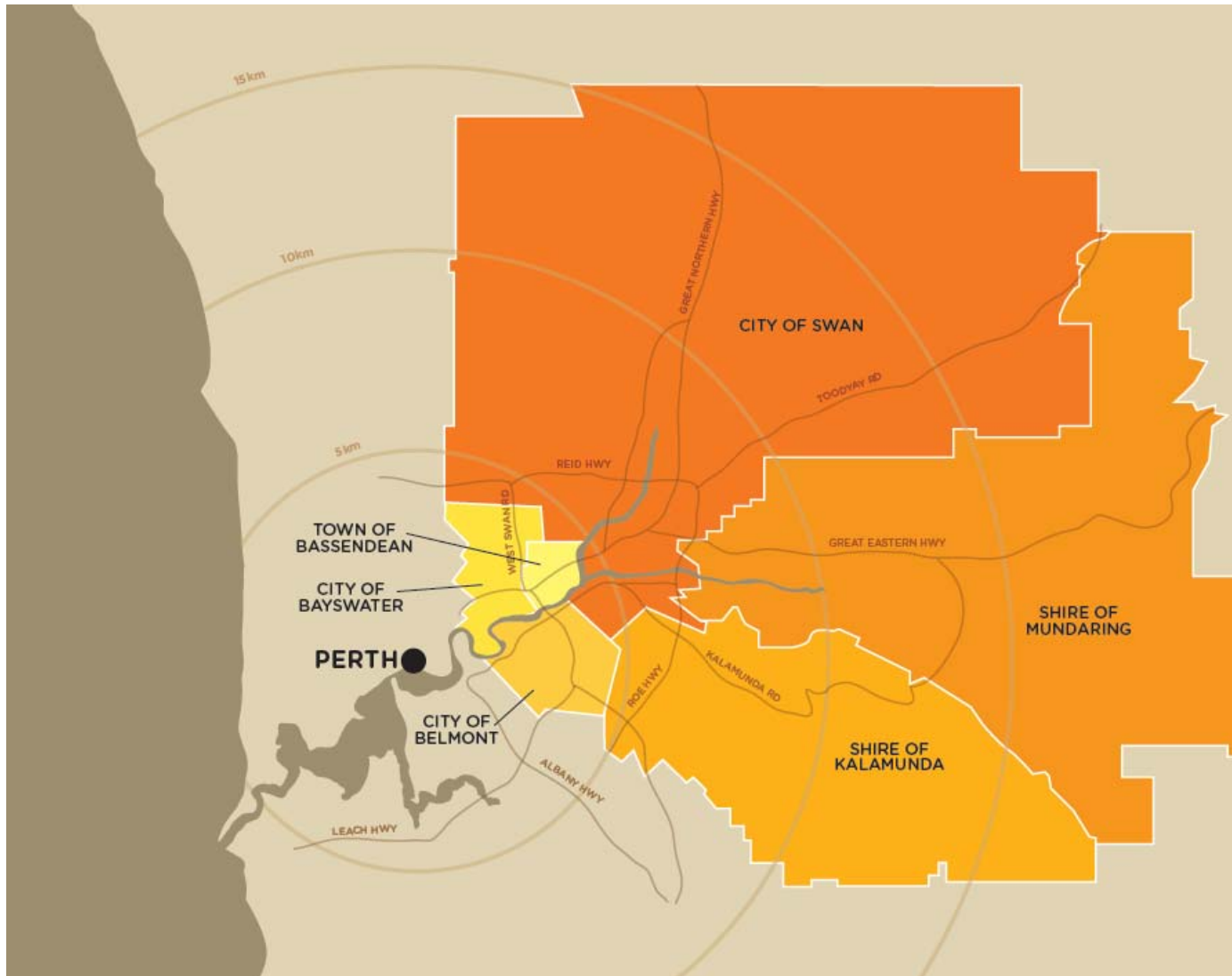
What a Smart Grid means to Western Power

II

- **Creates a clear path to improved energy efficiency throughout the grid**
- **Builds a platform for persistent, continued carbon reduction**
- **Builds a platform for innovative products/tariff offerings**
- **Comprehensive trial enables incremental changes to the network and business, reducing financial risks, simplifying technology and business evolution**
- **May turn the take-up of EVs from a problem to part of the solution**
- **Establishes a flexible and adaptable platform on which to build the 21st century “low carbon” WA State economy**



Where is PSC?



Consortium



Australian Government

Solar Cities



SUNPOWER

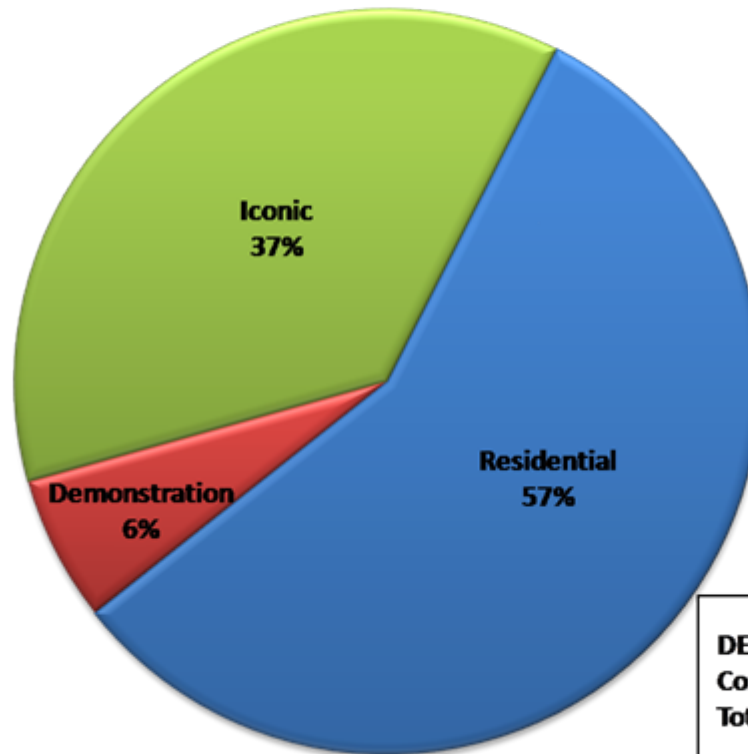


PSC program overview

Program Management Office		
DEWHA -	\$4.4m	(35%)
Western Power -	<u>\$8.0m</u>	(65%)
Total -	\$12.4m	

Iconic Projects		
DEWHA -	\$3.5m	(34%)
Consortium -	<u>\$6.8m</u>	(66%)
Total -	\$10.3m	

Residential Projects		
DEWHA -	\$5.4m	(21%)
Consortium -	<u>\$20.5m</u>	(79%)
Total -	\$25.9m	



Demonstration Projects		
DEWHA -	\$0.6m	(40%)
Consortium -	<u>\$0.9m</u>	(60%)
Total -	\$1.5m	

Total		
DEWHA -	\$13.9m	(28%)
Consortium -	<u>\$36.1m</u>	(72%)
Total -	\$50.0m	
Additional ineligible and household contributions		
	<u>\$23.5m</u>	
Total Value	\$73.5m	

Program overview: residential

- Includes the installation of:
 - 1,200 solar hot water systems
 - 1,000+ solar PV systems
 - 3,500 home eco-consultations
 - **2,200 in-home displays**
 - **Time of use tariff trials**
 - **AMI trial (8,700 smart meters + comms)**
 - **Direct load control trial (air conditioners)**
 - **PV saturation trial**
 - coaching and one-on-one community advice/support



SmartGrid-AMI Technology being trialled

SMARTGRID DEVICES



RENEWABLE OR ALTERNATIVE ENERGY SOURCES



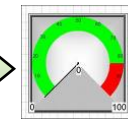
WIDE AREA NETWORK (FIBRE)
WP/NBN



HOME AREA NETWORK



L+G SMART METERING



NETWORK MANAGEMENT
SYSTEM (NMS)

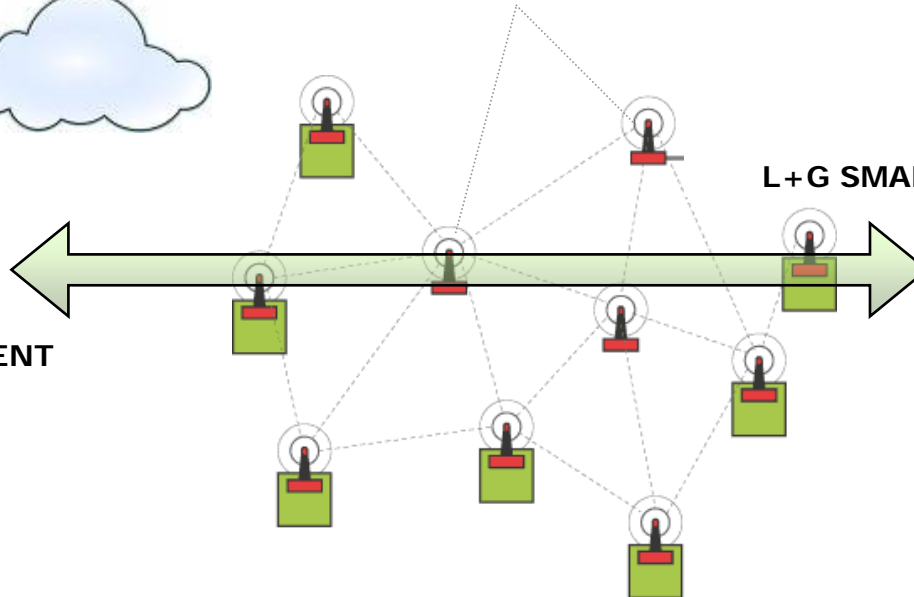


IN HOME DISPLAY (IHD)



DIRECT LOAD CONTROL (Zigbee)

SSN RF MESH METER COMMUNICATION



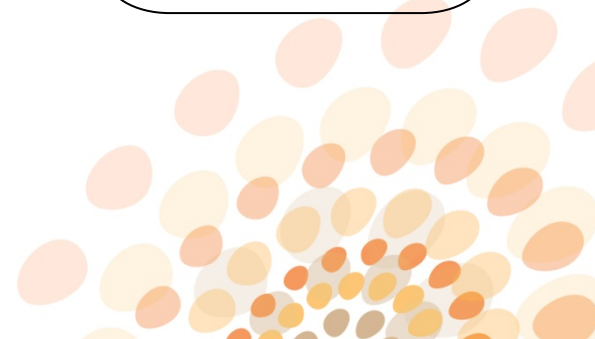
Sample of Customer Information

Display
Automatically displays total accumulated energy consumption

Boost Button
Will activate a boost for electric hot water system if you have this function enabled

Scroll Button
Enables you to scroll through display options

Probe Port
Will only be used by a meter reader if manual reading is required



Meter functionalities in the trial

- **Remote daily reading**
- **Power factor measurement**
- **Import-export**
- **Connect-disconnect (response time 30 min)**
- **Supply capacity control: avoided cost of blown service fuses**
- **Load management: Dedicated control circuit**
- **Interface to load control devices/HAN**
- **Enablement of IHD**
- **Interface for gas and water metering – in time**
- **Quality of supply and other event recording**
- **Meter loss of supply and outage detection**
- **Real time service checking**
- **Remote reconfiguration**
- **Remote software upgrades**
- **Plug & play commissioning – partial (SSN)**



Program overview: iconic

- **5 solar PV systems will be installed at iconic Perth locations**
- **> 500 kW grid connected solar PV systems**
- **LCD screens will display live information feeds from PV systems**
- **Prominent displays to maximise community engagement and promote energy efficiency**



Central Institute of Technology 49kW



Midland Railway Workshops 60kW



Other iconic installations

- Perth Zoo: 269kW
- Perth Arena: 111 kW
- Kings Park Naturescape: education centre



Artists impression of Perth Arena




A smarter grid helps to integrate and use renewables

- 'Edge of Grid' solution -



What WP will get out of PSC and our trial

- **Test our smart meter and comms deployment under live conditions – urban and rural**
 - **Analyse all data and qualitative learnings**
 - **Contribute to and learn from Solar Cities database**
 - **Integrate lessons into our business processes**
 - **Upskill staff**
 - **Continue/intensify stakeholder engagement – government – regulators – public**
 - **Next Step – Use all this to develop a whole-of-SWIS detailed business case (costs & benefits) for full smart meter deployment**
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Questions?



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