Pilbara Undergrounding Program
Smart Grid Opportunities
November 2009
Smart Grid?

- A Smart Grid is an electricity network that can intelligently integrate the actions of all users connected to it – generators, consumers and those that do both – in order to efficiently deliver sustainable, economic and secure electricity supplies.
  – Source: European Technology Platform SmartGrids

- A Smart Grid is self-healing, enables active participation of consumers, operate resiliently against attack and natural disasters, accommodate all generation and storage options, enable introduction of new products, services and markets, optimize asset utilization and operate efficiently, provide power quality for the digital economy.
  – Source: US Department of Energy
**Smart Grid?**

- Smart Grid is the future evolution of the entire power network.
- Smart Grid includes both transmission and distribution, focuses on the integration of renewable generation, reliability and efficiency of the grid.
- Smart Grid includes the demand response and the potential of new technologies such as large scale integration of electric vehicles.
- Smart Grid includes both automation/IT and controllable power devices in the whole value chain from production to consumption.
- “Smart Grids are more than IT and smart meters”.
  - Source: ABB
So What?

• Horizon Power does not claim to know all about Smart Grids but we do understand:
  – some of the components,
  – some of the directions it may take, and
  – some of the potential benefits to our customers and Horizon Power.

• We also understand that we have a unique opportunity at our fingertips, to integrate some smart grid components into a current project, at a much lower cost than might otherwise be possible in a greenfield and dedicated smart grid rollout.

• Our project:
  – The Pilbara Underground Power Project
Pilbara Undergrounding Project

• Purpose, scope and project areas
• Pilbara energy market characteristics
• Smart grid opportunities
  - customer applications
  - smart metering
  - grid side applications
• Integration with NBN
• Next Steps
Project Overview

• Aimed at cyclone affected North West towns
• Karratha, Roebourne, Onslow & South Hedland
• A Royalties for Regions Program
• Significant expenditure
• Various agencies involved in Program
• Horizon Power is implementing agency
Purpose

• Safe & reliable electricity supply to north west towns
• Improved network reliability during cyclones & adverse weather
• Implement technological innovations
• Reduced network maintenance costs
• Safer and more attractive streetscapes
• Opportunities for local employment and businesses
Project Scope

- Network design
- Procurement and logistics
- Project Construction
  - Underground network
  - House service connections
  - New streetlighting
- Remove old assets
- Site rehabilitation
Proposed Project Area
Karratha

Residential Areas

Light Industrial Area
Proposed Project Area
South Hedland
Proposed Project Area
Onslow

- Project Area A
- Project Area B
- Provisional Project Area OC
Proposed Project Area
Roebourne

Roebourne Project area
Project Scale

• **Schedule of Quantities**
  - Substations: 100
  - HV Switching Kiosks: 35
  - HV Cable: 45 km
  - LV Cable: 90 km
  - Consumer Services: 70 km
  - Streetlights: 720
Pilbara Energy Characteristics

- Approximately 13,000 customers across four towns
- Less than 2,000 non-residential customers
- Despite low customer density over Horizon Power’s footprint (40,000 customers over 2.2 million sq km), customer density is relatively high in the four Pilbara town areas
- Horizon Power energy sales in the Pilbara about 450 GWh per annum - about one third of these sales are residential
- High daily residential consumption ~ 40kWh per day
- Significant seasonal variation in demand
- Large number of “company paid” residential energy accounts – insensitive to price
- Smart grid technology aimed at network management and control has significant potential
Smart Grid Opportunities

• Customer Applications (downstream of meter)
  – in home displays - better information – informed energy use decisions
  – future smart appliances and thermostats
  – possible management of customer demand for greater efficiency in use of energy
  – support for time-of-use pricing in longer term
  – Telecommunications opportunity?
Smart Grid Opportunities

- Grid Side Applications (upstream of meter)
  - active voltage support
  - power factor correction
    - Can be achieved by automated/remote controlled capacitor banks and transformer tap changers
  - fault detection and isolation
  - reduce outage duration through “self-healing” supply
  - Provides information to manage outages
  - Optimise maintenance to lower costs
  - Remote meter reading
  - Remote disconnection & reconnection
Smart Grid Opportunities

• Smart Metering Infrastructure (SMI)
  - remotely controllable interval meters
  - bi-directional communication
  - communications network supports appliance control
  - automated remote meter reading
  - reduced operating costs

• Wide Area Measurement (WAM)
  - real time monitoring of HV/LV lines
  - uses technologies such as phasor measurement
  - increased transmission line capacity
Integration with NBN

• Horizon Power following NBN developments closely
• Timing of Underground Project is favourable with roll out of NBN
• Potential to provide conduit to facilitate fibre-optic to the house. Platform for:
  - smart meters
  - telecoms
  - others?
• Detailed NBN integration strategy to be developed
Next Steps

• Finalisation of scope and funding arrangements for Project.
• Detailed planning including:
  - Roll out of Project
  - Key technology decisions
  - Integration with NBN
• Procurement of materials and engagement of contractors
• Implementation