Power, Water and Sewerage Services in the Northern Territory Remote Indigenous Communities
Overview

- Northern Territory context
- Overview of the Remote Operations
- Governance: Power Water Corporation – Indigenous Essential Services Pty Ltd
- Overview of our programs
- Initiatives
- Summary
Northern Territory Demographics

ABS - as at June 2011:
• Resident Population: 231,300 ep
• 1% of the total Australian Population
• Population has increased by 17% in 10 years
• The third fastest growth rate of all states and territories
• Almost half of the population are located within the greater Darwin area
• Indigenous population is 56,779
  = 25% of the total NT population and
  = 10% of total Indigenous Australian Population
• Median age of Indigenous people is 23 years
More NT context ....

- Significant changes have occurred since the NT intervention, AG and NTG initiatives:
  - *Closing the GAP* on Indigenous Disadvantage,
  - Building Education Revolution
  - *Territory 2030* Strategy
  - Northern Territory Govt: *Working Futures*
  - Australian Govt: *Stronger Futures*
  - *National Partnership Agreement on Remote Service Delivery (NPRSD)* Local Implementation plans,
    Upgrading stores and health clinics
Remote Operations

Our combined **project management** (routine maintenance, operations and capital works) services for remote NT include:

- Deliver an adequate and reliable supply of safe **drinking water**
- Provide an adequate and reliable **electricity supply**
- **Manage energy and water services** in a sustainable manner
- Provide a **safe and constructive workplace**.
Remote Operations

• Four offices- Darwin (HO), Katherine, Tennant Creek and Alice Springs
• Subsections covering:
  – Electrical Services
  – Mechanical Services
  – Water Supply
  – Sewerage Systems
  – Water Quality
  – Community Water Planning
  – Renewable Energy
  – Community Liaison (auditing)
  – Planning
Domestic clients pay for electricity through use of pre-paid meters, however do not currently pay for water or sewerage services

PWC has been working over 1.3 million km² to service these communities since 1988

Small Populations 100-3,000 people per community

Domestic clients pay for electricity through use of pre-paid meters, however do not currently pay for water or sewerage services

Services provided through Indigenous Essential Services (IES) Pty Ltd a not-for-profit subsidiary of PWC

Provide power, water and sewerage services to 20 Territory Growth Towns and 52 remote communities

Integrated utility model, planning development, operations, maintenance.

Overall Customer Satisfaction for people and services 8.2 out of 10

Commercial and Government clients pay for power, water and sewerage services.
Income provided by NTG and revenue, together with specific project funding by the Australian Government.

**Income:**
- Grant Revenue: $53.3M
- Operating Revenue: $31M
- **Total:** $85M
- +Capital Grants: $40.6M

**Expenditure:**
- Distillate - $32M
- Staffing - $15.5M
- Maintenance - $16.5
- ESO contract - $9M
- Capital projects $40M
Safe Drinking Water and Sewerage Services

- **Manage and operate water related infrastructure** (250 production bores, 160 storage tanks, pumps, water treatment, water reticulation & 56 wastewater treatment systems)
- **Water Quality** - disinfect all supplies (chlorine, UV) and monitor water quality
- **Sampling**: 7,500 samples collected by planes with 90,500 tests in laboratories, over 70,000 chlorine tests
- **Water Resource** is (primarily) ground water
- Reporting to NRETAS and **Essential services Commission**.
Overview of Water Services

(1) Bores are sunk into the aquifer to extract water from underground. Some communities get their water from rivers, or springs or dams.

(2) Disinfection - Chlorine or Ultra-Violet. Some communities have additional filters that remove naturally occurring particles in the water or add fluoride.

(3) Water is held in tanks so if there is a power outage, water can still be supplied to the community (2-6hrs).

(4) Water is reticulated throughout the community.
Overview of Sewerage Services

(5) Wastewater drains and enters the sewerage pipe network and pumped to the ponds. Some (20) communities have septic tank systems.

(6) Anaerobic bacteriological breakdown of wastewater and evaporation.

(7) Wastewater treated and used for irrigation meeting environmental guidelines.
• Manage and operate electricity generation infrastructure (largest fleet of diesel generation plant in Australia – 177 diesel generators in 55 island power stations, over 30 million litres of diesel- $31, 6 solar systems, 9 communities with grid connection, one wind system)
• Manage and operation electrical distribution networks
• Monitor power supply efficiency and reliability and safety
• Growing renewable and low emission energy sources
Overview of Power Services

1. Diesel fuel is delivered in trucks and stored in tanks.

2. Diesel is used in power stations to generate electricity.

3. Some communities are augmented with solar power stations.

4. Electricity is delivered to houses and buildings by powerlines.

5. Customers use power cards to pay for the electricity they use. The electricity used is measured by meters.
Renewable Energy (RE) Profile:

The project consists of:

• Design and construction of total 1MW RE systems at Ti Tree (324KW), Kalkarindji (402KW) & Lake Nash (266KW), cost: $14M, saving 1170 tonnes of CO2p.a.

• Grid Stability Controllers (GSS or GSC) to control power output stability – ensures generators are operated appropriately.

• Concentrated Photo Voltaic systems at Ntaria (Hermannsburg) 190KW, Lajamanu 290KW, Yuendumu 240KW.
Other Utility functions

- Retail - pre payment meters, water charging
- Logistics and coordination of fuel and program delivery
- Development requests (large increase Yr:2006:100, Yr: 2012: 600)
- Strategic initiatives - renewable and low emission electricity supply; water quality, sustainability
- Legislative and regulatory reporting re water quality, water extraction, discharge, emissions
- Water and energy efficiency and planning
- Asset management and planning
- Automation, smart solutions - SCADA
- Capital program management and delivery
- Emergency response (flooding, fires and cyclones).
How we provide services?

Consolidated (integrated) utility structure and years of experience operating across the NT

- Significant operational and maintenance cost efficiencies with organisational **technical expertise**, and **on-site operators** (to service, monitor, and manage power and water systems) – all **appropriately trained and inducted**
- **Resource planning**, including cost effective Territory and regional based contracts based on large quantities (economies of scale)
- A coordinated *prioritised* program for the delivery of routine maintenance, minor upgrades and capital projects
- **Innovative and integrated** culture with **collaboration** between energy, water and sewerage services that may not be available within separate utilities or agencies
  - This allows operational delivery and planning teams to work closely together on improving services
  - Leverage off other Power & Water Corporation services.
Three core components:

1. Local Community SCADA systems - power stations, bores, tanks, disinfection systems, sewerage plant,

2. Backhaul communications (Optical fibre (esp. Growth towns), ADSL, Satellite)

3. Central data base
Current Situation

This has resulted in:

– **Unprecedented investment and focus in remote areas**
  - 20 Growth Towns (Nguiu, Millingimbi, Yirrkala, Gapuwiyak, Umbakumba, Angurugu, Wadeye, Gunbalanya, Ramingining, Maningrida, Galiwinku, Kalkarindji, Lajamanu, Ngukurr, Ali Curung, Yuendumu, Papunya, & Ntaria)
  - Significant increase in development applications (600% in 5 years)
  - Growth in demand for water and electricity
  - Increasing gap between the cost of delivery and the revenue recovered.

– **Increased expectations for essential services:**
  - Become equivalent to other urban centre of similar size
  - Assumption that primary infrastructure capacity is available for development/ growth of the communities (without the necessary headworks).
How to deal with this?

- We developed an Integrated approach
- Using a risk-based assessment
  - Provide a systematic and consistent framework to direct and control risks to our services
  - Allows consistent and robust decision-making process
- Supported by in-depth knowledge and understanding of the systems
  - Multidisciplinary input
  - Telemetry / SCADA
Risk Assessment Process

- **Identified issues at each community**
- **Assessed the risk** *(ISO 31000:2009)*
  - Rated Consequence *(insignificant → severe)*
  - Grouped into 4 risk types *(drivers)*
  - Rated Likelihood *(rare → almost certain)*
  - **Determined overall risk** *(using risk matrix)*

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Almost Certain</th>
<th>Likely</th>
<th>Possible</th>
<th>Unlikely</th>
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<th>Consequence</th>
<th>Insignificant</th>
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<th>Moderate</th>
<th>Major</th>
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<td>Likely</td>
<td>4</td>
<td>9</td>
<td>14</td>
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<td>7</td>
<td>13</td>
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<tr>
<td>Unlikely</td>
<td>2</td>
<td>6</td>
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<td>17</td>
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<tr>
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<td>5</td>
<td>11</td>
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### Risk outcomes

#### Water and Wastewater Infrastructure High and Non assessed

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<th>Component of Supply</th>
<th>Extreme to Very High Risk %</th>
<th>Unassessed Risk %</th>
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<tr>
<td>Water Source</td>
<td>82</td>
<td>5</td>
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<td>Water Storage</td>
<td>78</td>
<td>4</td>
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<tr>
<td>Water Treatment</td>
<td>44</td>
<td>25</td>
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<tr>
<td>Water Distribution</td>
<td>22</td>
<td>42</td>
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<tr>
<td>Demand Management</td>
<td>0</td>
<td>32</td>
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<tr>
<td>Wastewater Reticulation</td>
<td>43</td>
<td>7</td>
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<tr>
<td>Wastewater Treatment</td>
<td>45</td>
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<td>Wastewater Discharge</td>
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#### Energy Infrastructure High and Non assessed

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<th>Component of Supply</th>
<th>Extreme to Very High Risk %</th>
<th>Unassessed Risk %</th>
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<td>Energy Source</td>
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<td>48</td>
<td>40</td>
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<td>Electricity Generation</td>
<td>56</td>
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<td>Distribution Network</td>
<td>17</td>
<td>73</td>
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<tr>
<td>Demand Management</td>
<td>TBC</td>
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### Major risks areas:
- Water source, water storage, energy source
### Place based view:

**Community A - Essential Utility Services Infrastructure Overview - Pop. 1083**

<table>
<thead>
<tr>
<th>Essential Service</th>
<th>Capacity (1)</th>
<th>Detail</th>
<th>Current Capacity</th>
<th>Measured Peak Demand</th>
<th>Engineered Required Peak Day Capacity</th>
<th>Identified Capacity Constraints</th>
<th>Condition</th>
<th>Current Project to Address</th>
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<td><strong>Water</strong></td>
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<tr>
<td>Supply</td>
<td>215%</td>
<td>Sustainable Yield of Source (kL/day) (2)</td>
<td>605</td>
<td>1844</td>
<td>1300</td>
<td>Under capacity</td>
<td>No</td>
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<tr>
<td></td>
<td></td>
<td>N-1 bore pump capacity (kL/day)</td>
<td>634</td>
<td>1844 (3)</td>
<td>1300 (4)</td>
<td>Under capacity</td>
<td>No</td>
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<tr>
<td></td>
<td></td>
<td>Rising Main - Max Capacity (kL/day) (5)</td>
<td>1300</td>
<td>1844</td>
<td>1300</td>
<td>At capacity</td>
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<tr>
<td>Ground Storage</td>
<td>8hrs</td>
<td>Storage capacity (kL) (6)</td>
<td>440</td>
<td>8.1hrs</td>
<td>1300</td>
<td>Under capacity</td>
<td>Age: 1978</td>
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<tr>
<td>Pressurised Storage</td>
<td>1.7hrs</td>
<td>Storage capacity (kL) (6)</td>
<td>90</td>
<td>1.7hrs</td>
<td>325</td>
<td>Under capacity</td>
<td>Age: 1995</td>
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<td><strong>Sewer</strong></td>
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<tr>
<td>Sewer Pump Station 1</td>
<td>109%</td>
<td>Pump capacity (L/s) (7)</td>
<td>32</td>
<td>35</td>
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<td>Under capacity</td>
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<td>Sewer Pump Station 2</td>
<td>151%</td>
<td>Pump capacity (L/s) (7)</td>
<td>15</td>
<td>22.7</td>
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<td>Under capacity</td>
<td>No</td>
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<tr>
<td>Waste Stabilisation Ponds (m³)</td>
<td>229%</td>
<td>Primary Pond Surface Area m² (7)</td>
<td>1400</td>
<td>3200</td>
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<td>Under capacity</td>
<td>No</td>
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<tr>
<td></td>
<td>429%</td>
<td>Secondary Pond Volume m³ (7)</td>
<td>2620</td>
<td>11240</td>
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<td>Under capacity</td>
<td>No</td>
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<td>Effluent Discharge</td>
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<td>Discharge (7)</td>
<td>DN150</td>
<td></td>
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<td>Open Pipe joints</td>
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<td><strong>Power</strong></td>
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<td></td>
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<tr>
<td>Fuel Storage</td>
<td>5.4</td>
<td>Fuel storage capacity kL (8)</td>
<td>134</td>
<td>25kL/wk</td>
<td>150kL (9)</td>
<td>At capacity</td>
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<td>Generation</td>
<td>55%</td>
<td>N-1 Generation capacity (kw) (10)</td>
<td>1400</td>
<td>770</td>
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<td>Genset 1</td>
<td>600</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Genset 2</td>
<td>1000</td>
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<td></td>
<td>Genset 3</td>
<td>800</td>
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<tr>
<td>Network capacity</td>
<td>Unknown</td>
<td>Upgrades to transformers/feeder cables</td>
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<td></td>
<td></td>
<td></td>
<td>No</td>
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How we provide services

Local Essential Service Operators (ESOs)

• Located in the communities - operate and maintain the supply systems through contracts with shires, councils, & private contractors
• Fundamental to the delivery of services on the ground and provide immediate responses
• Career path from trainee, to ESO to ESO Supervisor- skills for the community, utilities and the mining sector.
Indigenous Economic development

PWC supports regional development and Indigenous employment and training through ESO and other contracts.

Created a career path for ESO’s with new trainee positions. Support provided includes supervision, formal training, mentoring as well as on the job training

Target is to:

• Improve skill levels with at least 50% of ESO workforce holding a Certificate II or III Qualification
• Increase indigenous ESO employment from 40% to 60% over 5 year time frame

Working in partnership with educational and training institutions (i.e. Charles Darwin University and Group Training NT) and ESO employers
The way forward…

• Increase Indigenous employment to from current 37% to 60% over 5 year time frame

• Improve skill levels with at least 50% of ESO workforce holding a Certificate II or III Qualification

• Improve supervision of ESOs with mentoring and on site skills development
Some challenges?

• Investment
  – **Many assets reaching end of life**
  – **Recurrent funding** insufficient to maintain and replace aging assets
  – **Rapid growth** in demand in most communities impacted by population growth, government programs and infrastructure, improved lifestyle and prosperity
  – **Secondary infrastructure development** has limited funding allocated for primary (essential) infrastructure
  – **Sustainability** (ground water) constraints

• Remote communities have evolved differently from conventional urban or regional centres
  – Limited **Strategic planning for growth** - conventional planning and development processes haven’t been applied
  – Rely on subsidisation by government (NTG)
  – **i.e. Governments (NTG and AG) are the major developer/investor** (limited private sector involvement to date)
  – **Cost to deliver water and electricity services is high** compared to urban areas uniform Tariff and Indigenous Households do not pay for water and sewer services
  – **Quality of information on systems** variable:-capacity and as constructed infrastructure fluctuates and can be incomplete
Further advancements....

- Focus on **public health and water quality**
- Innovative asset solutions across water, wastewater and electricity “smart technology, smart community”
- **Water and energy efficiency**- Community Water Planning initiatives
- **Prioritised infrastructure** developments- based on **asset management** principles (incl. risk), legislative requirements and sustainability.
- Continue to **build local indigenous capacity**, through training, mentoring and a planned longer term program of works
- Alternative funding options?
- **Cost recovery and payment** for services in remote locations
- **RIPO (Remote Infrastructure Program Office)** for **program management** to provide coordination, evaluation and reporting of all remote indigenous related programs for the short, medium and long term.
Electricity, water and sanitation services are primary infrastructure services essential for the health and function of community.
Thankyou!
Domestic clients pay for electricity through use of prepaid meters, however do not currently pay for water or sewerage services. PWC has been working over 1.3 million km² to service these communities since 1988.

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# Essential Service Operators

<table>
<thead>
<tr>
<th></th>
<th>Trainee</th>
<th>Base Grade ESO</th>
<th>Advanced ESO</th>
<th>Essential Services Supervisor</th>
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<td><strong>White Card</strong></td>
<td>Yes✓</td>
<td>Yes✓</td>
<td>Yes✓</td>
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<td><strong>Site Inductions</strong></td>
<td>Yes✓</td>
<td>Yes✓</td>
<td>Yes✓</td>
<td>Yes - and able to provide</td>
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<td></td>
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<td>Power Water induction</td>
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<td><strong>On-site Training</strong></td>
<td>Yes✓</td>
<td>Yes✓</td>
<td>Yes✓</td>
<td>Yes - and able to provide</td>
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<td><strong>Mentor</strong></td>
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<td>Limited mentoring ability</td>
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<td>No</td>
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<td><strong>Must have:</strong></td>
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<td></td>
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<td>- Power and Water familiarisation training and 12 months on the job experience; or</td>
<td>- Met requirements of Base Grade ESO Qualifications;</td>
<td>- Met requirements of Advanced Grade ESO qualifications;</td>
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<td>- A trade qualification as an electrician, mechanic, fitter or plumber; or</td>
<td>- Cert II (or trade) qualification or working towards a Cert III qualification;</td>
<td>- Cert II and III qualification;</td>
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<td></td>
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<td>- Undertaking the Cert II in electro-technology.</td>
<td>- Completed specialised training.</td>
<td>- Specialised skills in training people;</td>
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<td>- Specialised safety training qualification.</td>
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