APA Group

APA Group Investor Day
Lifecycle of pipelines
-Technical presentations

14 November 2013 Sydney

APA Group

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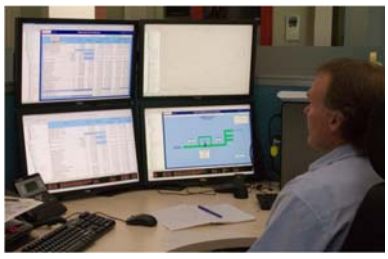
Lifecycle of pipelines

Kevin Lester – Infrastructure Development
Mark Fothergill – Infrastructure Development
Edwin De Prinse - Transmission Operations

Agenda

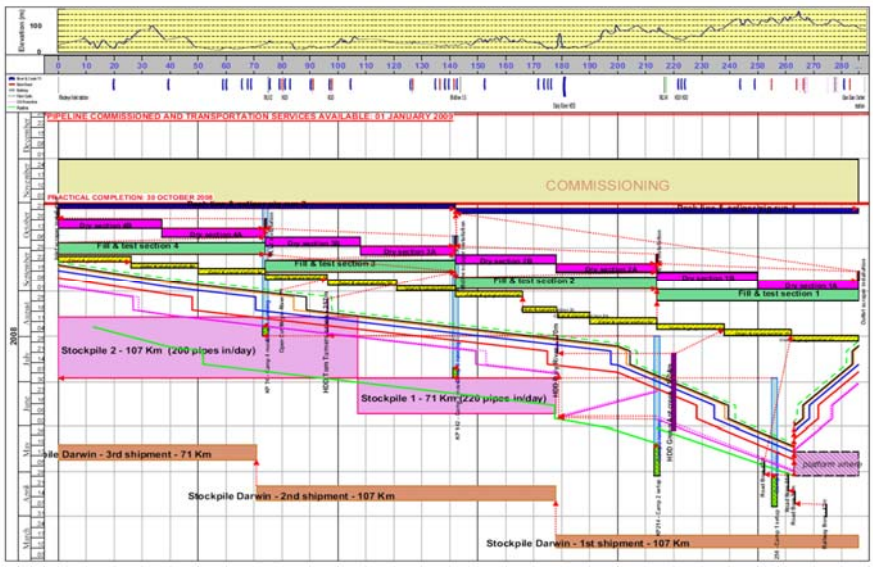
- Pipeline construction
  - Kevin Lester – Group Executive Infrastructure Development
- Pipeline expansion
  - Mark Fothergill – GM Infrastructure Strategy and Engineering
- Pipeline operations
  - Edwin De Prinse – GM Transmission Operations



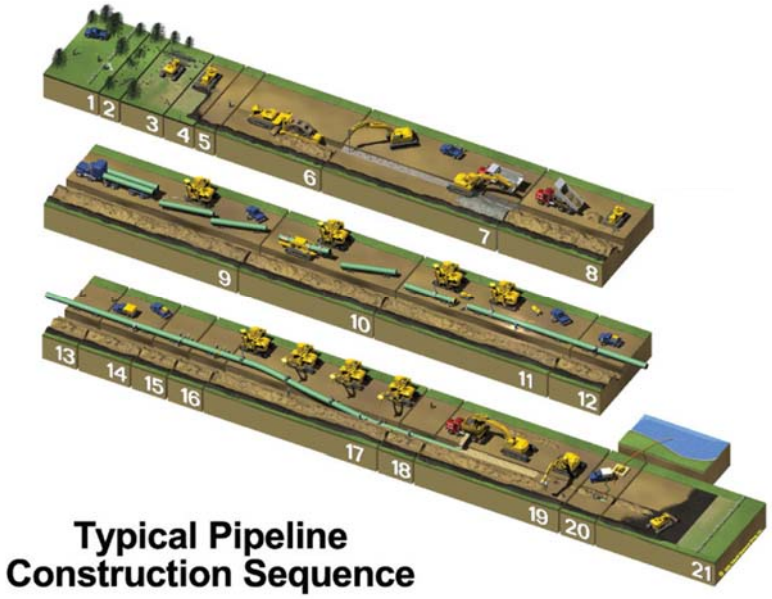
Pipeline construction

- Construction planning
- Activities during construction
- Special crossings
- Restoration
- Pipeline easements
- Pipeline integrity

Construction planning



Activities during construction



Typical Pipeline Construction Sequence

1) Survey and Staking
2) Clearing
3) Front-End Grading
4) ROW Topsoil Stripping
5) Restaking Centerline of Trench
6) Trenching (wheel ditcher)
7) Trenching (rock)
8) Padding Trench Bottom
9) Stringing Pipe
10) Field Bending Pipe
11) Line-Up, Initial Weld
12) Fill & Cap, Final Weld
13) As-Built Footage
14) X-Ray Inspection, Weld Repair
15) Coating Field Welds
16) Inspection & Repair of Coating
17) Lowering Pipe in to Trench
18) As-Built Survey
19) Pad, Backfill, Rough Grade
20) Hydrostatic Testing, Final Tie-In
21) Replace Topsoil, Final Clean-Up, Full Restoration

Activities during construction

Pipe unloading

Clearing

Pipe stringing

Pipe bending

Welding

Non-destructive testing

Activities during construction

Gritblasting


Joint coating


Trenching

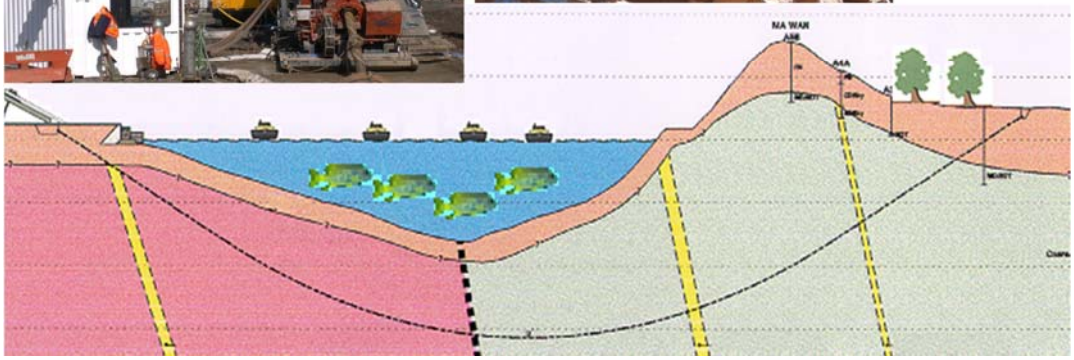

Padding


Lower in


Backfill & Restoration


Hydrotesting

Special crossings



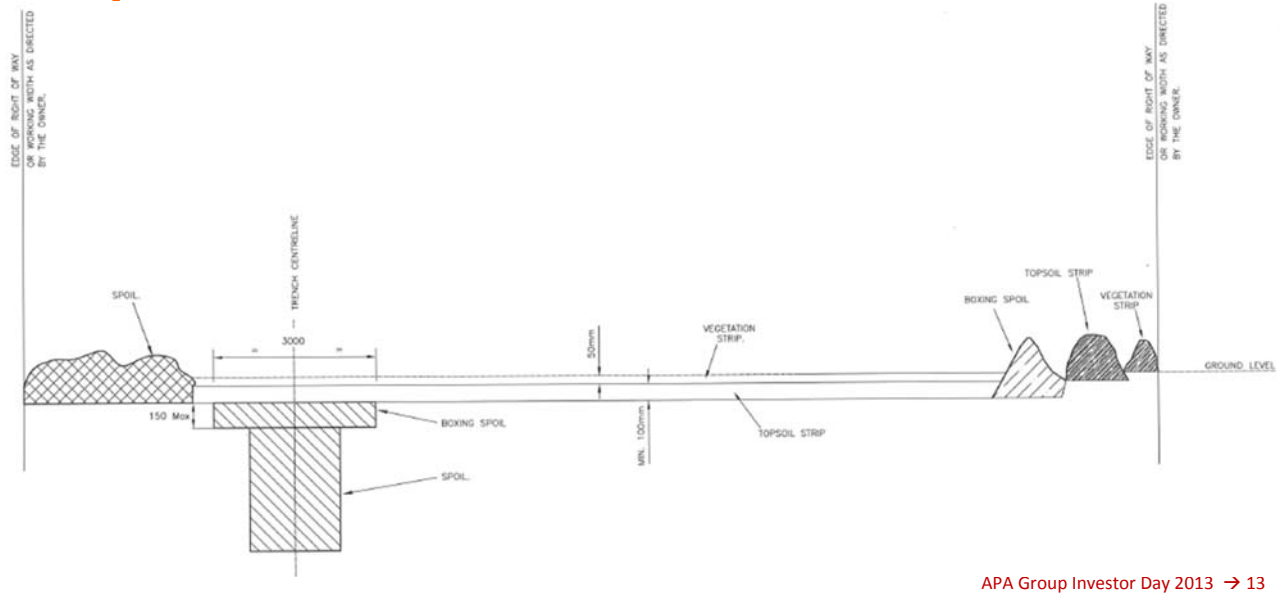
Restoration

Existing Easement | Construction of looped pipeline | After restoration

Pipeline easements

- Pipelines require a Pipeline Licence from relevant State regulator
  - Licenses only issued when key approvals and all landowner agreements in place
  - Ability to compulsorily acquire easement
- Easements typically 25 metres wide
  - Easements generally exist infinitum
  - Access to easements by others only by agreement
  - Expansion by looping easily accommodated where easement exists
  - Can generally negotiate additional temporary or working space
  - Above ground facilities on APA owned land

Pipeline easements



Pipeline integrity

- Design, construction and operations to relevant standards
- 50 - 80 year design life
- Factory applied coatings
- Joint coating to complement factory coating
- Coating drainage tests
- Weight coating and concrete slabbing
- Corrosion prevention
- Pipeline inspection and maintenance
- Pipeline corridor management and surveillance

Pipeline expansion

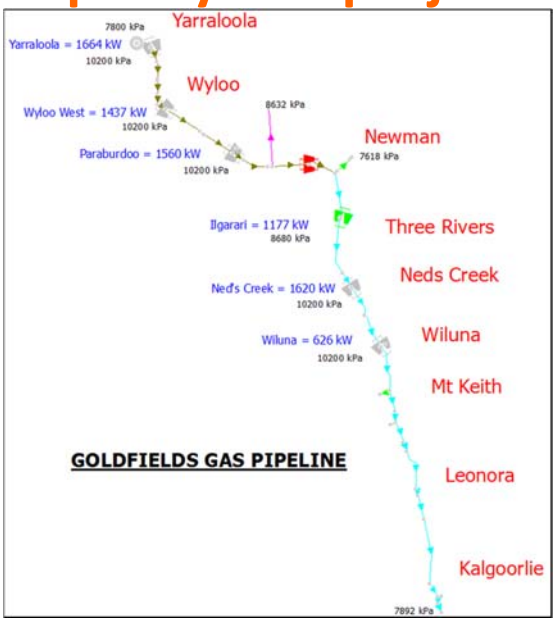
Mark Fothergill
General Manager Infrastructure Strategy & Engineering

Pipeline expansion

- Capacity and project registers
- Expansion options
  - Add compression
  - Increase maximum operating pressure
  - Looping a pipeline
  - In-pipe storage
- Creating a bi-directional pipeline
- Benefits of east coast grid
- Efficient design - case studies
  - Roma Brisbane Pipeline
  - Victorian Transmission System

How to get more through your assets

Capacity and project registers



- Identify customer requirements including level of service flexibility
- Capacity determination
  - Pipeline modelling platforms
  - Validation and tuning of simulations
- Project cost and schedule register
  - Extensive knowledge of cost and scope for pipeline, compressor and end-of-line facilities
  - Standard design for common compressor station (schedule and cost)
  - National business model

Expansion - add compression

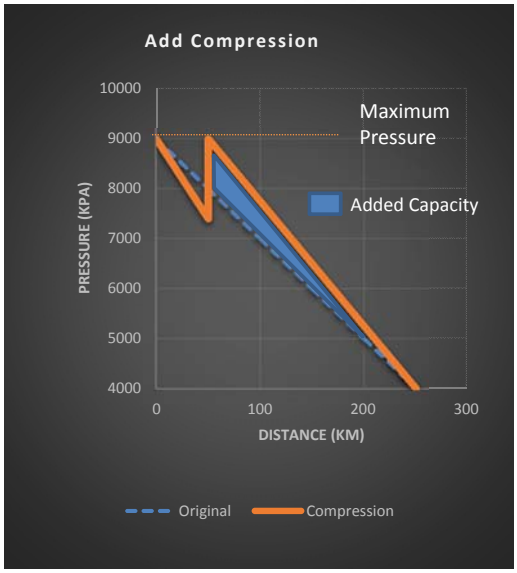
- Compression takes low pressure gas and lifts it back to a high pressure
- Compressor power is sized to cover both the flow and required pressure lift

Example of compression:

250km pipeline with compressor installed at the 50km point

Inlet pressure is 9,000kPa and customer delivery pressure is 4,000kPa

As the flowrate increases, the pressure along the pipeline falls more quickly, requiring re-pressurisation en-route



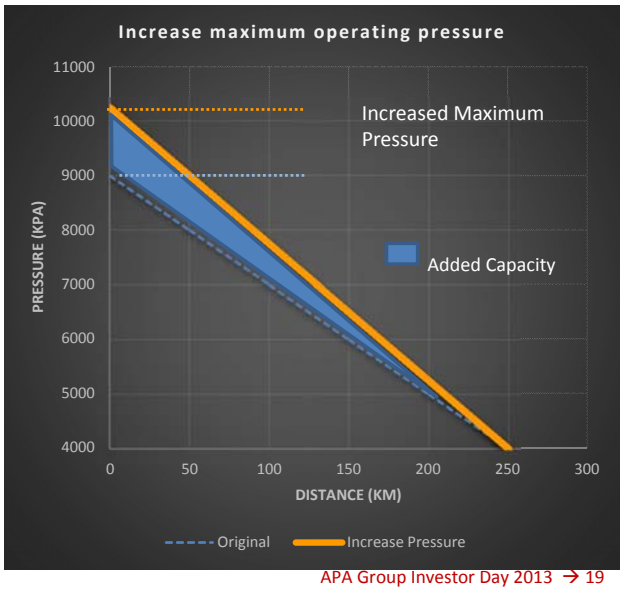
Expansion - increase operating pressure

- If the pipeline and associated facilities are appropriately pressure rated, the operating pressure of the pipeline can be increased

Example of increased pressure:

250km pipeline. Inlet pressure is increased to 10,300kPa from 9,000kPa with a customer delivery pressure of 4,000kPa

Avoids compression, as the pressure at 50km point is at the old maximum pressure



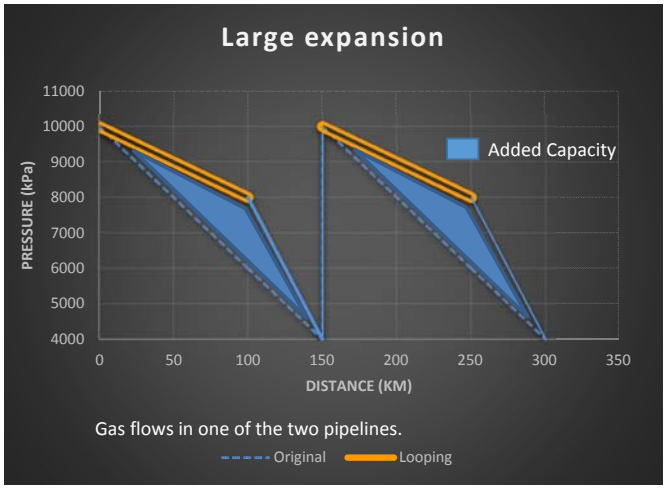
Expansion - looping a pipeline

- For larger expansion projects, the optimum capex solution is looping

Example of looping expansion:

250km pipeline with one existing mid-line compressor. Inlet pressure 10,000kPa and customer delivery pressure is 4,000kPa

The flowrate has increased, in the looped sections we have a lower pressure loss along the pipeline, whilst the un-looped (blue) sections have much higher pressure loss

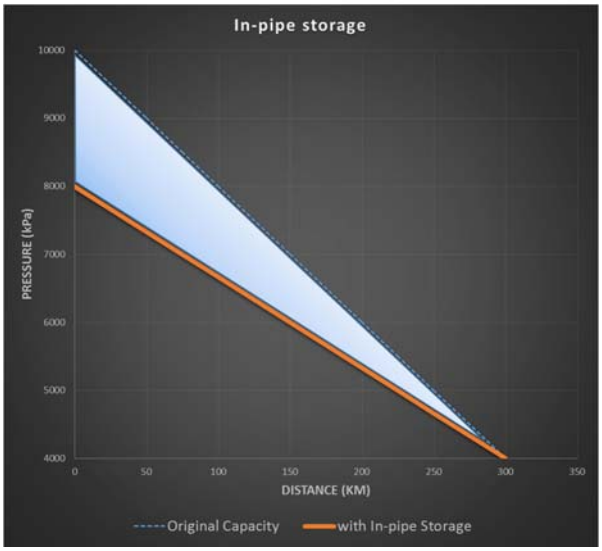


In-pipe storage- swapping throughput to storage

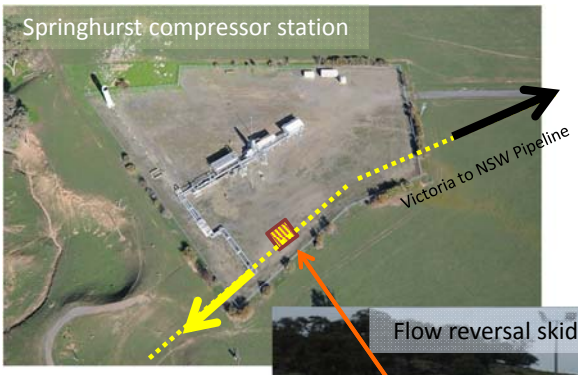
- In-pipe storage is achieved by allocation of some throughput services to a storage service
- Customer typically has complete flexibility over their withdrawals and in-pipe storage level

Example peaking power station:

250km pipeline with a peaking power station using a 50TJ gas storage contract



Creating a bi-directional pipe

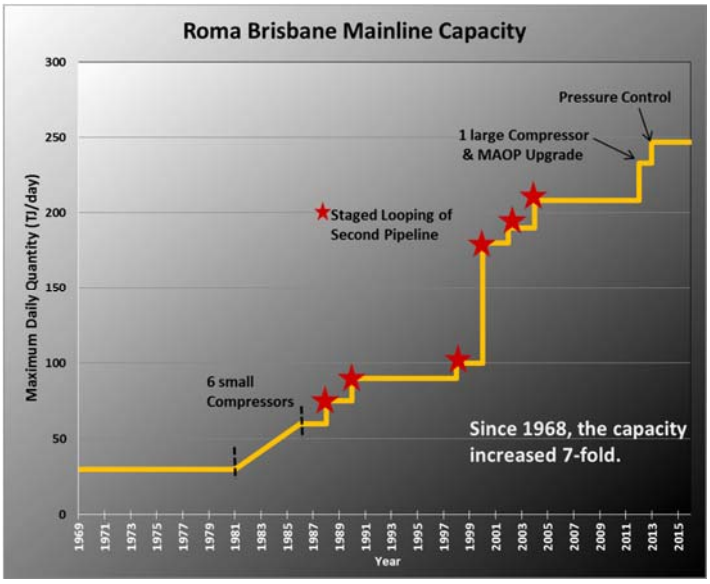


- 2012: automated functionality was added Springhurst compressor station (built 1999) on the Victoria / NSW pipeline, to provide remotely controlled flow reversal
- Flow reversal is achieved by swapping the inlet and outlet connections over

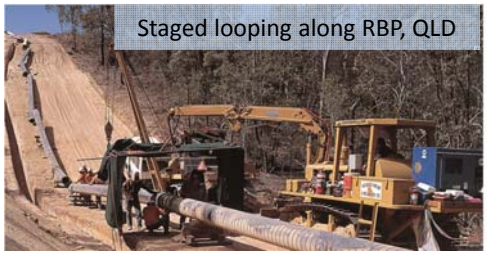
Benefits of the east coast grid

- Roma Brisbane pipeline converted from flow control to pressure control.
  - Pressure control maintains a constant high pressure at Wallumbilla which results in an increase in the firm throughput capacity of the RBP
- Storage services can be relocated from congested pipes to adjacent less congested pipes
- APA has improved control over system line pack. Previously “point-to-point” pipelines had their line pack controlled by shippers’ nominations
- Reduction in operating expenses as compression usage can be optimised by maintaining high pressures in congested pipes
- Improved sustainability performance due to reduced greenhouse gas emissions from compressors
- Higher reliability due to reduction on compression usage

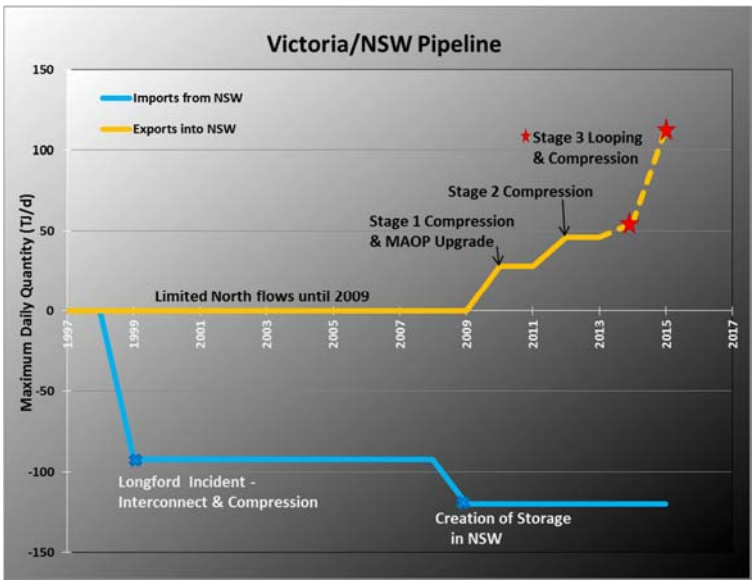
Efficient design – Roma Brisbane Pipeline




Large compressor, Dalby QLD


Staged looping along RBP, QLD

Efficient design – VIC / NSW pipeline



Gas transmission Operations

Edwin De Prinse

General Manager Transmission Operations

Gas transmission operations

- Scale of our operations
- What it takes to manage and operate a pipeline
- Operating the east coast grid

Understanding the scale

=

0.415GJ

or

0.000415TJ

Understanding the scale

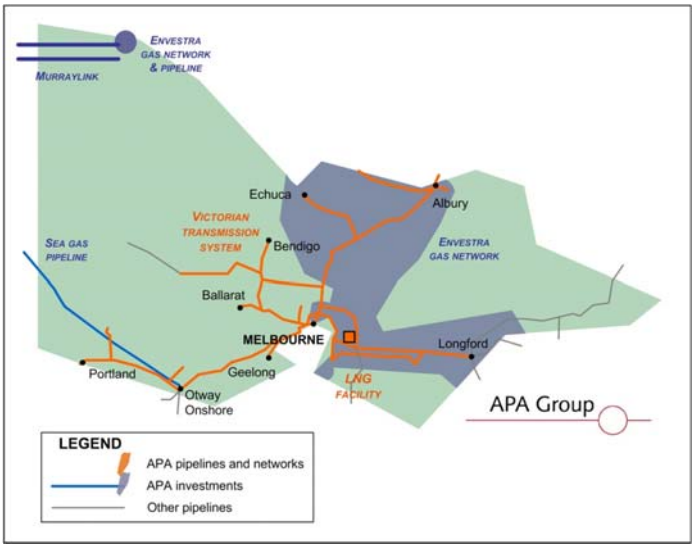
(Dandenong LNG = 750 tankers)

= = 0.8TJ

X 2,000

1 LNG tanker = 16 tonnes

Understanding the scale

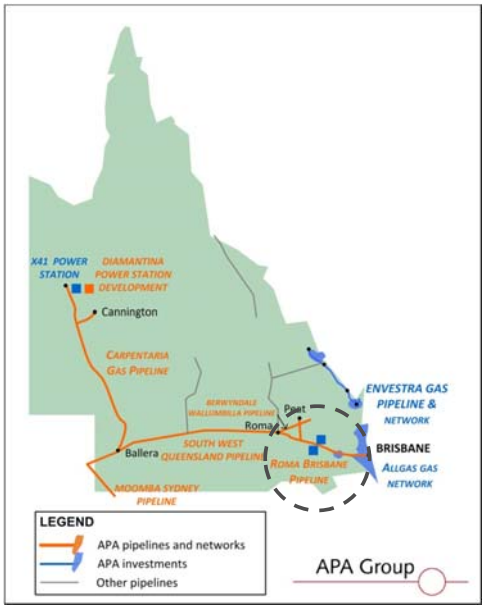


In VIC on a cold day, up to 1,200TJ/day is transported through our pipelines

As much as

- 1,600 LNG tankers or
- 3 million BBQ bottles per day

Understanding the scale



In QLD on the RBP we can deliver over 220 TJ/day

- over 275 LNG tankers driving into Brisbane

Compressors

- Increase the throughput and capacity of pipelines
- 300 kW compressors at Iona
  9,860 KW units being installed at Moomba and Wallumbilla
- 87 compressor units
- Total horsepower of 244,000 kW


Ned's Creek compressor station, WA

Compressors

- Each Moomba compressor unit has the horsepower of 50 Falcons or Commodores per unit
- 3 new compressors at Moomba, has the combines horsepower of 150 Falcons or Commodores

What it takes to operate a pipeline

- Capital intensive business
- For every $100M capital, for simple pipeline, ops costs of 1-3% of overall capital
- Annual SIB capital usually less than 1%
- Management and operations include:
  - Maintain the buried pipe
  - Maintain compressors
  - Operate, manage flows and monitor it 24 x 7
  - Technical support
  - Measurement, billing and invoicing
  - Emergency response preparedness
  - Finance, administration & other support

SIB capex

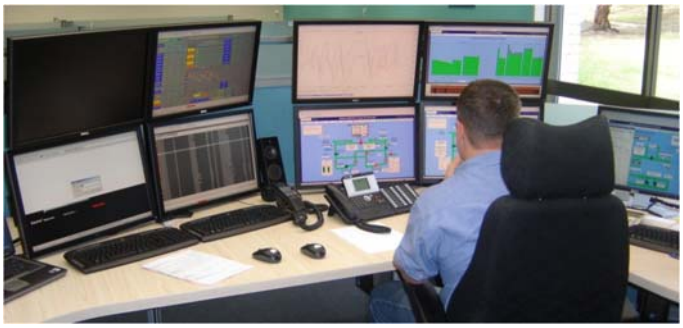
- Pipeline SIB budget is for
  - Aged or worn out components
  - Parts where spares are no longer available
  - Upgrade older control systems
  - Corrosion protection equipment
  - Plant and motor vehicles
  - Pigging and pipeline inspection
- Typically older pipelines require more SIB capex

Maintenance

- Computerised maintenance management system
  - Generates work orders and records what and when maintenance was done
- Driven by
  - Codes and legislation
  - Safety and operating plans and safety cases
  - Asset management plans
  - Vendor recommendations for itemised plant

Control Room

- Control rooms operate and oversee the pipelines
- Plant and Equipment
  - Start and stop compressors
  - Manage flows
  - Monitor alarms
  - Initiate response
  - Manage line pack and metering issues
- Personnel
  - Issue Field Work Permits
  - Oversee travel in outback areas
  - Field maintenance interaction
- Response
  - After hours response



Pipeline maintenance

- Compressors
  - Turbines and reciprocating
  - Periodic and breakdown maintenance
- Meter stations
  - Meters, gas chromatographs, pressure regulators
  - Periodic calibration of gas measurement equipment, and respond to anomalies
- Main line valves
  - Routine testing and surveillance
- Buried pipeline
  - Corrosion protection systems
  - Needs to be tested and monitored to ensure adequate protection levels are maintained
- Just like a car, needs routine maintenance to maintain reliability
- Don't over or under service
  - Cost vs reliability

Scraper station on the SWQP

Cooladdi compressor station, QLD

In-line inspection and repair

- Inspection device is put into pipeline
- Data is retrieved


RoCD2 pig being loaded into the Moomba Sydney Pipeline

- Field crews excavate live pipeline
- Effect repairs “live”, no interruption to flow

Emergency response

Two stage response

1. Initial response
   - Make safe
   - Public
   - Assess
2. Secondary is repair
   - Welded sleeves
   - Clamp on fittings
   - Welded repair
   - Replacement damaged pipe

Preparedness and exercises

…and doing it safely

- To deliver a zero harm work environment through alignment of HSE processes, mindsets and capabilities
- To ensure compliance with the HSE aspects of ASX Principle 7 (Recognise and Manage Risk)
  - Identify, assess, monitor and manage risk
  - Identify material changes to the company's risk profile

- Identify and analyse HSE **RISKS**
- Determine the best **CONTROLS** to prevent risk realisation, or mitigate realised consequences.
- Provide **ASSURANCE** to the Board, Executive and business that HSE risks are controlled to as low as reasonably practicable level via audit and reporting

Benefits of scale

- East coast grid operating as one system
- Gas flows multiple ways on some pipelines
- Recent benefits
  - Pressure control on Roma Brisbane Pipeline
  - Increased flexibility with field personnel
  - Scale of systems and processes
  - Spare parts holding
  - Buying power with suppliers


Wallumbilla compressor station

Summary

- Reliable operations
- In-house expertise
- Benefits of scale

- Key focuses
  - Cost effectiveness
  - Reliability
  - Safety

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