Western Australia

Economic Regulation Authority

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The Economics and Regulation of Gas Pipelines

K Peter Kolf
General Manager

Economic Regulation Authority

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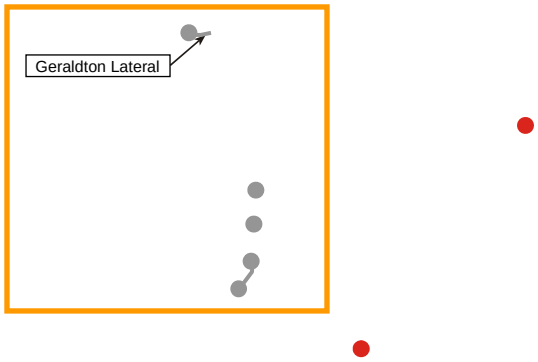
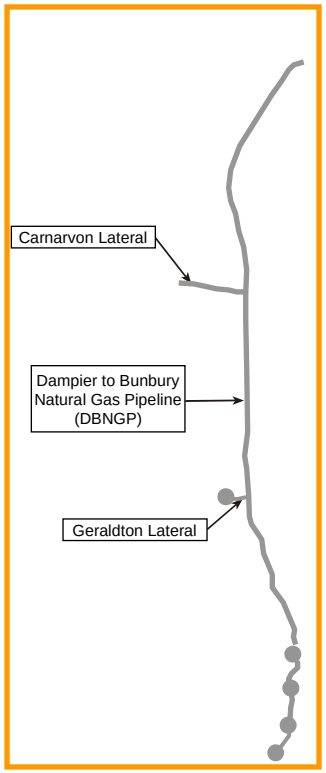
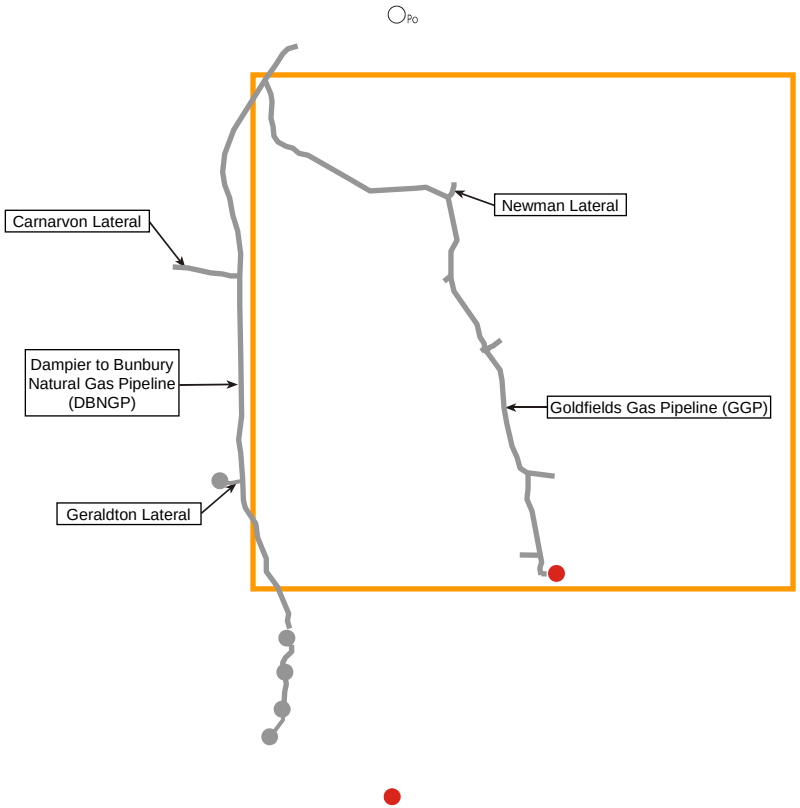
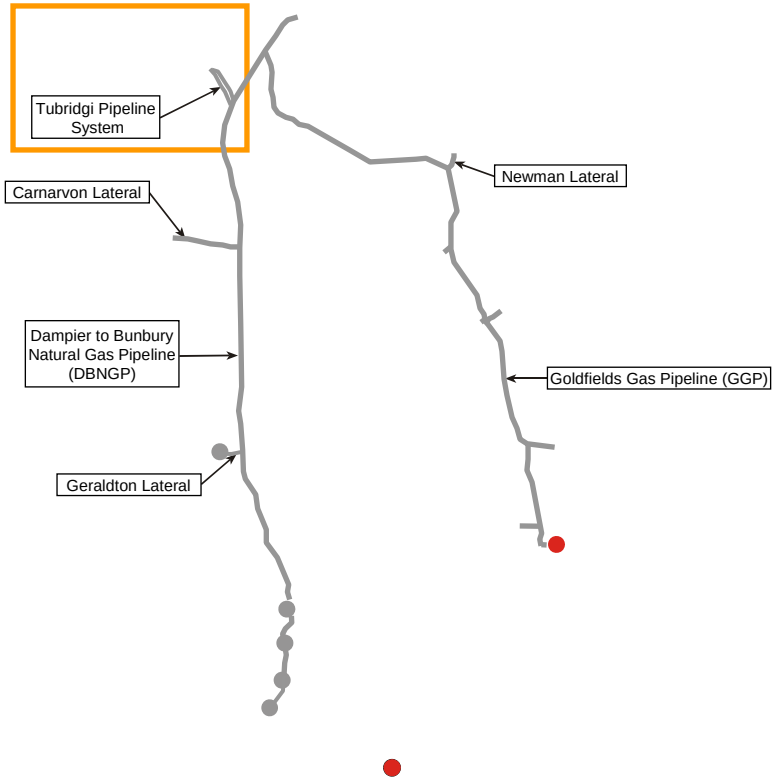
Introduction

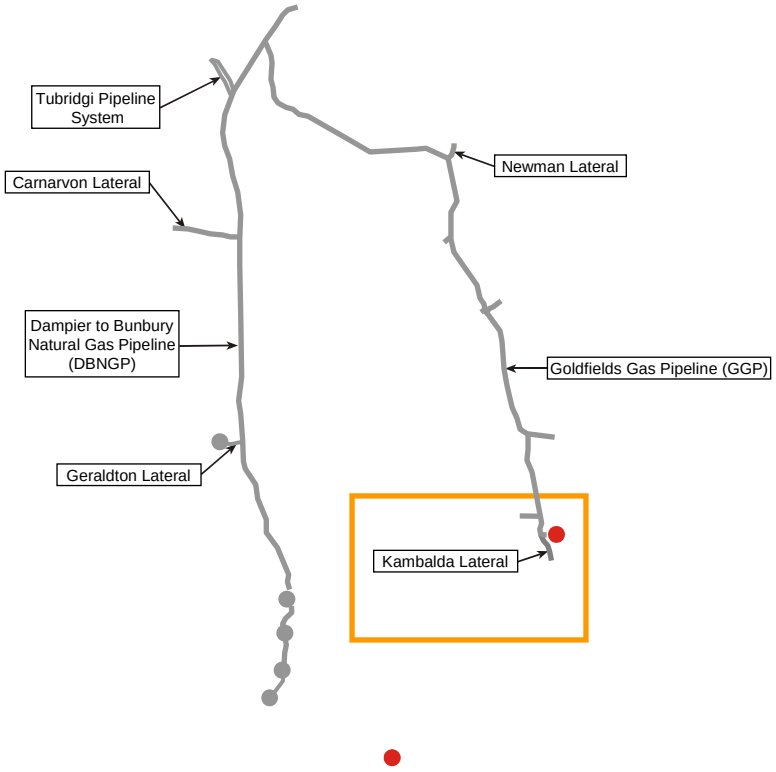
- Pipeline Operations
- Pipeline Design
- Looping
- Pressure management


Geraldton Lateral


Carnarvon Lateral
Dampier to Bunbury Natural Gas Pipeline (DBNGP)
Geraldton Lateral


Po
Carnarvon Lateral
Newman Lateral
Dampier to Bunbury
Natural Gas Pipeline
(DBNGP)
Goldfields Gas Pipeline (GGP)
Geraldton Lateral


Tubridgi Pipeline System
Carnarvon Lateral
Dampier to Bunbury Natural Gas Pipeline (DBNGP)
Geraldton Lateral
Newman Lateral
Goldfields Gas Pipeline (GGP)


Tubridgi Pipeline System
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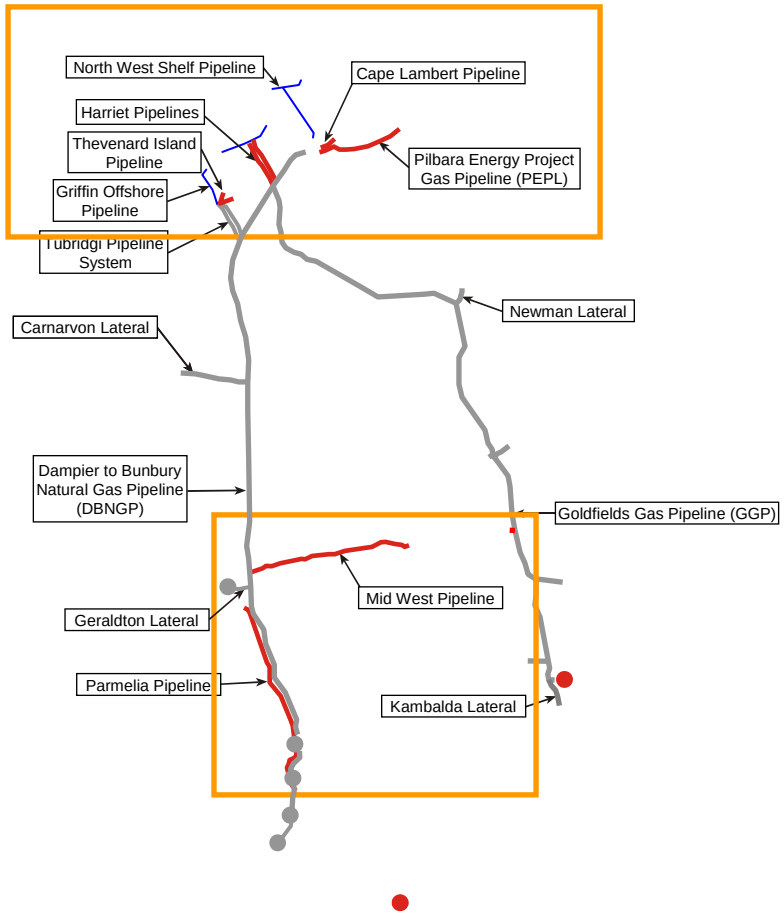
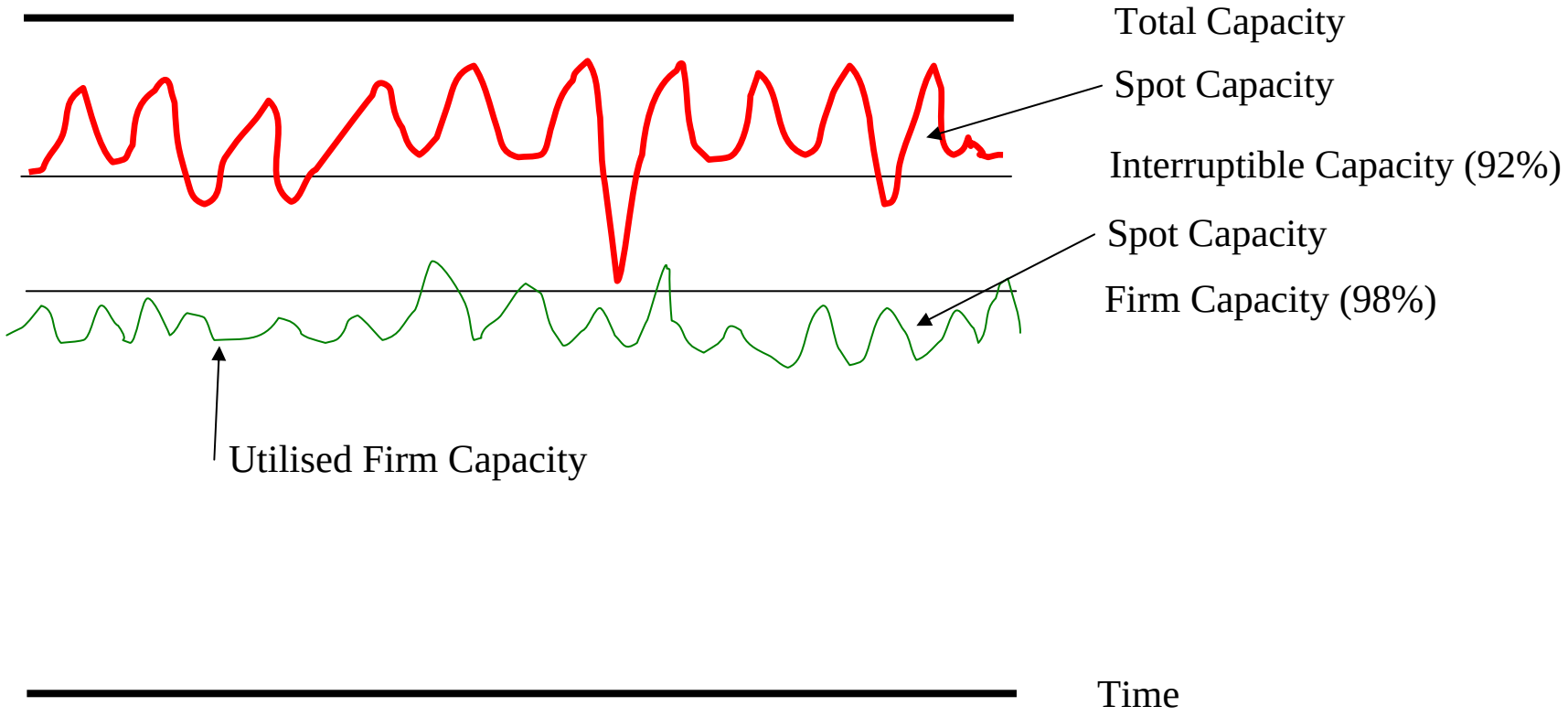
Dampier to Bunbury Natural Gas Pipeline (DBNGP)
Geraldton Lateral
Newman Lateral
Goldfields Gas Pipeline (GGP)
Kambalda Lateral


North West Shelf Pipeline
Cape Lambert Pipeline
Harriet Pipelines
Thevenard Island Pipeline
Pilbara Energy Project Gas Pipeline (PEPL)
Griffin Offshore Pipeline
Tubridgi Pipeline System
Newman Lateral
Carnarvon Lateral
Dampier to Bunbury Natural Gas Pipeline (DBNGP)
Goldfields Gas Pipeline (GGP)
Mid West Pipeline
Geraldton Lateral
Parmelia Pipeline
Kambalda Lateral

Schematic of Pipeline Capacity



Operational Surcharges

- Peaking Surcharge (hourly)
  - 20% MDQ margin
- Overrun Surcharge (daily)
  - 10% MDQ
- Nominations Surcharge (daily)
  - +/- 10% MDQ
- Balancing Surcharge (daily on-going accumulation)
  - +/- 8% MDQ margin

Operational Services

- Peaking Service (hourly)
- Overrun Service (daily)
- Nominations Service (daily)
- Park and Loan (daily on-going accumulation)
- Secondary market
  - Spot
  - Bare transfer
  - Transfer of capacity

(Subject to availability)

Pipeline Design

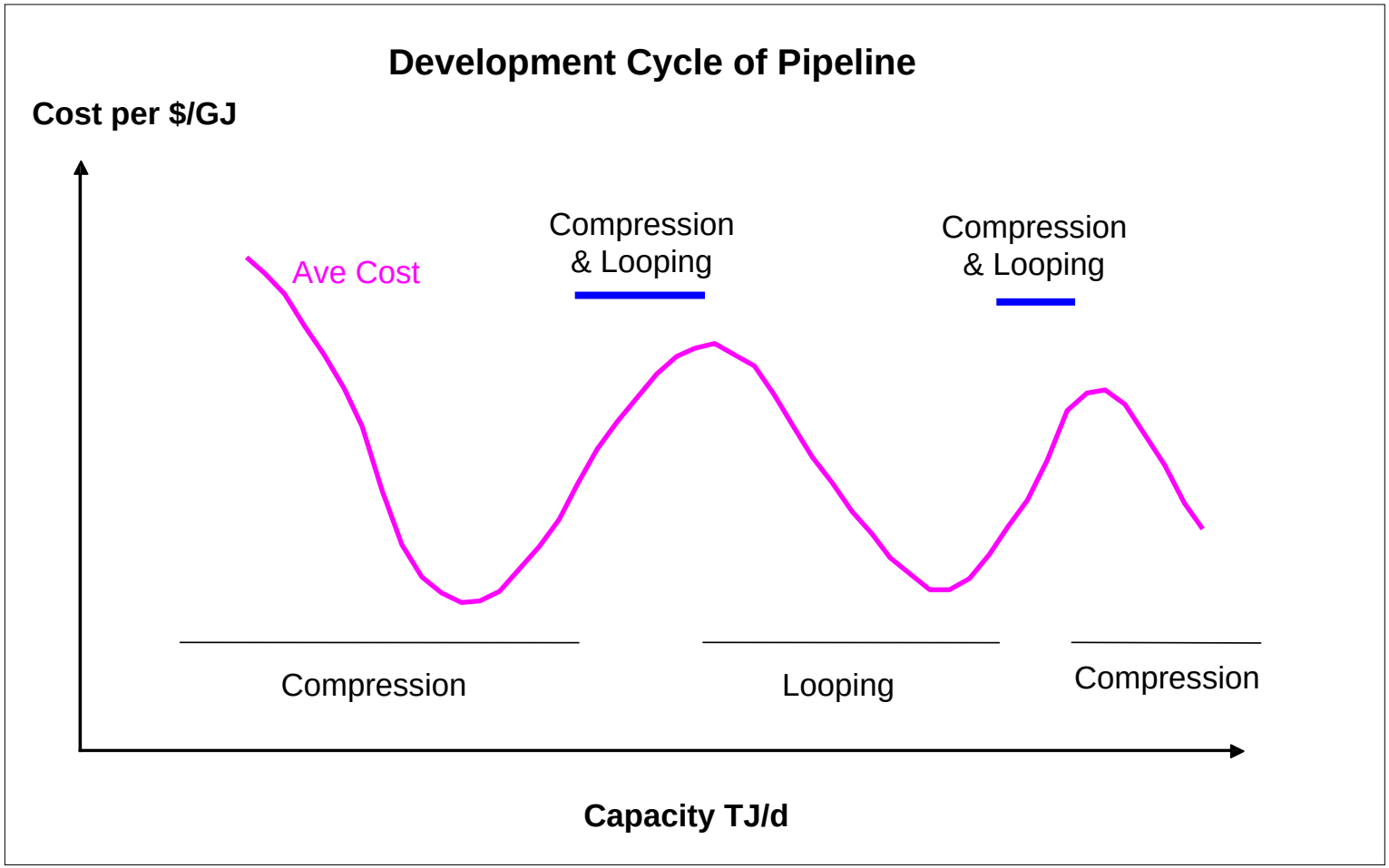
- Pipeline Diameter
  - Future demand
  - Length of the pipeline
  - Distribution of load
  - Operating pressure (MAOP)
  - Thickness of pipeline (material & pressure)
- Compression
  - Location (determines power and fuel usage)

Steps in Pipeline Development

1. Free Flow
2. Additional Compression
3. Additional Compression & Looping
4. Looping
5. Looping and additional compression

Repeat from Step 2

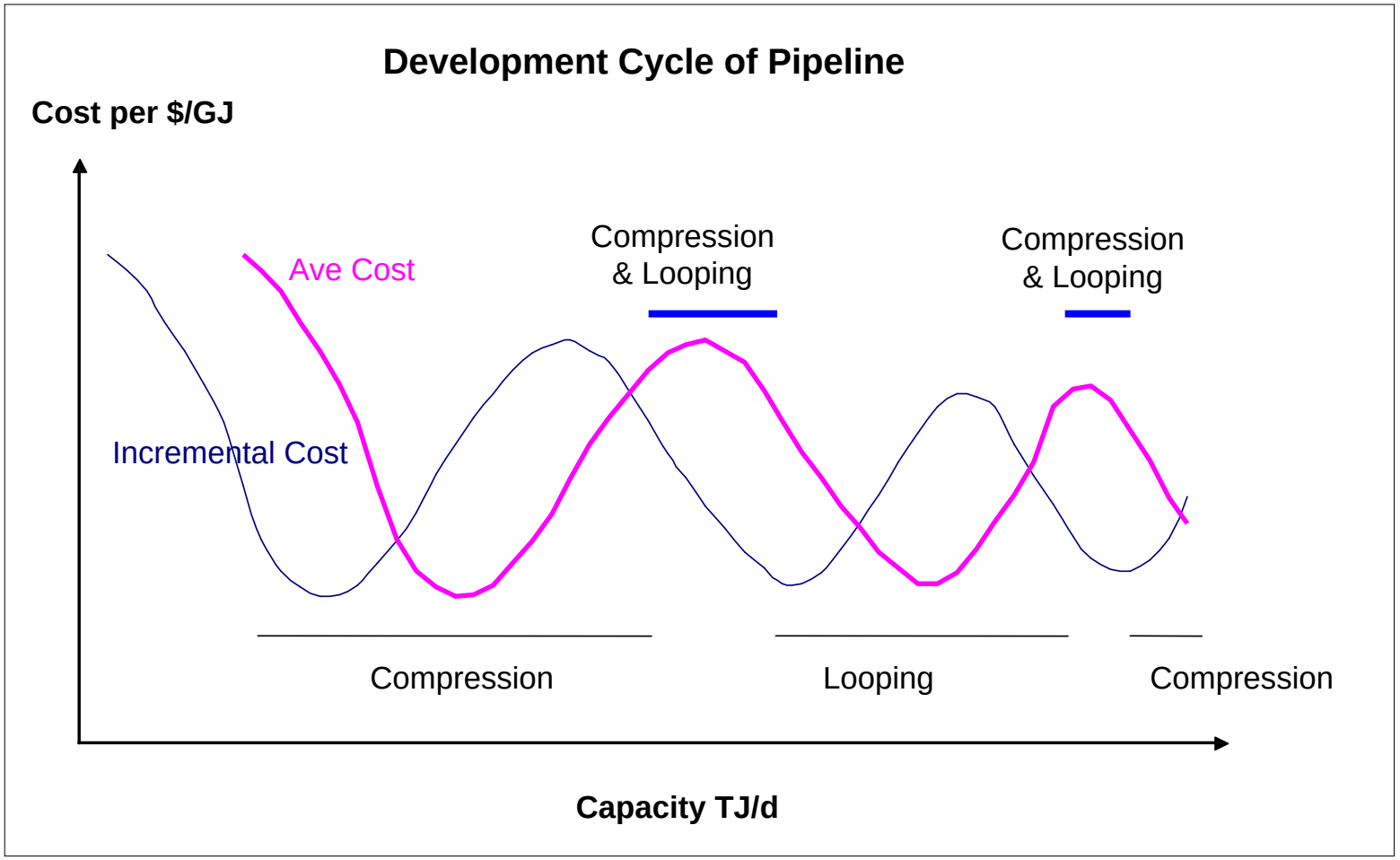
Pipeline Development Cycle

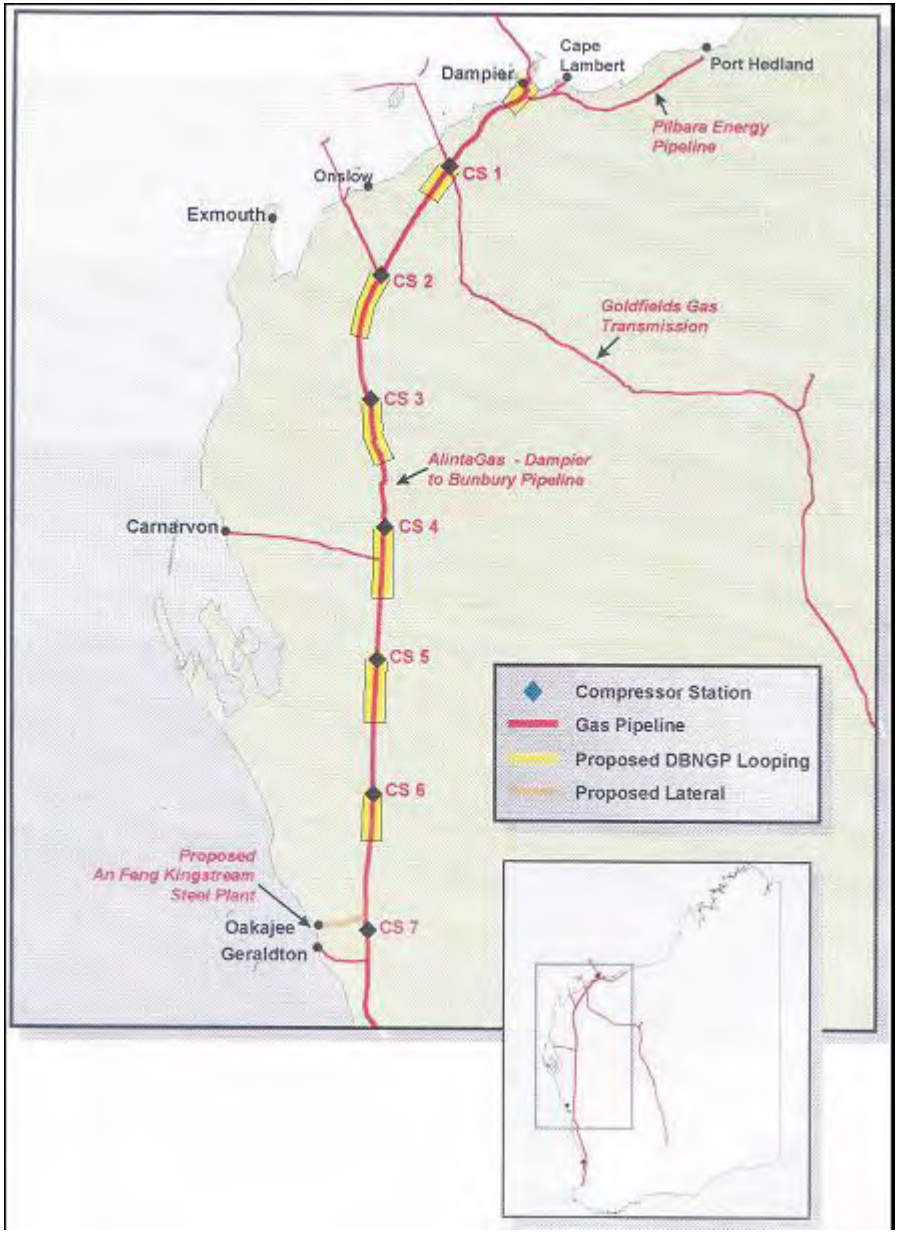


Principle of Looping

- Bigger diameter
- Higher Max Allowable Op Pressure (MAOP)
  - once fully looped can be operated independently
- Looping of each section of the pipeline (between 2 compressor stations) starts at the beginning of the section
- Objective is to bring the discharge pressure of the downstream compressor to the MAOP

Pipeline Development Cycle




Cape Lambert
Port Hedland
Dampier
Pilbara Energy Pipeline
Onslow
CS 1
Exmouth
CS 2
Goldfields Gas Transmission
CS 3
AlintaGas - Dampier to Bunbury Pipeline
Carnarvon
CS 4
CS 5
Compressor Station
Gas Pipeline
Proposed DBNGP Looping
Proposed Lateral
CS 6
Proposed An Feng Kingstream Steel Plant
Oakajee
Geraldton
CS 7

Pressure Profile