SUSTAINABLE TRANSPORT AND LOGISTICS
Considerations and opportunities for infrastructure investment programmes
Sue Lund, General Manager: Public Policy & Sustainability, Transnet SOC Ltd
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Overview

1. Turning around historic under-investment
2. Sustainable development: economic, social and environmental value
3. Environmental planning and management in capital projects
4. Examples of innovation in capital projects
Historic underinvestment

Transnet Historical Capital Investment in ports, rail, pipelines – Pre-turnaround strategy

R billion

Average investment = R2bn/annum

Turnaround strategy commences

Annual Average Investment over 10-years = R2.7bn

- Average age of locomotive fleet exceeded 30 years (Class 1 railways average 15 years)
- Reduced rolling stock fleet
- Sub-optimal maintenance regime, including rail infrastructure
- Old generation and outdated equipment resulting in inefficiencies
- Inadequate capacity at ports and terminals to handle growing demand
- Inadequate investment to build capacity ahead of demand
Total investment of **R86.8 billion** over past 5 years, funded without government guarantees, on the strength of Transnet’s financial position.
Current five-year capital investment plan: R110bn

Capital investment (R billion)

R110bn (2011/12 – 2015/16)
(Excl. capitalised borrowing cost)

Maintaining vs Expansion (%)

Expand 37%
Maintain 63%

Asset Type Split (Rb)

Locomotives 23.0
Pipeline networks 13.2
Mach & Equip 5.9
Port facilities 20.9
Wagons 18.9
Perway 20.6
Land & Buildings

Divisional Split (Rbn)

TRE 1.6
TNPA 5.0
TPT 15.1
TPL 2.0
TFR 63.7

Commodity Split (Rbn)

Bulk 2.5
Break Bulk 14.3
Piped Products 14.7
Containers (Ports) 14.6
Export Iron Ore 10.5
Export Coal 39.0
Other 14.3
GFB (Rail) 14.7

2011/12 2012/13 2013/14 2014/15 2015/16
21.5 25.9 22.4 24.6 18.7 19.0
### Current five-year investments - major projects

**R110.6 billion investment**

<table>
<thead>
<tr>
<th>Project</th>
<th>Details</th>
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<tbody>
<tr>
<td>Iron Ore Line expansion to 60m tons per annum</td>
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<tr>
<td>Iron Ore Line: 76 Class 15E locomotives</td>
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<tr>
<td>New Multi-Product Pipeline</td>
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<tr>
<td>Coal Line expansion to 81 mtpa</td>
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<td>Coal line: 110 Class 19E dual voltage locos</td>
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<td>Durban Container Terminal Reengineering</td>
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<td>Ngqura Container Terminal</td>
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<td>Durban entrance channel sand bypass</td>
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<td>Cape Town Container expansion</td>
<td></td>
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<tr>
<td>Acquisition of 100 Class 43 diesel locomotives</td>
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<tr>
<td>Acquisition of old Durban Airport site for new port</td>
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<td>Reconstruction of quay walls at Maydon Wharf</td>
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<tr>
<td>Durban Container Terminal berth deepening</td>
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<td>Pier 1 Phase 2 expansion into Salisbury Island</td>
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Corridor investments to build freight system density
30-year horizon Transnet Infrastructure Plan Plan

Sishen
Saldanha
Cape Town
Port Elizabeth
Ngqura
Durban
Richards Bay
East London
Maputo
Transnet is committed to delivering lasting economic, social and environmental value for both present and future generations.

**Key sustainability focus points for Transnet capital investments:**

- Getting more cargo on rail
- Local supplier industry development
- Skills development
- Energy efficiency
- Biodiversity protection and enhancement
- Safety
- Stakeholder engagement


[www.transnet.net](http://www.transnet.net)
Localisation in locomotive acquisition programme

<table>
<thead>
<tr>
<th>Project</th>
<th>Rm Total Contracted</th>
<th>% Local Content Committed</th>
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<tbody>
<tr>
<td>100 Class 43 Diesel Locomotives</td>
<td>2,300</td>
<td>54%</td>
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<tr>
<td>GM Long Term Parts Agreement</td>
<td>1,359</td>
<td>12%</td>
</tr>
<tr>
<td>50 Like New Locomotives</td>
<td>481</td>
<td>67%</td>
</tr>
<tr>
<td>EMD Long Term Parts Agreement</td>
<td>543</td>
<td>39%</td>
</tr>
<tr>
<td>32 Class 15E new Locomotives</td>
<td>1,312</td>
<td>40%</td>
</tr>
<tr>
<td>44 Class 15E new Locomotives</td>
<td>1,980</td>
<td>39%</td>
</tr>
<tr>
<td>110 Class 19E new Locomotives</td>
<td>3,300</td>
<td>39%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11,279</strong></td>
<td><strong>41.00%</strong></td>
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Regenerative power opportunities in new locomotives on the ore line and the coal line

- In regenerative braking, the force required to turn traction motors is used as a train braking force. On down gradients, both mechanical and electrical braking power is needed to regulate speed. Electrical power consists of regenerative power and power dissipated in on-board brake resistors.

- Regenerative energy is fed back into the overhead track equipment via locomotive pantographs. This power can be used by other trains in the section.

- The quantum of potential electricity savings, and the operational requirements to achieve these, are currently being investigated.

Class 19E 25kV on Coal line

Class 15E 50kV on Ore line
Capital projects life cycle process and environmental management tools (up to construction commencement)

### Project Phase
- **Master Planning / Concept Dev FEL 0 - 1**
  - Strategic environmental overview
  - Environmental issues included in Transnet Infrastructure Plan
  - Environmental Screening studies
  - Strategic Environmental Assessments
  - Public and government engagement
  - Inform Government planning frameworks

- **Pre-feasibility Development FEL 2**
  - Env Risk Assessments
  - Public and government engagement during planning studies on env issues
  - Poverty and Social impact studies
  - Sensitivity studies
  - Ensure alternatives selected during FEL2 meet env standards
  - Cumulative impact assessment

- **Feasibility Engineering FEL 3**
  - Environ resource economics studies (natural capital and full cost accounting)
  - Environmental Impact Assessments.
  - Public & government engagements
  - Environmental Management Plans
  - Biodiversity Offsets
  - Env friendly design
  - Corporate Social Investments.
  - Permits

- **Implementation FEL 4**
  - Construction Environmental Management Plans
  - Standards Environmental Specifications
  - Project Environmental Specifications
  - Method Statements
  - Monitoring, auditing and reporting
  - Public & government engagements to report on compliance during construction
Capital project life cycle process and environmental management tools (operations and closure)

**Project Phases**

- Operate
  - Implementation of Operational Environmental Management Plan
  - ISO 14001
  - Monitoring, auditing and reporting
  - Public and government engagement
  - Remedial actions
  - Continual improvement

- Closure
  - Decommissioning Environmental Authorisation
  - Remedial actions
  - Review and closure
Innovative solutions for sustainability
Environmental Resource Economics studies of ecosystem services

Challenges

• Port expansions needed in congested and sensitive port areas
• Mitigation of impacts of large mega projects not always possible
• How do we cost the environmental impact or loss?
• How do we explore opportunities for improvement to environment?
Innovative solutions for sustainability
Environmental Resource Economics studies of ecosystem services

Solutions

- Determine value of ecosystem services
- Determine loss due to development/project
- Determine value of the discounted net benefits of each development option
- Explore options for habitat improvements and creation: invest in these.

“Ecosystem services” as applied in the Millennium Ecosystem Assessment: ecosystems incorporate assets that yield a flow of services of benefit to people:

- provisioning services (production of foods, fuels, fibres);
- cultural services (non-consumptive recreation, amenity, spiritual); and
- regulating services (absorption of pollutants, storm buffering, erosion control).
Innovative solutions for sustainability
New Multi Products Pipeline

Context
- DJP being replaced
- 555km of new 24” pipeline
- 160km of new 16” pipeline
- Pump stations along route and at each terminal
- Coastal Terminal
- Inland Terminal

Inland Terminal & Pump Station
Pump Stations #1, #3 and #5
Coastal Terminal
Challenges

- Environmental Authorisation required biodiversity offset for Terminal 2. In absence of mitigation, impact on fauna & flora will be highly significant, especially for:
  - endangered veld types
  - two critically important species (frogs and owls)

Recommended that a Conservation Offset be established.
Innovative solutions for sustainability
New Multi Products Pipeline

- **Biodiversity offsets**
  - conservation activities intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to ensure no net loss of biodiversity;
  - measurable outcomes that result from actions designed to compensate for significant adverse residual biological impacts that arise from project development, after appropriate prevention and mitigation measures have been taken.
  - (Business and Biodiversity Offset Program, 2009)

- The need to consider a biodiversity offset is only triggered when residual biodiversity impacts of medium or high significance are evident.
- Biodiversity offsets are a last resort impact mitigation option; and only considered as a mechanism for compensating for residual biodiversity impacts after a developer has proven that reasonable and responsible actions have been taken to avoid, minimise and mitigate biodiversity impacts resulting from a proposed development.
Innovative solutions for sustainability
New Multi Products Pipeline

Challenges

• Part of Offset area utilised for agricultural purposes
• Land leased for grazing
• Blesbokspruit Highveld Grassland – threatened ecosystem
• Lesedi Spatial Development Framework and future development pressure

FIGURE 7-8: Proposed land acquisition for conservation offsets
Innovative solutions for sustainability
New Multi Products Pipeline

Solutions

- University of the North West appointed to develop the proposal for this offset
- Engagement with:
  - Local municipality
  - Local communities
  - Environmental authorities
  - NGOs
- Studies on frogs’ migratory routes

Layout of mitigation dykes and drift fence to protect migratory bullfrogs
Innovative solutions for sustainability
New Multi Products Pipeline

Solutions

- Mitigation measure used on site to protect the giant bullfrog from entering the construction site: fence constructed.

- Fence is closely monitored daily. Should any frogs get around the obstacle, they are safely relocated from the construction area.
Innovative solutions for sustainability
New Multi Products Pipeline

Solutions

• Measures taken to protect wetlands during construction
• Measures taken to protect topsoil for re-use
Innovative solutions for sustainability
Erosion control at Berth 208, Port of Richards Bay

Context

• Port of Richards Bay is a sensitive environment
• Expansion of port required
• eChwebeni Natural Heritage site
  site next to new bulk liquid berth
  (Berth 208)
• Few places in country where white, black and red mangroves co-exist

Mangroves: Woody plants that grow at the interface between land and sea in
sheltered and lagoonal waters in tropical and sub-tropical latitudes
Innovative solutions for sustainability
Erosion control at Berth 208, Port of Richards Bay

Challenge

- Shoreline erosion an existing problem
- Tug movement contributes significantly to erosion at ecologically sensitive heritage site leading to loss of mangrove area
- Environmental Authorisation suggests that solution be found – not prescriptive
- To develop a solution to mitigate the impact of wave energy along Berth 208 and allow tidal interchange
Innovative solutions for sustainability
Erosion control at Berth 208, Port of Richards Bay

Solutions

• Management and engineering solutions suggested

• Floating Pontoons (breakwater system) designed after studies of by CSIR and WSP and model tested

• 46 concrete pontoons each weighing about 63 tons. 15m long x 5m wide x 1.5m deep

• Designed for 70–80% wave reduction

• R50 million invested by Transnet to ensure sustainability
Lessons learnt

- Environmental risk assessment up front essential
- Project must budget for environmentally friendly solutions
- Best solution not always cheapest
- Go beyond compliance
- Best practice integral to project management and each phase of project life cycle
Innovative solutions for sustainability
Port of Ngqura

Context and Challenge

- Port of Ngqura is located in some of the most sensitive environments in South Africa and is surrounded by large undisturbed natural areas.

- Various naturally occurring raptors and other predators, including some Red Data species are present.

- Environmental Authorisation required that rodents (from incoming ships etc) be controlled.

- Rodents are plague carriers affecting human health; considered to be predators posing a threat to the existence of endangered bird species inside the Port and on the nearby Jahleel Island.
Innovative solutions for sustainability
Port of Ngqura

Solutions

- Transnet implemented the first ever poison-free system for monitoring and controlling rodents inside an international Port of Call in 2008.

- Transnet appointed the Urban Raptor Project to implement this rodent monitoring and control system.

- Since commencement, 12 Spotted Eagle Owls, eight Rock Kestrels, one Peregrine Falcon and ten Barn Owls have been reintroduced to the Port area by the Urban Raptor Project.

- In this time, rodent population numbers have dropped to natural state.
Thank you.

Targeting Sustainability in all we do.