

# BRIDGING THE GAP

with innovation & new business strategy



**SMART 2009 CONFERENCE**  
 10-11 June 2009  
 Sydney Convention & Exhibition Centre  
 Darling Harbour Sydney Australia



**Stream** Rail and Intermodal

**Title** At the Coal Face - ensuring the performance of the Australian coal export supply chain

**Presented by** Jonathan Vandervoort  
 General Manager  
 Hunter Valley Coal Chain Logistics Team

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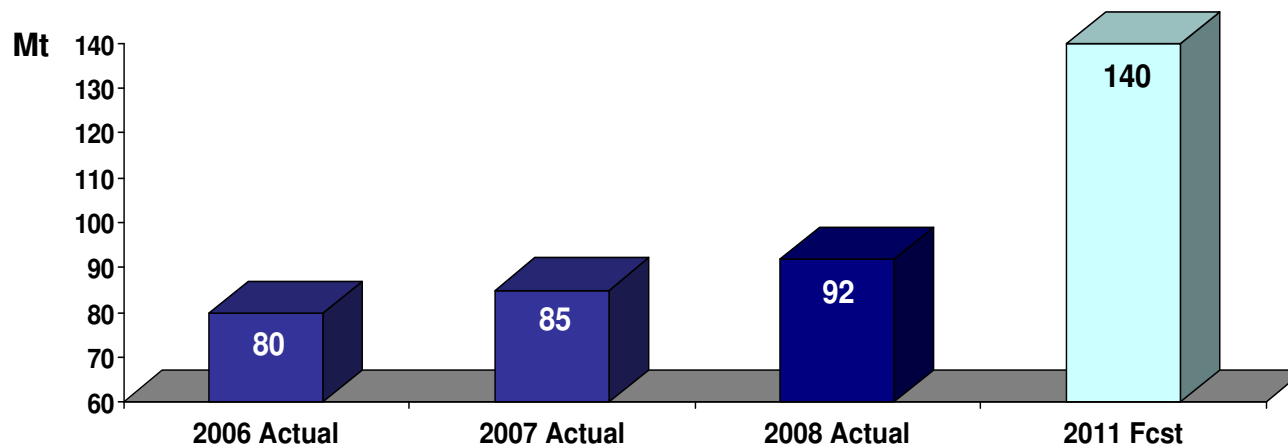


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# Hunter Valley Coal Chain

- Being planned and made available **at an all-time record** rate over a sustained period. Productivity of existing infrastructure increased by 15% from 2004 to 2007
- For 2008 **the system finished 9% (7mt) ahead** of 2007 with a **16% increase in the rail task (Net Tonne Kms)** as demand moves further away from the Port of Newcastle
- Approximately **\$650million in new infrastructure** has been commissioned in the last 3 years based on HVCCLT modelling to identifying current capacity constraints
- A further **\$2.5billion in new infrastructure is planned** for delivery in the next 4 years based on HVCCLT modelling of infrastructure required to meet forecast demand



# Hunter Valley Coal Chain: The Worlds Largest Coal Export Operation



- 35 Coal Mines
- 14 Producers
- 24 Load Points
- > 80 Different Brands of Coal



- 2 Above Rail Operators
- 28 Trains/15,000 trips per year
- 2 Track Owner/Operators
- Haulage distances up to 350km



- 2 Coal Loading Terminals
- 5 Dump Stations
- 1.5Mt of Working Stockyard
- 5 Ship Berths and Loaders, "4 Queues"



- Approx. 1000 vessels per year
- Average vessel size is 87kt
- Avg 2 Cargoes per Vessel
- Multiple Components per Cargo
- Tidal constrained river port



- 10% Domestic Consumption
- 90% Export – mostly Thermal coal
- 65% to Japan

- Turn of Arrival loading port

- JIT cargo assembly process

- 16 independent organisations required to move each tonne of coal

- No control over demand – only two weeks visibility and highly variable volumes

- Avg 5 days clean coal on stock at the mines

Q: How to maximise system throughput and drive efficient asset utilisation?

A: Plan and operate the system as though owned by a single shareholder



# HVCCLT: A Cooperative Planning and Operating Model



- *MOU between the organisations that own the train, track, terminal and port infrastructure*
- *The movement of every tonne of domestic and export coal is planned via the HVCCLT*
- *HVCCLT provides a 'system wide' forum for pursuing operational improvements and making efficient decisions about future investment in infrastructure*

- Provides centralised planning services on behalf of its members:
  1. **Short term objective** – focus on maximising daily capacity and throughput
  2. **Long term objective** – assist members with investment planning
- Established as a trial in 2003 and formalised with governance arrangements under an MoU in July 2005 – operates on a premise of cooperation between the members
- Membership includes all transport asset owners in the Hunter Valley
- 35 Employees seconded from member organisations
- \$6 million investment in state-of-the-art constraint based planning technology and models

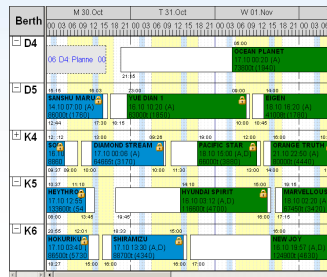


# Short-term Planning – Operations Planning and Scheduling

- HVCCLT developed a \$6 million state of the art Integrated Planning System 'IPS' software tool
- Provides for a continuous process of preparing and updating fortnightly plans and daily schedules to fulfil customer orders to load vessels

**Step 1:** An order is placed with PWCS to load a vessel. PWCS accept or decline the request

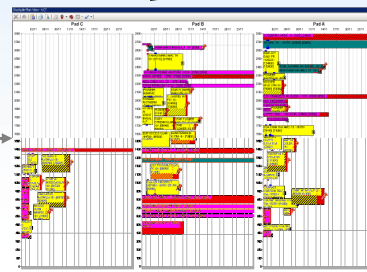
**Vessel Nomination:**  
Size,  
Type,  
Arrival Date,  
Cargoes,  
Components,  
Rail Operator,  
Load Plan,  
etc



**IPS: Vessel Stem**

**Step 2:** A vessel stem is prepared that allocates vessels to berths and sets loading time and sailing times

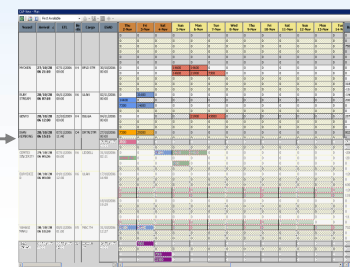
**Step 3:** The stockpiles at the port are planned to ensure the cargo is assembled ready to load the vessel at its appointed time



**IPS: Stockpile Plan**

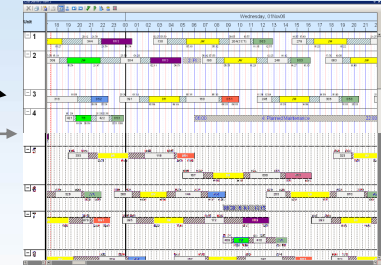
**Step 4:** A first cut of the Cargo Assembly Plan is prepared which identifies how many tonnes and on which days the coal will be moved from the mines into the port.

**Step 5a:** The Cargo Assembly Plan is turned in a rail schedule which specifies exactly what trains will run at which times to which load points – this is the plan that is handed over each day to the train operators

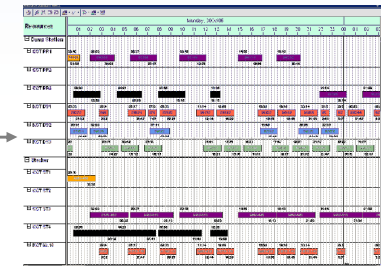


**IPS: CAP**

**IPS: Cargo Assembly Schedule**



**IPS: Resource Utilisation Plan**



**Step 5b:** A set of plans are provided each day to identify exactly what assets are required to do what task at what times in order to maximise system throughput. This includes everything from stackers to assemble stockpiles through to reclaimers, shiploaders and requests to the Newcastle Port Corp to move vessels

The Coal Chain plans are continuously revised in response to:

- Changes and events that occur during the Live Run mean the next day's plan needs to be updated
- Changes (e.g. to blends) from Customers necessary to fulfil their vessels.

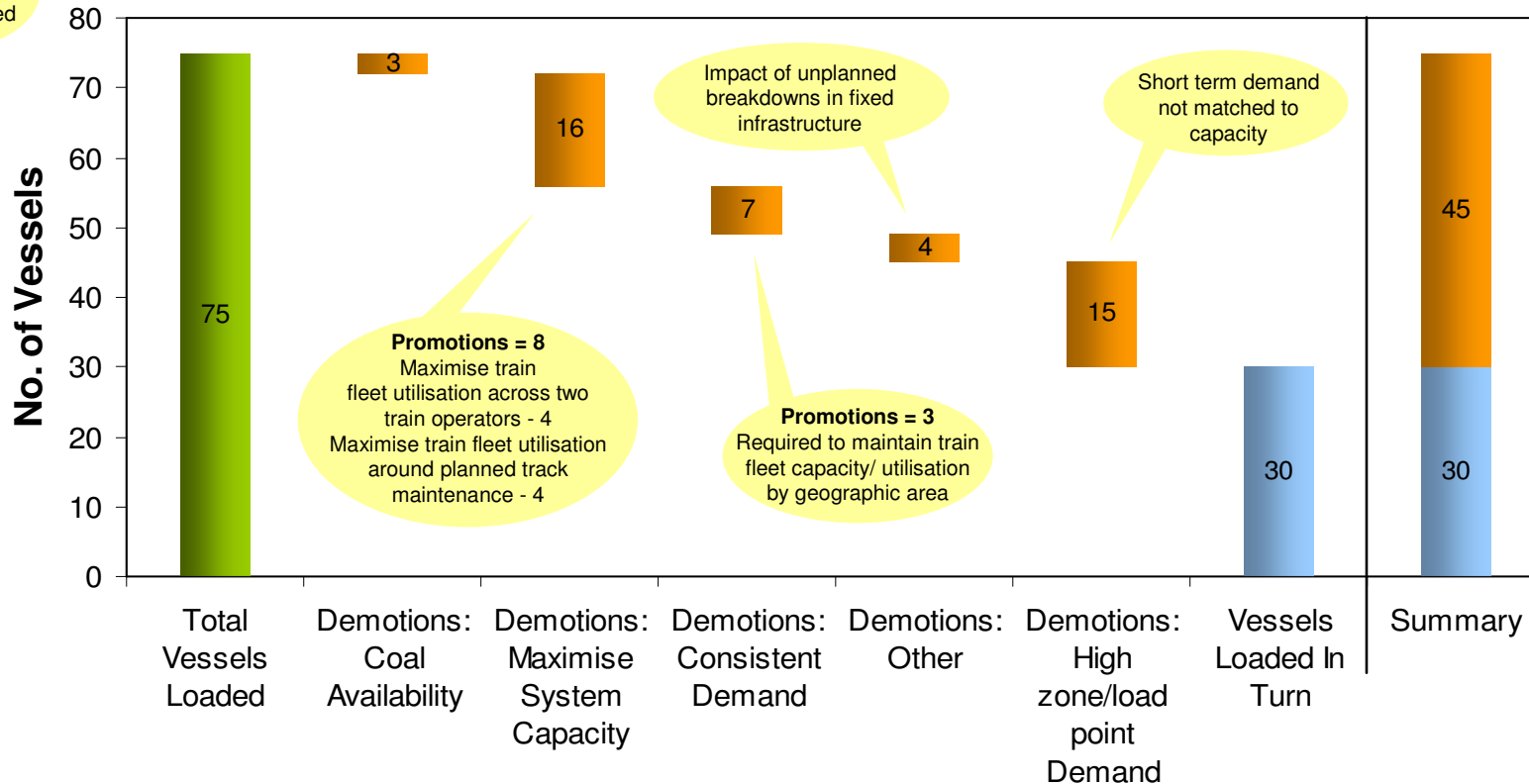


# Short-term Planning – Maximise Throughput (within contractual obligations)

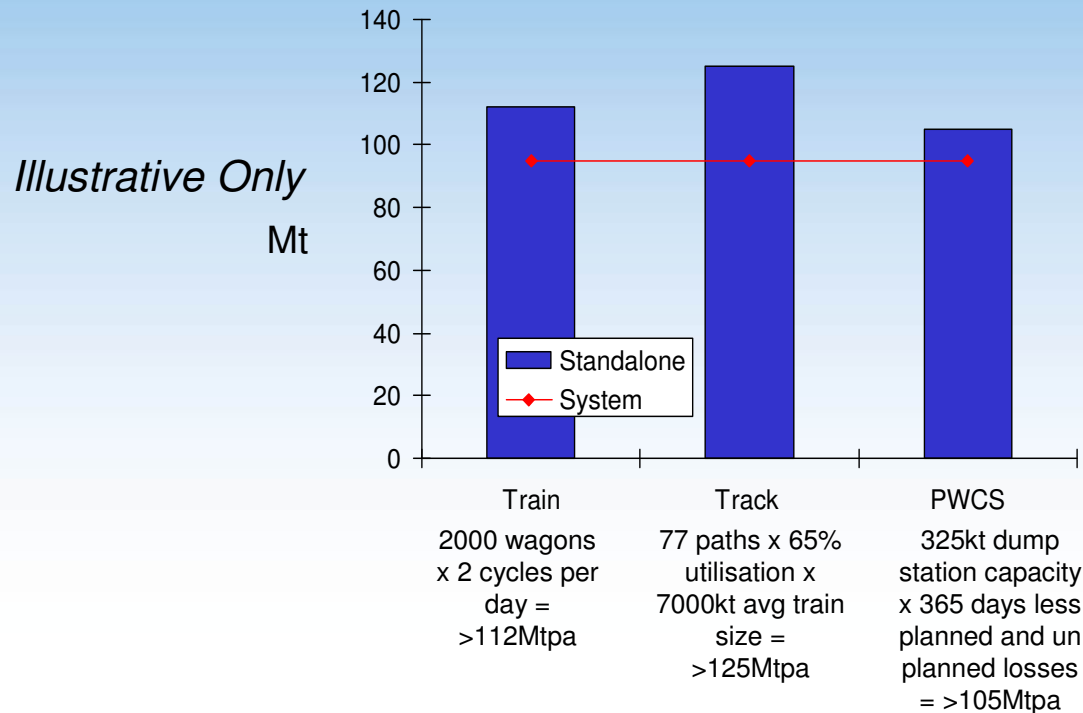
## Case Study - Out of Turn Loading for May

- Vessel loading sequence (therefore Port stockpile allocation) based on Turn of Arrival off Newcastle Port
- Contracted rail capacity often based on regular and consistent off-take from Producers by geographic region

Commercial drivers not always aligned



## Short-term Planning – Managing the Coal Chain as a System



- Each element of the coal chain can claim capacity above the system capacity - however these standalone capacities **are not available** in the sense they cannot be turned into real export tonnes
- The opportunity to lift the system capacity closer to the standalone capacity of the coal chain is entirely dependent upon the willingness of each member of the coal chain to work together. Maintenance alignment is the major lever to unlocking capacity

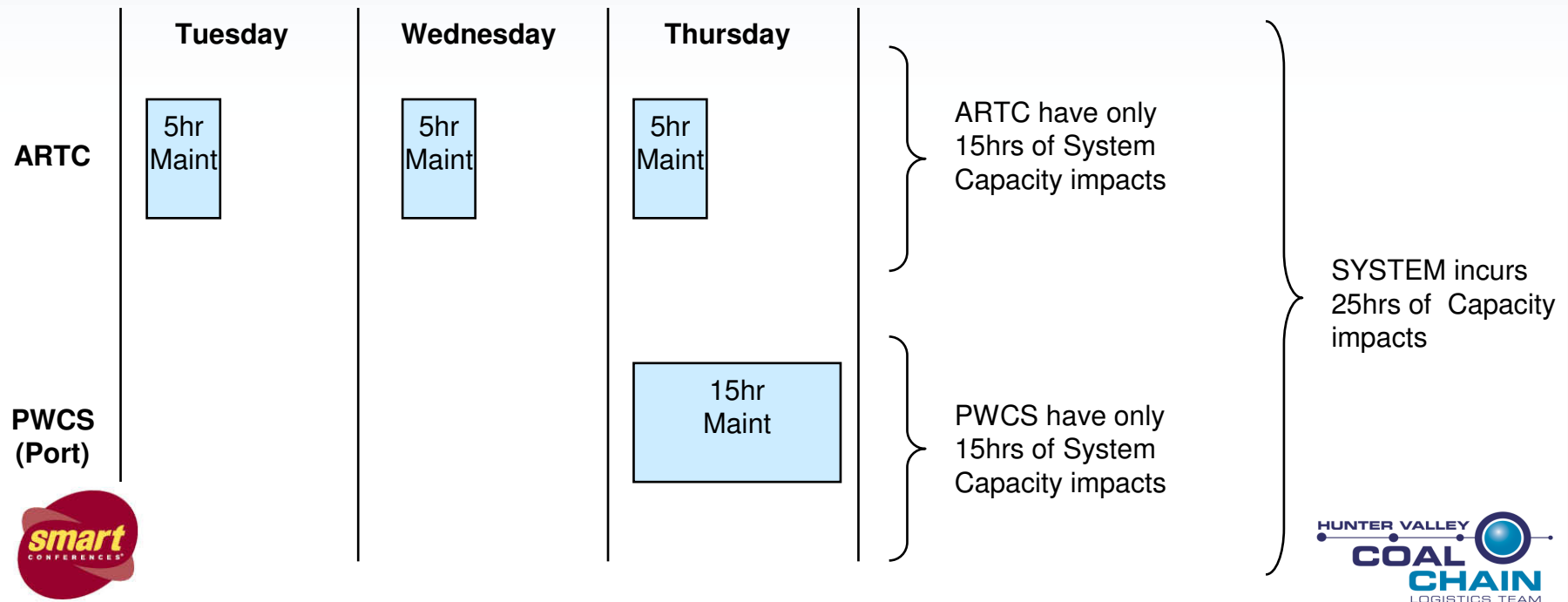


## Short-term Planning – Maintenance Co-ordination

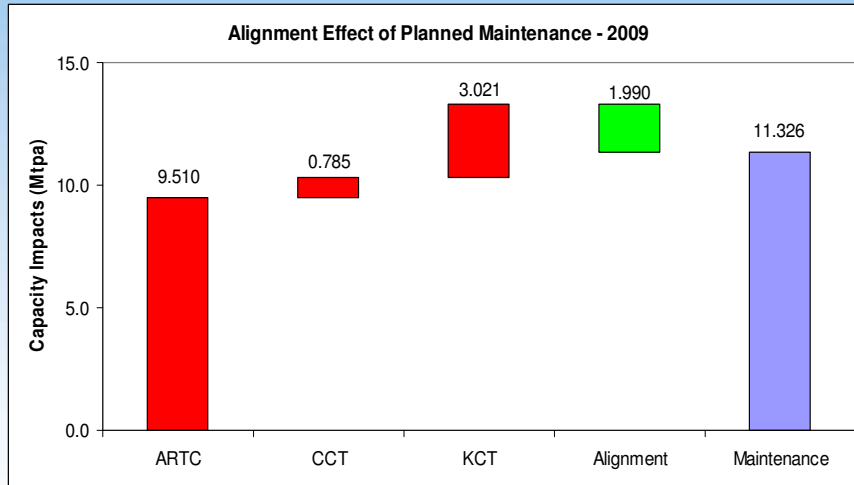
Capacity losses due to planned maintenance are the biggest driver of system capacity being below standalone capacity of each element of the coal chain:

- Maintenance impacts at the port reduce access to available rail paths
- Maintenance impacts on the track reduce access to available dump station capacity
- The combined effect means that the System losses through planned maintenance are greater than the standalone losses of each member – i.e. no individual organisation is “the constraint”, but collectively all participants determine system capacity

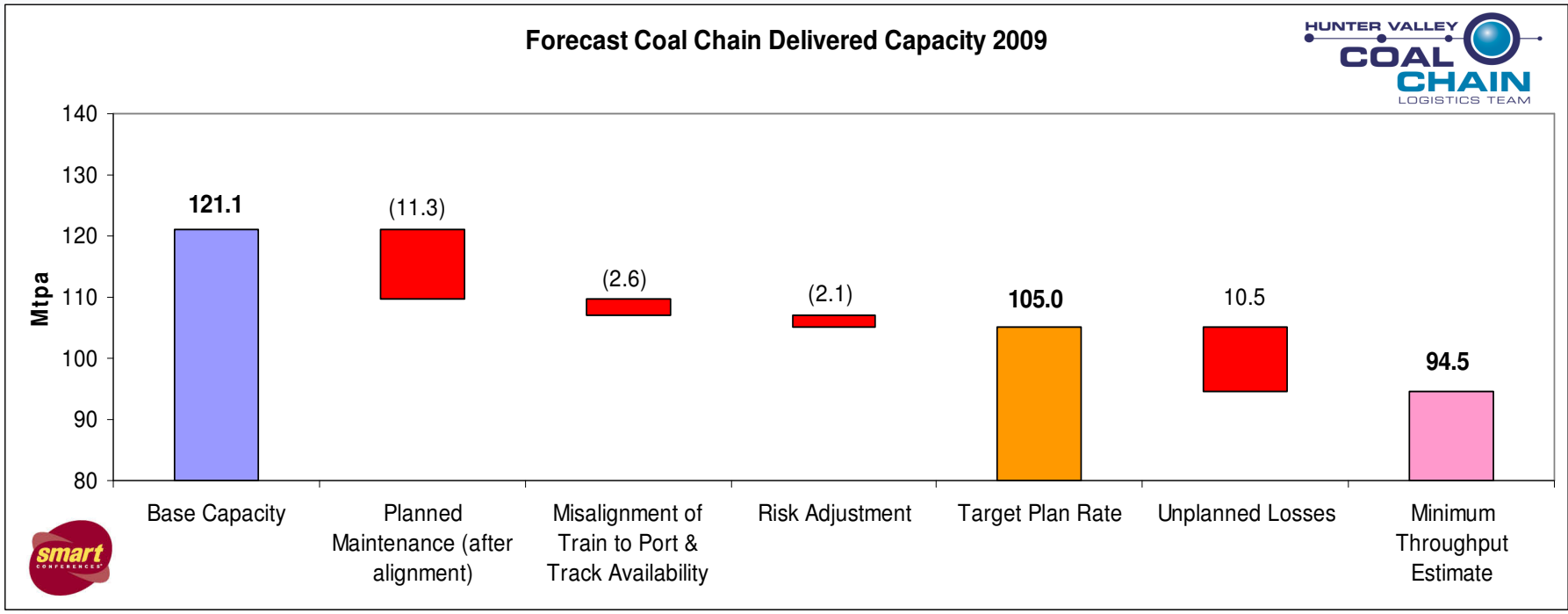
*Illustrative Only*



## Short-term Planning – Maintenance Co-ordination

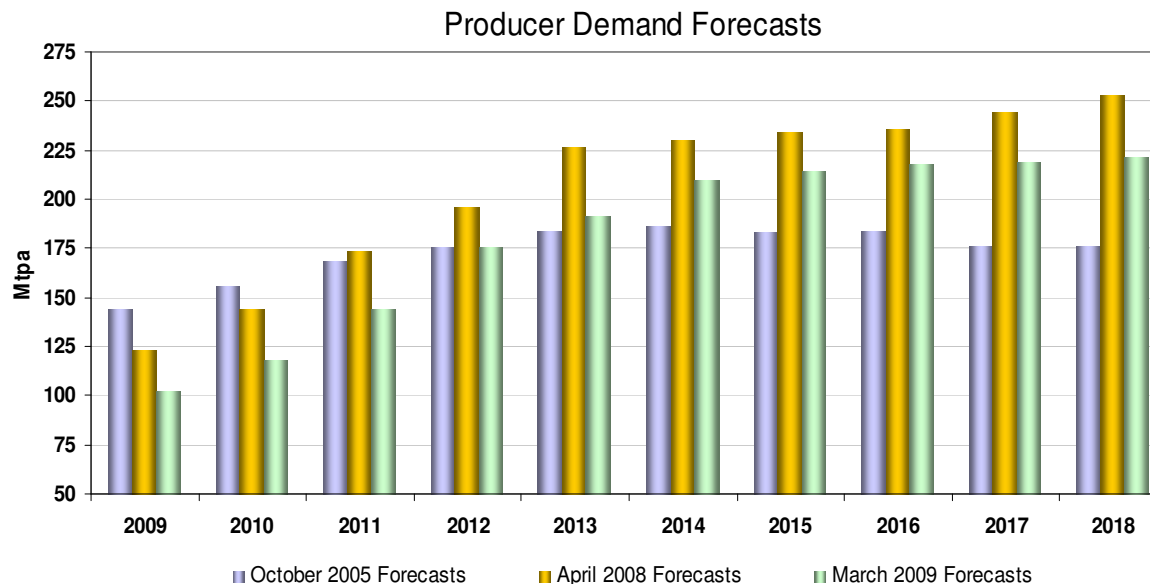


**Unplanned Losses**  
 Members = 7.6%  
 Non-Members = 2.4%  
 Total = 10.0%



## Long-term Planning – Coordinating Capital Investment

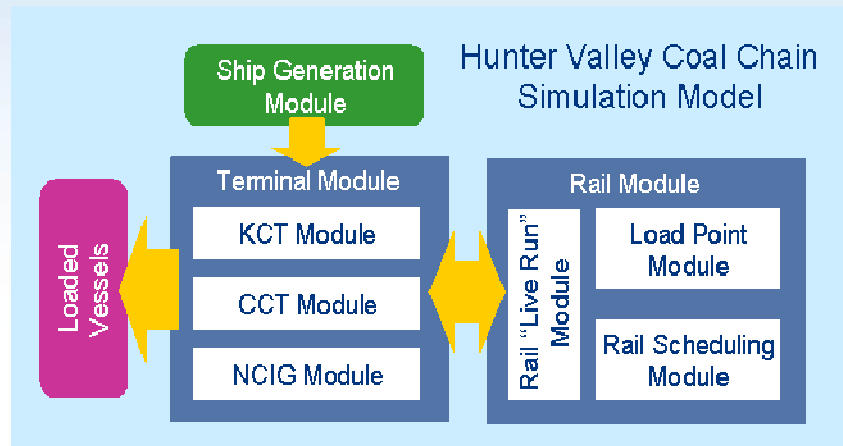
- Forecasts of between 50% and 100% growth in export demand from Newcastle over the next ten years continues to create pressure for growth in coal chain capacity
- Cooperation within the coal chain becomes even more critical, with up to \$2.5 billion in new transport infrastructure required to create capacity to meet demand. Key themes for the future include:
  - Contract alignment – how to coordinate investment when there is no common contract for capacity across the system
  - Efficient allocation of capital – who determines where money should be spent to create the least cost outcome for the system (e.g. trade-off between loadpoint, train, track and port capacity)
  - Integration of mines and ships into the cooperative model



# Long-term Planning – Capacity Modelling Tools

## Arena Simulation Modelling

HVCCLT developed an Arena based Coal Chain Simulation Model consisting of several modules that cover the related activities of the Coal Chain

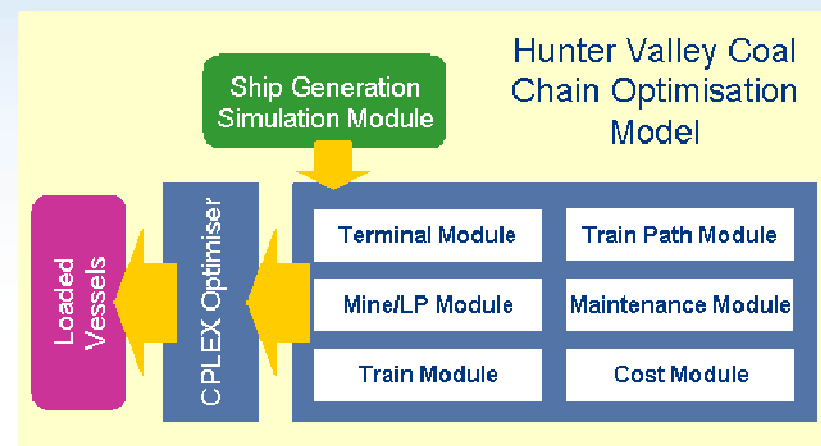


- An imitation of the real Coal Chain systems and processes
- Represents the key characteristics of the Coal Chain using mathematical and logical relationships.
- Considers variability, process and operating rules
- Excellent for understanding sensitivities and explaining reasons
  - Requires a large number of runs



## Ilog Optimisation Modelling

HVCCLT jointly developed with CSIR an Ilog based Coal Chain Optimisation Model to enable high level pre-simulation model analysis



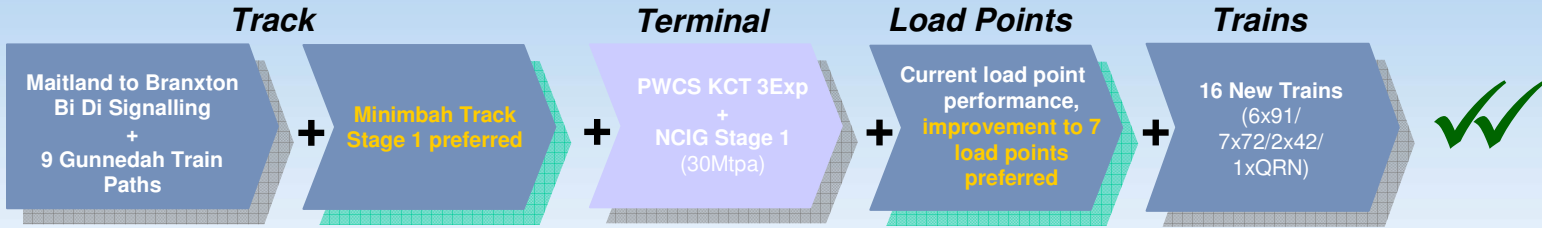
- A high level representation of Coal Chain
- Balances demurrage costs against the cost of providing additional infrastructure to find minimum cost solution
- Uses average values, and system constraints
- Difficult to explain why a certain solution is the best, as the governing algorithms search and find the best.
- Optimum solution is found in one run



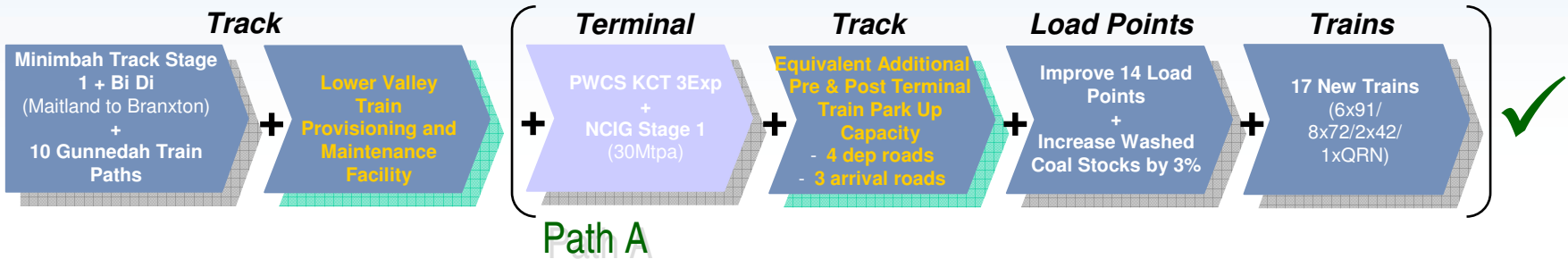
# Long-term Planning – Pathways to Achieve Throughput of 140 Mtpa

*Illustrative Only*

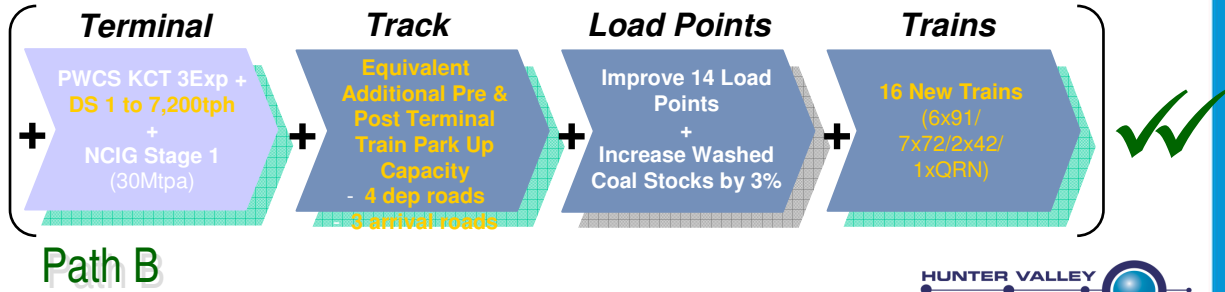
## Pathway to 118Mtpa....



## Pathways to 140Mtpa ....



OR



# Long-term Planning – Coordinating Capital Investment



*Most new coal production coming from more remote regions*

- Options for rail access over mountain range under development
- New passing loops, timetables, track capacity upgrades in progress

- New train control technology
- Additional passing loops
- New timetables

- Upgraded capacity at Muswellbrook Yard
- Duplication of single line track
- Increased train speed
- Additional track over hills
- New overpass separating passenger and coal trains
- New timetable

- PWCS Expansion to 110 and up to 122+
- New Terminal (NCIG)
- More NPC capacity



Where to go for more information: [www.hvcclt.com.au](http://www.hvcclt.com.au)

the world's largest coal export operation

- about us
- map of operations
- events calendar
- newsletters
- contact us / feedback
- throughput reports
- maintenance plan
- other documents
- capacity notices
- links to other sites



# Questions ?

## HVCC PERFORMANCE [Download latest performance report](#)

Target for month	month to date
	MTPA
April 2007	94.3
	Inbound 89.0
	Outbound 84.8

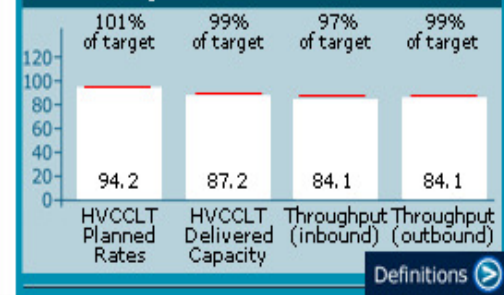
as at midnight 23/4/2007

Vessel Queue	70	Port Stocks	933	Vessels Assembled	3
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last 24 hours

	KT	MTPA	% vs plan
Inbound	218	79.56	78%
Outbound	237	86.58	117%

## year to date coal chain performance (MTPA) as at midnight 31/3/2007



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