

# Transition Engineering Long Term Supply Chain Strategy New Zealand

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# Ministerial Expert Working Group



Provide Advice to Cabinet

40-Year strategy

Efficient Freight Supply Chain

Net Zero Carbon

Critical Investments next 5 years

- Greg Miller
- Wayne Brown
- Noel Coom
- Susan Krumdieck
- Shane Vuletich
- Vaughan Wilkinson

Transition Engineering  
Research Group at  
Canterbury University

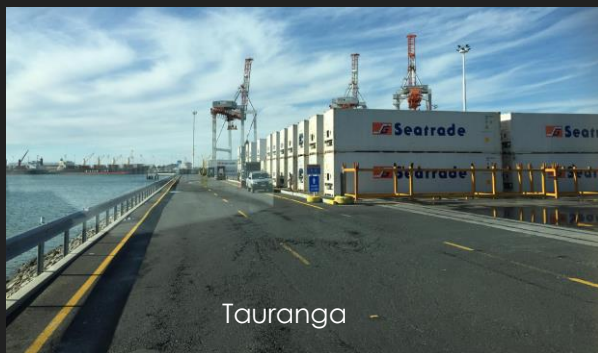


# Upper North Island New Zealand

85% Mode Share



# Three Ports, Infrastructure, Economy



Southdown  
Freight  
Hub

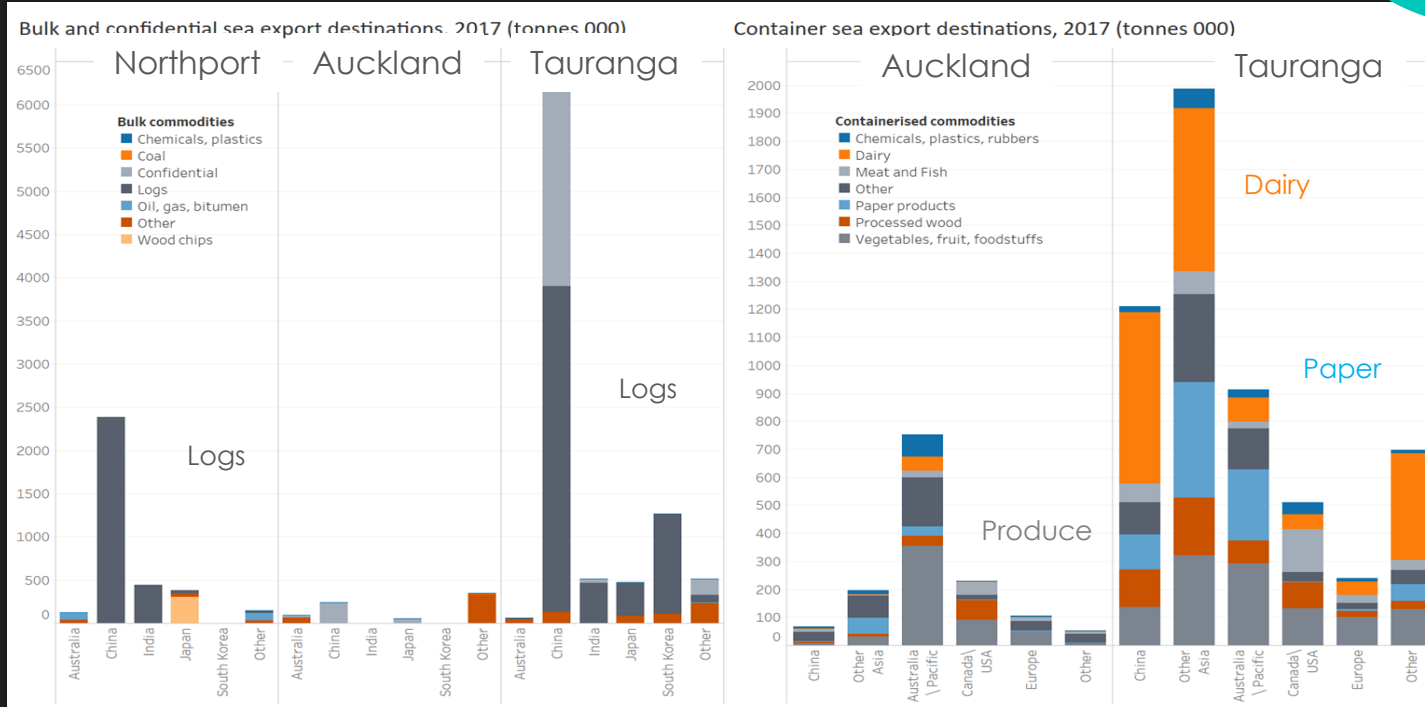


North Auckland  
Rail Line



# Exports come from Land

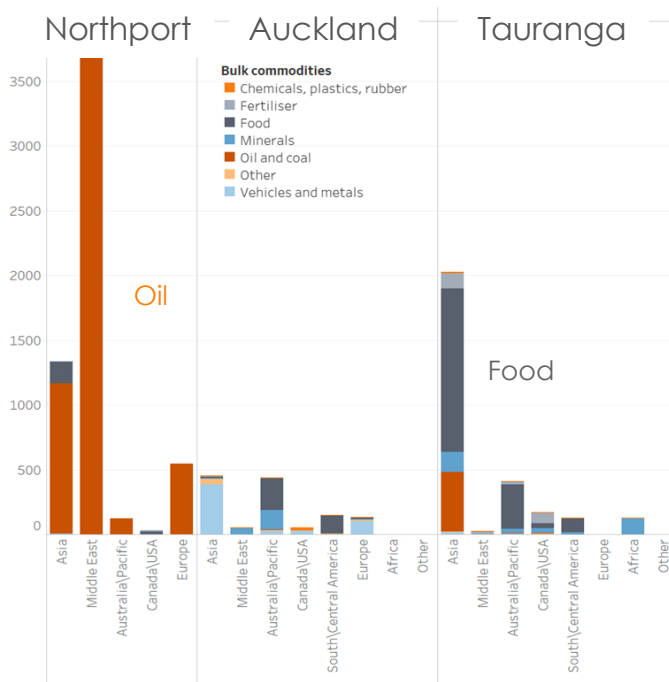
Bulk  
(ktonnes)



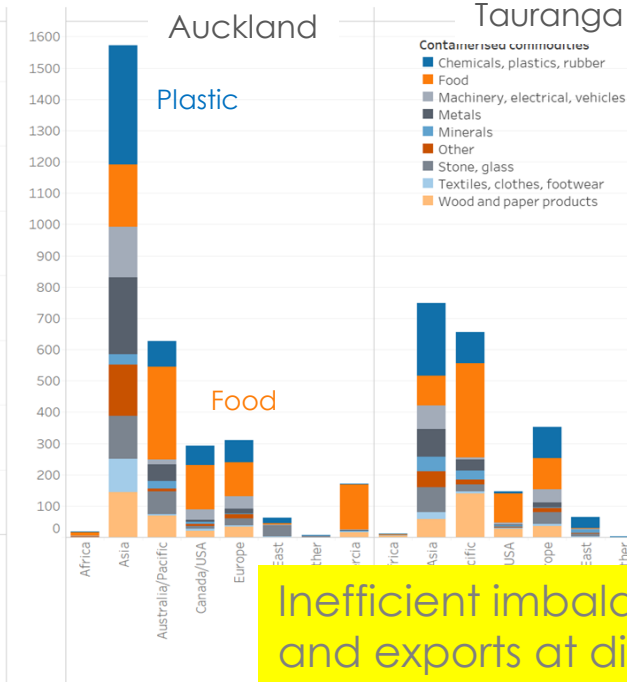
# Imports Through the Auckland CBD

Bulk  
(ktonnes)

Bulk and confidential sea import origins, 2017 (tonnes 000)



Container sea import origins, 2017 (tonnes 000)



Containers  
(TEU)

Inefficient imbalance of imports and exports at different ports



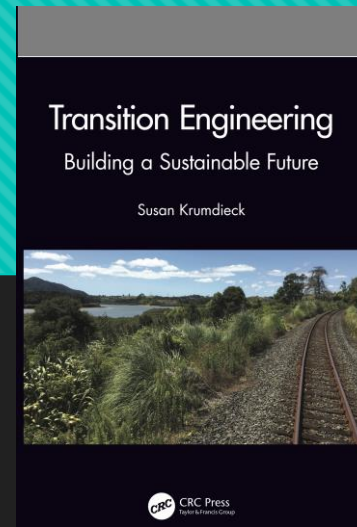
# The Auckland Urban Port



Re-Develop  
Auckland Waterfront

Auckland  
“competing” with  
other ports doesn’t  
make sense and is  
inefficient.

# Transition Engineering



- How do we take the 40 year strategic view?
- How do we invest in carbon emissions reduction?
- How do we include community, culture and social values?
- How do we understand economic values of freight, goods and jobs?
- How do we get the boys to play nice?

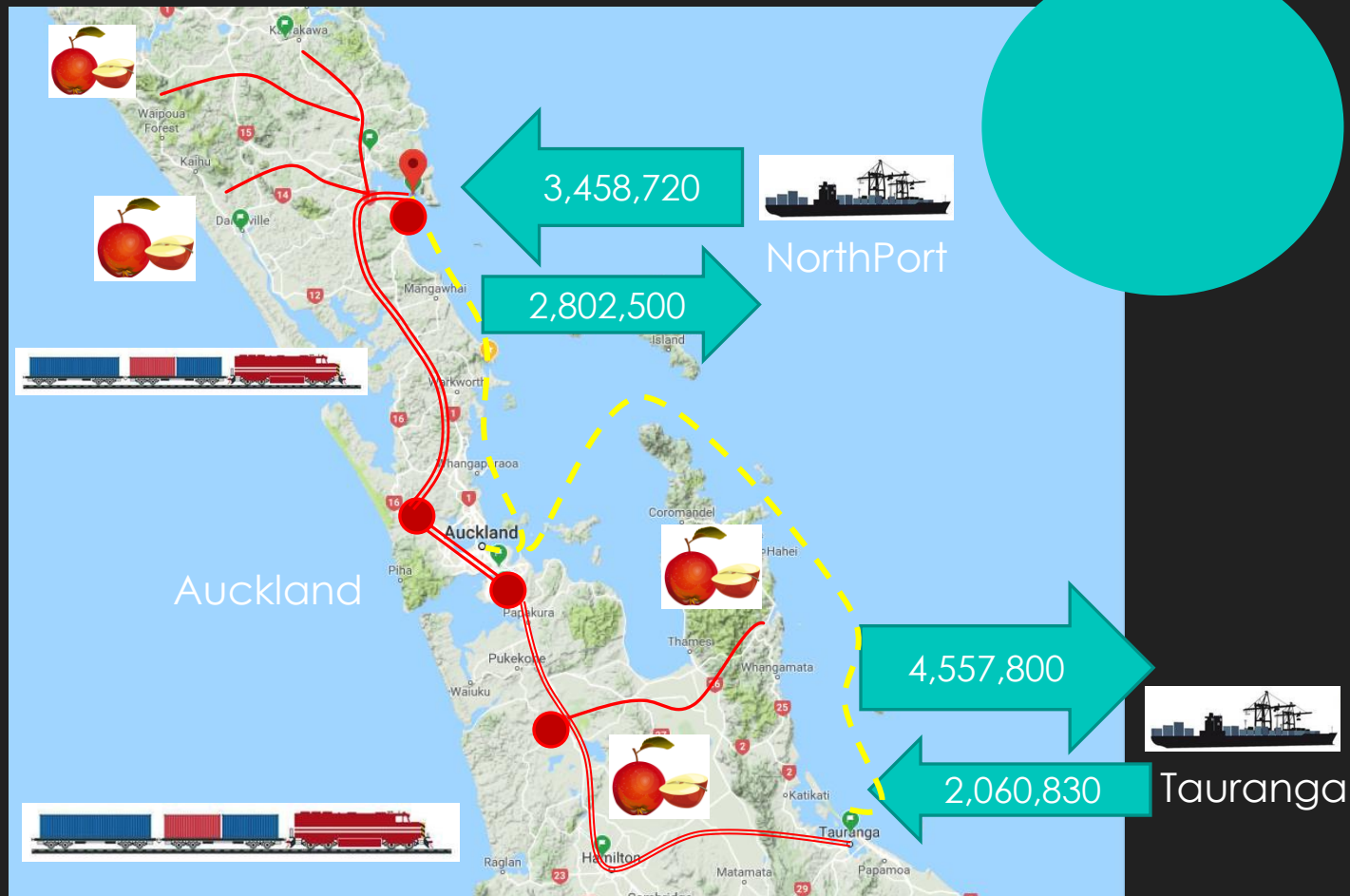


# 2060 What would work?

Northland  
Thriving

National Electric  
Rail Passenger & Freight

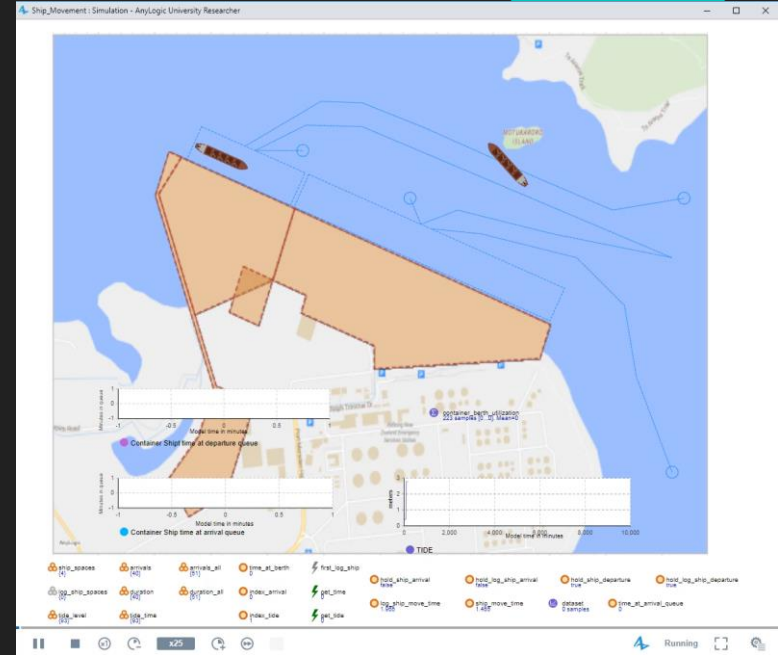
80% Freight Rail &  
Coastal Shipping



# Port Development Digital Twin

## Agent Based Simulation Patricio Gallardo

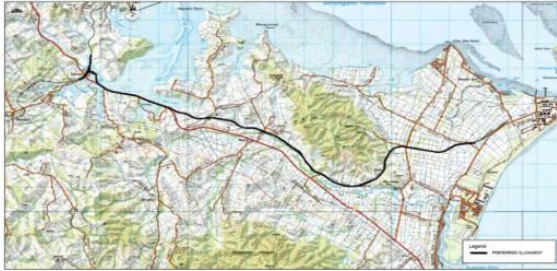
- Berth Utilization
- Entrance and Departure
- Service Windows equal to Auckland



# Rail Freight Digital Twin

Northport\_to\_Auckland : Simulation - AnyLogic University Researcher

## Northport to Waimauku



The model simulates train movements between Northport and Waimauku. A rail link to Marsden Point has already been proposed. Rather than using routes from OSM, this model is based on a customized network that includes a rail connection to Marsden Point (<https://www.greaterauckland.org.nz/2018/03/09/northland-rail-part-2-marsden-point-line/>). It allows to study different interventions to improve the train frequency within this corridor. The model allows to assess the impact of increasing train speed or converting a specific section of of the network to double track. Moreover, the model delivers a potential timetable for train operations based on different strategies. The addition of a new terminal is not considered, yet, it is something that can be easily upgraded given the architecture of the background program. In the Business as Usual Scenario only 6 trains manage to do a run a roundtrip within the simulated time (1 day).

Train Speed (km/h)



Single (check) or Double (uncheck) track

- ☒ Northport to Maungaturoto
- ☒ Maungaturoto to Wellsford
- ☒ Wellsford to Helensville
- ☒ Helensville to Waimauku

# Conclusion

- New Zealand's Economic Future Depends on Electrified Rail
- Today's political and personal issues are irrelevant in 2060
- Today's infrastructure and supply chain regulation decisions are critical to achieve climate targets and ensure economic vitality