

# Food, transition, EROI, & NZ

## A Nuffield International Farming adventure



Solis Norton, Nuffield Scholar, 2018

# Introduction



- The transition
- Biophysical boundaries of humans and food
- Nuffield International – the wings to fly
- Topic: Primary food systems in New Zealand & energy constraints  
United Nations Committee on Food Security, World Energy Council, Cargill, Syngenta, Monsanto, Bayer, Horsch, Rabobank, International Fertiliser Association, USDA, Amazon, Uber, FinnAvia, CORSIA, Synlait, Fonterra, Universities at Leeds, Cumbria, Otago, Victoria, Massey, Wageningen, Edison Electrical Institute, Bloomberg etc etc

70,000+ km...

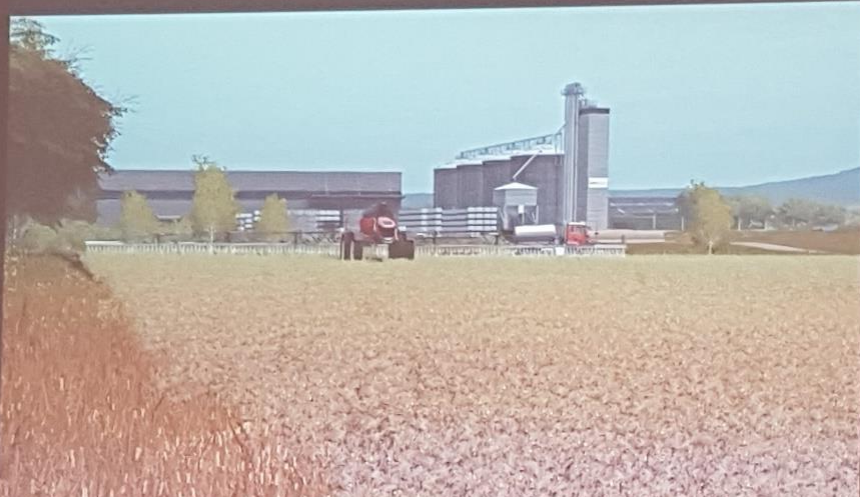
# Low tech



# Mega tech



# Future tech



# Transition context: NZ Carbon Zero Act

- Reduce emissions ~75% or more by 2050
- How? Low emissions economy report – NZ Productivity Commission 2018
- Transition to renewable electricity, away from fossil fuels (farming?)
- Scenario modelling by Vivid Economics (London)

# The problem

- Scenarios are born only of economics
- No consideration of biophysical impacts
- Particularly energy
- How do we quantify those impacts?

# Energy Return on Investment

## *Quantifying the problem*

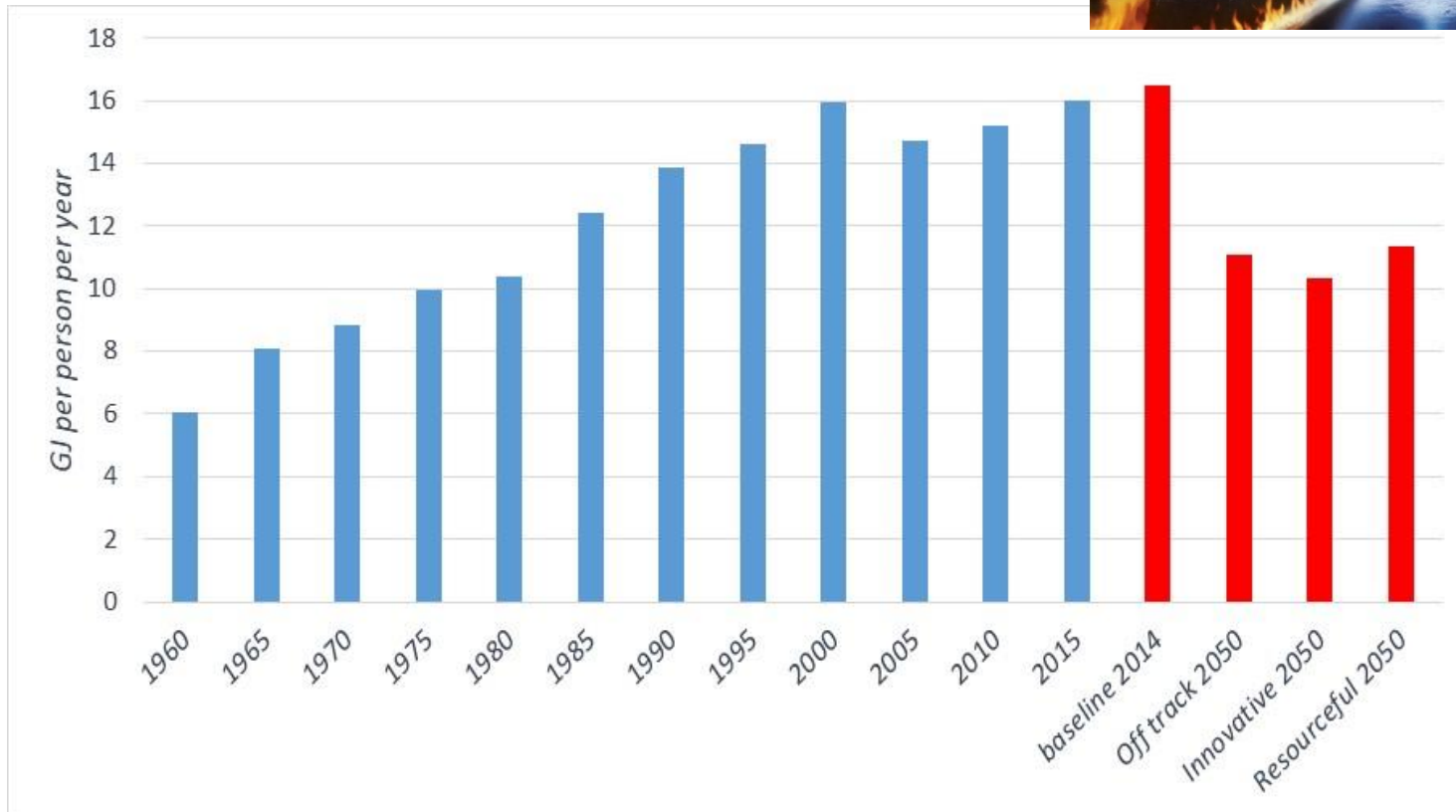
- A ratio of outputs to inputs on an energy scale.
- Outputs (energy used by society): from coal, petrol, diesel, PV, hydro, wind, biomass etc
- Inputs (energy invested by society): in mining, refining, building renewables etc
- Key point: High ratio is good, a low ratio is bad
- What is this ratio for NZ today?
- What can we expect in 2050?





# EROI & the low emissions scenarios

- Based on the numbers in Vivid's Technical Report
- Today: 20:1
- Resourceful 2050 scenario - 14:1
- Innovative 2050 scenario - 10:1
- What impact of a change of 25 – 50%
- Similar change for Fonterra processing
- To come:  
Wakatu, Synlait, red meat processor, animal health providers....



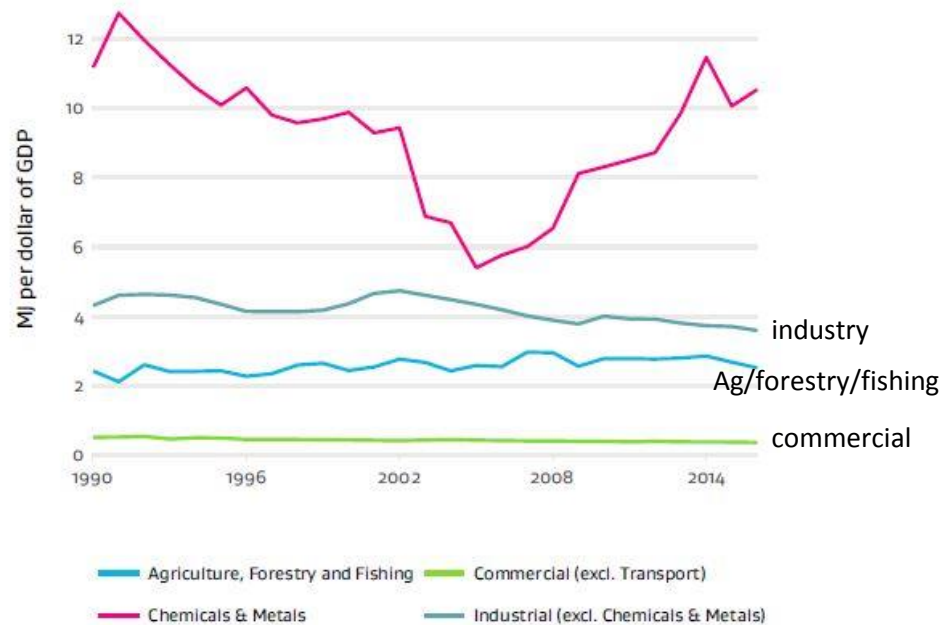
([https://www.theglobaleconomy.com/New-Zealand/Energy\\_use\\_per\\_capita/](https://www.theglobaleconomy.com/New-Zealand/Energy_use_per_capita/))



From an energy use perspective we're headed back to the 80s

# Risks

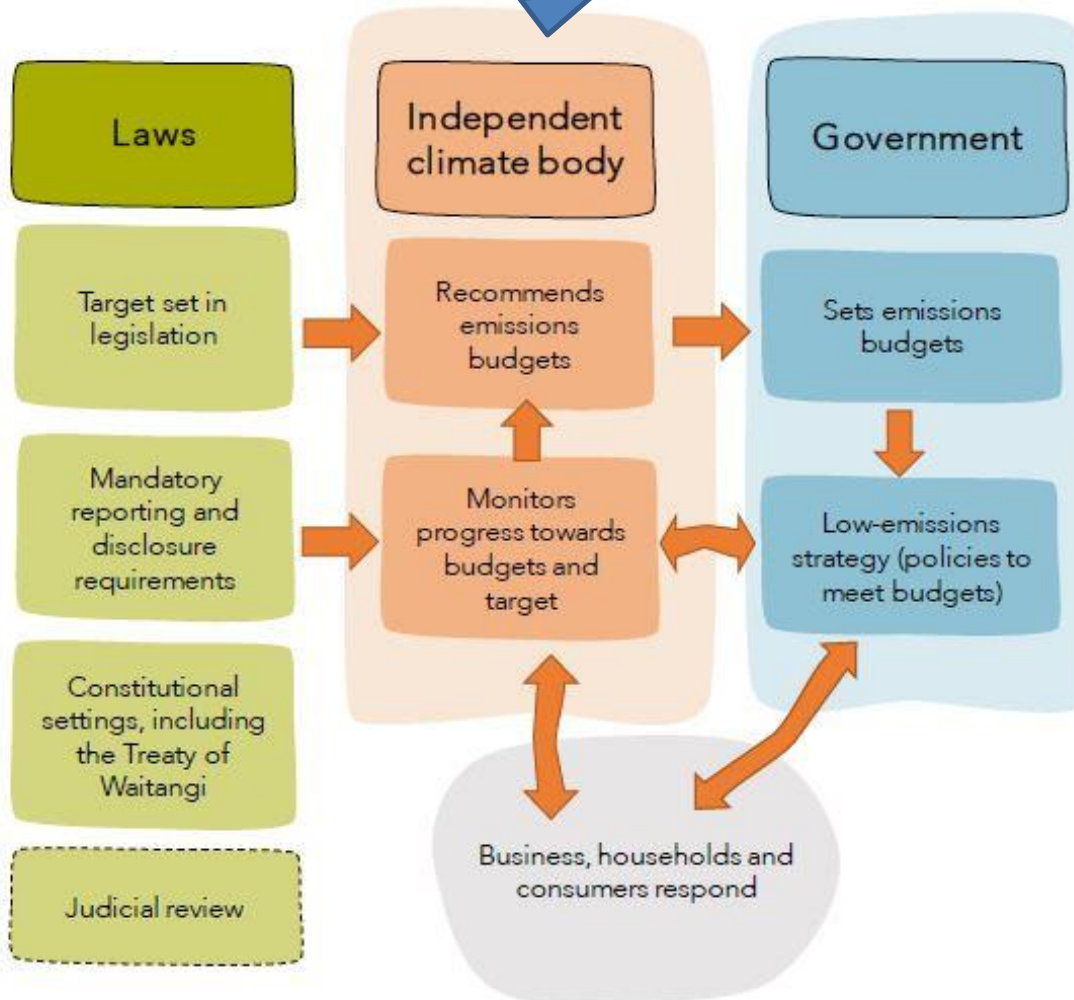
- An equitable transition anticipating double GDP.
- Taking the wrong path
- Waiting for the silver bullet
- Get EROI values for NZ



Primary energy consumption per dollar of GDP produced by sector  
([Ministry of Business Innovation and Employment 2017](#))

# The solution

Laws and institutions to support the low emissions transition



Create Transition Institute

Bring biophysical measures

Together with economics

Spearhead in primary food systems

*Create a transition that matches economic aspirations with biophysical boundaries*

# Take me home

- The transition requires an energy mix with ~50% lower return on investment than we have today
- Need to understand how this will impact NZ and our food systems
- A Transition Institute within the Independent Climate Body can do this with EROI and other biophysical measures
- Our primary food systems are an ideal EROI guinea pig
- Time, apparently, grows short.

*Marvellous thing!*

[solinsnorton1@gmail.com](mailto:solinsnorton1@gmail.com) 027 5552882



Thanks Nuffield – we love you 😊