Adaptation and Transformation

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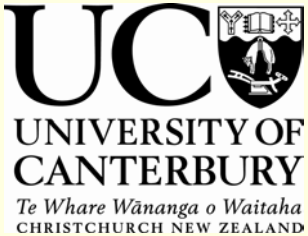
Land Transport NZ
Ikiiki Whenua Aotearoa



What will your great-grandchildren say about us?

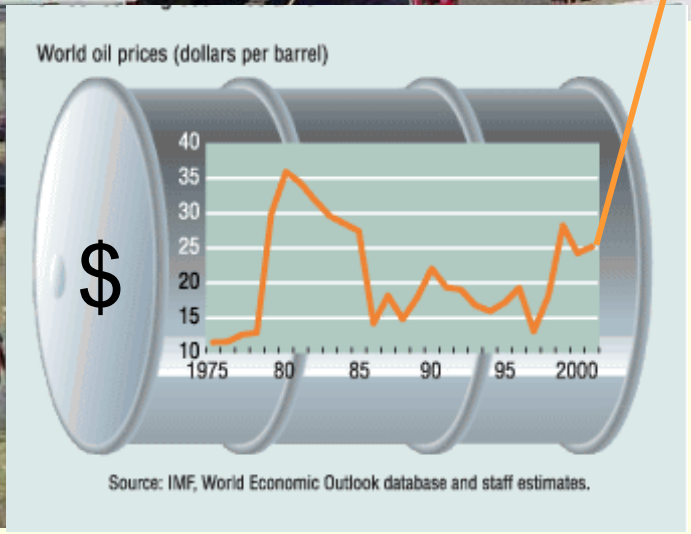
Thank God they did that..

What the Hell were they thinking?


ipeNz
"If you don't know where you are going, any road will take you there." - Lewis Carroll
BACK TO THE FUTURE
Transportation Conference 2006
IPENZ Transportation Group Workshop & Conference
My challenge to you
If you don't change direction you will probably get where you are headed.

There are indications that…

Your current Transport Engineering approach may not have a future.



Mistress of Doom?

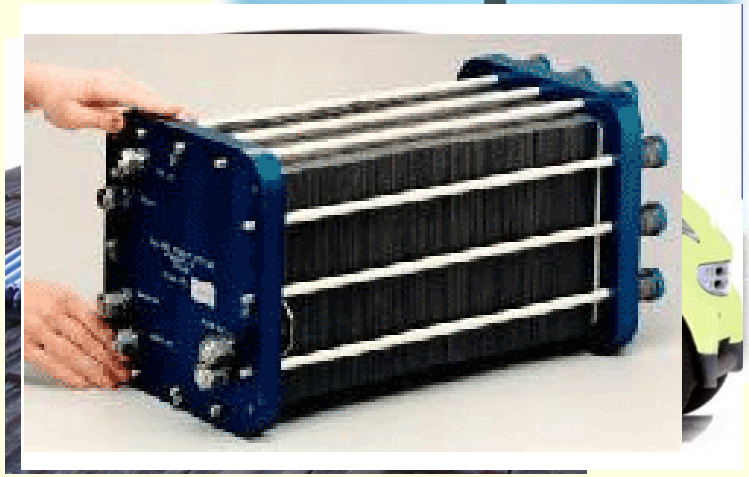
Curriculum Vitae

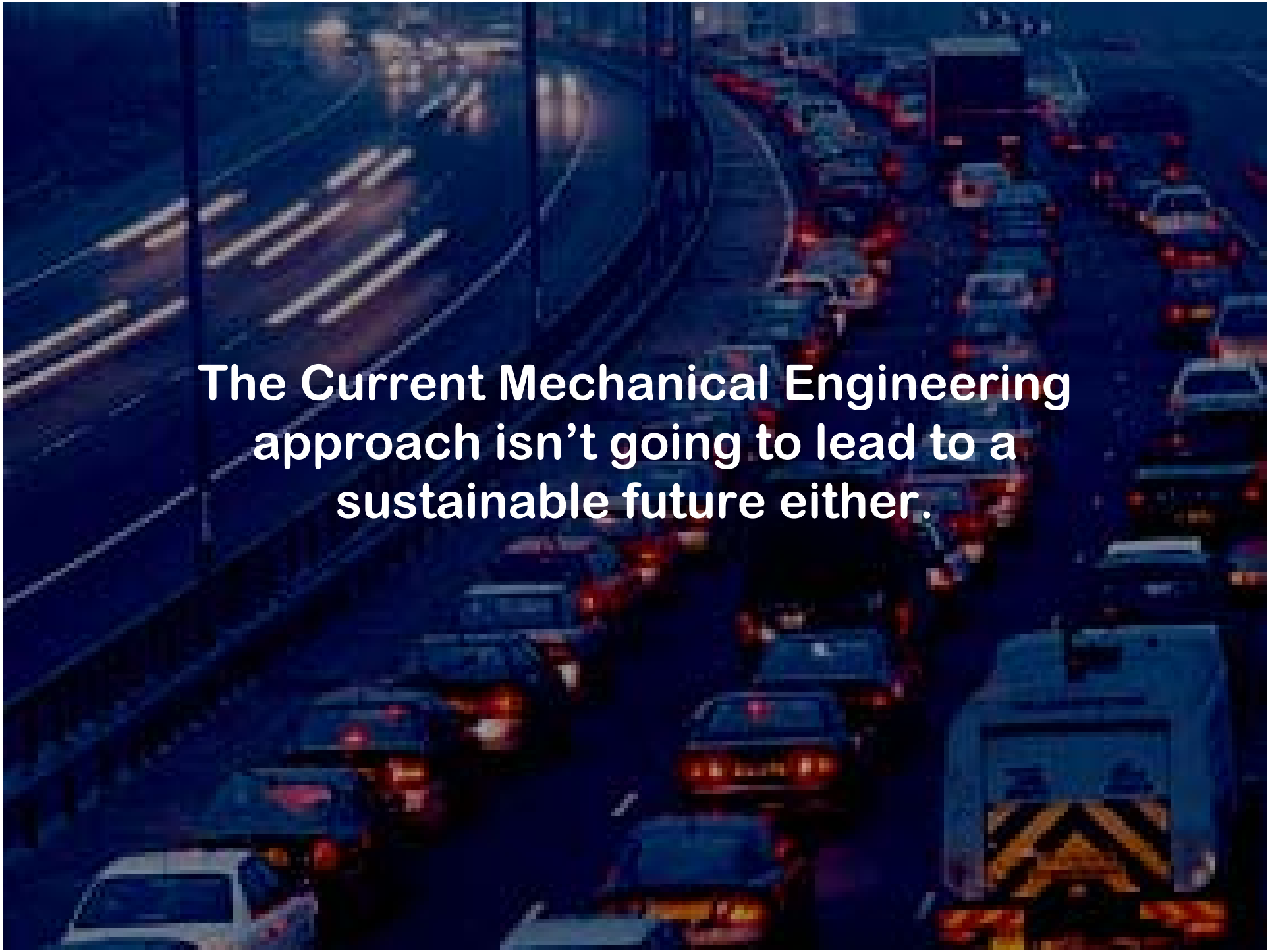
Dr. Susan Krumdieck

BS, MS, PHD (University of Colorado at Boulder)

MECHANICAL ENGINEERING

- Variable Speed Wind Turbine Controls
- Solar Hot Water System Design & Certification
- Building Energy Efficiency & Energy Management
- Combustion Biomass Fuels
- Materials for Solid Oxide Fuel Cells
- Monitoring System for PEM Fuel Cells



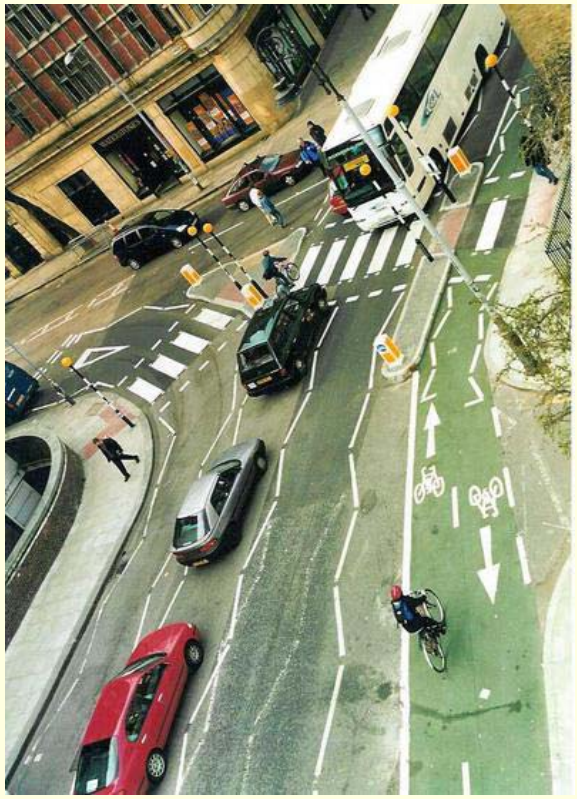

The Current Mechanical Engineering approach isn’t going to lead to a sustainable future either.

Sustainability? Is it about Vision?

Sustainability Engineering

Two Projects

Adaptation
To mitigate RISKS to wellbeing



Transformation
To a system with managed environmental and supply RISKS

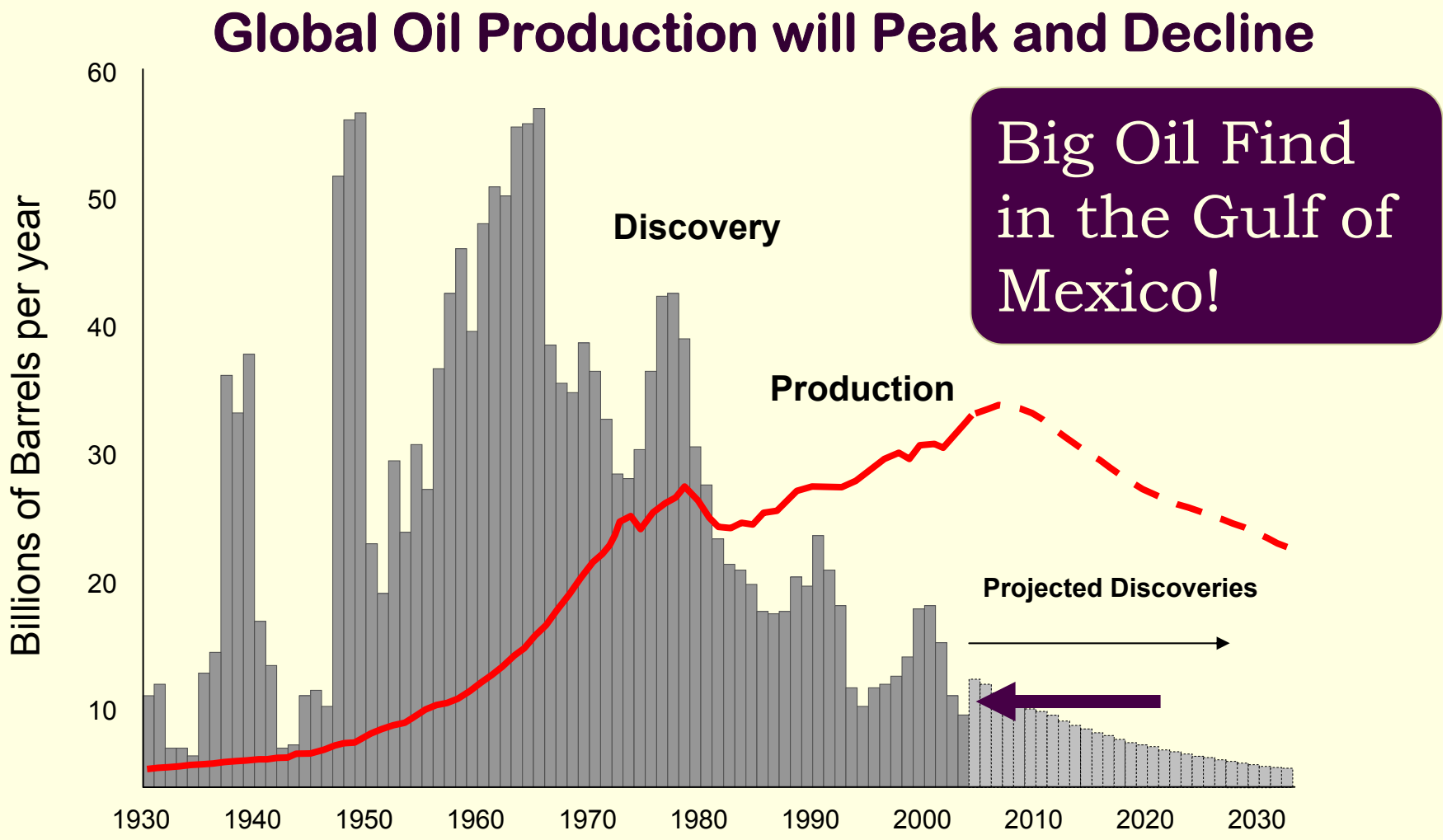

Sustainability Engineering:
RISK Management

Risk to our Wellbeing
(and our Children's, and their Children's…)

Oil Supply Shortfall

Environmental Catastrophe

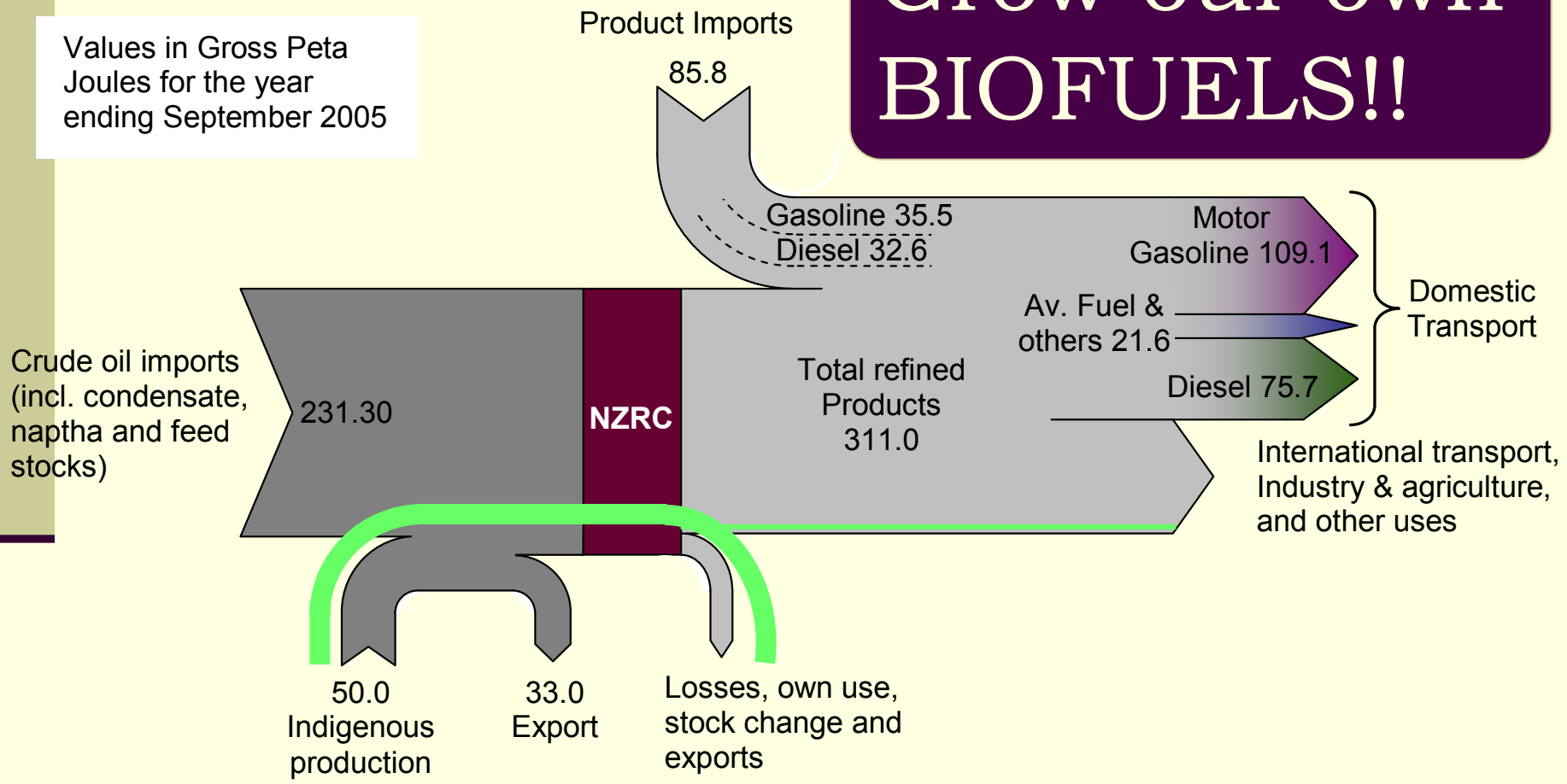
Facts about Oil Resources



Facts about NZ Oil Supply

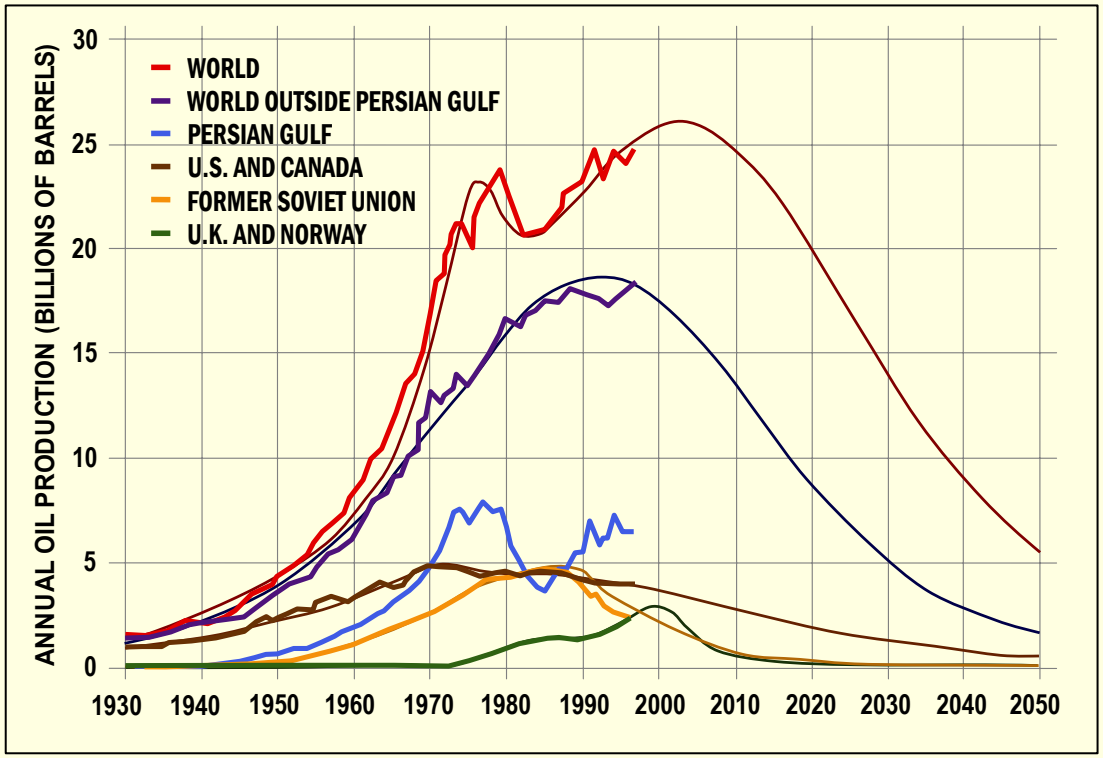
Values in Gross Peta Joules for the year ending September 2005

Grow our own BIOFUELS!!



New Zealand is Dependent on World Oil Market

Probability of Fuel Shortfall



Shortage

20% Below 2005

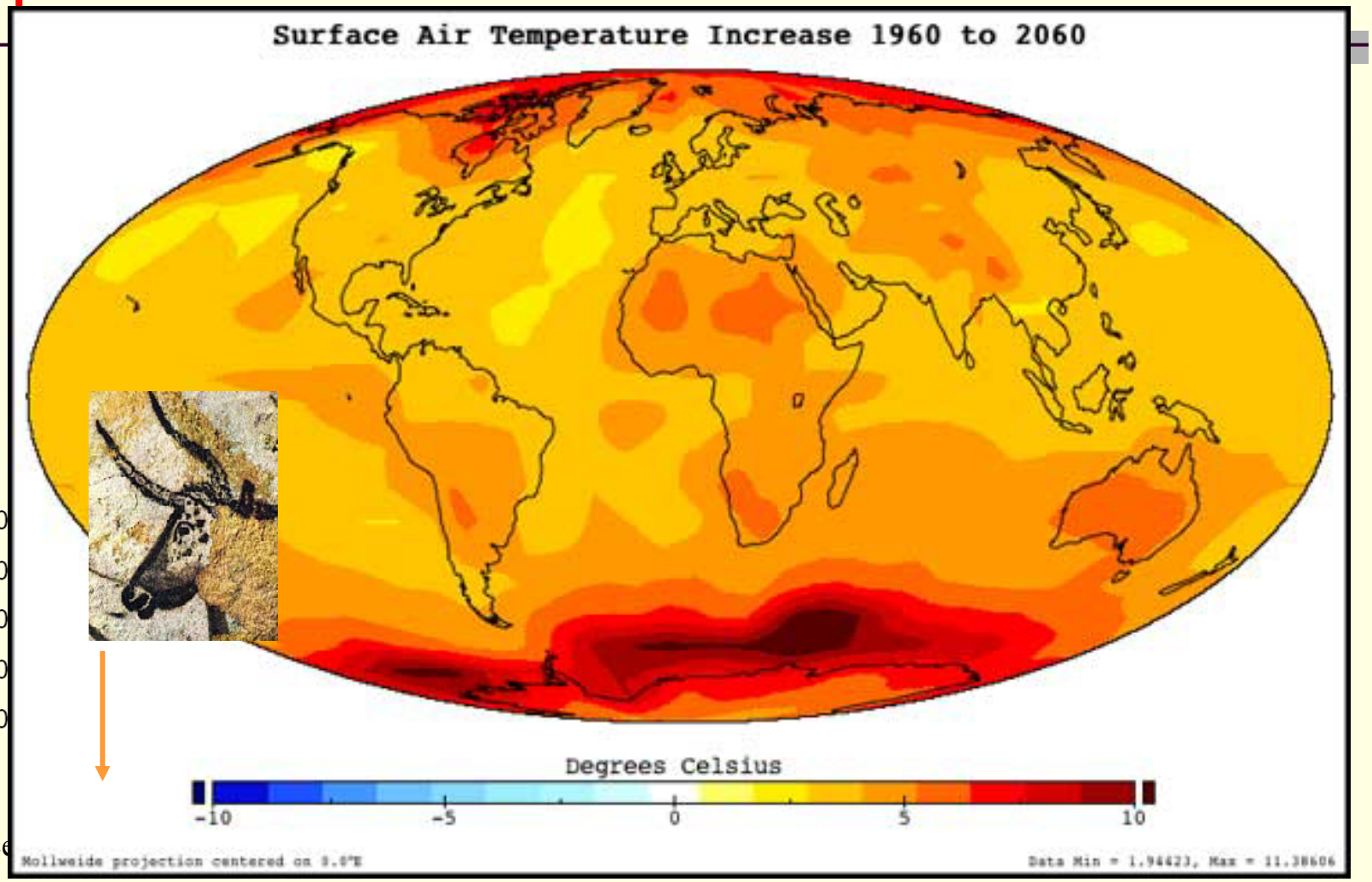
2020	8%
2025	60%
2030	91%

MED Energy Outlook: BAU
37% Fuel Increase by 2030

Post Peak Oil Supply Decl **ortages**

IEA Optimistic Target 2030
550 ppm

Atmospheric Chemistry Facts



CO_2 (p.p.m.v.)
280
260
240
220
200

Source

There is no up-side


Adaptation to Mitigate Risks

Adaptation:

Curtail Fossil Fuel Consumption

15% decrease in fuel imports per year to meet RSNZ Energy Panel target for risk mitigation

HOW?!?

$1.2 Billion per year to spend on the solution

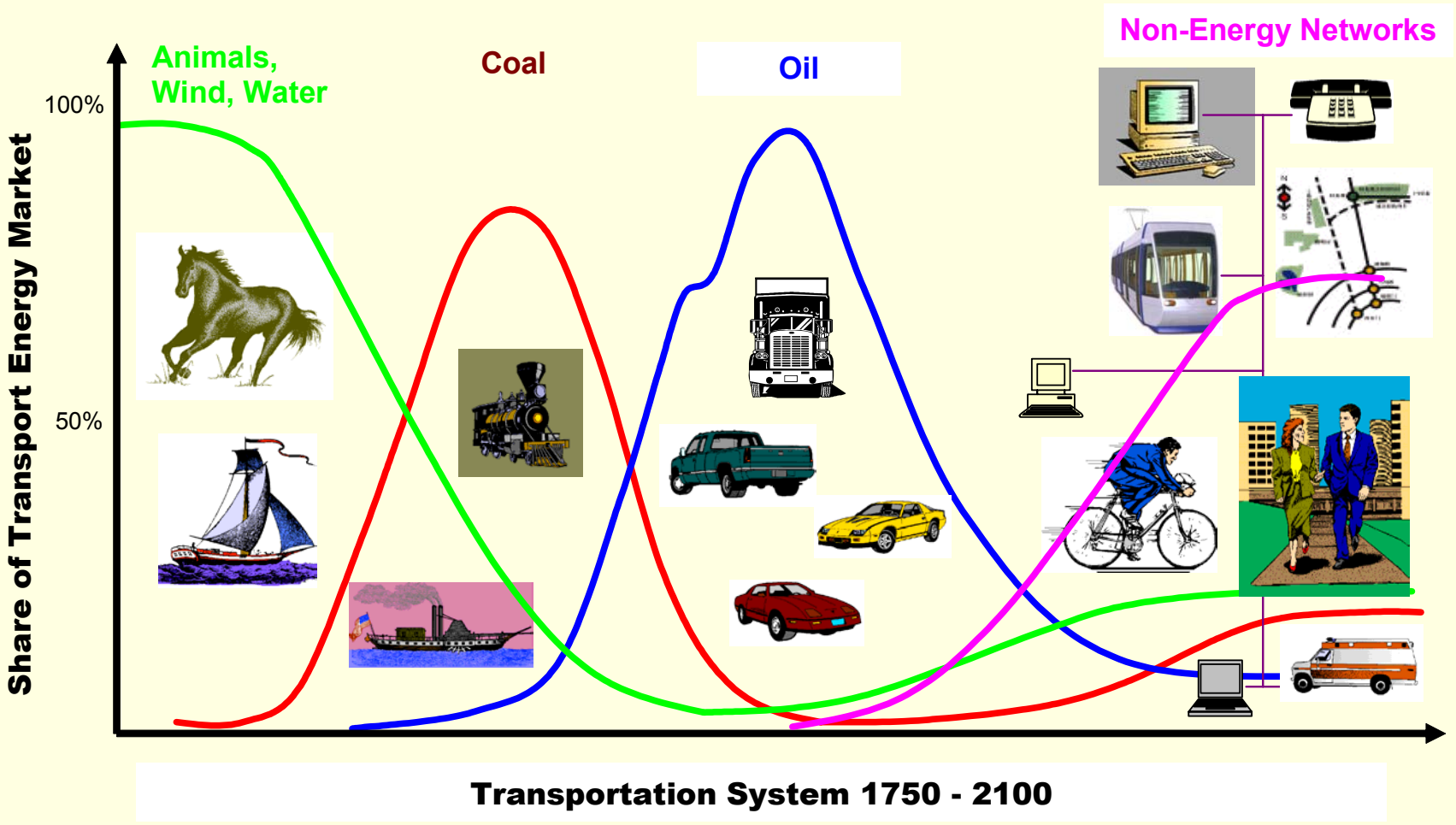

Sounds Crazy?
Depends on your perspective…
What will your children say?
Thank God you did that.
What the Hell were you thinking?


Transform to a Low Risk System

Transformation:

De-Carbonized Forms Production, Trade and Activities

Transformation Engineering Research



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Conclusion
Curtail Fossil Fuel Consumption

Recommendations

Research is needed to determine HOW to curtail fossil fuel use while ensuring wellbeing and productivity.

Urgently need to get talented, creative engineers working on this problem!

AE&M SYSTEMS LAB

Advanced Energy and Material Systems Lab

New Research Results

Energy Risk to Activity Systems as a Function of Urban Form
Land Transport New Zealand Research Report
A. Dantas, S. Krumdieck and S. Page, (2006).

Energy reliance, urban form and the associated risk to urban activities
M. J. Saunders, S. Krumdieck, A. Dantas, *Road & Transport Research,* Vol 15 No 1 (2006) 29-43.

Performance-Objective Design for Energy Constrained Transportation System
A. Dantas, S. Krumdieck, A. Hamm, M. Saunders, S. Minges, *Journal of Eastern Asia Society for Transportation Studies,* **6** (2005) 3276-3292.

Assessing the risk to suburban activities associated with transport energy availability as a function of urban form
A. Dantas, S. Krumdieck, M. Saunders, Transportation Research Board 85th Annual Meeting (Washington D.C. January 22-26, 2006) CD-ROM.

2020: Energy Opportunities, Report of the Energy Panel of the RSNZ (2006)