

Construction Clients Group



The Impact of Oil Supply Constraints on Capital Investment Strategy



- **False Alarm !!**
- **Oil below US\$ 70**
- **Problem Solved**
- **Save the SUV**

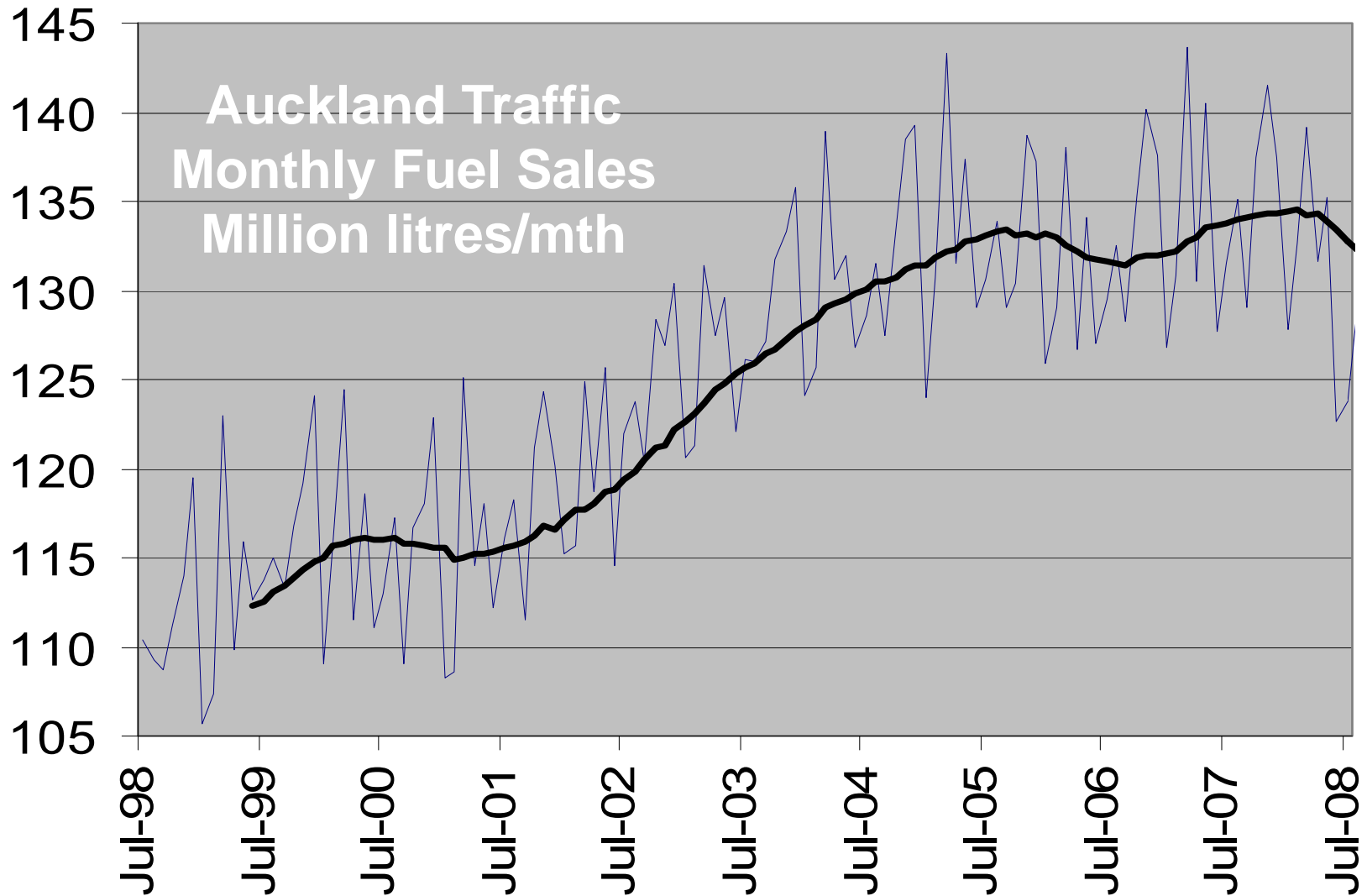
If Only That Was So

Recent Events Demonstrate the System Dynamics

- **Supply & Demand Now Finely Balanced**
- **Rising Demand Drove Prices Through the Roof**
- **High Fuel Prices Destroyed Demand – after a while**
- **Falling Demand Caused Rapid Fall in Prices**
- **Volatility Will Continue to Keep the Balance**

- **High Fuel Prices Made the Collapse Worse ??**
- **All Previous Price Spikes Linked to Recessions**

What Happened to the Traffic ?



If Only That Was So

All we Need is Recession to Keep Prices Down ??

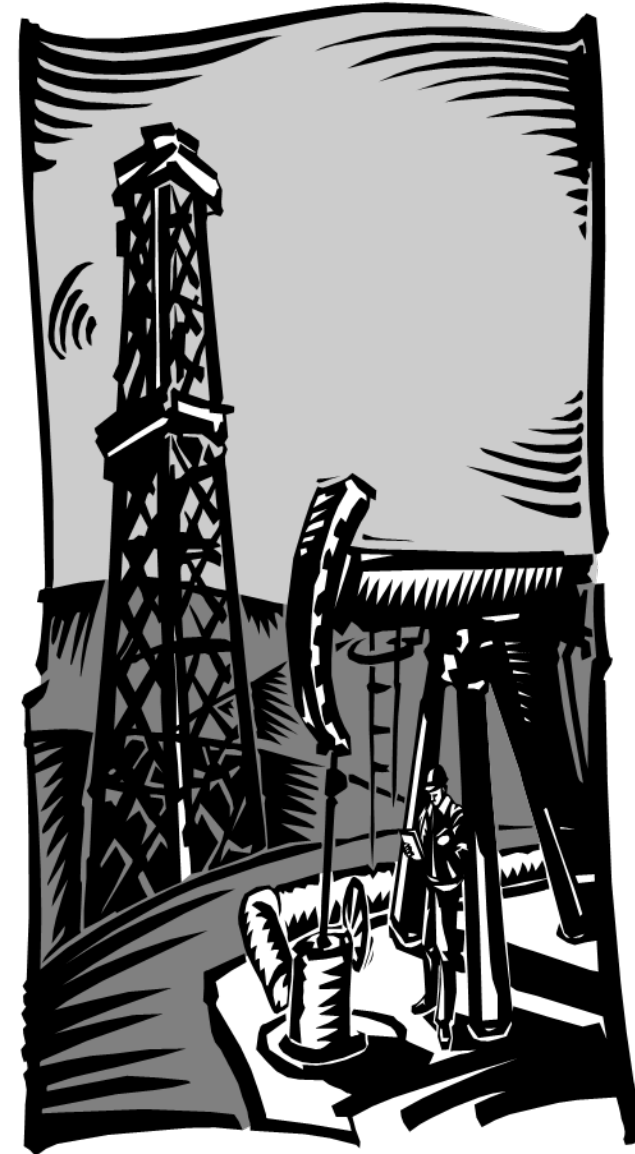
- **Supply may be in Still Rising - Very Slowly**
- **Or in the Plateau Stage Now**
- **But After “Peak” Oil Supply will Start Falling**
- **Slowly at first then maybe Faster**
- **The Only Way to Exit Recession & Settle Volatility ??**
- **Proactively Lower Demand – Ahead of Falling Supply**

This is Oil Depletion – this is the Energy Descent

What is Oil Depletion ?

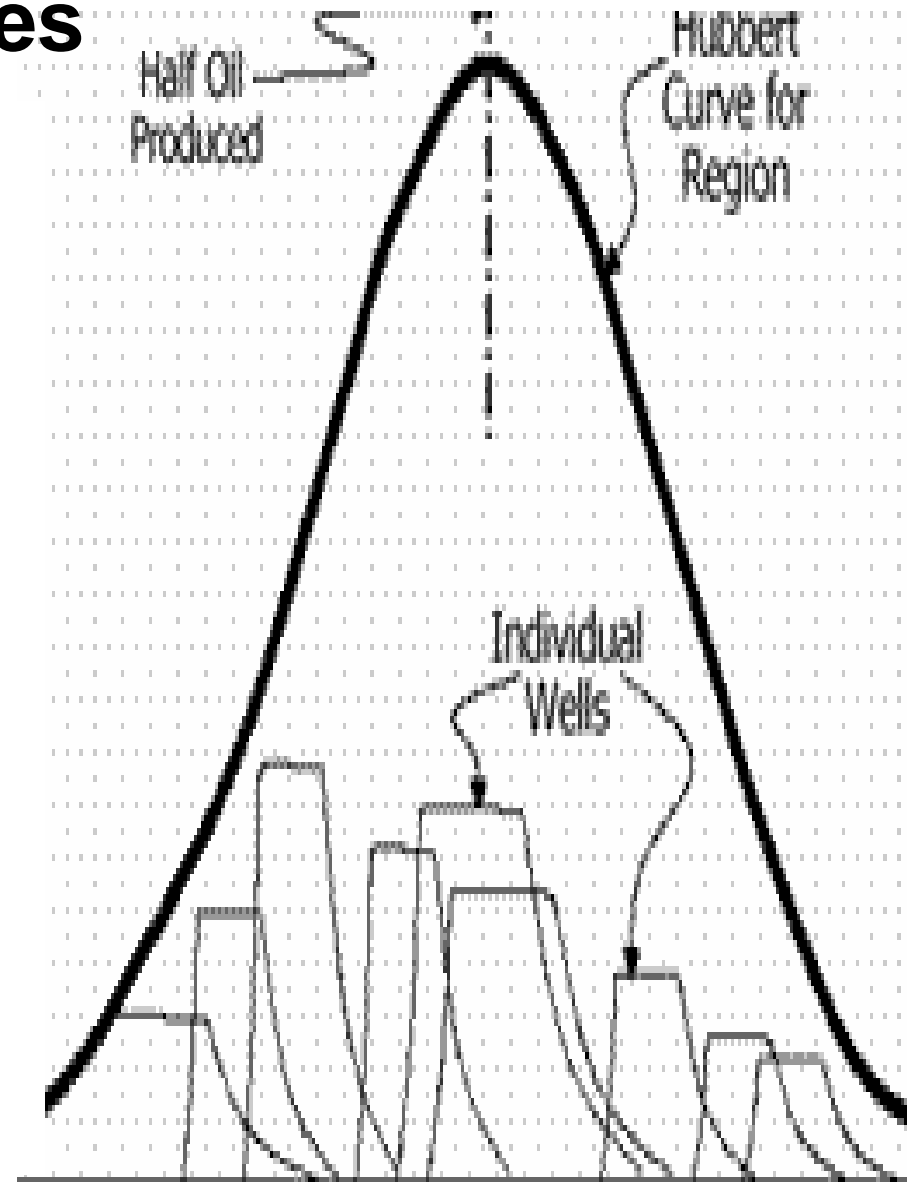
WE ARE NOT RUNNING OUT OF OIL

- But there will be Max Rate of Production – Peak Oil
- Now 86 m bbl/day = 31.4 bn bbl/yr
- After Peak Oil rate of production will start to decline
- But demand continues to grow
- Example: Chindia phenomenon
- So, A Growing Supply/ Demand Gap
- Unmet demand = High Prices



Peak Oil Rules : It's a Game of Two Halves

1. Production rate increases with added wells to max geological yield
2. Max production rate @ half way thru & can never return
3. The first half of the oil resource is higher quality & easier to extract
4. After Peak
 - production will decline
 - quality will decline
 - Risk profile will decline



Players in the Theatre of Peak Debate

- **Denialists**
 - **Cornucopeans**
 - **Abiotic Oil**
 - **Conspiracy**
 - **Not yet Proven**
 - **Drill, Baby Drill**
- **PollyAnnas**
 - **Petro Prozac**
 - **Techno Mirage**
 - **Market Mystic**
 - **Climate Change ? Will Reduce CO₂**
- **“Doomers”** –
 - **External Locus of Control**
 - **Catastrophic Collapse**
 - **End of Times**
 - **Armageddon**
 - **Head for the Hills**
- **Life Boats**
 - **Internal Locus of Control**
 - **Catabolic Collapse**
 - **Managed Depletion**
 - **Energy Descenders**
 - **Transition Townies**

Forecasts of Supply, Demand & World GDP

International Energy Agency (IEA)

- **Set up by OECD countries (includes NZ) in 1970s**
- **Agent for oil management**
- **Annual, semi-annual and monthly reports**
- **Focus on Supply and Demand related to world GDP**
- **Many others, including**
 - **Energy Information Administration EIA – US Dept of Energy**
 - **Oil Drum**
 - **ASPO**

Supply / Demand Shortfall = \$\$ Price Gains

Demand Growth (IEA)

OPEC Crude

**New Projects Delayed
All Very Complex**

- High Cost
- High Risk
- New Technology
- Credit Squeeze ??

**2008
Crash**

1.45 mb/d

World GDP Recovers

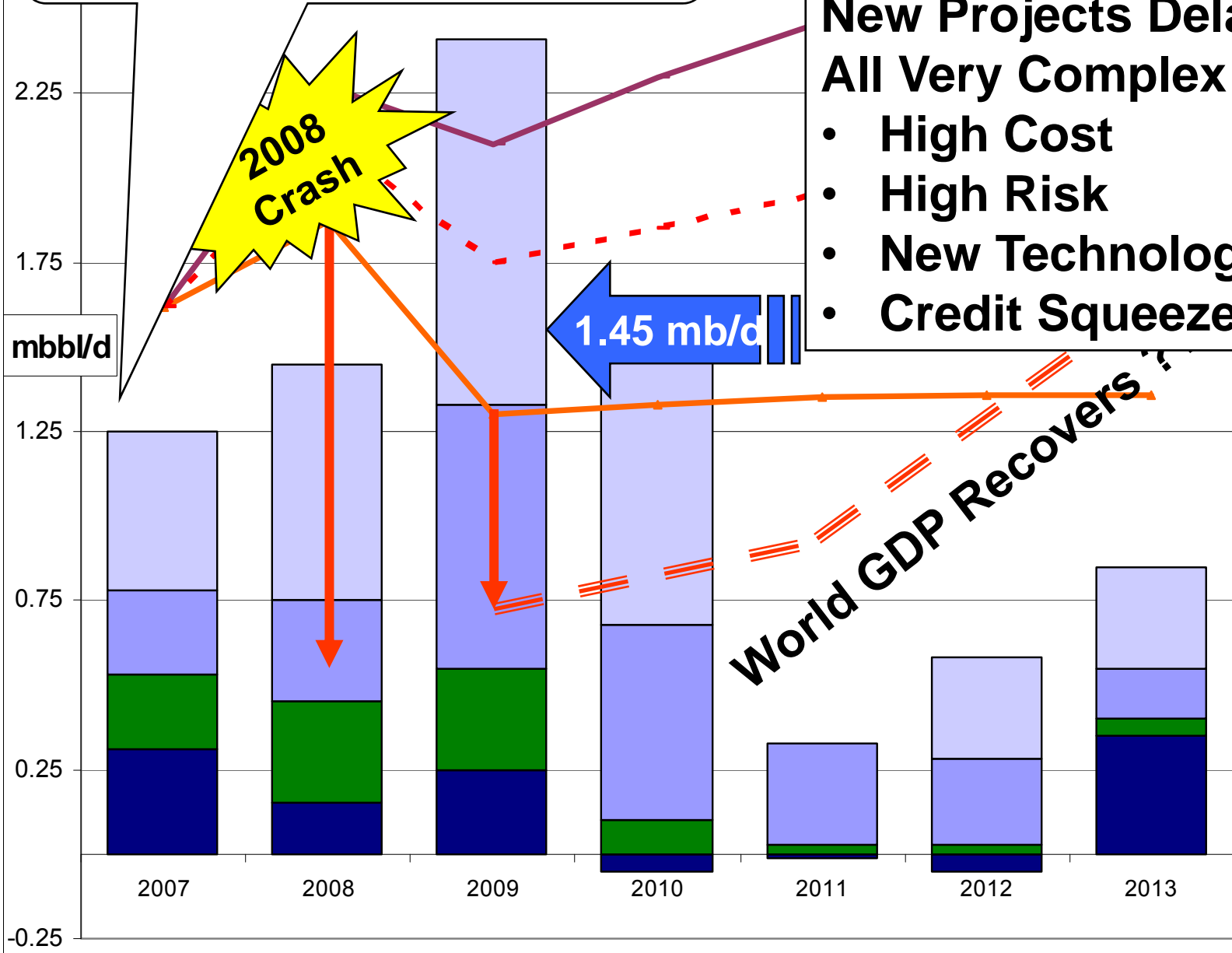
OPEC Gas
Liquid
Biofuels

Non-OPEC Crude

Demand @ 4.5% GDP

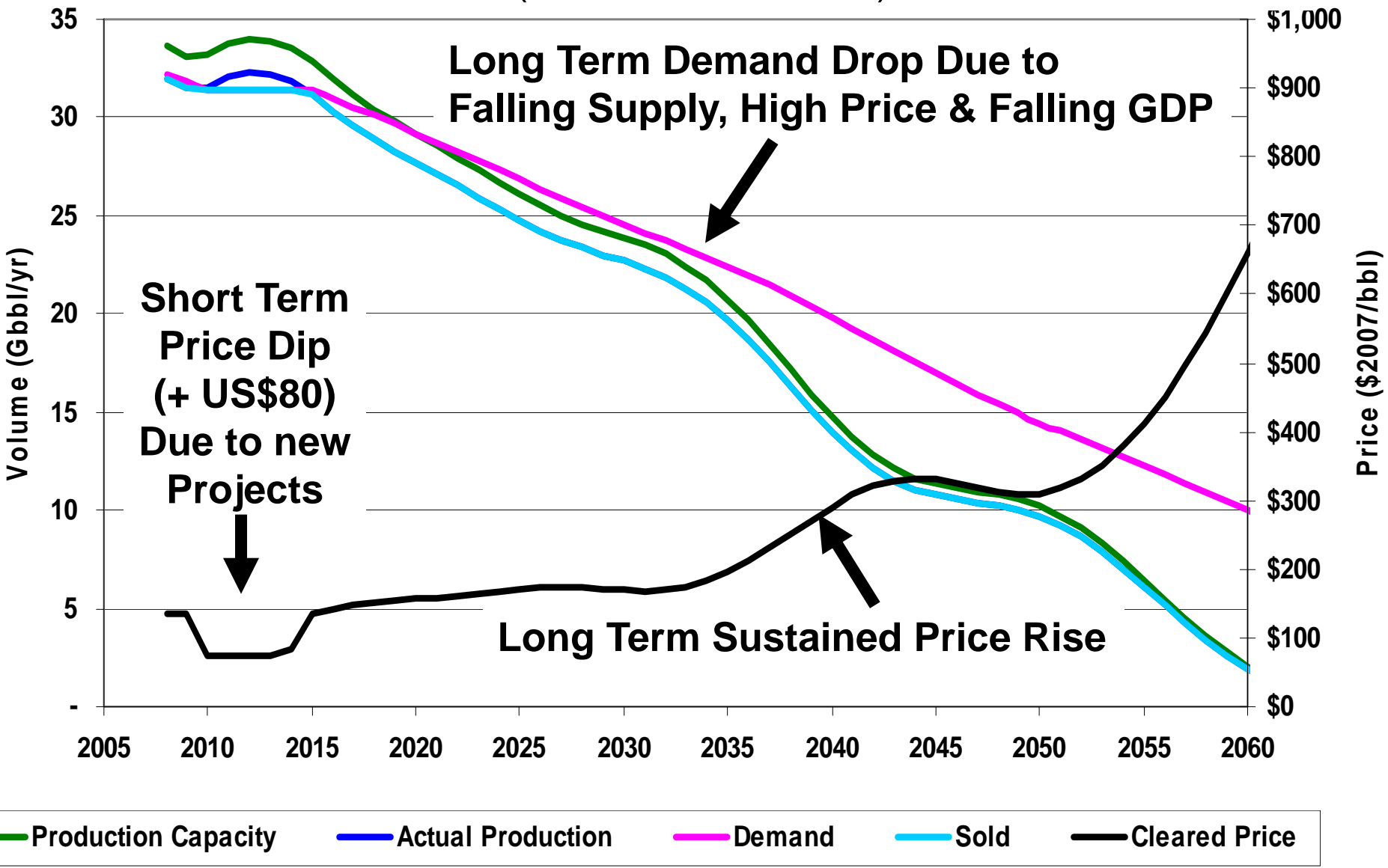
High Demand @ 5.9% GDP

Low Demand



Draft ARC Study of Future Oil Prices (July 2008)

(McCormack Rankin)



What Happens After the Production Peak ?

SOME SCENARIOS TO EVALUATE “WHAT IF ?”

- **Portland, Oregon (2007) approx 2.5% pa (50% by '32)**
 - **Average long term World Decline 4%**
 - **Scenario for War or Disaster not considered**
 - **-----**
- 1. Risk & Probability Scenario (+ IEA Reduction stages)**
 - 2. Scenario “Progressive 2+4+8”**
 - 3. Electric Vehicle Replacement Scenario**

Portland Plan to reduce by 50% In 25 Years



**Many Other Cities incl
London, Hamilton, Ontario,
Ventura, Calif
have similar initiatives**

**Descending the Oil Peak:
Navigating the Transition
from Oil and Natural Gas**

Final report 7th March 2007

**Report of the City of Portland
Peak Oil Task Force**

**PUBLIC COMMENT DRAFT
January 18, 2007**

Risk & Probability Approach to Energy Descent

Meta Forecasts & IEA Fuel Reduction targets (Dantas, Krumdieck)

Risk Appetite with $p = 50\%$



Allow 10 years preparation



SCENARIOS

2005

2010

2015

2020

2025

2030

Peak Production

0%

37.8%

79.2%

94.9%

99.0%

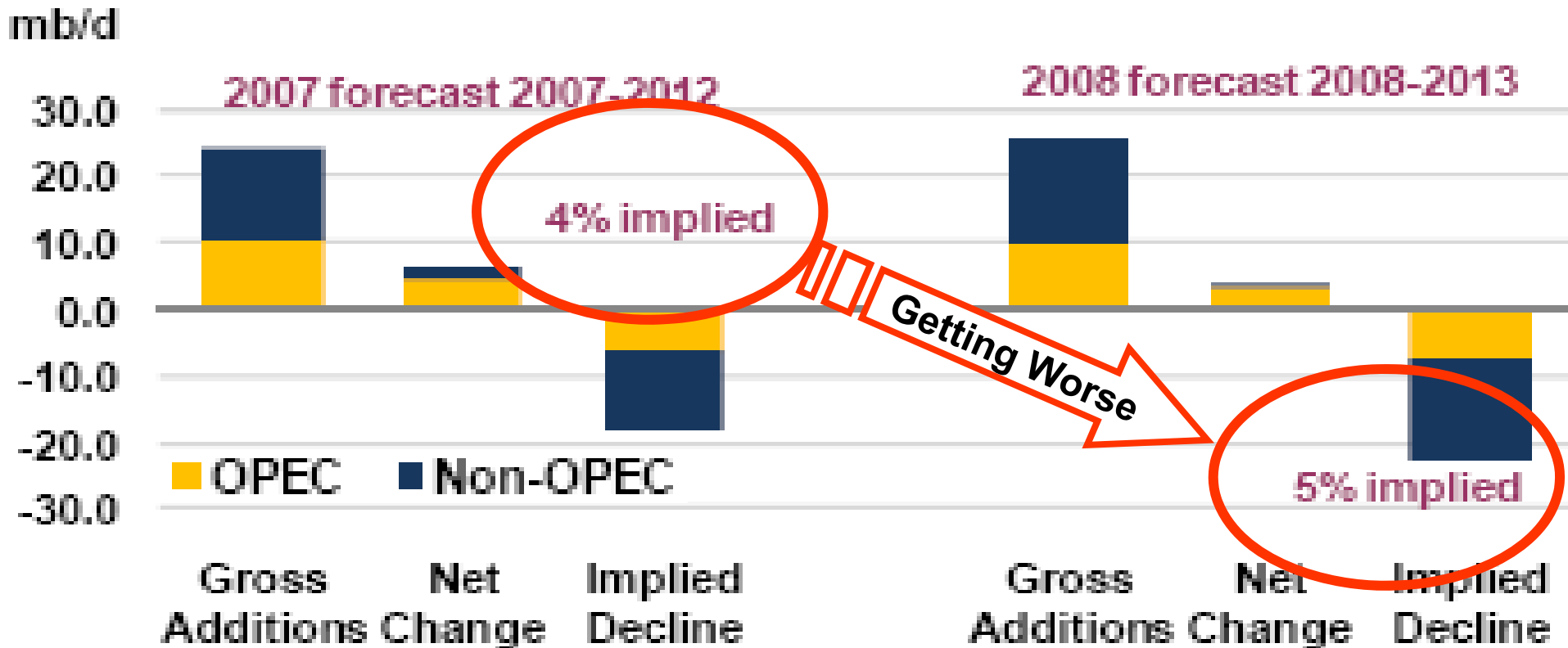
100%

What Happens After the Production Peak ?

- **Scenario “Progressive 2+4+8” – Assumes**
 - **Supply/Demand Squeeze from 2012 (IEA date)**
 - **Initially 2% only decline (new fields still added)**
 - **2007 IEA 4% net annual decline**
 - **Then Avge 8% (>10% OECD & some national limit)**
 - **Result is 70% decline by 2032**

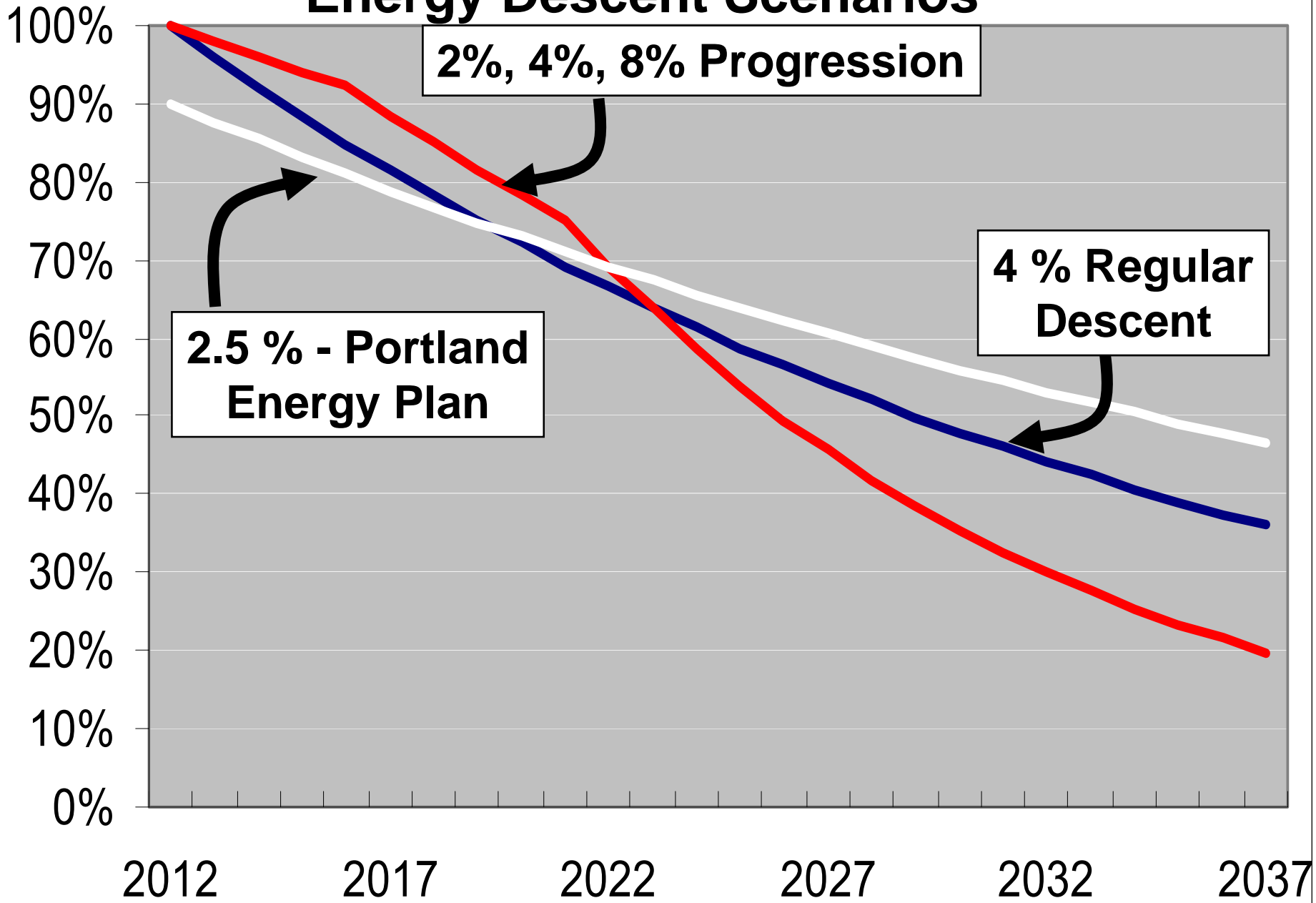
(Graph Shows %age daily Oil Production rate remaining)

Why the Steep Production Decline Later ?



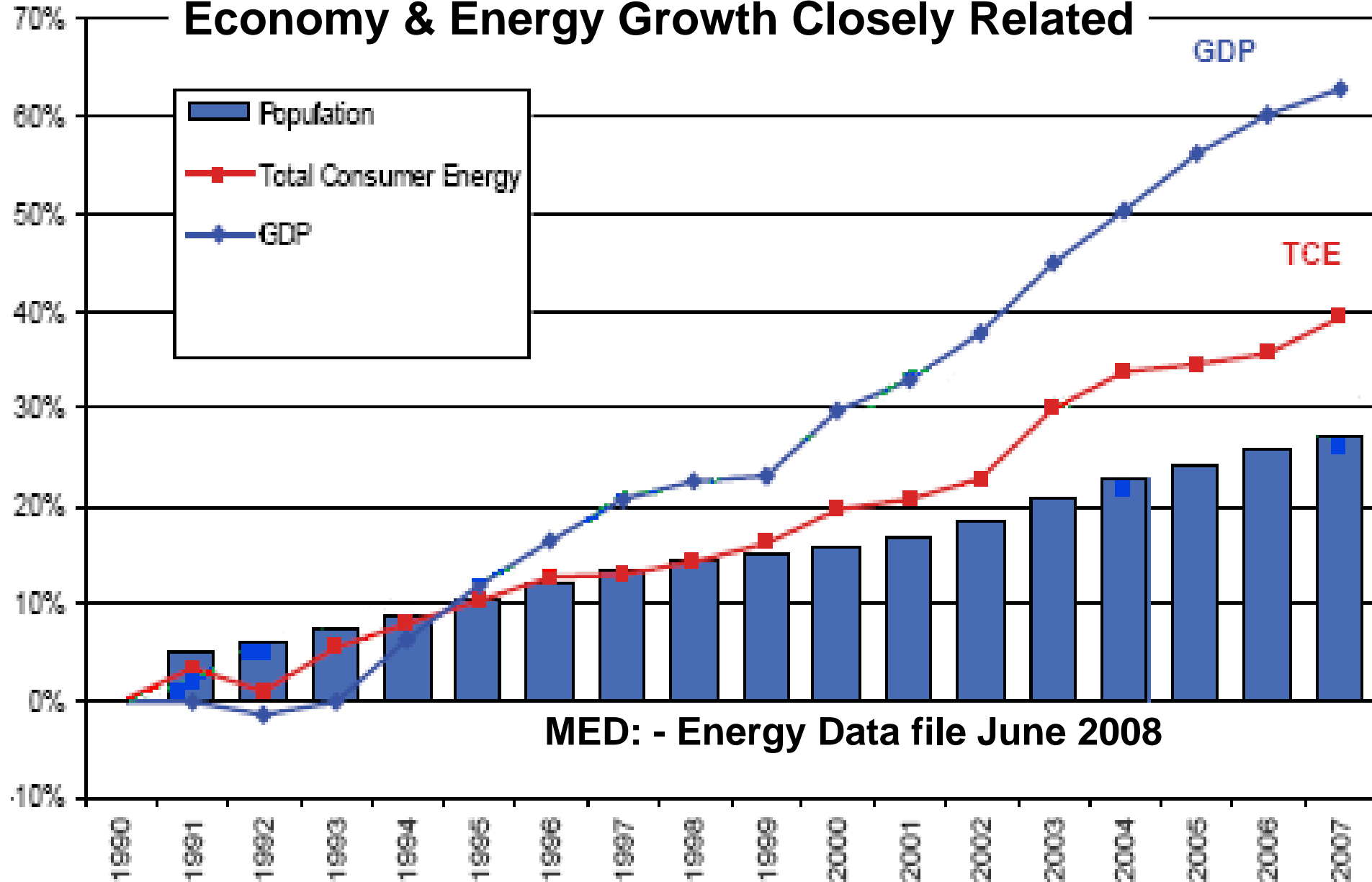
- Global net decline 5% pa for 2008-2013
- Need > 3.5mb/d new start-ups every year to stand still
- OECD facing mature field decline >10% pa

Energy Descent Scenarios



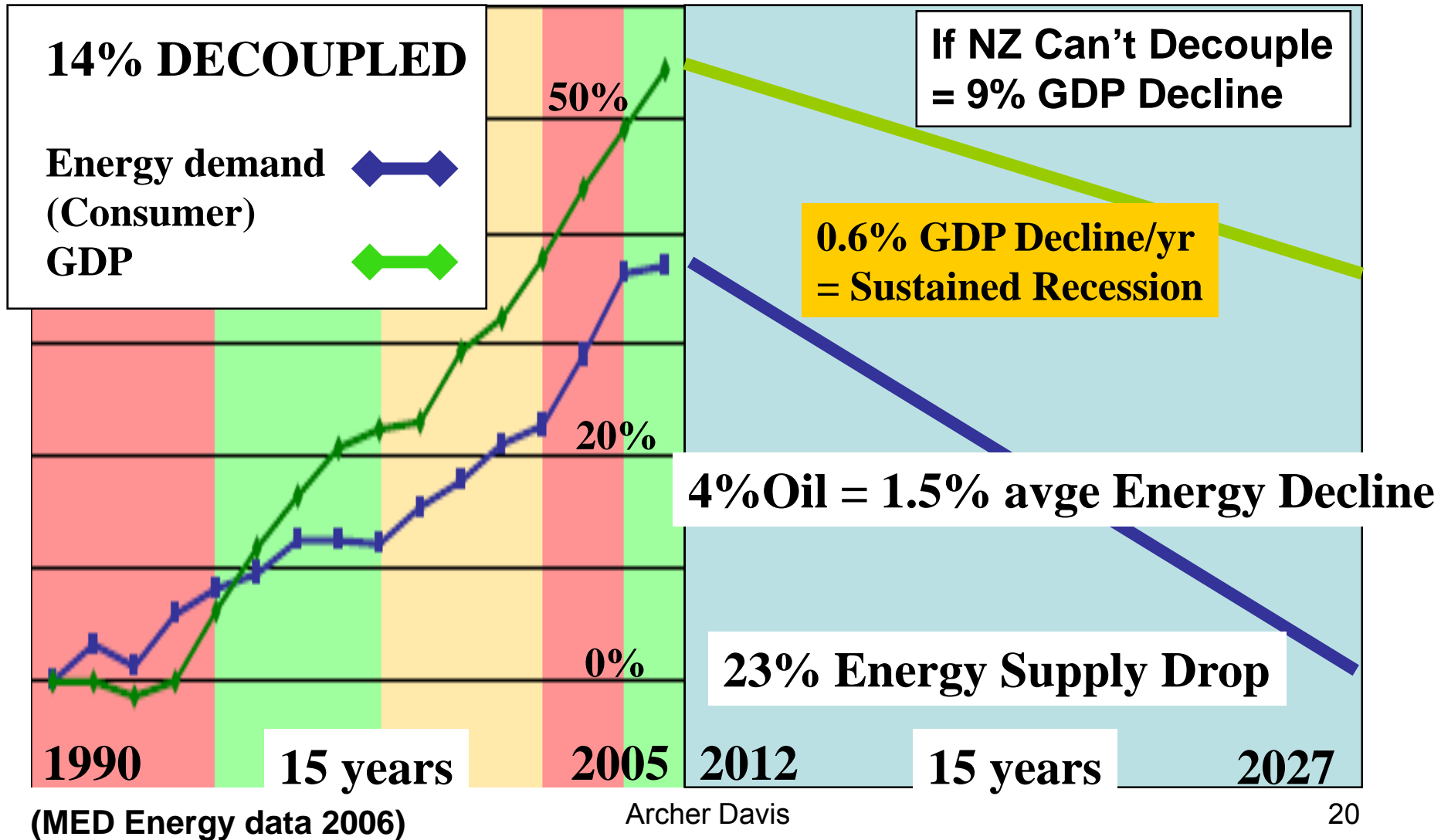
The Economic Effects of Energy Descent in NZ

Economy & Energy Growth Closely Related

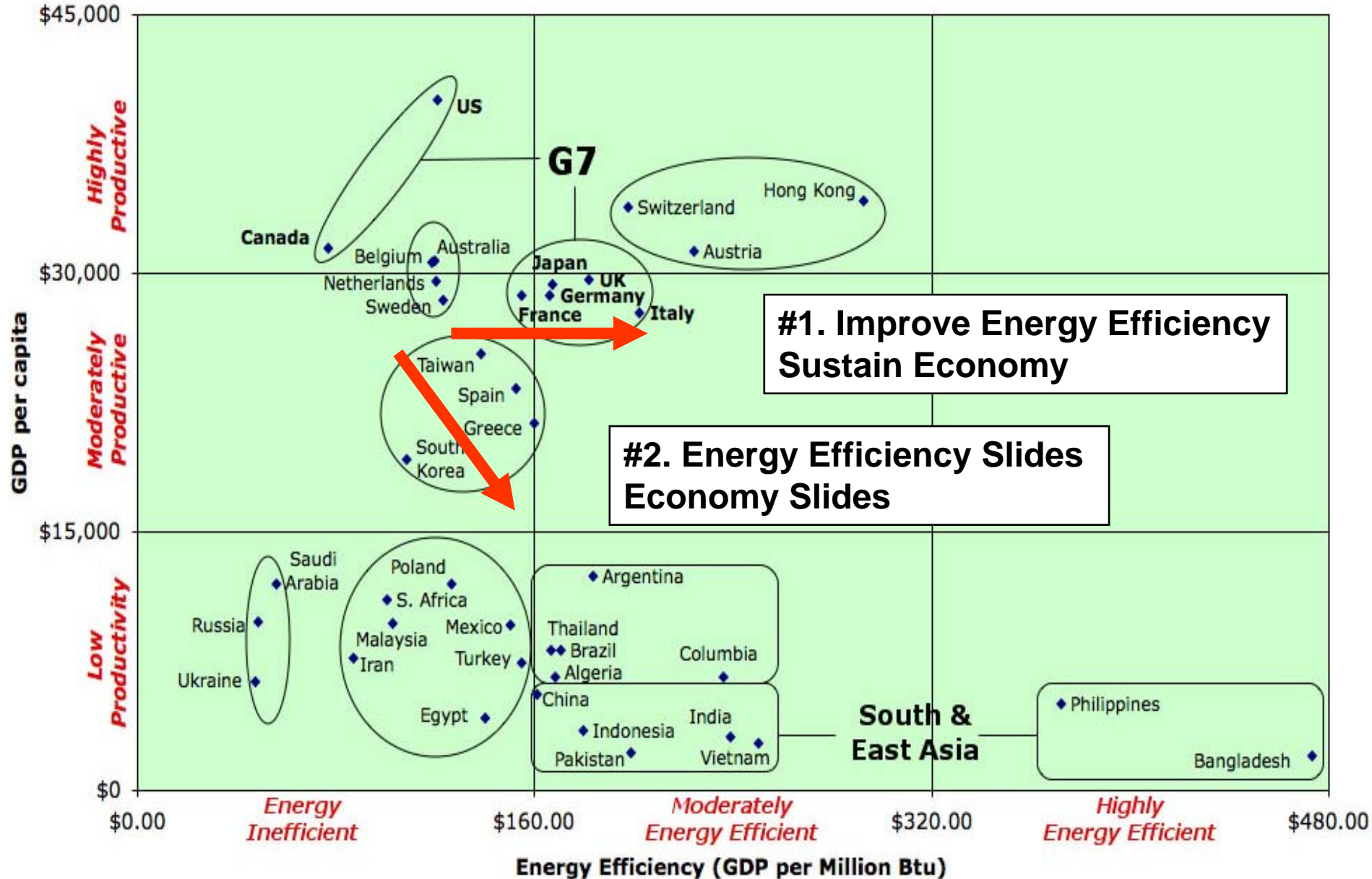


Energy Use & GDP Are Tightly Coupled

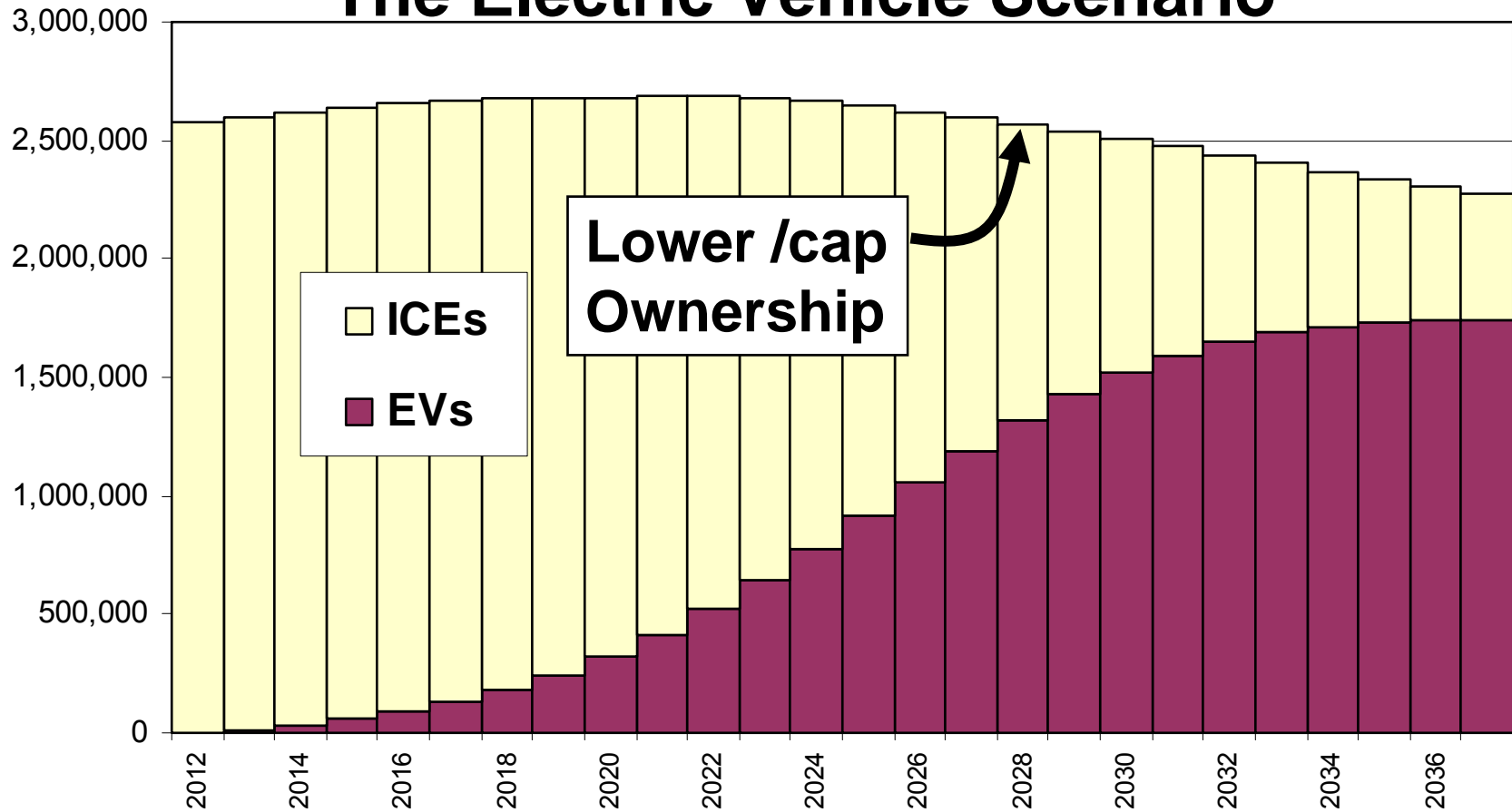
governments try to “uncouple” GDP & Energy
(In NZ 50% of energy is from Oil in 2007)



GDP vs. Energy Efficiency (Top 40 Economies by GDP)



The Electric Vehicle Scenario

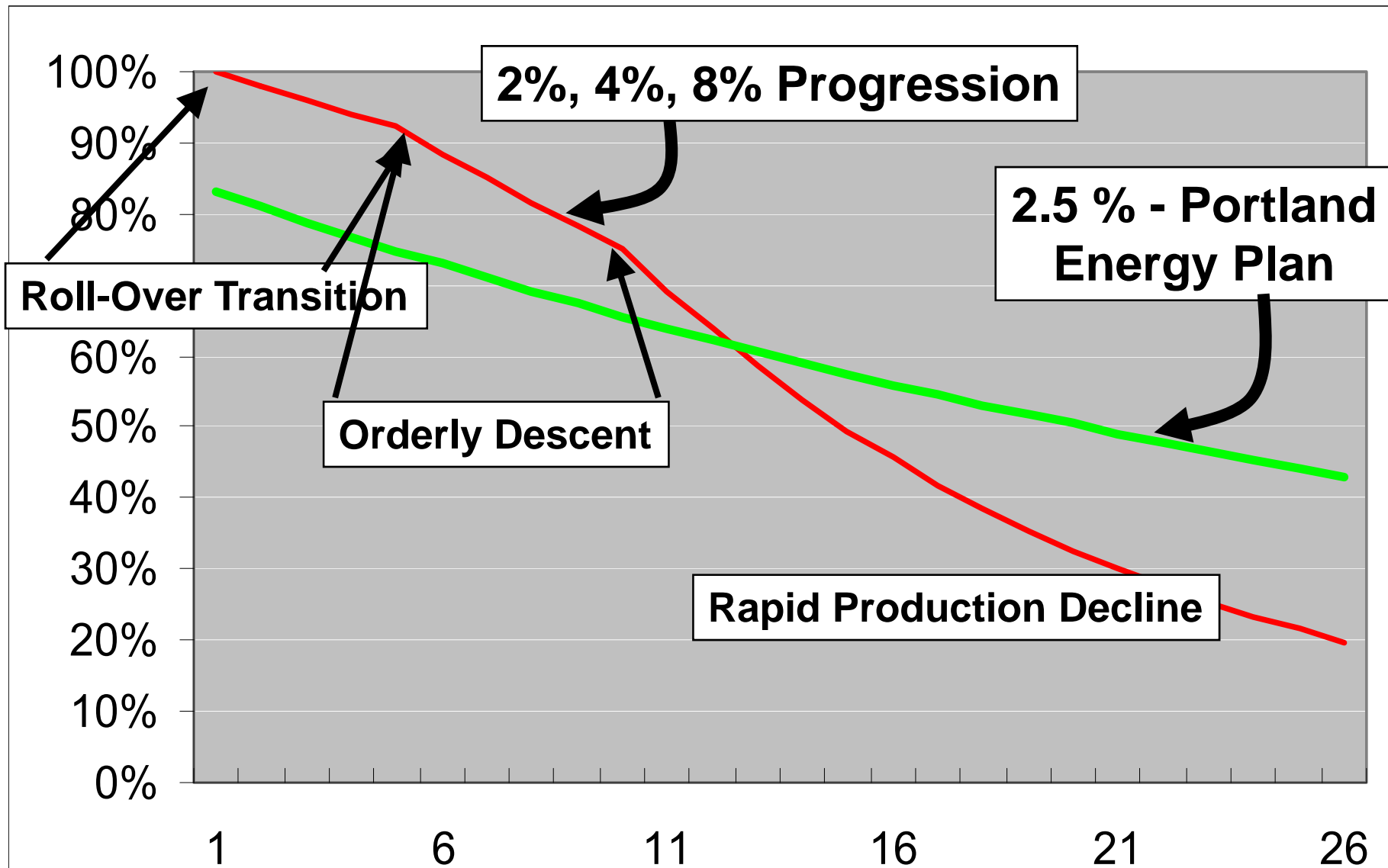


BEV replacement can be achieved But:

- **New Vehicles vs Second Hand Imports**
- **Cost 2 - 3 times**
- **Break even with ICE not before \$4 / litre**
- **Probably Recession Conditions**

Archer Davis

Planning to Decouple in Progressive Energy Descent Scenario



How to Decouple ?

Reverse Transport & Land Use Hierarchies

Link Land Use & Transport Planning

Short to Medium term

2016 - 2022

- **No More Subsidy for Personal Car infrastructure**
- **Stop & Withdraw Free Parking**
- **Invest in PT – include operations, e.g. frequency**
- **Convert PT to Electric – Rail – Trolley buses - Trams**
- **Safety, Amenity for Vulnerable Modes**
 - **Walking – Cycles - Motorcycles**
- **Freight Management Strategy with Business**

- **Focus on Small town Centres – Counter “Big Box”**
- **Energy Sensitivity in Planning – Shorter Travel**
- **More Mixed Use & TOD with Mixed Use**
- **Defend MUL & Avoid Distant Dormitory Cities**

A Vision of Transport in Rapid Descent Period

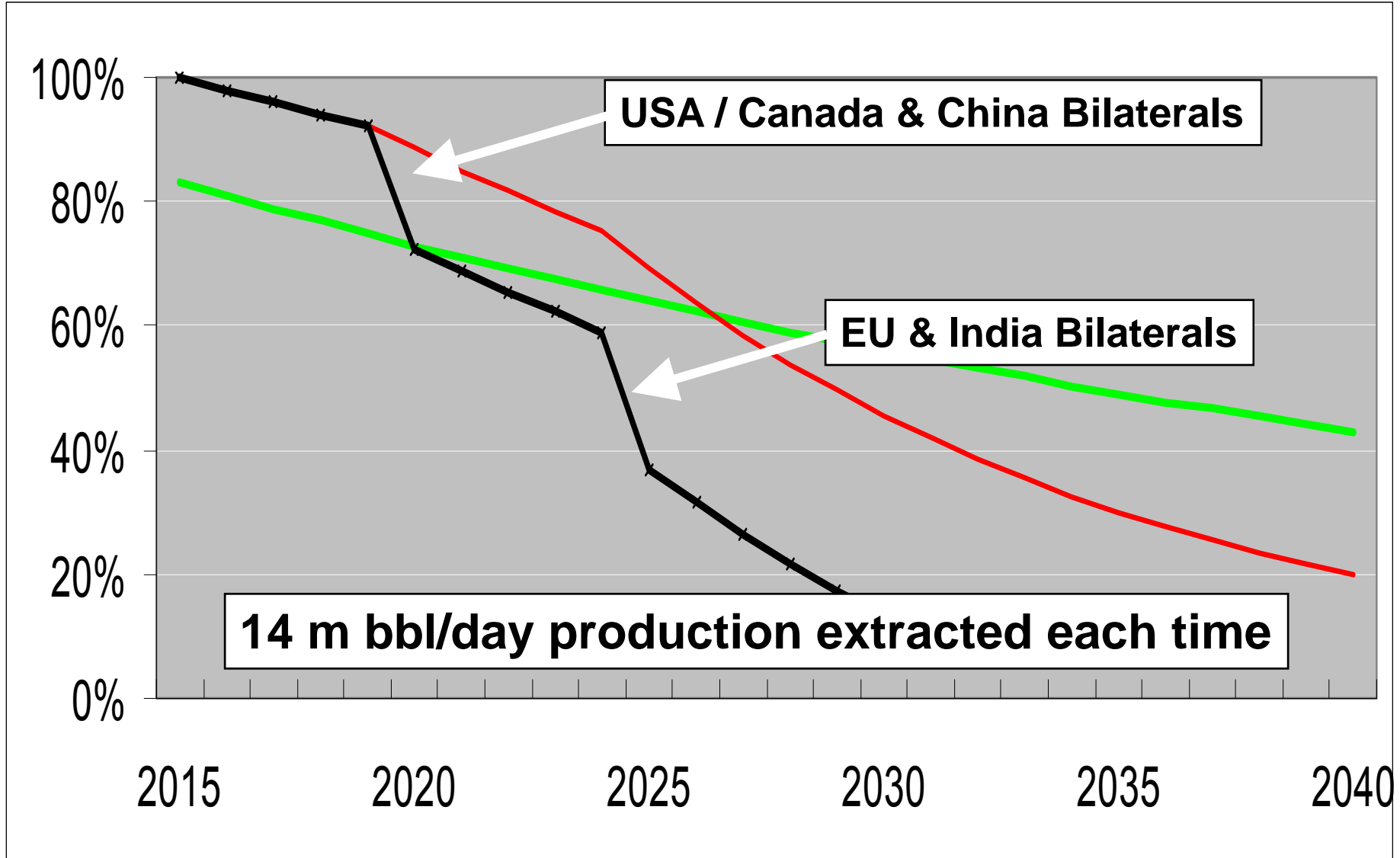
Medium to Long Term - Progressive

2022 - 2038

- **Liquid Fuels - Expensive, Rationed**
- **Private Cars - Electric, HOV, Workshop, PT**
- **Electric PT Backbone & Feeders - Electric Rail, Trolley Buses & Trams, CNG Buses**
- **Electric Rail to North Shore – with Freight Capacity**
- **Convert Arterial lanes for Trams & Trolleys**
- **Convert Motorway Lanes to Trolley Bus & Light Rail**
- **Freight using Trolley network & CNG distribution**

- **Road Maintenance Cost Crisis: - Abandon No Exits / Minor Roads, Preserve Footpaths for Cycles, Carts**

What About That Rapid Descent Scenario ? (Portland Chose not to Plan for this)

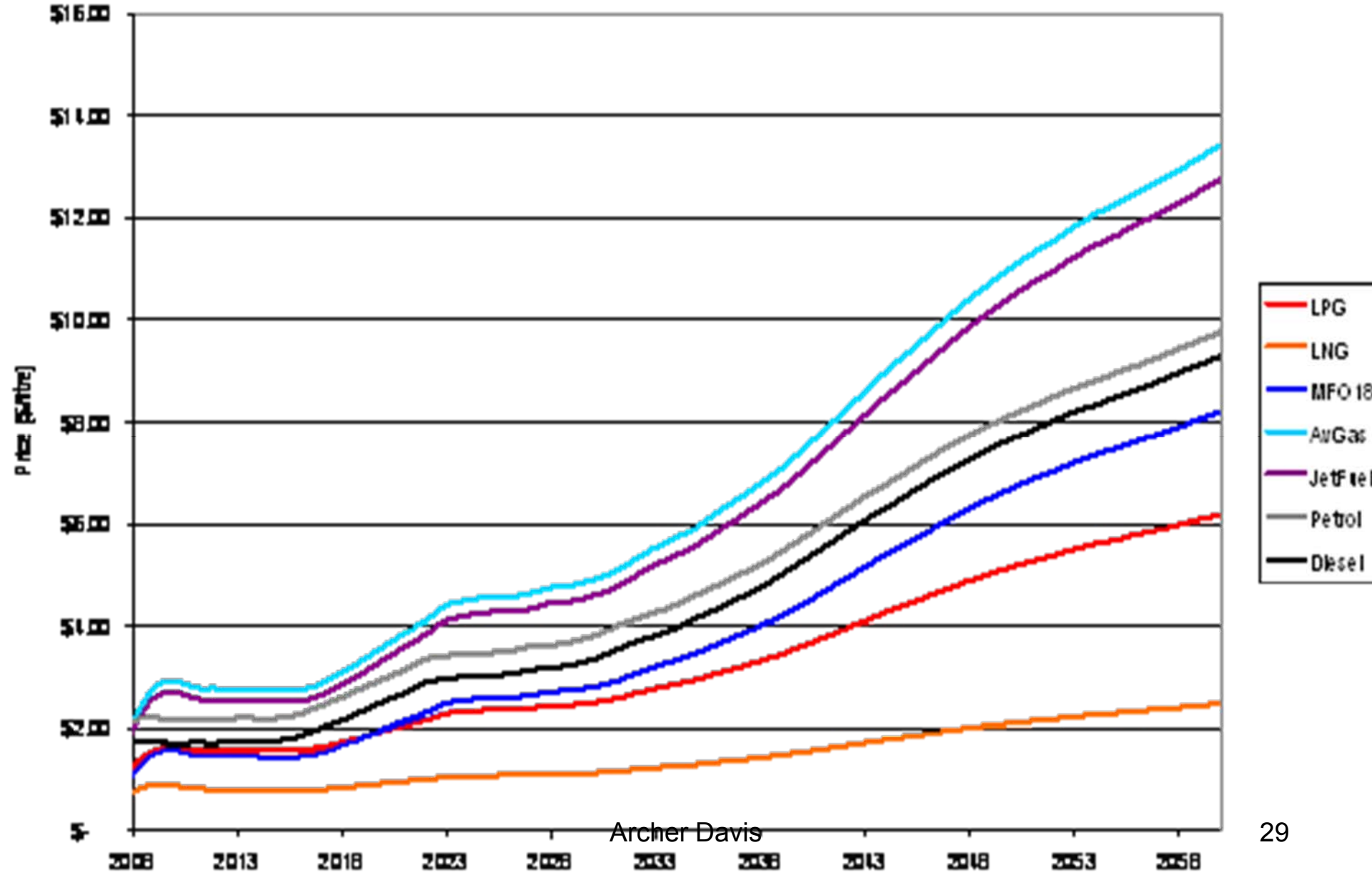


- **Oil is a Limited Resource – It Will Run Out**
- **Oil won't Suddenly End – It Will Gradually Deplete**
- **The Peak Moment is Uncertain, but not Far Away**
- **Oil = Transport = Economic Activity**
- **Energy and Economy Are Closely Linked**
- **Energy Descent Could Mean Economic Descent**
- **Risks of “Inaction” Higher than “Action” to Decouple**
- **Transport Infrastructure Must Change to Decouple**
- **City Structure Must Change to Decouple**
- **How Does Your Client's Business Fit the Challenge ?**

Thank You !

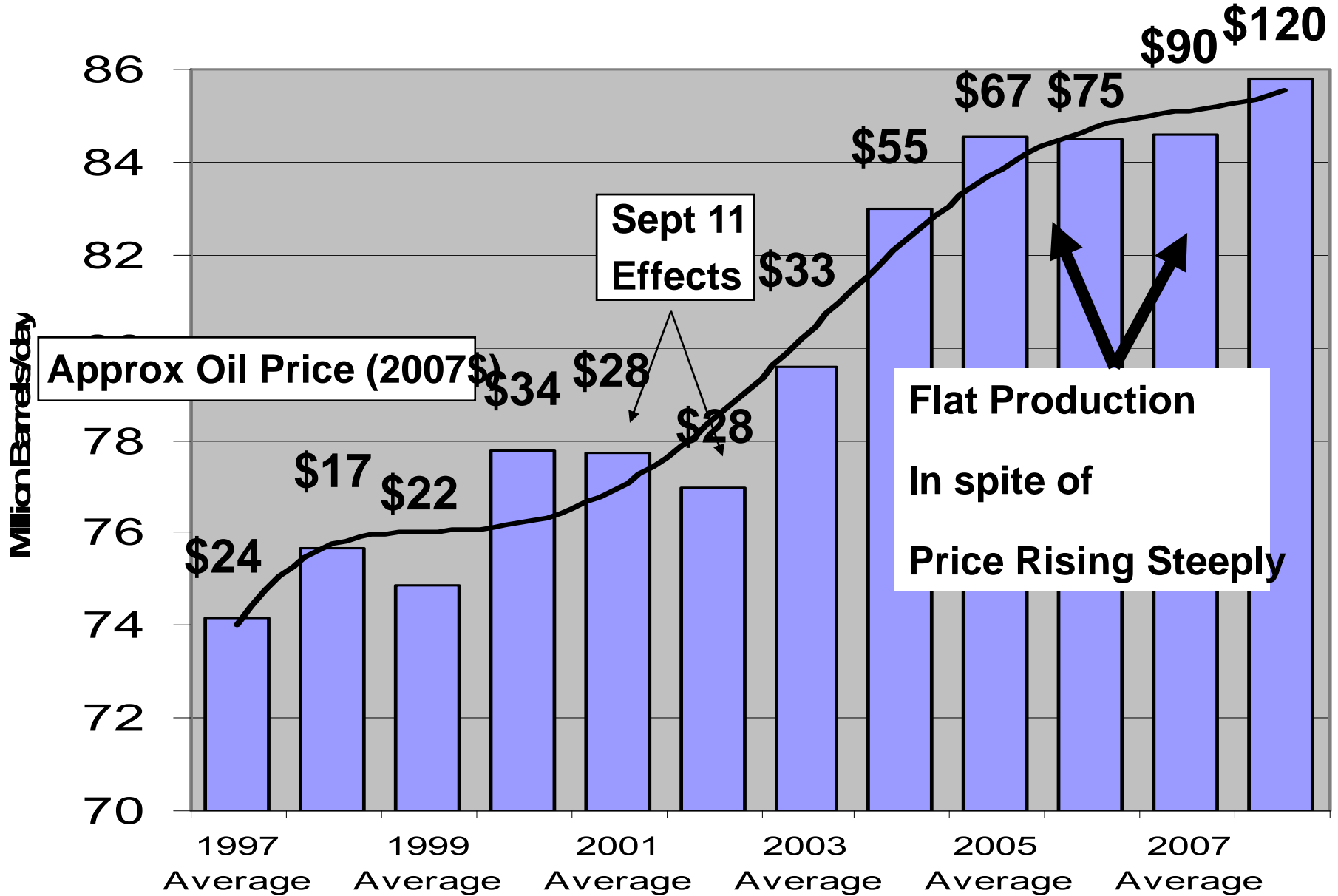
- Any Questions ??

ARC Research on Fuel Price

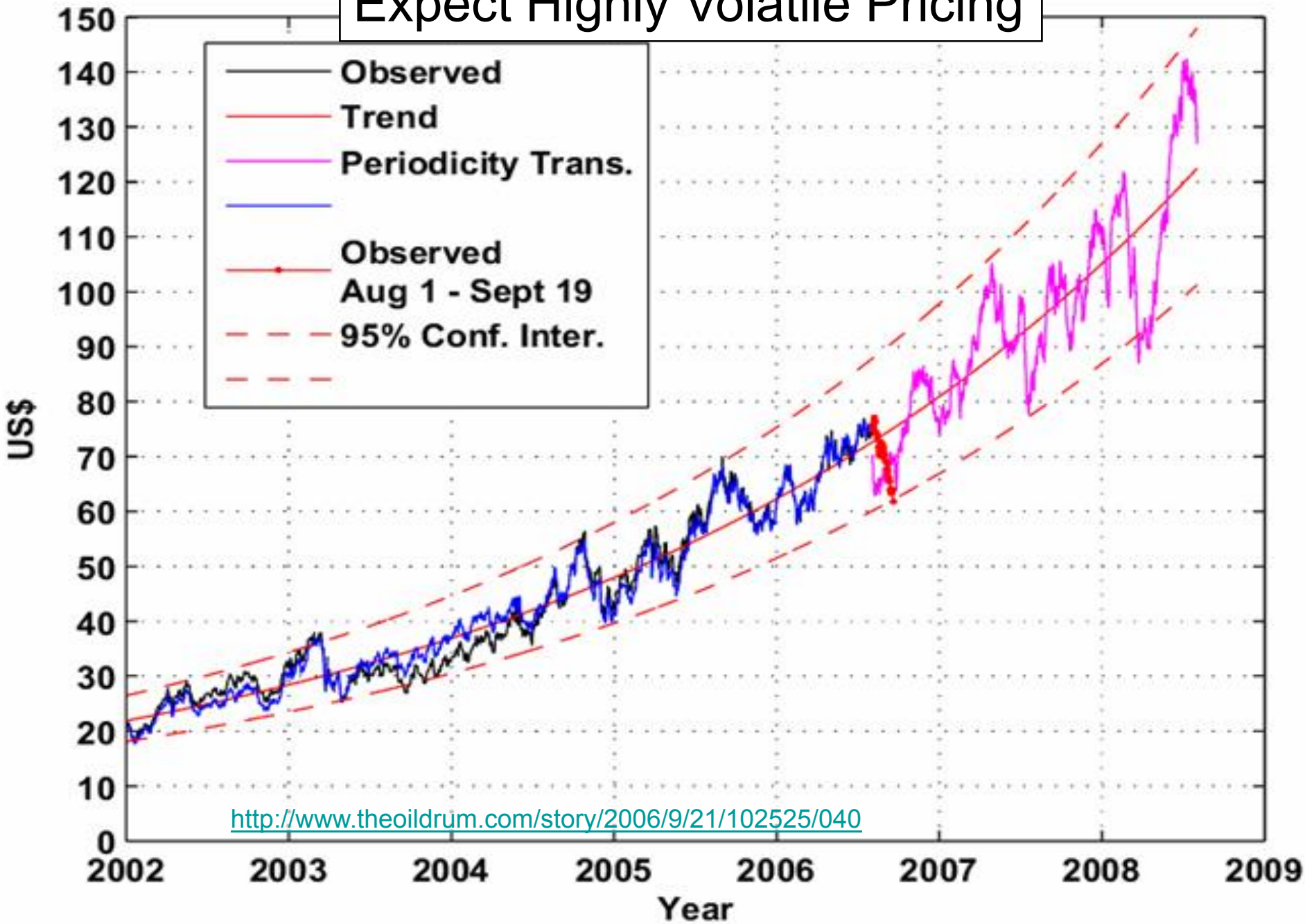


Archer Davis

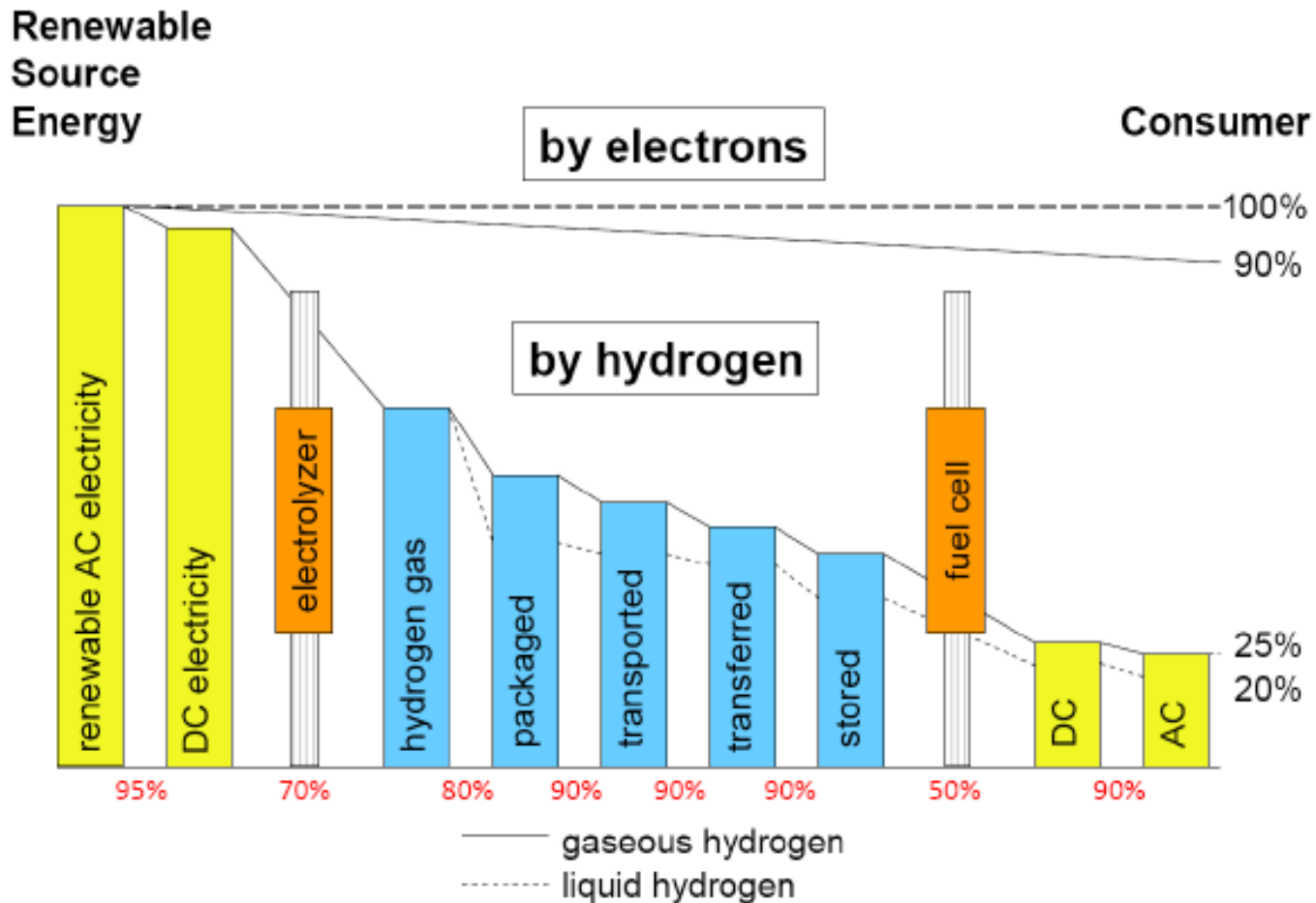
World Oil Production (EIA)



Expect Highly Volatile Pricing



Why the hydrogen fuel cell future won't work (but grid-connected vehicles will)



Source: Bossel (2005)

Household Stats 2007

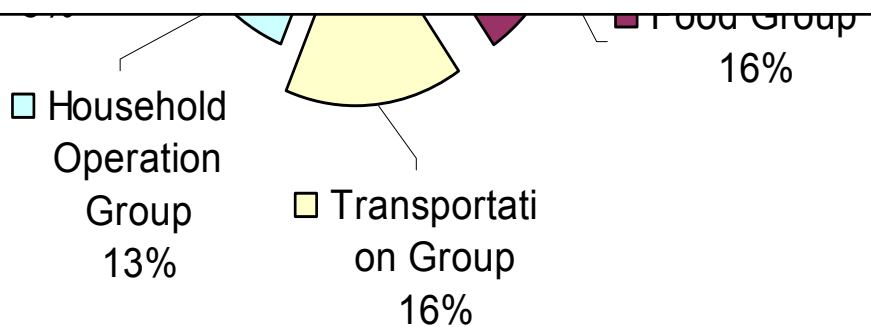
Category Changes Makes Data Hard to Compare

Except Transport

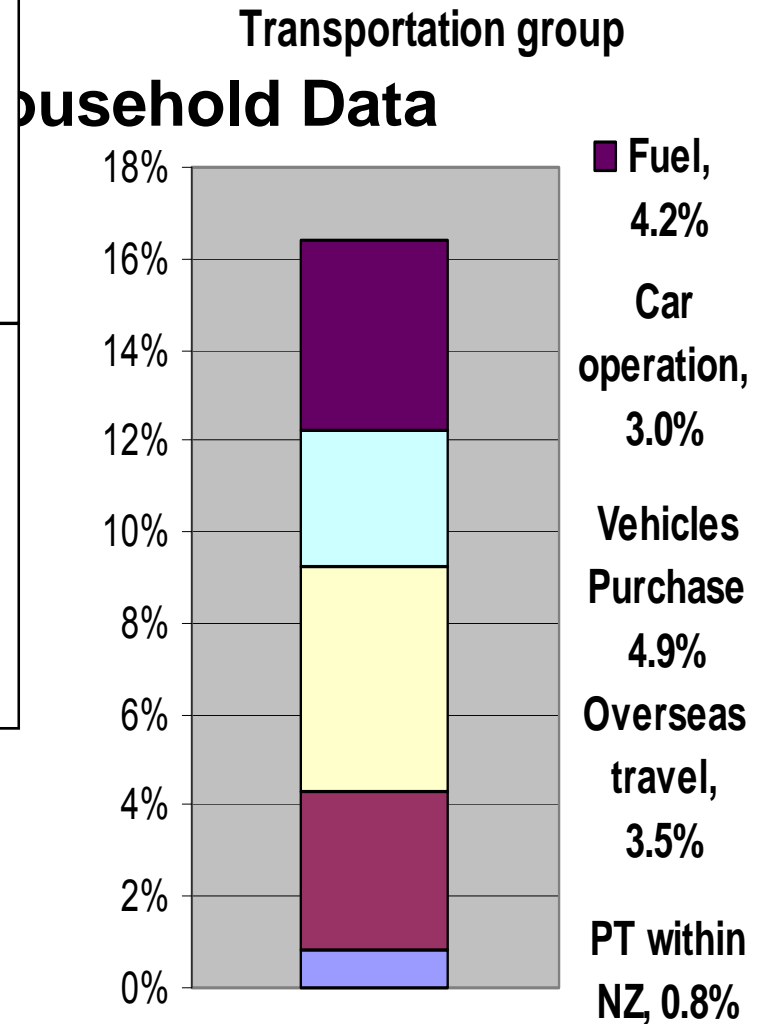
Transport declines to 14%

Fuels up to 4.4%

Overseas Travel Down to 1.2%



Behaviour Change ?



Summary of Forecasts & Resource Estimates

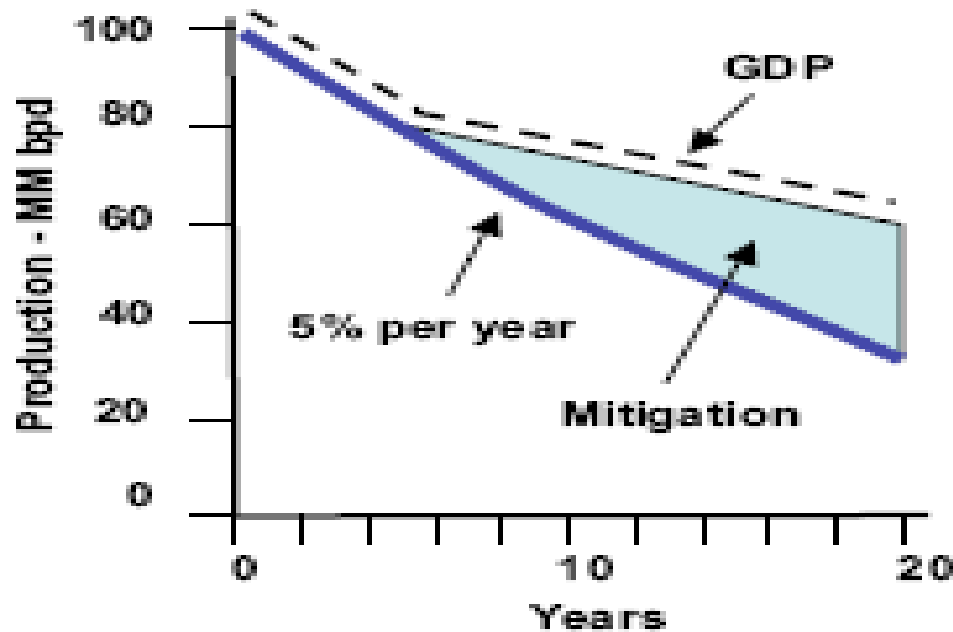
Low Estimate 2 – 2.4 t bbl Peak 2006 – 2010

Median Estimate 3 – 3.6 t bbl Peak 2010 - 2020

High Estimate 4 t bbl Peak 2030 - 2050

All these dates are relevant in the life of a City

Potential Impacts On World GDP



- What will the world oil decline rate be?
- How closely will GDP decline follow oil shortages?

**Robert L. Hirsch, Ph.D., Senior Energy Advisor, MISO,
Clean Technology 2008 Conference, June 4, 2008**

“Peaking Of World Oil Production: Impacts, Mitigation, & Risk
Management” at SAIC for USA DoE, Feb 2005