THE ENERGY CHALLENGE

Presentation to The Energy Federation of New Zealand (EFNZ)

Rob Jager – Country Chair, Shell New Zealand

22 April 2009

The Energy Challenge - Introduction

- Overview
  - The Energy Challenge and Response Framework (3-2-1-6-5)
  - Shell's view on the NZ ETS
  - What we think Copenhagen needs to deliver

- Context
  - 'More Energy, Less Carbon Dioxide' = Energy Challenge
  - Recession impact

THE EFFECT OF CO_2 ON GLOBAL TEMPERATURES ISN'T A RECENT DISCOVERY!

THE

LONDON, EDINBURGH, AND DUBLIN

PHILOSOPHICAL MAGAZINE

AND

JOURNAL OF SCIENCE.

[FIFTH SERIES.]

APRIL 1896.

XXXI. *On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground. By* Prof. SVANTE ARRHENIUS *.

I. *Introduction: Observations of* Langley *on Atmospherical Absorption.*

A GREAT deal has been written on the influence of the absorption of the atmosphere upon the climate. Tyndall † in particular has pointed out the enormous importance of this question. To him it was chiefly the diurnal and annual variations of the temperature that were lessened by this circumstance. Another side of the question, that has long attracted the attention of physicists, is this: Is the mean temperature of the ground in any way influenced by the presence of heat-absorbing gases in the atmosphere? Fourier‡ maintained that the atmosphere acts like the glass of a hot-house, because it lets through the light rays of the sun but retains the dark rays from the ground. This idea was elaborated by Pouillet §; and Langley was by some of his researches led to the view, that "the temperature of the earth under direct sunshine, even though our atmosphere were present as now, would probably fall to −200° C., if that atmosphere did not possess the quality of selective

* Extract from a paper presented to the Royal Swedish Academy of Sciences, 11th December, 1895. Communicated by the Author.
† 'Heat a Mode of Motion,' 2nd ed. p. 405 (Lond., 1865).
‡ *Mém. de l'Ac. R. d. Sci. de l'Inst. de France*, t. vii. 1827.
§ *Comptes rendus*, t. vii. p. 41 (1838).

Phil. Mag. S. 5. Vol. 41. No. 251. *April* 1896. S

. . . and for Shell this isn't an issue anyway

"For us, as a company, the debate about whether man-made climate change is happening is over.

The debate now is about what we can do about it. Businesses, like ours, need to turn CO_2 management into a business opportunity by leading the search for responsible ways to manage CO_2, and use energy more efficiently. But that also requires concerted action by governments to create the long-term, market-based policies needed to make it worthwhile for companies to invest.

With fossil fuel use and CO_2 levels continuing to grow fast, there is no time to lose."

Jeroen van der Veer, CEO

OVERVIEW 3-2-1-6-5

3 Hard truths

2 Scenarios

1 Preferred approach

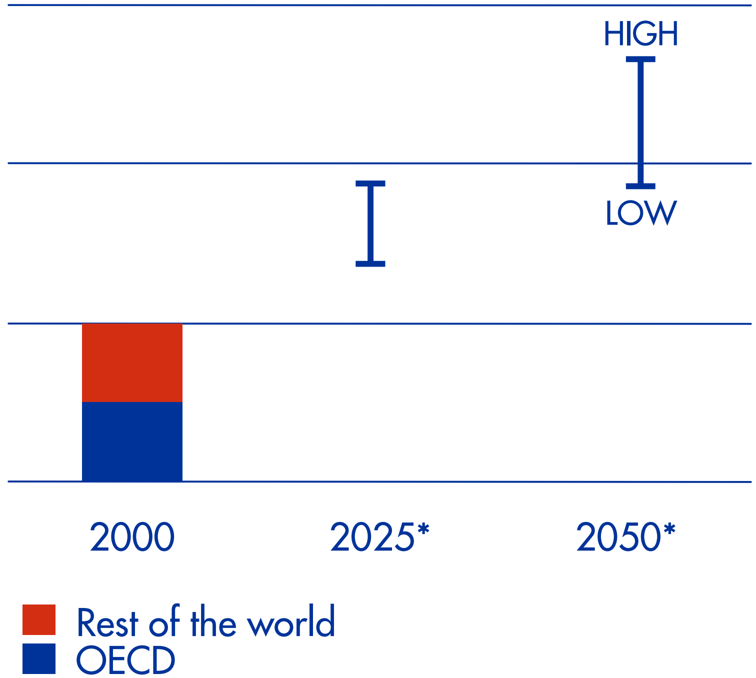
6 Pathways

5 Messages to regulators

1- ENERGY DEMAND WILL DOUBLE BY 2050

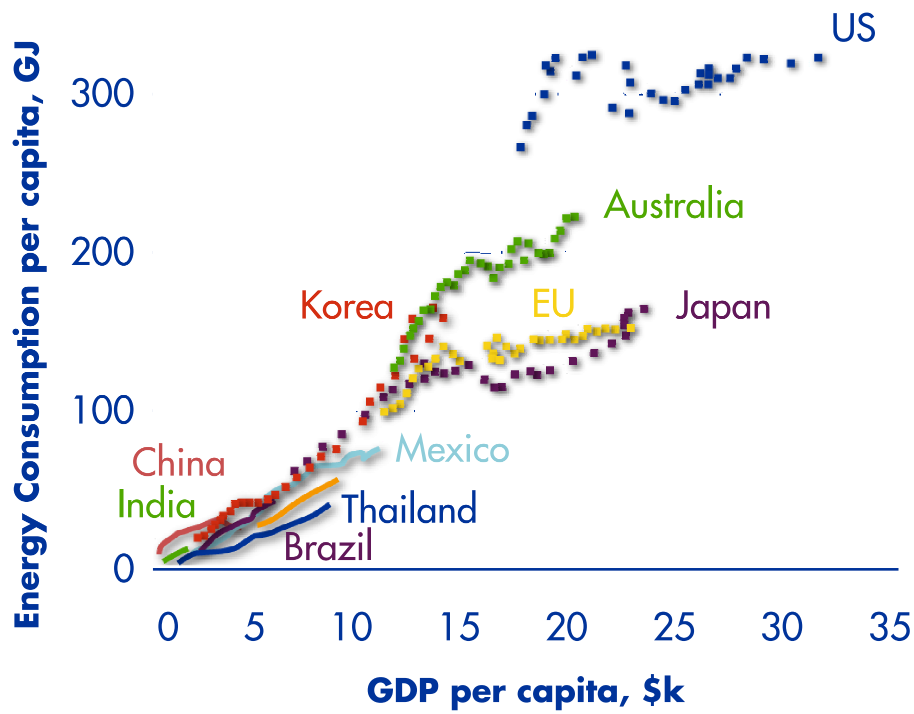
RISING GLOBAL ENERGY DEMAND

Global primary energy demand 2000



THE ENERGY LADDER

Economic Development is fuelled by access to energy



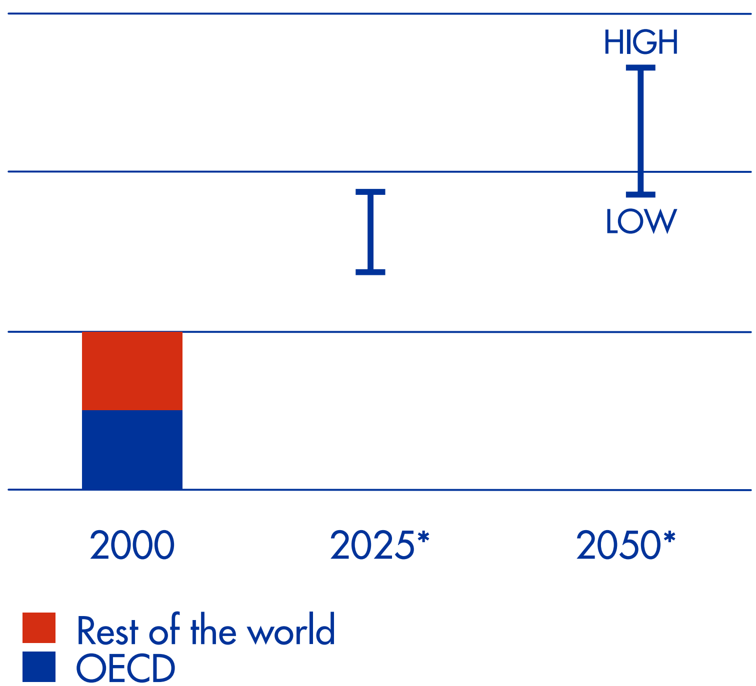
* Shell estimates

Source: IMF, BP

2 - SUPPLY WILL STRUGGLE TO KEEP PACE

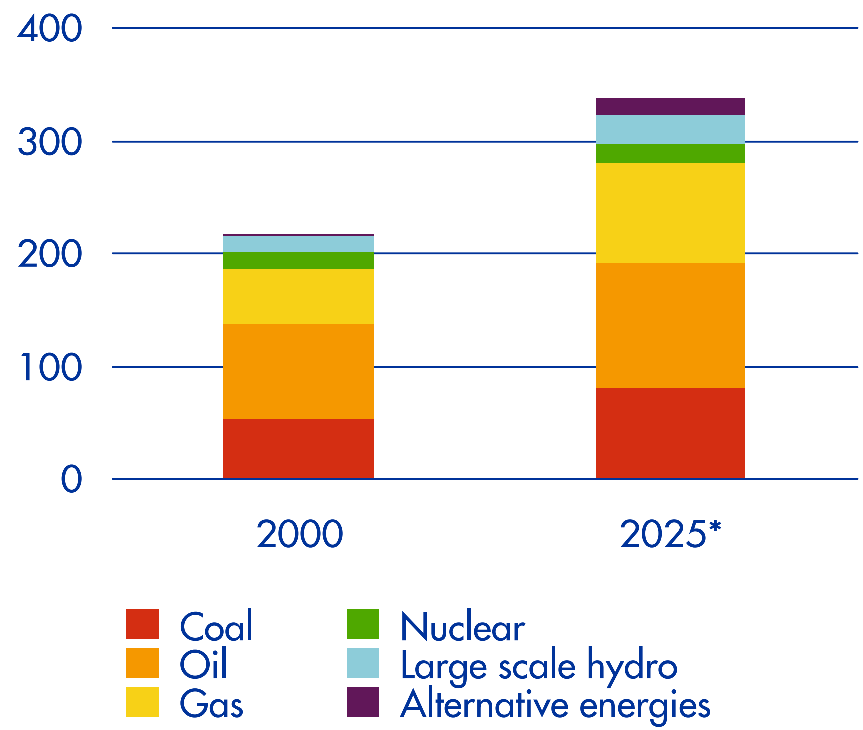
RISING GLOBAL ENERGY DEMAND

Global primary energy demand 2000



CHANGING ENERGY MIX

Million barrels oil equivalent per day



* Shell estimates

3 - ENVIRONMENTAL STRESSES ARE INCREASING

CARBON EMISSION PROFILES

> 900 ppm Trajectory

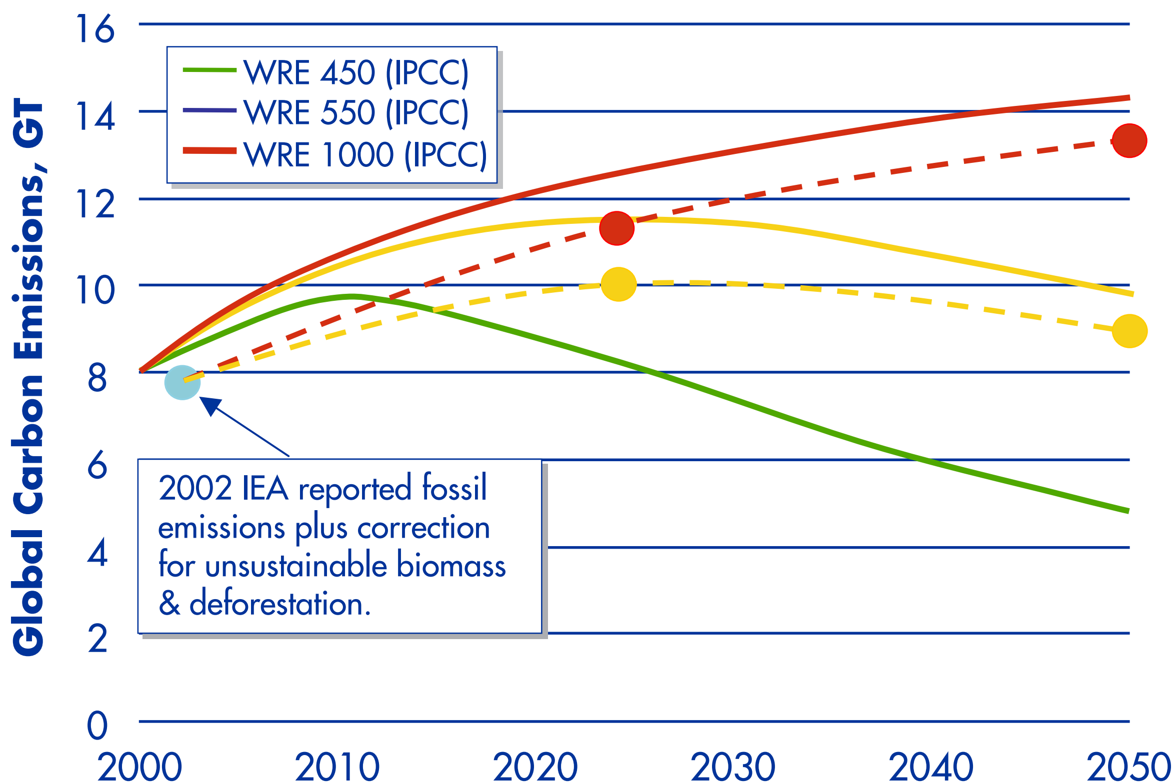
- Current "business as usual" trend, even with more renewable power, biofuels and energy efficiency improvements

< 550 ppm Trajectory

- Will require very substantial changes in the way we produce and use energy. We need to start now to achieve this

450 ppm Trajectory

- Will allow for minimal adaptation due to climate change

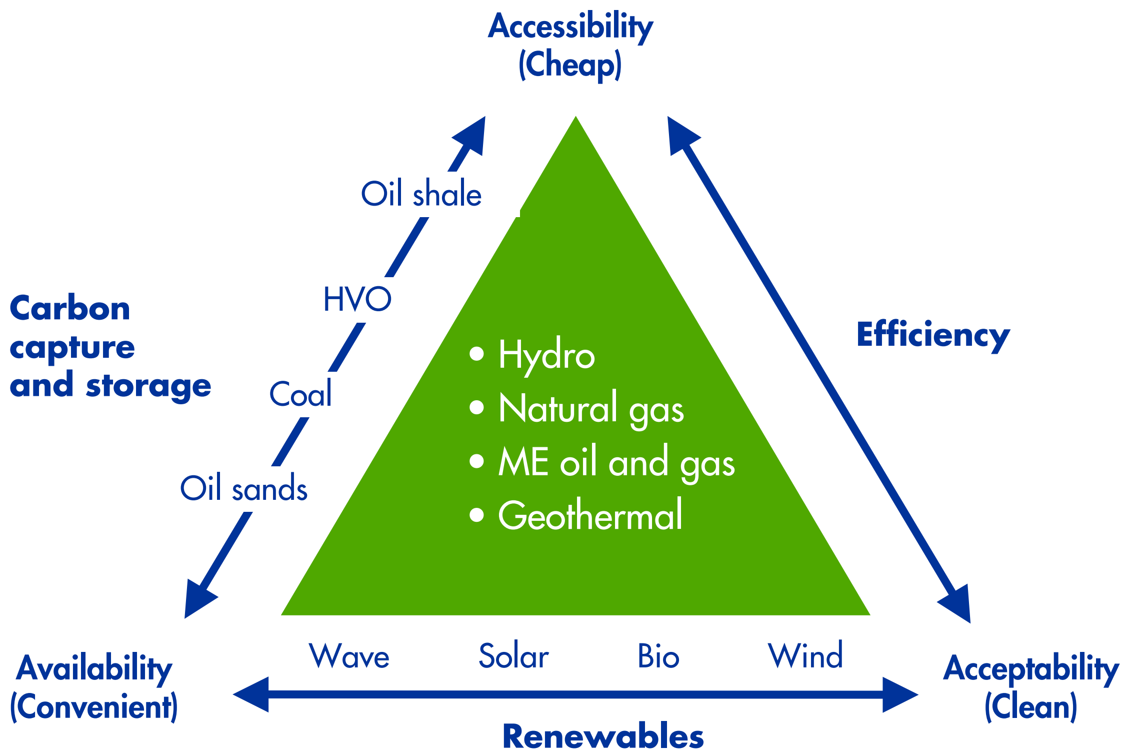


Theoretical carbon emissions profiles published in IPCC 3rd Assessment Report

THE ENERGY CHALLENGE - 'TRILEMMA'

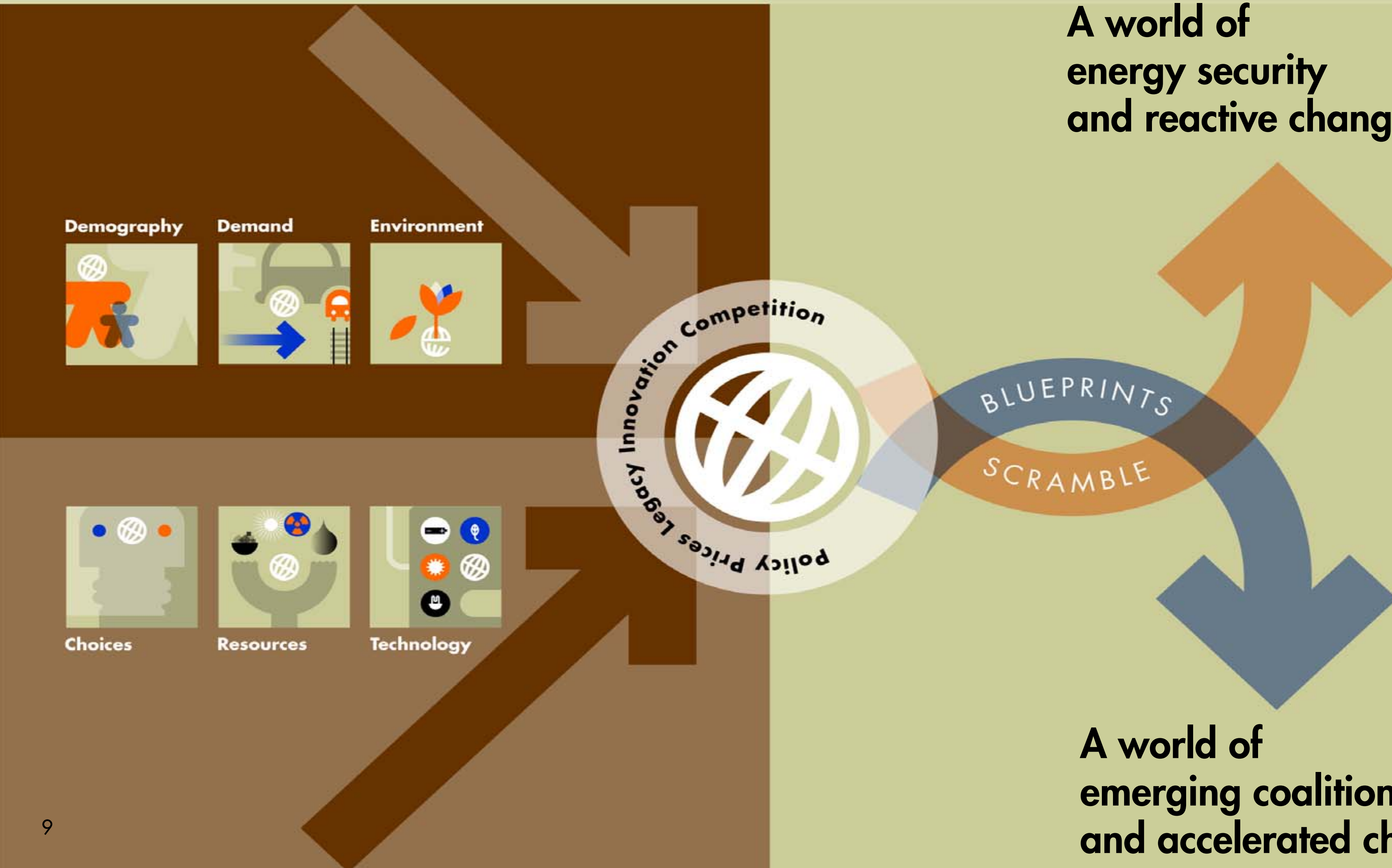
ENERGY DEMAND

- Could more than double by 2050 as population rises and developing countries expand economies
- Hydrocarbons will continue to provide the foundation of world energy supply for at least the rest of this century
- As a result, management of the CO_2 footprint is a priority



SHELL SCENARIOS HELP US TO IMAGINE ALTERNATIVES FUTURES

A world of
energy security
and reactive change

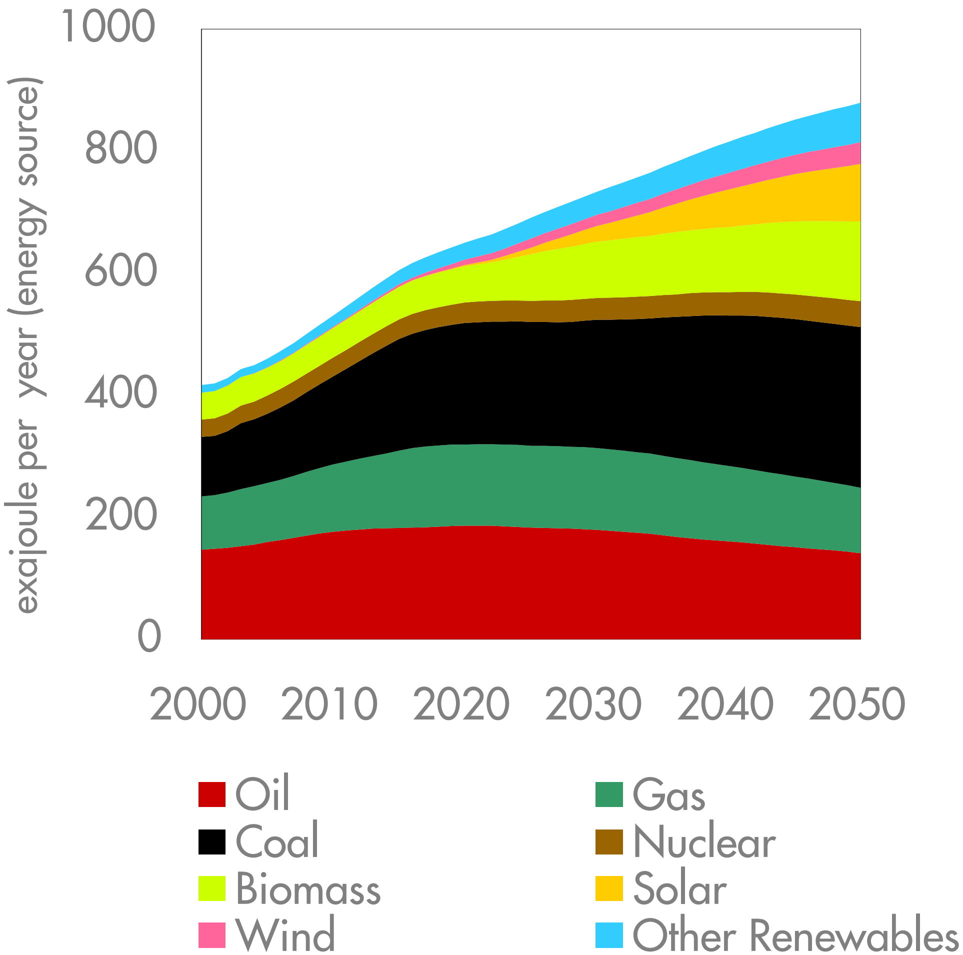


A world of
emerging coalitions
and accelerated change

③-❷-①-⑥-⑤

SCRAMBLE AND WHAT THIS MEANS FOR ENERGY

Total primary energy supply/demand

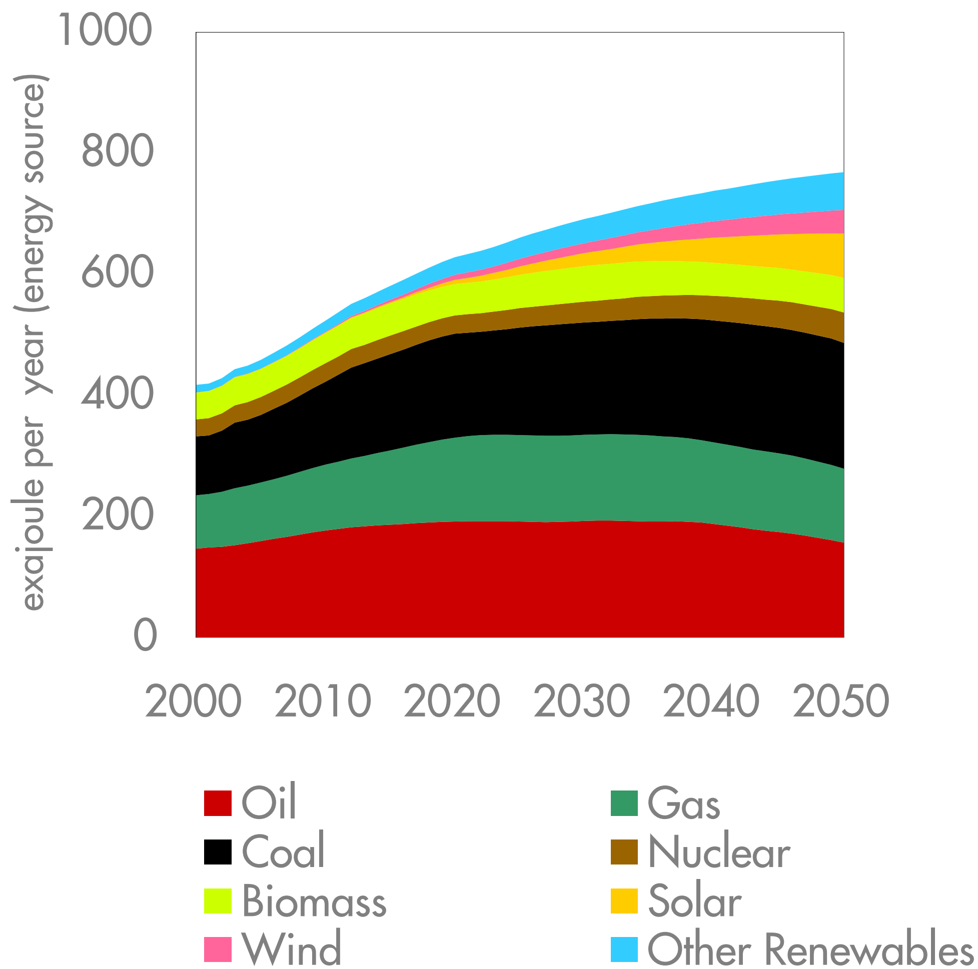


- Focus on existing infrastructure
- Sequential responses to hard truths
- Volatile energy prices
- Knee-jerk reactions to climate events
  - No effective carbon pricing
  - Adaptation
- Flight to coal, then biofuels
- Renewables forced in by mandates
- Patchwork of national standards

Source: Shell International BV and Energy Balances of OECD and Non-OECD Countries©OECD/IEA 2006

BLUEPRINTS AND WHAT THIS MEANS FOR ENERGY

Total primary energy supply/demand



- Broader anticipation of challenges
- Critical mass of parallel responses to hard truths
- Effective carbon pricing established early
- Aggressive efficiency standards
- Growth shifts to electrification
- New infrastructure develops
- CCS emerges after 2020

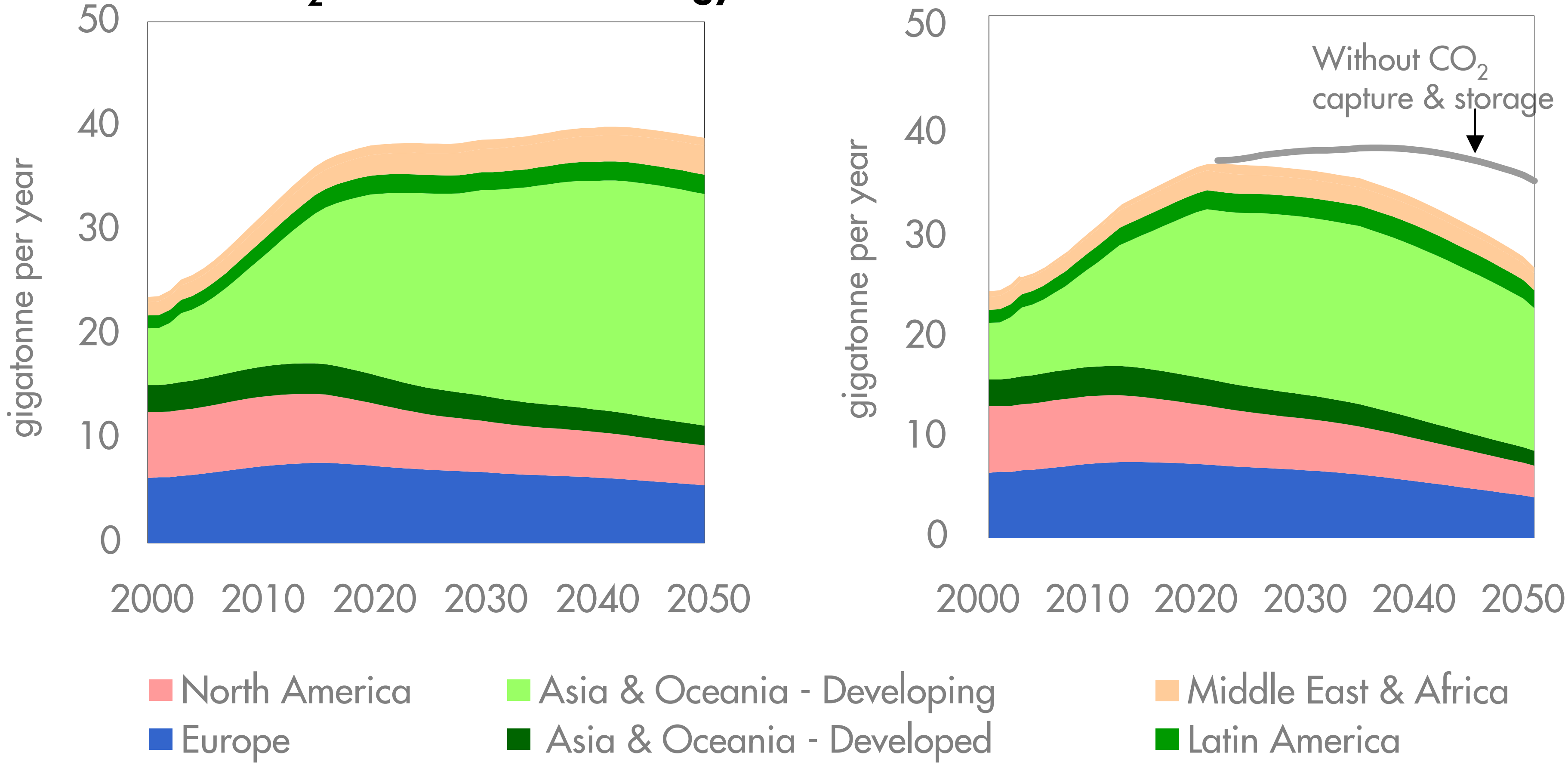
Source: Shell International BV and Energy Balances of OECD and Non-OECD Countries©OECD/IEA 2006

IMPLICATIONS FOR DIRECT CO2 EMISSIONS FROM ENERGY

Scramble - Late reactions

Blueprints - Early actions

Direct CO_2 emissions from energy



Source: Shell International BV and Energy Balances of OECD and Non-OECD Countries©OECD/IEA 2006

6 - REDUCTION PATHWAYS

1. Increasing the efficiency of our operations, seeking to be first quartile.
2. Establishing a substantial capability in CO2 Capture and Storage (CCS).
3. Continuing to research and develop technologies that increase efficiency and reduce emissions in hydrocarbon production.
4. Aggressively developing low-CO2 sources of energy, including natural gas and low CO2 fuel options.
5. Helping manage energy demand by growing the market for products and services that help customers use less energy and emit less CO2.
6. Working with governments and advocating the need for more effective CO2 regulation.

5 – POLICY OBJECTIVES

Governments need to develop internationally aligned policies to meet the energy challenge and address climate change.

- **They should include:**
  - cap and trade systems for large stationary sources
  - clear incentives for Carbon dioxide Capture and Storage (CCS)
  - a simple, credible target for the share for renewable sources in our energy supply.
  - transport sector measure such as vehicle efficiency standards; programmes for modal switch and reduction of vehicle kilometres travelled; and broadening the fuel pool by incentivising the use of fuels based on their ability to deliver reductions in CO_2 based on WtW
  - A series of robust energy standards for buildings and appliances with incentives to retrofit existing infrastructure.

SHELL'S VIEWS ON THE NZ ETS

We recently submitted to Parliament that:

- The government needs to provide some regulatory clarity;
- A cap and trade scheme will deliver an environmental outcome at the lowest cost to the economy;
- With the right policies, the transition to a low carbon economy has the potential to stimulate economic growth;
- There are methods to contain the costs and market volatility without overly constraining the market through price controls;
- Short term where price pass through does not occur allocation of allowances should be given to trade exposed business; long term we support full auctioning
- Carefully considered complementary measures are needed to restore market failures i.e. energy efficiency in vehicles; and buildings; and
- We support CCS qualifying as a removal activity as it will help encourage CCS development in NZ.

...WHAT COPENHAGEN NEEDS TO DELIVER...

Incentives for CCS
An international CCS project mechanism that delivers a fully convertible certificate for one tonne of CO_2 stored underground. This could be established under the Clean Development Mechanism or as a separate instrument.

Clean technology funds
We also consider that technology funds could be useful to Discovery, Development and Demonstration of key energy technologies that are still some distance from deployment. The funds must go beyond R&D and include assistance for the important commercial scale **demonstration phase** of new technologies such as CCS.

'We wish to pursue these through coalitions, and not as Shell alone'

In Conclusion

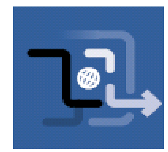
3 Hard truths

Demand Supply CO_2

2 Scenarios

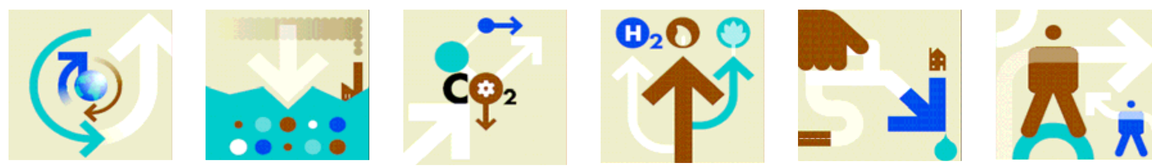
Scramble Blueprints

1 Preferred approach



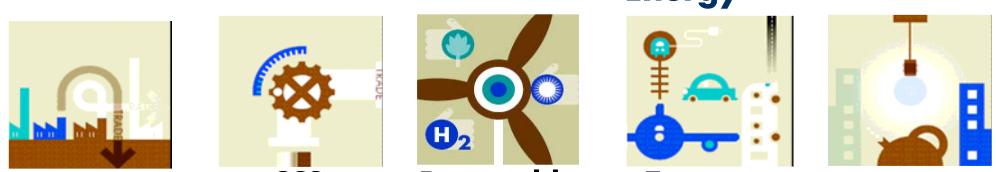
Blueprints

6 Pathways



Efficiency CCS Technology Low CO2 Energy Customers Advocacy

5 Messages to regulators



Cap & Trade CCS Renewables Transport Building Standards

Q&A?

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Q&A?

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Q&A?

GOING GLOBAL!