

Shell energy scenarios to 2050

An era of revolutionary change

**ALL ENERGY 2008
ABERDEEN**

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HEAD OF UK GOVERNMENT RELATIONS
SHELL INTERNATIONAL**

energy



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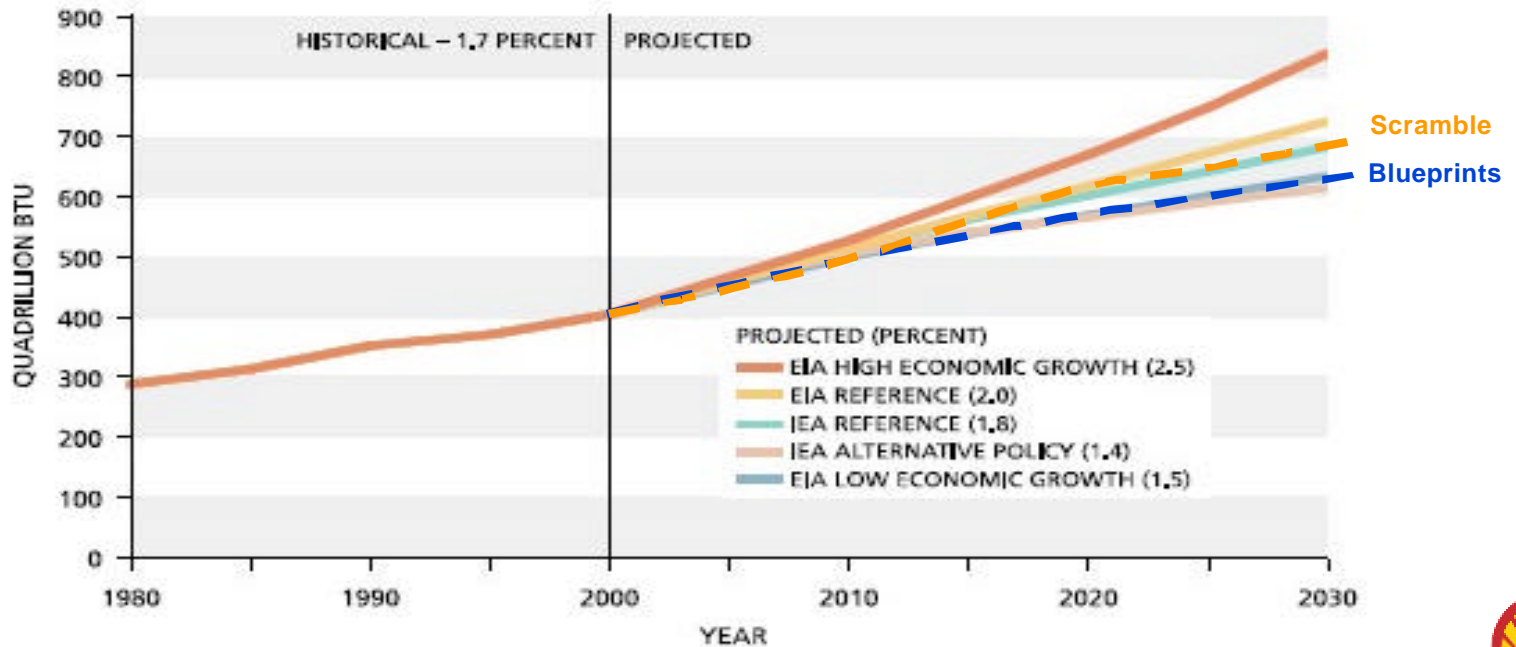
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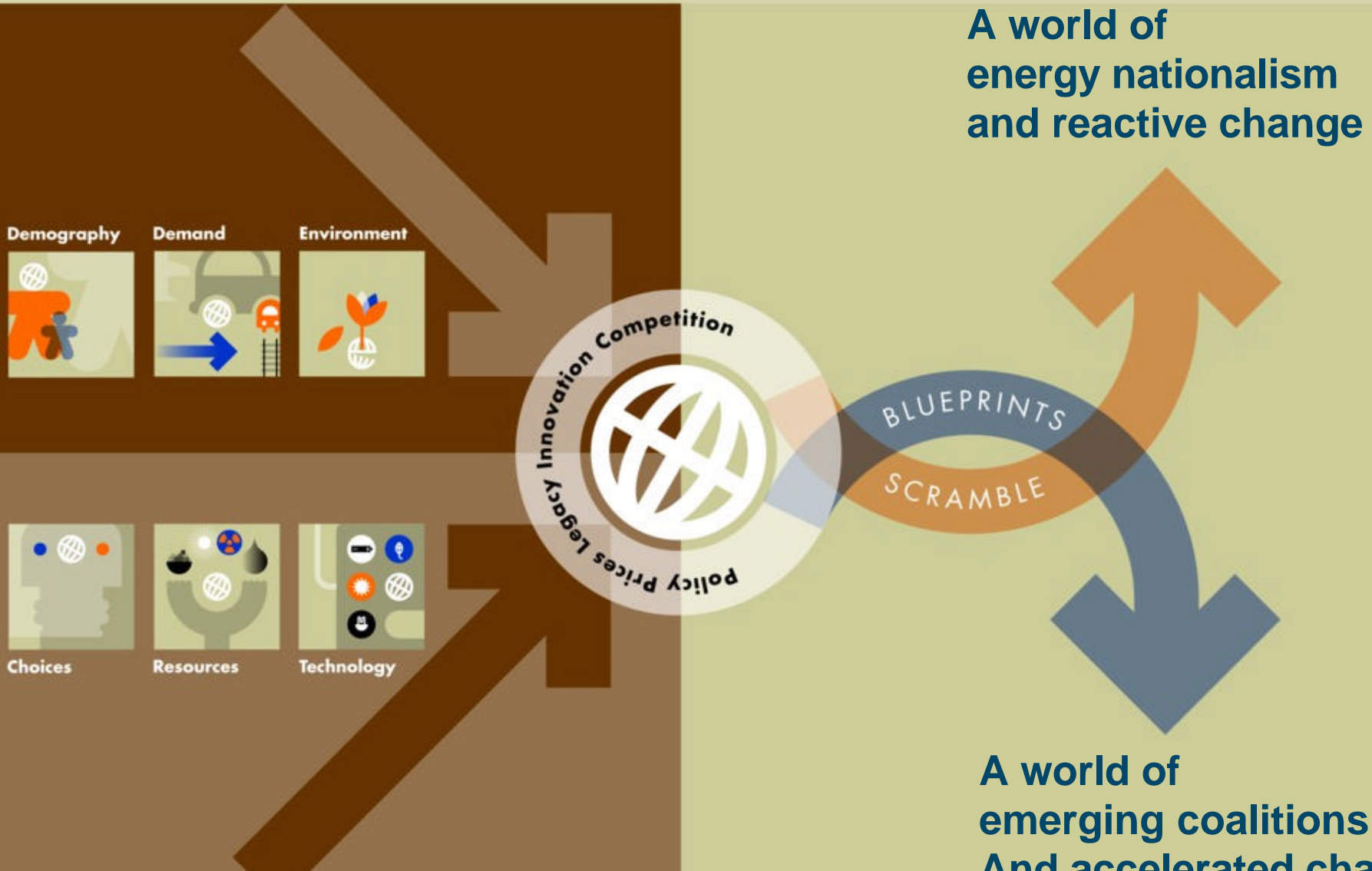
World Energy Demand



Three Hard Truths

- **Step-change in Energy Demand Growth**
- **Supply will struggle to keep pace**
- **Environmental stresses are increasing**

Shell energy scenarios

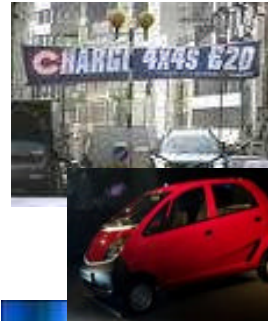




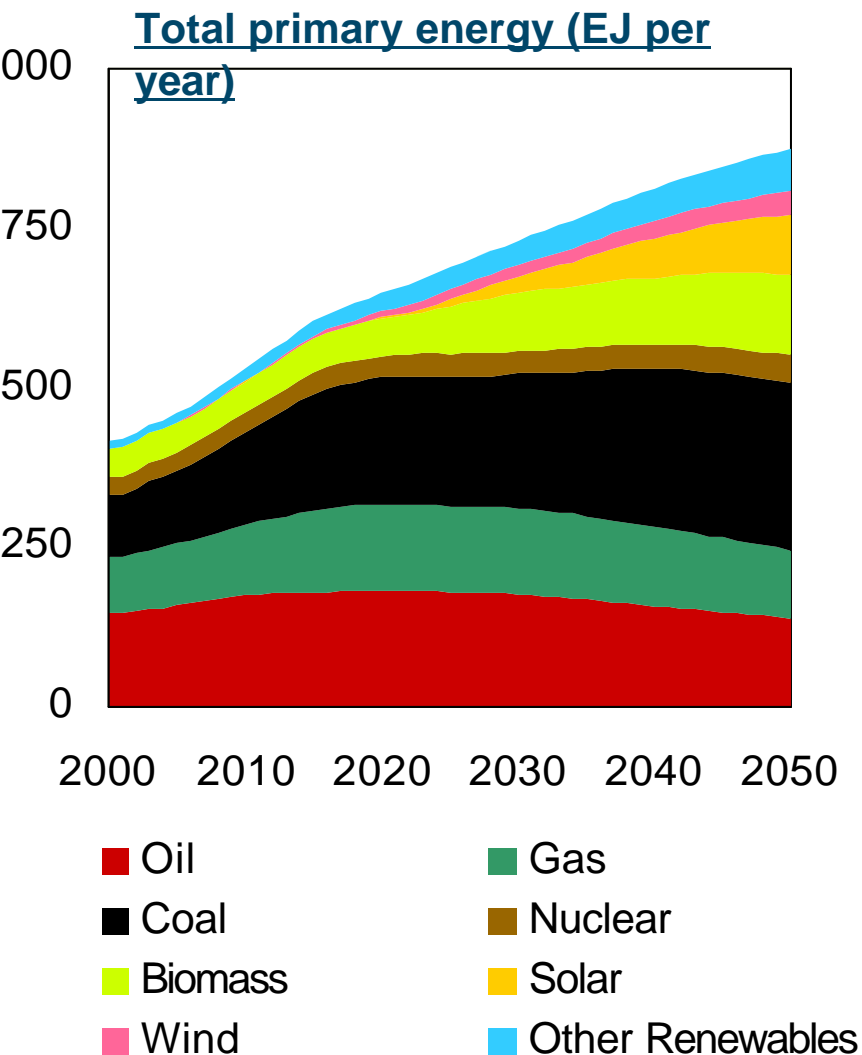
SCRAMBLE

Scramble

Security of supply and fear of losing economic growth



Consequences for energy mix



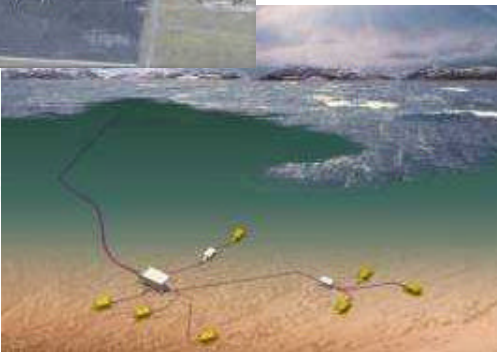
- Traditional energy pathways
 - Focus on existing infrastructure
- Sequential responses to hard truths
- Energy price volatility
- Knee-jerk reactions to climate events
 - No effective carbon pricing
 - Adaptation
- Coal and Biofuels spotlighted; renewables forced in by mandates
- Patchwork of national standards



BLUEPRINTS

Blueprints

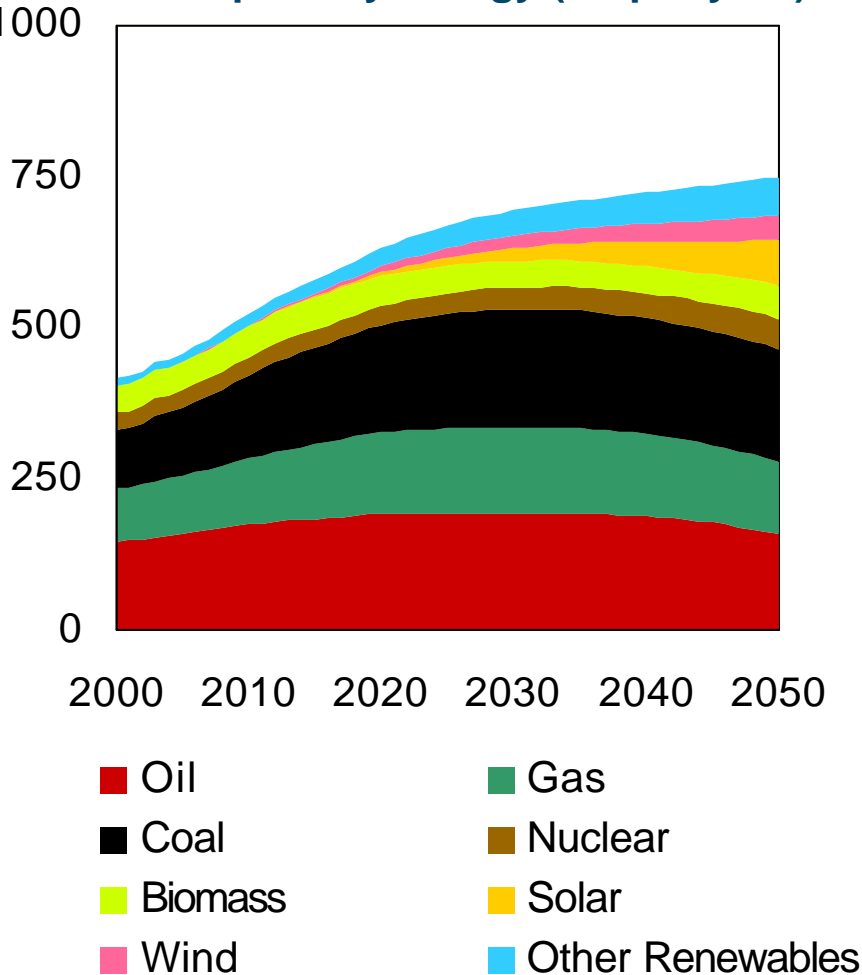
Energy security and sustainability



Energy sustainability drives a distinctly different energy mix



Total primary energy (EJ per year)



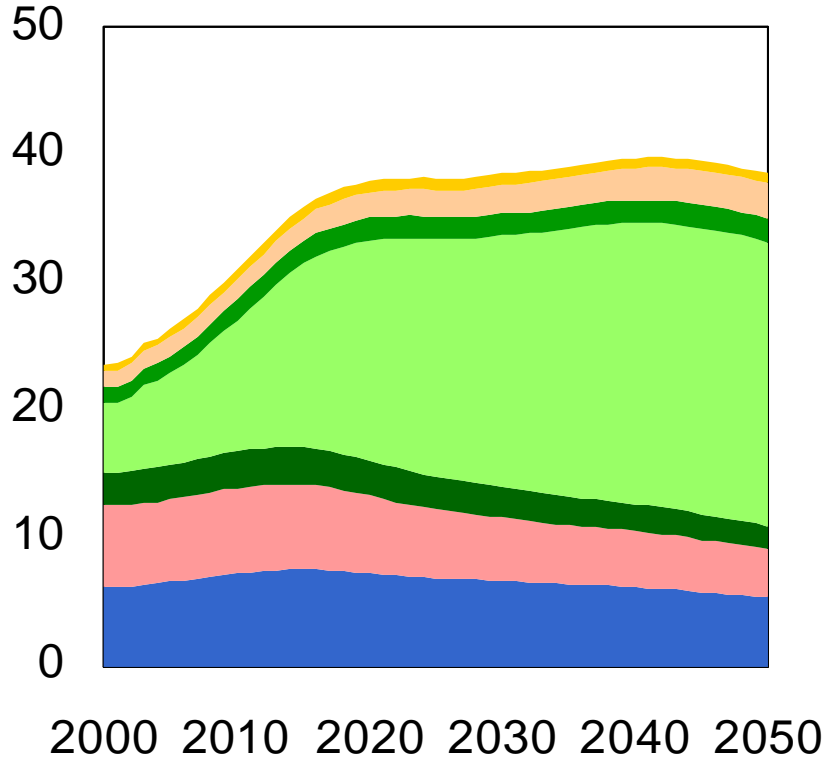
- Broad awareness of challenges at all levels, not only national
- Critical mass of parallel responses to hard truths
- Effective carbon pricing established early
 - Rerouted to renewables
 - Taxes on imported fossil fuels
- Efficiency standards
- Electrification of transport sector
- New infrastructure develops e.g. CCS emerges after 2020

Implications for CO₂ emissions from energy



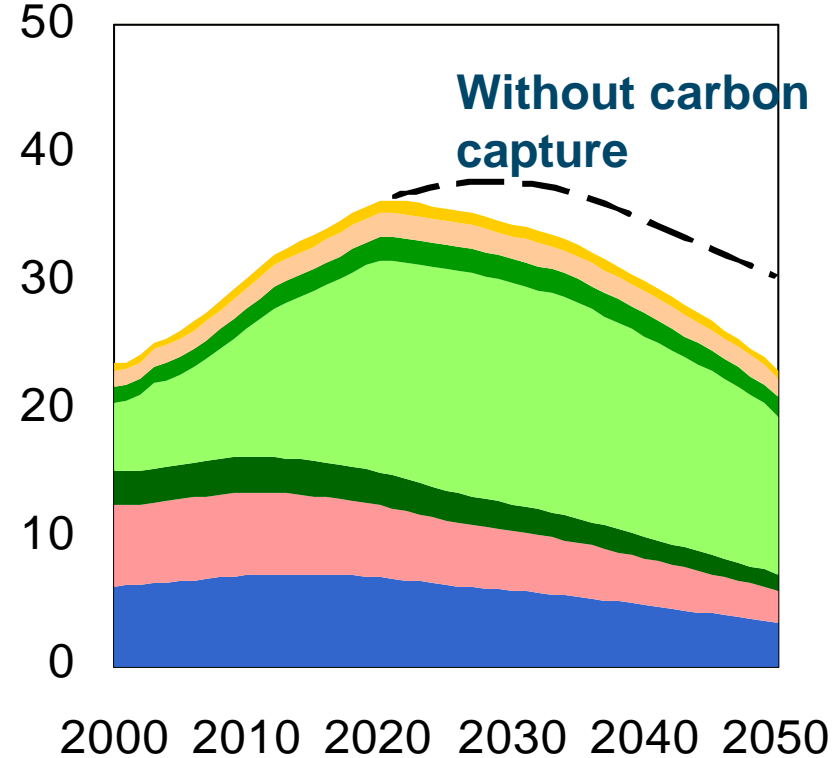
Late reactions

Gt CO₂ per year



Early actions

Gt CO₂ per year



Europe

Asia & Oceania - Developed

Latin America

North America

Asia & Oceania - Developing

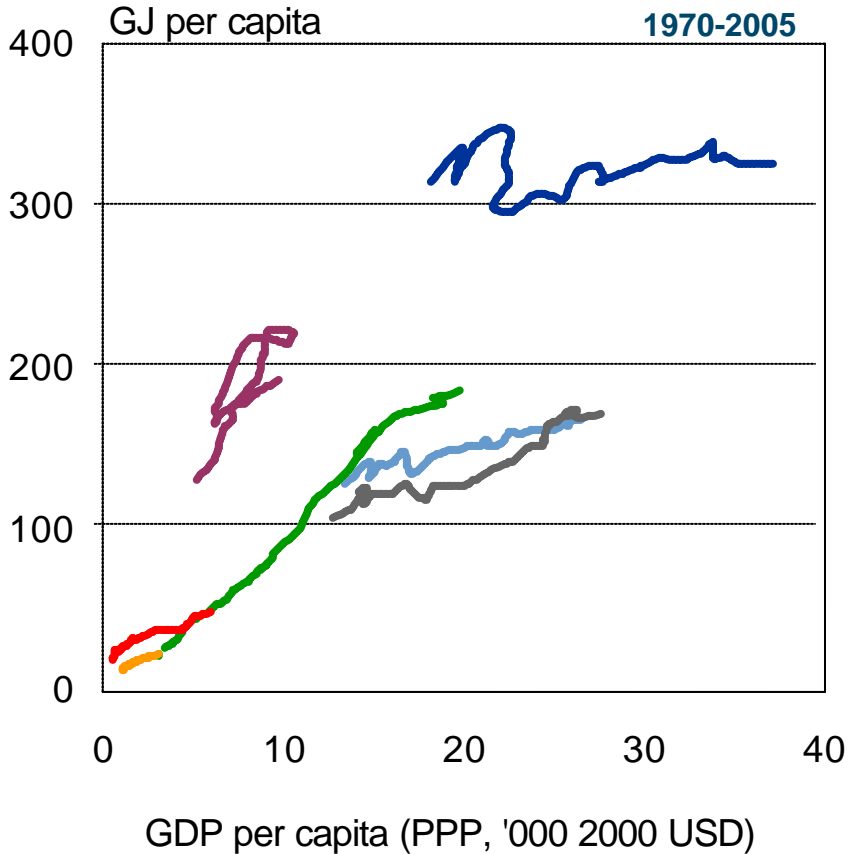
Middle East & North Africa

Sub-Saharan Africa

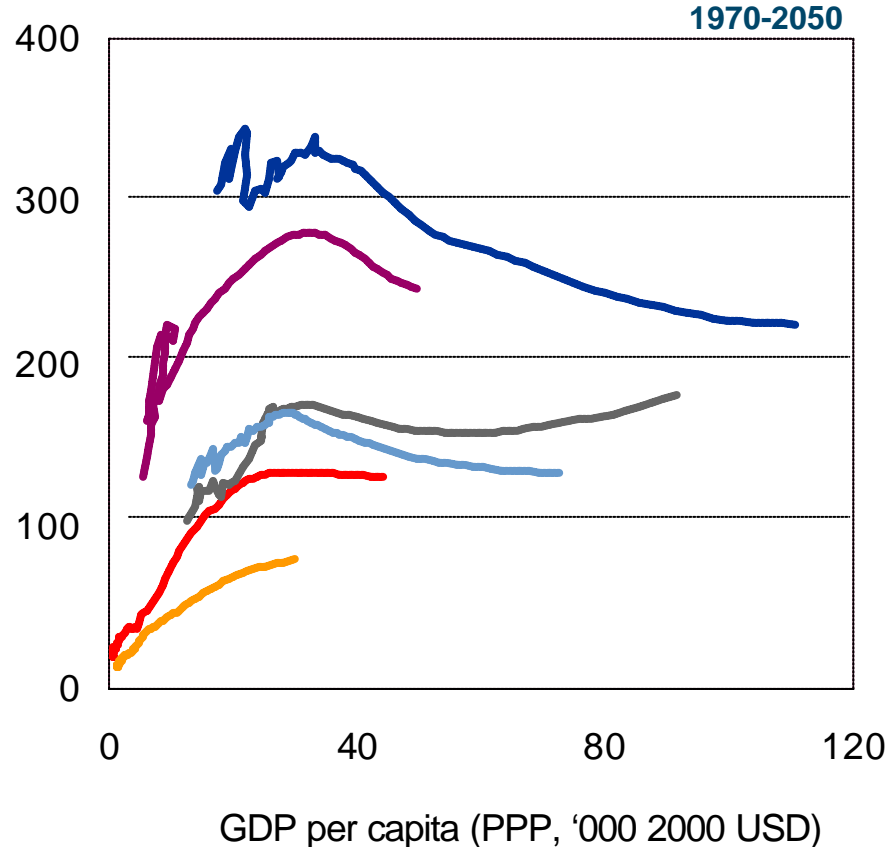
History is not sustainable and Blueprints requires a revolution in energy consumption



History -Traditional paths



Revolutionary paths



— USA — Europe EU 15 — Japan — South Korea — China — India — Russia

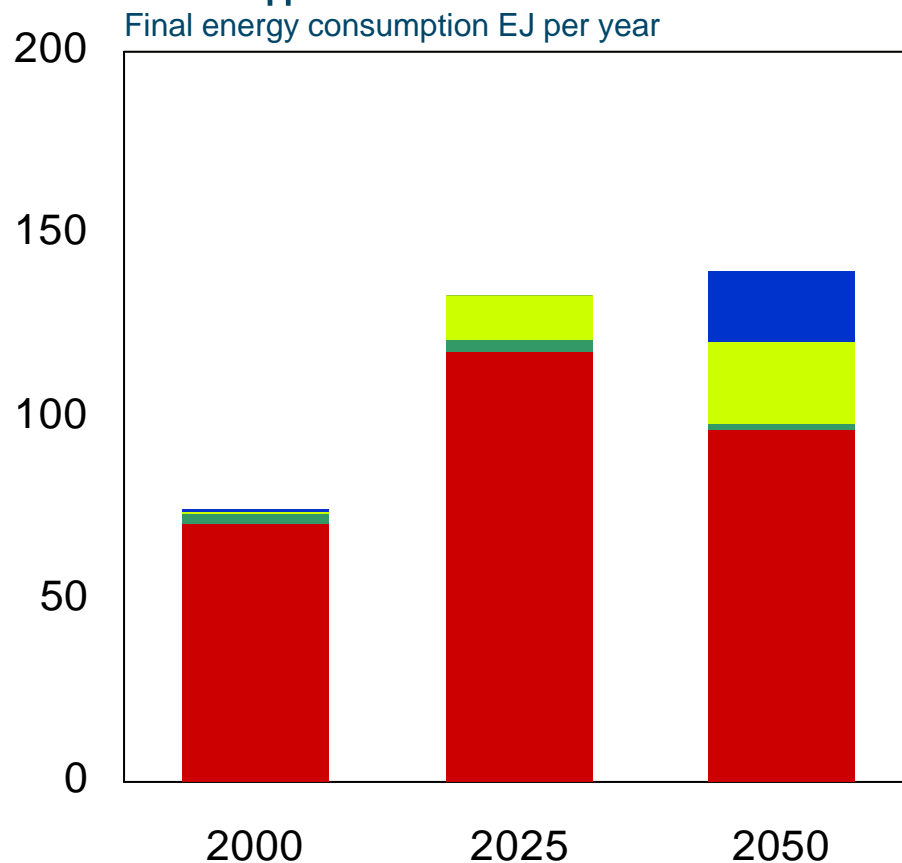
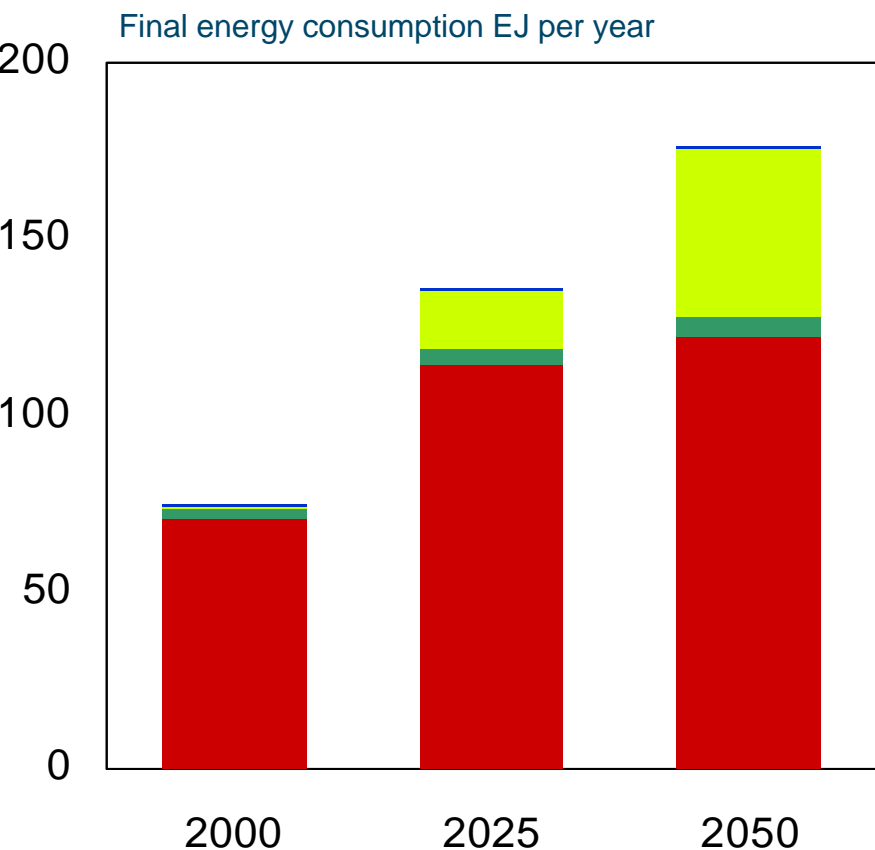
Transport liquid fuels remain strong, and in Blueprints are complimented by electricity



Liquid-based fuels



Electrification



■ Liquid fuels fossil-derived ■ Gaseous hydrocarbon fuels ■ Biofuels ■ Electricity*



- The three hard truths are very hard
- Business “as usual” is not sustainable
- Technology plays a major role, but no silver bullets
- Political and regulatory arenas are pivotal
- Choices made within the next 5 years are critical

Tackling all three hard truths **TOGETHER** is essential for a sustainable future

Q & A ?

? Q & A ?

? ? Q & A ?