

Shell Global Energy Scenarios to 2050

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An Era of Revolutionary Change

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energy



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Scenarios explore alternative futures

The present



The path



The future



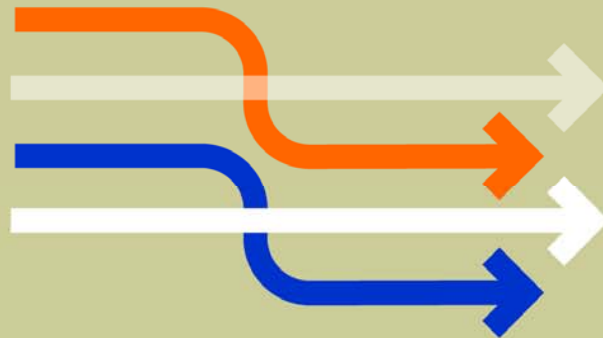
Forecast

Tends to remove discussion of uncertainties

Current realities (mental maps)



Multiple paths



Alternative futures



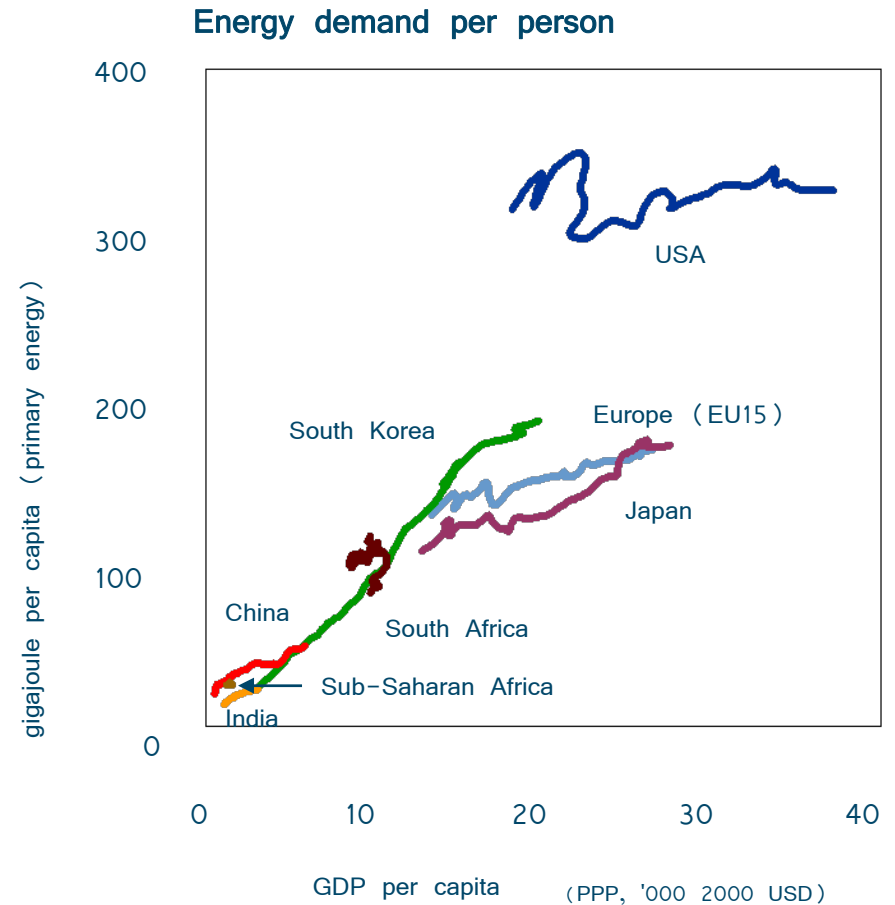
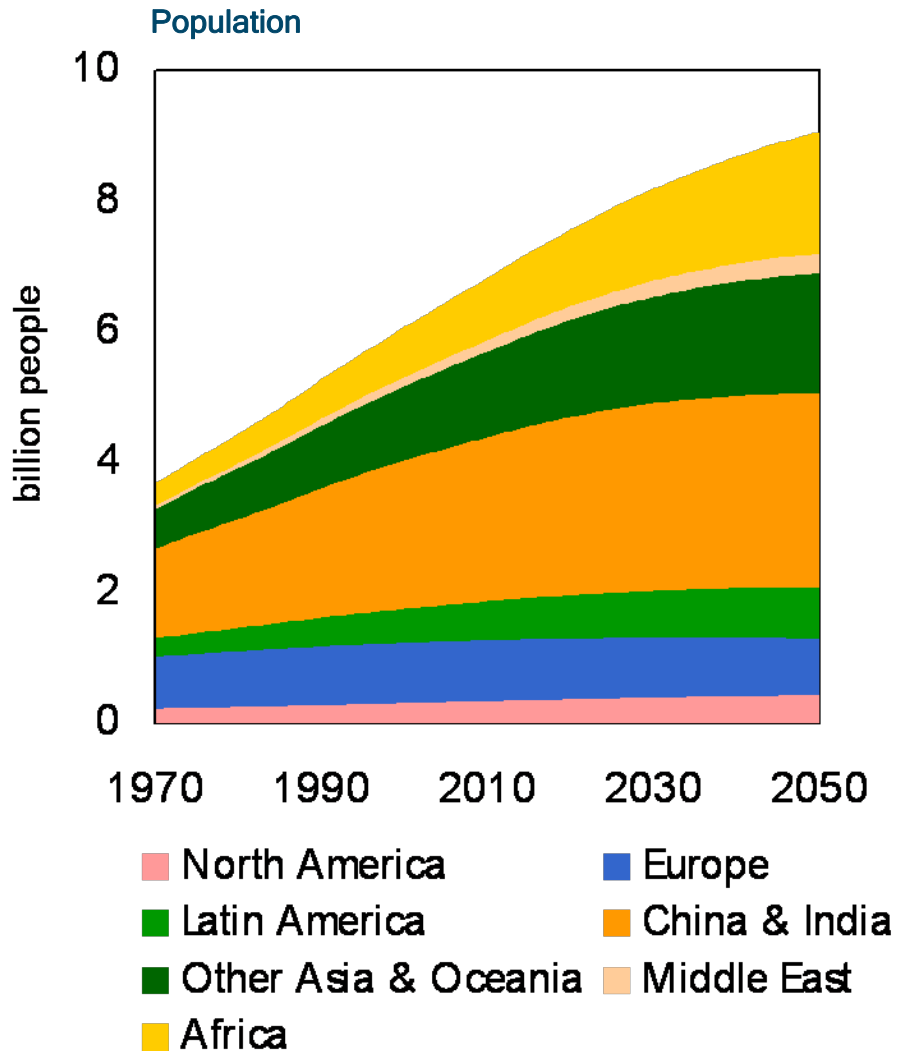
Scenarios

Critical Uncertainties centred on choices. Scramble, Blueprints

Three Hard Truths

- **Surging energy demand**
- **Supply will struggle to keep pace**
- **Environmental stresses are increasing**

Growth in population and prosperity are key drivers of energy demand



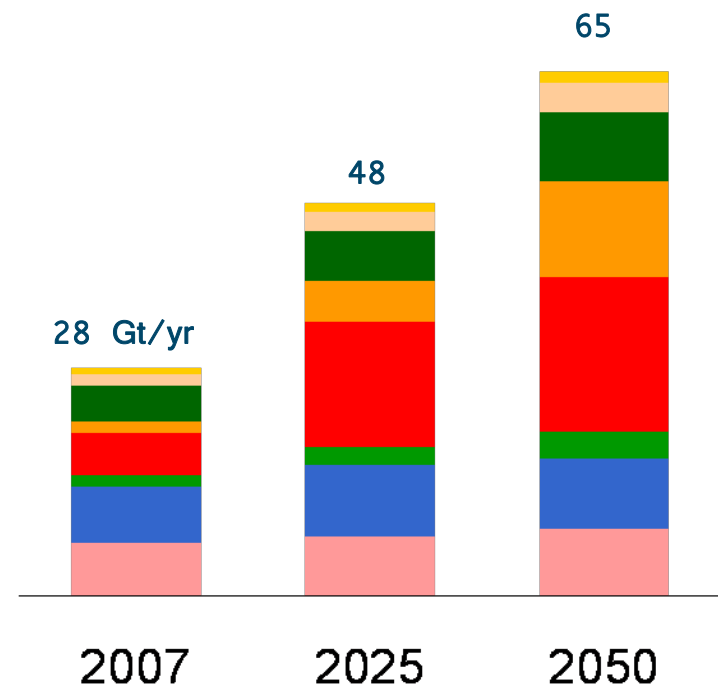
Supply will struggle to keep pace



Environmental stresses are increasing



In “Business as usual” world, direct CO₂ from energy could rise dramatically



- North America
- Europe
- Latin America
- China
- India
- Asia & Oceania
- Middle East & N Africa
- Sub-Saharan Africa

Shell energy scenarios help us to imagine alternative futures



A world of energy security and reactive change

A world of emerging coalitions and accelerated change



SCRAMBLE

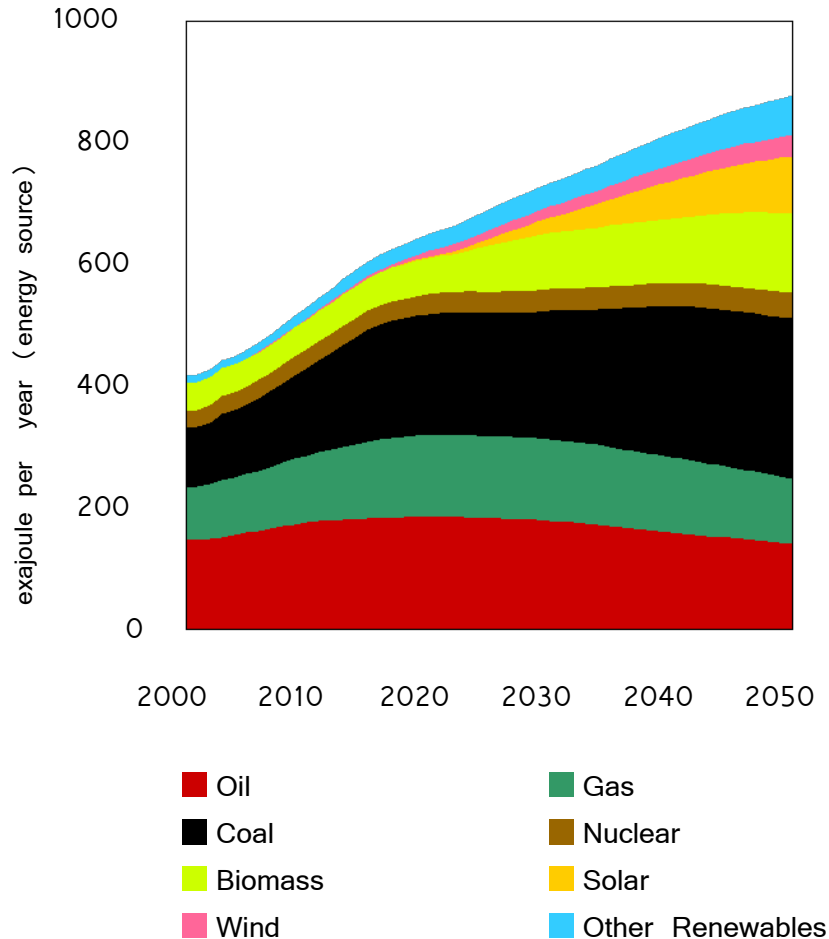
Scramble – Security of supply and fear of losing economic growth



What this means for energy



Total primary energy supply/demand



- Focus on existing infrastructure
- Sequential responses to hard truths
- Flight to coal, then biofuels
- Volatile energy prices
- Renewables forced in by mandates
- Eventual governments turn to efficiency measures
- Knee-jerk reactions to climate events
 - But no effective carbon pricing
 - Focus on adaptation



BLUEPRINTS

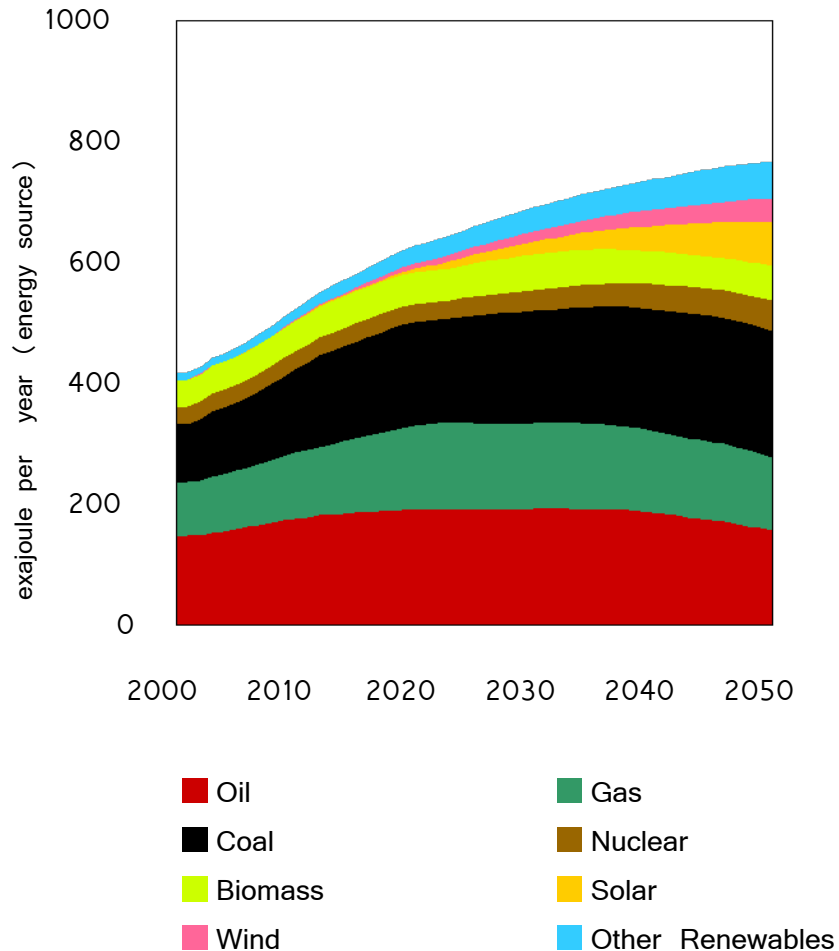
Blueprints - energy security and sustainability



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



- 🌐 The three hard truths are very hard
- 🌐 Transition is both inevitable and necessary
- 🌐 Technology plays a major role,
but no silver bullets
- 🌐 Political and regulatory choices are pivotal
- 🌐 The next 5 years are critical

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

- Energy security ‘Scramble’ not viable

Q&A?

? Q&A?

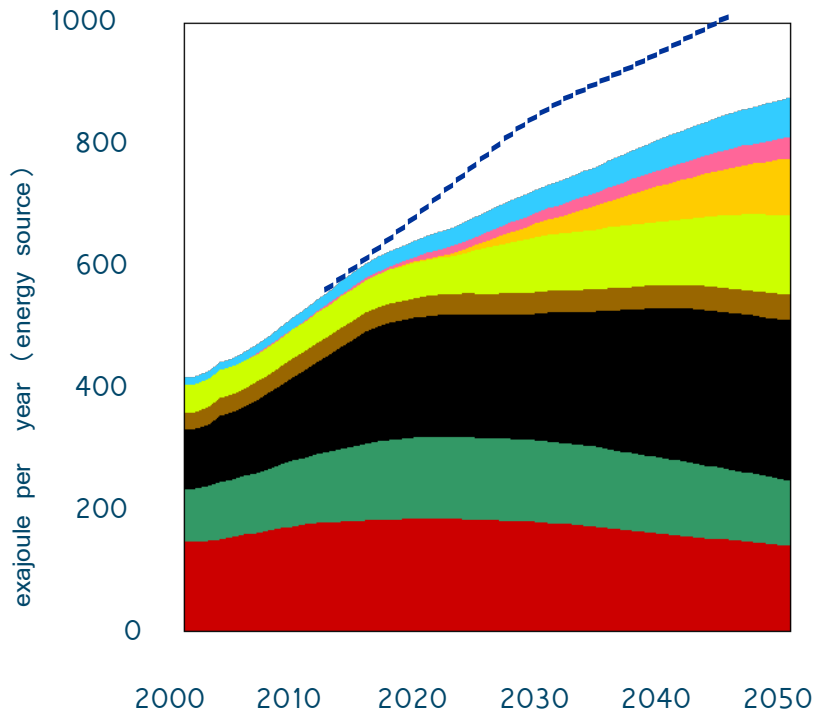
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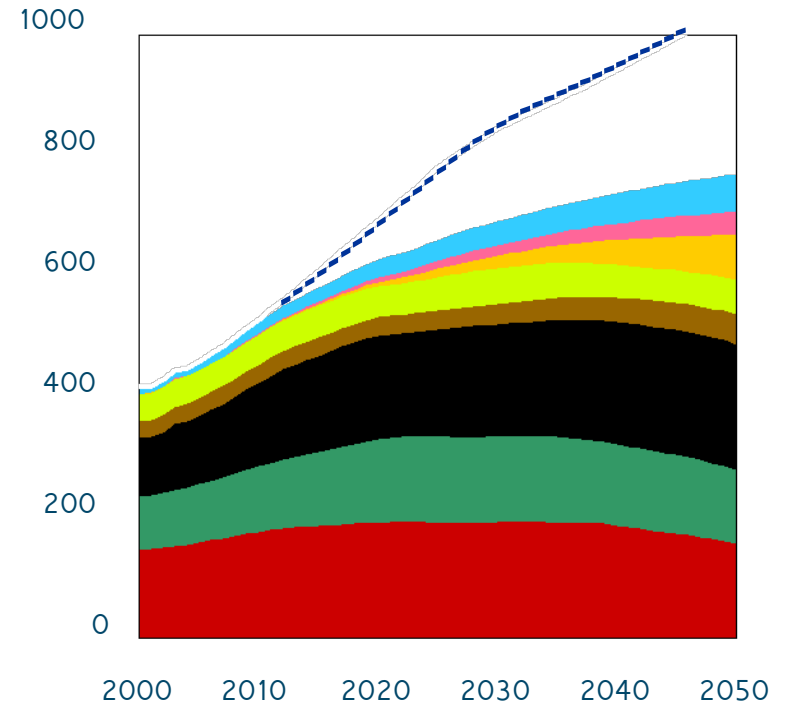
Comparing the scenarios' energy mix



Scramble



Blueprints



■ Oil
 ■ Gas
 ■ Coal
 ■ Nuclear
 ■ Biomass
 ■ Solar
 ■ Wind
 ■ Other Renewables

Implications for direct CO₂ emissions from energy

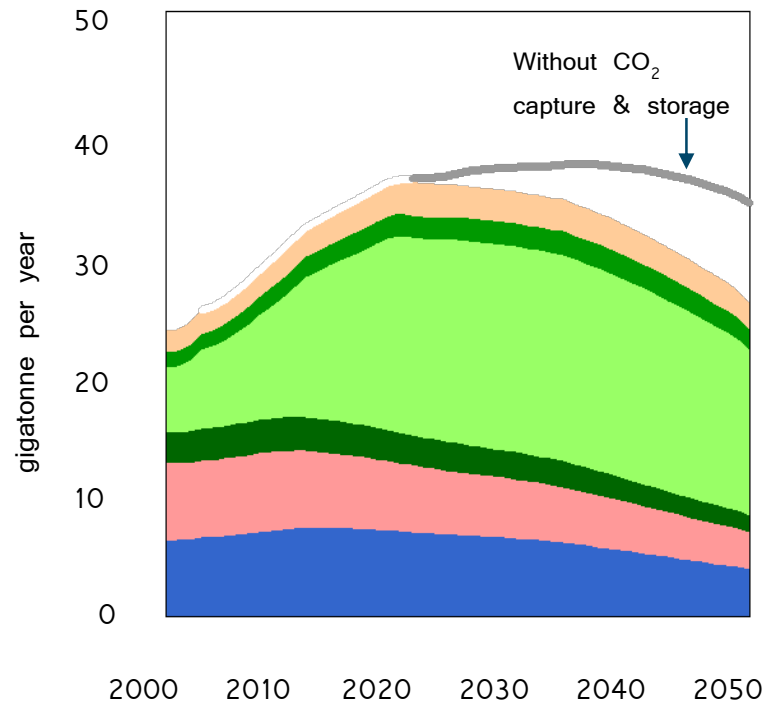
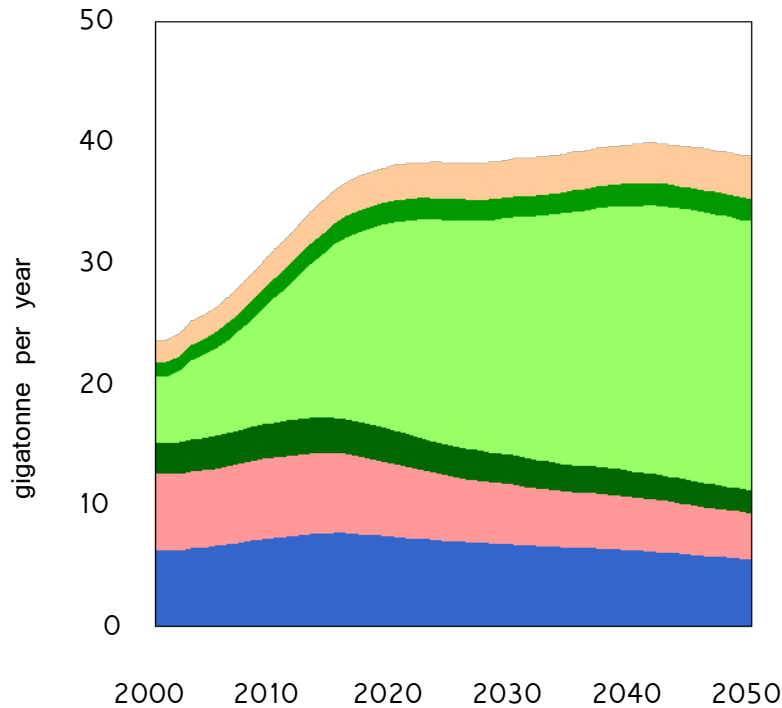


Scramble - Late reactions



Blueprints - Early actions

Direct CO₂ emissions from energy



North America

Asia & Oceania - Developing

Middle East & Africa

Europe

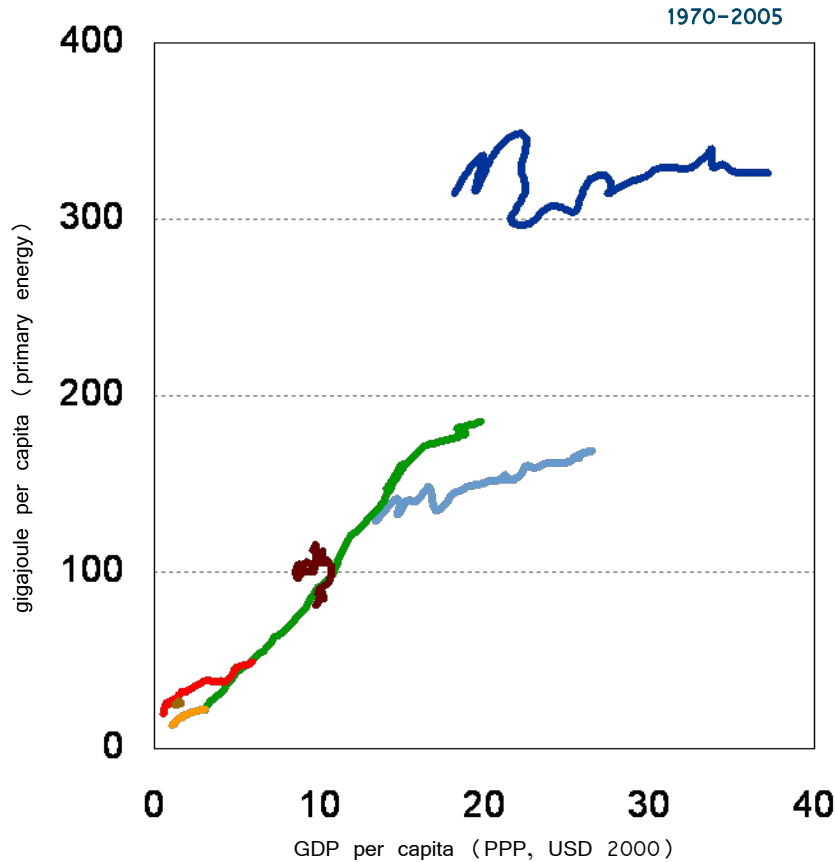
Asia & Oceania - Developed

Latin America

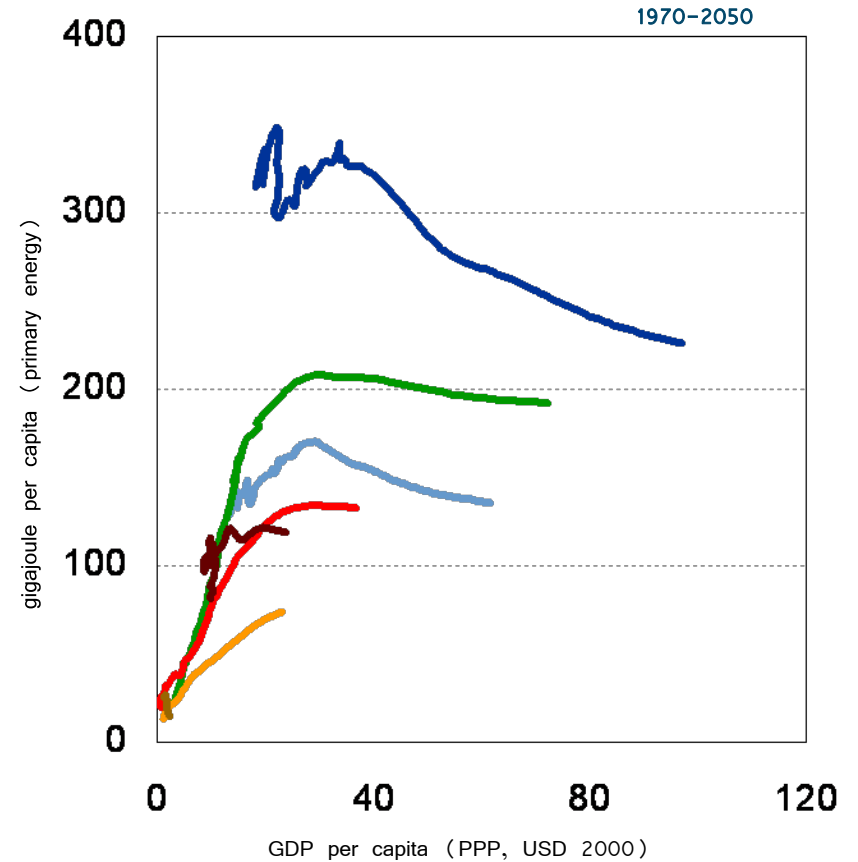
History is not sustainable and Blueprints requires a revolution in energy consumption



History - Traditional paths

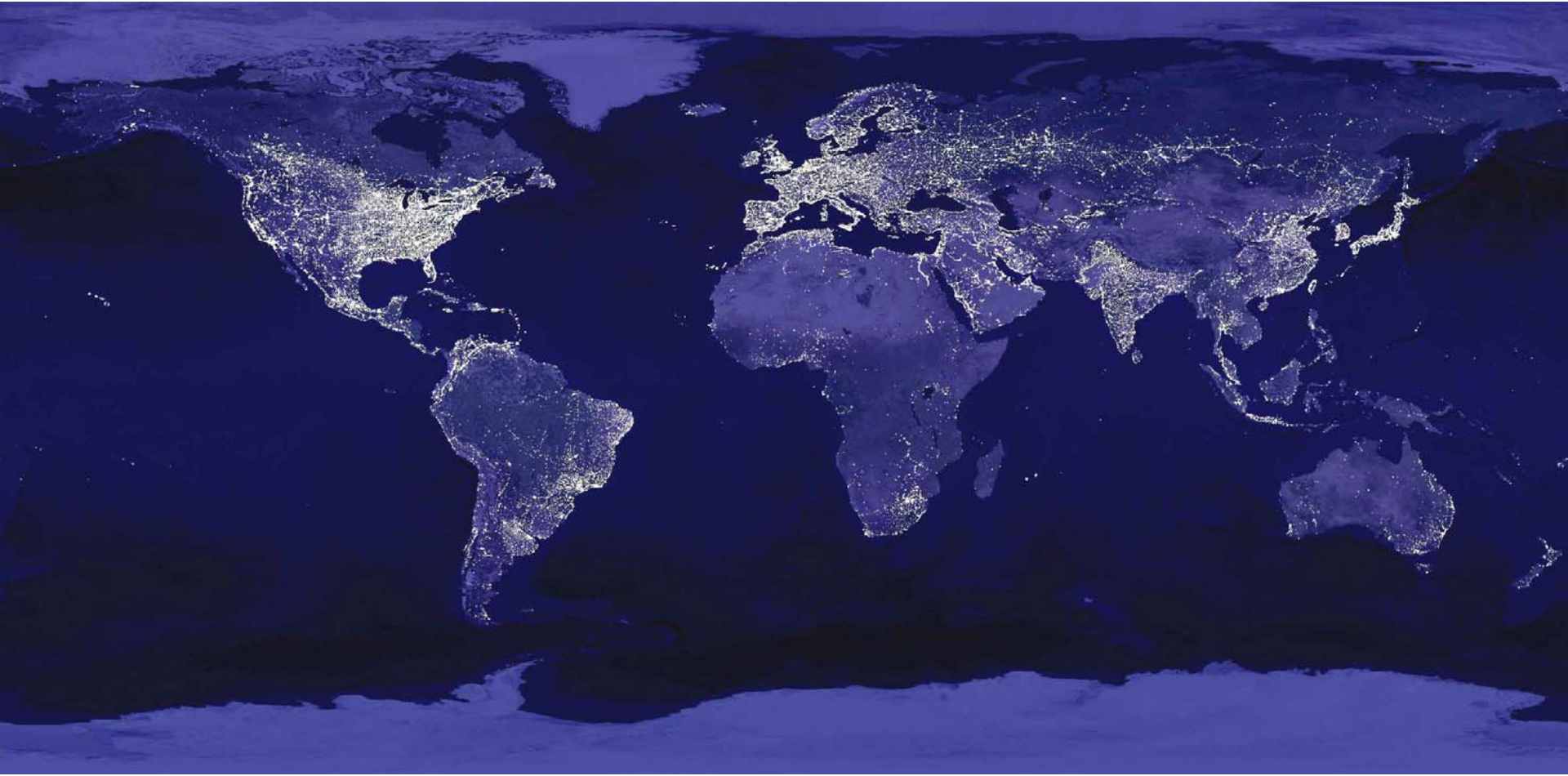


Revolutionary paths



— USA — Europe EU 15 — South Korea — China — India — Sub-Saharan Africa — South Africa

A focus on Sub-Saharan Africa



What is Shell doing?

- 🌐 Increasing our own efficiency
- 🌐 Helping our customers use less energy and emit less CO₂
- 🌐 R&D into efficient technologies
- 🌐 Aggressively developing low CO₂ sources of energy
- 🌐 Establishing capability in Carbon Capture and Storage
- 🌐 Working with governments for more effective CO₂ regulation

Shell advocates CO2 regulation

We ask governments to lead in regulating:

- Cap and trade CO2 market
- Incentives for Carbon Capture and Sequestration
- Targets for renewables sources
- Transport sector measures
- Building and appliances efficiency standards