

COMPARING AND USING GLOBAL ENERGY SCENARIOS

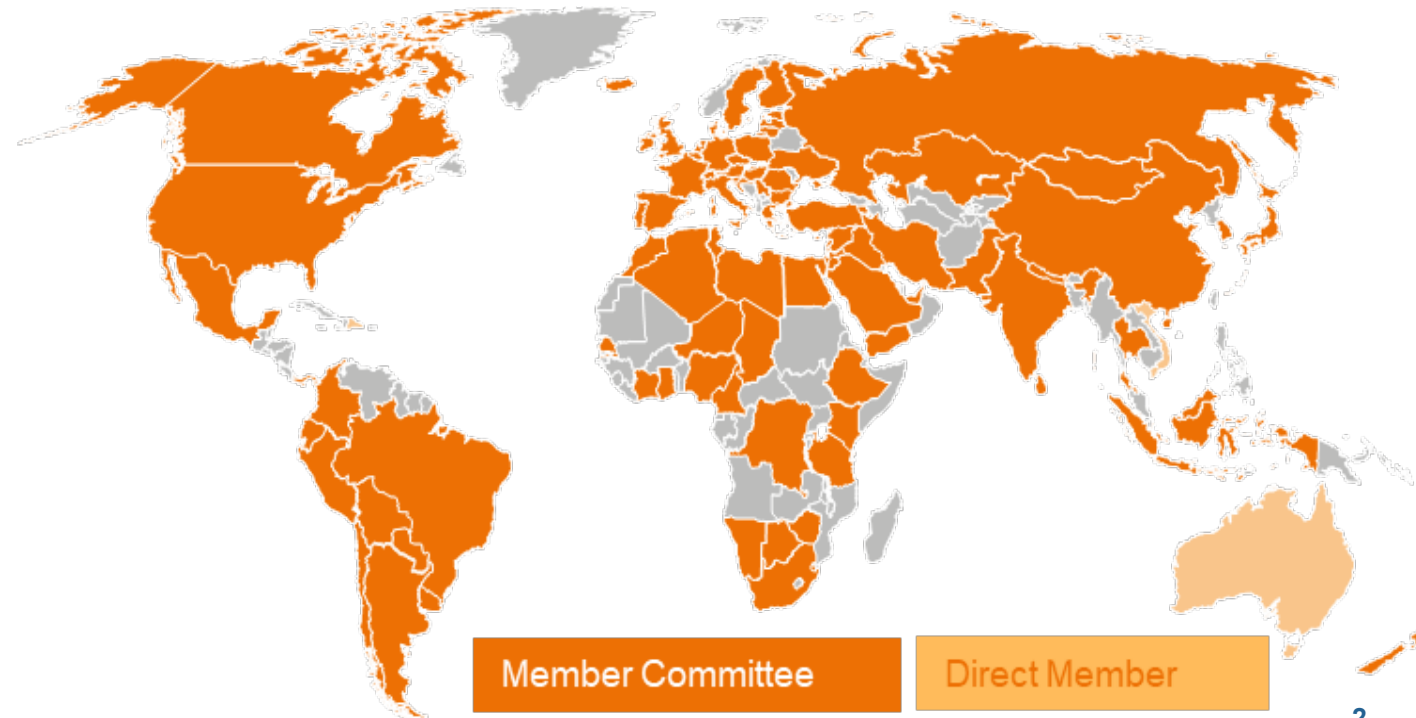
Young Energy Leaders Future Perspectives
@Vienna Energy Club hosted by Verbund AG
25 June 2019 | Vienna

Christoph Menzel

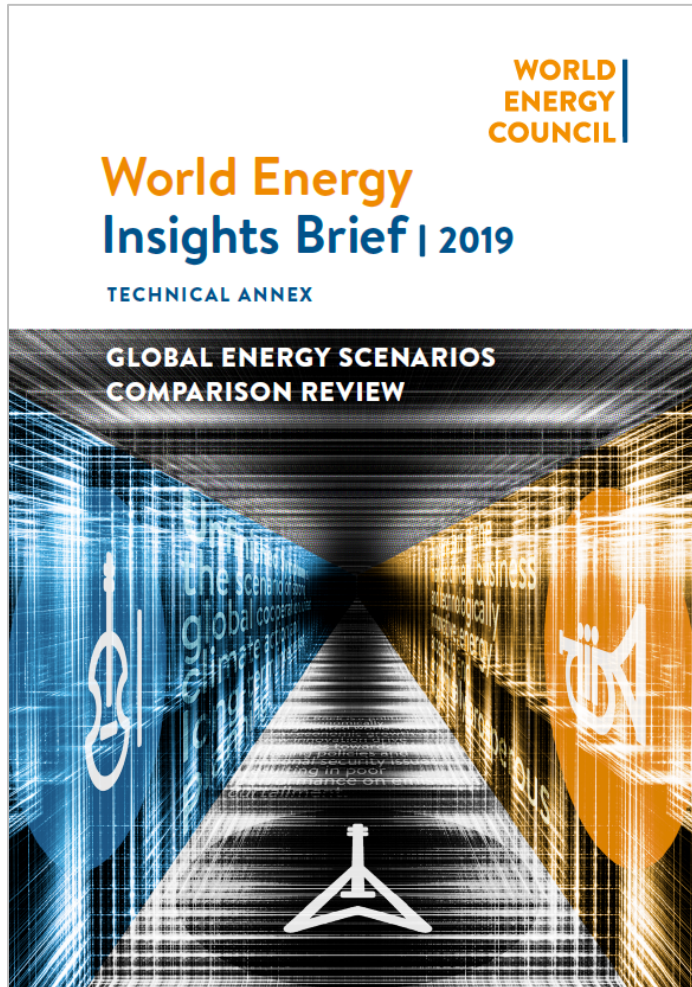
Energy Advisor to World Energy Council Germany, Member of WEC's Scenarios Working Groups

The World Energy Council

- A registered charity, established in **1923**
- The only **truly global** energy organisation - UN accredited
- A **neutral platform** engaging experts **across the whole energy system and beyond**
- **Promoting robust energy transition** and sustainable energy for all
- We are **impartial**, but not passive!



Inevitable transition, deeply uncertain success



A decade of experience in building and using global energy scenarios:

- Energy systems shaped by many and more diverse actors
- Energy transition part of a much wider Grand Transition, which is not all about energy
- Relying on quant. modelling and better forecasting to manage successful transition will be fatal, even in a data-rich era.

It is timely for energy leaders to ask:





- What can we learn by contrasting the increasing richness of energy futures thinking?
- How do the Council's scenarios compare with global energy outlooks, scenarios and visions used by others?

Global Energy Scenarios Comparison Review - released by Council in April 2019, available at <https://www.worldenergy.org/publications/>





World Energy Scenarios (2016): at glance

Multi-stakeholder, multi-stage process aimed at **useful and usable, technology- and resource-neutral global energy scenarios**. In 2016 our focus was on climate negotiations.

PRE-DETERMINED FACTORS: The Grand Transition

-  Population / Workforce
-  New technologies
-  Planetary boundaries
-  Shift in power

CRITICAL UNCERTAINTIES

-  Pace of innovation and productivity
-  Int'l governance & geo-political change
-  Priority given to climate change
-  'Tools for action' - markets vs state

THREE ALTERNATIVE PATHWAYS to 2060



Modern Jazz

Market mechanisms, technology innovation, energy access for all



Unfinished Symphony

Strong policy, long-term planning, united climate action



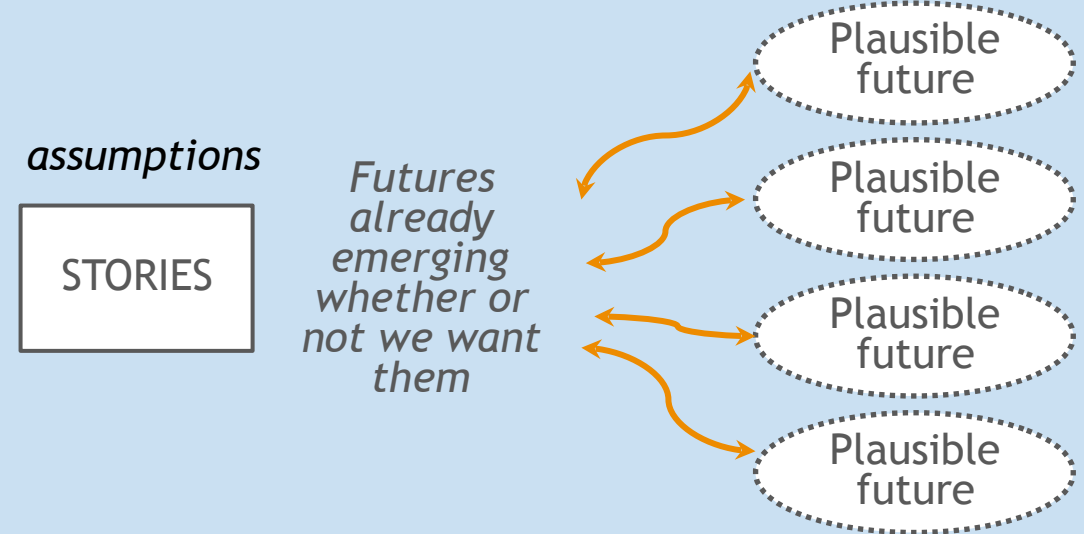
Hard Rock

Fragmented scenario, inward looking policies, low global cooperation

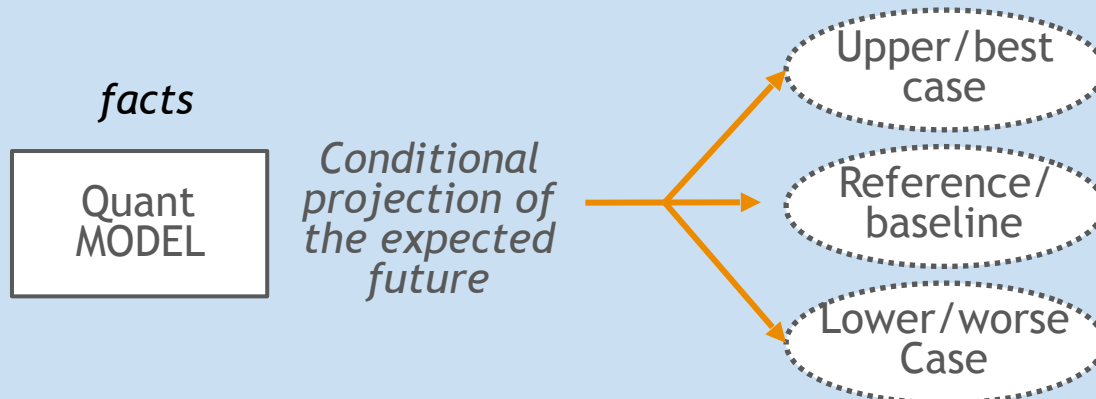
Different types of global energy scenarios compared



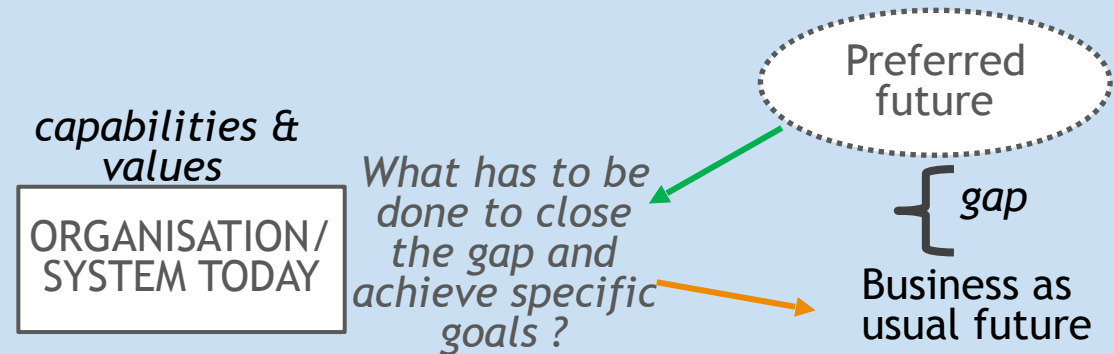
PLAUSIBLE SCENARIOS



OUTLOOKS



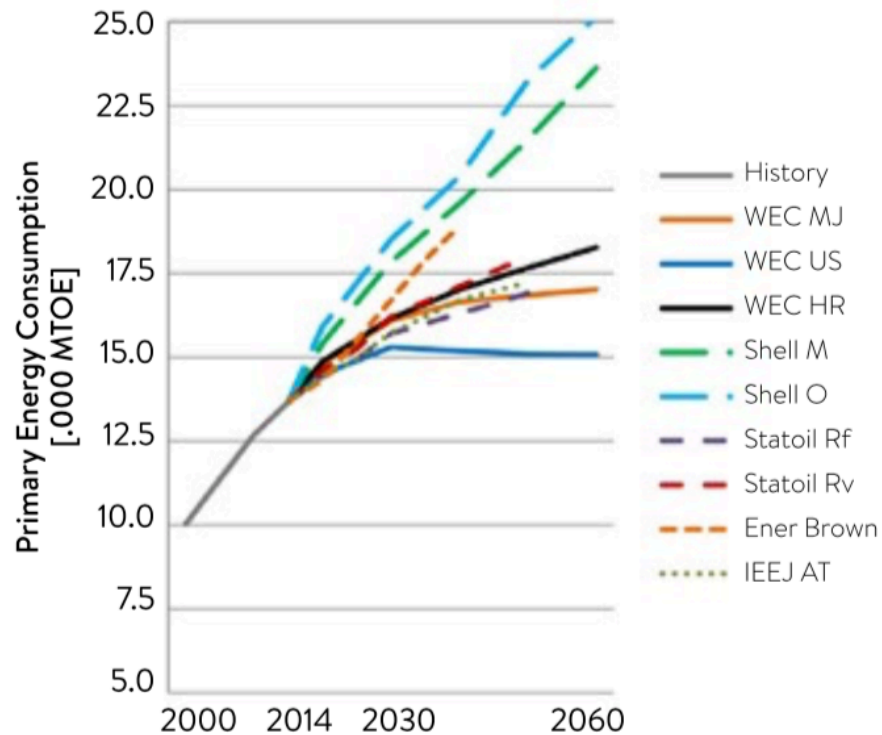
NORMATIVE SCENARIOS



Primary Energy Demand

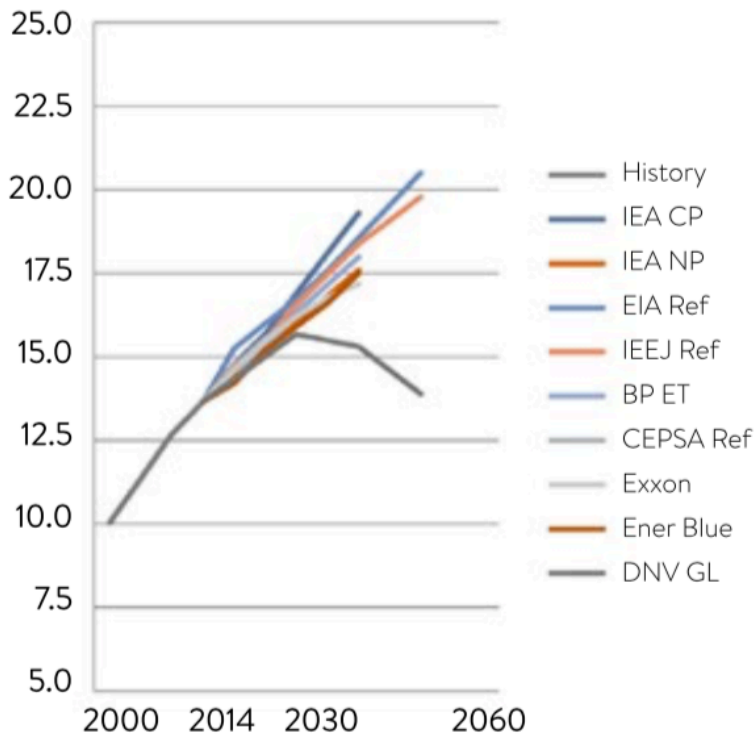
Contrasting patterns and digging into different assumptions

Plausible Scenarios



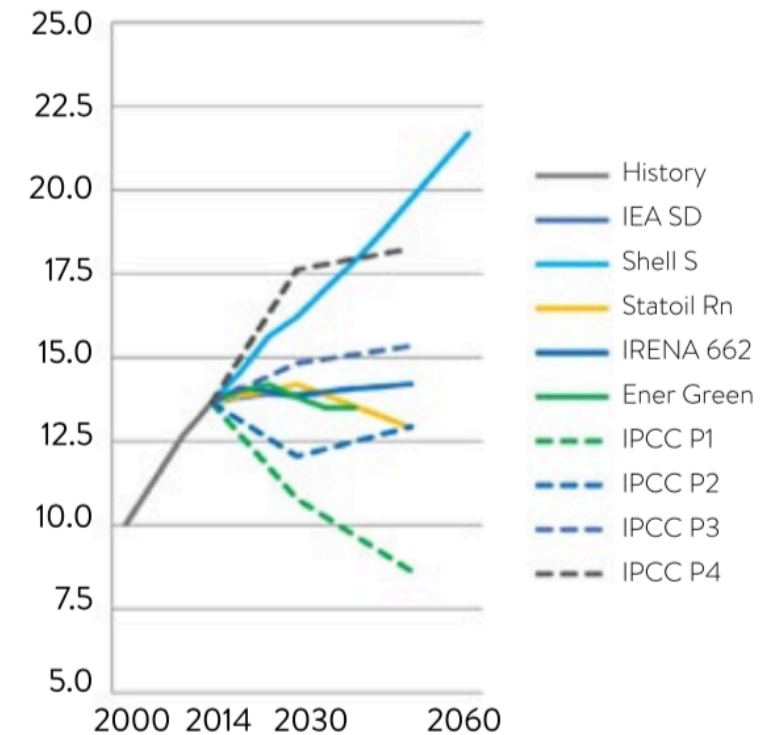
Plausible: WEC Modern Jazz, WEC Unfinished Symphony, WEC Hard Rock, Shell Mountain, Shell Ocean, Statoil Reform, Statoil Rivalry, Ener-Brown, IEEJ Advanced Technology

Outlooks



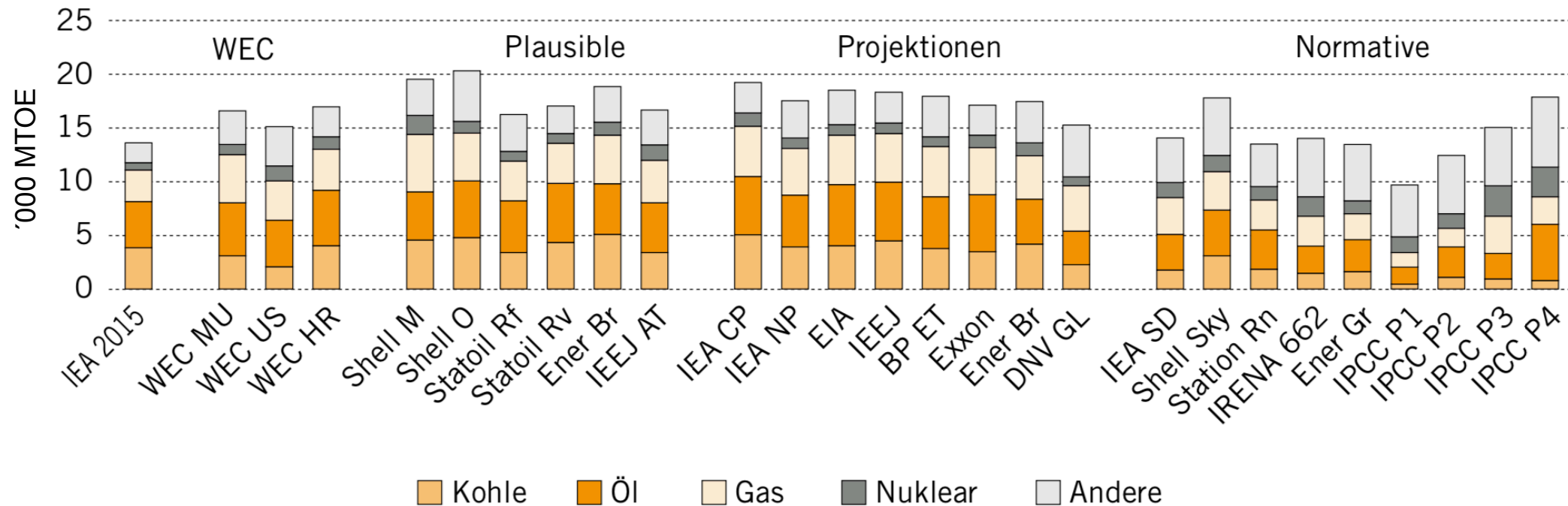
Outlooks: IEA Current Policies, IEA New Policies, EIA Reference, IEEJ Reference, BP Evolving Transition, CEPSA Reference, Exxon Reference, Ener-Blue, DNV GL

Normative Scenarios



Normative: IEA Sustainable Development, Shell Sky, Statoil Renewal, IRENA 66% below 2°C, Ener-Green, IPCC P1 Low Energy Demand, IPCC P2 Sustainability, IPCC P3 Middle of the Road, IPCC P4 Fossil-fuelled Development

Primary Energy Demand

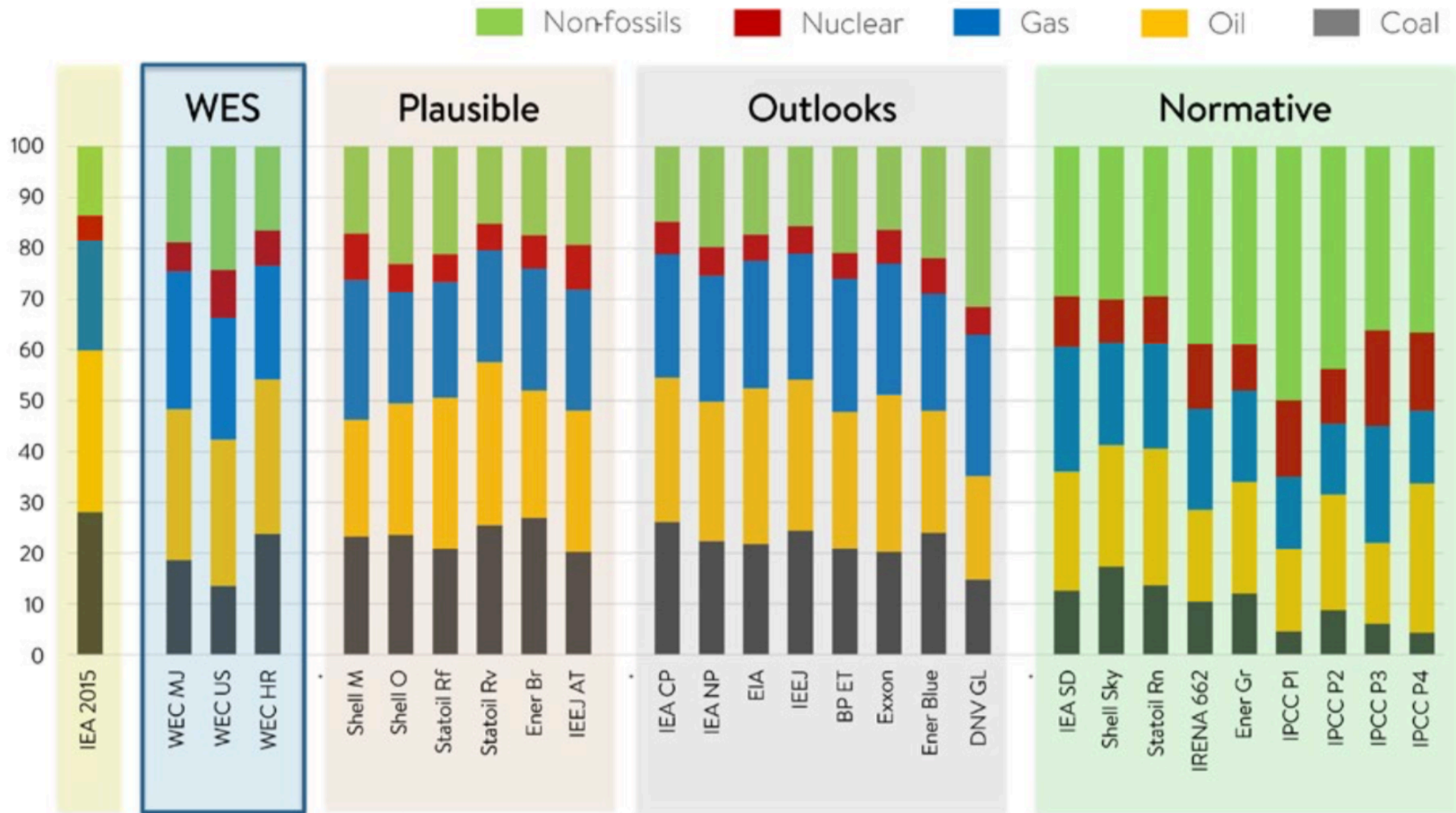


Plausible: WEC MJ (Modern Jazz), WEC US (Unfinished Symphony), WEC HR (Hard Rock)/Shell M (Mountain), Shell O (Ocean), Statoil Rf (Reform), Statoil Rv (Rivalry), Ener-Brown, IEEJ AT (Advanced Technology)

Outlooks: IEA CP (Current Policies), IEA NP (New Policies), EIA Ref (Reference), IEEJ Ref (Reference), BP (Evolving Transition), CEP SA Ref (Reference), Exxon (Reference), Ener-Blue, DNV GL

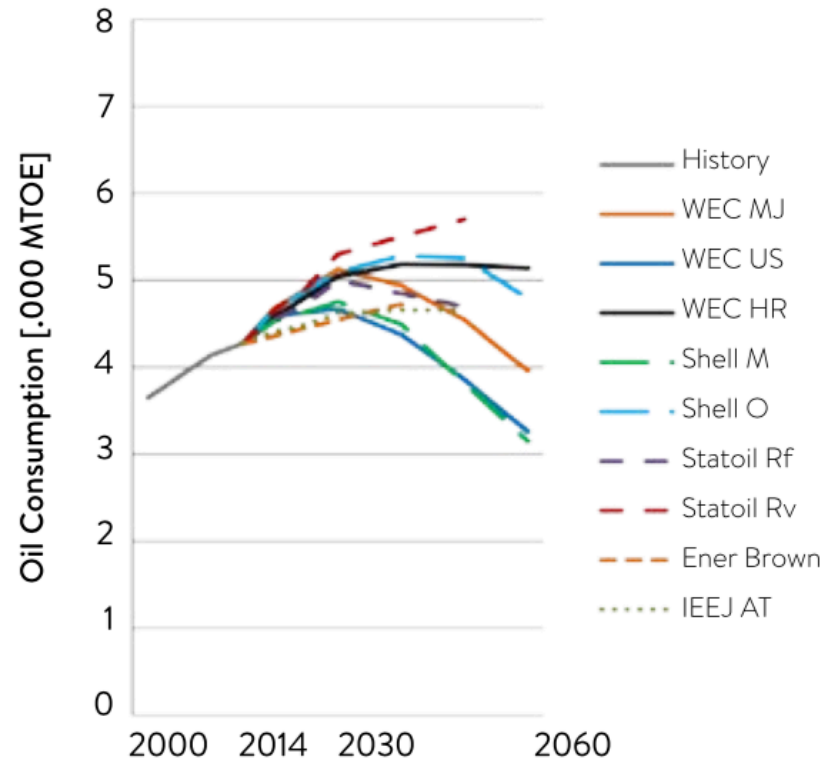
Normative: IEA SD (Sustainable Development), Shell S (Sky), Statoil Rn (Renewal), IRENA 662 (66 % below 2 °C), Ener-Green, IPCC P1 (Low Energy Demand), IPCC P2 (Sustainability), IPCC P3 (Middle of the Road), IPCC P4 (Fossil-Fuelled Development)

Energy mix by 2040 (%)



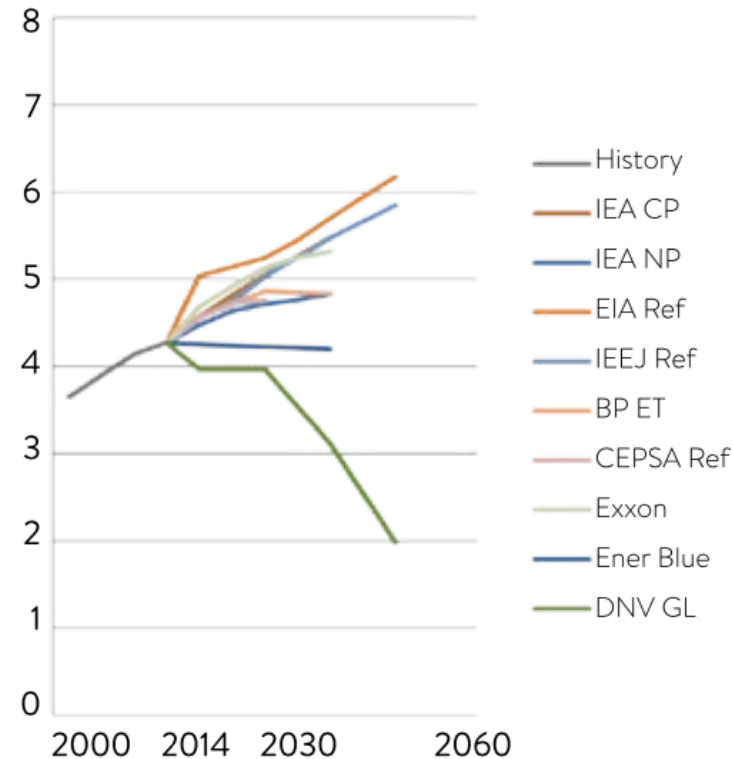
Fossil Fuel – (2) Oil

Plausible Scenarios



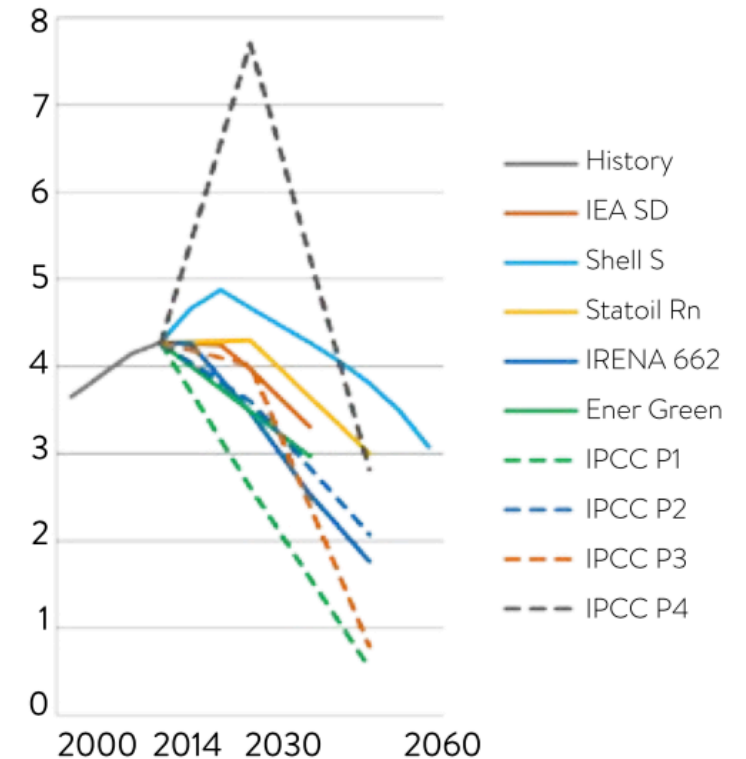
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Outlooks



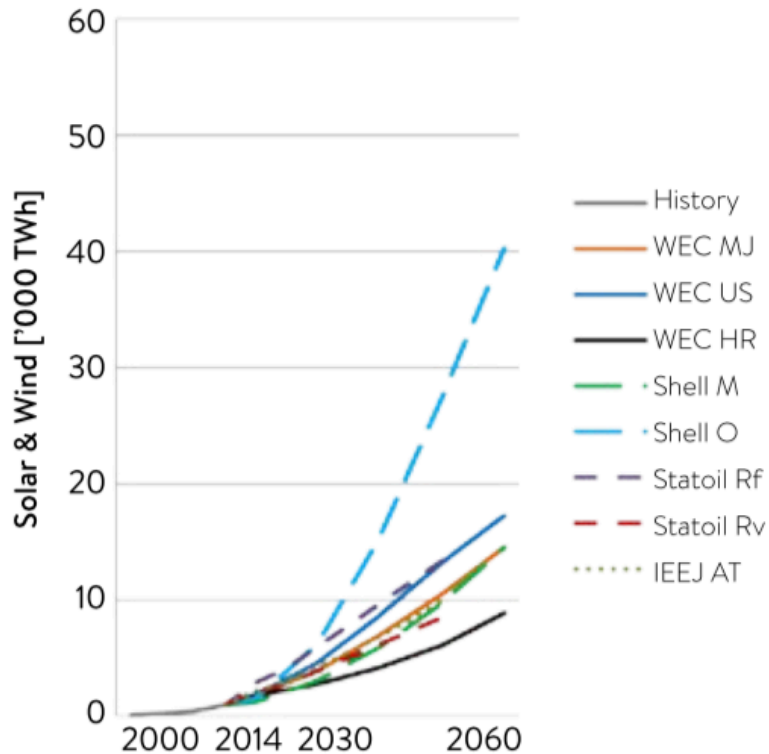
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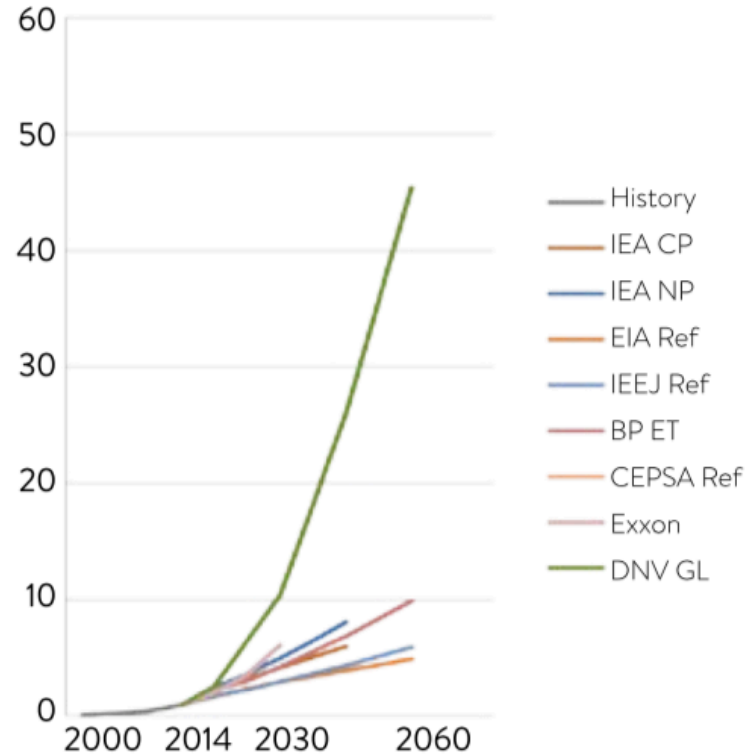
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Plausible Scenarios



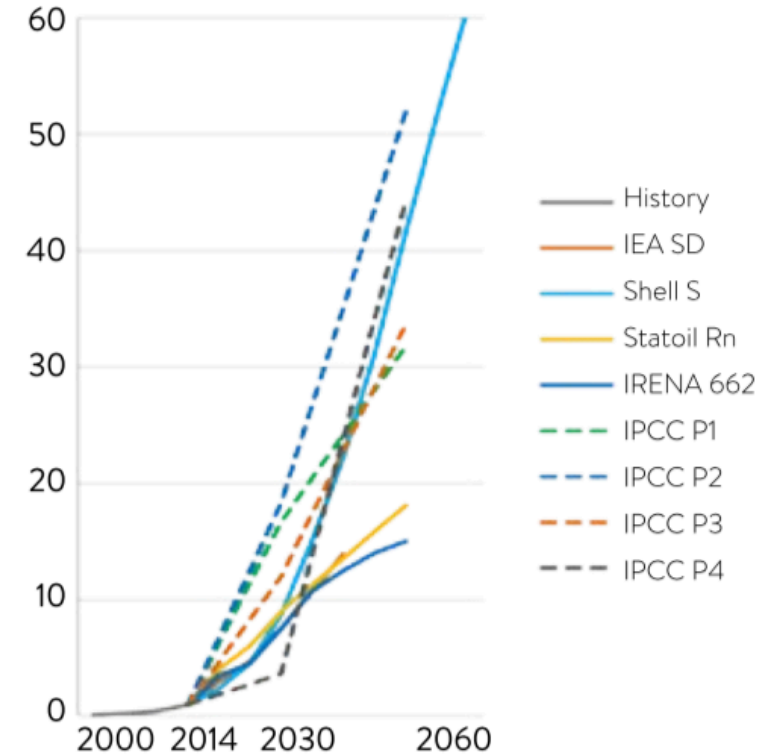
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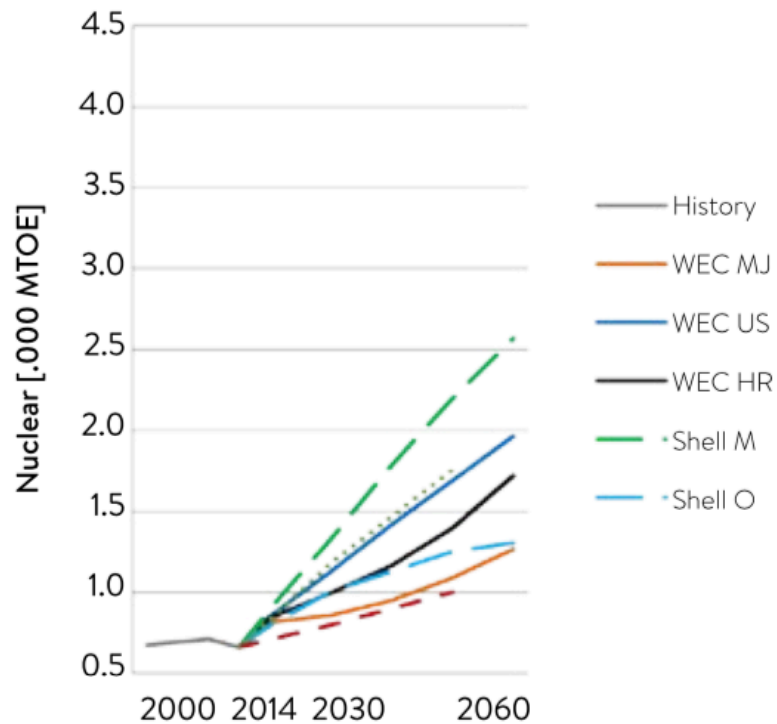
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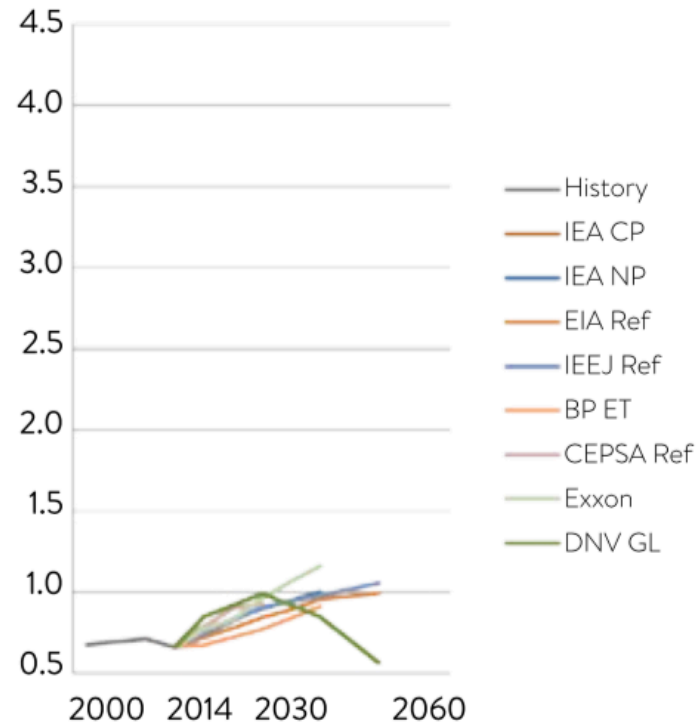
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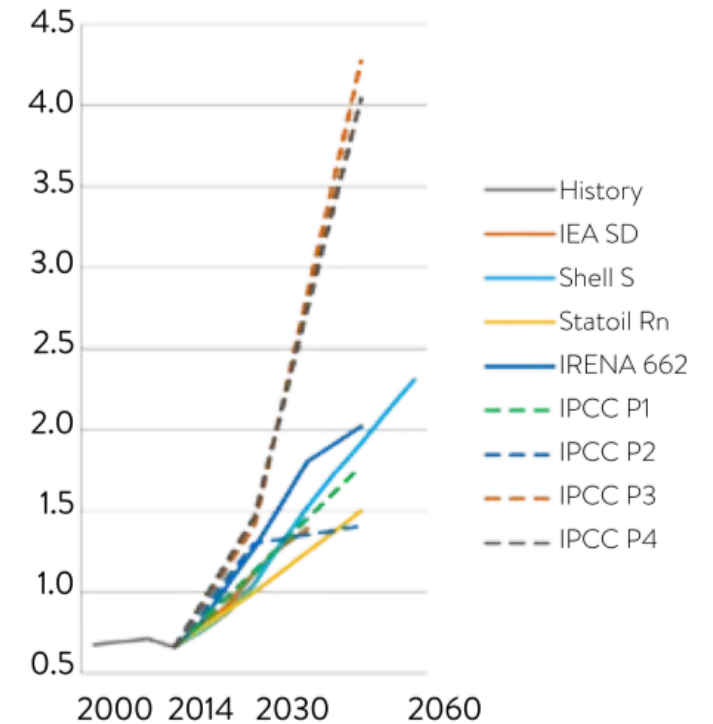
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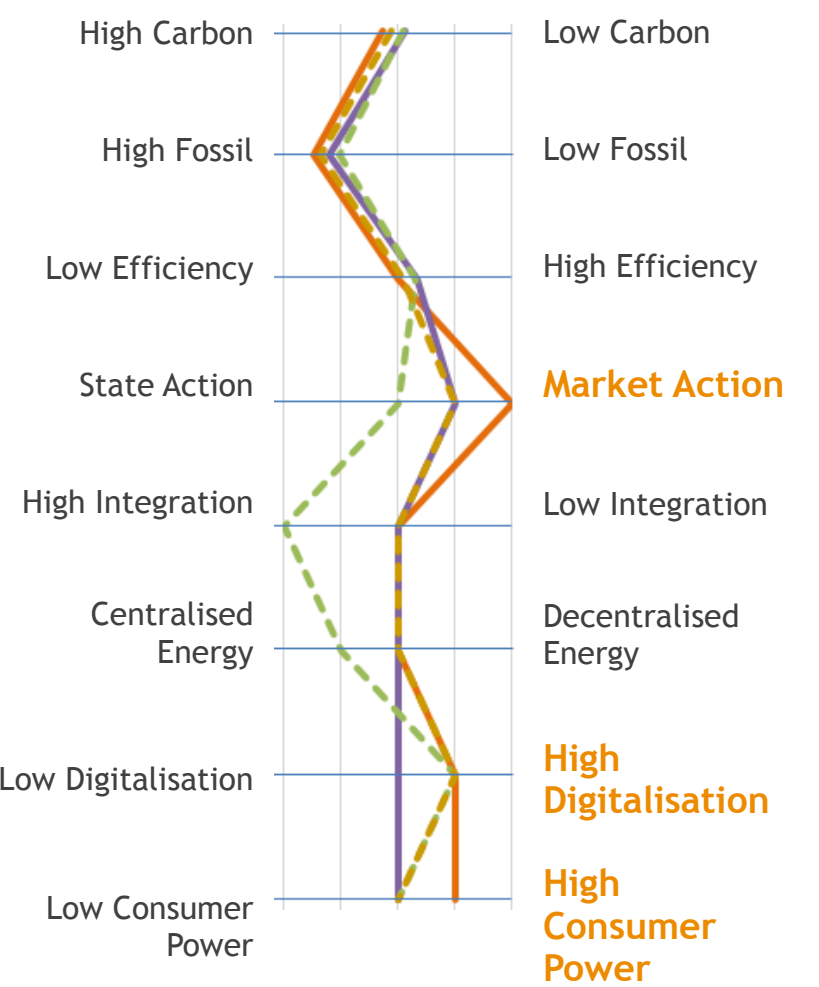
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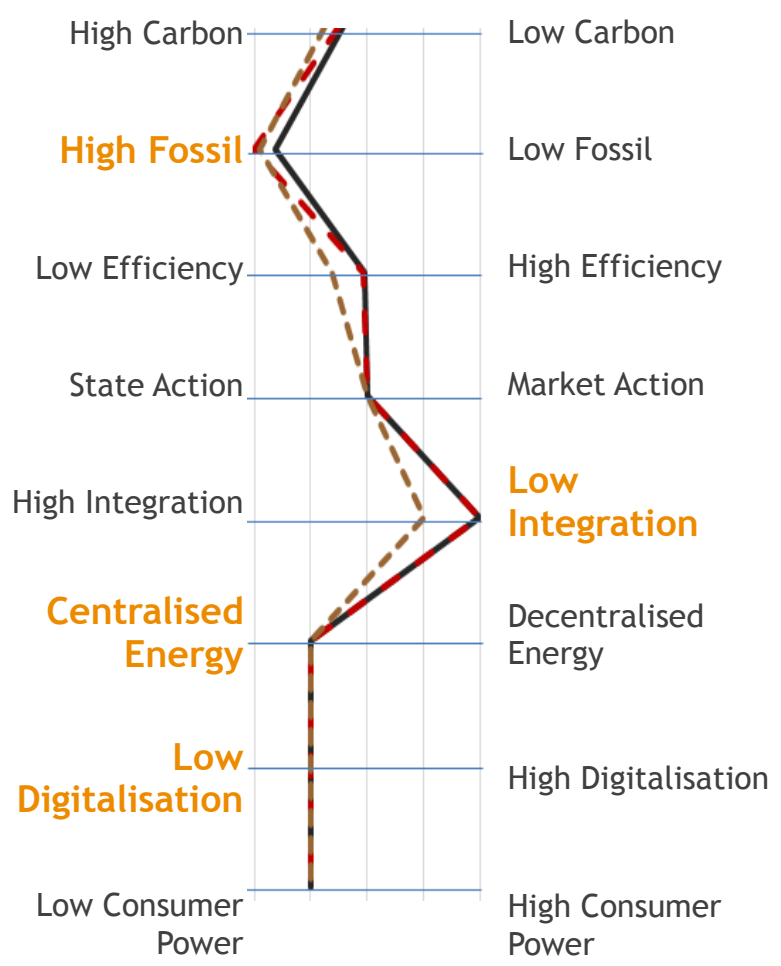


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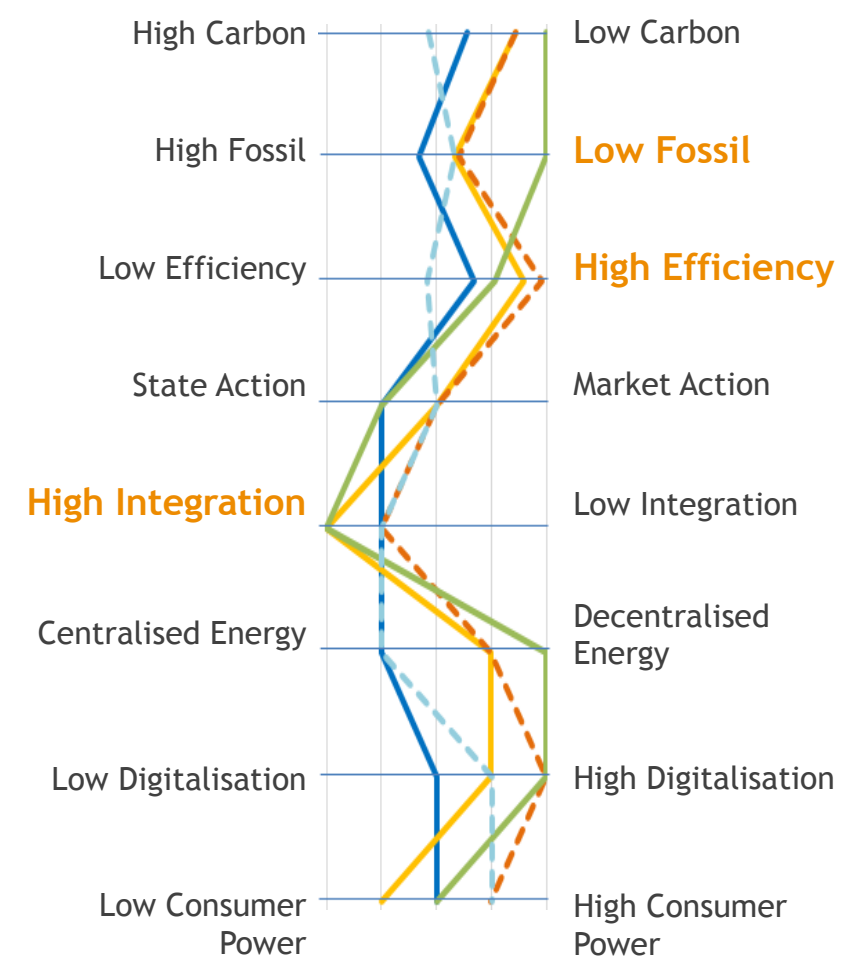
Where do Council's scenarios stand?



WEC Modern Jazz Statoil Reform
IEEJ Advanced Technologies IEA New Policies



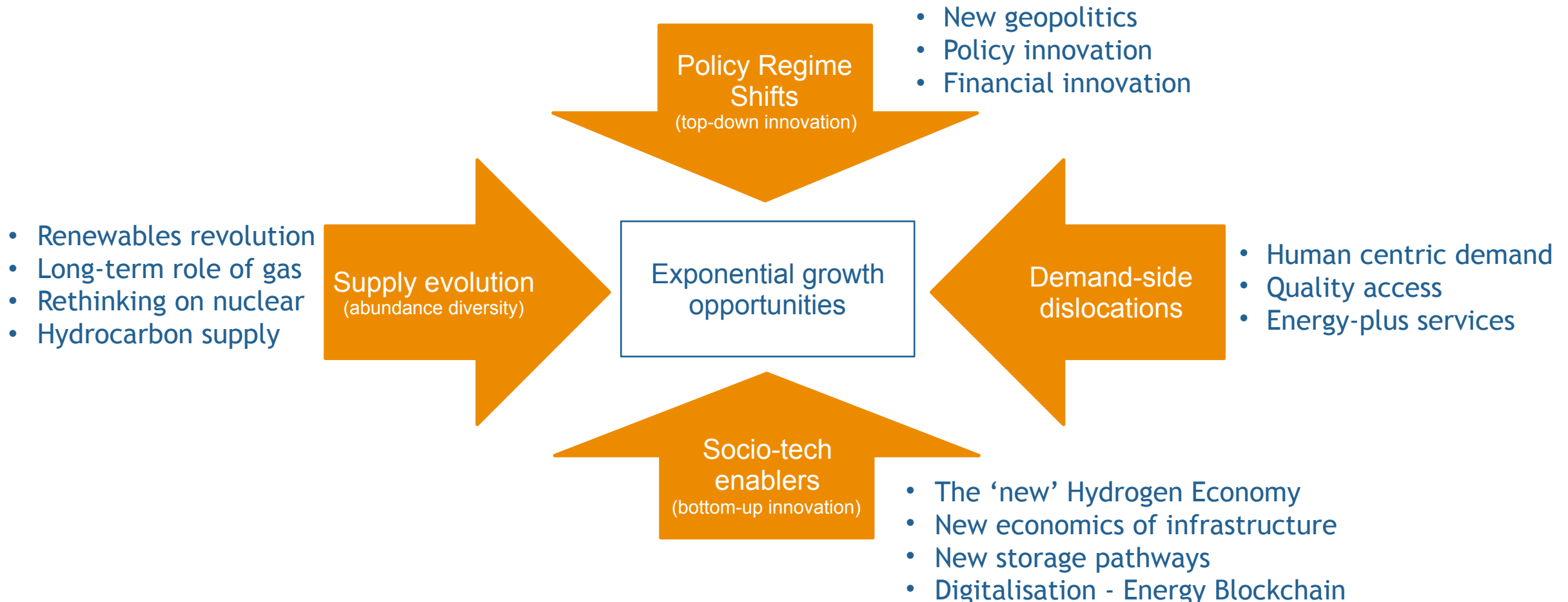
WEC Hard Rock Statoil Rivalry
IEA Current Policies



WEC US Statoil Rn IEA SD
IRENA 662 Shell SKY

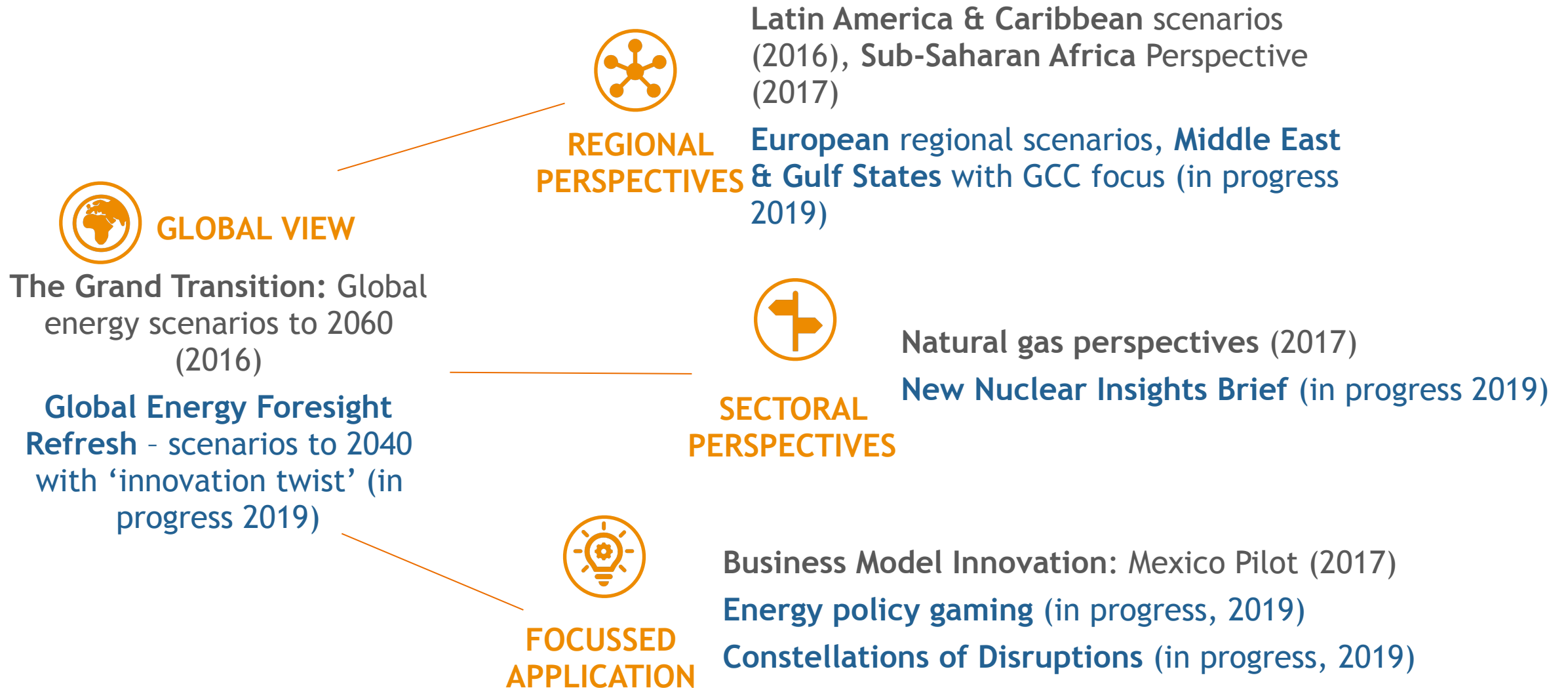
Global energy foresight refresh (2019)

- Global member network horizon scanning - validation of ‘nuanced’ archetypes
- 100+ thought leadership interviews, digging into 14 key themes of change
- Creating three global stories to 2040 (launch at the 24th World Energy Congress)



Using global energy scenarios is not straight-forward

User-centric design in application – curating new experiences, combining with other tools





Using scenarios with other tools

The Council is developing actionable insights and tools for impact to enable its members and users to manage successful energy transition



World Energy Scenarios: a tool for bigger picture thinking, revealing deeper assumptions and reframing choices and options



Energy Policy Trilemma: policy pathfinding to manage security, equity and sustainability through transition



Dynamic Resilience: better prepare firms for new shocks and stresses and adapt whole systems to emerging and systemic risks



World Energy Issues Monitor: reality check - global, regional, national energy leaders perspectives on the key challenges



Innovation Insights: digging deeper into disruptive dynamics and moving transition innovation from the margins to mainstream

Congress theme „Energy for Prosperity“

Programme structure 8 – 12 September 2019

Key Themes

- Global Scenarios and regional perspective
- Transformative Innovation
- Markets, Business Models and Consumer Dynamics
- Trilemma and Sustainable Development
- Efficiency and Dynamic Resilience
- Governance Frontiers
- Sector Coupling: Mobility, Storage and Energy-Water-Food nexus
- Management for the Future
- Finance and Investment



Get noticed by 15,000 energy professionals from 150 countries



Thank you

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