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WORLD ENERGY COUNCIL
CONSEIL MONDIAL DE L'ÉNERGIE
For sustainable energy.

In cooperation with the CTI

Energy
Swiss Competence Centers for Energy Research

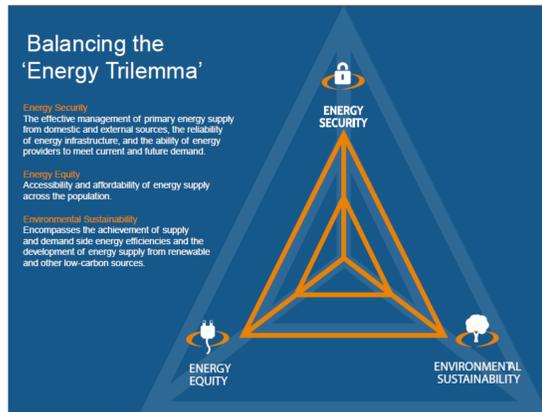
Schweizerische Eidgenossenschaft
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Objectives of the study

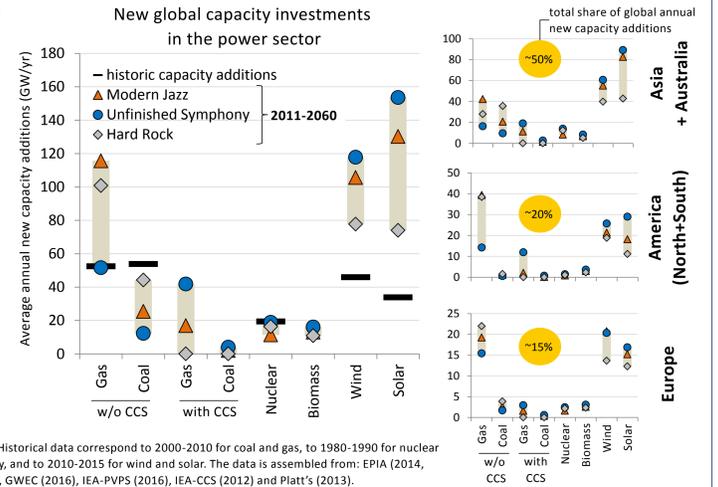
In partnership with the World Energy Council and Accenture, the Energy Economics Group of PSI, quantified and analysed three scenarios (named **Modern Jazz**, **Unfinished Symphony** and **Hard Rock**) in order to explore alternative development pathways for the global energy system by 2060.



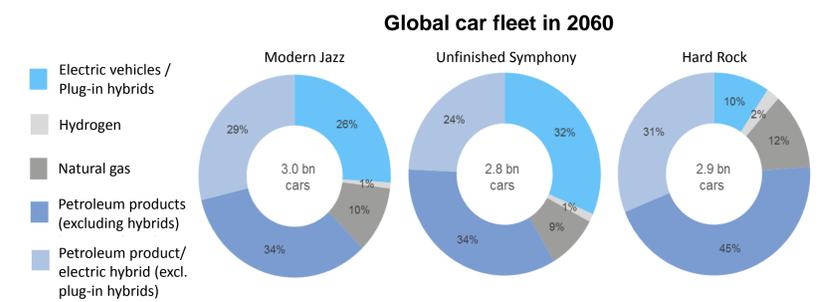
The **Modern Jazz scenario** describes a market-driven world oriented towards economic and affordable access to energy. The **Unfinished Symphony scenario** characterizes a rather government-driven world with coordinated international action to mitigate climate change. The **Hard Rock scenario** represents a rather fragmented world with low global cooperation and with priority on local energy security and exploitation of local energy resources.

Results (cont.)

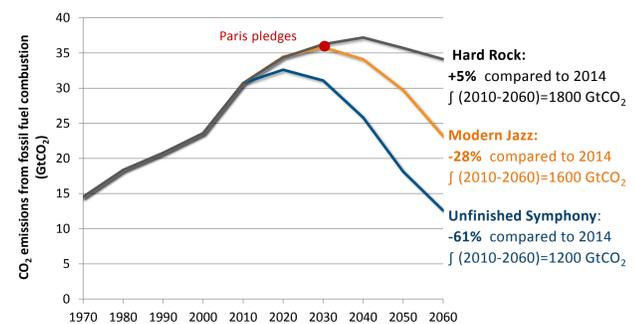
Wind and solar continue to grow at an unprecedented rate and create new opportunities and challenges for energy systems



Transitioning global transport forms one of the hardest obstacles to overcome in order to decarbonise future energy systems



Reaching the 2°C climate target will require an exceptional and enduring effort, far beyond already pledged commitments, and with high carbon prices



Performance of scenarios in view of the Energy Trilemma

Global cooperation, sustainable economic growth, and technology innovation are needed to balance the Energy Trilemma

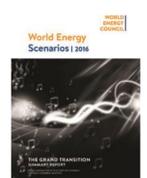
	Modern Jazz	Unfinished Symphony	Hard Rock
Energy Security	<ul style="list-style-type: none"> Higher energy production Greater trading and diversity of international fossil energy suppliers 	<ul style="list-style-type: none"> Wider diversity of energy resource types Government-promoted investment in Infrastructure 	<ul style="list-style-type: none"> More domestic production Lower capacity for funding infrastructure Lower trade
Energy Equity	<ul style="list-style-type: none"> Energy Access for all by 2060 	<ul style="list-style-type: none"> 0 - 0.5 bn people still lack access to energy 	<ul style="list-style-type: none"> 0.5 - 1 bn people still lack access to energy
Environmental Sustainability	<ul style="list-style-type: none"> Surpass Carbon budget in early 2040s Emissions fall 28% below 2014 volumes in 2060 	<ul style="list-style-type: none"> Surpass carbon budget in before 2060 Emissions fall 61% below 2014 volumes in 2060 	<ul style="list-style-type: none"> Surpass carbon budget in early 2040s Emissions are 5% above 2014 volumes in 2060

The challenge is to maintain the current integrity of energy systems worldwide while steering towards a new transformed future. This requires new policies and strategies, and consideration of novel and risky investments. The decisions taken in the next 10 years will have profound effects on the development of the energy sector in the coming decades. To this end, the **WEC/PSI scenarios provide support to the development of robust medium to long-term strategies, government policies, as well as investment and disinvestment decisions.**

Reference

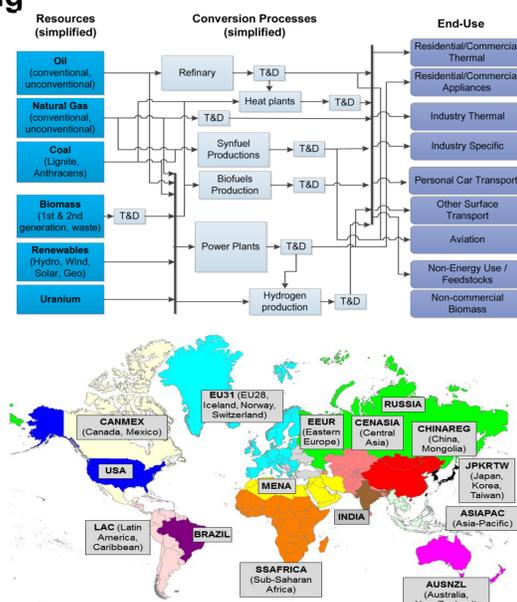
World Energy Scenarios 2016 – The Grand Transition

<https://www.worldenergy.org/publications/2016/world-energy-scenarios-2016-the-grand-transition/>



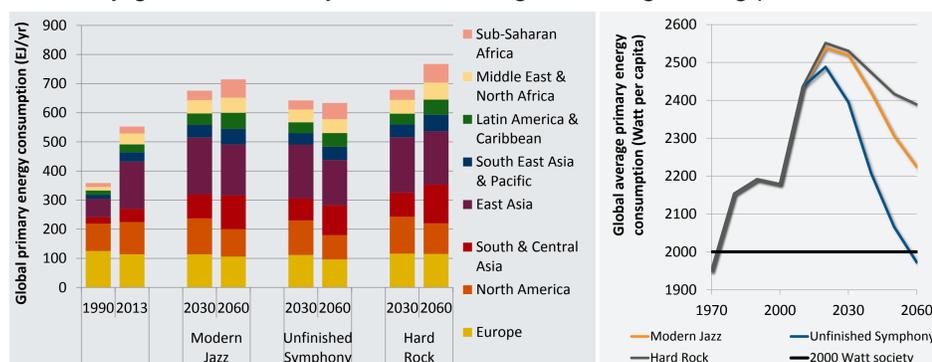
Energy systems modelling

The scenario analysis was carried out by PSI using its **global multi-regional MARKAL (GMM) model**. This optimisation tool represents around 400 different energy technologies (e.g. power plants, heating devices, vehicles, etc.) with their technical, economic and environmental characteristics, and determines the least-cost configuration of the **global energy system based on 15 world regions** and their specific boundary conditions.



Results

Dampened growth of world primary energy consumption and a peaking in per capita energy consumption before 2030 due to significant efficiency gains created by new technologies and tightening policies



Demand for electricity expected to double to 2060: meeting this demand with cleaner energy sources requires substantial infrastructure investments and system integration to deliver benefits to all consumers

