Pathways to Sustainable Energy

National approaches to a global challenge

Baku, 21 October 2016
Country Perspectives

- **Mr. Jamil Malikov**, Deputy Chairman, State Agency on Alternative and Renewable Energy Sources of the Republic of Azerbaijan
- **Mr. Mohammed Abdel Fattah Mofleh Al Dabbas**, Ministers Advisor for Energy Affairs, Ministry of Energy and Mineral Resources, Jordan
- **Mr. Sergiu Robu**, Energy planning expert, Academy of Sciences of Moldova, Institute of Energy, Republic of Moldova
- **Mr. Matija Vajdic**, Senior Engineer, Department for Renewable Energy Sources and Energy Efficiency, Energy Institute Hrvoje Pozar, Croatia
Group Discussion: Expected Outcomes

• Collection of national and sub-regional insights to formulate regional narratives that fit within the overall global storyline.

• Definition of national and sub-regional key drivers as well as regional trends for the sustainable energy transformation

• Collect regional messages, trends and challenges that will shape future sustainable energy pathways in the context of the global modelling
Groups: Regional focus

- Central Asia countries
- Caucasus countries
- Eastern Europe
- South-Eastern Europe
- Western Europe
- North America
- Non-ECE
Regional Deep-Dives

Which aspects are key to defining sustainable energy for your country and sub-region?

How do you define sustainable energy in 2050 for your sub-region? What are the key pillars, and main aspects in each of the pillars? Where are challenges to come to a shared vision? Which aspects differ among your countries?

After the discussion, using a triangle visualisation with the key pillars marking the ends, draw 3 triangles in the diagram: one each for 2015, 2030, and 2060.

When would you achieve the „optimal“ rating for all three dimensions?
Energy Sustainability Diagram

Social

• Energy equity
• Energy access
• Energy affordability
• Consumer awareness
• ...

Environmental

• Pollution
• Climate resilience
• Energy-related nexus (water, land, food, ...)
• ...

Economic

• Cost efficiency & effectiveness in meeting energy demand
Energy Trilemma Chart

**Energy Security**
The effective management of primary energy supply from domestic and external sources, the reliability of energy infrastructure, and the ability of energy providers to meet current and future demand.

**Energy Equity**
Accessibility and affordability of energy supply across the population.

**Environmental Sustainability**
Encompasses the achievement of supply and demand side energy efficiencies and the development of energy supply from renewable and other low carbon sources.
Regional Deep-Dives

What are the key drivers for your country and (sub-) region moving towards sustainable energy in 2050? What are regional drivers (rather than global drivers)?

Starting from the 2 key uncertainties and 27 descriptors clustered according to STEEP (Society – Technology – Economy- Environment – Technology), please discuss in your group the key drivers (about 8-15) for the sustainable energy system going forward in your region?

What are regional trends and/or shocks that should be integrated in the Pathways towards 2050? What are regional messages that should be considered in the storylines?

These trends, risks, disruptions, or messages should have an impact on the energy sector, and can come from a variety of areas, including energy trading, resource pricing and availability, society and consumer behaviour, leadership of specific countries, technology and business innovation, international cooperation, etc.

If possible and time allows, you can allocate each message to one of the four storylines from the Scenario matrix.
# Driving Factors

- **International cooperation on Sustainable Development**
- **Innovation in business and technologies**

## SOCIETY
- Society Change
- Civil Society
- Consumer awareness about energy conservation & energy efficiency
- Urbanisation

## TECHNOLOGY
- Information & communication technology (ICT)
- Grid Development & Infrastructure
- Energy storage
- Low carbon technologies
- Carbon Capture & Storage (CCS)
- Transport

## ENVIRONMENT
- Land, water, energy nexus
- Water availability
- Environmental crisis

## ECONOMY
- Cost and availability of energy
- Carbon pricing
- Energy market design
- Business Models
- Global Economic Growth
- Population Growth
- Energy Demand Growth
- Private Sector Initiatives & Investments
- Energy Resource Uncertainty
- Producer responses to changes in the value of energy at source

## POLICY & REGULATION
- International Cooperation on Sustainable Development Goals (SDGs) & Paris Agreement (COP 21)
- Country leadership
- Taxes/subsidies for energy
- Policy support of energy efficiency and energy conservation
- Sanctions
- Energy Security
Scenario Matrix

Two critical uncertainties

A
- Energy service-based business models with innovative enabling technologies
- Low amount of cooperation in meeting sustainable development goals

B
- Energy service-based business models with innovative enabling technologies
- High amount of cooperation in meeting sustainable development goals

C
- Traditional energy commodity business models with slow technological innovation
- Low amount of cooperation in meeting sustainable development goals

D
- Traditional energy commodity business models with slow technological innovation
- High amount of cooperation in meeting sustainable development goals
## DRAFT Global (UNECE) Storylines

<table>
<thead>
<tr>
<th>Scenario A</th>
<th>Technology development in home markets, with service-based business models and decarbonisation of fossil fuels through CCS and system-wide efficiency.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario B</td>
<td>Service-based business models with emergence of energy “prosumers”, increased decentralisation, and aggressive application of low-carbon technologies with renewables, gas, nuclear and storage.</td>
</tr>
<tr>
<td>Scenario C</td>
<td>Strong acceleration of energy efficiency measures from source to use leading to improved energy intensity; focus on domestic energy sources with CCS, nuclear, and domestic storage.</td>
</tr>
<tr>
<td>Scenario D</td>
<td>Sustained high penetration of gas in the energy system beyond 2030 with increased application of renewable gas and networked collaboration.</td>
</tr>
</tbody>
</table>
Thank you

Lisa Tinschert
Project Coordinator
Pathways to Sustainable Energy
UNECE – Sustainable Energy Division
Lisa.tinschert@unece.org
Background slides
## Grand Transition: Three Scenarios

<table>
<thead>
<tr>
<th>Modern Jazz</th>
<th>Unfinished Symphony</th>
<th>Hard Rock</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy Security</strong></td>
<td>• Higher energy production&lt;br&gt;• Greater trading and diversity of international fossil energy suppliers</td>
<td>• Wider diversity of energy resource types&lt;br&gt;• Government-promoted investment in infrastructure</td>
</tr>
<tr>
<td><strong>Energy Equity</strong></td>
<td>• Energy Access for all by 2060</td>
<td>• 0 – 0.5 bn people still lack access to energy</td>
</tr>
<tr>
<td><strong>Environmental Sustainability</strong></td>
<td>• Surpass Carbon budget in early 2040s&lt;br&gt;• Emissions fall 28% below 2014 volumes in 2060</td>
<td>• Surpass carbon budget in before 2060&lt;br&gt;• Emissions fall 61% below 2014 volumes in 2060</td>
</tr>
</tbody>
</table>

Source: World Energy Council, Paul Scherrer Institute, Accenture Strategy