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Pathways to Sustainable Energy Project

13th Session of the Group of Experts on Cleaner Electricity Production from Fossil Fuels

27 October 2017, Geneva

Project Overview

Pathways to Sustainable Energy

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- Timeframe: May 2017 – June 2018 (Phase I)
- Overarching Question

  How can the UNECE Region attain Sustainable Energy?
- Key deliverables
  - Development of policy and technology options / technology portfolio
  - Modelling of Sustainable Energy scenarios
  - Definition of adaptive policy pathways
  - Definition of Key Performance Indicators
  - Conceptualization of an early-warning system
  - 2-4 workshops to define & discuss policy options
  - High-level policy dialogue planned for 2019

https://www.unece.org/energy/pathwaystose.html

UNECE Region
Sub-regional Clusters

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- **Global Modelling**
- **UNECE modelling**
- **Regional subsets**
  - North America
  - Western Europe
  - Central and Eastern Europe
  - Southeast Europe
  - Caucasus
  - Central Asia
  - Ukraine, Belarus, Moldova
  - Russian Federation
  - Turkey
  - Israel

See countries in each cluster here:
http://data.ene.iiasa.ac.at/message-globiom/message_globiom/overview/spatial.html

DRAFT Research Questions

Draft Deep Dives & Case Studies* (Technology, Policy, Regional)

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Focal question: How can countries attain sustainable energy by 2050?

I	**What is the optimal energy-mix for different sub-regions within the UNECE region in order to help achieve the 2030 Agenda and create a sustainable energy system?**
	- Energy mix - Role of sub-regional energy trade / Regional cooperation - Geopolitical consequences by increased RE upscaling / SE transition (tbd) - Country leadership
II	**What can be drivers for the transition towards a sustainable energy system?**
	- Policies - Technologies - Infrastructure - Finance / Investments
III	**How to track progress towards achieving and for maintaining a sustainable energy system?**
	- Key performance indicators for continuous improvement & feedback-loop - „Early warning“ system

*Case Study: Further analysis of an existing national, sub-regional, sectoral case; Deep Dive: Further analysis of modeling results as part of a research question.

Target Definition: Sustainable Energy

Three pillars

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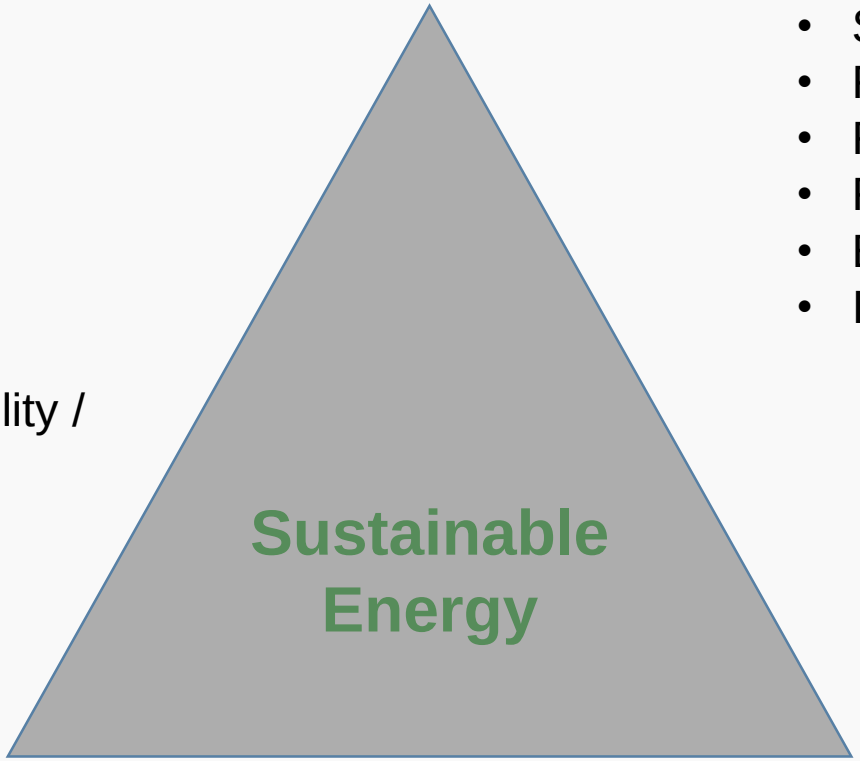
Energy Security

- Energy Intensity (Final, primary)
- Share of RE
- Resilience
- Robustness
- Reliability
- Energy imports vs. Exports
- Investment requirements



- Energy affordability / prices
- Physical energy Access
- Energy Services

Energy for Quality of Life

- Carbon intensity of GDP & of energy
- Air pollution
- Land use
- Water use
- Waste produced

Environmental Protection

Building the Scenarios
Metrics (Outputs)

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Energy security

- Primary and final energy prices: *USD/GJ*
- Energy expenditures: *price * consumption*
- Energy imports: *share of energy consumption*
- Energy exports: *share of GDP*
- Investment requirements: *Indicator to be defined*
- Producer behavior : *Indicator to be defined*
- Consumer behavior: *Indicator to be defined*
- ***Others?***

Quality of life

- Energy consumption per capita: *EJ per capita per year*
- Energy services per capita: *efficiency-adjusted energy consumption*
- GDP per capita: *USD/person*
- Food security:
  - Expenditures: *(consumption * prices)/GDP*
  - Nutrition: *share of calories from staple foods*
  - Distributional effects: *share of population at risk of hunger*
- Reliance on solid cooking fuels*: *share of population*
- Other potential measures (specific metrics TBD)*: distributional impacts, access
- ***Others?***

Building the Scenarios
Metrics (Outputs)

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Environmental Protection

- Renewable energy: *share of primary energy from renewable sources*
- LCA impacts*
  - Land occupation of energy technologies, excluding bioenergy supply
  - Eutrophication
  - Mineral resource depletion
  - Release of ionizing radiation
  - Human toxicity
  - Ecotoxicity
- Land cover: *thousand hectares forest, other protected lands, …*
- Irrigation: *share irrigated cropland*
- Water deficit*: *demand/supply*
- Global average temperature change: *degrees C above preindustrial*
- GHG emissions/concentrations: *CO_2, CH_4, NMVOC, …*
- Non-GHG pollutant emissions/concentrations: *SO_2, NO_X, PM2.5, NH_3,*

- ***Others? – fossil fuel related (coal, oil, gas)?***

Project Outline

Technological Portfolio and Zoom-In (2017)

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Technology Portfolio

- Nuclear energy, hard/soft coal, natural gas, oil, biomass, wind, solar, CCS/ CDR, energy efficiency technologies in final energy uses etc.

Technology Zoom-In

- Energy Storage
- Power2X,
- CCS / CDR technologies
- Energy Efficiency

Committee on Sustainable Energy

Flagship project: Pathways to Sustainable Energy

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- Overseen by the Committee
- Potential to link expert groups' work, making use of synergies
- The project's results can serve the group, and vice versa

Committee on Sustainable Energy	
Group of Experts on Gas	Group of Experts on Coal Mine Methane
Experts Group on Resource Classification	Group of Experts on Renewable Energy
Group of Experts on Cleaner Electricity Production from Fossil Fuels	Group of Experts on Energy Efficiency

Project Stakeholder Community

Pathways to Sustainable Energy

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- **Policy Group** — Lead: TBC
- **Technology Group** — Lead: TBC
- **Communications Group** — Lead: TBC
- **Stakeholder Community**
- **Project Advisory Board** — CSE Bureau; Expert Groups; Individual Experts
- **Project Coordination** — ECE SED Secretariat
- **Modeller Team**
  - **Geographical Zoom-In** — MESSAGE; GCAM
    - **Global & regional dive-ins** — IIASA
    - **Global & regional dive-ins** — PNNL
  - **Technological Zoom-In**
    - **Technology Survey, Portofolio** — FRAUNHOFER

Project Timeline

Engagement with the Expert Community

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Status update 26th CSE
Geneva, Sep 2017

Expert Workshop
U.S., Q2 2018 (tbc)

Expert Workshop
at 9th IFESD
Ukraine, Q4 2018

Expert Workshop
Western-Central
Europe, Q1 2018 (tbc)

Expert Workshop
Central Asia, Q2/3 2018 (tbc)

Preparatory Meeting
Geneva, Q1 2019 (tbc)

May 2017

Jun 2019

Modeller Kick-off Workshop
Oberhausen, May 2017

Policy Dialogue &
Workshop at 27 CSE
Geneva, Sep 2018

High-level Political Dialogue
Q2 (2019)

Kick-off & Expert Workshop at 8th IFESD
Astana, Jun 2017

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CSE = Committee on Sustainable Energy
IFESD = Internat. Forum on Energy for Sust. Dev.

Discussion
Expert Group's Involvement in the Project

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- Reaction to the presented slides
- How to strengthen the expert groups involvement in the Project?
  - … in the development of policy options
  - … in the discussion and formulation of scenarios (workshops)
  - … in the development of policy pathways
- How to formalize the interventions:
  - Work plan – Activity Area A: Assess a future role for thermal power plants in sustainable electricity systems
  - Focal point?
  - Involvement in policy or technology group?
  - Planning for 27th session of the Committee: Sep 2018

For more information please visit the Project website:
https://www.unece.org/energy/pathwaystose.html

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Thank you!

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