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Pathways to Sustainable Energy

Item 4: Role of Fossil Fuels in Decarbonizing Energy Systems

14th session of the Group of Experts on Coal Mine Methane

7 November 2019, Geneva

Key Message
"It's still possible but don't delay"

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Mission (Im)Possible?

- It is possible to achieve sustainable energy through **collaboration, forward looking policy measures for investors & immediate action.**
- **Technology transition** is imperative to attain sustainable energy and meet 2ºC target.

Reality Check

- In UNECE region 80% of today's energy fossil fuel based. Even under a scenario that meets the 2ºC target, fossil fuels will still account for at least 56% of the region's energy mix by 2050.
- 200GW of relatively new coal-fired power plants are still operational in 2050.

Key Message
"Delay is expensive!"

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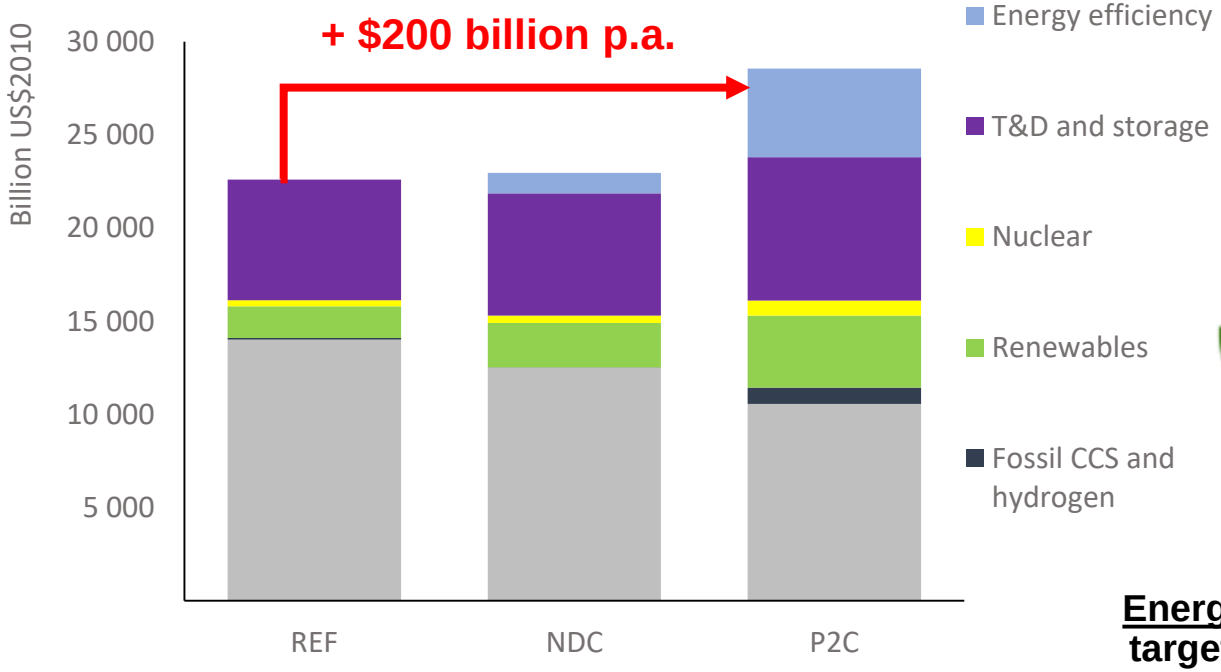
Comparing investment requirements - UNECE REF, NDC and P2C scenarios (2020 – 2050)



<u>Energy transition cost</u> increase to meet 2ºC target is <u>negligible compared to social and health costs.</u> Air pollution ALONE cost $1.8 trillion in 2015 in OECD and BRIICS* combined

- T/D&S: transmission, distribution and storage of electricity and district heat
- CCS: carbon capture and storage

Address GHG Emissions throughout the whole Coal Value Chain

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Integrated Coal Value Chain

Extraction & Processing

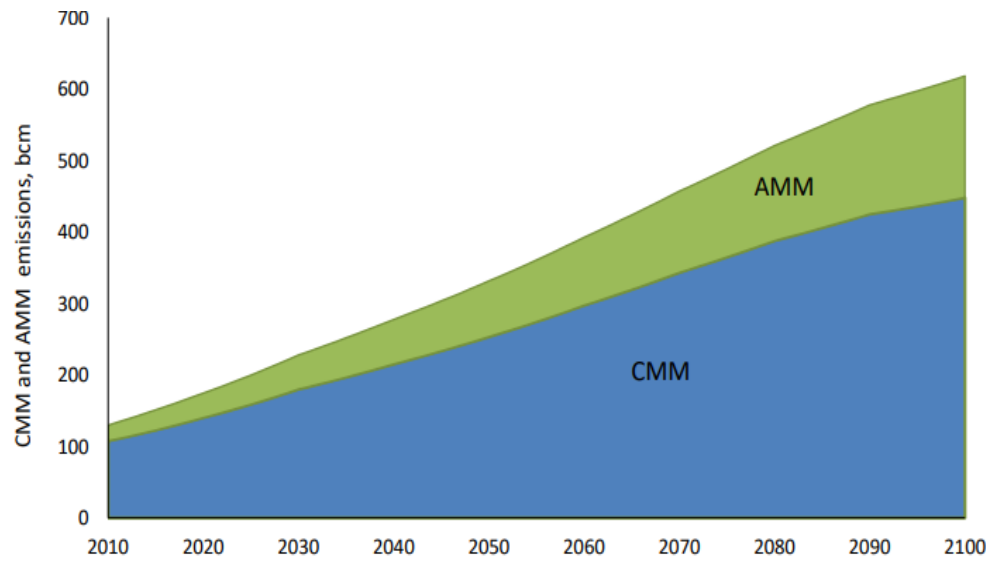
Coal Mining

End Market

Power Plants

Industry
Steel & Cement

Global Abandoned Mine Methane (AMM) and Coal Mine Methane (CMM) Emissions – Reference scenario, source: PNNL 2018



Opportunities to Address GHG Emissions during Coal Mining Life Cycle

1. **Pre-mine Drainage**
2. **Methane Capture and Use during Coal Extraction**
3. **Abandoned Mine Methane**

Environmental, Economic and Social Concerns

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Environmental Concerns

- **Promote carbon neutral technologies**, especially **in** the case of most **carbon intensive uses**.
- Introducing **water and air management** in existing assets.

Economic Realities

- **Manage the speed of structural changes** as local and national **economies need to adjust** to new circumstances.
- Potential for **new business opportunities**, however, structural change needs to be carefully managed.
- The **problem of vested interests**. The expected resistance of current system beneficiaries and important stakeholders needs to be managed.

Social Concerns

- Coal-industry dependent communities face challenges, such as job losses, economic decline, disruptive cultural changes.
- A **concept of "just transition"** can facilitate in structural planning.
- **Benefits** of transition include **job creation in low-carbon sectors**.

Policy Imperatives

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Reduce the Environmental Footprint of the Energy Sector

- **Position CCS/CCUS/HELE and negative carbon technologies** in policy parity with other carbon neutral electricity generation technologies.
- Develop and disseminate **investment guidelines for low-carbon technologies** (HELE and CCUS).
- **Deploy and disseminate best practice guidance on methane management** (monitoring and remediation) in extractive industries.

Accelerate the Transition to a Sustainable Energy System

- **Address the social and economic impacts** of phasing out obsolete and aging fossil-based infrastructure.
- **Address the challenge of integrating intermittent renewable energy** into power and heating grids.
- **Promote alternative business models** that move away from energy as commodity (push model/customer communication as a one-dimensional bill) to energy as service, with new breeds of service providers.
- **Facilitate policies and standards to limit emissions of methane** if natural gas is to provide needed balancing support for introducing intermittent renewable energy.

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Prepare the Energy System for Deep Transformation

- **Discourage the use of high carbon energy** sources with **environmental taxes.**
- **Promulgate policies to commercialize renewable gases** (such as hydrogen and biomethane) as essential elements for advancing decarbonization through sector coupling and sectoral integration.
- **Establish regulatory frameworks for big data, smart grids and an integrated systems approach** to support energy transition and create opportunities for new entrants.
- **Accelerate deployment of Information & Communication Technologies (ICT)** to improve demand-side participation in energy markets, improve supply and demand side efficiencies, and enable greater penetration of intermittent renewable energy.
- Implement energy market designs that **promote innovative, sustainable and flexible business models.**
- **Set national targets** and pursue sustainable energy **action plans**.

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Thank you!

Sustainable Energy Division
UNECE
Date 07 I 11 I 2019, Geneva

More Insights

Project Design and Objectives

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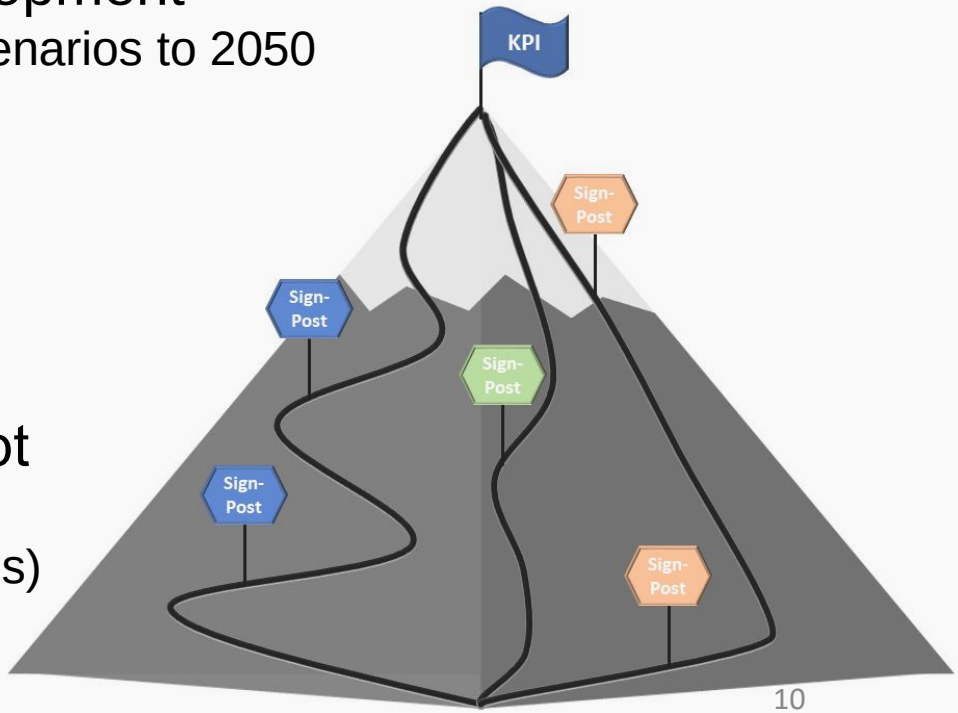
How can the UNECE Region attain Sustainable Energy (SE)?

- Current Phase: May 2017 – Oct 2019
- Outputs
  - Pathways and Scenario Development
    - Sub-regional modelling of SE scenarios to 2050
    - Policy and technology options
  - Policy dialogue
    - Adaptive policy pathways
    - Policy dialogues
    - Sub-regional workshops
  - "Early-warning system" concept
    - SE Targets
    - Key Performance Indicators (KPIs)
    - Signposts



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

Defining Sustainable Energy

Three Pillars

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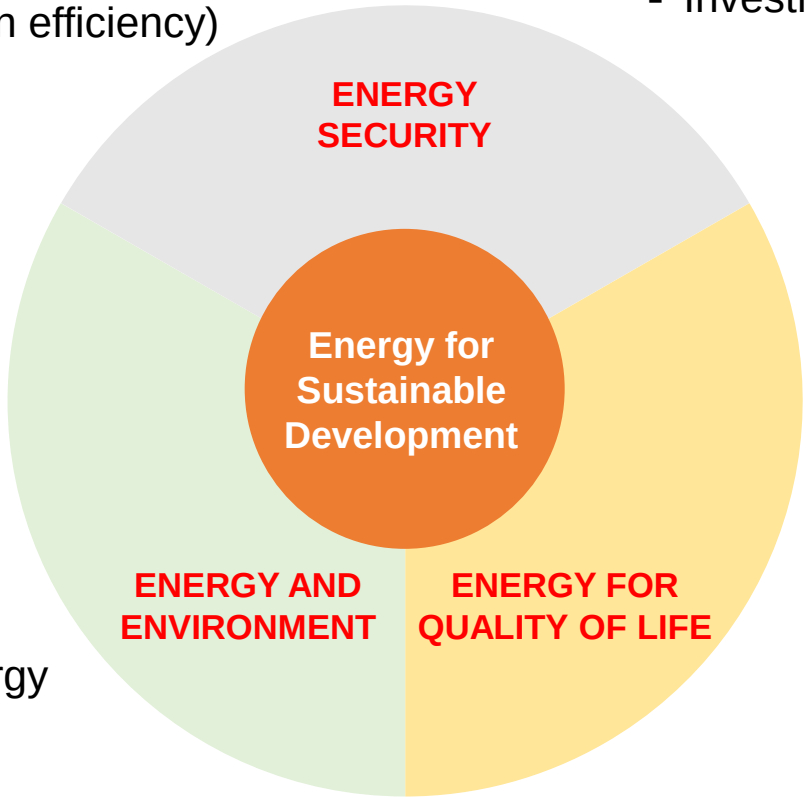
"Secure the energy needed for economic development"

- Energy Efficiency (energy intensity of economy, rate of improvement of energy intensity, conversion efficiency)
- Fuel mix
- Net energy trade
- Investment requirements



"Minimize adverse energy system impacts on climate, ecosystems & human health"

- GHG emissions from the energy system
- Energy-related air pollution, water use & water stress

"Provide affordable energy that is available for all at all times"

- Access to energy services
- Energy affordability
- Food security (biomass use)

Scenario development

Illustration of scenario design

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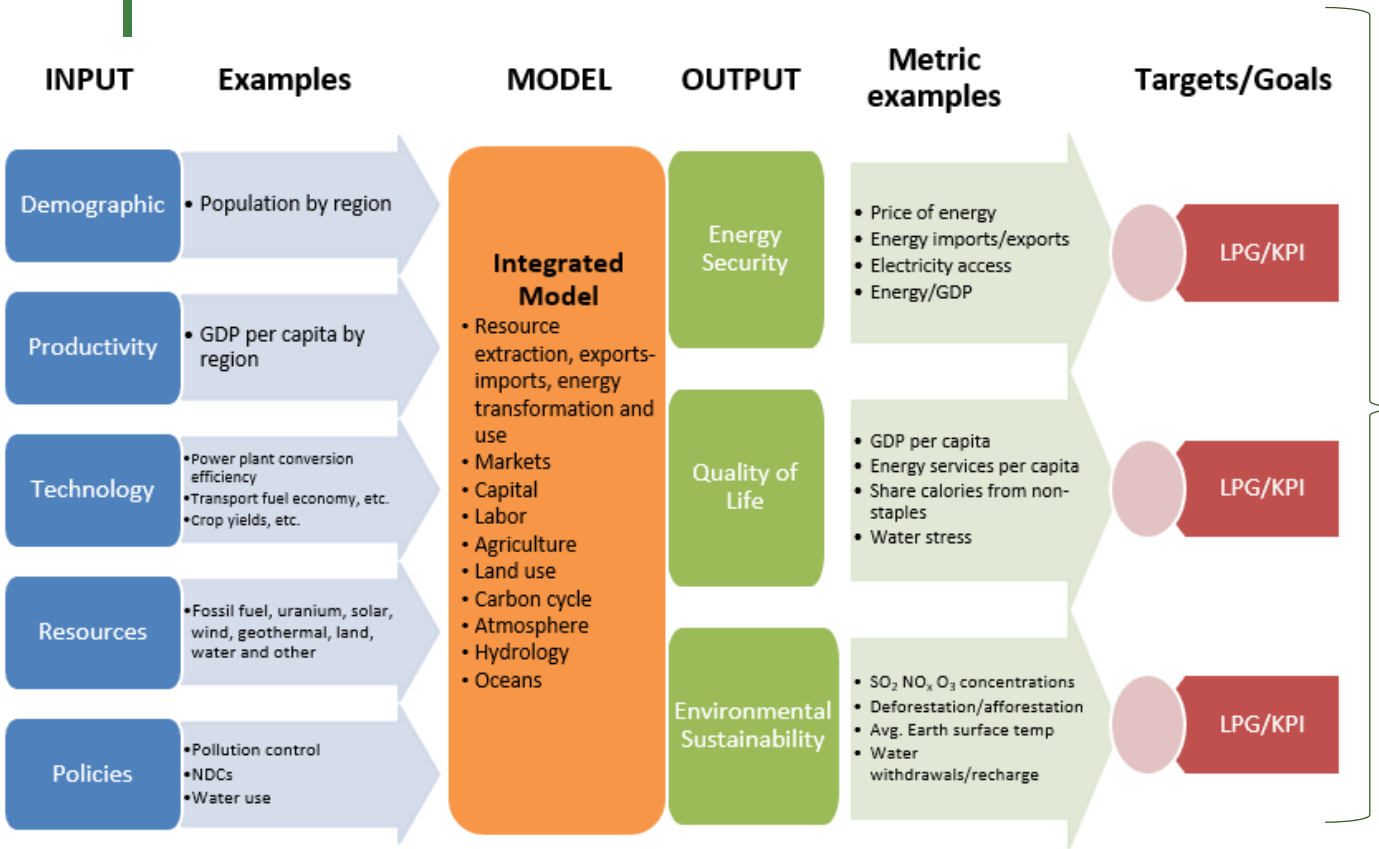

Scenario Analysis

REFERENCE SCENARIO

Based on shared socio-economic pathway

NDC SCENARIO

Implements by 2030 the NDC under the Paris Agreement – NDCs forever

P2C SCENARIO

2-Degree target of the Paris Agreement as the key component of Sustainable Energy

Modeling Results: UNECE

Electricity Generation

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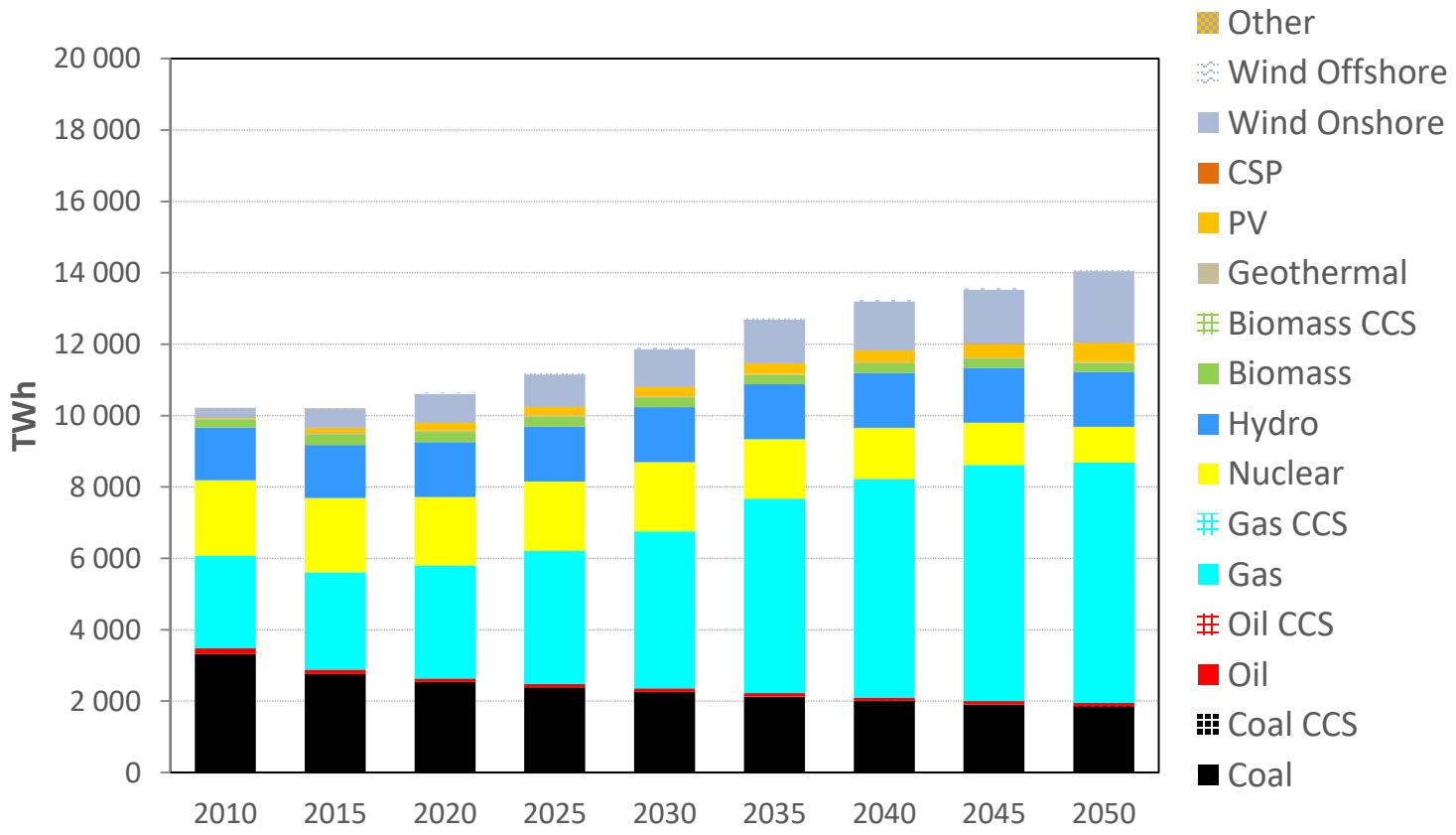
Electricity generation by technology - UNECE REF Scenario



Modeling Results: UNECE

Electricity Generation

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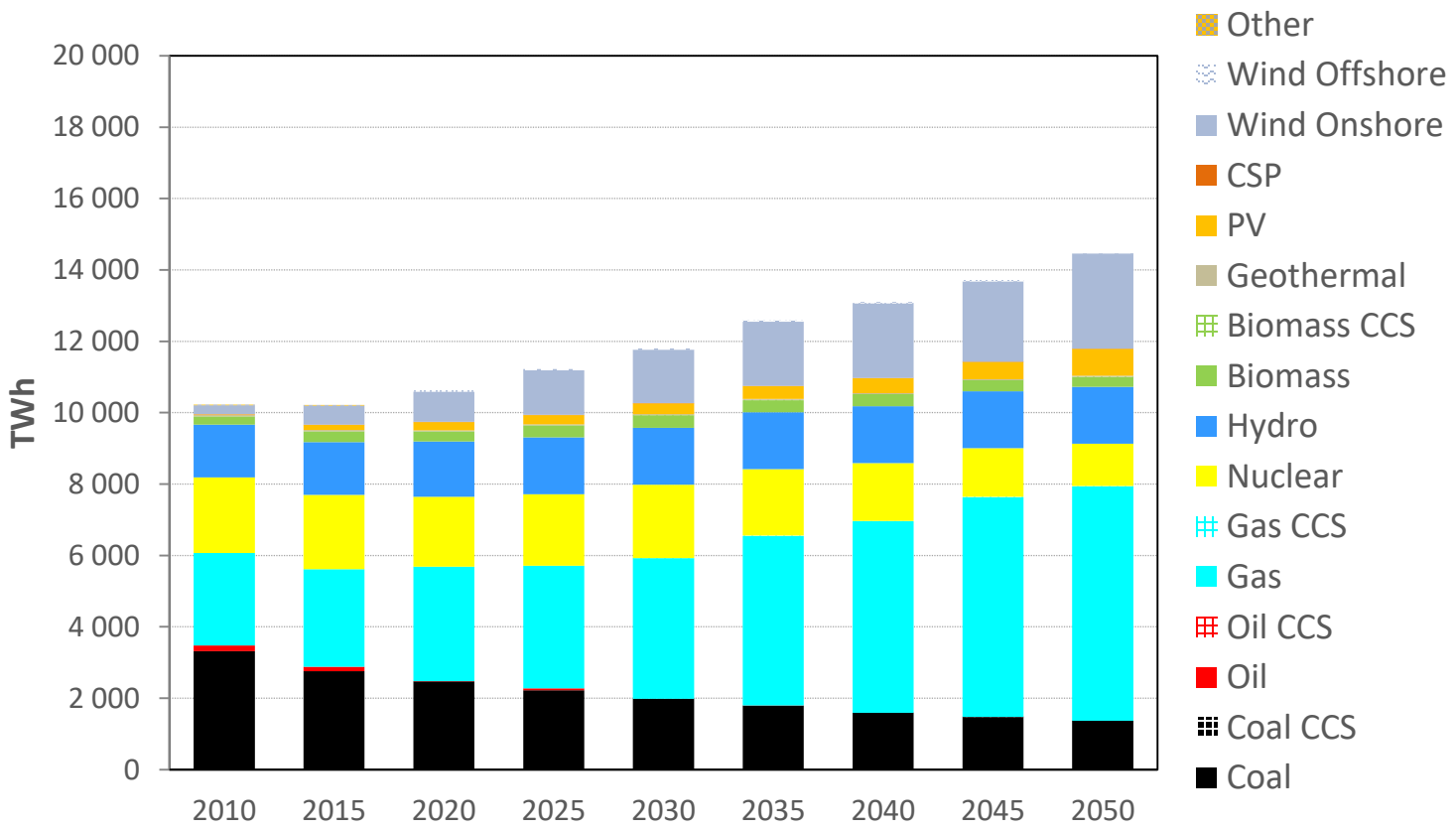
Electricity generation by technology - UNECE NDC Scenario



Modeling Results: UNECE

Electricity Generation

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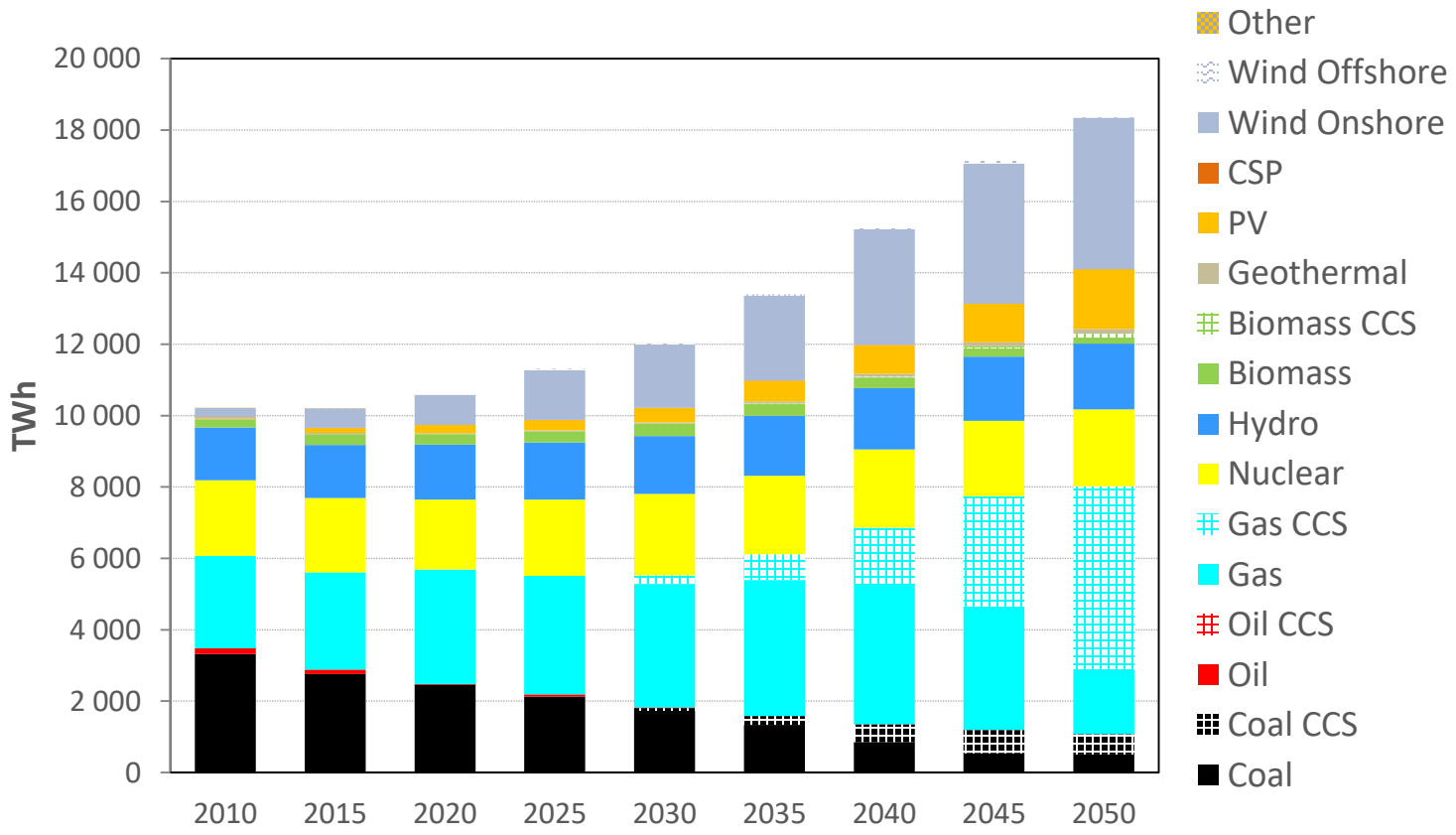
Electricity generation by technology - UNECE
P2C Scenario



Modeling Results: UNECE

Share of Coal in Electricity Generation Mix

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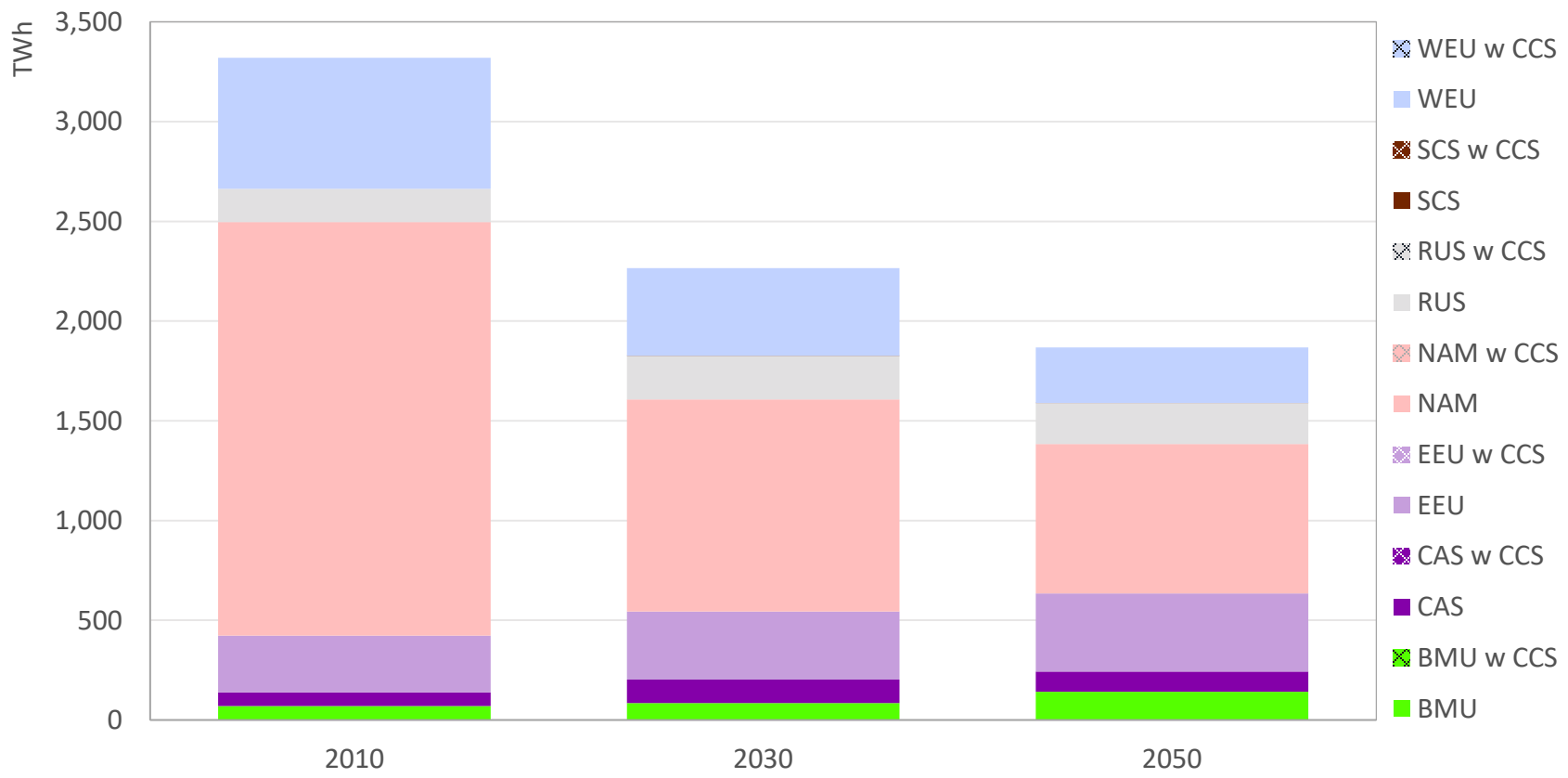

Modeling Results: UNECE

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