

# CAREC Energy Investment Outlook

Discussion Paper

Task Force A: Knowledge Products,  
Partnerships & People's Networks



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## A. Objectives and project timeline



## Why a CAREC Energy Investment Outlook?

- Energy infrastructure investment needs of the CAREC region (excluding PRC) in 2020–2030 are estimated to be at least \$400 billion. Currently, only about a quarter of the needed investment level is available and about two-thirds of investments are public sector investments
- Therefore, creating enabling conditions for crowding in private and commercial capital is needed to relieve the growing pressure on government budgets
- However, potential investors currently lack reliable and comprehensive knowledge of energy market trends and investment opportunities
- **The CAREC Energy Investment Outlook will provide the first comprehensive source of information for potential investors to understand the energy landscape of Central Asia, its likely future development and related investment opportunities**

# Energy landscape of CAREC is changing rapidly with multiple moving parts – Potential investors lack comprehensive overview

## Energy sector context in CAREC

Roland Berger in cooperation with ILF



Investors struggle to grasp and follow all moving parts in a rapidly changing energy landscape



Comprehensive and trustworthy data source is needed to enable effective decision-making

### Emergence of new technologies

New technologies continue to emerge in the global and regional energy landscape, promising to provide cheaper and sustainable alternatives to traditional fuels

### Rising energy demand

Rapid economic growth across CAREC is accompanied with higher energy demand from industry, residents and service sector

### Incomplete and scattered data

Even if investors are willing to analyze multiple sources, only limited information is available on recent energy trends and investments needs in CAREC

### Environmental awareness

CAREC, whose members are vulnerable to the effects of climate change, is becoming increasingly aware of the environmental challenges and the need of urgent actions

### Infrastructure condition

Energy infrastructure in many CAREC countries is outdated and in dire need of modernization and innovation in order to ensure security of supply

### Regulatory reforms

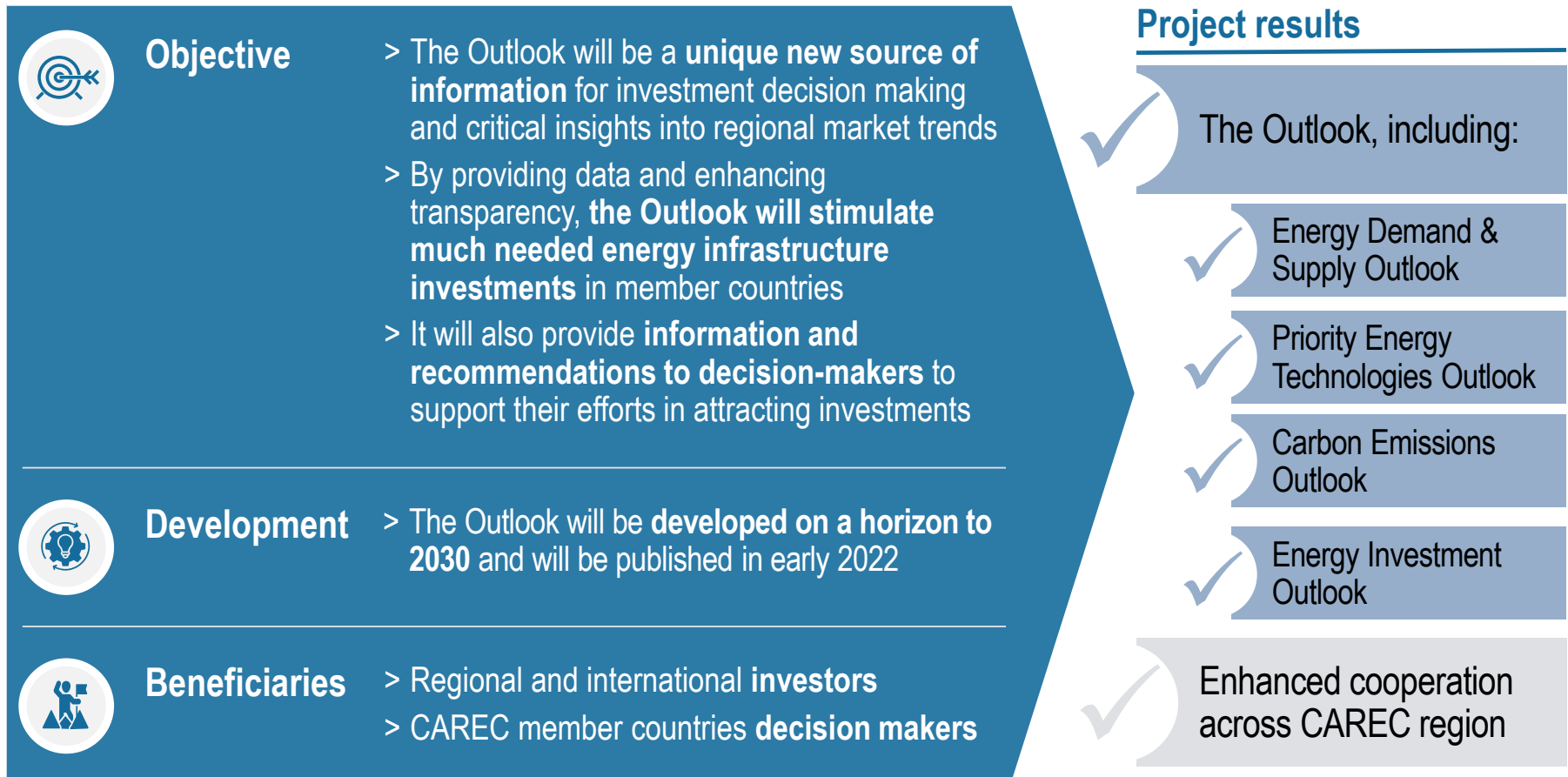
Many CAREC members have shown strong ambition in advancing regulatory framework towards liberalization, one of the key factors for potential investors

Why a CAREC Energy Investment Outlook?

# CAREC Energy Investment Outlook 2030 will be a landmark publication and important data source for investors and officials

## Key features of Energy Investment Outlook 2030

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# Apart from three key CAREC meetings, we will schedule bilateral interactions to align on forecasts before Outlook publication in 2022

Overview of preparation process and future meetings

Roland Berger in cooperation with ILF



Date



May 28<sup>th</sup>

June 10<sup>th</sup>

October 12<sup>th</sup>

February 2022

Key CAREC Meetings



Working Group & Task Force Meetings

Energy Sector Coordinating Committee Meeting

Energy Investment Forum

Publication of the Outlook

Bilateral interactions



Bilateral meetings with representatives of each country will be scheduled in summer and autumn to align on forecasts and discuss key drivers and assumptions



## B. Proposed Structure of the Outlook





# The Outlook will provide assessment of CAREC energy system from various angles and probe its potential future until 2030 via 3 scenarios

## General approach and methodology

- The Outlook will **project energy system in CAREC and its member countries until 2030 from various angles**. The starting point of our approach will be **forecast of energy demand** based on key drivers (e.g. GDP, population) and changes in efficiency, considering also country-specific historical trends. Projected **demand will be matched with energy supply** by fuel type, allowing us to **calculate resulting carbon footprint** based on combustion emission factors. Finally, the **investment needs in each country will be forecasted** based on improvements in the energy systems required to secure supply until and beyond 2030.
- While **the future cannot be predicted in principle**, preparing scenarios is **useful to explore potential developments** and evaluate implications. Following this logic, the forecasts will be united in **three scenarios**:
  - > **Business-as-usual** scenario assumes continuation of current trends and policies
  - > **Government commitments** scenario assumes adoption of policies to meet efficiency and climate change targets
  - > **Green growth** scenario assumes more rapid regulatory and technological change
- Scenarios will contain different **assumptions** in terms of energy **efficiency, fuel and technology shifts** etc, which will be discussed with country representatives to ensure relevance of the results.
- Furthermore, we will qualitatively **assess energy technology** based on country-specific context, energy priorities and global shifts. Complemented with an analysis of **barriers to private investments** and potential levers to address them, the Outlook will provide a **comprehensive view on energy system in CAREC until 2030**.

First part of the Outlook will contain perspective on energy in CAREC overall, followed by eleven country-specific sections

Table of contents of the Outlook

Preliminary



## Introduction and executive summary

### Part I. CAREC level



- 1. CAREC at glance**
- 2. Supply and demand Outlook**
  - 2.1. Historic overview
  - 2.2. Supply and demand forecast 2030
- 3. Technology Outlook**
  - 3.1. Global technology trends
  - 3.2. Development of technologies in CAREC
- 4. Carbon emissions Outlook**
- 5. Investment Outlook**
  - 5.1. Global investment trends
  - 5.2. Challenges and opportunities in CAREC
  - 5.3. Energy investment needs
  - 5.4. Role of IFIs

Aggregated view on the entire CAREC region

### Part II. Country level (x11)



- 1. Country at glance**
- 2. Supply and demand Outlook**
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- 5. Investment Outlook**
- 6. Policy recommendations**

Deep-dive for each CAREC member country

# Supply and Demand section will focus on projecting energy balances under three scenarios at CAREC-aggregated and country-levels

## Key elements of Supply and demand Outlook

Preliminary



### Section of the Outlook

Quick facts about energy landscape

1. CAREC/ Country at glance

**2. Supply and demand Outlook**

3. Technology Outlook

4. Carbon emissions Outlook

5. Investment Outlook

### Supply and demand

	CAREC level	Country level
● Analysis of historic data on energy supply and demand	✓	✓
● Forecast of energy demand until 2030 per fuel type (coal, oil products, natural gas, electricity and other) and sector (industry, transport, residential and services) under 3 scenarios	✓	✓
● Forecast of primary energy supply until 2030 per fuel type (coal, oil products, natural gas, renewable sources and other) under 3 scenarios	✓	✓
● Forecast of energy efficiency development until 2030 under 3 scenarios	✓	✓

# Technology section will contain overview of trends and modern energy technologies, case studies and country-specific priorities

## Key elements of Technology Outlook

Preliminary

Roland Berger in cooperation with ILF



### Section of the Outlook

- 1. CAREC/ Country at glance
- 2. Supply and demand Outlook
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- 4. Carbon emissions Outlook
- 5. Investment Outlook

### Technology

CAREC level

Country level

●	Analysis of global technology trends	✓	
●	Overview of key energy transition technologies and their development until 2030	✓	
●	Definition of priority energy technologies in order to reach NDC, other national targets and policies		✓
●	Case studies of innovative energy technologies in CAREC with derived lessons learned for regional peers	✓	

# Forecasts of energy-related carbon emissions will be supplemented by the analysis of drivers and implications for NDCs' targets


## Key elements of Emissions Outlook

Preliminary

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### Section of the Outlook

1. CAREC/ Country at glance
2. Supply and demand Outlook
3. Technology Outlook
- 4. Carbon emissions Outlook** 
5. Investment Outlook

### Carbon emissions

	CAREC level	Country level
● Definition of carbon emission drivers related to energy	✓	
● Forecast of carbon emission resulting from the combustion of energy sources under 3 scenarios	✓	✓
● Analysis of scenario implications regarding achieving targets set in NDCs of the Paris Agreement	✓	✓

Investment section will focus on assessing investments needs as well as key trends, role of IFIs and case studies on private investments

Key elements of Investment Outlook

Preliminary

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Section of the Outlook

- 1. CAREC/ Country at glance
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**5. Investment Outlook**



**Investment**

CAREC level

Country level

● Forecast of energy investment needs until 2030 under 3 scenarios	✓	✓
● Analysis of global energy investment trends as well as challenges and opportunities in CAREC	✓	
● Definition of IFI's role in energy investments	✓	
● Case studies of private sector investments in modern energy infrastructure in CAREC and lessons learned	✓	

# Three scenarios have been defined to assess development under various policy measures and subsequent energy mixes

## Overview of forecast scenarios

### 1 Business-as-usual (BAU)

### 2 Government commitments

### 3 Green growth

#### Description

- > Projected energy supply and demand with **current energy system and policies**, including COVID-19 impact and post-COVID recovery trajectory
- > Projected energy supply and demand considering individual **priorities & pledges of CAREC governments** (incl. CO<sub>2</sub> emissions according to NDCs and other national plans)
- > Energy & supply demand under **enhanced environmental policies** vs the ones pledged by the countries, considering **increased energy efficiency** and, generally, an **accelerated economic development**

#### Forecasting approach



- > Forecast is based largely on the **historical energy supply and demand mix**
- > Slight adjustments that account for existing deployment plans of energy generating assets
- > The existing energy mix is adjusted to reflect shifts in energy policy, i.e., individual country priorities, **national commitments through NDCs**
- > Rising environmental awareness among consumers
- > The existing energy mix is significantly adjusted to meet the **higher levels of national commitments** (if both conditional or unconditional pledges are available) or **more optimistic targets** vs the pledges
- > Stronger environmental awareness among consumers

#### Expected investments



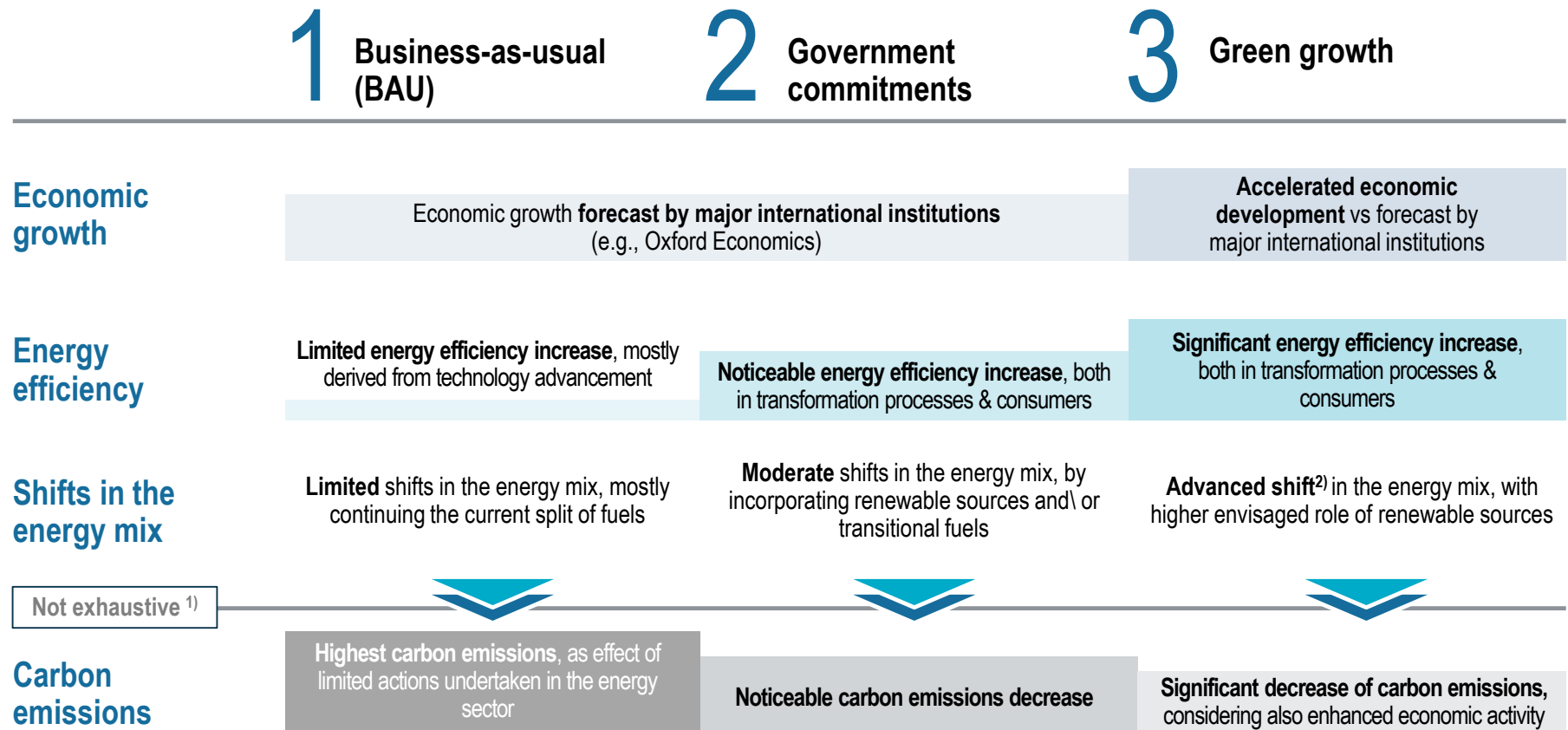
Low High



Details/ Zoom-in on the next page

# Several key assumptions will be considered to develop the Outlook along the three defined scenarios

Zoom-in on the forecasting approach for scenarios – Main assumptions



1) Other factors like population, degree of access to power & natural gas grid or COVID-19 to be considered as assumptions, while in terms of outputs investments will also be a key dimension  
 2) Dependent on country-specific natural resources and limitations



# Developed on CAREC and country levels, the Outlook will assess future energy system until 2030 along four key dimensions

## Summary of the Outlook approach and structure

- The Outlook, prepared on **the horizon of 2030**, will reflect a **range of potential developments** of energy system in CAREC **via 3 scenarios** (BAU, Government commitments and Green growth). Scenarios assume **varying level of policy and regulatory advancements** until 2030 and of resulting **technology shifts and energy efficiency**. The **assumptions** used in preparation of forecasts **will be discussed with representatives of member countries**.
- Energy system will be analyzed on **two levels: CAREC** (aggregated view for all members) and **Country** (deep-dive for each member country). Analysis on both levels will be conducted along the same **four key dimensions: supply and demand, technology, carbon emissions and investments**.
- **Supply and demand Outlook** will investigate **future energy balances** in CAREC overall and each country, focusing on supply and demand as well as energy efficiency
- **Technology Outlook** will shed light on **global trends** in energy technology, **leading energy technologies** in CAREC. It will also outline **priority technology for each country** in meeting their security and sustainability goals
- **Carbon emissions Outlook** will assess **carbon footprint** resulting from combustion of energy sources and **implications** towards **meeting various climate change targets**
- **Investment Outlook** will identify **investment requirements in each country** as well as **global trends** in energy investments, complemented by the case studies of private sector investments in CAREC and role of IFIs

## C. Snapshots of the Outlook: an early glimpse into the content



# First part of the Outlook will contain perspective on energy in CAREC overall, followed by eleven country-specific sections

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Deep-dive for each CAREC member country

# In the Demand and Supply section, inter alia, various scenarios of primary energy supply until 2030 will be considered

## Snapshot of the Outlook (1/6)

Illustrative

### Section of the Outlook

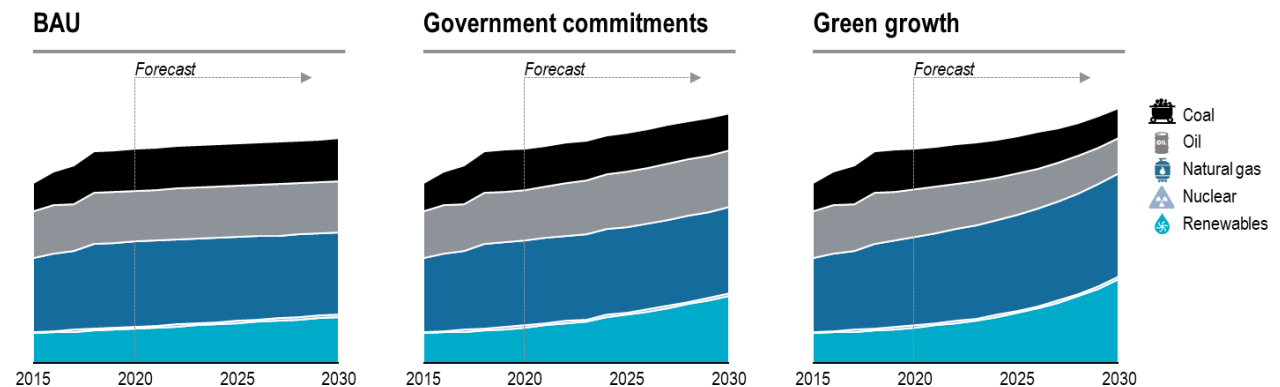
#### Part I. CAREC level

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- 5. Investment Outlook



### Content illustration: Forecast of primary energy supply by scenario

Primary energy supply in CAREC [m toe]



# Technology Outlook will investigate future development of main energy technologies and, inter alia, overarching global trends

Snapshot of the Outlook (2/6)

Illustrative

## Section of the Outlook

### Part I. CAREC level

1. CAREC at glance
2. Supply and demand Outlook
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## Content illustration: Global energy technology trends

Overview of main global energy trends

Renewable energy	Alternative fuels / Hydrogen	Electrification	Carbon capture, utilization and storage	Digitalization
<p><b>Tumbling of the energy costs from wind and solar</b> will continue in this decade</p> <p><b>Renewables</b>, in particular solar, will become the <b>cheapest energy source</b>, also boosted by wider adoption of carbon prices</p> <p>Renewables will achieve a <b>prominent role in energy system at the expense of carbon-heavy fuels</b>, especially coal</p>	<p><b>Hydrogen and hydrogen-based fuels have emerged as alternative fuel</b> due to significant interest from political and business stakeholders</p> <p><b>Hydrogen</b> can be burned without harmful emissions and <b>has a considerable potential to replace fossil fuels</b></p> <p>In combination with CCUS<sup>1)</sup>, <b>blue hydrogen</b> can be produced from natural gas; existing gas infrastructure can be potentially adopted for the transportation of blue hydrogen</p>	<p><b>Direct consumption</b> of coal and oil products is expected to be gradually <b>replaced by electricity</b> across sectors, especially transportation</p> <p><b>Natural gas</b> is likely to play a role of transitional fuel due to its lower carbon footprint</p> <p>Considering the essential role of renewable sources in the future, main <b>enablers</b> of broad electrification are <b>optimization of batteries and balancing technologies</b></p>	<p>Despite being at an early adoption stage, CCUS already allows to remove and safely store <b>CO<sub>2</sub> emissions from industrial and power plants</b></p> <p><b>CCUS</b> will be essential to <b>decarbonization of power sector and heavy industry</b></p> <p>Expansion and <b>commercial viability</b> will <b>depend on carbon prices</b></p> <p>In the long term, CCUS is likely to evolve into capturing of CO<sub>2</sub> directly from air</p>	<p>Digitalization is expected to unlock a <b>new dimension of energy automation and control, leading to higher efficiency</b></p> <p><b>Smart grids</b> are projected to be a centerpiece of future energy infrastructure as advanced metering will enable interconnections to smart cities, smart mobility solutions etc.</p> <p>Improved data availability as a result of digitalization will likely <b>foster innovation</b> further</p>

### Global trends shaping long-term future of energy

1) Carbon capture, utilization and storage

# Multiple case studies on private sector investment in modern energy technologies in CAREC will be analyzed to derive key takeaways

Snapshot of the Outlook (3/6)

Illustrative

## Section of the Outlook

### Part I. CAREC level



1. CAREC at glance
2. Supply and demand Outlook
3. Technology Outlook
4. Carbon emissions Outlook
5. Investment Outlook



## Content illustration: Investment case study

100 MW large scale solar power plant in central Uzbekistan



### Project description

As part of the Government's strategy to develop up to 5 GW of solar power by 2030, state-owned Uzbekenergo JSC awarded UAE-based developer Masdar (part of Mudabalah) the contract to develop Uzbekistan's first large-scale PV plant with a capacity of 100 MW. Located in Navoi region, the plant will be commissioned in 2021. The bid price was USD 0.027/kWh, one of the lowest bid for PV in emerging markets.



### Project details

Main shareholders/developer	Uzbekenergo JSC, Masdar (developer, financier, operator)
Other promoters	Financing by ADB, IFC and EBRD, transaction advisory by IFC, technical assistance by the World Bank, the Governments of Austria, the Netherlands and Switzerland
Operational model	Public Private Partnership (PPP) with a 25 year duration
Output	100 MW
Tender/bid procedure	Competitive tender (23 bids received)
Winning bid/energy tariff [USD/ kWh]	USD 0.027 per kWh (lowest bid for large scale solar in emerging markets)
Regulations/framework	Power purchase agreement & gov't support agreement
Approximate cost	USD 100 m

# Investment Outlook will also examine role of IFIs in advancing energy systems in CAREC, e.g., available instruments

Snapshot of the Outlook (4/6)

Illustrative

## Section of the Outlook

### Part I. CAREC level

1. CAREC at glance
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## Content illustration: Role and instruments of IFIs

### Instruments utilized by IFIs

<b>Equity / Direct investments</b>		<ul style="list-style-type: none"> <li>&gt; IFIs provide developmental support and long-term growth capital by <b>making equity investments</b></li> <li>&gt; Investment size is usually between 5 and 20 percent of company's equity</li> </ul>
<b>Guarantees / Insurance</b>		<ul style="list-style-type: none"> <li>&gt; IFIs <b>guarantee payments for the principal and interest on debt issuance</b> (up to certain percentage) under new or existing loan portfolios in case the borrowers do not pay</li> </ul>
<b>Grants</b>		<ul style="list-style-type: none"> <li>&gt; IFIs often provide <b>grants for interest or technical assistance</b></li> <li>&gt; The allocated <b>grant funds</b> are generally <b>concessional</b></li> </ul>
<b>Loans</b>		<ul style="list-style-type: none"> <li>&gt; IFIs provide initial funding for the projects by giving <b>loans under favorable</b> conditions (low interest rate and relatively long repayment period); loans can be also given in local currency</li> </ul>
<b>Blended finance</b>		<ul style="list-style-type: none"> <li>&gt; Strategic <b>use of for profit and public funding</b> to mitigate investment risks (balance risk/benefit ratio) and facilitate private sector investment</li> <li>&gt; Frequently used when IFIs mobilize private investment in pioneering projects and challenging environments</li> </ul>
<b>Technical assistance / Advisory</b>		<ul style="list-style-type: none"> <li>&gt; IFIs can also assist by <b>providing project preparation support, high level screening, due diligence, formulation for project components</b>, etc.</li> <li>&gt; <b>Knowledge products</b> (e.g. Country Private Sector Diagnostic) are developed by IFIs to assist provide market overview, enabling informed and effective decision making for private sector</li> <li>&gt; In addition, IFIs take an active role in <b>helping governments to develop laws and regulations</b> that stimulate private sector investments</li> </ul>

# Each country level analysis will start with energy highlights to underline standout features of country's energy system

Snapshot of the Outlook (5/6)

Illustrative

## Section of the Outlook

### Part II. Country level

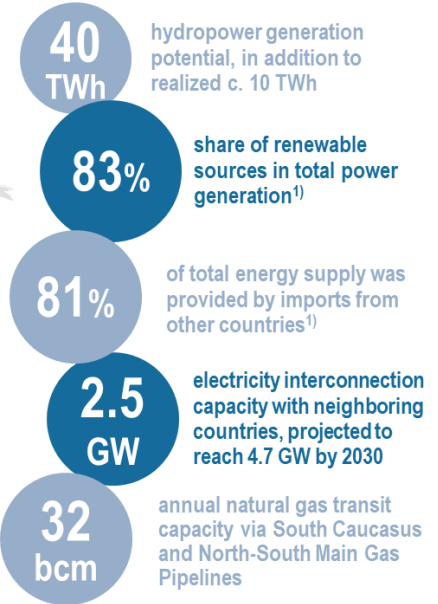
#### 1. Country at glance

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## Content illustration: Country energy highlights

Georgia: Energy highlights



1) Figures for 2018



# At the country level, supply and demand forecasts will be analyzed in greater detail

Snapshot of the Outlook (6/6)

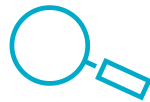
Illustrative

## Section of the Outlook

### Part II. Country level

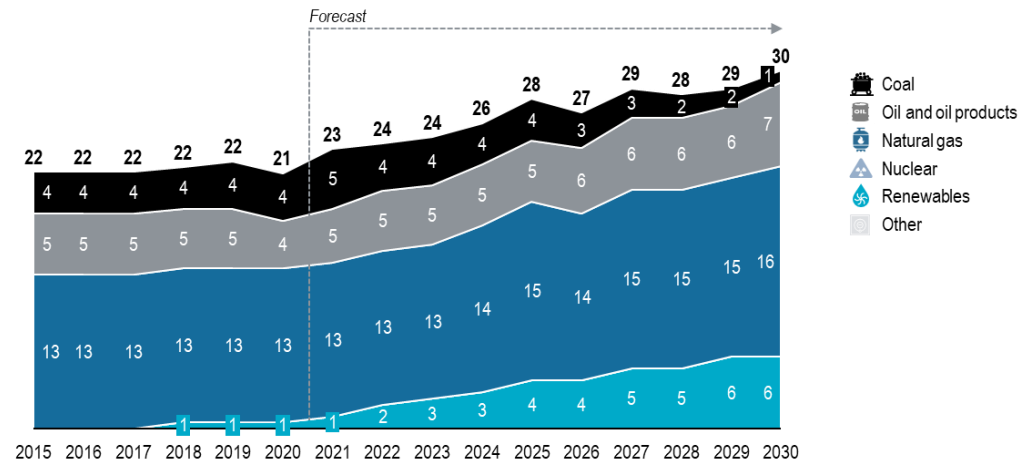


1. Country at glance
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## Content illustration: Forecast of final energy demand

Primary energy supply under Green growth scenario [m toe]



## D. Questions to Task Force Members



# We will appreciate the countries' insight on targets and expectations in the energy mix, energy efficiency and security by 2030

## Questions to Task Force Members



Do you agree with **the proposed structure, composition and approach** of the CAREC Energy Investment Outlook?

What **energy mix** do you expect **in your country in 2030**?

- Will there be a **significant shift** in the type and amount of **conventional fuels** used as compared to today? If yes, in which respect?
- What do you expect **the share of renewable energy** to be in the total energy mix in the most optimistic scenario?

Can you name **the most important domestic or cross-border infrastructure projects** (planned or desired) that will help you achieve **energy security and a cleaner energy mix** in the next 10 years?

CAREC Energy Ministers Declaration committed to double energy efficiency level in the region by 2030. What **national policies are planned in order to reach this goal**?

Roland  
Berger

THINK:ACT

