Energy Sector Strategy

2024-28

As approved by the Board of Directors on 14 December 2023

European Bank
for Reconstruction and Development

Table of contents

European Bank
for Reconstruction and Development

European Bank
for Reconstruction and Development

Ramping up the supply of clean electricity to electrify economies: scaling up renewables from megawatts to gigawatts, improving energy efficiency and enhancing grids, while accelerating a just transition from fossil fuels

Executive summary

European Bank
for Reconstruction and Development

- **The central theme of the European Bank for Reconstruction and Development's (EBRD) Energy Sector Strategy is to accelerate the vital energy transition in the economies where the Bank operates, while ensuring that the transition drives economic growth and social development.**
- This new Energy Sector Strategy is consistent with the EBRD's commitment to aligning its activities with the goals of the Paris Agreement and the Bank's Strategic and Capital Framework (SCF) (which prioritises supporting the transition to a green, low-carbon economy, promoting equality of opportunity and accelerating the digital transition) and to achieving an annual green finance ratio of at least 50% by 2025.
- Three key factors shape the strategic directions of the Energy Sector Strategy: the **climate emergency, energy security and innovation**. Both the climate emergency and energy security require an **accelerated green energy transition**: emissions must peak this decade and fall to net zero by mid-century. To achieve this, the world needs to electrify its economies and accelerate the provision of clean electricity. Innovation is key to **unlocking decarbonisation solutions**.
- The accelerated green energy transition presents **major challenges** for many EBRD economies, particularly those with high energy and carbon intensity and those which are heavily dependent on fossil fuels. Many of the economies in which the EBRD operates have limited access to long-term, low-cost capital and lack an attractive investment climate with a robust regulatory framework. Investments in modernised networks and interconnections are insufficient, hindering the integration of renewables. In addition, many countries in the EBRD regions lack competitive energy markets and have gaps in their institutional capacity to deliver the green energy transition.
- These factors and challenges in the EBRD regions have led to two strategic directions for the Energy Sector Strategy:
    - **accelerating the decarbonisation of energy**
    - **delivering resilient, efficient and inclusive energy systems**.
- These strategic directions entail a series of actions:
    - **Scaling-up renewables** – turning megawatts of renewable energy installed into gigawatts to accelerate electrification and decarbonisation, while building greater energy security and diversity.
    - **Upgrading power networks, storage solutions and regional interconnections** – to ensure resilient and secure energy systems that successfully integrate intermittent renewables.
    - **Promoting zero-carbon fuels** – investing in innovative technologies and harnessing renewables to decarbonise other sectors especially those that are hard to abate.
    - **Phasing out unabated fossil fuels** – the Bank will actively support the transition away from fossil fuels and limit its investments in new fossil-fuel projects to increasingly rare instances.
    - **Promoting well-functioning markets and resilient assets** – to ensure efficient, secure energy systems adapted to impacts of climate change.
    - **Enhancing energy efficiency and productivity** – allowing for more efficient and cost-effective decarbonisation and more efficient use of energy, resources and materials.
    - **Delivering an inclusive and just energy transition** – to ensure that the transition leaves no one behind.
- These actions would be delivered through a **holistic approach** at the Bank, country and sector level via **financing instruments, policy dialogue,** the mobilisation of **private-sector capital**, increased **coordination and complementarity among development partners,** and, where needed, **blended financing**.
- The energy sector lies at the heart of the green transition; it is where the greatest challenges lie, but also extraordinary opportunities to move to a world of abundant, reliable, low-cost and sustainable energy. This Energy Sector Strategy creates a platform for the EBRD to support the economies in which the Bank operates in meeting those challenges and capitalising on opportunities in 2024-28.

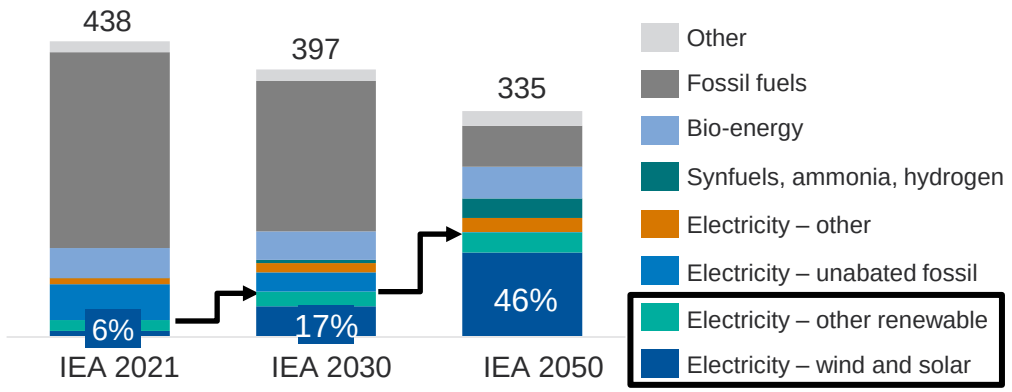
Electrifying economies and decarbonising energy: Worldwide and EBRD regions

European Bank for Reconstruction and Development

Electricity demand will increase sharply due to electrification and economic growth, and this increase will be met by scaling up zero-carbon electricity

- Annual energy consumption to shift from 20% electricity in 2021 to 27% in 2030 (and more than 50% by 2050).
- Electricity from solar and wind to increase fivefold between 2021 and 2030 (generation from unabated fossil fuels to decrease by more than 40% during this period).
- By 2050, electricity generation from wind and solar to account for more than 70% of total power generation.

Global final energy consumption, EJ

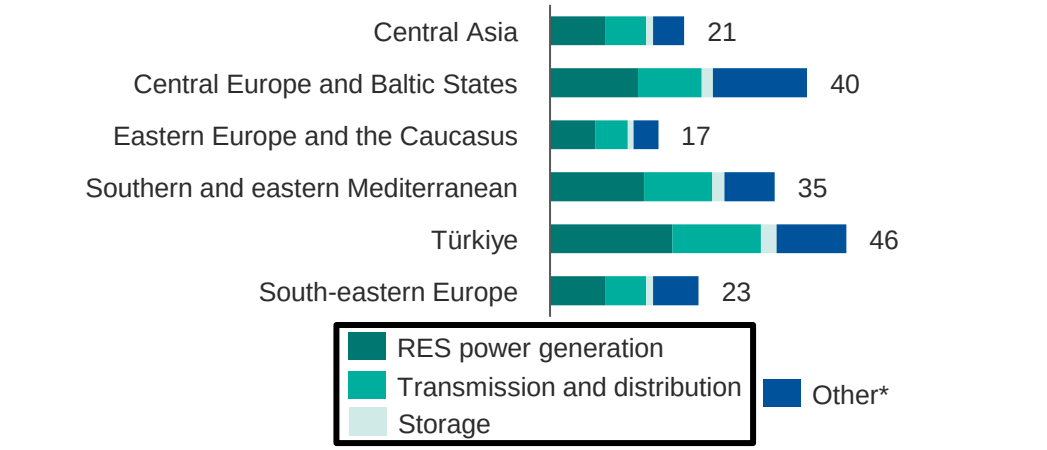


Note: *2030 and 2050 illustrate the International Energy Agency's (IEA) Net Zero Emissions by 2050 (NZE) scenario, "a normative IEA scenario that shows a pathway for the global energy sector to achieve net zero CO2 emissions by 2050, with advanced economies reaching net zero emissions in advance of others". Note that estimates of energy supply and associated electricity supply vary form source to source. For example, the ETC estimates 451 EJ energy supply in 2050, as opposed to the IEA's estimate of 335 EJ, and 306 EJ electricity supply in 2050, as opposed to the IEA's estimate of 176 EJ.*

Required annual net zero power-sector investment is significantly higher than current levels in EBRD economies

- Between January 2019 and September 2023, the EBRD committed more than €3.5 billion of financing to over 100 renewable projects. This added around 12 GW of renewable energy capacity, more than triple the capacity installed in the previous Energy Sector Strategy period.
- Significant annual investment of around US$ 182 billion, is required in the EBRD regions to enable a sustainable, secure and affordable net-zero economy by 2030.
- Around 75% of these investments will be in the power sector, corresponding to approximately US$ 130 billion per year between 2024 and 2030.Total renewable energy investment needs will increase fivefold from the annual average in 2018 to 2022 to remain in line with a net-zero target.

Total estimated annual net-zero investment by region and sector, 2024-30
US$ billion per year



% of 2021 regional GDP

3.4%
1.8%
3.4%
3.4%
3.4%
2.3%
Approx. 3%

*Other includes hydrogen, buildings, transport, industry and removals.

Energy Sector Strategy: Snapshot

European Bank
for Reconstruction and Development

Context

- Climate emergency
- Energy crisis
- Innovation

Strategic directions

1. Accelerate the decarbonisation of energy
2. Deliver resilient, efficient and inclusive energy systems

Critical action areas for delivering the energy transition

- Scale up renewable energy sources
- Upgrade and expand networks and storage solutions
- Promote zero-carbon fuels
- Phase out unabated fossil fuels
- Promote secure and resilient energy assets
- Enhance energy efficiency and productivity
- Manage an inclusive and just energy transition

Delivering through a holistic approach that includes but is not limited to:

- financing instruments
- promoting well-functioning markets and market-based mechanisms
- mobilising the private sector
- blended finance
- policy dialogue

while collaborating with multilateral development banks (MDBs) and other external partners for systemic impact and addressing key transition challenges (see Annex P).

Energy Sector Strategy: Scope – interface and complementarity

European Bank
for Reconstruction and Development

The Energy Sector Strategy covers the Bank's activities from 2024 to 2028 in:

(i) electricity generation, transmission, distribution, storage and supply

(ii) hydrocarbon extraction, processing, transportation, distribution, storage and supply (hydrocarbons for this purpose include oil, gas and thermal coal)

(iii) production, transportation, distribution, storage and supply of hydrogen and low-carbon fuels.

The strategy also covers utility-scale heat generation in district heating. The broader approach to district energy is covered in the Bank's Municipal and Environmental Infrastructure strategy.

The strategy covers all of the economies in which the Bank operates, taking into account their specific transition challenges.

The Energy Sector Strategy is shaped by the Bank's commitments and interfaces with other EBRD strategies, approaches and policies, including:

- **The EBRD's commitment to aligning all of its activities with the Paris Agreement from 2023**
- **The EBRD's Strategic and Capital Framework**, with three cross-cutting strategic themes: transitioning to a green, low-carbon economy; promoting equality of opportunity; and accelerating the digital transition

Country strategies

Thematic strategies, approaches and frameworks, such as the Green Economy Transition (GET) approach, the Strategy for the Promotion of Gender Equality, the Equality of Opportunity Strategy, the Digital Approach and EBRD Green Cities

Other sector strategies

Sector strategies interface with country strategies by outlining the ways in which the Bank would achieve transition impact, reflecting sectoral developments and transition challenges across the economies in which the Bank operates. Country strategies tailor sectoral strategic direction to individual country contexts.

The Bank's sectoral strategies, including transport, the extractive mining industries, municipal and environmental infrastructure, agribusiness, property and tourism, and financial institutions. Cross-sectoral links range from the EBRD's support for energy-efficiency improvements to the promotion of lower-carbon technologies.

Policies, including the EBRD's Environmental and Social Policy, Procurement Policies and Rules and Access to Information Policy.

Section 1: Context

Current context: Global

European Bank
for Reconstruction and Development

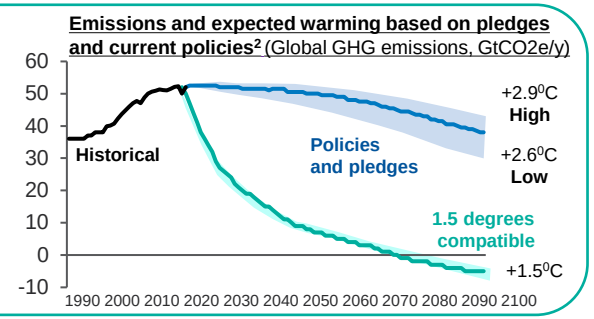
Imperative to provide a clean, secure and affordable energy system

Climate emergency

Climate action and environmental, social and governance (ESG) concerns are driving change in the sector with policies and plans that aim to mitigate adverse climate change effects and drive investments in the energy transition, but more is needed.

Emissions must reach net zero by mid-century to limit warming to 1.5˚C. Keeping this goal attainable requires **major transformation**. The climate emergency is linked to the impacts of poor air quality on public health, as well as to the sharp decline in biodiversity.

In addition to urgently reducing emissions, the energy system needs to **adapt** and **become more resilient** to the effects of climate change, including frequent extreme weather events.



Energy crisis

Several forces are shaping the energy sector. The war on Ukraine, the Covid-19 pandemic and the energy crisis have created volatility in prices and caused disruption to the supply of renewable energy components and materials. These forces have brought **energy security and affordability** into sharp focus, which together with the climate emergency, reinforce the **need to accelerate the energy transition**.

There is strong alignment between promoting energy security and meeting decarbonisation goals: **moving to a lower carbon economy also enhances energy security.**

Greater momentum is paramount in order to address these challenges and drive the energy transition. This would entail a **coordinated ramp-up of investments** in renewables, energy efficiency, storage, grid upgrades and expansion, hydrogen production and infrastructure, enabled by a **significant policy response**.

Innovation

Access to cheaper zero-carbon electricity has a positive effect on **unlocking other net-zero solutions**.
In combination with **innovation**, low-cost renewable electricity makes it possible to **rapidly enable zero-carbon technologies and unlock decarbonisation** solutions in different sectors and areas, especially the ones with high carbon intensity (for example, steel, aviation and transport).

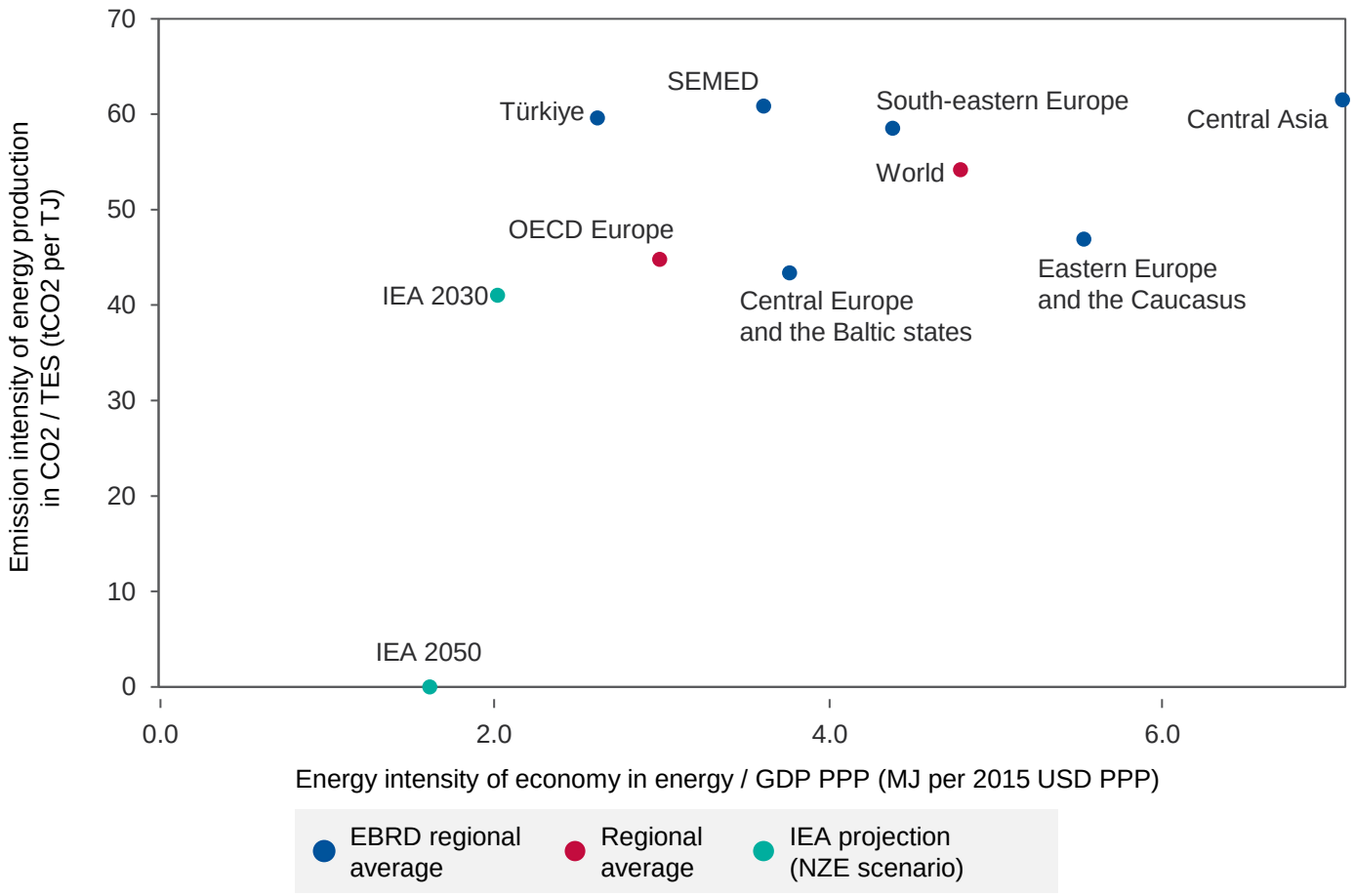
→ *See Annex C for more information.*

Current context: EBRD regions

European Bank
for Reconstruction and Development

Significant need in the EBRD regions to reduce carbon intensity and increase energy efficiency

Energy and carbon intensity



- To meet climate goals, emissions must halve by 2030 in many of the EBRD regions.
- Several EBRD regions – Central Asia, south-eastern Europe, southern and eastern Mediterranean (SEMED) and Türkiye – have carbon intensities exceeding the world and Organisation for Economic Co-operation and Development (OECD) Europe averages.
- Most economies in the EBRD regions (for example, counties in Central Asia, SEMED, Central Europe and the Baltic states, the Western Balkans, and eastern Europe and the Caucasus) rely significantly on fossil-fuel based generation for electricity and district heating.
- *See Annex O for country-specific data.*

Section 2: Strategic directions

Current context: Transition challenges in EBRD regions[1]

European Bank
for Reconstruction and Development

Green	To decarbonise the economies in which the EBRD operates, a concerted effort is required to attract investment **to scale up renewable energy** and **transition away from fossil fuels**. Access to long-term, low-cost capital remains challenging and **mobilising private and public capital** is a priority. Investment is also needed in segments that support renewable energy growth, and leveraging concessional finance could help deliver progress in the most innovative areas, such as **advanced storage, grid expansion and upgrades, and green hydrogen**. The lack of enabling frameworks inhibits the investments needed to deliver the energy transition.
Well governed	In most of the economies where the Bank operates, state-owned enterprises (SOEs) play a central role in the energy sector, but often suffer from poor corporate and climate governance, resulting in negative financial positions, poor climate reporting and chronic sectoral underinvestment. On a national level, a **reduction in state ownership**, the **corporatisation of SOEs** and the development of credible **regulatory oversight of market functioning** and **robust legal and regulatory frameworks** that promote private-sector investment remain key transition challenges. Lengthy permitting and administrative barriers delay energy investments in many EBRD economies.
Competitive	The pace of energy market development and market liberalisation varies from economy to economy across the Bank's regions. Developing **well-functioning, liquid wholesale and retail** energy markets remains a challenge, as does instituting sector reforms that would facilitate the use of innovative technologies and business models (such as merchant or corporate power purchase agreement (PPA)-based projects). **Tariff reforms** that promote **cost-reflective pricing, eliminating subsidies for fossil fuels and other market-distortive policies**, would also enable more private-sector participation. Despite falling technology costs, a lack of liquid energy markets and transparent merchant price signals impact further growth in renewable energy.
Inclusive	Some EBRD economies have a significant number of workers employed in the coal, oil and gas sectors and need to develop **just transition plans and initiatives** to encourage the **reskilling, upskilling and redeployment** of affected workers. Moreover, the pace of green energy transition requires increasingly **new skills** and **human capital**, which have been identified as a key bottleneck in most EBRD economies. In parallel, vulnerable customers face affordability issues. These have been exacerbated by recent events such as the war on Ukraine and the rise in energy prices.
Resilient	Resilience to energy shocks and energy security are priorities given the ongoing energy crisis. Key transition challenges include **increasing energy supply diversification**, as well as ensuring the **reliable and uninterrupted supply** of vital energy services. Energy **network reliability and flexibility** remain a significant transition challenge and an important barrier to further renewable energy growth.
Integrated	A lack of regional cooperation and connectivity is an impediment to energy security, supply diversification and investment. In particular, this is an issue for the **small and illiquid energy markets** present in some of the economies where the EBRD operates. In other cases, while countries are large, connectivity between regions is very poor. This suggests a need for continued development of **cross-border and regional integration that supports energy trading**, as well as the **alignment of rules and regulations, market coupling and trade**.

1. For further details on the EBRD's transition qualities, please visit: http://www.ebrd.com/our-values/transition.html.

Energy Sector Strategy: An ambitious and holistic approach

European Bank
for Reconstruction and Development

Aim

The Bank will promote secure, affordable and sustainable energy through a transition to market-oriented, zero-carbon, resilient and inclusive energy systems, vital to the green development of the economies in which it operates

Deliver impact through different types of financing instrument by promoting well-functioning markets and market-based mechanisms, fostering policy dialogue and mobilising the private sector while collaborating with MDBs and other external partners on policy and investments for a systemic impact

Two-pronged strategic direction: stronger focus on larger-scale and faster energy transition in the EBRD regions

1 Accelerate the decarbonisation of energy

- Scale up renewable energy sources
- Upgrade and expand power networks and storage solutions to integrate renewable energy sources
- Promote zero-carbon fuels
- Phase out unabated fossil fuels

2 Deliver resilient, efficient and inclusive energy systems

- Promote well-functioning markets and resilient energy systems
- Enhance energy efficiency and productivity
- Set standards, build capacity and support an inclusive and just energy transition

Address key transition challenges. Interface with Bank-wide approaches, initiatives and policies, other sector strategies and country-specific characteristics.

2.1 Accelerate the decarbonisation of energy (1/2)

European Bank
for Reconstruction and Development

1

Accelerate the decarbonisation of energy

Targeted transition qualities

- Green
- Well governed
- Competitive
- Inclusive
- Resilient
- Integrated

Scale up renewable energy sources – from megawatts to gigawatts

- Invest directly in **utility-scale** and **distributed** renewable energy generation (including when coupled with storage), across all **well-established, emerging or less-established technologies** (for example, **offshore wind, floating solar, waste to energy**).
- Finance, through intermediary institutions, facilities that support renewable energy projects, such as **Green Economy Financing Facilities**, bonds, green bonds, GET-eligible transactions, equity funds and promote public-private partnerships.
- Use blended finance (combining loans with grants, concessional loans or guarantees (such as InvestEU)) to scale up renewables and support **innovative green technologies.**
- Pursue **holistic and well-sequenced policy engagements** to develop and **reform energy markets** and regulatory frameworks, considering **country-specific characteristics**:
  - low-carbon pathways for the power/energy sector as a key operational/policy framework to drive the energy transition
  - regulatory frameworks and support schemes for established and emerging technologies, covering small-scale and distributed renewable generation sources
  - competitive price discovery processes and mechanisms
  - improving the functioning of markets to facilitate arrangements allowing for the **uptake of renewable energy** by end users (for example, corporate power purchase agreements (PPAs), municipal PPAs, cross-border PPAs and self-consumption regulation).

Upgrade and expand power networks and storage solutions to integrate renewable energy sources

- Invest in modernising and expanding power networks (including transmission, distribution, microgrids) to facilitate electrification, integrate renewables, grow decentralised energy sources, foster energy efficiency and improve loss reduction.
- Promote policy engagement and financing that enable investment in energy storage, flexible/dispatchable generation sources, prosumers and demand response.
- Invest in the **digital transformation** and development of **digital skills** for the energy sector (smart grids, smart meters, the integration of electric vehicles (EVs), active participation in the energy markets of energy consumers/demand response).
- Invest in the expansion and upgrade of **network infrastructure**, including cross-border, to support the transportation of electricity and energy vectors and **regional energy systems integration**.
- Finance energy-storage solutions to leverage intermittent resources efficiently (for example, batteries, **pumped-storage hydroelectricity** and other storage technologies)
- Develop reforms, regulatory frameworks, market rules and regulations, and market platforms (energy exchanges) that promote well-functioning energy markets and support investment.
- Finance infrastructure for the increased **electrification of the economy** (for example, EV charging stations).

Promote zero-carbon fuels

- Assist countries and companies in developing **hydrogen strategies** and investments, where hydrogen is an essential part of green energy transition.
- Support the sustainable production, distribution, storage and supply of renewable fuels of biological origin (biogas/bio-ammonia and/or bio-methane) and non-biological origin (green hydrogen, with its derivatives), as well as **low-carbon hydrogen**.
- Support investments in downstream operations (gasoline stations) that facilitate exclusively the introduction and scaling up of **non-fossil-fuel transport** (biofuels, e-fuels, EV chargers and/or green hydrogen filling technology).

2.1 Accelerate the decarbonisation of energy (2/2)

European Bank
for Reconstruction and Development

1

Accelerate the decarbonisation of energy

Phase out unabated[1] fossil fuels

- The EBRD will invest increasingly rarely in fossil fuels, being guided throughout by a **holistic view of energy systems**. Accordingly,:
  - The Bank will not invest in thermal coal mining and coal-fired electricity generation.
  - The Bank will not invest in the upstream oil or gas sectors, where upstream means exploration, production, extraction or related services. Recognising the central importance of abating fugitive methane emissions as rapidly as possible, the Bank will continue to engage with its countries of operation to address this issue, including through the newly-established Global Flaring and Methane Reduction Partnership[2] and the Global Methane Pledge.
  - In exceptional cases, and subject to specific national circumstances, the Bank would consider targeted support for fossil-fuel investments in the mid and downstream oil and gas sectors. Such investments must not only be aligned with the goals of the Paris Agreement, but go beyond that requirement to demonstrate strong ambition to accelerate the low-carbon transition. These projects must demonstrate a **low risk of carbon lock-in**, **not displace renewable sources or low emissions alternatives**, use the Best Available Techniques, meet the **highest environmental and social standards**, and be subject to an assessment of physical and carbon transition risk.
  - See Annex D for detailed guidance on individual types of investment.

Targeted transition qualities

- Green
- Well governed
- Competitive
- Inclusive
- Resilient
- Integrated

- Furthermore, the Bank will engage in a number of activities to **accelerate the decarbonisation of energy**:
  - Extend assistance to develop country and corporate strategies for a **low-carbon transition**, including assistance to develop and implement just transition masterplans.
  - Support the decommissioning and environmental remediation of existing thermal coal, oil and gas assets and the switch to **less carbon-intensive electricity and heating sources**. The broader approach to strategic direction for heating sources, including renewable heating sources, such as heat pumps in buildings, and networks and district cooling, is covered in the Bank's Municipal and Environmental Infrastructure Strategy.
  - Promote impact financing instruments (bonds or loans) linked to **sustainability, environmental, social and governance (ESG) and decarbonisation** targets.
  - Explore opportunities for carbon capture, utilisation, transportation and storage (CCUS) where it is economically feasible and promotes decarbonisation goals.
  - Promote policies and support governments to accelerate the phase-out of unabated fossil fuels including developing pricing mechanisms for greenhouse gas (GHG) emissions; fossil-fuel subsidy reforms; and **methane reduction initiatives**[3].
  - Improve **corporate climate governance**, including the reporting and disclosure of emissions and carbon-related risks for high-emitting companies with significant carbon assets and the development of plans for decarbonisation.

[1] Abated fossil fuels means that either the asset should include solutions such as CCUS or low-carbon/renewable fuels from the outset, or the technology route is combined with a legally binding roadmap to include solutions such as CCUS or low-carbon/renewable fuels.
[2] World Bank-led multi-donor trust fund focused on ending routine gas flaring and reducing methane emissions in the oil and gas sector. [3] Country/corporate-level technical assistance, policy dialogue and investment towards reducing methane emissions.

2.2 Deliver resilient, efficient and inclusive energy systems

European Bank
for Reconstruction and Development

② **Deliver resilient, efficient and inclusive energy systems**

Targeted transition qualities

- Green
- Well governed
- Competitive
- Inclusive
- Resilient
- Integrated

Promote well-functioning markets and resilient energy systems

- Promote electricity market development and reforms through **capacity-building** and **technical assistance initiatives** for policymakers and regulators to improve the functioning of energy markets and the investment climate.
- Support greater **private-sector participation** through privatisation, facilitating models that increase private-sector participation (for example, public-private partnerships, concessions and service contracts) and strengthening regulatory frameworks to attract private-sector investment.
- Support energy market participants contributing to greater **liquidity and competitiveness** in the energy market (such as energy traders, energy aggregators or PPA platforms).
- Foster investment and policy engagement that enhance the **resilience of energy assets** to climate events and improve the management of climate, biodiversity and/or nature-related risks.

Enhance energy efficiency and productivity

- Facilitate improvements in **energy efficiency though investments**; support the modernisation, upscaling and repowering of existing facilities (modernising existing hydropower plants, repowering older renewable sites).
- Support energy-efficiency initiatives across all segments, including demand-side energy efficiency and financing to energy service companies and financial intermediaries that promote energy efficiency.

Set standards, build capacity and support an inclusive and just energy transition

- Support the adoption of practices, policies and standards that promote **inclusion and gender equality** in the energy sector.
- Engage with governments and energy utilities (including SOEs) to develop strategies that **foster an inclusive and just energy transition** away from the coal sector and the oil and gas sectors, addressing workforce challenges and providing alternative economic activities to affected regions.
- Help energy companies to improve ESG practices.
- Assist in the development of workforce management strategies that develop, retain and increase human capital.
- Reflecting the importance of SOEs and the successful experience of promoting transition through SOE reform, support the **commercialisation** and/or **restructuring of SOEs**, as well as initiatives to improve corporate governance and corporate climate governance standards, and adopt low-carbon transition strategies.
- Promote high standards and resilience in **clean-energy value chains**, a **level playing field, best international practices, competition** and **procurement practices in line with the EBRD's Procurement Policies and Rules.**
- The Bank will continue to consider funding for **safety improvements to operating plants**, as well as for radioactive waste management and the decommissioning of nuclear facilities. Recognising the role nuclear energy will play in the energy transition, we will continue to monitor developments in the nuclear sector and the needs of our countries of operation. Should any opportunities in line with the EBRD's private sector mandate emerge, we will revisit our current approach.
- Support access to clean energy services for all customers.

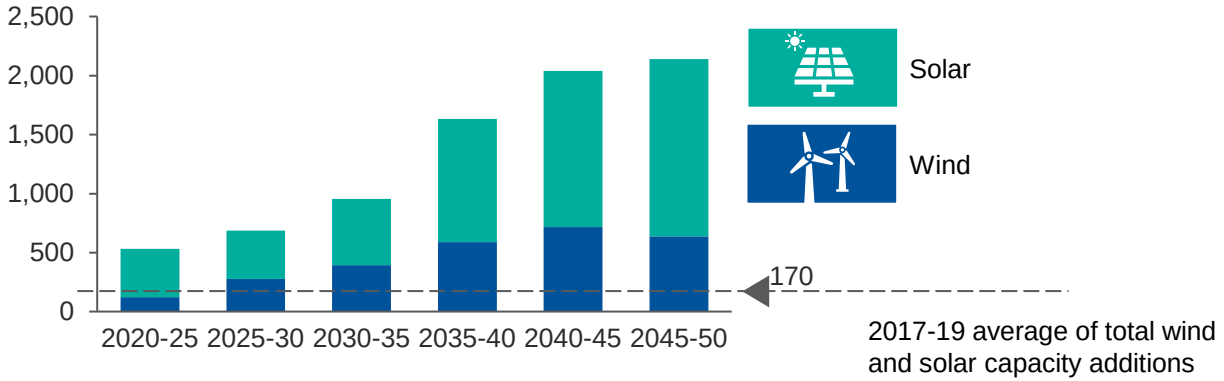
Section 3: Critical action areas

3.1 Scale up global annual renewable capacity 4-5x by 2030

European Bank
for Reconstruction and Development

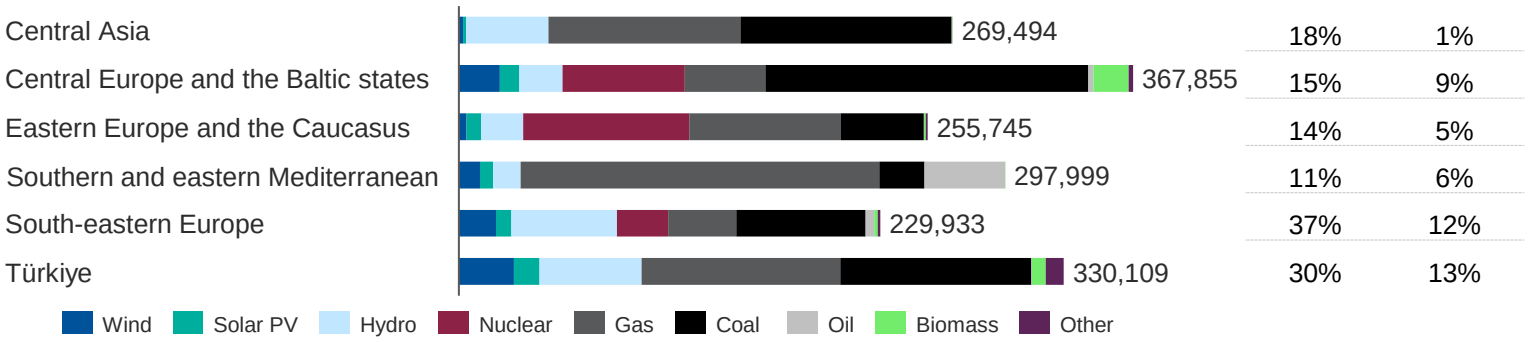
Average global installed capacity additions between 2025 and 2030 needed to reach 687 GW/year

Global annual installed capacity additions,[1] GW/year



Based on the current shares of renewable energy sources in their energy mixes, installed renewable energy capacity needs are high in the EBRD regions

Primary electricity supply in EBRD regions (GWh, 2021)

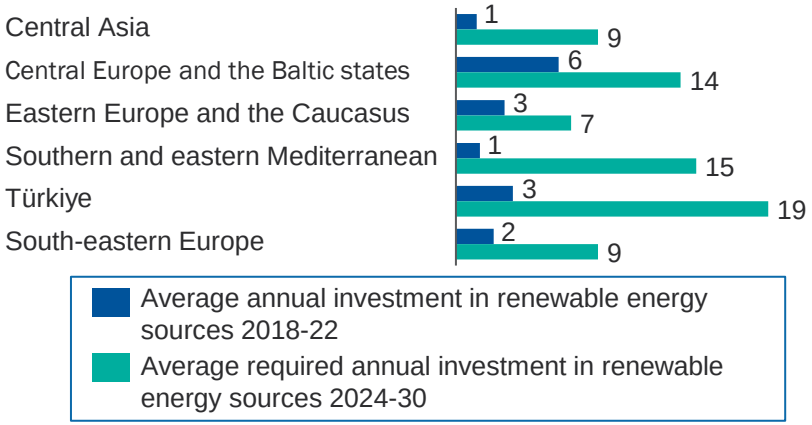


	% of renewables in energy mix incl. hydro	excl. hydro
Central Asia	18%	1%
Central Europe and the Baltic states	15%	9%
Eastern Europe and the Caucasus	14%	5%
Southern and eastern Mediterranean	11%	6%
South-eastern Europe	37%	12%
Türkiye	30%	13%

Renewable investment needs in the EBRD regions

Difference in annual renewable energy investments in the EBRD regions

US$ billion per year



Investments in rapid deployment would need to be supported by additional efforts to:

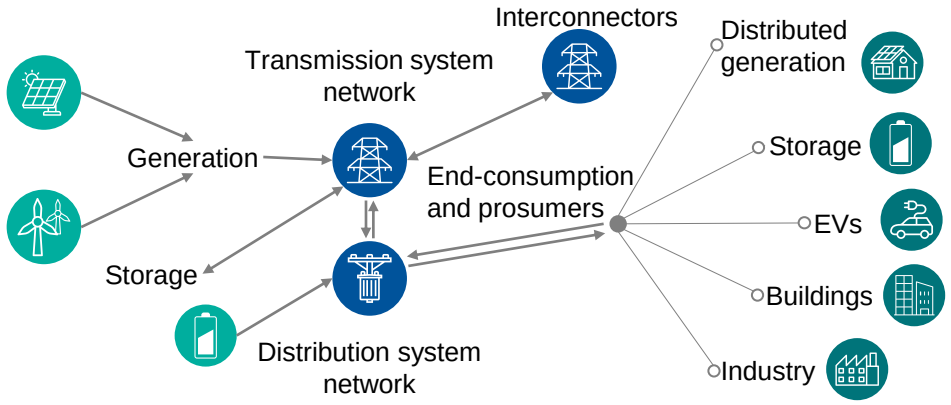
- improve the investment climate and regulatory frameworks to attract private investment
- improve power market design, such as, long-term contracts, corporate PPAs and competitive bidding processes for renewables
- accelerate planning and permitting approval processes
- develop sustainable and resilient supply chains
- provide a full range of financing instruments, including through the development of capital markets
- ensure sustainability and the protection of nature and biodiversity

Source: [1] Values are based on a 75% variable renewable energy sources scenario, assuming 32% solar and 43% wind generation in 2050. ETC (2021) *Making Clean Electrification Possible*; [2] BNEF data are used. No data are available for Cyprus, Kosovo, Montenegro and the West Bank and Gaza, so these data are not included in the analysis. BNEF (2022) *Global Installed Capacity*; [3] Renewable energy investments (including hydro) 2018-22 are provided by BNEF. Central Europe and Baltic States (CEB) and Eastern Europe and the Caucasus (EEC) have a relatively low increase due to the rapid recent ramp-up in renewable investments of US$ 2.67 billion in Ukraine in 2021 and of US$ 6.4 billion in Poland in 2021 and 2022. Excluding Poland from the CEB region, investments would have to increase sixfold, and excluding Ukraine in the EEC region, investments would have to increase fourfold. BNEF (2021) *New Energy Outlook*; IEA (2021) *Net Zero by 2050*; [4] ETC (2023), *Streamlining planning and permitting to accelerate wind and solar deployment.*

3.2 Upgrade and expand networks and storage solutions to integrate renewable energy sources

European Bank
for Reconstruction and Development

Upgrade, expand and digitalise networks in order to integrate variable renewable energy sources



Power network reinforcements:

- **Transmission:** Connecting high volumes of renewables, integration across networks, employing new technical capabilities
- **Distribution:** Digitalised, connected to new infrastructure (such as EV charging), bidirectional power flows
- **Microgrids**

Networks and storage account for 32% of all net-zero investments globally

- Investments in networks (accompanied by modernised systems operating procedures, tools and policies) must be frontloaded to ensure grid capacity constraints do not inhibit the growth of renewables.
- Regulatory reforms and the commercialisation of utilities, especially SOEs, are required to enable network investment.
- Advanced technologies are required to deliver enhanced capacity, reliability, flexibility and resilience in grids.
- Environmental and social effects, including the cumulative effects of renewable energy growth, need to be taken into account in the upgrading and expansion of networks.
- Market structures are needed to provide signals/incentives for storage investments and operating behavior, along with greater digitalisation and improved digital skills (for example, to support demand-side management).
- Different, multiple solutions will be needed to address daily, weekly and seasonal balancing challenges in integrating variable renewables (for example, batteries, demand-side management hydropower and other storage solutions).

→ *See Annex G for more on energy networks and Annex H for more on storage solutions.*

The nature of the intermittency challenge and associated solutions would be specific to each country, depending on system characteristics (for example, the availability of flexible sources, such as hydropower, the flexibility of demand – and the link with heating needs – and the level of regional interconnectedness).

Increased capacity for interconnectors and more regional integration, including common markets and rules, would enable large-scale projects, renewable energy exports and increase energy security.

The development of well-functioning markets, particularly, short-term markets, and well-developed regulatory frameworks that provide the right incentives for investments, would be critical to addressing the balancing challenge.

Source: [1] Thirty-two% determined by adding up the share of total capacity investment of "networks" and "storage and flexibility" in Exhibit 1 of ETC (2023), *Financing the transition*. All other general insights are based on analysis from ETC (2023), *Financing the transition,* ETC (2021), *Making clean electrification possible* and ETC (2020), *Making Mission Possible*.

3.3 Promote zero-carbon fuels

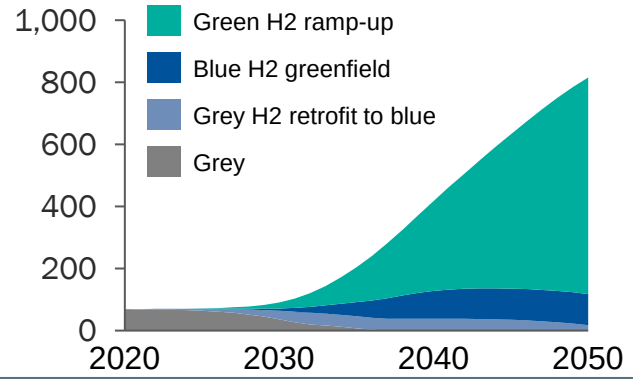
European Bank
for Reconstruction and Development

Scale up the production and use of zero-carbon fuels in order to decarbonise the economy

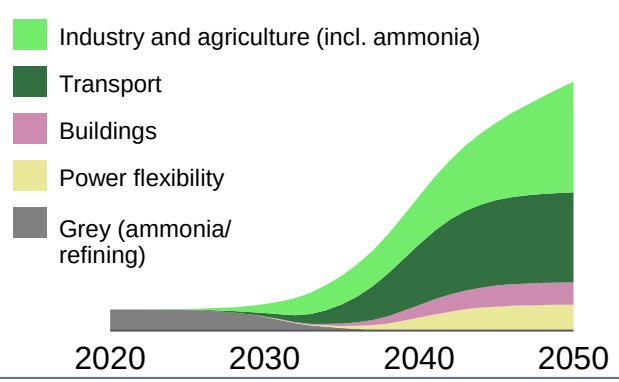
- Zero-carbon electricity will be the main source of energy in economies globally, requiring a scaling up of zero-carbon electricity production and the upgrade and expansion of grids.
- Some economic activities cannot be readily electrified and decarbonising them would require the use of different zero-carbon fuels and the development of technologies such as CCUS.
- Examples of low-carbon fuels include:
  - bioenergy, such as biogas, biomethane, biodiesel and others
  - synthetic fuels
  - low-carbon ammonia
  - low-carbon hydrogen.
- Hydrogen is expected to play a particularly important role in multiple sectors, both as an energy vector and as a feedstock.

Hydrogen is an important source of energy for many sectors (such as industry, transport); a 5-7x increase in green hydrogen production is needed to meet net-zero goals

Hydrogen supply, Mt hydrogen/year



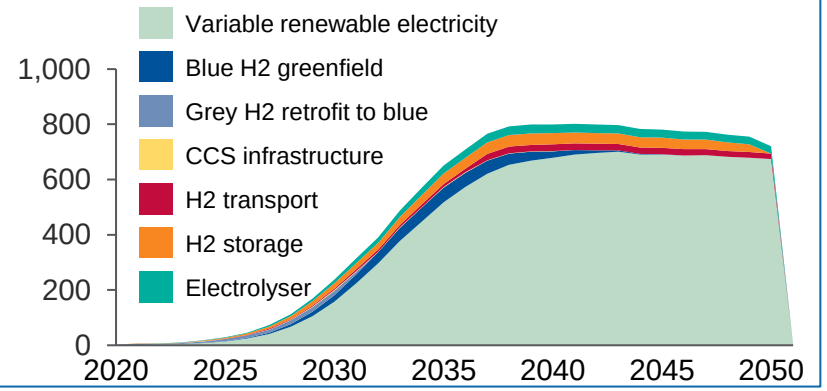
Hydrogen demand, Mt hydrogen/year



Investment is needed to rapidly scale up and lower the price of green hydrogen production

- Cumulative global investment needs are around US$ 15 trillion to 2030. Investments are dominated by renewable electricity production (about 85%).
- Early green hydrogen applications (pre-2030) are:
  - displacing current uses of grey hydrogen in ammonia production for fertiliser and hydrocracking in refineries
  - early steps in zero-carbon shipping fuels: ammonia and methanol.
- EBRD economies with high potential for producing renewable energy at low cost have the opportunity to produce and export low-cost green hydrogen or low-cost green hydrogen derivatives (such as ammonia, methanol).
- Investment in green hydrogen production would be in line with relevant policies for the protection and management of water resources.

Annual global investment need in the hydrogen economy (US$ billion)

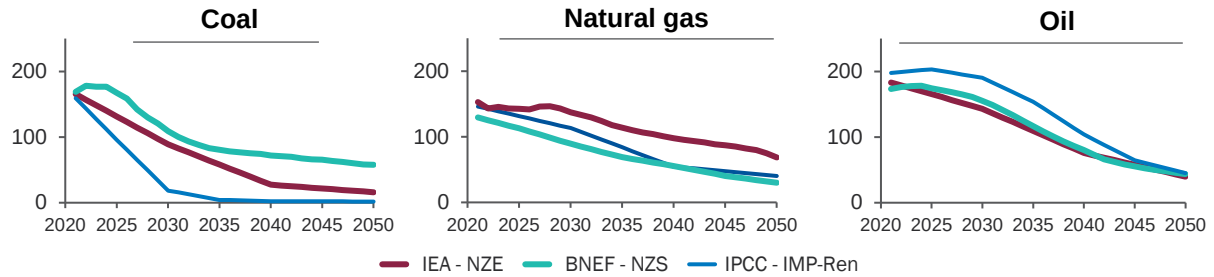


3.4 Phase out unabated fossil fuels and ensure a rapid exit from coal

European Bank
for Reconstruction and Development

The energy sector must undergo a transformation and shift away from its overwhelming reliance on unabated fossil fuels

Total global supply of fossil fuels in different net-zero scenarios (EJ)



- Fossil fuels account for nearly 80% of the global energy mix (26% coal, 23% natural gas and 29% oil).
- An accelerated phase-out of unabated fossil fuels is needed to meet climate goals.
- Different energy sources are likely to follow different trajectories.
- Coal use needs to fall sharply through the 2030s, with further declines thereafter. The pace of the exit from coal would be more rapid in developed countries.
- The phase-out of natural gas is more gradual (with relatively constant use through 2030s in some scenarios).
- Oil use declines steadily over time.

A changing role for fossil fuels – supporting the early peaking of emissions while ensuring energy security

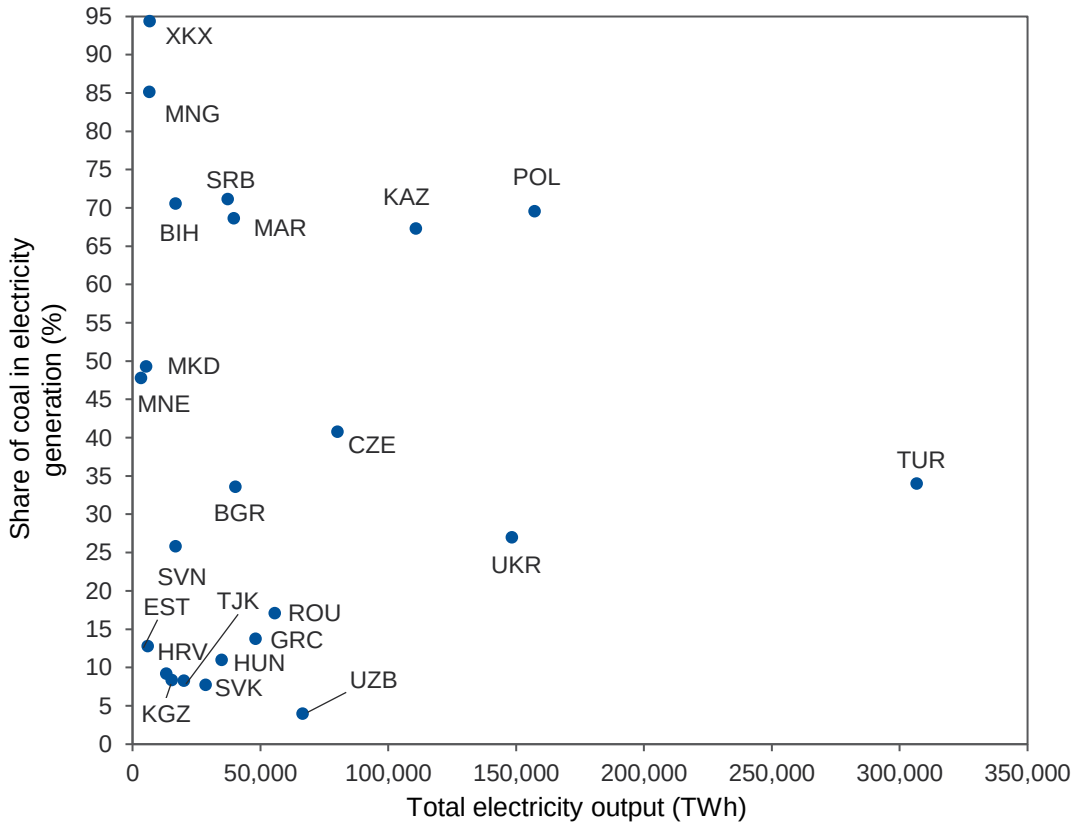
Potential areas for engagement with fossil fuels to accelerate the energy transition include:

- facilitating emissions peaking by switching away from more polluting sources
- accelerating the decarbonisation of existing fossil-fuel infrastructure
- providing flexibility and energy security in systems – for example, to address seasonal variations and/or prolonged shortfalls in wind and solar generation
- providing infrastructure for zero-carbon solutions in hard-to-abate sectors, for example zero-carbon fuels and carbon capture and storage (CCS) including CO2 transportation infrastructure.

When engaging with fossil fuels, the Bank considers how these actions can affect the security of energy systems

Eight EBRD economies have significant (more than 20%) reliance on coal for electricity generation, including four of the six largest electricity producers (Türkiye, Poland, Ukraine and Kazakhstan).

Coal dependence of EBRD economies, % 2020



→ *See Annex E for a discussion on actions for phasing out unabated fossil fuels.*

→ *See Annex F for a discussion on the outlook for generation in district heating.*

Source: [1] IEA (2022), *World Energy Outlook*; ETC analysis, IEA, BNEF, IPCC-IMP-REN **[2]** Countries with no coal use and/or electricity generation of less than 25,000 GWh are not listed. There is a similar dependence on coal for heat generation. **[3]** Copenhagen Economics (2017), *The future of fossil fuels: How to steer fossil-fuel use in a transition to a low-carbon energy system*; Blended Finance Taskforce, Stellenbosch University (2022), *Making Climate Capital work: Unlocking 8.5bn USD for South Africa's Just Energy Transition*.

The EBRD's approach to fossil-fuel investments: highly selective

European Bank
for Reconstruction and Development

The Bank will limit financing to fossil-fuel projects with a strong ambition to accelerate the low-carbon transition in specific country contexts and that are aligned with the goals of the Paris Agreement. The approach goes beyond a condition that the project simply be compatible with the goals of the Paris Agreement to ensure that it actively contributes to them. The approach recognises that, when carefully designed and assessed, selected investments in the fossil fuels sector can be essential for a low-carbon transition: first, to rapidly achieve an early peaking of emissions by reducing them in absolute terms; and second, to ensure energy security while accelerating the deployment of renewable energy.

Specific requirements for and/or limitations on investments in fossil-fuel projects

All fossil fuels

- be aligned with the goals of the Paris Agreement per the EBRD's Paris Agreement alignment methodology;[1]
- be consistent with NDCs and LTSs;
- demonstrate that they have a low risk of carbon lock-in and therefore do not lead to carbon lock-in;
- for projects with significant emissions, be subject to an economic viability test incorporating a shadow carbon price;
- be located in a policy context that demonstrates commitment to the goals of the Paris Agreement[2], and be consistent with this policy context;
- be aligned with a credible low-carbon pathway, either at a national or sectoral level, per the EBRD's Paris Agreement alignment methodology;
- not displace renewable sources or low emissions alternatives;
- be consistent with the Bank's Environmental and Social Policy (including requirements for using best available techniques); and
- demonstrate that they would not lead to stranded assets and therefore be subject to a thorough assessment of climate-financial risks.

or otherwise

- target exclusively the decommissioning of existing assets or repurposing for lower-carbon fuels.

See Annex D for further details of the criteria that apply to fossil-fuel investments (including additional criteria that apply to different parts of the fossil-fuel value chain)

Notes: [1] The Paris Agreement alignment methodology is subject to periodic review and may be revised in future. Any future, more stringent, revisions of the methodology will be reflected in the assessment of fossil-fuel projects (in addition to the application of these criteria). [2] Depending on the country and sector context, a commitment means combination of policy commitments (NDCs, NECPs, LTSs, emissions targets set at the level of a sector or country, targets for low-carbon technology deployment, etc.) that are consistent with the targets of achieving peak emissions as early as practically feasible and targeting net-zero emissions by 2050 or shortly thereafter.

3.5 Adapt energy assets to climate change

European Bank
for Reconstruction and Development

Climate change directly affects every segment of the electricity system, altering generation potential, transmission and distribution networks, and changing demand patterns

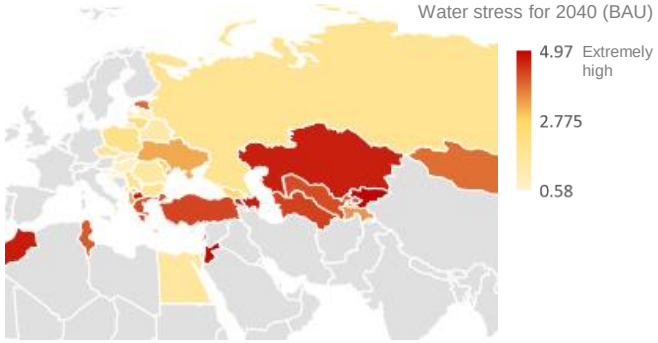
Impacts of climate change on the energy system

Climate impact	Generation	Transmission and distribution	Demand
Rising global temperatures	• Cooling efficiency • Need for additional generation • Generation potential	• Efficiency	• Cooling and heating
Changing precipitation patterns	• Output and potential • Peak and variability • Technology application	• Physical risks	• Cooling • Water supply
Sea-level rise	• Output • Physical risks • New asset development	• Physical risks • New asset development	• Water supply
Extreme weather events	• Physical risks • Efficiency	• Physical risks • Efficiency	• Cooling • Heating

Resilient energy systems will generate more benefits than costs

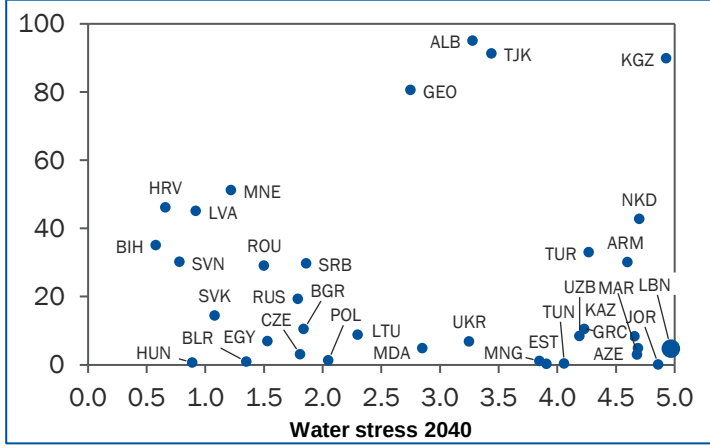
A climate-resilient energy system that can anticipate, absorb and recover from climate hazards could prevent negative effects spreading across the energy value chain. For example, the IEA estimates that the net benefits of investing in resilience against floods could reach almost US$ 1 trillion to 2050.

Hydropower, a major source of renewable energy globally, is under threat from water stress and ageing infrastructure



- Climate change is expected to make some areas drier and others wetter. Some regions, including EBRD economies, are already experiencing a decrease in hydropower generation.
- Almost 40% (476 GW) of the global fleet is at least 40 years old (the average age is 32).

Hydropower is an important source of electricity in some economies where the EBRD operates, some of which are highly exposed to water stress



- About 40% of EBRD economies rely on hydropower for more than 20% of their electricity generation.
- Several EBRD economies, including Albania, Armenia, Georgia, the Kyrgyz Republic, North Macedonia, Tajikistan, and Türkiye are highly dependent on hydropower and are in areas expected to have high levels of water stress.

Source: WRI, World's Most water-stressed countries in 2040; BP Statistical Review of World Energy 2021, Systemiq.

3.6 Increase energy efficiency and productivity to reduce energy demand by about 30% by 2050

European Bank
for Reconstruction and Development

Improving energy efficiency and productivity offers multiple, attainable benefits and could cut final energy consumption by 30% globally

Energy productivity is defined as less energy being used while maintaining (or improving) living standards

Energy efficiency: More efficient equipment and production processes (such as the reuse of waste heat, reduced flaring and grid losses).

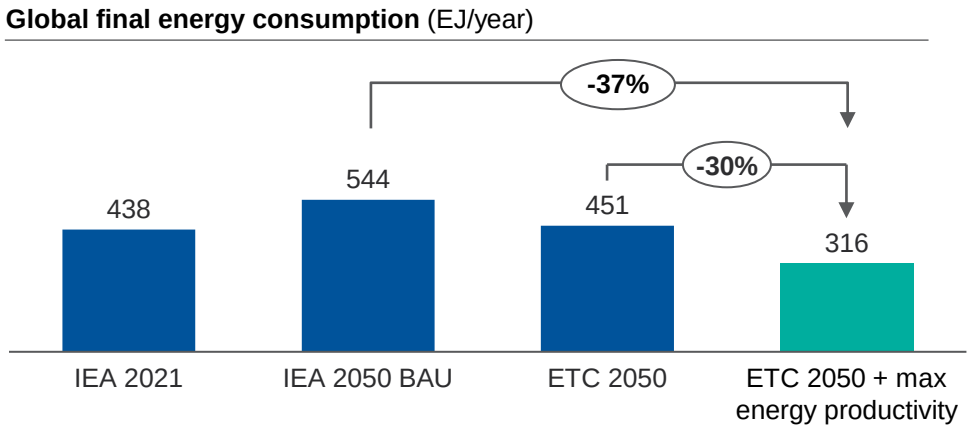
A number of EBRD countries in Central Asia and eastern Europe have higher energy intensity than the world average.

Rapid investment is required to improve energy efficiency across all segments including, buildings and SMEs and working closely with the municipal sector.

Material efficiency/circular economy: Less primary material input required to deliver the same level of energy-based services (such as repowering older renewable sites, energy supply solutions with recycled content).

Service efficiency: Better utilisation of products and services to achieve the same living standard (such as reducing water/heating consumption in housing including through smart meters).

Energy demand could decrease by 37% from a business-as-usual (BAU) scenario and 30% from the ETC 2050 scenario.



3.7 Manage an inclusive and just energy transition

European Bank
for Reconstruction and Development

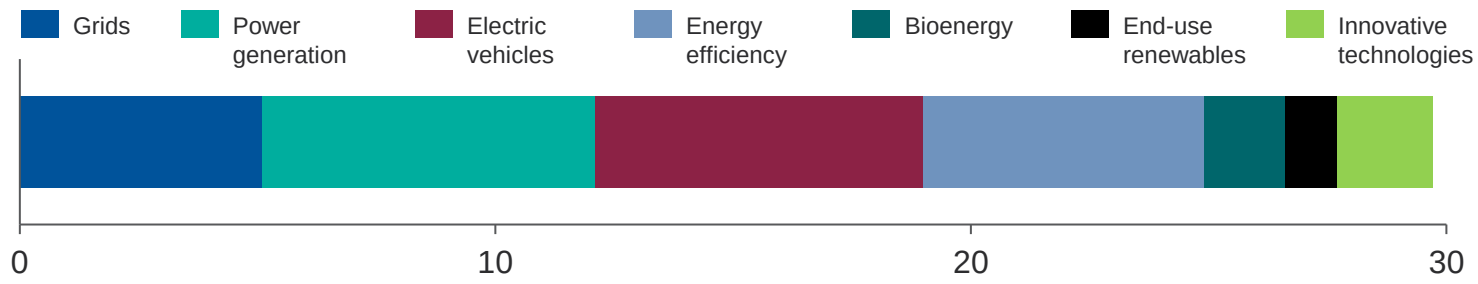
Accelerating the energy transition requires new skills and an employment shift from fossil-based jobs to clean energy jobs

- **An estimated 1.1 million jobs are directly or indirectly linked to activities** in coal-fired power plants and coal mines in the EBRD regions.
- Employment impacts on the energy transition also extend to the oil and gas sectors.
- **Just transition funds and initiatives** are key to supporting coal, oil and gas sector workers' early retirement, retraining and redeployment, thereby enabling a faster energy transition.

The scale-up of renewables and other energy transition-related technologies would unleash economic opportunities

- Fostering green skills development for local workers would be key to unlocking the jobs potential of renewables and other clean energy solutions.
- Globally, the net zero transition would create an estimated 30 million new jobs by 2030, including 14 million jobs in renewables and grids.

Net zero emission jobs by sector (2030), millions



Action areas for promoting equality of opportunity

Access: Energy provision is crucial to enabling economic participation.

Human capital development: Skills for energy professionals should reflect the demand for delivering and operating cleaner and smarter energy systems.

Workforce management: Forward-looking workforce management can support the intergenerational transfer of skills alongside system updates.

Workforce diversity: Improvements in human resources policies and practices can both develop talent pools and close gender gaps.

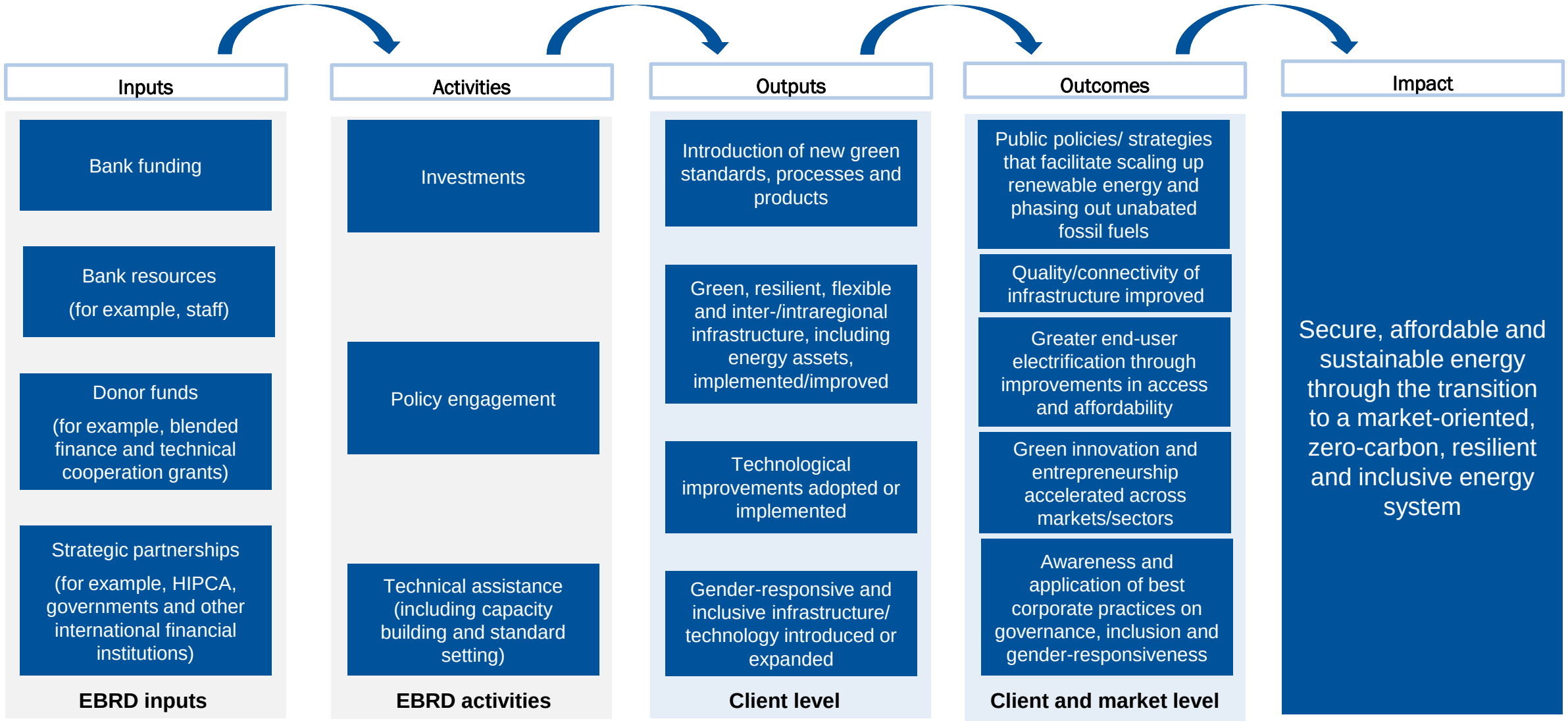
Local renewable energy ecosystems: Local growth and social acceptance can be fostered by engaging communities and stimulating participation.

Just transition and regional development: The green energy transition should leave no one behind and increase economic diversification opportunities.

Section 4: Measuring results

4.1 Results monitoring: Theory of change

European Bank
for Reconstruction and Development



4.2 Performance monitoring framework

European Bank
for Reconstruction and Development

Specific strategic objectives	Tracking indicators		Context indicators
	Outputs	**Outcomes** (for relevant countries tracked in country strategies)	**Impact**
1. Accelerate the decarbonisation of energy	• Volume of investments supporting new/improved renewable energy infrastructure • Volume of investments supporting resource-efficient infrastructure (for example, the use of cleaner power generation, such as network expansion, charging infrastructure, flexible sources and supporting supply-side energy efficiency) • Number of clients with improved environmental or energy management standards • Number of policy dialogues to promote an enabling environment for renewable energy investments (for example, private-sector participation, market-based solutions, sector unbundling) • Number of recommended strategies or regulatory standards agreed by stakeholders for the use of cleaner fuels	• CO_2e emissions avoided from renewable energy • CO_2e emissions reduced from cleaner power generation • Number of legal/regulatory/institutional frameworks improved in the area of renewable energy, including competitive procurement schemes and network integration • Renewable energy capacity installed (MW) • Renewable energy – electricity produced (MWh/year)	• Share of coal in electricity generation • Share of natural gas in electricity generation • Share of intermittent solar and wind in electricity generation • Share of renewables in electricity generation
2. Deliver resilient, efficient and inclusive energy systems	• Number of clients approving climate corporate governance development plans, corporate governance action plans and corporate climate governance action plans • Number of clients with improved practices in the area of climate change adaptation • Number of clients introducing new/updated digital technologies or products for renewable energy generation or energy efficiency • Number of operations expanding access of infrastructure across regions/borders • Number of clients engaging in dialogue or capacity-building activities to foster the development of energy markets and integration into regional markets (electricity and gas infrastructure, private-sector participation) or supporting supply-side energy efficiency (including strategies for cleaner fuels) • Number of operations expanding access to infrastructure for underserved groups • Number of private sector clients participating in the competitive markets • Number of clients approving gender action plans • Number of women receiving training or mentoring services	• Number of clients with improved climate corporate governance • Number of clients with improved operational performance • Number of legal/regulatory/institutional frameworks improved for the development of well-functioning energy markets, including carbon markets (third-party access, unbundling, cost-reflective pricing, market reforms) • Number of SOE commercialisations/restructurings • Competitive and resilient markets, low barriers for entry and level playing field • Net increase in regional/cross-border energy infrastructure capacity • Number of individuals (local population) with improved access to electricity • Number of clients implementing gender action plans • Number of women enhancing their skills as a result of training	• Energy intensity of economy in energy/GDP at purchasing power parity • Emissions intensity of energy production in CO_2/total energy supply (TES) • Energy CO_2 emissions per unit of GDP • Energy CO_2 emissions per capita

Section 5: Annexes

Annexes

European Bank
for Reconstruction and Development

Annex A: Acronyms and abbreviations

Annex B: Implementation of the previous strategy

I. Snapshot of energy activities from the previous strategy period (2019-23)
II. Landmark transactions, policy engagement and capacity-building initiatives
III. Lessons informing the 2024-28 strategy

Annex C: Sector context

Annex D: Approach to climate goals

I. Climate ambition and related assessments at the EBRD
II. Climate assessments to promote the EBRD's climate ambition
III. The EBRD's approach to fossil-fuel investments

Annex E: Phasing out unabated fossil fuels

Annex F: Fossil fuel-based district heating generation

Annex G: Energy networks

Annex H: Energy storage solutions

Annex I: Digitalisation in the energy sector

Annex J: Gender and economic inclusion in the energy sector

Annex K: United Nations Sustainable Development Goals

Annex L: The Environmental and Social Policy and the Energy Sector Strategy

Annex M: Links to EBRD country strategies

Annex N: Supporting energy sector transition through partner financial intermediaries

Annex O: Context indicators

Annex P: Collaboration with development partners in the energy sector

Annex A: Acronyms and abbreviations

European Bank
for Reconstruction and Development

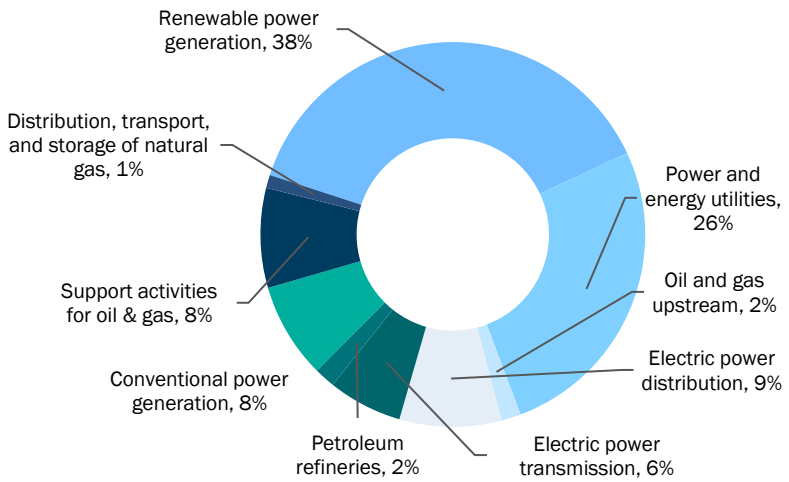
ABI – Annual Bank Investment
BAU – business as usual
CCS – carbon capture and storage
CCUS – carbon capture, utilisation and storage
CESEC - Central and South Eastern Europe energy connectivity
CO_2 – carbon dioxide
CO_2e – carbon dioxide equivalent
EBRD – European Bank for Reconstruction and Development
EJ – exajoule
ESG – environmental, social and governance
ESP – Environmental and Social Policy
ETC – Energy Transitions Commission
EU – European Union
EV – electric vehicle
GDP – gross domestic product
GEFF – Green Economy Financing Facility
GET – Green Economy Transition
GHG – greenhouse gas
GW – gigawatt
H_2 – hydrogen
Hydro – hydropower/hydroelectric power
HIPCA – High-Impact Partnership on Climate Action
Hydro – hydropower/hydroelectric power
IEA – International Energy Agency
LTSs – long-term, low-emission development strategies
MDB – multilateral development bank
MJ - megajoule
MW – megawatt
NDCs – nationally determined contributions
NZE – net zero emissions by 2050 scenario
PCI – Projects of Common Interest
PECI – Projects of Energy Community Interest
PMI – Projects of Mutual Interest
PPA – power purchase agreement
PPP – purchasing power parity
PV – photovoltaic
RE – renewable energy
RES – renewable energy sources
SDG – Sustainable Development Goal
SOE – state-owned enterprise
TCFD - Task Force on Climate-related Financial Disclosures
TES – total energy supply
TI – Transition Impact
TJ – terajoule
TWh – terawatt-hour
V2G – vehicle to grid

Annex B (I): Snapshot of energy activities from the previous strategy period (2019-23)[1]

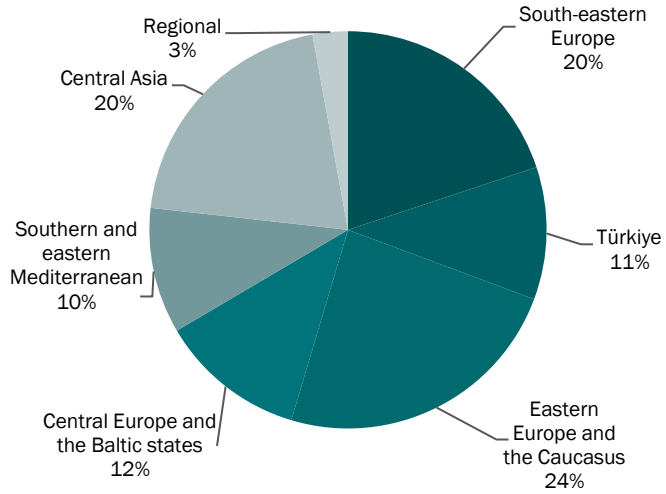
European Bank
for Reconstruction and Development

176 Number of projects	€9.1 billion Cumulative investments
74% Private-sector projects	>21,700 (kt/y) CO_2e reduction[2]
78% GET-related projects[3]	>15 GW Power generation capacity
	of which **11.8** GW of renewables

Investments by sub-sector



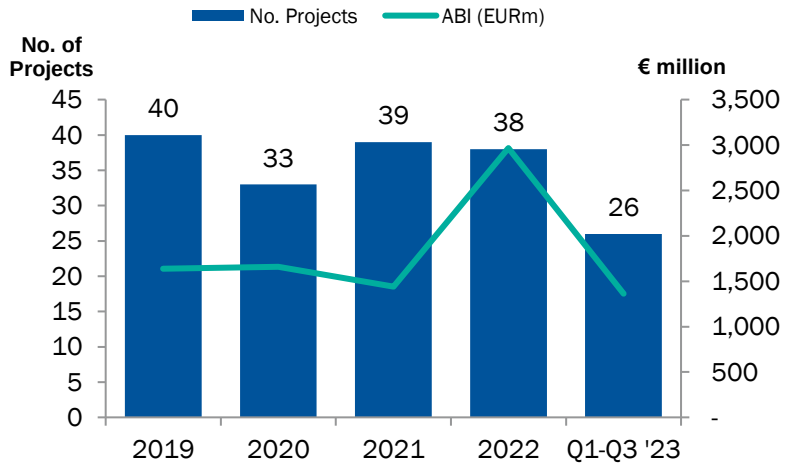
Investments by region



Operational highlights

- One hundred and sixteen operations contributed to a cumulative expected annual emissions reduction of more than 21,700 kt CO_2e/year. The countries with projects expected to deliver the greatest reductions include Kazakhstan, Uzbekistan, Poland, Egypt, Greece and Türkiye.
- One hundred and six renewable energy projects delivered nearly 12 GW of capacity. Wind was the largest technology financed by capacity (led by investments in Uzbekistan, Poland, Egypt, Ukraine and Türkiye).
- One hundred and thirty one operations contributed to more widespread private ownership, notably multiple private-sector renewable energy projects (including in Poland, Ukraine, Uzbekistan, Egypt, Türkiye and Kazakhstan).
- One hundred and two operations contributed to primary energy savings of over 138,000 TJ per year. Operations in Uzbekistan, Egypt, Türkiye, Poland and Greece were the major contributors.
- The Bank financed one hundred and twenty five GEFFs indirectly supporting the installation of a further 243 MW of renewable energy capacity.[4]
- Only two capex-related fossil-fuel projects, financed by the Bank, since July 2021,[5] representing 2.3% of the total number of energy sector projects.

Investments and number of projects



[1] The snapshot covers the period from 1 January 2019 to 30 September 2023. [2] Does not include CO_2 emission reductions from gas power generation projects. [3] Number of GET projects over total number of projects 2019 – Sept 2023. [4] GEFFs are not included in the above figures or graphs. [5] In July 2021, the EBRD's Board of Governors adopted Resolution No. 239 on EBRD Climate Ambition. The Resolution stated that "All EBRD activities shall be fully aligned with the goals of the Paris Agreement no later than 31 December 2022" and noted that "the Bank will step up investment in renewable energy and associated energy systems and will further narrow and limit fossil-fuel financing to projects meeting a strong ambition to accelerate the low-carbon transition in specific country contexts".

Annex B (II): Landmark transactions, policy engagement and capacity-building initiatives (1/2)

European Bank
for Reconstruction and Development








Landmark renewable energy investments

- In Uzbekistan, the EBRD financed wind capacity of 1.5 GW in 2022, including **its largest onshore renewable energy project to date**, the 1 GW Bash and Dzhankeldy Windfarm.
- In Poland, the Bank financed the development of a 1.2 GW Baltic Power offshore windfarm. It is the **first offshore windfarm** developed and financed in the EBRD regions. Once operational, the project would provide **clean energy to more than 1.5 million households**.
- The EBRD financed the development of the 38 MW Szymankowo Windfarm in northern Poland, the **first fully merchant wind energy project financing** in the Bank's regions.
- The EBRD's US$ 80 million equity bridge loan to Egypt Green supported the development of a 100 MW electrolyser facility as the first component of an integrated hydrogen production facility powered by renewables. The project is **Africa's first large-scale green hydrogen production facility** and is due to deliver up to 15,000 tonnes of green hydrogen annually. With support from the EBRD, the government of Egypt launched the **Nexus on Water, Food and Energy (NWFE) initiative's energy pillar**, which includes building 10 GW of renewables, decommissioning 5 GW of inefficient thermal capacity and strengthening the grid.
- The EBRD provided financing for two windfarms in Croatia with total capacity of 111 MW. The project was the **first corporate PPA/merchant project in Croatia** and **the first renewables project financing to feature a bank guarantee for the benefit of the merchant electricity offtaker** in the EBRD regions.

Policy engagements to foster renewables and private investment

- The EBRD's ambitious **renewable energy auctions** programme spans 14 countries and has led to more than €2.5 billion in investments and 2.5 GW of clean energy.
- The EBRD supported the Ministry of Environment and Energy of Greece in developing Greece's **offshore wind framework**, comprising a high-level plan and new law on the development of offshore wind power, targeting 2 GW of offshore wind by 2030.
- **Low-carbon pathways:** The EBRD and the government of Uzbekistan developed a long-term decarbonisation strategy to support the achievement of a carbon-neutral power sector by 2050. The EBRD is also working with the government of Kazakhstan on a low-carbon pathway and national long-term strategy to achieve carbon neutrality in the country's power sector by 2060. Overall, the EBRD has financed 3.7GW of renewable energy in Central Asia to date.

Promoting the switch to cleaner generation sources – largest CO_2 reduction projects

- Under the EBRD Green Cities programme in Almaty, Kazakhstan, the Bank supported the **modernisation and coal-to-gas switch of an existing combined heat and power plant**, which would reduce CO_2 emissions by nearly 3 million tonnes overall and, crucially, improve the city's air quality.

Annex B (II): Landmark transactions, policy engagement and capacity-building initiatives (2/2)

European Bank
for Reconstruction and Development

Supporting corporatisation and the privatisation of SOEs

- The EBRD invested €75 million in a series of sustainability-linked bond (SLB) issues by Greece's largest electricity generator and supplier, PPC – **the first SLB in the Bank's regions**. The issue included the ambitious sustainable performance target of reducing CO_2 emissions by 57% by the end of 2023. Subsequently, the EBRD invested €75 million in PPC's share-capital increase, aimed at reducing the state's holding in the company. The EBRD became the **largest minority shareholder in Lithuania's Ignitis Group**, a leading utility and renewable energy company, with an investment of €67.5 million, corresponding to 15% of the €450 million initial public offering (IPO). The IPO underscored the successful raising of capital by SOEs via the stock exchange and was, at the time, the largest IPO in the Baltic States.

Crisis response

- The EBRD provided a financing package of €370 million to **Ukraine's electricity transmission company, Ukrenergo,** to enable it to make emergency repairs to civilian power infrastructure damaged by heavy bombing during Russia's war on Ukraine and to keep the country's energy system operational and stable. The package comprises an EBRD sovereign guaranteed loan of €300 million and a grant of up to €70.6 million provided by the Netherlands. The EBRD previously repurposed a €147.2 million infrastructure loan to Ukrenergo as emergency liquidity funding.

- The EBRD extended a revolving three-year €300 million loan to Moldova to **boost its energy security** by contracting emergency gas supplies in case of disruption to the supply currently provided by Russia through Ukraine under an existing five-year contract and the creation of a strategic gas reserve to avoid seasonal gas spikes.

Promoting the digitalisation and modernisation of grids

- The EBRD provided a US$ 110 million loan in Turkish lira to Enerjisa Enerji in 2021 to **upgrade its network and reduce CO_2 emissions by more than 30,000 tonnes annually.** This upgrade introduces smart metering, smart grid systems and digitalisation of the network to improve the reliability of the power supply and integrate renewables. Enerjisa supplies electricity to nearly a quarter of Türkiye's population.

- The EBRD extended a €40 million loan in Romanian leu (RON) to Distributie Energie Electrica Romania SA, the electricity distribution subsidiary of Romania's Electrica Group, to significantly improve the network's reliability, reduce grid losses, introduce smart meters and other digital transformation measures, and to integrate renewables, **saving about 67,100 tonnes of CO_2e a year**.

Annex B (III): Lessons informing the 2024-28 strategy

European Bank
for Reconstruction and Development

2019-23 project-level experience

- Strong and competent regulatory authorities are critical to ensure broad and sustainable impact in the sector.
- Fundamental regulatory reforms take time and the wider context should be considered when setting implementation deadlines for reforms.
- Good-quality sponsors with sufficient liquidity, capable of supporting the project at least until full completion, are critical to project finance transactions in difficult investment environments.

Key findings of thematic evaluations

- Rapid growth in solar power requires support to expand the capacity of power systems. The timing of grid investment is critical to unlocking renewable energy growth.
- Provide greater clarity on operational priorities and the scope of the Bank's intended operations in the hydrocarbons sector. Identify an approach that takes into account the Bank's multiple transition objectives.
- Scaling up renewables in low income countries may be affected by higher cost of capital requirements and capex, particularly in markets where commercial banks are facing regulatory and/or capital constraints.
- Competitive procurement can deliver renewables at very low prices and provide more sustainable incentives to investors.

Lessons learned for the 2024-28 strategy

- Promote capacity building and provide technical assistance to regulators and policymakers.
- Employ a gradual and phased approach when designing comprehensive regulatory initiatives to ensure a smooth transition from one regulatory regime to another.
- Strong financial incentives and regulatory/tariff certainty are critical in order to attract good-quality sponsors.

- Deliver flexible, secure and resilient energy assets and expand networks, including investments in smart grids and demand side management.
- Targeted support to fossil-fuel investments when they play a role in accelerating decarbonisation.
- There is a need for blended financing (loans plus grants or concessional[1] loans), particularly in early transition countries.
- Promote support schemes and the design of competitive auctions.

Annex C: Sector context (1/3)

European Bank
for Reconstruction and Development

Countries are rolling out their national climate mitigation and adaptation plans in alignment with Paris Agreement commitments

- Countries and regions accounting for more than 98% of anthropogenic emissions have ratified or acceded to the Paris Agreement.
- The Paris Agreement has widespread support among the EBRD's shareholders and has been signed by all but one of the economies in which the Bank operates.
- The EBRD has committed to aligning all of its activities with the Paris Agreement from the start of 2023.

Industrial policy actions are already driving investments in the energy transition

- Recent national and regional policies include: the European Green Deal, REPowerEU, the Net Zero Industrial Plan, the European Union's (EU) Carbon Border Adjustment Mechanism, the US Inflation Reduction Act and the EU Hydrogen Strategy.
- These policies directly and indirectly affect a number of economies in which the EBRD invests.

ESG and other recent policy actions are already driving energy transition investments, cost-curve declines and accelerating the adoption of key technologies

Investors are prioritising ESG factors:

- Mandatory ESG reporting is becoming a requirement in EU countries and others.
- A greater focus on climate risks and disclosure (for example, mandatory reporting under the Corporate Sustainability Reporting Directive (CSRD) in the EU and the Taskforce on Climate-related Financial Disclosures (TCFD).

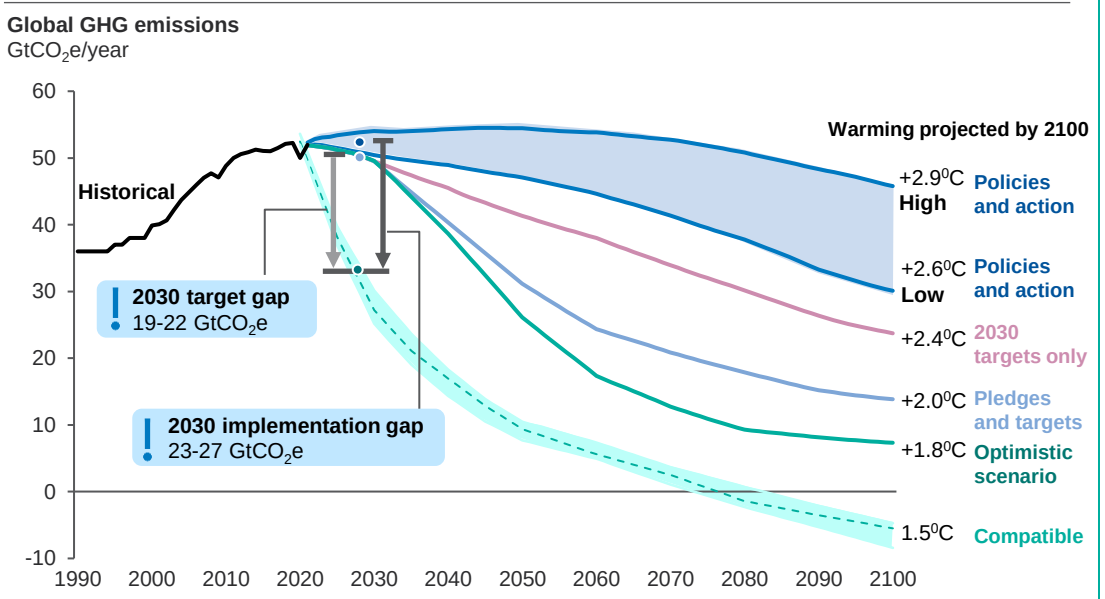
However, greater action is needed to remain within the 1.5°C target

Keeping the 1.5˚C goal attainable requires major transformation:[1]

- **Emissions must peak** to fall rapidly in the 2020s so that annual emissions are approximately halved by 2030.
- **Emissions need to reach net zero by mid-century** without exceeding the carbon budget.

In addition to urgently reducing emissions, the energy system needs to adapt to the effects of climate change

Emissions and expected warming based on pledges and current policies[2]



Annex C: Sector context (2/3)

European Bank
for Reconstruction and Development

Several forces are shaping the sector …

- **European energy crisis**
- **War on Ukraine**
- **Severe weather and natural hazards**
- **Covid-19**
- **Disruptions to the supply of key components and raw materials**

… leading to volatility in energy prices and disruptions in the supply of renewable energy technologies, affecting energy security, affordability and the deployment of renewables

Price volatility, including high energy prices, puts affordability pressure on end users and creates liquidity struggles for many utilities. This is a large contributor to high inflation and has ripple effects throughout the economy. It impacts the investment climate and puts at risk green energy investments and/or has the potential to reverse energy sector reforms.

Energy security – The use of energy supply for geopolitical leverage has raised the risk of supply disruptions for many of the economies in the EBRD regions. Countries that are net energy importers are exposed to high costs and need to find new energy supply sources and routes.

Severe supply disruptions have led to rises in the price of solar photovoltaic (PV), wind and battery technologies after a long period of falling prices.

Greater momentum is needed to accelerate the energy transition, strengthen energy security and address affordability

- Increased investment in energy efficiency
- Impetus for investment in competitive solar and wind
- Investment in the upgrade and expansion of power grids and interregional linkages
- Accelerated investment in hydrogen production, delivery and storage

Investment to support energy security and the diversification of energy supplies

Investment to support energy assets in adapting to climate hazards

Significant policy response to address affordability, rethink market design and promote good governance and a sound investment climate

Policy focus on clean energy manufacturing, critical raw materials and sustainable supply chains

Source: All insights on this slide are based on EBRD internal analysis and ETC (2022) *Building Energy Security through accelerated energy transition*; icons created by Adrien Coquet and Silvia Ojog from the Noun Project

Annex C: Sector context (3/3)

European Bank
for Reconstruction and Development

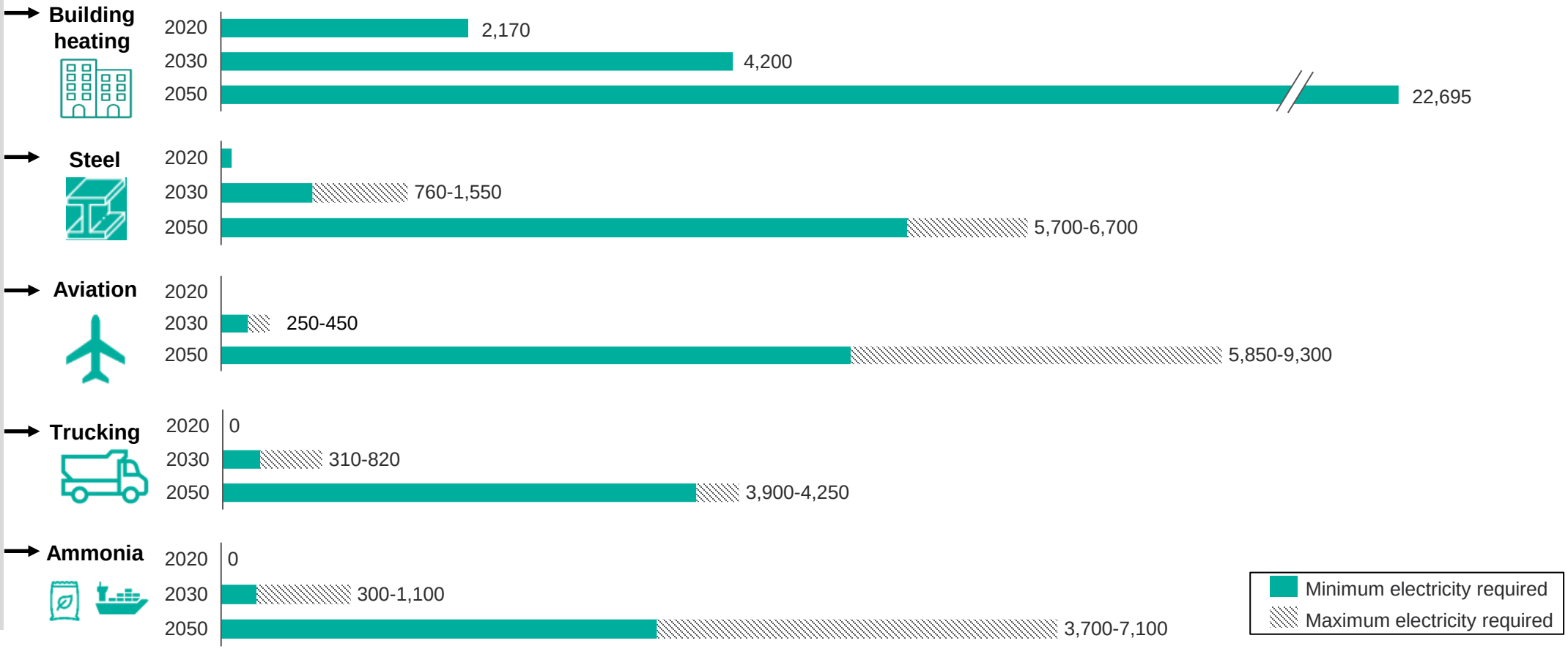
Greater access to cheap renewable energy …

- In 2021, solar and wind were the cheapest sources of new power in countries accounting for 90% of electricity generation
- The clear cost competitiveness of renewables has led to a large ramp up in deployment, with solar and wind accounting for more than 75% of total new capacity additions globally last year

… is having a cascading effect on the deployment of other technologies:

The increase in availability of low-cost renewable energy sources (in combination with other enablers and innovations) has a positive effect on other techno-economic tipping points, unlocking other net-zero solutions and innovations.

Sectoral electricity demand across net zero-consistent scenario pathways for five illustrative sectors (TWh/year)[4]



Annex D (I): Climate ambition and related assessments at the EBRD

European Bank
for Reconstruction and Development

The EBRD and climate action

- Climate change is the result of critical market failures. Addressing climate change, therefore, is reflected in the EBRD's mandate to promote the transition to market-based economies and its commitment "to promote in the full range of its activities environmentally sound and sustainable development".[1]
- Climate action is reflected in a number of the Bank's institutional commitments, strategies, policies and approaches. Notable examples include:
  - The EBRD's SCF, which sets out the EBRD's strategic aspirations for 2021 to 2025 and which identifies "supporting transition to a green, low-carbon economy" as one of three crosscutting strategic themes. The SCF also reaffirms the Bank's goal to reach an annual green finance ratio of at least 50% by 2025 - a commitment initially made in the Bank's Green Economy Transition (GET) approach.
  - Since the start of 2023, all of the Bank's activities have been aligned with the goals of the Paris Agreement, reflecting an institutional commitment made by the Bank's Board of Governors at the EBRD's 2021 Annual Meeting.

Climate assessments

- To reflect climate action in projects, the EBRD has introduced a number of climate assessments for individual projects.
  - Key assessments applied to all projects are:
    - environmental and social due diligence, reflecting the provisions of the Environmental and Social Policy
    - Paris Agreement alignment assessment
    - climate-related financial risk assessment.
  - In addition, the Bank has implemented an internal architecture that promotes the delivery of green financing. Key elements of this architecture are:
    - GET finance: the attribution of green financing, in line with a detailed methodology that has been developed over time
    - green transition impact assessment under the Bank's assessment of the transition of a project; green is one of the six transition qualities the Bank uses.
- A summary of these assessments is provided in Annex D (II).
- **As with all EBRD investments, all fossil-fuel projects are subject to these assessments. In addition, all fossil-fuel projects are subject to the additional criteria presented in Annex D (III).**

[1] Article 2.1(vii) of the Agreement Establishing the EBRD.

Annex D (II): Climate assessments to promote the EBRD's climate ambition

European Bank
for Reconstruction and Development

A summary of the different climate-related assessments used by the EBRD. As with all EBRD investments, all fossil-fuel projects are subject to these assessments. In addition, all fossil-fuel projects are also subject to the additional criteria presented in Annex D (III).

	1 Applied to all projects			2 Promoting green transition through projects	
	Environmental and social due diligence	**Paris Agreement alignment**	**Climate-related financial risk**	**Green (GET) finance**	**Green transition impact**
WHY	The EBRD is committed to promoting "environmentally sound and sustainable development" in the full range of its activities	The Paris Agreement is the international treaty on tackling climate change and is supported by all economies in which the Bank operates and by its shareholders	Information on the financial impacts of climate change support risk management, strategic planning and capital allocation	Reflecting the urgency to address climate and environmental issues, finance should be directed to investment projects that deliver green benefits	To understand how EBRD projects deliver green impact, including those that support systemic change
INSTITUTIONAL COMMITMENT	Environmental and Social Policy (updated 2019)	EBRD activities are to be fully aligned with the goals of the Paris Agreement by the start of 2023, per Governors' resolution and the GET approach 2021-25	Supporter of the TCFD	GET approach 2021-25 targeting a green finance ratio of at least 50% by 2025 and 25-40 Mt net GHG reductions	Article 1 of the Agreement Establishing the EBRD states the "the purpose of the Bank shall be to foster the transition"
AIM	To ensure the Bank appraises and monitors the Environmental and Social risks and impacts of its projects appropriately and that clients assess, mitigate and monitor these risks and impacts	To determine whether a project the Bank might finance is "aligned" or "not aligned" with the mitigation and adaptation goals of the Paris Agreement	Largely to support sound banking considerations and facilitate consistent climate-related financial risk disclosure	To assess whether a project meets the qualifying criteria for green finance	To assess whether a project credibly delivers green-related transition (which may also support other transition qualities)

Annex D (III): The EBRD's approach to fossil-fuel investments (1/2)

European Bank
for Reconstruction and Development

	All fossil fuels	• Be aligned with the goals of the Paris Agreement per the Bank's Paris Agreement alignment methodology;[1] • Be consistent with NDCs and LTSs; • Demonstrate that they have a low risk of carbon lock-in and therefore do not lead to carbon lock-in; • For projects with significant emissions, be subject to an economic viability test incorporating a shadow carbon price; • Be located in a policy context that demonstrates commitment to the goals of the Paris Agreement[2], and be consistent with this policy context; • Be aligned with a credible low-carbon pathway, either at a national or sectoral level, per the EBRD's Paris Agreement alignment methodology; • Not displace renewable sources or low emissions alternatives; • Be consistent with the Bank's Environmental and Social Policy (including requirements for using Best Available Techniques); • Demonstrate that they would not lead to stranded assets and therefore be subject to a thorough assessment of climate-financial risks; • Or otherwise target exclusively the decommissioning of existing assets or repurposing for lower-carbon fuels.
Down stream	Coal-fired power generation	• The Bank will not finance thermal coal mining or coal-fired electricity generation capacity (including upgrades to existing plants or the construction of new capacity). • Through policy dialogue, the Bank will engage with the economies in which it operates that have significant coal dependence to design a transition away from coal that addresses issues of air quality, retrenchment and energy security.
Up stream	Oil exploration, extraction and related services	• The Bank will not invest in the upstream oil sector.
Mid stream	Oil transportation and storage	• The Bank will not invest in infrastructure dedicated to oil transportation and/or storage.
Downstream	Oil transformation (refineries), gasoline stations and oil-fired electricity generation	In addition to the requirements applicable to all fossil-fuel projects: • The Bank will invest in refineries only when they target high decarbonisation impact in existing assets through absolute GHG emission reductions or environmental impact remediation and pollution prevention measures; without increasing the crude intake capacity of the relevant asset, or when they aim exclusively to decommission or transition to low-carbon fuel feedstock or production. • The Bank will not finance oil-fired electricity generation. • The Bank will not invest in other downstream assets (for example, gasoline stations) unless they exclusively target the introduction and scaling up of non-fossil-fuel transport (biofuels, e-fuels, electric vehicle (EV) chargers and/or hydrogen filling technology).

Notes: [1] The Paris Agreement alignment methodology is subject to periodic review and may be revised in future. Any future, more stringent, revisions of the methodology will be reflected in the assessment of fossil-fuel projects (in addition to the application of these criteria). [2] Depending on the country and sector context, a commitment means a combination of policy commitments (NDCs, NECPs, LTSs, emissions targets set at the level of a sector or country, targets for low-carbon technology deployment, etc.) that are consistent with the targets of achieving peak emissions as early as practically feasible and targeting net-zero emissions by 2050 or shortly thereafter.

Annex D (III): The EBRD's approach to fossil-fuel investments (2/2)

European Bank
for Reconstruction and Development

Upstream	Gas exploration, extraction and related services	• The EBRD will not invest in the upstream gas sector.
Midstream	Gas transportation, liquefaction, regasification, distribution and storage	• In addition to the requirements applicable to all fossil-fuel projects, the Bank will only invest in projects that contain a clear plan to minimise methane leakages from the relevant asset.
Downstream	Gas-fired electricity generation and gas-fired heat generation (including combined heat and power) that supply to district energy networks	
	Non-capex-related operations	• Where the Bank provides finance that is not related to specific capital expenditures to a company with significant fossil-fuel assets operating in the energy sector (for example, privatisations, working capital facilities, refinancing), it will only do so on condition that the company has in place, or is committed to adopting, high climate governance standards and operates in a regulatory or corporate context that embeds strong commitments to decarbonisation.
	Operations with financial intermediaries	• For projects where the intended nature of the sub-transactions are known, the sub-transactions will exclude the financing of: thermal coal mining or coal-fired electricity generation capacity, and oil and gas production, processing (including refining), transport (transmission and distribution), storage and utilisation to generate electricity (other than for own consumption). For projects where the intended nature of the sub-transactions are not known, the financial intermediary will be required to refrain from financing new investments in coal mining, coal-fired electricity generation capacity, or upstream oil and gas exploration and development. Where the EBRD becomes a direct equity investor in a financial institution, an approach in line with the EBRD's Paris Alignment methodology for intermediated finance will be applied, including the preparation of a transition plan that will establish a strategy for fossil-fuel phase-out.

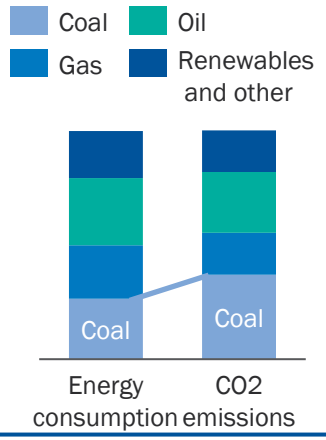
Annex E: Phasing out unabated fossil fuels – urgent action is needed to exit coal and cut upstream gas emissions in the next five years

European Bank
for Reconstruction and Development

Coal use needs to be ended as soon as possible

- **Climate impact:** Coal accounts for about 27% of total electricity production, but about 37% of the total emissions of the energy sector.
- **Environmental impact:** Cutting coal use can improve air quality and prevent premature deaths (around 19,000 premature deaths occurred from 2018 to 2020 due to coal-fired power plants in the Western Balkans), especially if district heating shifts away from coal.
- **Increasing regulatory and public pressures** to exit from coal (such as the impact of the EU Emissions Trading System on power imports into Europe).

Power sector by source in the EBRD regions



How can we exit from coal use as soon as possible?

An earlier exit from coal can be achieved through a combination of policy, technological and financial measures:

- **Setting clear and ambitious targets:** Governments can set targets for ending coal use, providing a strong signal to investors and energy companies to shift to cleaner sources.
- **Promoting and implementing carbon pricing mechanisms:** Carbon pricing, such as a carbon tax or cap-and-trade system, can make coal less competitive and encourage the shift to cleaner energy sources.
- **Supporting renewable energy development:** Provide support and financing for the development of renewable energy sources.
- **Investing in energy storage and grid infrastructure:** In the power sector, storage and grid infrastructure are critical to integrating renewable energy into the power system and ensuring a reliable and stable energy supply.
- **Supporting affected communities and workers:** Provide support for affected communities and workers, for instance, through retraining programmes, support for local economic diversification and other forms of assistance.

Gas use needs to be scaled down towards 2050

- **Climate impact:** Gas consumption causes around 18% of total global energy-related emissions, while about 2.5% of total energy-related emissions come from gas operations,[1] including venting, fugitive methane leakage and flaring.
- **Increasing regulatory and public pressures:** Greater certainty in mapping upstream gas emission levels leads to increased (regulatory) pressure to reduce these emissions and associated impacts.

Flare map 2020-21

Image from FlareIntel, a free and open-access digital tool to detect gas flares (ignition of gas)

What is needed to drive down gas use?

A changing role for gas: Gas is expected to cover a significant share of the energy mix to 2030, displacing more polluting fuels such as coal, or to serve as an enabler of low-carbon hydrogen production with CCS.

The use of natural gas will vary significantly depending on location and would depend on:

- **Where the gas is coming from:** The source of the gas supply can increase or decrease energy security.
- **What the gas is used for**: Gas use in the power sector can be replaced more readily by alternatives, while gas used in specific industries or for heating is more difficult to replace.

Countries can reduce upstream gas emissions while usage scales down by:

- Upgrading equipment to reduce venting and fugitive leakage; advocating for regulation and certification; banning routine flaring (CO_2 and methane); and decommissioning depleted assets through finance incentives.

Annex F: Fossil fuel-based district heating generation – outlook and challenges for EBRD economies

European Bank
for Reconstruction and Development

- **District energy systems are widespread in the EBRD regions:** District heating (DH) is the most common form of heating for urban buildings in central and eastern Europe and the former Soviet Union.
- **DH generation remains heavily reliant on fossil fuels:** Nearly 90% of DH supply globally is produced from fossil fuels (2021), predominantly coal (45%)[1]. In the EU, around 66% of DH supply is fossil fuel-based (2018), with natural gas accounting for the largest share (around 30%).[2]
- **DH systems are valuable infrastructure assets, crucial to decarbonising and electrifying urban heat:** Although DH systems in EBRD economies currently rely on fossil fuel-based generation, they (including downstream transmission and distribution networks) offer the best opportunity to integrate low-carbon energy sources into urban heat supply.
- **Low- or zero-carbon heat sources for DH include:** Large electric heat pumps, centralised solar thermal, waste-to-energy, geothermal, power-to-heat technology, sustainable biomass or biogas, and urban waste heat (sewage, data centres, metro systems and industrial facilities).
- **Investment in DH generation must be Paris aligned:** Generation should not be considered in isolation, as decarbonising the sector would require a whole-system approach.
- **The forthcoming Municipal and Environmental Infrastructure Strategy will outline the Bank's approach to the wider heating sector, including the demand side.**

Trends in the EBRD regions and sector

Natural gas and coal are the dominant fuels for DH generation in EBRD economies:

- **Coal use is gradually declining,** replaced by natural gas and biomass.
- Annual heat generation is decreasing due to improved energy efficiency and reduced industrial demand, despite an increase in the number of customers and the spread/extension of downstream DH networks.
  - Exceptions are **Bulgaria, Romania and Ukraine,** where many customers have disconnected from DH, with supplies overwhelmingly replaced by individual fossil fuel-based systems.
- **Natural gas is the predominant fuel in Europe,** including the Western Balkans, central and eastern Europe and Ukraine (Poland notable exception).
- Biomass is the largest fuel source in the three Baltic states.

Trajectory in EU 27 + UK shows a steady fall in DH fossil-fuel use:

- In 1990, 73% of total DH generation was based on coal and oil; by 2018, this share was 29%.[3]
- The share of renewable generation had risen from less than 5% in 1990 to more than 28% by 2018.[4]
- In 2020, Denmark installed about 350 MWth of DH heat pump capacity.[5]

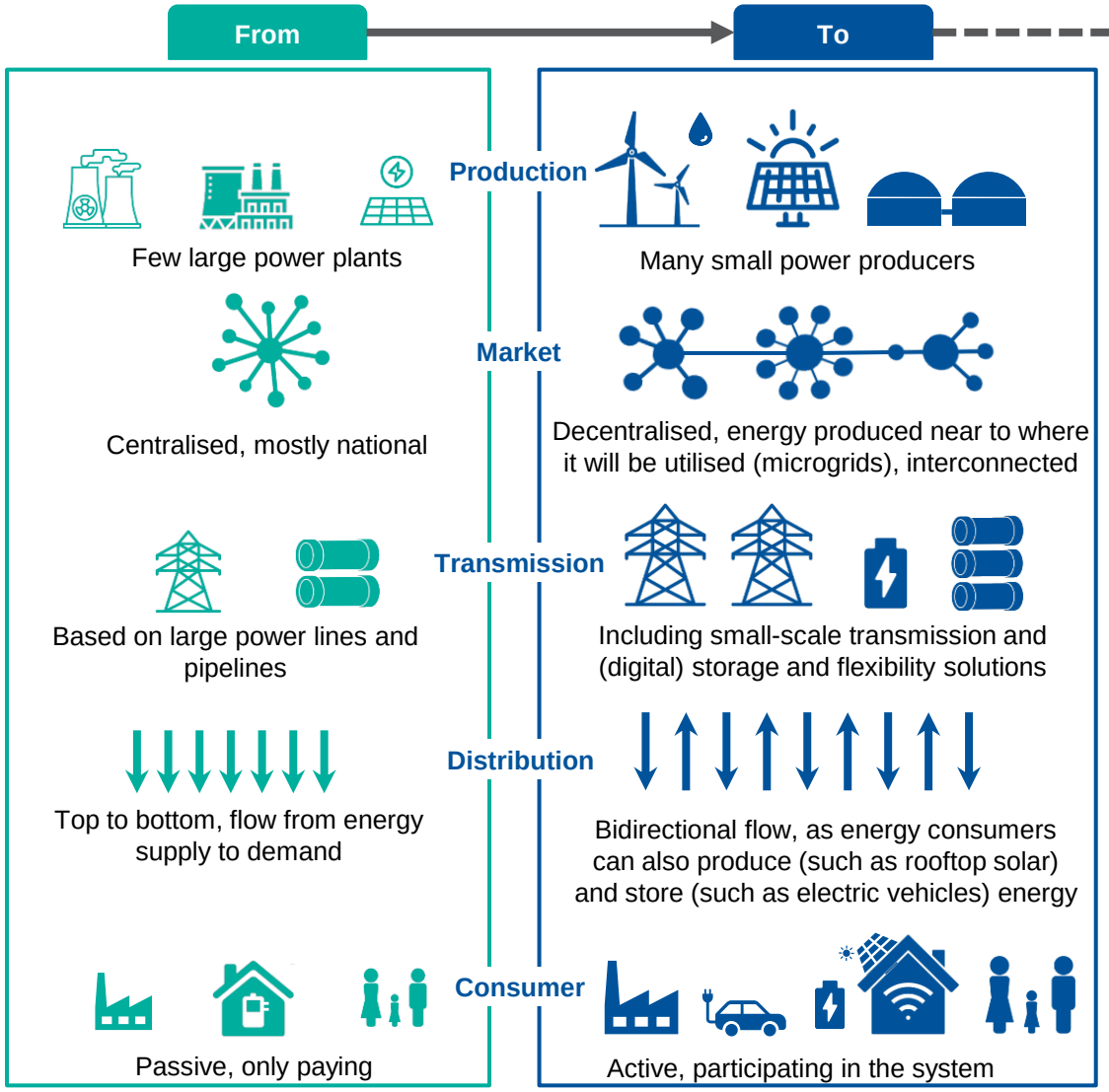
Decarbonisation and electrification challenges

- **Scale of heating demand:** Heating and cooling accounts for half of global energy consumption[6] and the share is even higher in EBRD economies due to low end-user efficiency and marked seasonal temperature variations.
- **Historic underinvestment:** Much of the generation fleet in the EBRD regions dates to the Soviet era, and infrastructure, including downstream networks, has seen limited investment over the past 30 years or so.
- **Fossil-fuel dependency:** The fuel mix in the region is dominated by fossil fuels, with renewables limited to biomass or waste-to-energy-based generation.
- **Unsupportive policy environment:** Limited policies, incentives, regulatory obligations or government support targeting decarbonisation of the sector.
- **Lack of carbon pricing:** No cap-and-trade or carbon tax schemes sufficient to influence investment decisions outside of EU Member States.
- **Capacity building and the skills gap:** Urgent need for demonstration projects and upskilling of the sectoral workforce to implement and operate new technologies (for example, large heat pumps, inter-seasonal storage).
- **Level of DH generation capacity:** In Poland alone. capacity is ca. 54 GWth.[7]
  - Selected system capacities in the EBRD regions: Almaty ca. 4.5 GWth; Kyiv ca. 9.3 GWth; Sofia ca. 3.6 GWth; Warsaw ca. 5 GWth

[1] https://www.iea.org/reports/district-heating; [2] [3] [4] https://op.europa.eu/en/publication-detail/-/publication/4e28b0c8-eac1-11ec-a534-01aa75ed71a1/language-en;
[5] https://heatpumpingtechnologies.org/publications/denmark-strategic-market-outlook/; [6] https://www.iea.org/fuels-and-technologies/heating; [7] https://www.ure.gov.pl/pl/cieplo/energetyka-cieplna-w-l/10763,2021.html

Annex G: Energy networks – massive electrification requires significant expansion and network upgrades

European Bank for Reconstruction and Development



Enabled by

Interconnectors add flexibility to the system

- Managing high levels of variable renewables, bringing down the total electricity price and providing cheaper security of supply.
- Creating the potential for countries to benefit from each others' renewable energy, for example, only 5-8% of power (TWh) is currently traded across borders in south-eastern Europe, while wind power generation peaks at different times in different countries in the region.

Digitalisation

- Includes introducing flexible demand management (such as smart meters) and physical improvements to distribution networks (such as bi-directional flows and remote sensors).
- While initially raising the costs of the power system, digital solutions could be offset in the long term as, for example:
  - fewer additional lines would be needed due to predictive algorithms and other solutions
  - load demand would be shifted from daily peak hours to off-peak hours to reduce power generation needs.

Infrastructure upgrades due to mass electrification

Includes substation upgrades, underground power lines (due to public acceptance challenges/urban density), cabling for EV chargers, infrastructure to manage increases in peak demand. New electrified use-cases, such as electric vehicles, could lead to additional, localised distribution costs.

Distributed energy resources

Grid expansion needs could be reduced through self-consumption (for example, rooftop solar) and microgrids.

Opportunities to strengthen the grid in the EBRD regions:

1) **Support the shift from distribution "network" operators to distribution "system" operators** as massive clean electrification would need operators that can procure and manage flexibly.

2) **Support further development of regional power systems**, integrating both physical networks (for example, interconnectors and projects that have been identified as PCI, PMI and PECI) and the associated power markets (for example, through market coupling), as well as regional cooperation initiatives like the CESEC group in south-eastern Europe.

3) **Support the digitalisation of energy networks:** Electricity grids in the EBRD regions are currently not ready for the increased amount of electrification. For example, smart meters require relatively large upfront capex, but lead to overall cost reductions in the power system.

Annex H: Energy storage solutions

European Bank for Reconstruction and Development

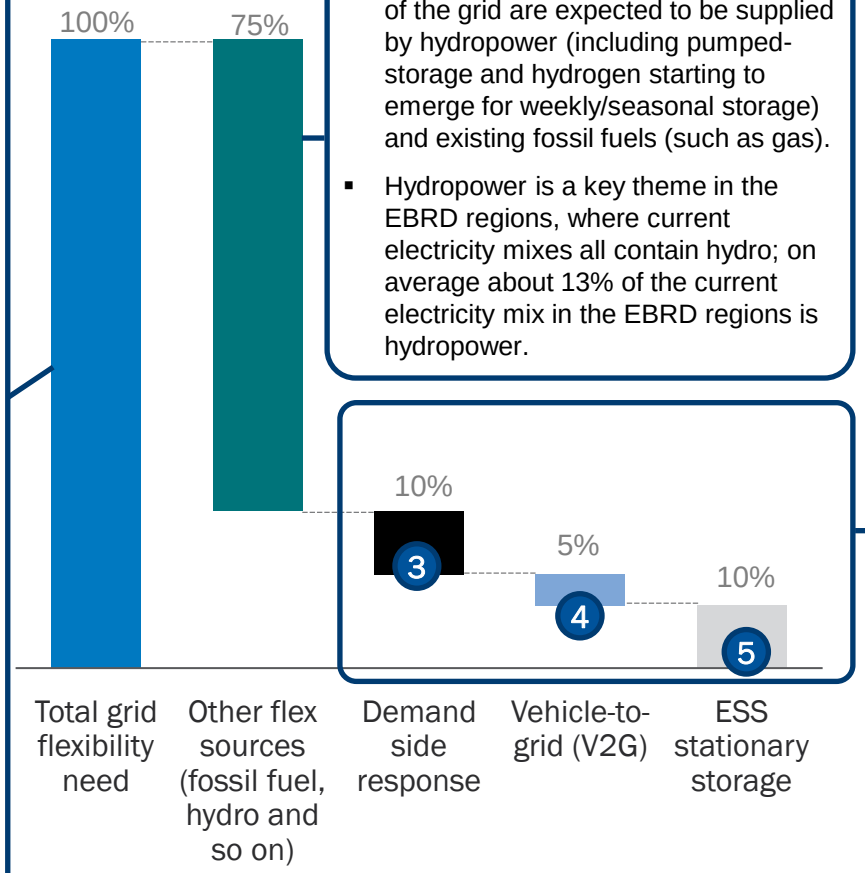
Expected means to meet storage demand by 2030, total installed TWh capacity (and percentage of total flexibility need)

Percentages illustrated are global averages; splits will differ by region and depend on the energy mix (see panel 1)

1 Choosing the optimal energy mix, interconnectivity and scale of renewable sources for a given geographical area.

Grid flexibility requirements depend on:

- **energy mix,** for example:
- **overall level of electrification:** relatively low level in the EBRD regions, averaging around 20%
- **overall percentage of variable renewable energy (VRE):** 1-13% depending on EBRD region; once the "threshold" of 15-30% VRE penetration is met, storage needs would grow exponentially
- **percentage of solar versus wind (solar has more intra-day flexibility/storage needs):** wind is the dominant renewable source in all of the EBRD regions, apart from eastern Europe and the Caucasus, where the solar supply is twice that of wind
- **level of interconnectivity:** for example, the EU has set an interconnection target of at least 15% by 2030
- **oversizing solar/wind resources** so that even when producing below maximum capacity (for example, when cloudy for solar), the site would still meet required output.



2 Deploying dispatchable generation

- By 2030, most of the flexibility needs of the grid are expected to be supplied by hydropower (including pumped-storage and hydrogen starting to emerge for weekly/seasonal storage) and existing fossil fuels (such as gas).
- Hydropower is a key theme in the EBRD regions, where current electricity mixes all contain hydro; on average about 13% of the current electricity mix in the EBRD regions is hydropower.

Deploying demand-side flexibility mechanisms and stationary storage solutions

Remaining flexible focuses on intraday needs. There are three (competing) elements:

3 load shifting from **demand-side response** (EV smart charging (V1G), heat-pump control, industrial response, and so on); not widely available in the EBRD regions.

4 using EV batteries as stationary storage (**V2G**); not widely available in the EBRD regions; 1% of new car sales in Cyprus, Poland, the Czech Republic and the Slovak Republic are EVs.

5 **ESS/stationary storage** battery systems (both utility-scale front-of-the-meter and commercial/residential behind-the-meter, possibly coupled with renewable sources); current small battery storage capability.

Opportunities to strengthen storage solutions in the EBRD regions:

1) Support investments in storage solutions as need increases in line with variable renewable growth, although the inclusion of hydropower is expected to reduce total system storage costs in most EBRD regions.

2) Support the development of battery manufacturing and recycling projects and companies: if clean energy systems are advanced, the EBRD regions could be an attractive location for the further development of sustainable battery supply chains.

3) Support appropriate power-market design that provides signals / remuneration for storage investments and system balancing capabilities: this could be facilitated by increased digitalisation (for example, to support demand-side management).

Annex I: Digitalisation in the energy sector

European Bank
for Reconstruction and Development

The EBRD Digital Approach

- Establishes digital transformation as a **means** to achieve the EBRD's transition mandate across transition qualities.
- Presents **three areas of focus** for EBRD intervention, with cybersecurity as a cross-cutting theme:
  - establishing the foundation of a digital economy,
  - promoting digital adaptation among organisations
  - fostering innovation among digital-first entities.
- Identifies the **mainstreaming of digital considerations** across energy and infrastructure projects as a core priority under the **adaptation** area of focus.

Digitalisation in the energy sector

Bringing digital and physical infrastructure assets together creates cyber-physical systems known as "smart" infrastructure. These use computer-based systems and applications to connect disparate utility, infrastructure and public services to generate real-time data. These data help asset owners manage their infrastructure and services more effectively, reducing costs and downtime, improving the environment and allowing improvements in service quality, delivery and accessibility. The digital enhancement of infrastructure can lead to better social, environmental and economic outcomes and improved transparency and governance, making digitalisation a key component of sustainable infrastructure solutions.

The EBRD's Energy Sector Strategy recognises digitalisation as an enabler of the energy transition. For example, digitalisation supports the scaling up and integration of variable renewable energy sources by helping to bring down renewable energy costs, allowing for improvements in forecasting, enabling demand-side management and facilitating new approaches to manage system operations.

This in turn helps **deliver efficient, digital and electrified energy systems** through investments in the digitalisation of the energy sector.

Cybersecurity in the energy sector

Ensuring energy operators and infrastructure are cyber secured is essential to maximise their resilience. This is true for operators adopting smart and connected solutions, as well as for operators relying on traditional technologies and architecture. Furthermore, the move from a limited number of centralised energy providers to a large number of decentralised renewable providers increases the cybersecurity risks.

Supporting delivery through a new knowledge product: the Energy Infrastructure Digitalisation Toolkit

What is it? A forthcoming sector-specific digitalisation roadmap and compendium.

Who is it for? EBRD clients, Green Cities, asset owners and operators

What does it include?

- a roadmap to outline pathways for transition from "low" or "no" digitalisation maturity in client organisations to best-in-class or "transformative", featuring key performance indicators, an action plan and an overview of public, private and user involvement to achieve maturity
- a compendium of specific individual current or near-future digital/smart technologies and applications that can be applied in each sector to achieve client digitalisation maturity objectives
- case studies to demonstrate how roadmaps might be achieved.

Annex J: Gender and economic inclusion in the energy sector

As set out in its Strategy for the Promotion of Gender Equality and Equality of Opportunity Strategy, the EBRD focuses on identifying **win-win solutions** for clients, often to address business challenges (such as skills shortages and low capacity), while enhancing equality of opportunity for end beneficiaries. This relies on **a holistic, human capital-centred approach,** whereby initiatives may target different and intersecting groups, depending on the economic inequalities that prevail in the energy sector of a given economy.



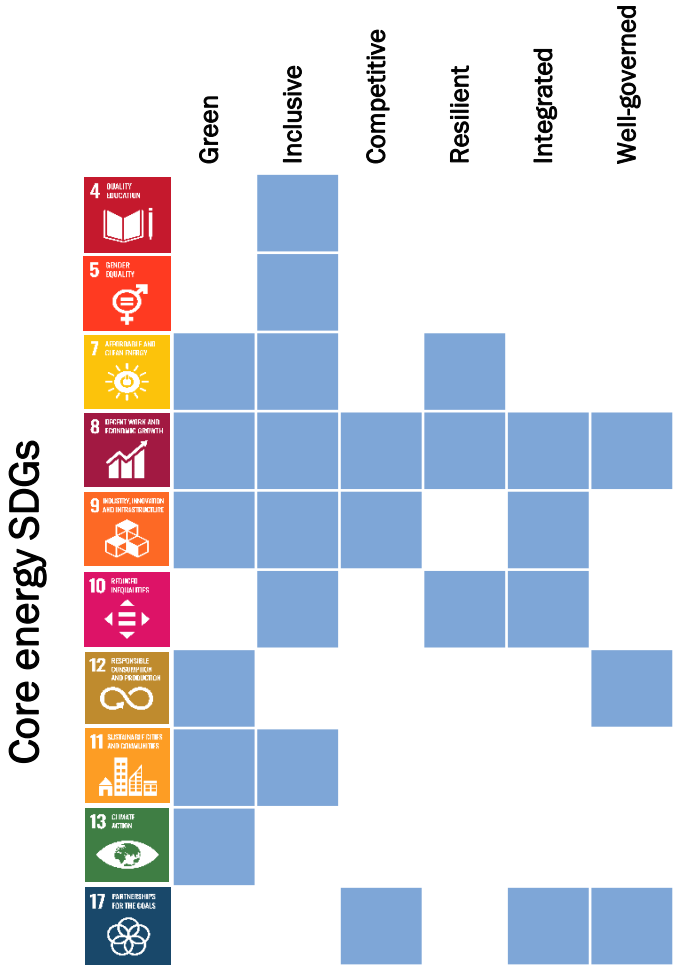


Developing green skills for all	Supporting a just transition away from the coal, oil and gas sectors	Promoting resilience and new skills standards	Expanding networks and opportunities for women	Improving energy-efficiency capabilities
The EBRD provided a loan to ACWA Power to fund the development of two wind power plants adding 1 GW to the renewable energy capacity of Uzbekistan, while promoting access to green skills and employment for the country's youth. With the EBRD's support, ACWA has been contributing to the activities of the Sectoral Skills Council for Energy and implementing a new three-year dual-learning programme to foster the skills of prospective wind energy specialists in collaboration with the local technical college.	The EBRD financed ESM, North Macedonia's coal-legacy SOE, to develop PV plants near its lignite mines, while leading the implementation of a package of just transition activities. This includes designing new workforce management measures and multiple re-skilling courses for workers at risk of redeployment, as well as supporting the delivery of a national skills strategy to further promote the human capital resilience of workers with stranded skills across the coal industry.	With a substantial investment in STEG, the leading player in Tunisia, the EBRD promoted not only the resilience of the energy system, but also the development of new skills standards and three nationally accredited master's-level programmes on green and digital skills for young energy engineers. This involves the introduction of five national occupational skills standards to define what new skills would be required in the sector, as well as to enhance the employability of labour-market entrants.	In Türkiye, the EBRD extended a loan to Enerjisa Enerji to support the upgrade of its existing network, the expansion of EV charging infrastructure and the enhancement of corporate climate governance practices. As part of the financing, Enerjisa also committed to applying a gender lens to all of its corporate climate governance activities and implementing an outreach programme for at least 600 young women who aspire to shape future climate action and become leaders in climate governance across the sector.	By investing in Romania's Electrica Distribution, the EBRD not only helped the company to address its liquidity needs, which were severely impacted by the recent spike in electricity market costs, but also enabled it to update its human resource practices by introducing an internal reward scheme to incentivise staff to report unauthorised losses of electricity and strengthen the results of its existing professional development training programme on new operational procedures and technologies.

Annex K: The United Nations Sustainable Development Goals

European Bank
for Reconstruction and Development

Secure, affordable and sustainable energy is central to achieving the **Sustainable Development Goals (SDGs)**. Through its activities in the energy sector, the EBRD directly contributes to **10** of the **17** SDGs, as shown below.



ENERGY – STRATEGIC DIRECTION

1. Accelerate the decarbonisation of energy
2. Deliver efficient, digital and inclusive energy systems

All EBRD energy projects contribute to **SDG 7 on affordable and clean energy,** which aims to ensure access to affordable, reliable, sustainable and modern energy for all.

Core SDGs for energy sector strategic direction

"In some countries, the COVID-19 pandemic has weakened or reversed advances already made [in the energy sector]. Rising commodity, energy and shipping prices have increased the cost of producing and transporting solar photovoltaics modules, wind turbines and biofuels worldwide, adding uncertainty to a development trajectory that is already far below [SDG 7. Clean and Affordable Energy] ambitions. Achieving energy and climate goals will require continued policy support and a massive mobilization of public and private capital for clean and renewable energy, especially in developing countries."

- United Nations Sustainable Development Goals Report 2022

Annex L: The Environmental and Social Policy and the Energy Sector Strategy

European Bank
for Reconstruction and Development

The Bank's Environmental and Social Policy (ESP) and associated Performance Requirements (PRs) set out the criteria for any EBRD financing. The PRs set the minimum environmental and social requirements for financing and are applied pragmatically on a risk basis. The ESP is undergoing review in 2023, with an new ESP set to be approved in May 2024.

The issues typically faced on energy projects involve environmental and social management; labour and working conditions; pollution prevention and use of EU Best Available Techniques (BAT); emissions to air; water management; waste management; the health and safety of workers and communities; compensation for economic and/or physical displacement; impacts on biodiversity caused by land take and/or habitat fragmentation; the cumulative impacts of associated infrastructure; the preservation of cultural resources; and the provision of meaningful consultation with local communities to ensure that they are aware of site activities and operations and understand how to seek additional information and file a grievance. For the energy sector, the EBRD has a dedicated Environmental and Social Guidance Note for Hydropower Projects and uses best international industry practice where relevant.

A challenge for clients in the economies where the Bank operates in the energy sector is meeting EU environmental and social standards across a range of issues, for example:

- EU environmental standards, such as BAT, as required by the Industrial Emissions Directive
- addressing cumulative impacts associated with the project developed (including infrastructure, such as power lines, that may not be directly financed by the Bank)
- appropriate assessment of biodiversity and habitats and developing mitigation measures (often not required by national legislation and, thus, PPAs)
- social issues associated with land acquisition and impact on livelihoods.

The EBRD would work with clients to identify pollution impacts and ensure compliance with national and applicable EU standards and the Bank's ESP/PRs. It would support the development and implementation of projects with GET elements that lead to less energy intensity, less water usage and a reduction in GHG and air-polluting emissions to help address public health. The EU Taxonomy would be used in this process where appropriate. The Bank would work to improve the implementation of the circular economy, where possible, as well as sustainability reporting and disclosure, and institutional strengthening and policy engagement, as relevant, including through cumulative impact assessments (strategic environmental assessments) and training. Where supply-chain standards are concerned, the EBRD would undertake risk-based due diligence to ensure the traceability and verification of supply chains for all energy-sector investments, with zero tolerance of forced labour. More work is underway on the Bank's approach to nature (in all sectors where it operates) and this would be integrated into its future activities.

Details of the EBRD ESP can be found at: http://www.ebrd.com/news/publications/policies/environmental-and-social-policy-esp.html

Annex M: Links to EBRD country strategies

European Bank
for Reconstruction and Development

The strategic direction of the Energy Sector Strategy is tailored to specific aspects of country strategies (selected examples below):

Poland
- Improve energy and resource efficiency
- Promote a more diversified energy mix
- Increase private-sector participation in state-dominated sectors

Greece
- Increase resource efficiency and climate resilience
- Improve the quality and connectivity of transport and energy networks
- Deepen and diversify local debt and equity capital markets
- Increase private-sector ownership or participation

Uzbekistan
- Increase the use of renewable energy
- Improve the quality and connectivity of transport, energy and ICT networks
- Strengthen the capacity of private-sector companies to grow and add value
- Promote commercialisation and private participation in state-dominated sectors

Egypt
- Increase renewable energy capacity and a more diversified energy mix
- Support access to skills development, services and economic opportunities
- Promote a more expansive, competitive and resilient private sector post-Covid-19
- Deepen and diversify the financial sector and products

Türkiye
- Increase renewable energy capacity and diversify the energy mix
- Support energy and resource efficiency, climate resilience and environmental performance
- Enhance access to entrepreneurship and skills for inclusion target groups, especially youth and refugees
- Promote gender equality in access to economic opportunities

Albania
- Support more diversified energy with reduced vulnerability to climate change
- Reinforce networks for domestic and regional connectivity
- Increase access to infrastructure, unlocking economic opportunities for inclusion target groups
- Commercialisation and restructuring of key SOEs; strengthening the corporate governance of firms

Annex N: Supporting energy sector transition through partner financial intermediaries

European Bank
for Reconstruction and Development

The EBRD FINANCIAL SECTOR STRATEGY 2021-25 GREEN OBJECTIVE....

… aims to develop financial sector partnerships to drive the transition to green, low-carbon economies. Scaling up green financing is a central objective, aiming to support the sector's resilience, governance and inclusiveness.

… focuses on financing green sub-transactions for sub-borrowers. The EBRD will help increase efficiency, through a broader, evolving product range to enhance green financing, especially for underserved segments.

… aims to sharpen partner financial institutions' focus on transition planning. The EBRD will support its partners to ensure their entire portfolio aligns with the Paris Agreement over time, with an impact on lending well beyond the EBRD's own financing for that institution. The Bank expects the majority of its new transactions to involve transition planning by end of 2027.

IT WILL SUPPORT THE EBRD REGIONS' ENERGY TRANSISTION BY...

… scaling up financing for energy related sub-projects through partner financial institutions. This includes those that deliver decarbonisation of the energy system and energy efficiency. This will build on the implementation experience between 2019 and 2022 where the EBRD financed 65,000 sub-projects covering energy efficiency (about €1 billion) and renewables (about €250 million).

… working with partner financial institutions to develop transition plans that support the energy transition. These plans will focus on implementing measures to align financial flows with the Paris Agreement in relation to governance, strategy, risk management; metrics and targets; and disclosure.

… supporting partner financial institutions in phasing out their fossil-fuel financing. Coupled with the rollout of transition planning, the Bank applies fossil-fuel exclusions.

Annex O: Context indicators (1/2)

European Bank
for Reconstruction and Development

	Country	TES/GDP (MJ per 2015 US$ PPP)	CO_2/TES (tCO_2 per TJ)	CO_2 emissions per capita (tCO_2 per capita)	Share of coal in electricity generation (%)		Share of intermittent solar and wind in electricity generation (%)		Share of renewables in electricity generation (%)	
		2020	2020	2020	2017	2020	2017	2020	2017	2020
Central Europe and the Baltic states	Croatia	3.4	41.8	3.6	12%	9%	11%	14%	60%	65%
	Czech Republic	4.4	51.7	8.1	51%	41%	3%	4%	11%	13%
	Estonia	4.2	37.8	5.3	9%	13%	6%	16%	14%	48%
	Hungary	3.7	39.9	4.5	15%	11%	4%	9%	11%	16%
	Latvia	3.3	35.6	3.4	-	-	2%	3%	73%	64%
	Lithuania	3.2	35.7	4.0	-	-	40%	35%	70%	54%
	Poland	3.6	63.7	7.1	78%	70%	9%	11%	14%	18%
	Slovak Republic	4.0	39.8	5.1	13%	8%	2%	2%	24%	24%
	Slovenia	3.7	44.6	5.7	30%	26%	2%	2%	28%	33%
South-eastern Europe	Albania	2.5	37.5	1.2	-	-	-	1%	100%	100%
	Bosnia and Herzegovina	6.6	69.0	6.3	76%	71%	<1%	2%	24%	29%
	Bulgaria	5.1	45.2	4.8	47%	34%	6%	7%	14%	19%
	North Macedonia	5.9	78.1	4.9	97%	94%	0%	2%	3%	5%
	Kosovo	4.2	59.3	4.1	55%	48%	4%	9%	45%	52%
	Montenegro	3.6	62.8	3.3	60%	49%	2%	3%	23%	28%
	Romania	2.7	48.1	3.4	26%	17%	14%	16%	38%	44%
	Serbia	5.5	68.5	6.6	73%	71%	<1%	3%	25%	27%
Türkiye		2.6	59.6	4.4	33%	34%	7%	12%	29%	42%
Greece		3.0	58.3	4.5	34%	14%	17%	29%	25%	37%

Source: IEA (2022), “World Energy Balances 2022" and “World CO2 Indicators 2022”.

Annex O: Context indicators (2/2)

European Bank
for Reconstruction and Development

	Country	TES/GDP (MJ per 2015 US$ PPP)	CO_2/TES (tCO_2 per TJ)	CO_2 emissions per capita (tCO_2 per capita)	Share of coal in electricity generation (%)		Share of intermittent solar and wind in electricity generation (%)		Share of renewables in electricity generation (%)	
		2020	2020	2020	2017	2020	2017	2020	2017	2020
Eastern Europe and the Caucasus	Armenia	4.6	42.1	2.1	-	-	<1%	2%	29%	24%
	Azerbaijan	4.7	50.6	3.3	-	-	<1%	1%	8%	5%
	Belarus*	5.9	50.0	5.6	-	-	1%	1%	2%	3%
	Georgia	4.2	45.0	2.5	-	-	1%	1%	81%	75%
	Moldova	5.7	49.1	3.1	-	-	<1%	1%	6%	6%
	Ukraine	7.7	44.6	3.7	32%	27%	1%	6%	7%	12%
Central Asia	Kazakhstan	6.1	74.3	10.9	67%	67%	0%	2%	11%	11%
	Kyrgyzstan	5.8	51.8	1.2	7%	8%	0%	0%	92%	91%
	Mongolia	6.9	81.0	6.3	91%	85%	3%	8%	4%	10%
	Tajikistan	4.4	47.4	0.8	5%	8%	0%	-	95%	90%
	Turkmenistan	11.5	56.8	10.0	0%	0%	0%	-	-	-
	Uzbekistan	7.2	57.9	3.2	3%	4%	0%	-	13%	8%
Southern and eastern Mediterranean	Egypt	2.8	51.3	1.8	-	-	1%	5%	8%	12%
	Jordan	3.8	56.3	2.0	-	-	7%	20%	7%	20%
	Lebanon	4.1	70.1	3.0	-	-	-	1%	2%	7%
	Morocco	3.4	70.6	1.7	53%	69%	11%	15%	14%	18%
	Tunisia	3.8	56.0	2.1	-	-	3%	4%	3%	4%
	Russia*	8.6	48.9	10.8	16%	16%	-	-	17%	20%

Note: No data available for the West Bank and Gaza.
* In April 2022, the EBRD Board of Governors decided to suspend Belarus' and Russia's access to EBRD resources in response to the invasion of Ukraine. Belarus and Russia remain shareholders of the Bank.
Source: IEA (2022), World Energy Balances 2022 and World CO_2 Indicators 2022.

Annex P: Collaboration with development partners in the energy sector

European Bank
for Reconstruction and Development

	Geography					
	Central Europe and the Baltic states	South-eastern Europe	Eastern Europe and the Caucasus	Central Asia	Southern and Eastern Mediterranean	Türkiye
ADB			€	€P		
AIIB			€	€	€	€
AfDB					€P	
World Bank	P	P	€P	€P	€P	P
IFC	●	€	€P	●	€P	●
EIB	€	€	€	●	€	●
IsDB and ICD			◔	€	€	€
EU and bilaterals	€P	€P	€P	€	€	€P
EBRD	P	€P	€P	€P	€P	€P

€	Area of significant investment	●	Focus mostly on the private sector
P	Area of significant policy dialogue	○	Focus mostly on the public sector

Central and South-eastern Europe and Greece

- Greece – financing the construction of the Mytilineos combined cycle gas turbine (CCGT) plant together with the European Investment Bank (**EIB**), contributing to the country's **accelerated phase-out of all coal-fired plants** by 2028.

Eastern Europe and the Caucasus

- Ukraine – **kick-starting the renewables sector** and gradually **mobilising other MDBs** to scale up the financing available for the sector.
- Moldova – supporting **energy sector reforms**, renewable energy auctions and **energy efficiency initiatives**, together with the **World Bank**, the **EU**, the **Energy Community**, the EIB and bilateral donors. The EBRD, alongside the **EIB**, financed important **electricity distribution investments**.
- Caucasus – developing **renewable energy auctions** in Armenia, Azerbaijan and Georgia. **Together with other MDBs**, the Bank financed the **first utility scale solar PV** projects in Armenia and Azerbaijan and continued to support **small-scale hydropower plants** and networks in Georgia and Armenia.

Central Asia

- Uzbekistan – supporting the implementation of the **Low-Carbon Pathway**, as well as competitive procurement through **2 GW wind auctions**. The Bank has invested in every renewable project in the country to date, co-financed with the International Finance Corporation (**IFC**), the Asian Development Bank (**ADB**), the German Investment Corporation (**DEG**), **Proparco**, the Organisation of the Petroleum Exporting Countries (**OPEC**), the Japan International Cooperation Agency (**JICA**), the Dutch Entrepreneurial Development Bank (**FMO**) and **commercial banks** including 2.5 GW of renewables financed in 2022-23.
- Kazakhstan – financing the Almaty combined heat and power plant's **coal-to-gas conversion**, accompanied by **comprehensive policy engagement** at country, sector, city and company level, together with the **ADB** and the **Development Bank of Kazakhstan**. Together with the Asian Infrastructure Investment Bank (**AIIB**), the **Industrial and Commercial Bank of China** and the **Green Climate Fund**, the Bank financed 100 MW Zhanatas Wind.
- Kyrgyz Republic and Tajikistan – driving **sector reform** alongside the **ADB** and the **EU Investment Facility for Central Asia**, the EBRD has **financed networks** and helped to **rehabilitate hydropower plants** as part of its **climate adaptation activities**.

Türkiye

- Supporting renewables and electricity distribution, including **EV charging infrastructure** and **integrated energy solutions** – co-financed with the **AIIB, FMO** and **commercial banks**.

Southern and eastern Mediterranean

- Egypt – the EBRD is Egypt's **lead partner on the NWFE energy pillar**, developed together with donors, development partners and the authorities. The Bank co-financed the **largest-capacity wind farm in Africa** (Gulf of Suez 2), together with **Japan Bank for International Cooperation** and the **first utility-scale solar project** awarded under a competitive tender (Kom Ombo), together with the **African Development Bank**.
- Morocco – financing the **first wind repowering project** in Africa, Koudia, together with the **Clean Technology Fund,** accompanied with extensive **policy engagement in developing the regulatory framework** for the commercial and industrial segment.
- Tunisia – the **first solar projects** were tendered following detailed engagement with the authorities, alongside the **IFC** and **Proparco**.

Note: IFI activity mapping based on publicly available information.