

# Electricity Monitor Moldova

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# Executive Summary

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- Electricity demand in right-bank Moldova mainly driven by residential consumption (little energy-intensive industry) creates challenges for balancing
- Supply strongly dependent on MGRES located in TN using gas from RUS; low wholesale prices, but diversification of supply needed to improve energy security
- Diversification options. Short-term: imports from UKR and ROU; long-term: expansion of own capacity through RES and balancing option (gas turbines)
- Short-term price increases expected for diversification options, long-term options require considerable investment
- High potential for RES in MDA and high investor interest; but, lack of adequate balancing capacity a limiting factor
- Electricity market characterized by lack of competition; market reforms and integration with neighbouring markets needed
- ENTSO-E integration improved options for supply diversification, but market integration is needed
- Further integration into EU market and achievement of climate goals will improve long-term energy security; but, further reforms in MDA required

# Outline

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- I. Electricity demand
- II. Electricity supply
  - i. Diversification of electricity supply
  - ii. Renewable energy
- III. Electricity market
- IV. ENTSO-E synchronisation
- V. EU energy integration
- VI. Climate goals

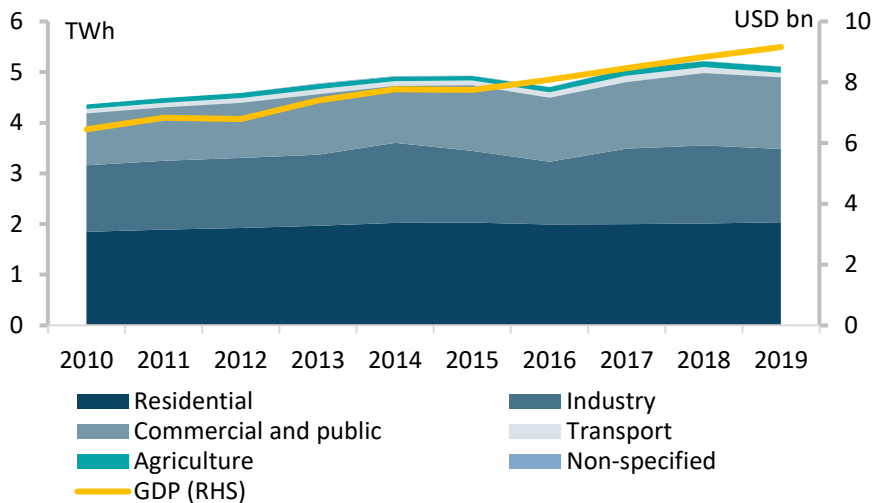
Annex I: Electricity demand and supply

Annex II: Energy Community

Annex III: Potential projects with donor participation

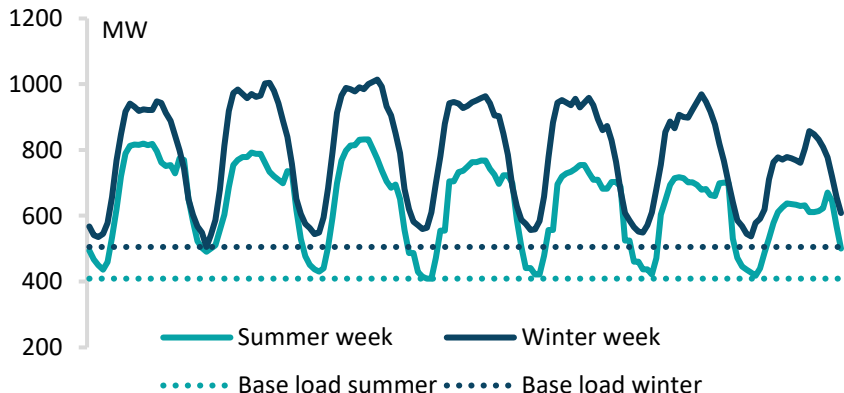
# I. Electricity demand

Annual electricity consumption by sector



Source: IEA, World Bank, data for 2010-2019

Hourly load in summer and winter week

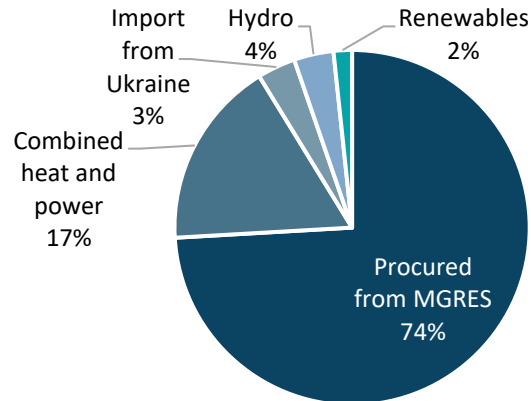


Source: ENTSO-E; data for 2021; Note: load curve covers RB MDA and TN

- Only modest increase in electricity consumption over previous years
- Households consume 40% of electricity (European average: 30%)
  - Reason: not much energy-intensive industry in right-bank MDA
- Consumption doubles between peak and off-peak periods (in winter and summer), with a fairly flat demand during the day
  - Reason: no industrial production during night
- **Electricity demand mainly driven by households' consumption; thus, affordability a key factor**
- **Large difference between peak and off-peak; challenge for balancing**

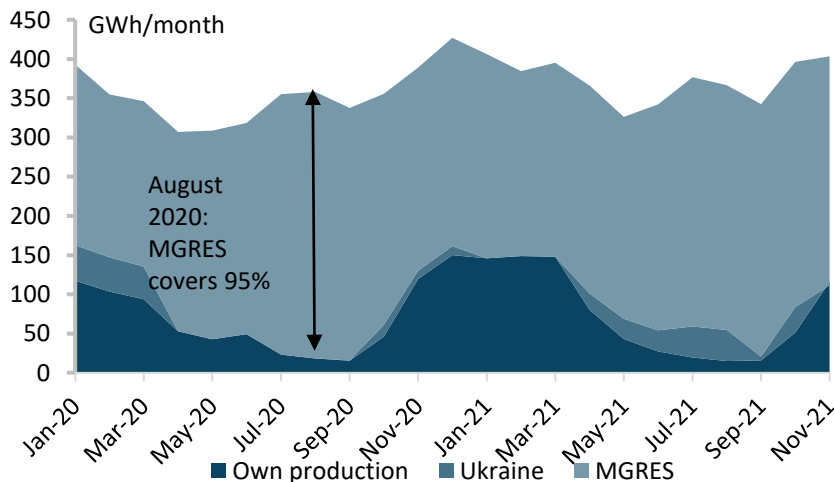
## II. Electricity supply

Share of electricity supply by technology



Source: Moldelectrica, data for 2021

Electricity balance of right-bank MDA



Source: Moldelectrica, data for 2020-2021

- 2021:  $\frac{3}{4}$  of right-bank MDA consumption covered by Russian-owned MGRES located in TN region (3.4 TWh)
  - Other supply: mostly Chisinau CHP I+II (0.7 TWh) and CHP Nord Balti (0.1 TWh)
  - Imports from UKR covered around 3% (0.2 TWh)
- Strong seasonal pattern of supply
  - In summer, MGRES covers up to 95% of electricity consumption
  - In winter, CHPs are must-run capacity due to heat production and, therefore, cover one third
- **Electricity supply is dependent on MGRES in TN and gas from RUS**
- **Diversification of supply needed to reduce dependence**

## i. Diversification of electricity supply

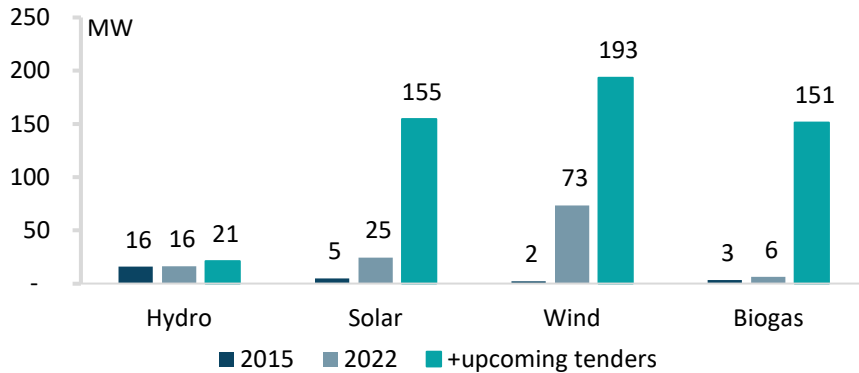
Option	Description	Energy security	Electricity price	Investment cost considerations	Climate
a) Increase cross-border electricity flows (electricity imports) – short-run perspective					
UKR	~600 MW of cross-border capacity	UKR electricity import already an important competitor to MGRES	74 EUR/MWh (UKR) vs. 55 EUR/MWh (MGRES)*	Cross-border capacity already exists	~30% of UKR electricity production from coal
ROU	~310 MW of cross-border capacity	Can replace MGRES production if electricity flows are better controlled (s. slide 9)	210 EUR/MWh (ROU) vs. 55 EUR/MWh (MGRES)*	Cross-border capacity already exists but B2B-station might be needed to control flows	~35% of ROU electricity production from fossil fuels
b) Expansion of own generation capacity – long-run perspective					
RES	Plans for 400 MW new RES capacity	Domestic production could reduce dependence on gas supply and MGRES	Price to be determined in upcoming auctions	Overall investment costs for capacity shared by multiple investors; high investor interest exists	Key element for MDA to reach climate goals
Gas turbines	Option for domestic balancing capacity	Could replace MGRES as balancing capacity, but dependence on gas imports remains	Electricity price dependent on gas import price; currently very high	Large upfront investment cost to be shouldered by one investor; not likely if MGRES market dominance prevails	With modern technology: lower emissions than MGRES, but higher than RES

\* ROU and UKR: average wholesale electricity price in May 2022, for MDA: MGRES bid in May 2022 59 USD/MWh

- **Short-run options for diversification only imports; prices would increase**
- **Long-run options require considerable investments and market reforms**

## ii. Renewable energy

Renewable capacity development



Source: IRENA, Ministry of Infrastructure and Regional Development, ANRE

Renewable support schemes

Support Scheme	Capacity limit	Responsible entity	Energy source	Installed capacity
Net-metering	Up to 200 kW	ANRE	Solar, wind	10 MW
Feed-in tariff	Up to 1 MW (up to 4 MW for wind)	ANRE	Solar, wind, biogas, hydro	43 MW
Tender auction	Over 1 MW (4 MW for wind)	Ministry of Infrastructure and Regional Development	Solar, wind	-

Source: ANRE, installed capacities as of January 2022

- Renewables important for supply diversification and climate goals
  - MDA offers 3 types of support schemes for RES: net-metering, feed-in tariffs, tenders
  - Upcoming RES tenders envisage a capacity increase of more than 3x
  - More variable RES (wind, solar) require sufficient **balancing capacity** (e.g. gas turbines, battery storage) to match supply and demand
  - Currently, only MGRES can provide balancing for right-bank MDA; difficult to implement due to lack of ANRE (regulator) enforcement capacity in TN
- **Without flexible generation technology, integration of renewables is limited**

# III. Electricity market

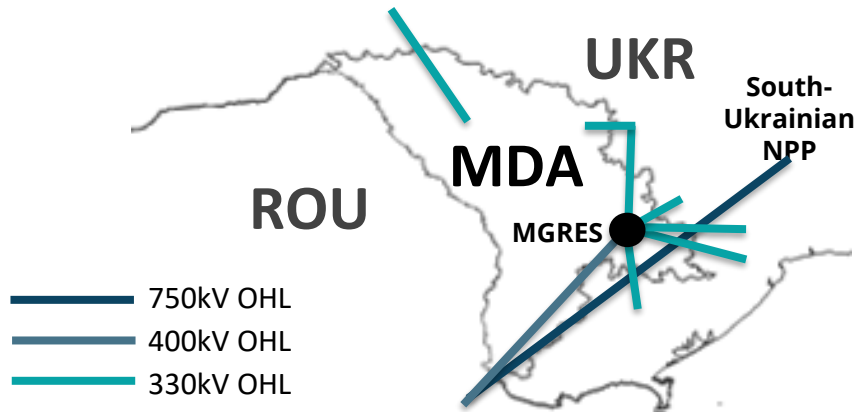
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- Competition on wholesale electricity market limited mostly to supply from MGRES and imports from Ukraine (DTEK Trading, Ukrhydroenergo, Energoatom)
  - No market operator and no spot markets (day-ahead, intraday) in place, makes introduction of flexible capacity difficult; so far, yearly tenders which MGRES mostly wins
  - MGRES receives gas from Gazprom with high discount; thus low production costs, which enable MGRES to strategically underbid other potential suppliers – bid in May 2022: 59 USD/MWh (equivalent to ca. 55 EUR/MWh)
  - Currently, no agreement on long-term contract possible; April and May: contracts for one month only, partly contingent on political concessions to TN
- **Dominant position of MGRES keeps prices low for MDA consumers; but, high dependence on supplier that does not fully operate on market principles**
- Intermediary objective: market coupling with UKR; would enable more competitive supply from UKR
- Final objective: market coupling with ENTSO-E; would enable access for ROU and other EU suppliers
- **Integration in UKR market and subsequently in ENTSO-E market will increase competition and improve bargaining position vis-à-vis MGRES**



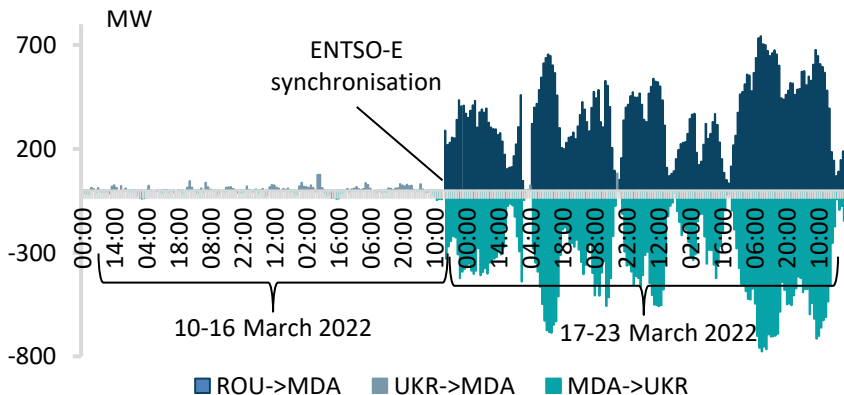
# IV. ENTSO-E synchronisation

MDA cross-border transmission capacity



Source: Moldelectrica, ENTSO-E grid map, own illustration  
 Note: For simplicity, 110 kV OHL are not shown.

Hourly physical electricity flows between MDA and neighbouring countries



Source: ENTSO-E Transparency Platform, data for 10-23 March 2022

- On 16 March 2022: ENTSO-E emergency synchronization with UKR-MDA electricity systems (initially planned for 2023)
  - Technical synchronisation led to high cross-border electricity transit flows (mostly unwanted loop flows from ROU to Odessa region in UKR)
  - Next step will be to couple MDA and UKR with ENTSO-E electricity market
  - MDA considers B2B-station to better control inflows from ROU

- **ENTSO-E synchronisation opens new options to diversify supply (imports from ROU and other EU)**
- **So far only technical sync., market coupling needed for imports**

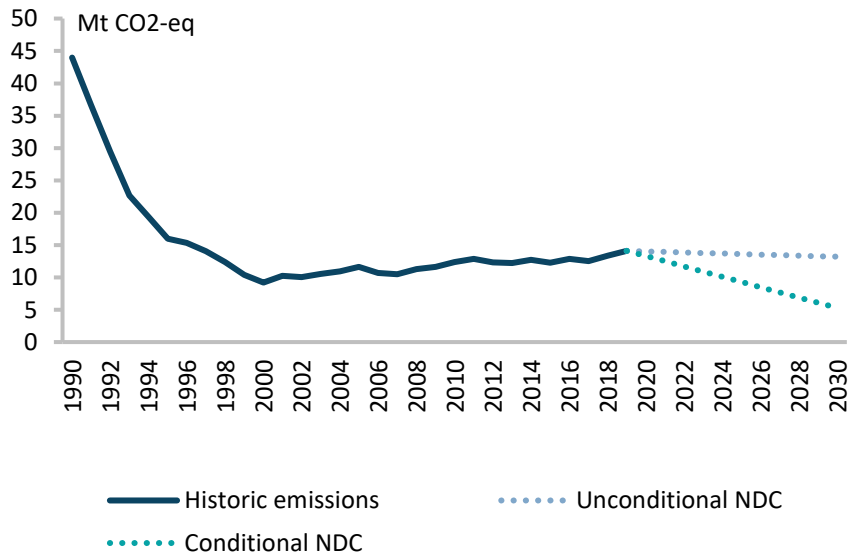
# V. EU energy integration

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- Integration with EU through Association Agreement signed in 2014 and membership in Energy Community since 2010 (see Annex II)
- Key energy policy points of Moldova-EU Association Agreement
  - Development of competitive, transparent and non-discriminatory energy markets (aligned to EU standards)
  - Stable and attractive investment climate
  - Diversification of energy sources, suppliers and transportation routes
  - Promotion of energy efficiency and energy saving
  - Reduction of emissions of greenhouse gases including through energy efficiency and renewable energy projects
- Climate-related requirements favour green development to avoid high carbon prices or replacement needs in the near future
- Energy integration would enable access to EU markets, e.g. gas purchasing platform
- **MDA integration in EU energy markets important for reduction of dependence on RUS and long-term alignment with climate goals**
- **But, requires commitments from MDA to reform energy markets, increase low carbon generation capacity and bolster energy efficiency**

# VI. Climate goals

Historic GHG emissions and NDC goal



Source: Updated NDC of Moldova, UNFCCC data

- In 2016, MDA signed Paris Agreement on Climate Change
  - Nationally determined contributions (NDC): -70% (unconditional) and -88% (conditional, if receiving int. fin. support) below its 1990 level in 2030
  - Implies -7% (unconditional) and -63% (conditional) below today's level
- Priorities in energy sector to reach climate goals:
  - Improving energy efficiency
  - Increasing the use of RES
- **Increase long-term energy security by lowering demand and increasing domestic supply**
- **In long-term, could also offer advantages on energy prices, if cost for fossil fuels remain high**

# About the German Economic Team



Financed by the Federal Ministry for Economic Affairs and Climate Action, the German Economic Team (GET) advises the governments of Ukraine, Belarus\*, Moldova, Kosovo, Armenia, Georgia and Uzbekistan on economic policy matters. Berlin Economics has been commissioned with the implementation of the consultancy.

*\*Advisory activities in Belarus are currently suspended.*

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# Annex I: Electricity demand and supply

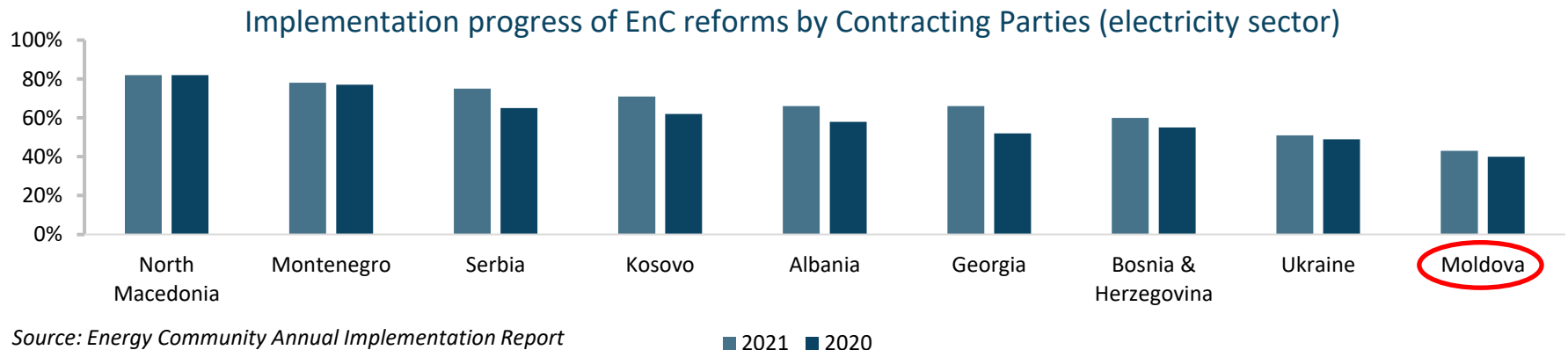
## Electricity demand and supply capacity

		in MW	Commentary
<b>Peak load in rb MDA and TN</b>		<b>1,074</b>	<ul style="list-style-type: none"> <li>Average load is 695 MW</li> </ul>
<b>Electricity supply, incl.</b>		<b>3,832</b>	<ul style="list-style-type: none"> <li>Despite sufficient installed generation and transmission capacity on the entire territory, MDA electricity supply currently is subject to energy security risks</li> </ul>
<b>MGRES (in TN)</b>		2,520	<ul style="list-style-type: none"> <li>Dominates electricity supply; provides relatively cheap electricity to right-bank MDA</li> <li>Subject to risk: constant disputes with TN, Russian ownership and reliance on Russian gas</li> </ul>
<b>Right bank MDA production</b>	<b>Combined heat and power</b>	343	<ul style="list-style-type: none"> <li>Electricity production is heat driven and, therefore, mostly in winter</li> <li>Subject to risk: reliance on Russian gas</li> </ul>
	<b>Hydro</b>	16 and 46 (TN)	<ul style="list-style-type: none"> <li>Low installed capacity</li> <li>Expansion difficult due to environmental issues</li> </ul>
	<b>Wind</b>	73	<ul style="list-style-type: none"> <li>Low installed capacity, due to variable nature, expansion requires balancing capacity</li> <li>Expansion costly but reduces natural gas imports</li> </ul>
	<b>Solar</b>	25	<ul style="list-style-type: none"> <li>Low installed capacity, due to variable nature, expansion requires balancing capacity</li> <li>Expansion costly but reduces natural gas imports</li> </ul>
	<b>Biogas</b>	6	<ul style="list-style-type: none"> <li>Low installed capacity</li> <li>Biomass/biogas production must be evaluated</li> </ul>
<b>Cross-border capacity</b>	<b>UKR</b>	600	<ul style="list-style-type: none"> <li>In previous years, important replacement option for MGRES</li> <li>War increases the risk of supply stop</li> <li>Most of cross-border transmission lines cross TN territory</li> </ul>
	<b>ROU</b>	310	<ul style="list-style-type: none"> <li>Since ENTSO-E synchronisation, unwanted electricity flows (loop flows) from ROU increased</li> <li>Therefore, useable capacity still relatively low</li> <li>Expansion (B2B-station) is planned and will be important</li> </ul>

Source: ENTSO-E Transparency platform, Moldelectrica, data for 2021

# Annex II: Energy Community

- Since 2010, MDA already full member of Energy Community (EnC)
  - EnC is an organization between the EU and a number of South-East European and Eastern European countries to expand the EU's internal energy market
  - Requires transposition EU Energy Acquis into national legislation
- Several EnC reforms have not yet been implemented by MDA:
  - Unbundling of TSO
  - Wholesale market rules to enable competition
  - Similarly, lack of competition in retail market has not yet been tackled so that share of suppliers at unregulated prices still very low



# Annex III: Potential projects with donor participation

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- Programmes for energy efficiency measures in residential buildings
- Programmes for energy efficiency measures in public buildings
- Designing financial mechanisms for implementing energy efficiency measures (e.g energy efficiency fund)
- Elaboration of options for the integration of more renewables and balancing capacity to ensure a future-oriented electricity system
- Designing and optimising renewable tenders procedure
- Elaboration of market reforms and measures for competitive energy markets in Moldova, incl. implementation of EU and Energy community requirements
- Strategy and action plan for implementation of MDA climate goals in energy sector
- Strategy and technical solutions for decarbonising the district heating sector