

INVESTMENT OPPORTUNITY OF ENERGY SECTOR



ENERGY SECTOR OF UKRAINE

Energy sector macroeconomics



7.6%

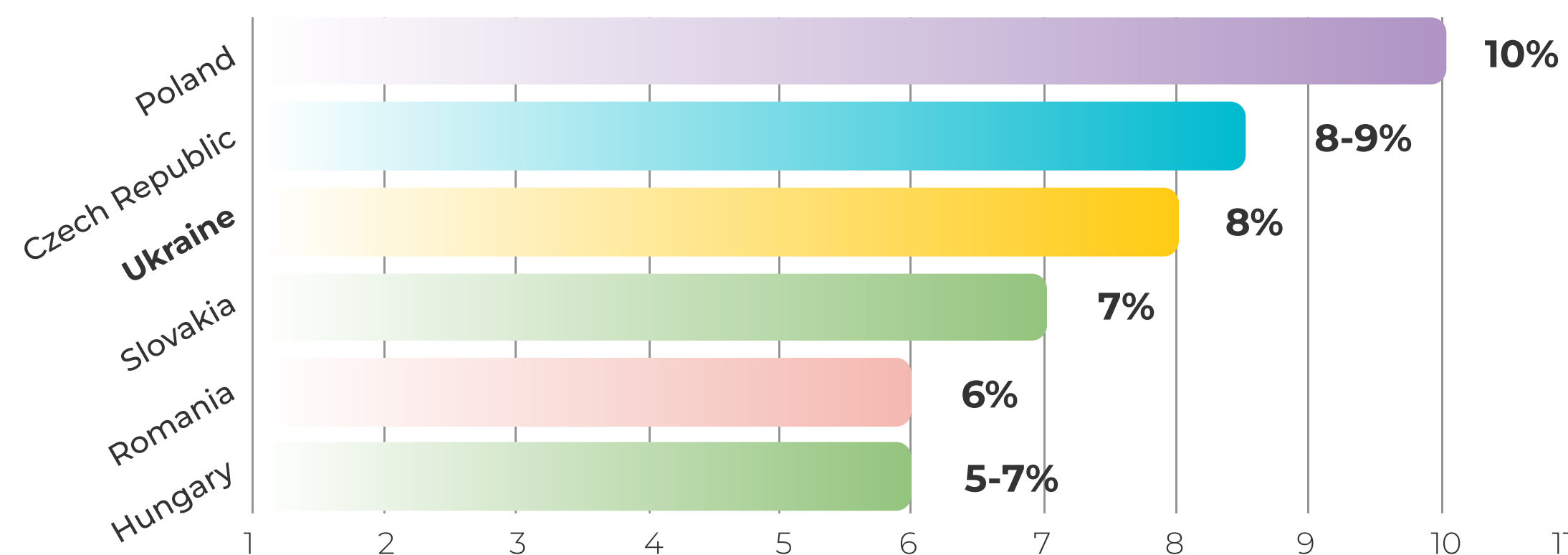
of Ukraine's budget was provided by the energy sector in 2023



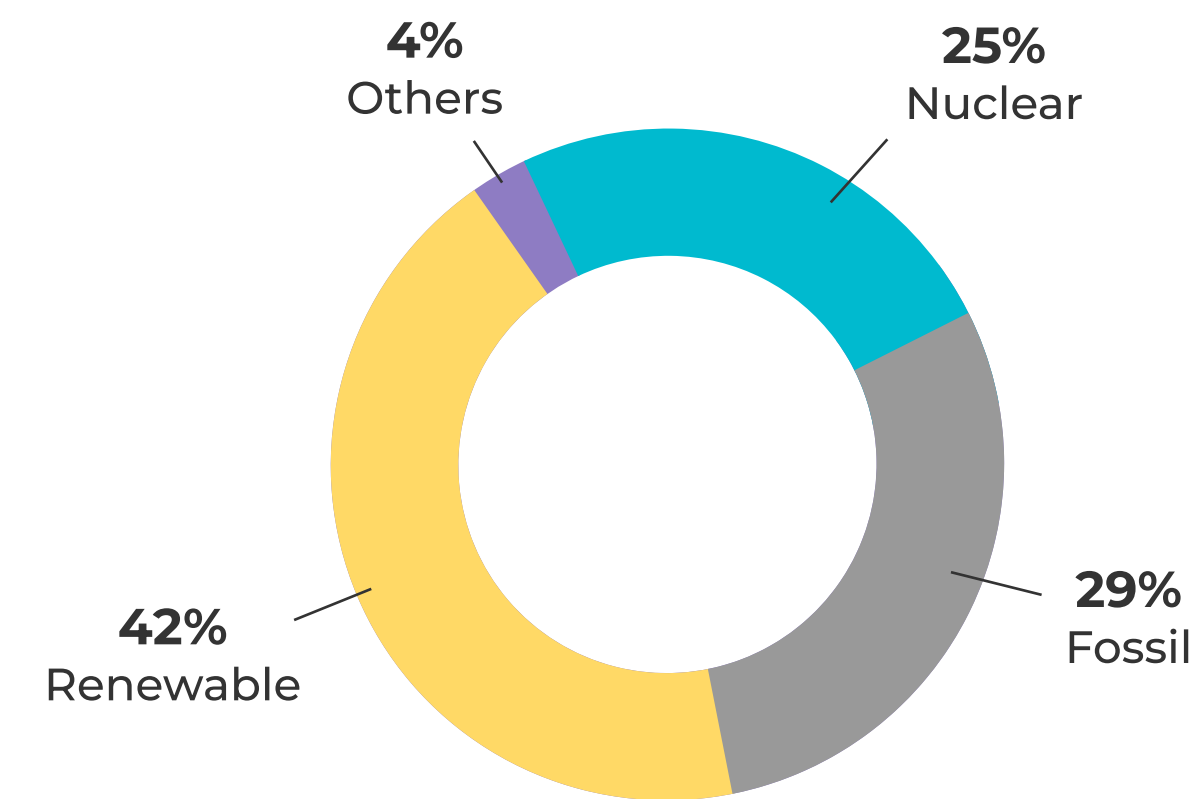
Top-30

electricity consumption in the world

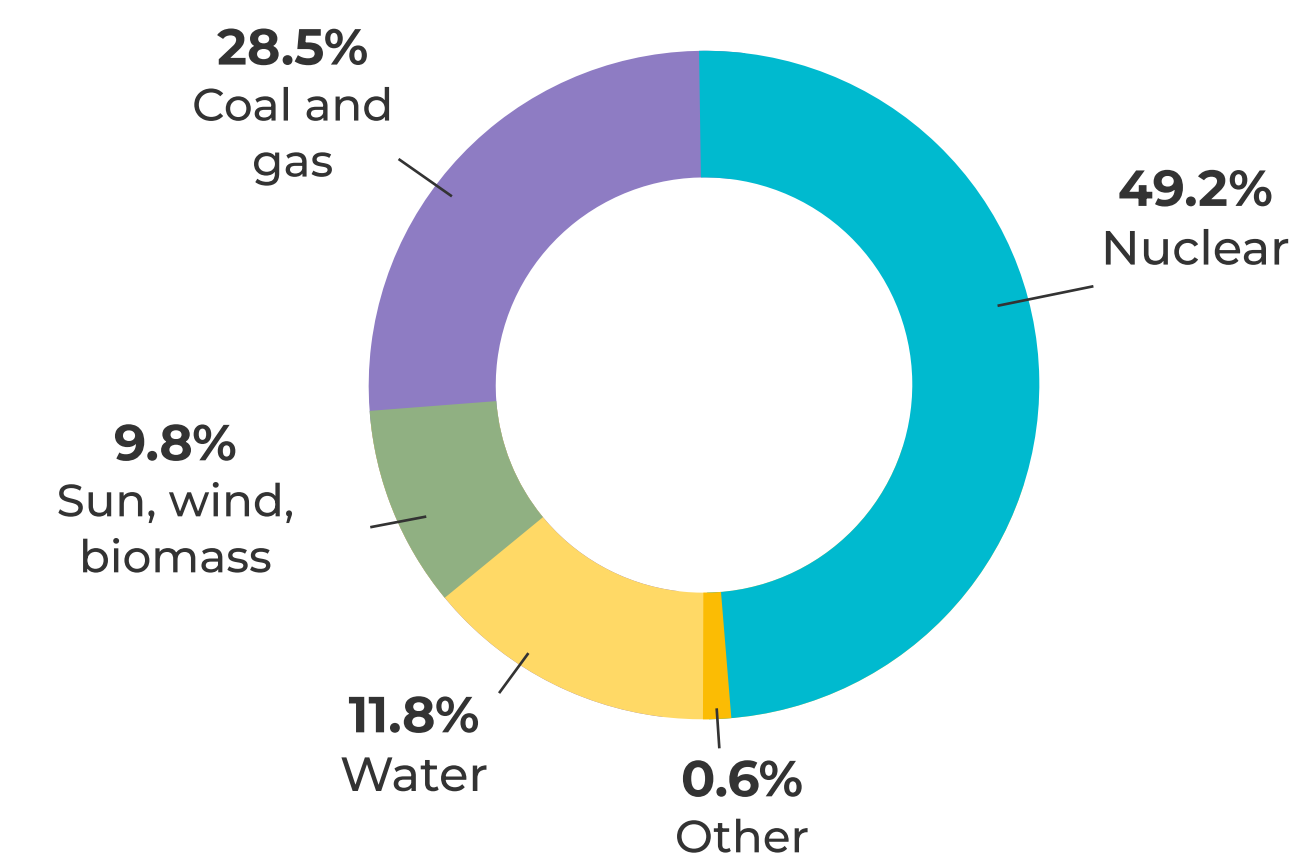
Energy share in the country's GDP, 2023



Energy sources in Europe, 2023



Energy sources in Ukraine, 2023

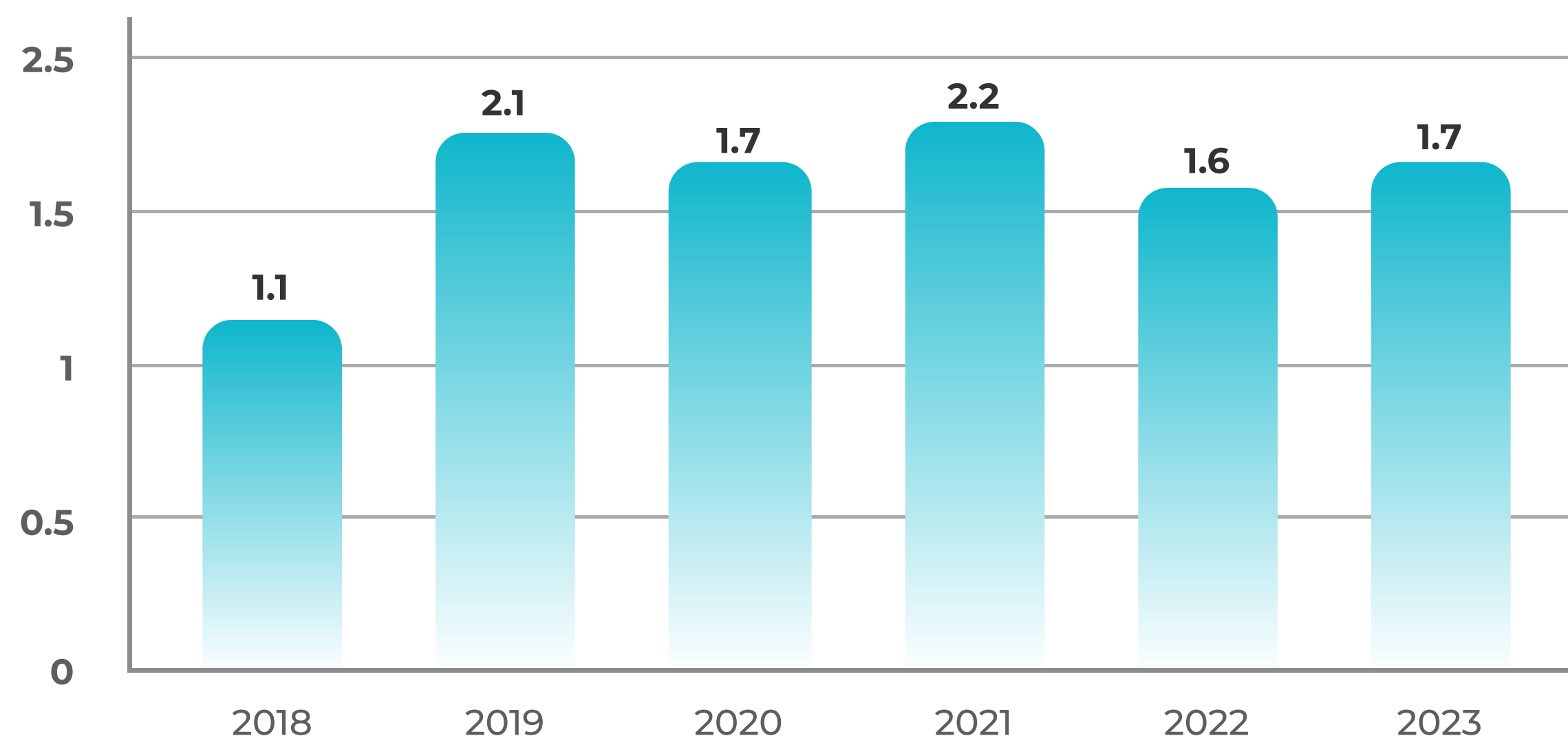


Approximately **450 000** individuals are employed in the Ukrainian energy sector, accounting for **1,2% of the population**

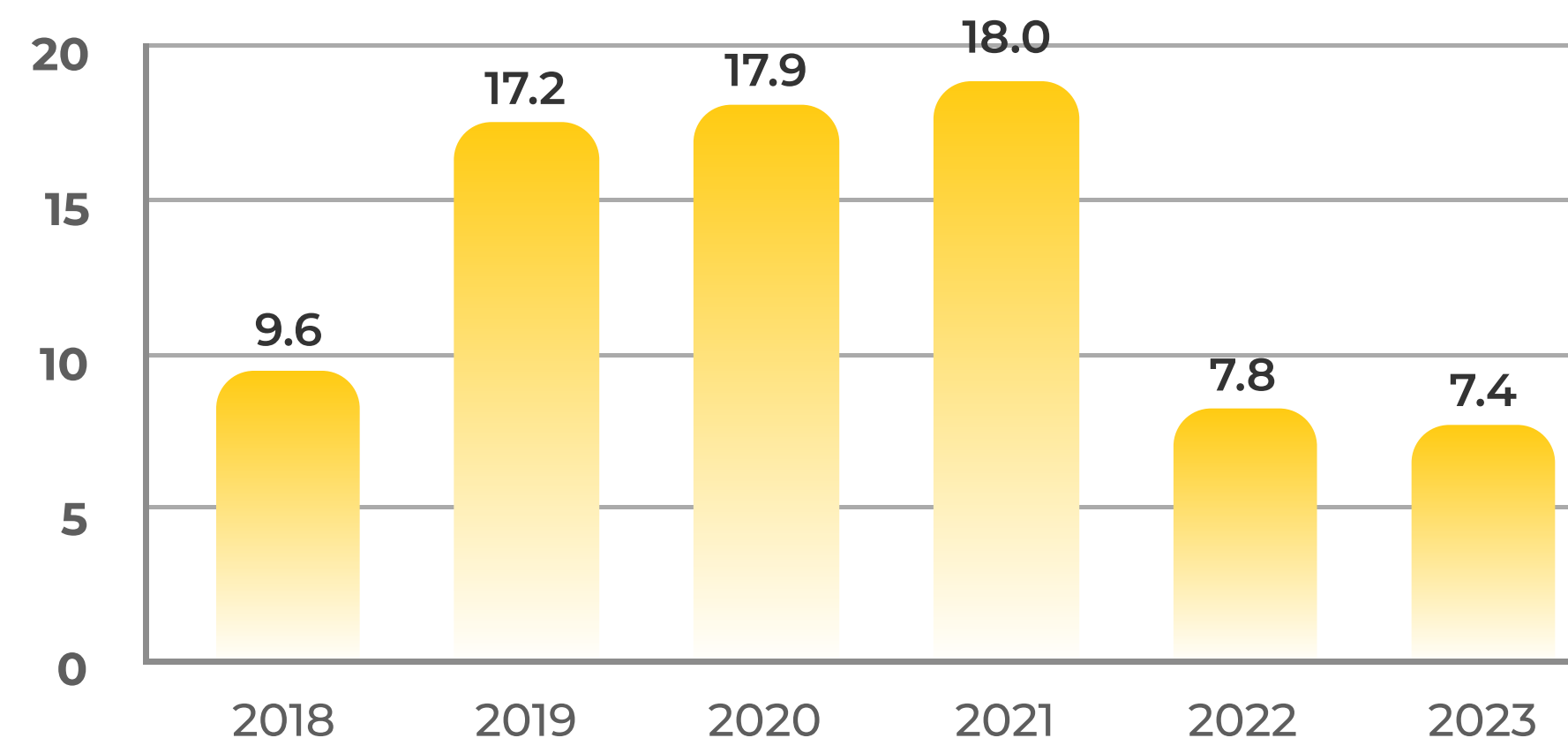
ENERGY SECTOR OF UKRAINE

FDI snapshot

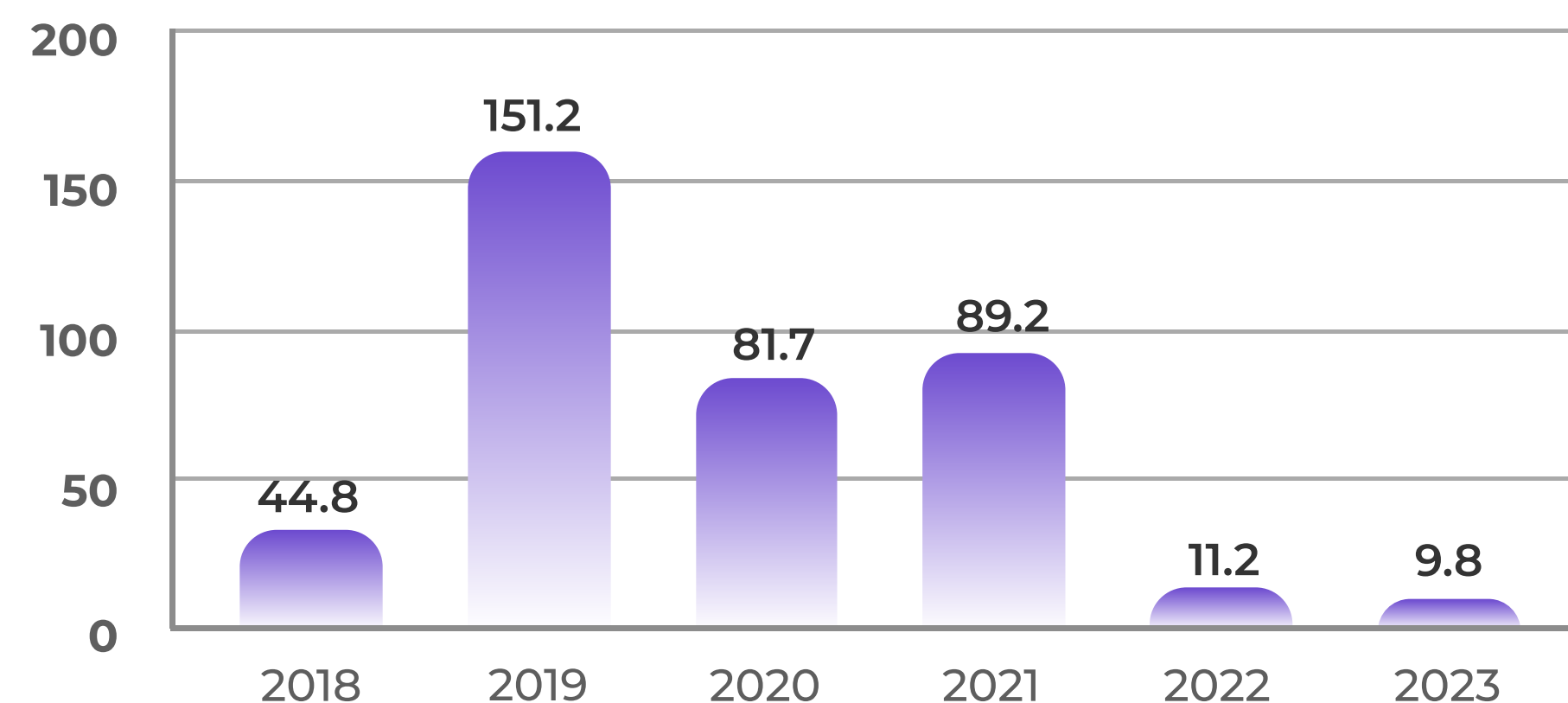
Total FDI in electricity generation, transmission and distribution, bln USD



Total FDI in manufacture of electric motors, generators, transformers, electrical distribution and control equipment, mln USD



Total FDI in gas production, mln USD



~7%

of FDI in electricity supply in Ukraine in relation to investments in other economic activities

ENERGY SECTOR OF UKRAINE

Losses due to full-scale invasion



Over **50%** of the energy infrastructure has been damaged, causing **23 GW** of generation losses.* From March to July 2024, Ukraine lost **9 GW** of generation



USD 56 bln

Damage to Ukraine's energy infrastructure caused by Russian attacks since the beginning of the full-scale invasion as of spring 2024

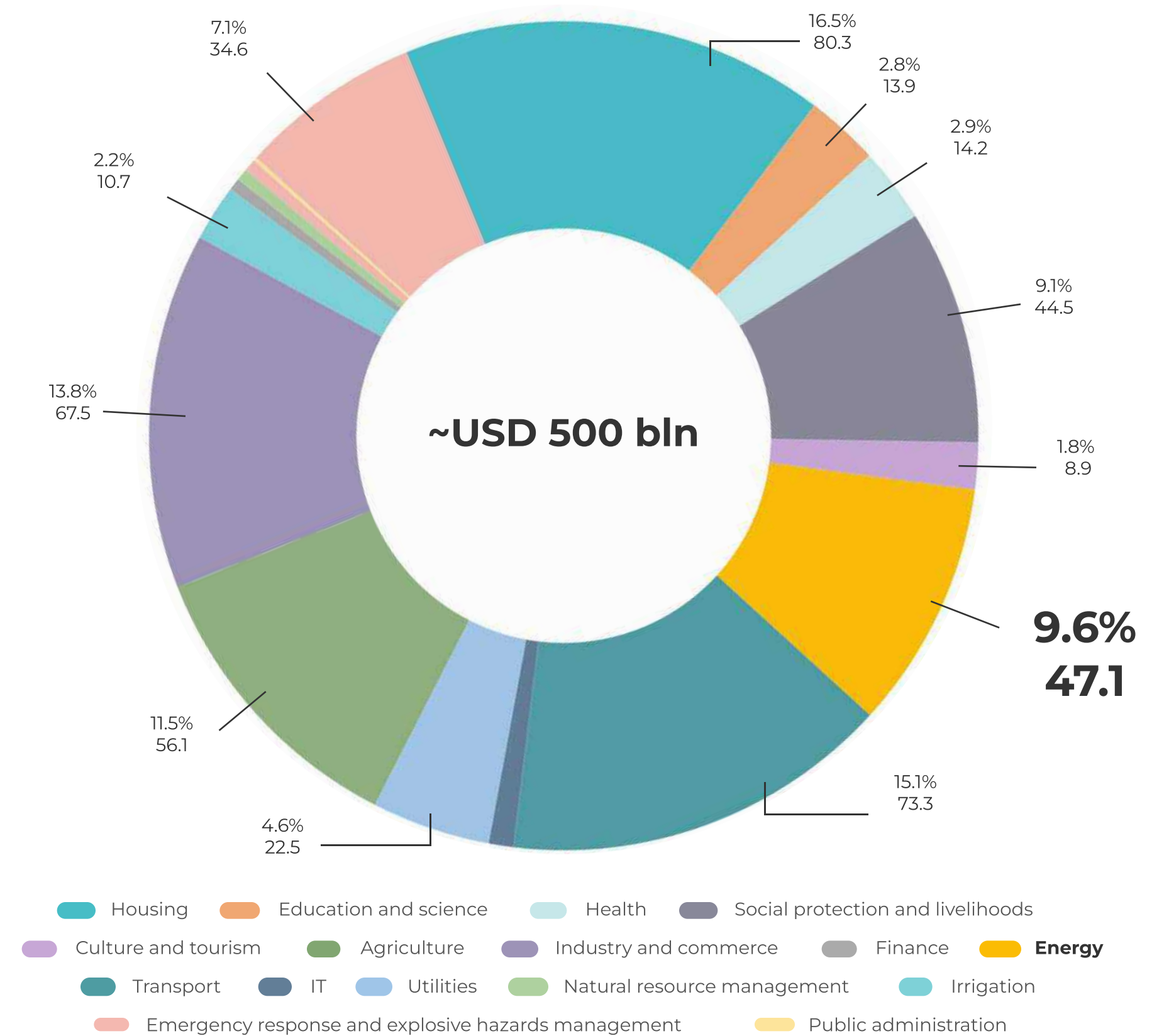
5%

Average electricity deficit forecast **in 2024-2025**

0.6%

of GDP will be electricity deficit in **2024**

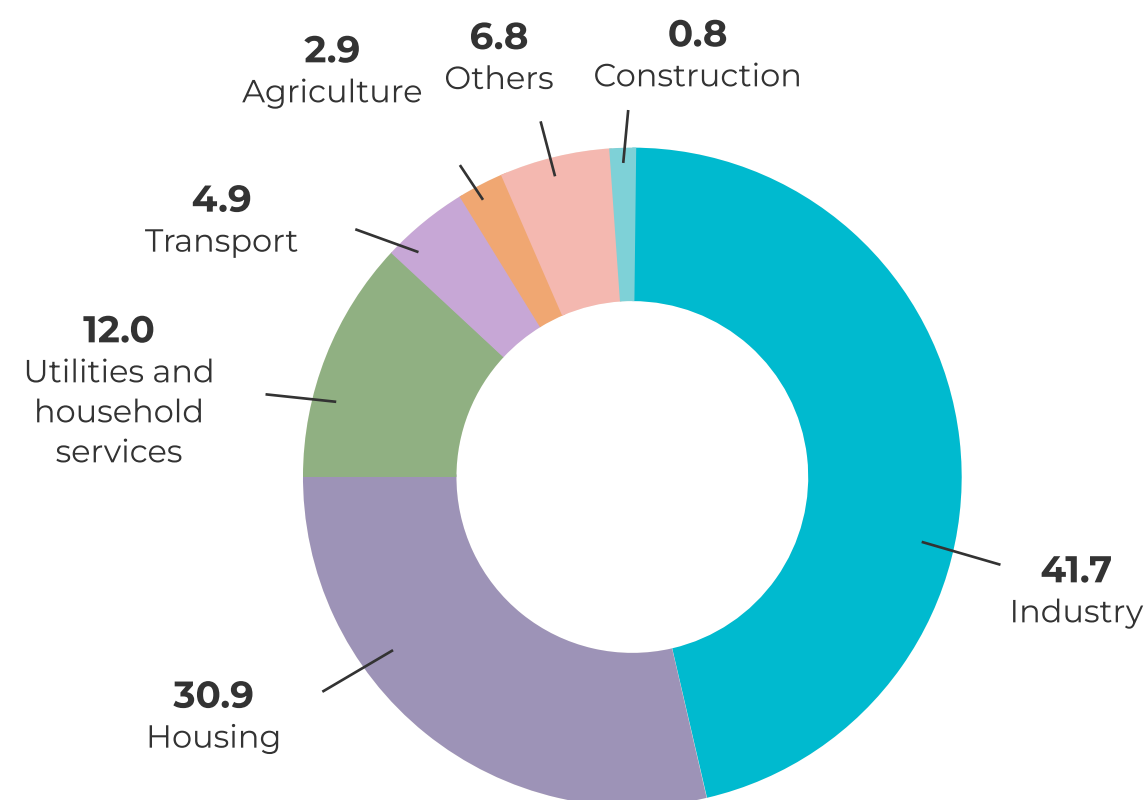
Recovery and reconstruction needs, USD bln*



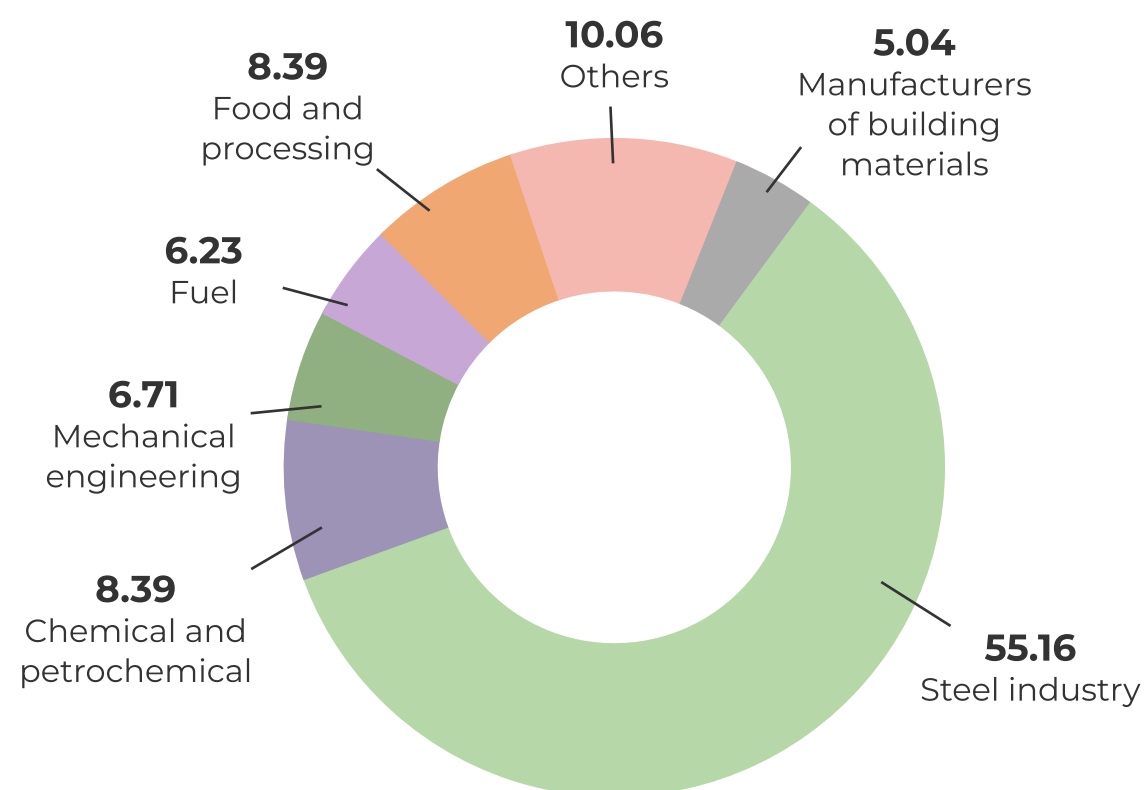
ENERGY SECTOR OF UKRAINE

Current state of electricity consumption

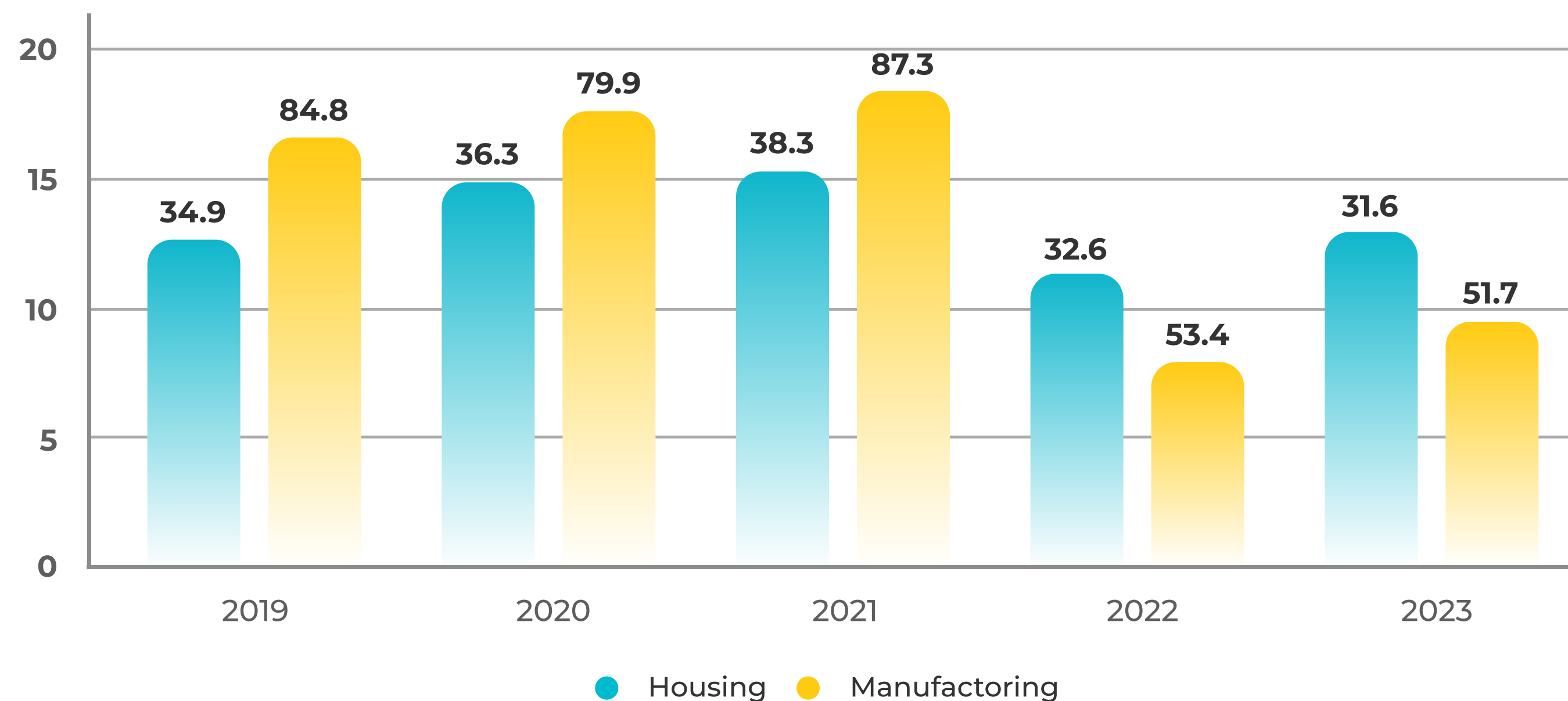
Electricity consumption in Ukraine, %, 2021



Industrial sector electricity consumption, %, 2021



Electricity consumption by housing and manufacturing, bln kWh, 2019-2023

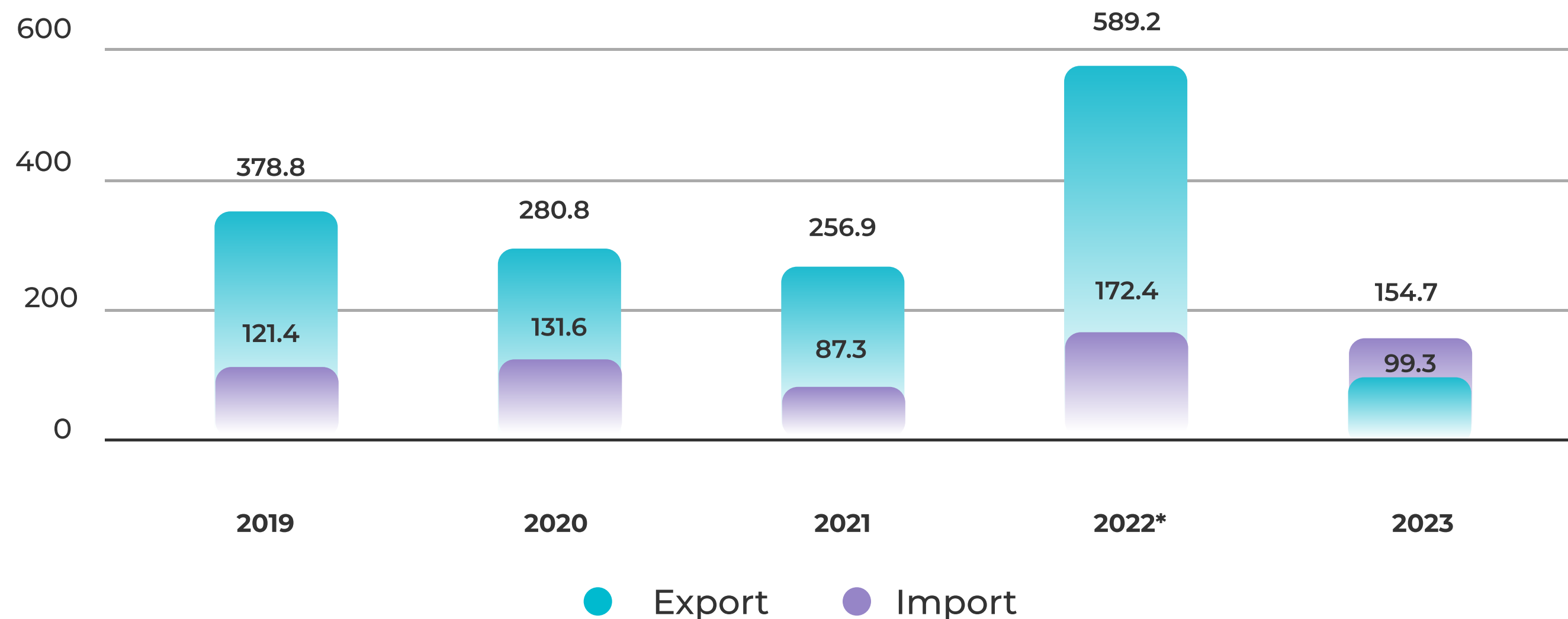


Electricity consumption structure shows that the majority of electricity is used by industry and covers the needs of the residential sector

ENERGY SECTOR OF UKRAINE

Electricity turnover

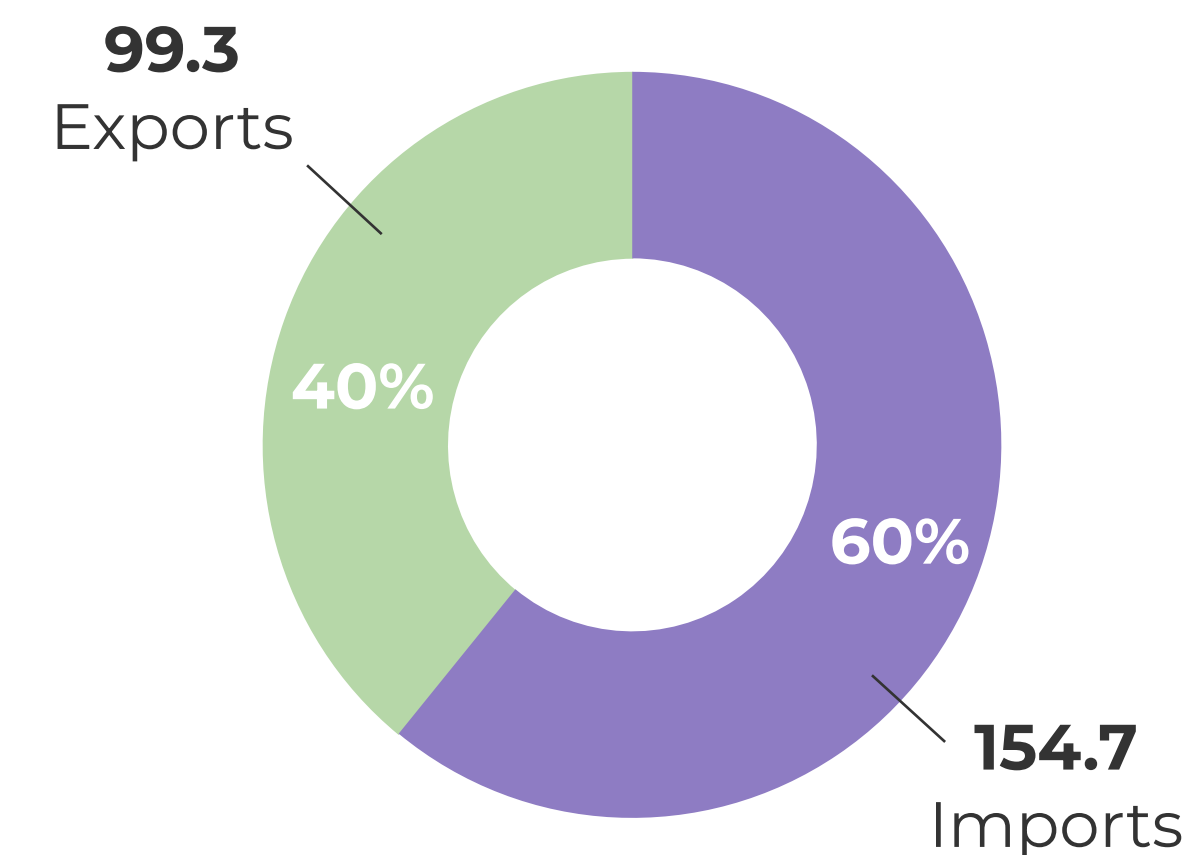
Dynamics of electricity turnover in Ukraine in 2019-2023, USD mln*



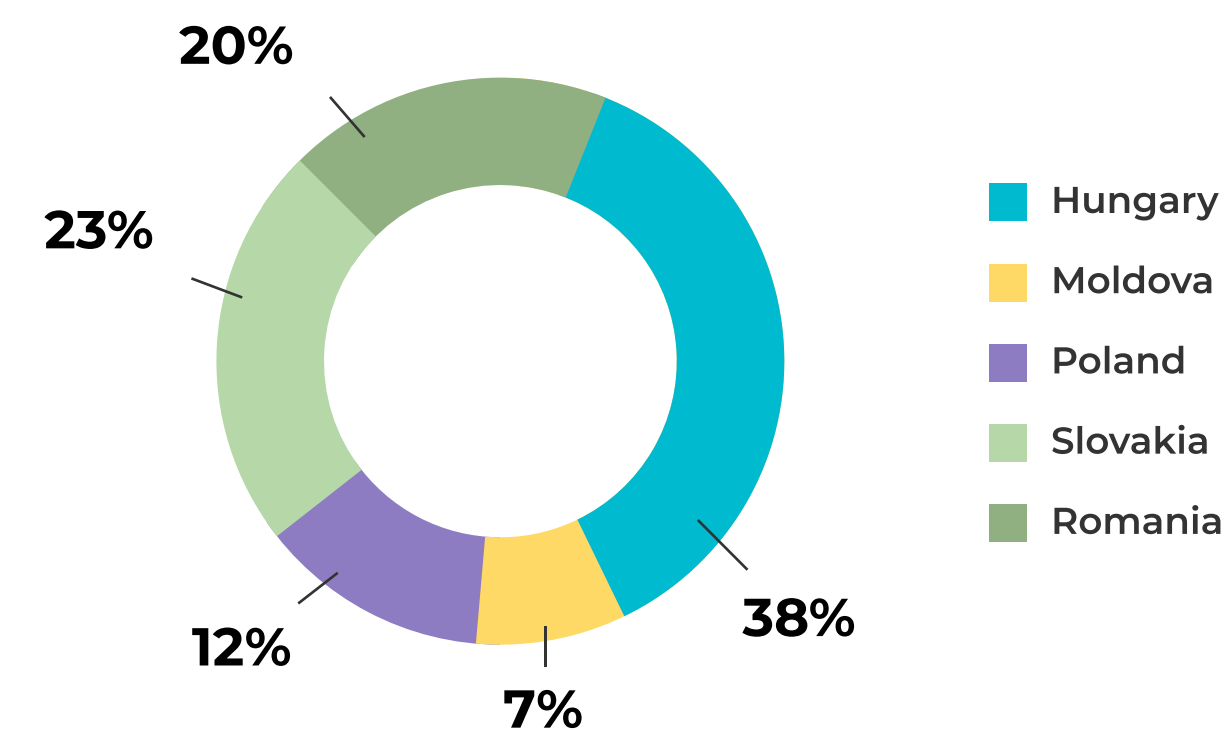
In 2023, electricity imports to Ukraine exceeded exports as a result of insufficient production capacity due to russia's terrorist attacks on energy infrastructure

In **June 2024**, Ukraine imported **6%** more electricity than in the whole of 2023 - **858.4 thousand MWh**, which is also the **largest monthly volume since 2014**

Electricity turnover, mln USD, 2023



Electricity imports to Ukraine, for the first six months of 2024

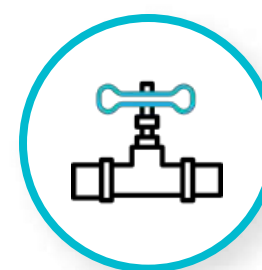


ENERGY SECTOR OF UKRAINE

Gas sector



12
underground gas
storage facilities



~31 bln m³
total storage
capacity

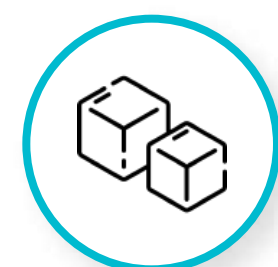
Nº1

in Europe

by the capacity of underground gas storage facilities

Nº3

In the world



more than 8.1 bln m³
of gas available in gas storage
facilities in Ukraine as of 2024

In 2023

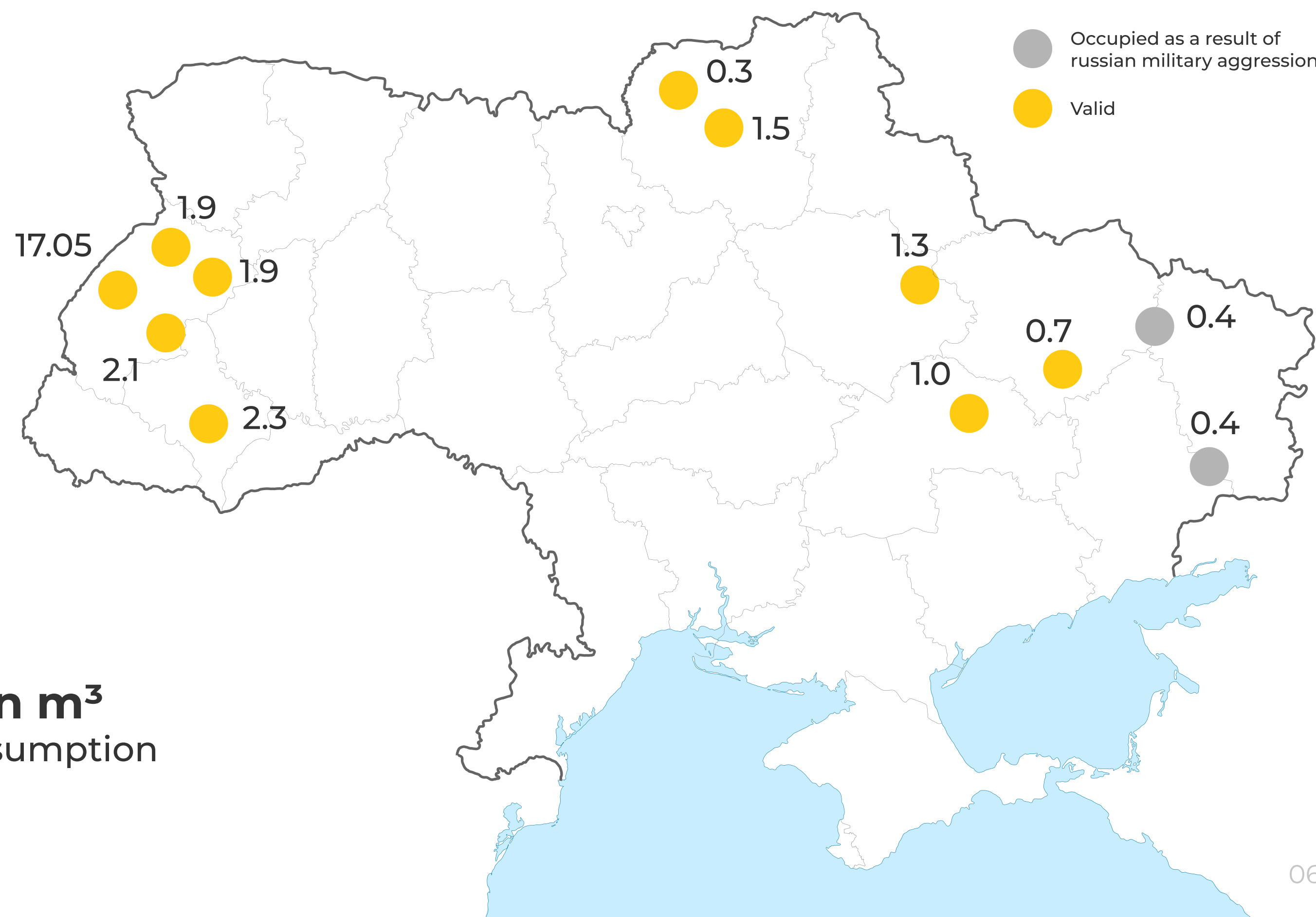


18.7 bln m³
gas production



19.6 bln m³
gas consumption

Underground gas storage facilities in Ukraine, bln m³

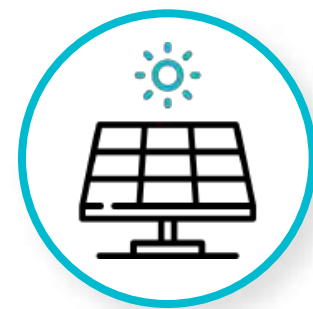


RENEWABLE ENERGY

Solar energy



about **13% of industrial SPPs** destroyed or damaged since the beginning of the full-scale invasion

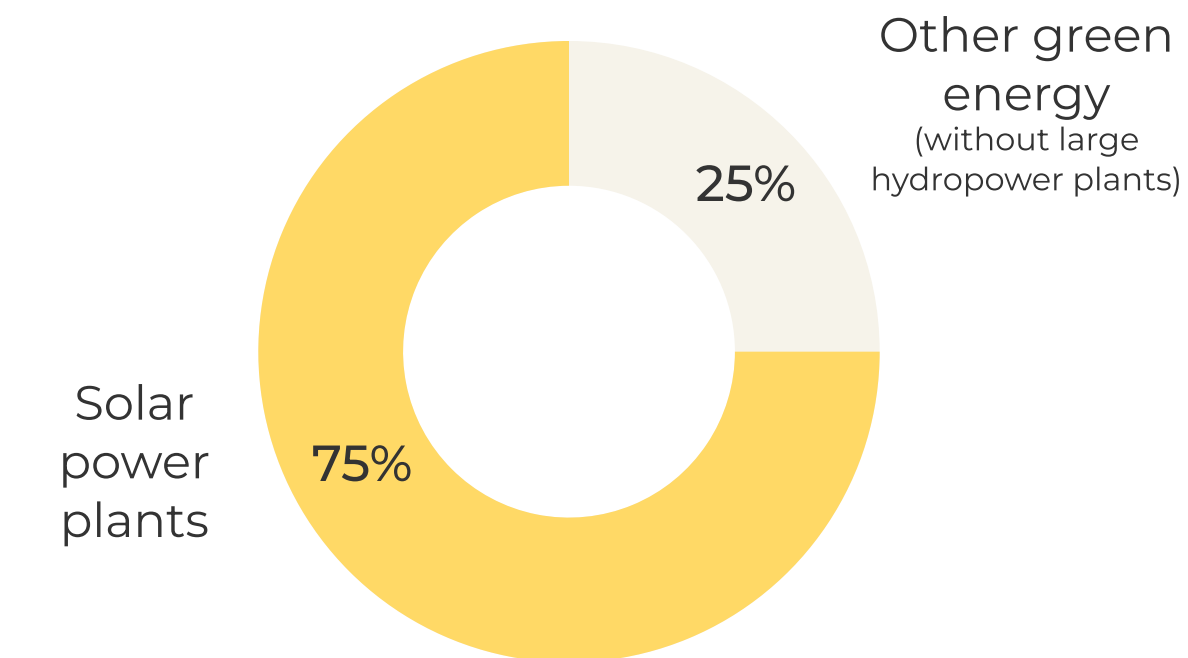


about **1400 facilities** solar power plants

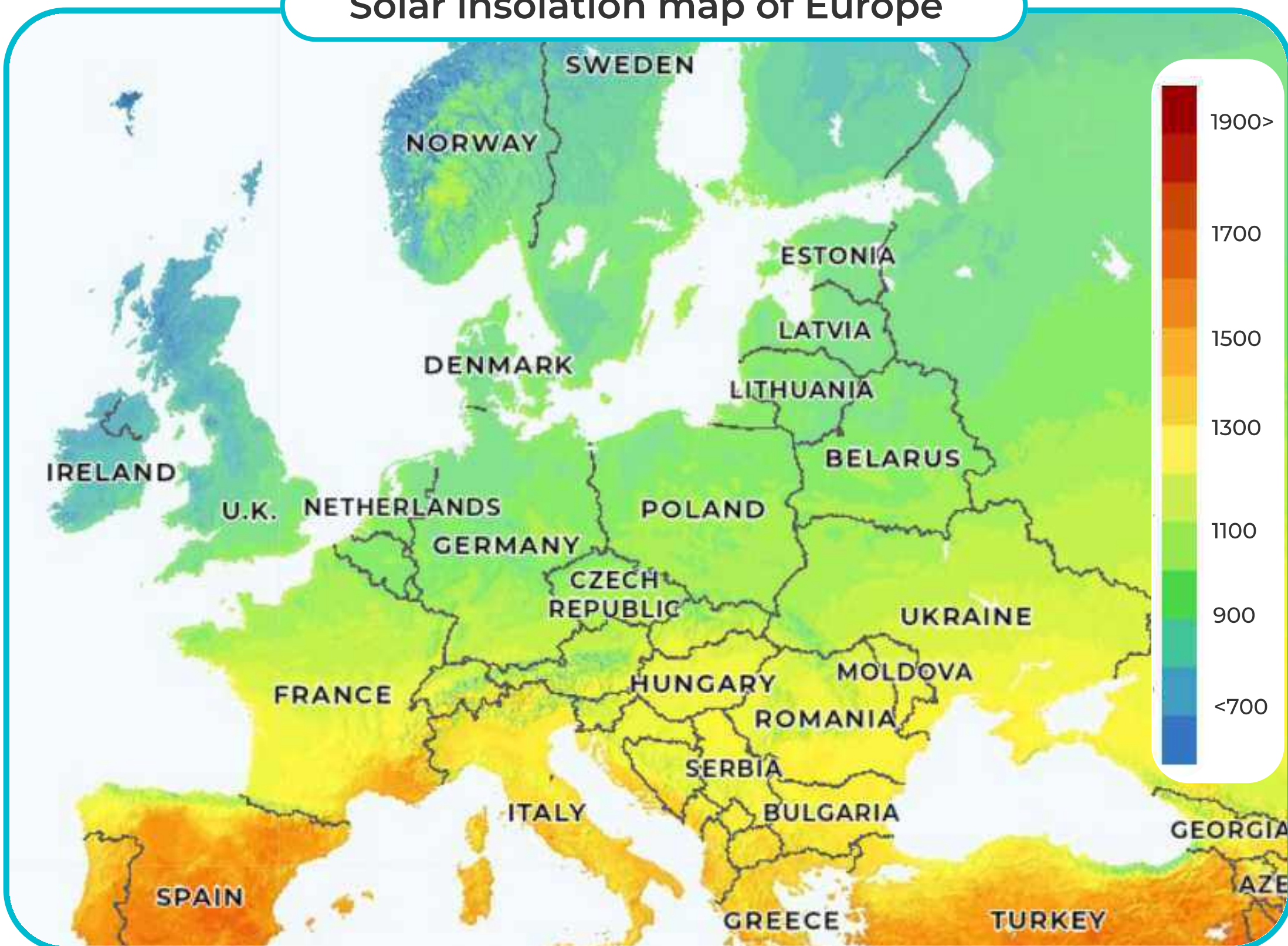


about **USD 150 mln** invested by Ukrainian businesses in solar energy in 2023

Share of solar energy production, 2024



Solar insolation map of Europe



- ⚡ The entire territory of Ukraine is suitable for the installation of solar power plants
- ⚡ The southern regions of the country are considered optimal for the operation of these facilities

Insolation indicators

Ukraine
From **1100** to **1500 kWh/m²**

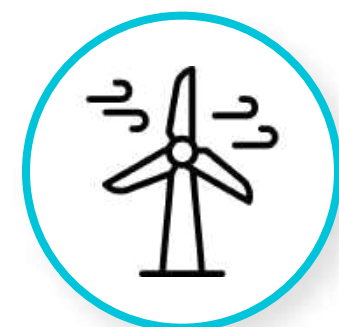
Europe
From **600** in the north to **2200 kWh/m²** in the south

RENEWABLE ENERGY

Wind energy

- The greatest potential for wind power plant installations is found in the northeastern regions of Ukraine, where the average **wind speed** exceeds **7 m/s**

Before the full-scale in Ukraine were:



34
wind power plants
(699 wind turbines)



3.5 MW
average capacity
of one turbine



about
80%
of wind power energy
was occupied or damaged

Bioenergy



34 mln tons
Biomass potential in Ukraine
(37% of agricultural waste per year)

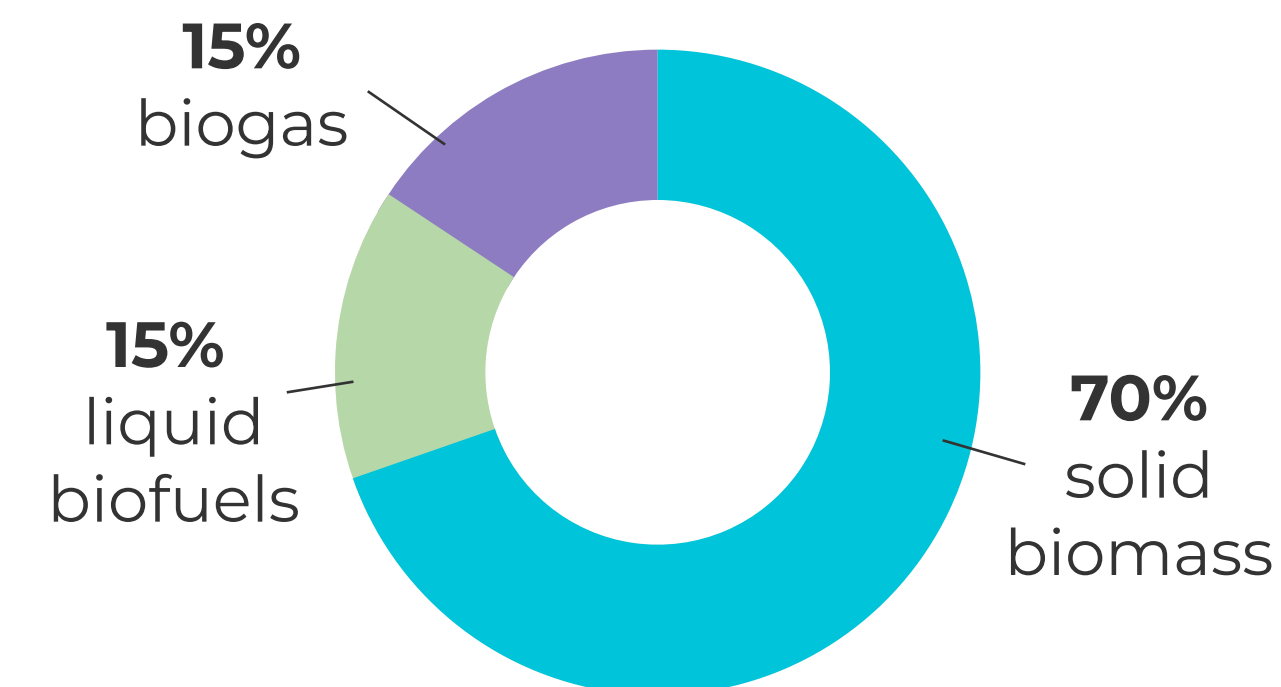
94 mln tons
solid waste
per year

12 mln tons
agricultural
waste per year



21.8 bln m³
Production potential of
biogas/biomethane per year

Structure of bioenergy in Ukraine



RENEWABLE ENERGY

Hydroelectricity

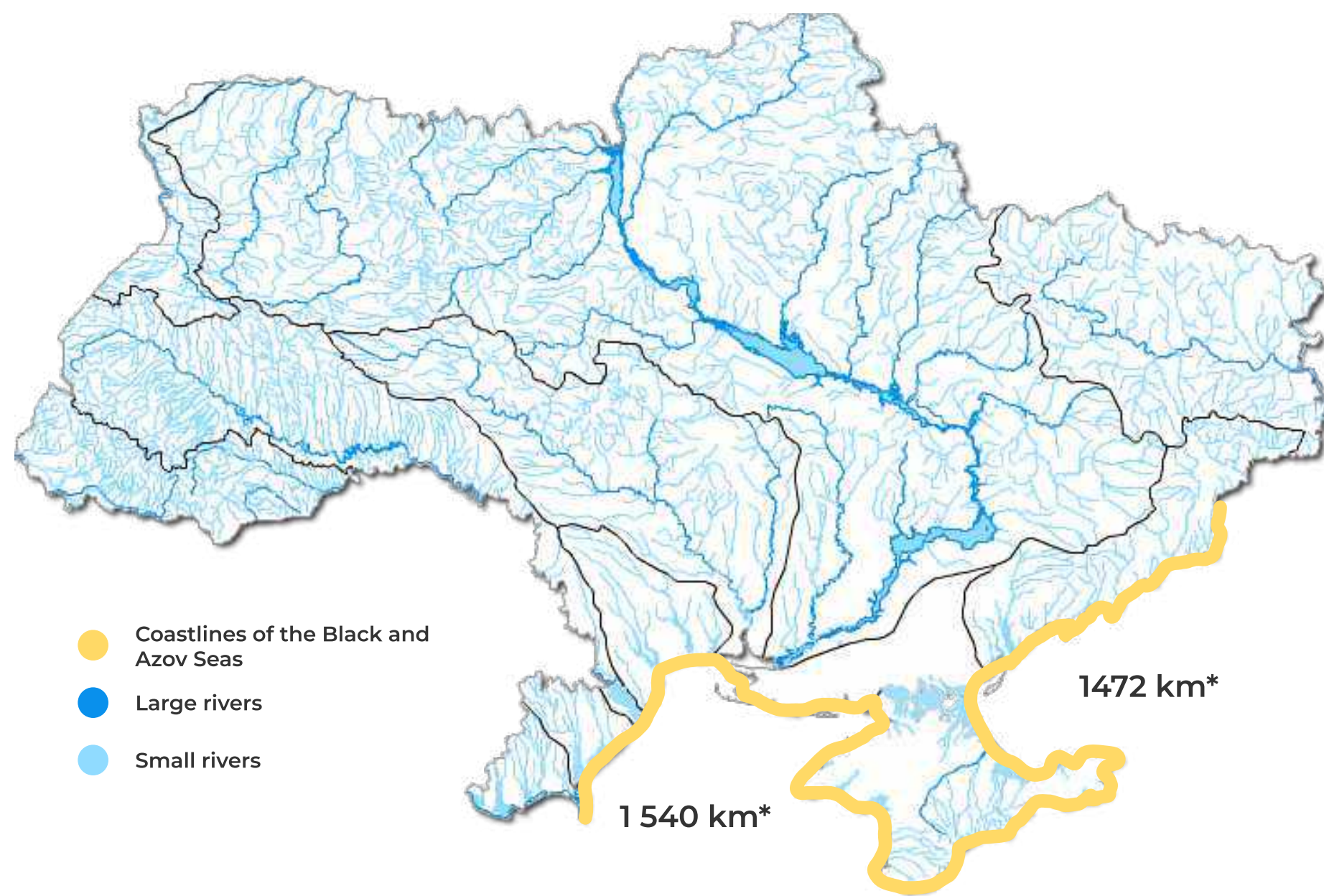


In 2023, the **Kakhovka HPP** was destroyed. **Kaniv HPP** and **Dnipro HPP** stations were damaged. Attacks on hydroelectric power plants resulted in the loss of about **2500 MW** of capacity.



45% of hydropower capacity was destroyed as a result of military aggression
The preliminary amount of losses is about **USD 3 bln**

Map of the rivers of Ukraine



Functioning in Ukraine:

● **10 large HPP**
of Ukrhydroenergo

● **3 hydroelectric PP**
Tashlyk, Dniester and Kyiv
hydroelectric power stations

● **~50 small HPP**
publicly or privately owned
average capacity — **200 mln kWh**

Investment opportunity: hydropower plant construction potential



The total hydroelectric capacity is located on the **Dnipro** and **Dniester rivers**. However, there is potential for establishing new stations in any region with rivers, such as the Carpathian rivers, which could provide significant energy supply to the western regions.

RENEWABLE ENERGY

Green energy condition



1400

new renewable energy sources
connected to the
system in 2023*



8,7 GW of renewable energy
capacity at the beginning of 2024**

1000+ companies,
operating more than

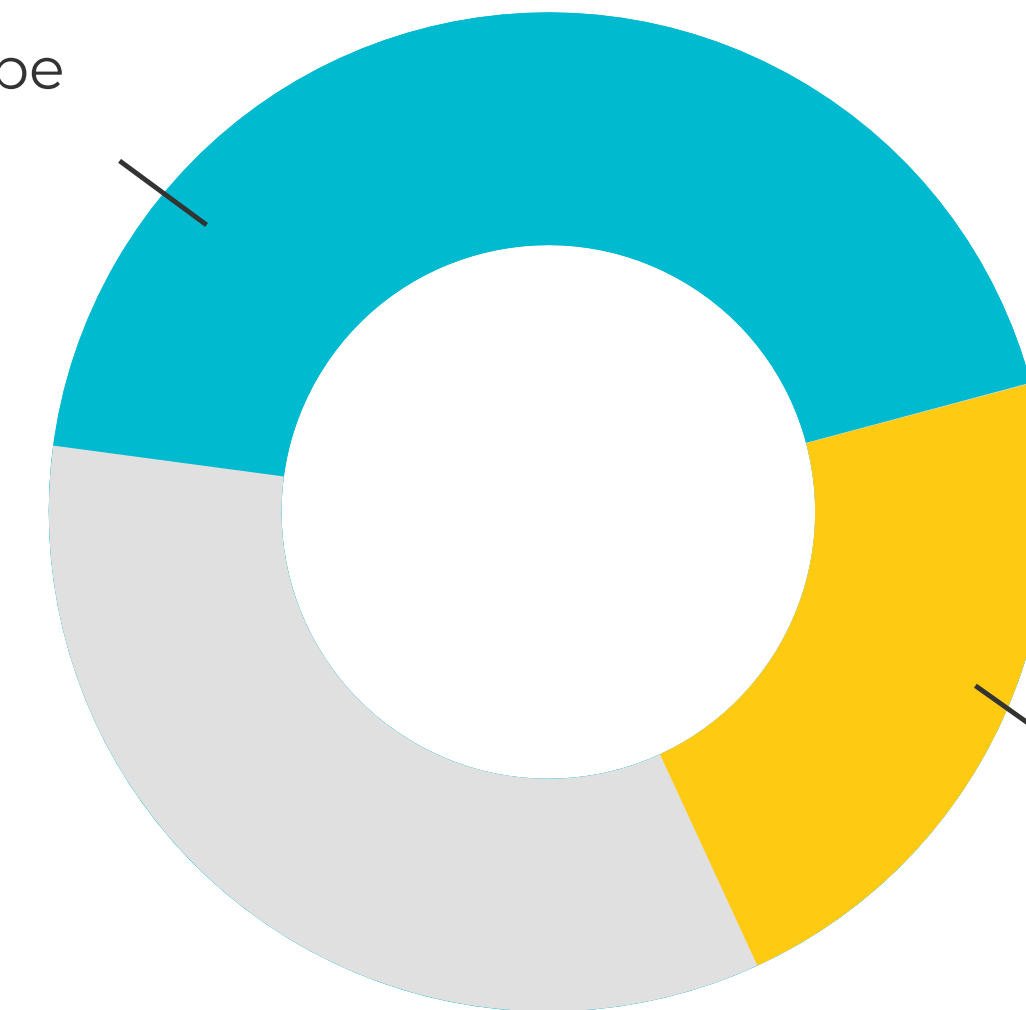
1500+ facilities
of renewable energy



up to **75%** of renewable energy
infrastructure objects suffered
varying degrees of damage
due to the war

Share of RES in the structure of production
(including large hydropower plants), 2023

42%
In Europe



21.6%
In Ukraine

ENERGY EFFICIENCY IN UKRAINE

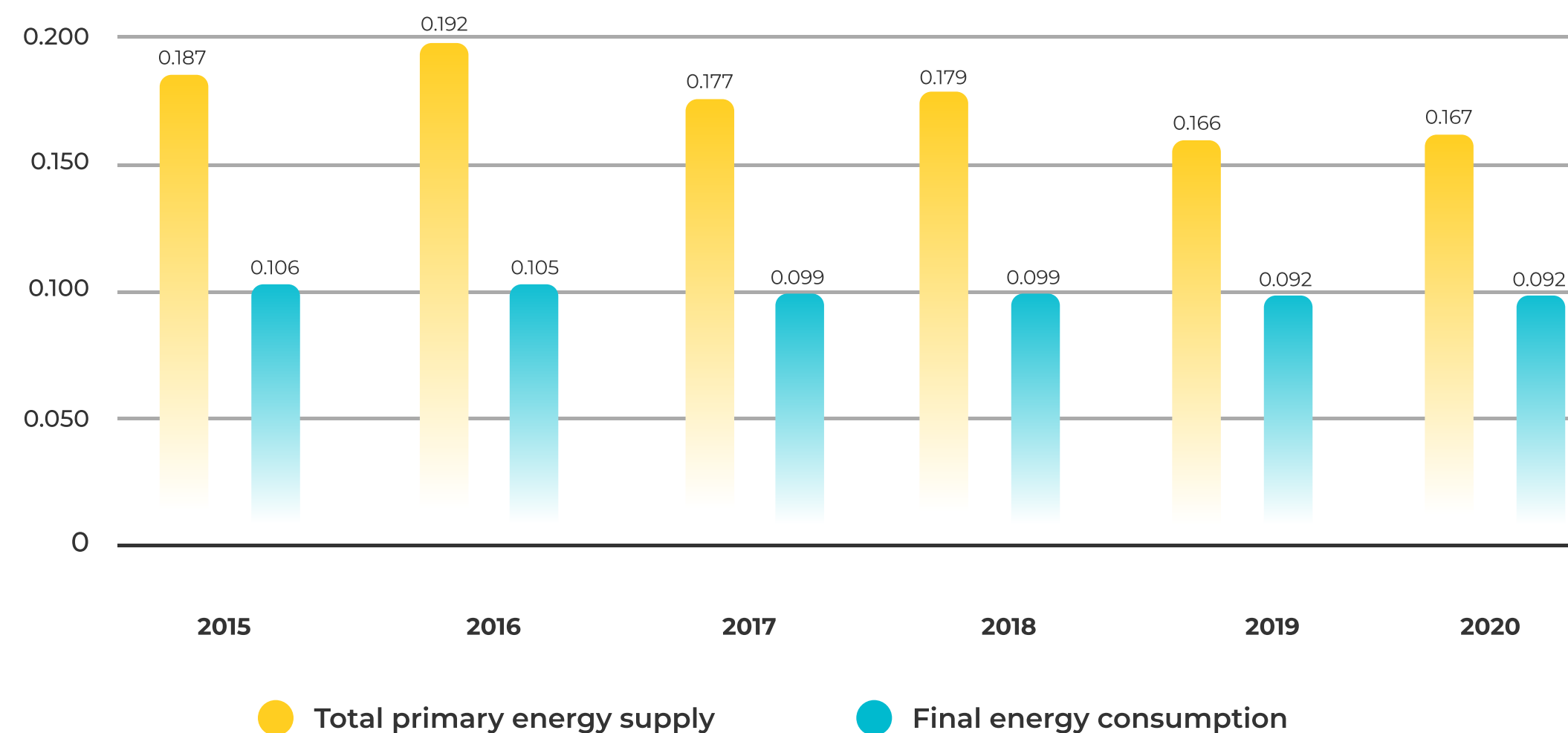
The state of energy efficiency development in Ukraine

Ukraine's GDP energy intensity is one of the highest in the world:

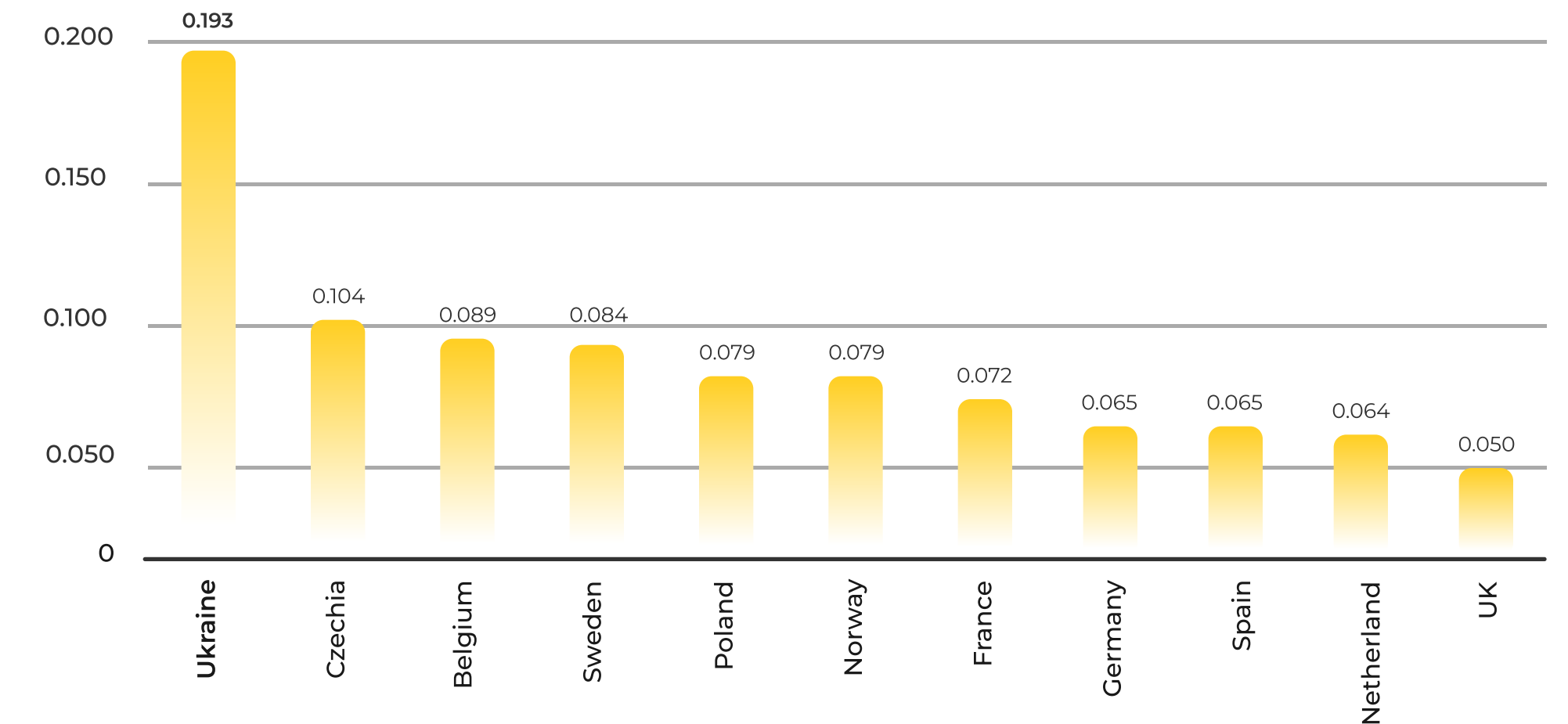
- 2.7 times higher than in Poland
- 3.3 times higher than in Germany

Due to the low energy efficiency of the economy, Ukraine's direct annual losses reach **USD 1+ bln** annually

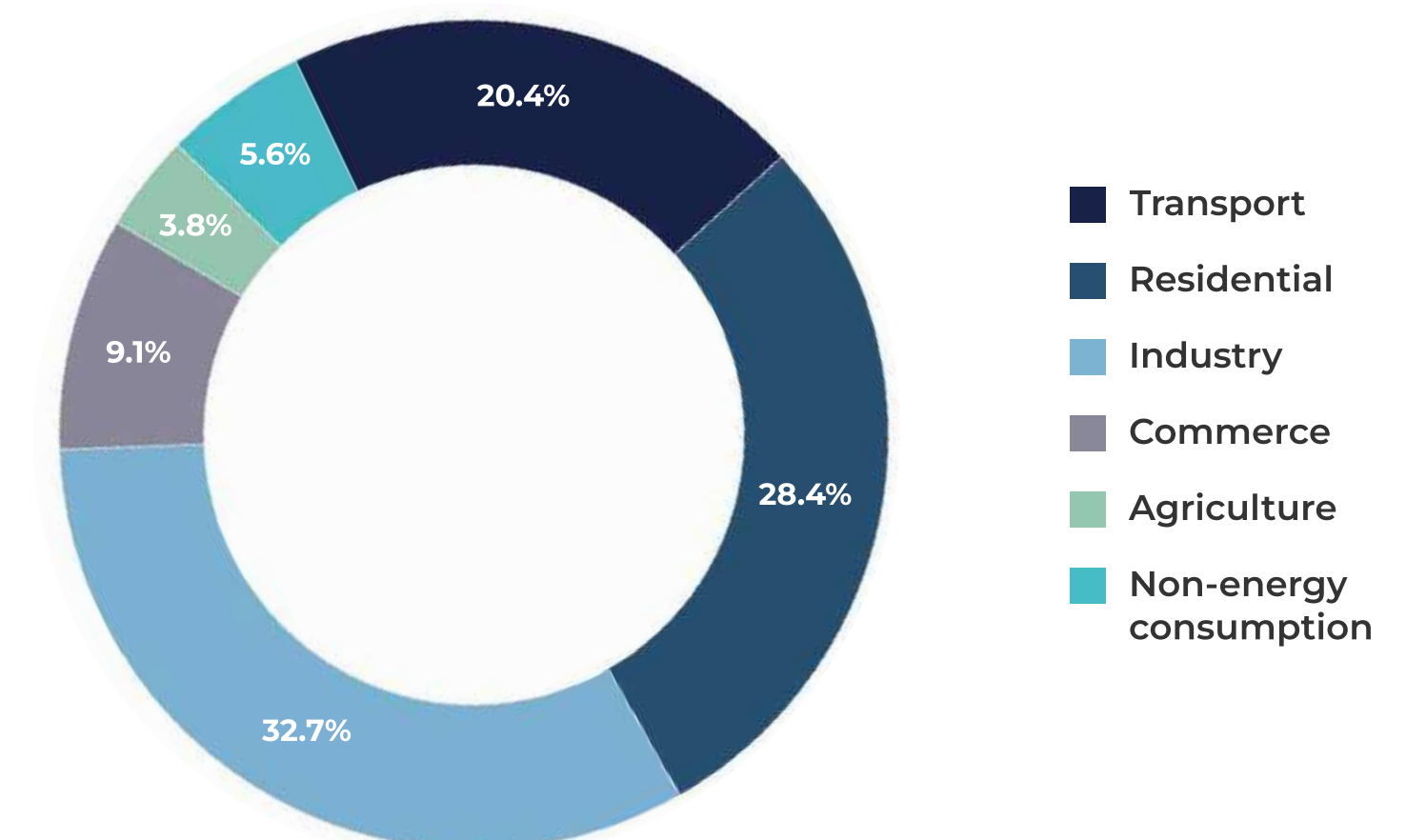
Energy intensity dynamics, tons of oil equivalent / USD thsd, 2015-2020**



Total energy consumption per unit of GDP, 2022*



Structure of final energy consumption, 2021*



ENERGY EFFICIENCY POTENTIAL

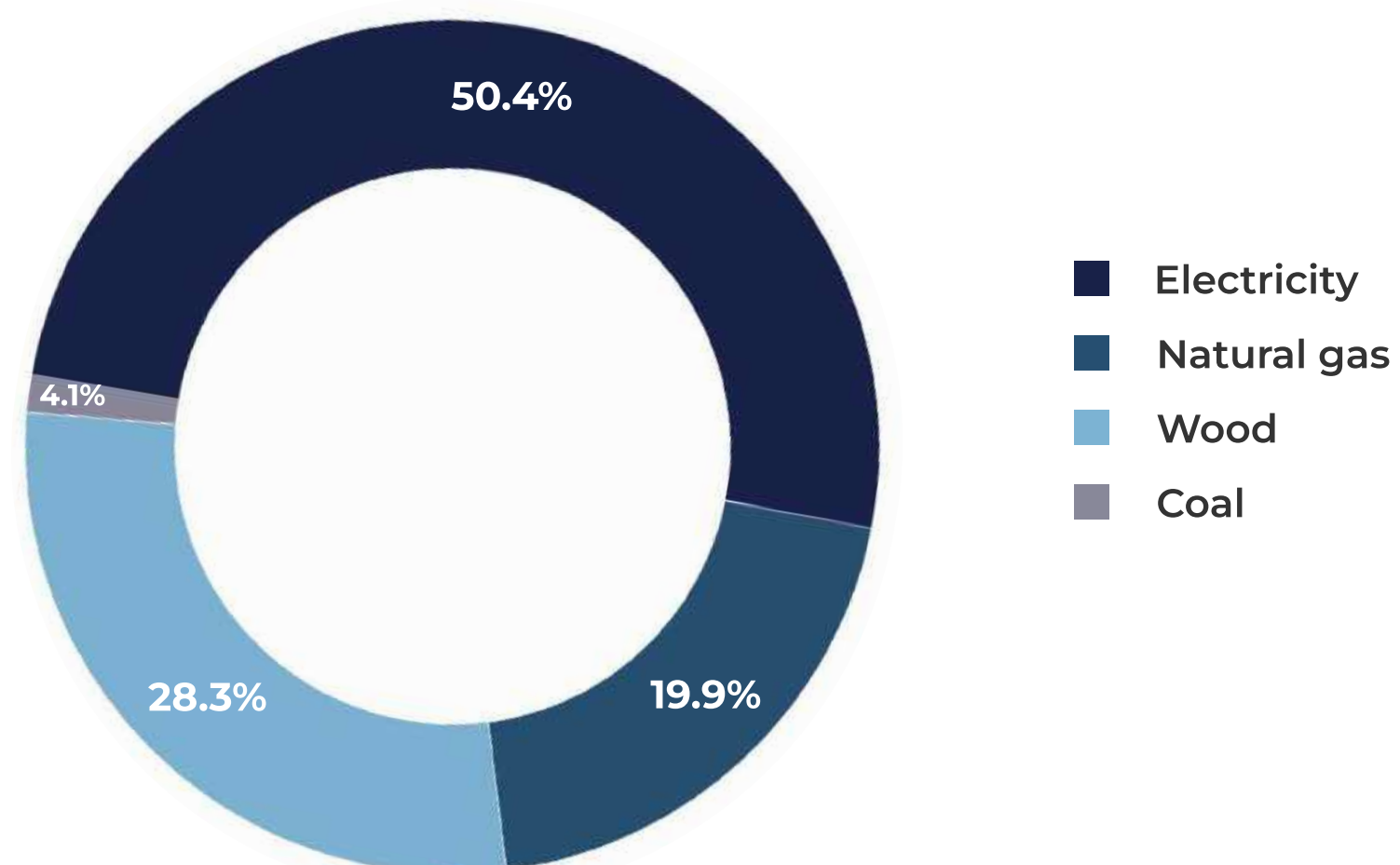
Machine-building sector



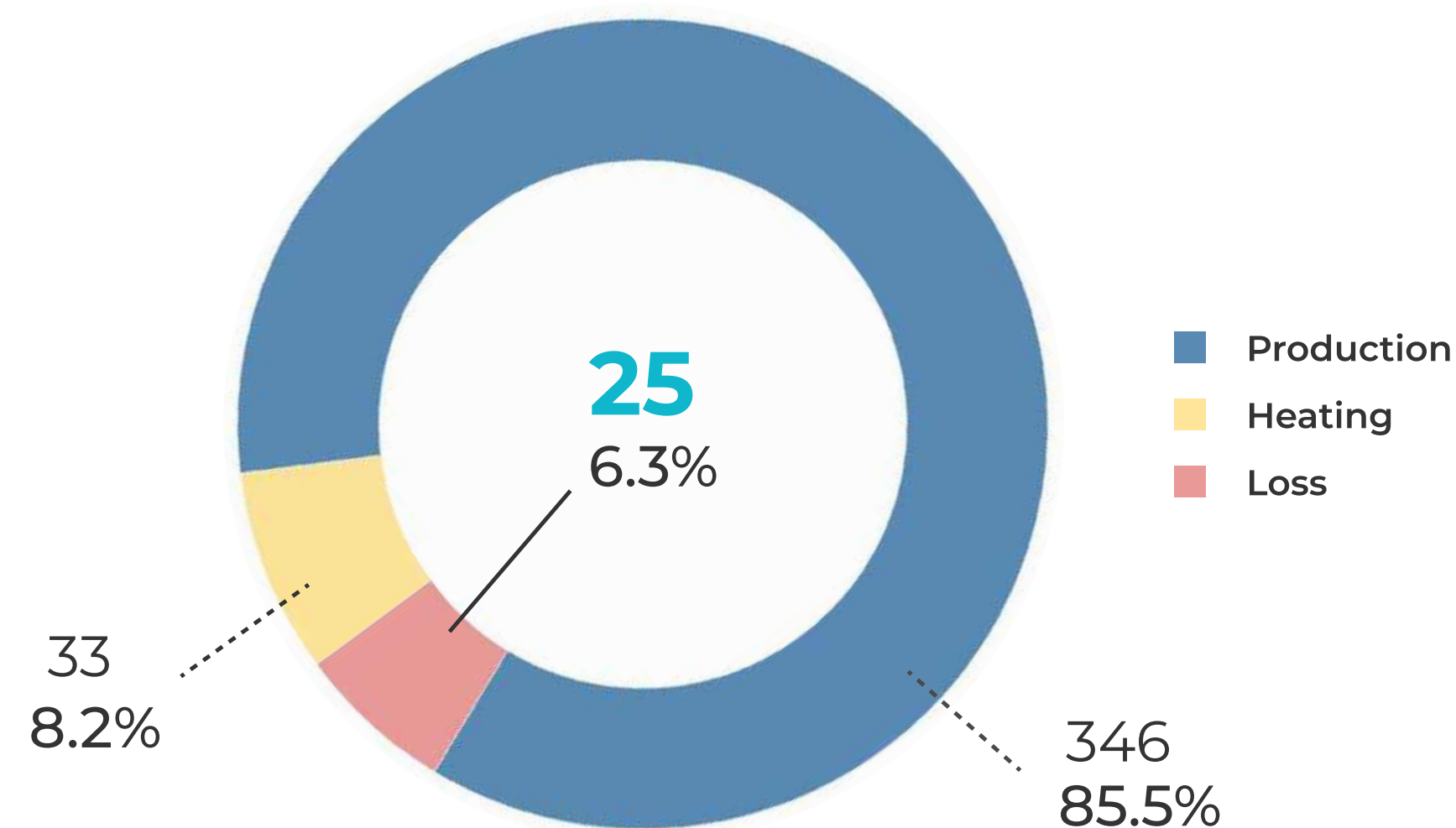
61 %

of energy savings can be achieved by implementing EEM with a simple payback period of less than 2 years*

Ratio of the main energy resources*



Cost of energy consumption, USD thsd/per year*



Investment opportunity: energy efficiency



~USD 1 mln

in total annual cost savings potential for large industrial enterprises**

* - The calculation of cost savings potential in the study is typical and can be applied to most large industrial enterprises

Source: GIZ Ukraine, analytical report on machine building, 2020

ENERGY EFFICIENCY POTENTIAL

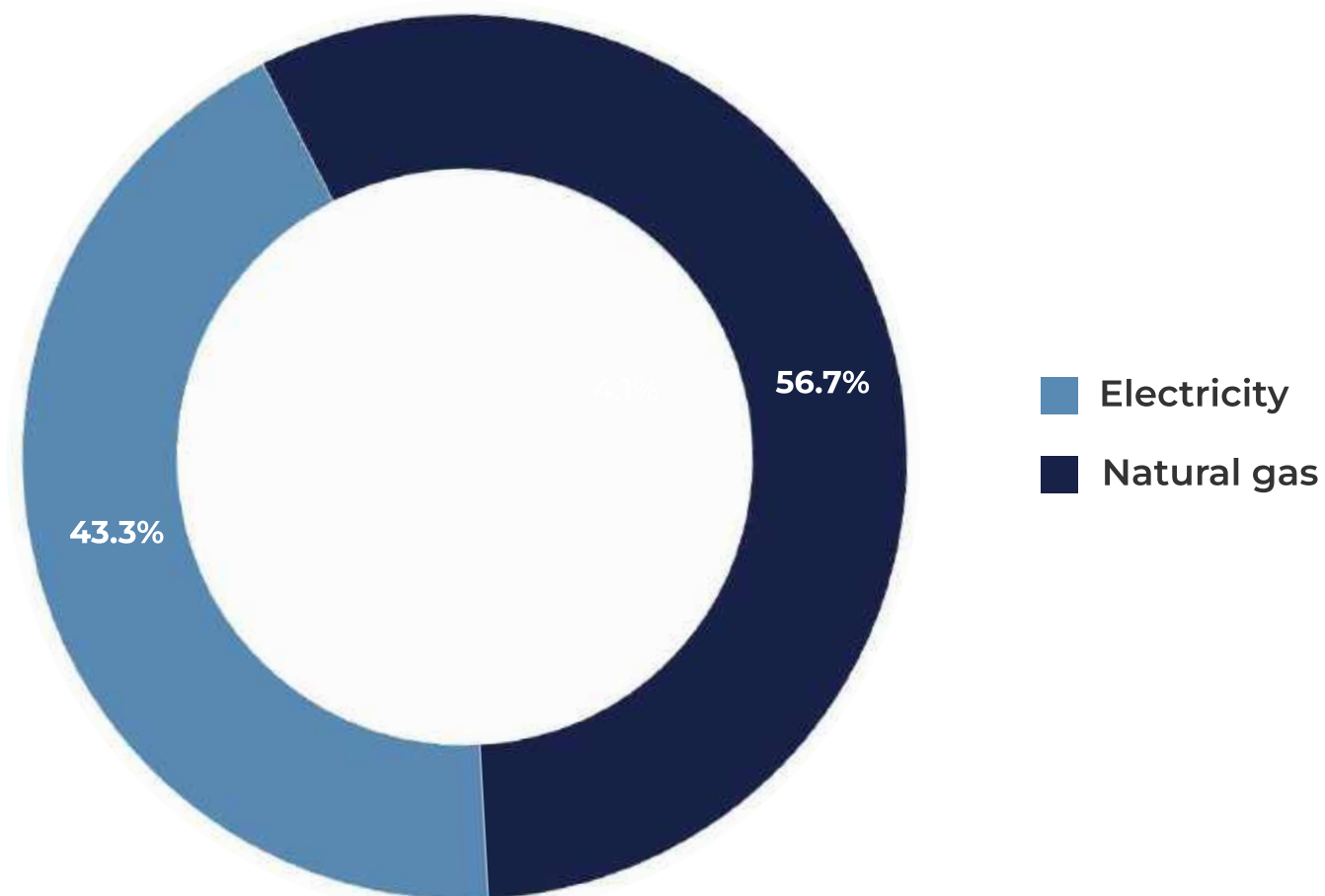
Construction materials industry



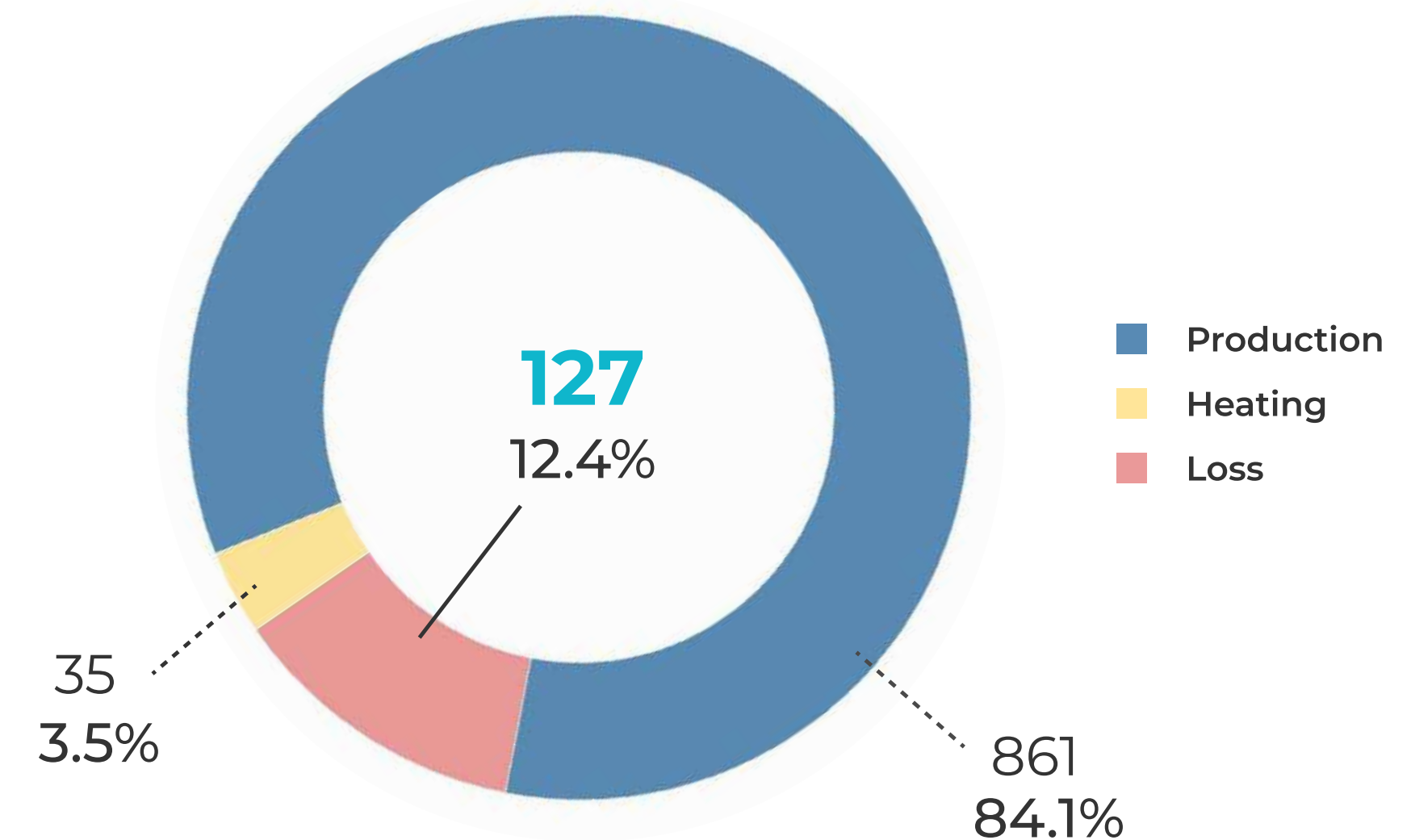
82 %

of energy savings can be achieved by implementing EEM with a simple payback period of less than 2 years*

Ratio of the main energy resources



Cost of energy consumption, USD thsd/per year



Investment opportunity: energy efficiency



USD 11 mln

in total annual cost savings potential for large and medium-sized enterprises in the construction materials sector*

* - The calculation of cost savings potential in the study is typical and can be applied to most large industrial enterprises
Source: GIZ Ukraine, analytical report on non-metallic building materials, 2020

INVESTMENT CLIMATE

Energy companies and state institutions



The main electricity transmission networks and large power plants, specifically hydroelectric and nuclear power stations, are state-owned



However, a significant part of thermal power plants, as well as energy facilities utilizing renewable sources such as wind and solar power stations, are privately owned

Major electricity suppliers in Ukraine



Energoatom
nuclear power plants



DTEK and Centrenergo
thermal power plants



Ukrhydroenergo
hydroelectric power plants



The National Energy Company "Ukrenergo" is the key management body in the energy sector. It is a private joint-stock company with 100% of its shares owned by the state, subordinated to the Ministry of Energy of Ukraine, and is responsible for the transmission of electricity to distribution companies

State institutions in the energy sector



Ministry of Energy of Ukraine
general energy issues, strategic planning



The State Service of Geology and Subsoil of Ukraine
issues related to the extraction of minerals, oil and gas



National Energy and Utilities Regulatory Commission (NEURC)
energy market regulation, tariff regulation, licensing



State Energy Saving Inspectorate of Ukraine
energy efficiency and energy saving issues



Ministry of Ecology and Natural Resources of Ukraine
environmental aspects of renewable energy sources, including solar and wind energy

INVESTMENT CLIMATE




Green energy development prospects

Ukraine actively promotes the development of green energy through legislative initiatives. **The National Energy and Climate Plan (NECP)** emphasizes the necessity of producing clean energy and reducing coal usage

Ukraine plans to **reduce** greenhouse gas **emissions** to **65%** of the 1990 level and achieve a **27%** share of **renewable energy sources**, replacing electricity generated from coal with renewable energy as one of the decarbonisation measures

A decision to hold pilot auctions for the allocation of support quotas in 2024, including auctions for the support of renewable energy, has been adopted by the Cabinet of Ministers of Ukraine. Support for auction winners will take the form of a market premium.

Structure of the additional annual quota for RES

	sun	11 MW
	wind	88 MW
	other RES <small>(biomass, biogas, small HPP)</small>	11 MW



Green rate

- Officially implemented in 2009
- The rate in 2024 is **EUR 0.117** per **1 kWh**
- Subject to a standard tax of **19.5%** (18% PIT and 1.5% military tax)
- Encourages private owners to install their own electricity generation capacities, allowing them to sell the produced electricity to the state



Private companies have the opportunity to actively implement alternative energy sources such as solar panels, wind turbines, and small hydroelectric plants, thereby promoting the sustainable development of the energy sector in Ukraine

* - at the rate of EUR 1 - UAH 46.16, average rate;
the tariff differs depending on a number of criteria, such as the type of generation and the category of consumers, etc.

INVESTMENT CLIMATE

ESCO program

The Energy Service Company (ESCO) program is a business model where a company provides energy services to improve energy efficiency at a client's facility. The savings from reduced energy consumption are used to cover the investment costs and generate profit. After the agreed contract term expires, all economic benefits are transferred to the client.



604 ESCO contracts
successfully implemented

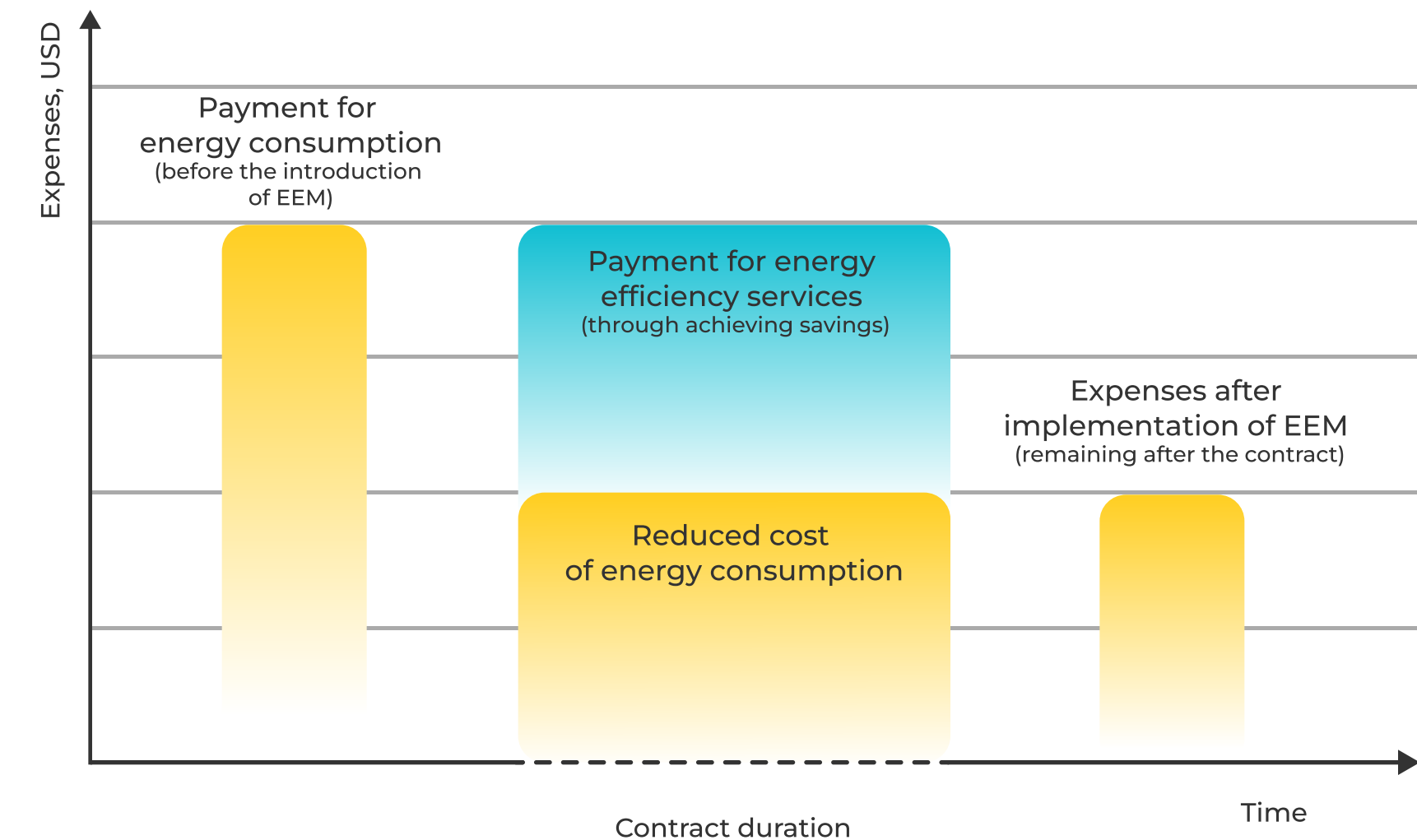


USD 1.68 bln
total amount



USD 8.5 bln
potential of the ESCO contracts

ESCO contract model



Investment opportunity: energy efficiency



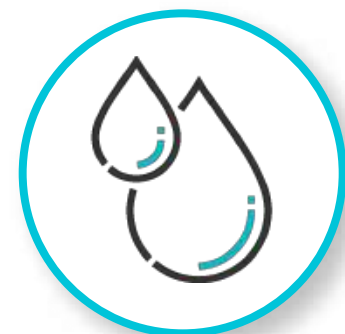
70 thsd
state institutions
require thermal modernisation

INVESTMENT OPPORTUNITIES

Natural resources



700+ bln m³
gas reserves



80+ mln ton
oil reserves



20 000+
mineral deposits



100+
types of minerals
(including lithium, zirconium,
cobalt, titanium, beryllium,
niobium and others)

Ukrnafta projects



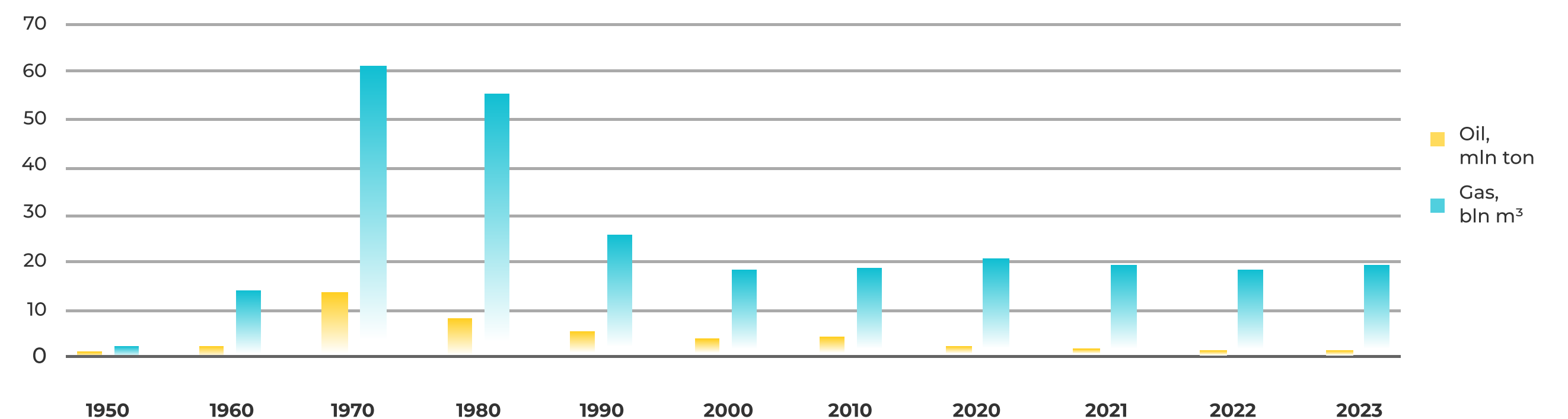
20+ fields

joint development under the PSA

The reserves of the fields is:

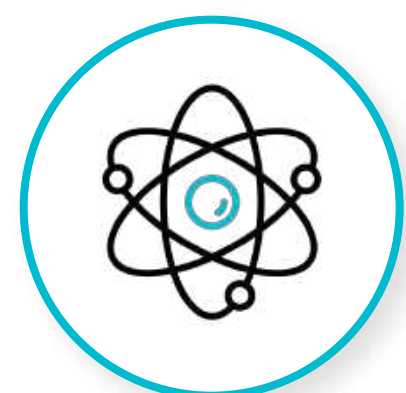
- 12 mln tons of oil
- 31 bln m³ of gas

Oil and gas extraction in Ukraine, 1950-2023



INVESTMENT OPPORTUNITIES

Nuclear energy



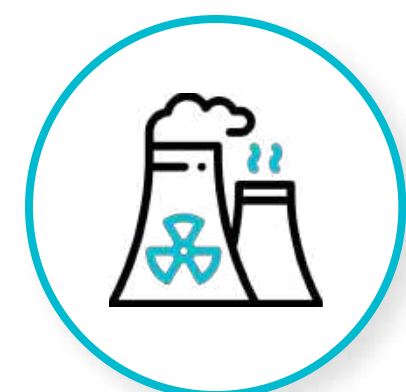
49.2%

the share of nuclear energy in the energy sector of Ukraine in 2023



13835 MBT

total capacity of 15 operating NPP units



Ukraine's nuclear energy sector ensures stable operation with a long service life. Most of nuclear reactors were commissioned in the **1980s**, with their operational **lifespan extending beyond the 2040s**

⚡ Nuclear power generates electricity without emitting carbon into the atmosphere during operation, and aligning with Ukraine's energy strategy goal of achieving carbon neutrality in the energy sector

⚡ As of 2023, Energoatom envisages creating its own nuclear fuel production line in Ukraine

Investment opportunity: small modular nuclear reactors



USD 1.2 bln

investment required for one 200 MW nuclear reactor module

Ukraine has potential for the development of small modular nuclear reactors and the introduction of these technologies to build its own production. The capacity of modular nuclear reactors ranges from **50 to 500 MW***

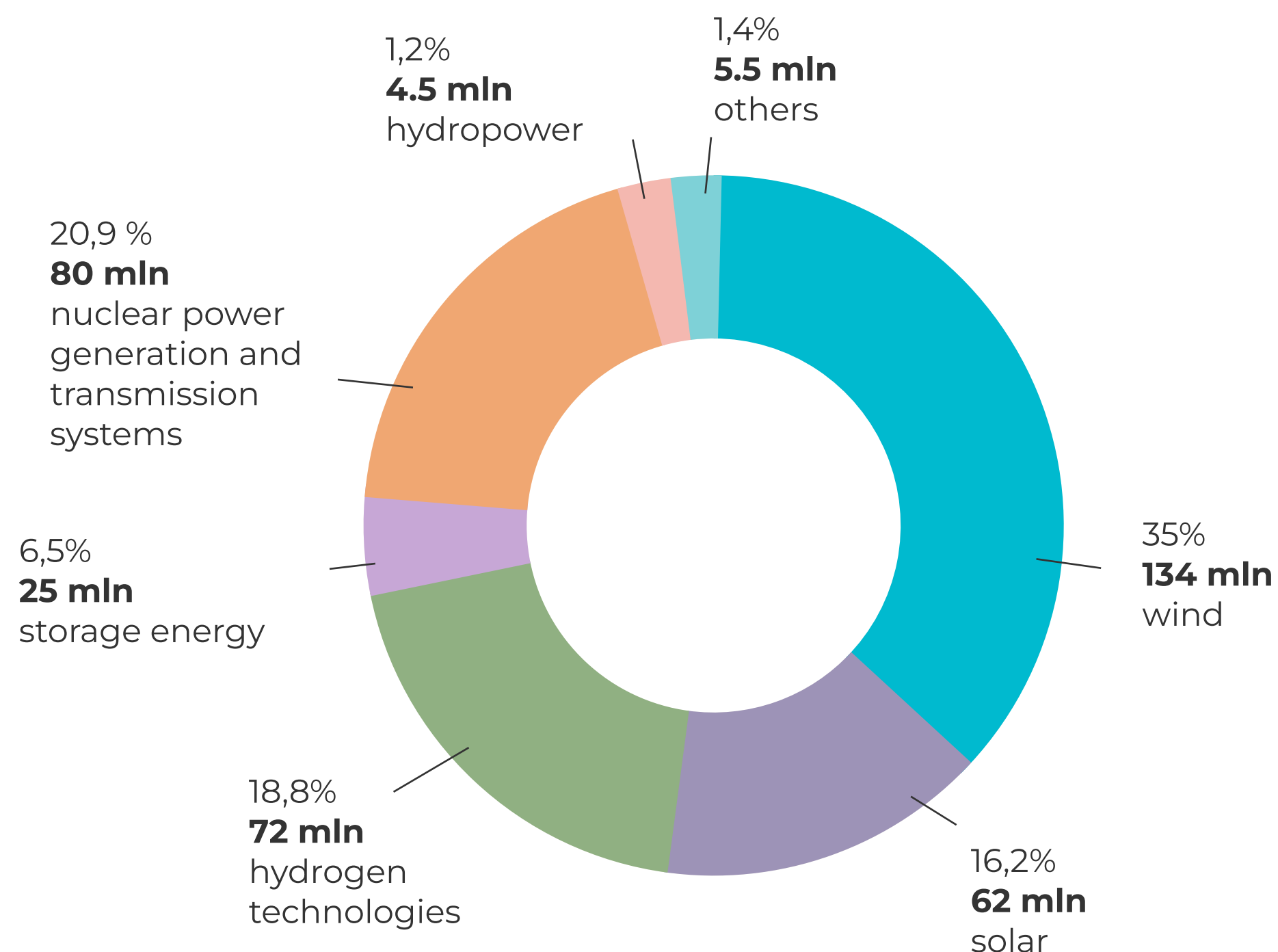
INVESTMENT OPPORTUNITIES

Green energy



6 mln tonnes (about **USD 73 mln**) of conventional fuel can be saved per year in Ukraine through the use of clean energy*

Investment opportunities for new energy capacities by energy sector, mln USD



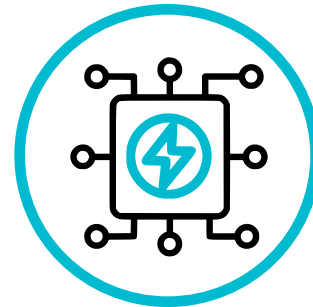
874 GW
RES potential in Ukraine

USD 383 bln
investment opportunities for new energy capacities according to the Energy Strategy until 2050

About **USD 12 bln**
of investments have been attracted in renewable energy over the past 10 years in Ukraine

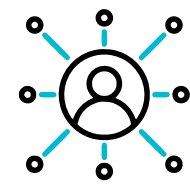
INVESTMENT OPPORTUNITIES

Distributed power generation



The development of a **distributed power generation** — is a government priority for 2024-2025, which involves a system of small local energy facilities that transfer surplus energy to the general grid

Expected



Self-sufficiency with energy

consumers have the opportunity to power their homes and businesses by independently distributing energy according to their needs, and transferring the surplus to the integrated energy system



Combining different energy generation facilities

such as solar panels, wind turbines, gas plants, cogeneration at thermal power plants and boiler houses, batteries, small hydro plants



Energy security and sustainability

the use of small power generation facilities is an opportunity to gain resilience against hostile attacks, accidents and imbalances in the energy system

Advantages

- ⚡ Rapid construction of power facilities
- ⚡ Increased investment in communities
- ⚡ Reduction of losses in electricity transmission
- ⚡ Development of regional innovations
- ⚡ Reducing dependence on imports
- ⚡ New workplaces

Investment incentives



exemption from import duties and VAT
energy equipment for citizens and businesses



loans for business
SMEs: up to **UAH 150 mln** for 10 years at **5-9%**

Large business: up to 7 years at **14-16%** for alternative generation



compensation for Home Owners Association from the state under the "Grindim" program

UAH 1 mln for solar panels
UAH 2 mln for heat pumps
up to **UAH 5 mln** loans



simplification of connection procedures to the electricity and gas distribution networks, reduced timeframes, no need to go through land allocation procedures and environmental impact assessment



concessional lending for the purchase of power equipment
Small business: at **5%** deposit rate

population: at **0%** deposit rate (up to UAH 480 thsd for 10 years without collateral, up to 10 kW of capacity)

INVESTMENT OPPORTUNITIES

Energy and gas storage



2.5 bln m³

of gas was accumulated by foreign companies in Ukrainian underground storage facilities



Customs Warehouse service – Underground gas storage operator service, which allows customers to store natural gas in underground gas storage facilities in Ukraine in a customs-free regime for 1095 days **without paying taxes and customs duties**

up to 10 bln m³

Ukrainian storage facilities ready to be offered to foreign companies

over **1000 companies** from 29 countries use Ukrainian underground gas storage facilities as customs warehouses



Short-haul – service of the gas transmission system operator that allows to receive a **discount on transportation** between certain interstate entry and exit points for transit transportation

The Ukrainian TSO has the capacity to receive:

- Incoming - **304 bln m³** per year
- output - **146 bln m³** per year



800 MW

Capacity requirements for energy storage facilities (ESF)



worth

1.2 USD bln

New special auctions for ancillary services for the procurement of ESF

- for a long period of up to 5 years
- a market participant may receive a deferral of up to 3 years to build capacities
- The cost of ancillary services, determined by the results of the auction, is protected from fluctuations in the UAH currency by conversion into EUR

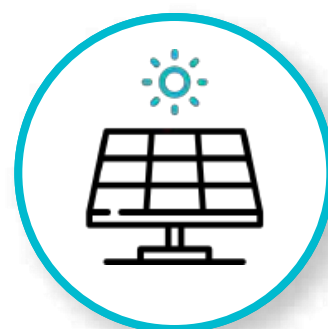
INVESTMENT OPPORTUNITIES

Recovery of losses in the energy sector

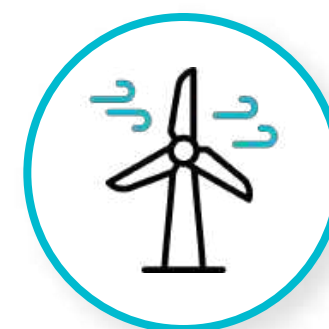


8500 MW of generating capacities were lost in the electricity sector as a result of military actions in Ukraine as of spring 2024*

Restoration of capacities through alternative energy



43 solar plants
if 1 solar plant - 200 MW



425 wind plants
If 1 wind plant - 20 MW

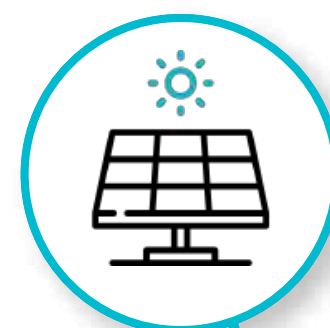


1700 biomass plants
if 1 biomass plant - 5 MW



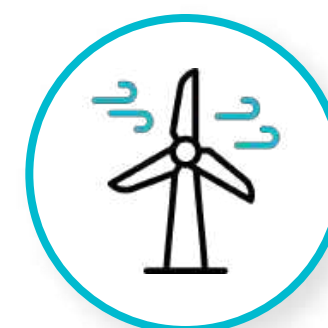
8500 biogas plants
if 1 biogas plant - 1 MW

or in combination (and related investment needs)



30 solar plants
6000 MW

EUR 5.5 bln



90 wind plants
1800 MW

EUR 3 bln



100 biomass plants
500 MW

EUR 400 mln



200 biogas plants
200 MW

EUR 2 bln

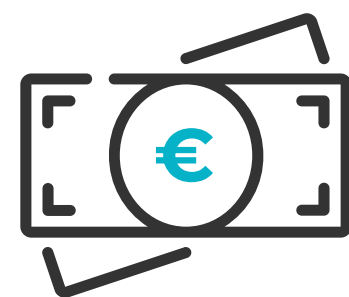
* - Calculations were made on the basis of existing real plants and stations, as of spring 2024

Source: Ministry of Energy

INVESTMENT INCENTIVES

Significant investments

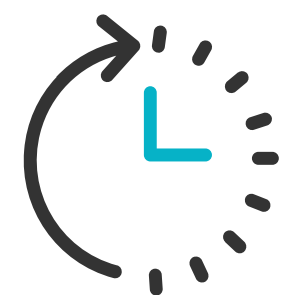
REQUIREMENTS FOR INVESTMENT PROJECT



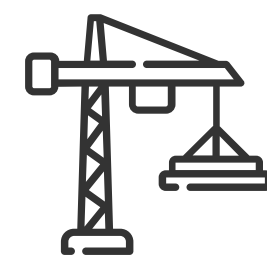
EUR 12+ mln
of investment



10+
of new jobs



up to 5 years
of project
implementation



**construction,
modernization,**
technical and/or
technological
reequipment of objects

**ENERGY SECTOR STATE SUPPORT IS LIMITED TO THE
PRODUCTION OF BIOGAS AND BIOMETHANE**

FORMS OF SUPPORT



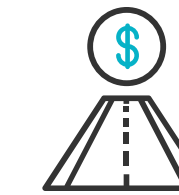
CIT exemption*
(for 5 years by choice)



Exemption from VAT
for importing new
equipment and
components to it **



Exemption from **import
duties** for new equipment
and components to it **



Construction/compensation
for built **engineering and
transport infrastructure**
(highways, communication
lines, utilities, etc.).



Lease of **state or
communal land plots**
without land auctions



Compensation for **costs
of connection to
engineering and
transport networks**



**Land tax exemption/
reduced land tax rates**



Exemption from
compensation for
**losses of forestry
production**

AMOUNT OF SUPPORT

up to 30% CAPEX***

* Not applicable to projects in the field of extraction for the purpose of further processing and/or enrichment of natural resources.

** List and volume of equipment is approved by the CMU for each project.

*** The applicant, not earlier than 18 months before the date of submission of the application to the authorized body, may make investments in investment facilities in the amount not exceeding 30% of the total amount of significant investments required for the implementation of an investment project with significant investments



**For more detailed information, we recommend to draw
attention to the following regulations**



PROJECTS AFTER 24.02.22



USD 1+ BLN
NEW INVESTMENTS
SUPPORTED BY
UKRAINEINVEST

* - the company continues to cooperate with russia and pay taxes to the terrorist country

INVESTMENT INSURANCE



A formalized agreement on the implementation of the investment insurance mechanism for foreign investments: **2022**
Annual rate: **2-3%**
Insurance period: **10 years**
Coverage of the amount of losses: **up to 90%**
Sure Trust Fund: USD 110 mln, goal - USD 330 mln



Law No. 9015 "On Amendments to the Law of Ukraine "On financial mechanisms for stimulating export activity" regarding insurance of investments in Ukraine against military risks": **2023**
Annual rate: **0.49% - 8.05%**
Insurance amount: **UAH 200 mln**
Insured for 5 months in 2024: **UAH 2.93 bln**



Property insurance against war risks: **2024**
Implemented cases: **Grain elevators**



Ship insurance in the Black Sea: **2023**
Containers with grain, iron ore, and steel, electrical equipment, fodder
Annual rate: **0.75%**
Coverage amount: **USD 50 mln**



Memorandum on coverage of American, international and Ukrainian investments in Ukraine: **2023**
Coverage of the amount of losses: **up to 85%**
Insurance for SMEs: **USD 50 mln**
Insurance of the agricultural sector, manufacture: **USD 300 mln**



22 export-import agencies: Germany, WB, USA, Japan, Canada, Italy, Poland, Norway, Slovakia, France, Bulgaria, Estonia, Latvia, Lithuania, Czech Republic, Austria, UAE, Portugal, Spain, Sweden, Finland, Denmark
Volume of the collected fund: **EUR 1 bln**



UKRAINEINVEST
GUIDE

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+38 098 567 88 99



INFO@UKRAINEINVEST.GOV.UA



WWW.UKRAINEINVEST.GOV.UA/EN



MUZEINYI LN, 12 KYIV, UKRAINE, 01008