



Kharkiv, Ukraine

KHARKIV, Ukraine

Dmytro Isaiev

Deputy Mayor for Strategic Development

JICA, 2024/02/16



Kharkiv, Ukraine

<https://youtu.be/ib-1sNC1s2U?si=kQPewEiQivJXdhyw>

OUR KHARKIV

Kharkiv.
City of youth, academia, and universities.

Date of Foundation: **1654**

Population: **1.2 / 1.5** mln (current / before the war)

Area: **360 km²**

JICA, 2024/02/16



SPECIALIZATION

- Mechanical engineering
- Pharmaceuticals
- Food industry
- Plastic production
- Agriculture
- Chemical industry
- ICT

Main investors



EDUCATION

- 39** Universities
- 184** Schools



Kharkiv International Airport



International roads E40, M03, E105



460 km



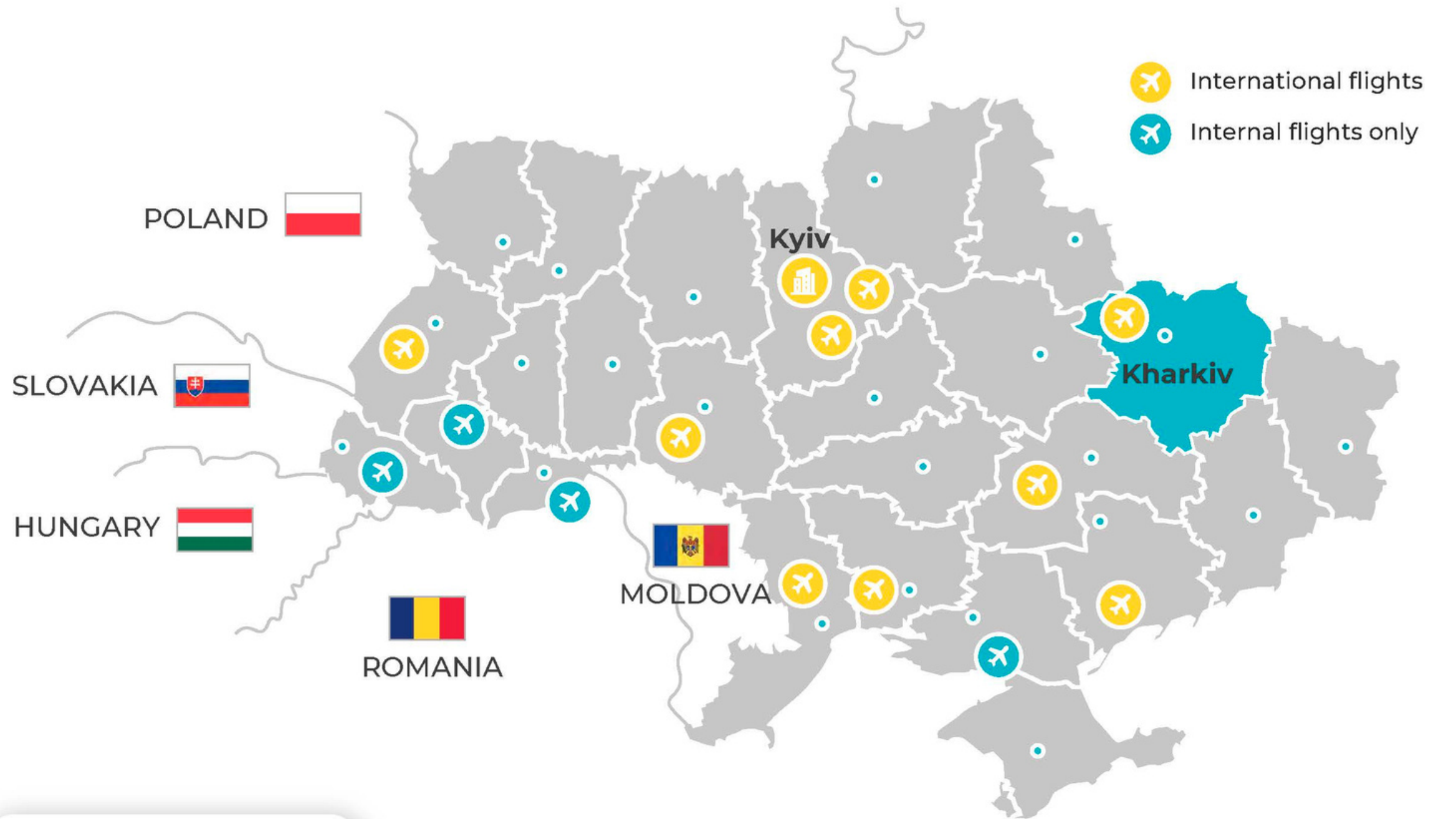
Kyiv



670 km



Odesa seaport





Kharkiv, Ukraine

OUR KHARKIV

Extensive Retail Network

14 hypermarkets, **209** supermarkets, **39** malls, **48** markets

Comprehensive Financial Infrastructure

43 exchanges, **47** insurance companies, **8** leasing companies, **306** bank branches

Well-Developed Transport Infrastructure

Road transport **9.7** thsnd-km, Rail transport **1.5** thsnd-km, Subway **38** km, Trolleys **264** km, Trams **215** km

Grand Green Spar Area

15,4 thsnd-ha: **29** gardens and parks, **4** water parks, **92** garden squares, **5** quays



Kharkiv, Ukraine

WAR IN KHARKIV

8 514 *Damaged / Destroyed* objects

3 897 Apartment Buildings

2 791 Private Sector Houses

364 Kindergartens, Schools, Universities

265 Administrative Buildings, Social Infrastructure

1 197 Critical and Production Infrastructure

2024/01/25

506 Residential buildings have been restored

468 with minor damage

38 with damage to the supporting structures



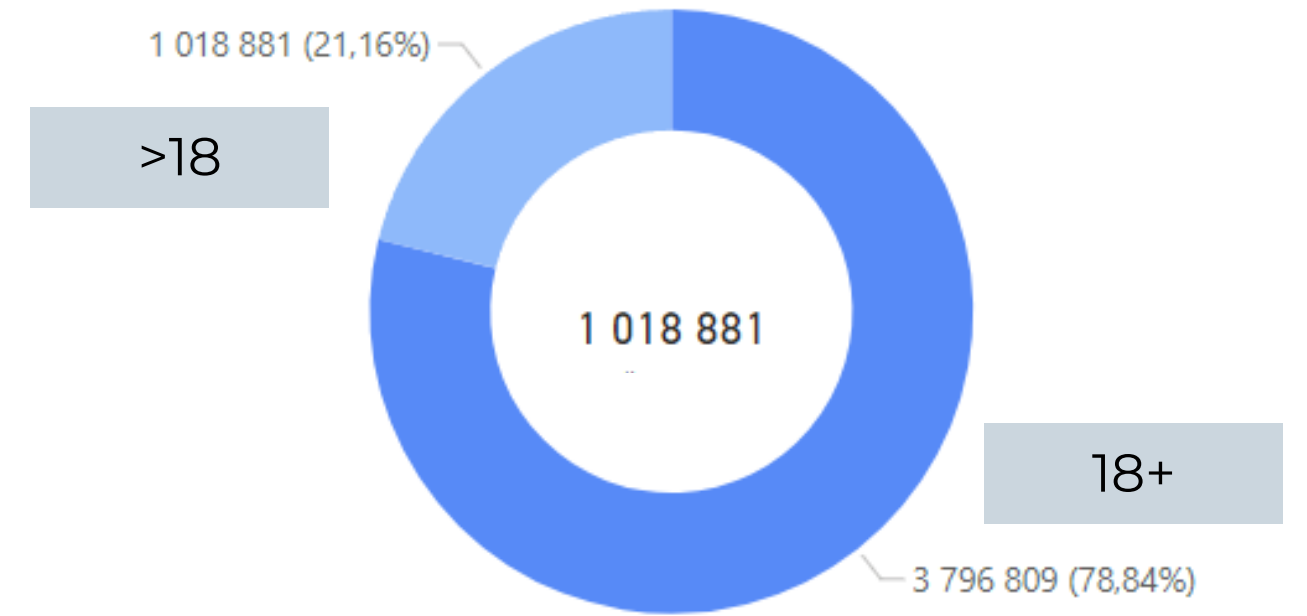
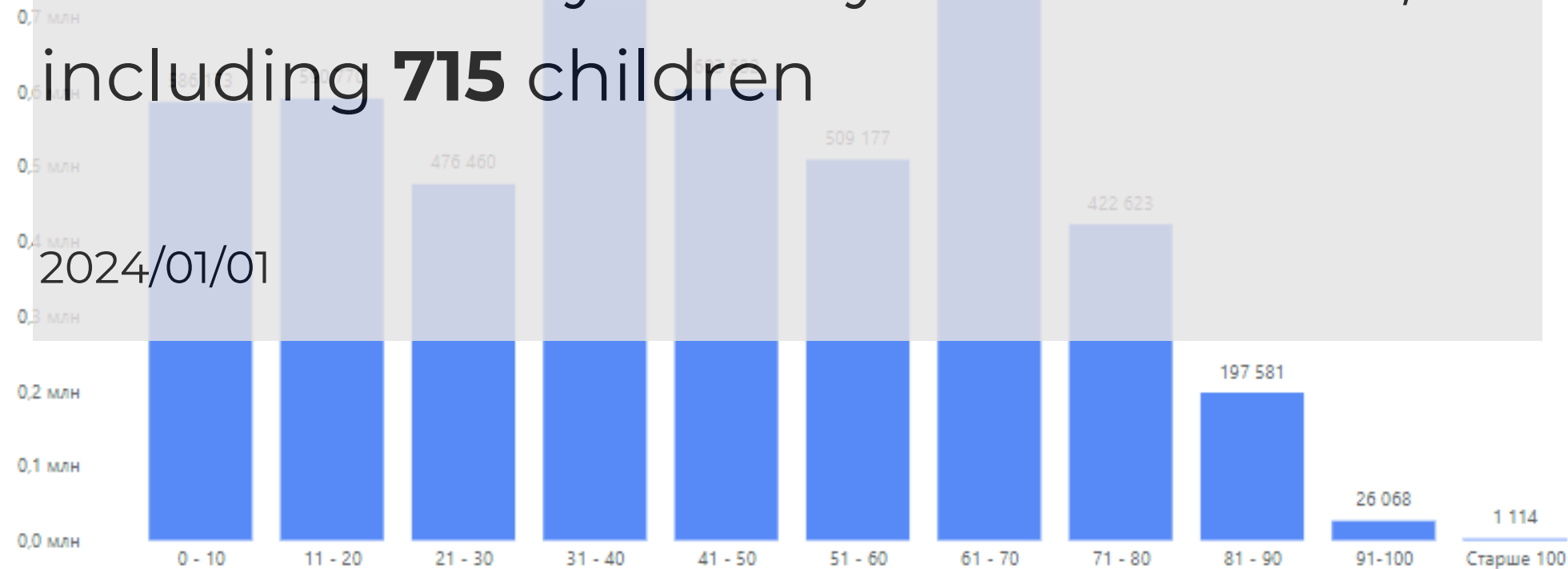
Kharkiv, Ukraine

WAR IN KHARKIV

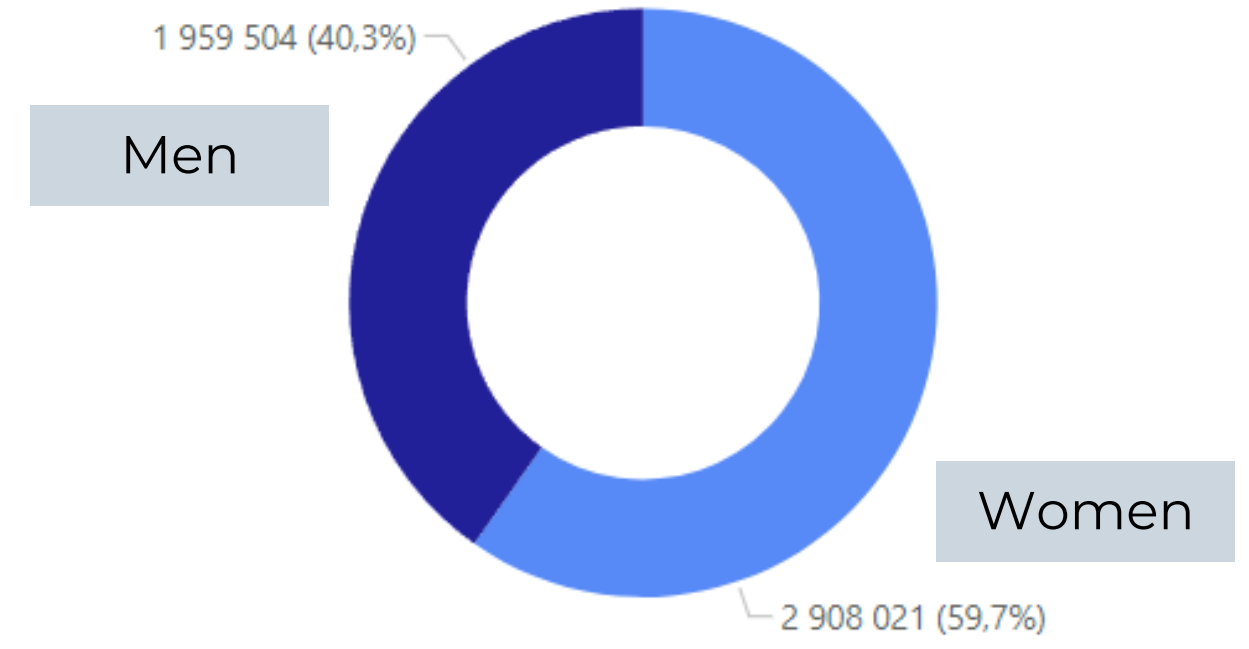
Internally Displaced Persons in Kharkiv

195 321 (in total since 2014),
including **151 762** (since 2022/02/24)

4 396 Placed by the city in dormitories,
including **715** children



4 867 525
IDPs in UKraine





Kharkiv, Ukraine

OUR KHARKIV

Kharkiv City Council is the founder of more than **320** municipal enterprises (the biggest number in Ukraine)

Transport, including the metro 16

City & Infrastructure 26

Sports & Recreations 13

Arts & Culture 18

Education 27

Social Protection & Healthcare 86

Administrative Services 130





Kharkiv, Ukraine

CITY'S ENERGY VECTOR OF DEVELOPMENT - part of the ENERGY STRATEGY OF UKRAINE UNTIL 2050

- 1) Transforming Ukraine into a **European Energy Hub**
- 2) **Renewable** energy, **Decarbonisation** and **Decentralisation** are priorities for private investment
- 3) Investment opportunities for new energy capacities totalled **\$383** bln: *solar* - \$62 bln, *energy storage* - \$25 bln, *transmission systems* - \$5 bln, *wind generation* - \$134 bln

**Незламна
енергетика**

Україна –
енергетичний
хаб Європи

2025 • 2032 • 2050



Міністерство
енергетики
України



Kharkiv, Ukraine

ESCO IN THE CITY

1. Energy **independence** of the city's municipal enterprises
2. **Reducing** the city's energy **costs** and potentially **generating** revenue from the sale of electricity
3. Implementation of **ESG standards**
4. **Reducing GHG emissions** from heat and power generation sources



Kharkiv, Ukraine

ESCO FOR HEALTHCARE FACILITIES

The roofs to be equipped, thsnd-m2 / buildings / MW **83.6 / 43 / 15.2**

Annual ESCO generation, GWh **17.24**

Investor's expenses, \$mln **19.1-23.2**
equipment and installation - \$645-730/kW; tax&credit, inflation - 610-780 \$/kW

Annual savings on ESCO generation, \$mln **3.3-3.8**

Payback period, years **5.3-6.4**

2024: Exchange Rate ₴40.7 per \$; Electricity Cost: 0.19-0.22 \$/kWh



Kharkiv, Ukraine

ESCO FOR CRITICAL INFRASTRUCTURE

The area to be equipped, ha / MW	7.2 / 3.6
Annual ESCO generation, GWh	4.1
Investor's expenses, \$mIn equipment and installation - \$645-730/kW; tax&credit, inflation - 610-780 \$/kW	4.5-5.4
Annual savings on generation, \$mIn	0.8-0.9
Payback period, years	5.6-6.0

2024: Exchange Rate ₴40.7 per \$; Electricity Cost: 0.19-0.22 \$/kWh

CITY ENERGY STORAGE - BESS

1. Backup Power
2. Energy Arbitrage (Time-Shift)
3. Firm Capacity or Peaking Capacity
4. Operating Reserves and Ancillary Services
5. Transmission and Distribution Upgrade Deferrals



Kharkiv, Ukraine

ENERGY STORAGE FOR CITY TRANSPORT

The area where the equipment is located

Metro

Peak Load, MW

max - 12.4

min - 3.9

Max Total Storage Capacity, MWh

8.5

Investor's expenses, \$mln

5.1-7.7

1 MWh = \$600,000-900,000

2024: Exchange Rate ₴40.7 per \$; Electricity Cost: 0.19-0.22 \$/kWh

KHARKIV METRO - DECARBONISATION

Modernisation of Rolling Stock (25 subway trains), \$mIn

for 125 cars, 500 motors (3-phase asynchronous, 105 kW, 3x450 V 1600 rpm, 175 A); train control systems; energy recovery systems; pneumatic system; modernisation of server and network equipment

90.8-113.8

Average annual cost energy (for 25 subway trains), GWh

with **current** equipment

with **modernised** equipment

14.2-16.8

8.9-10.6

Annual Effects

Monetary reduction, \$mIn

CO2 emissions reduction, thnd t

1.0-1.4

2.3-2.7

2024: Exchange Rate ₴40.7 per \$; Electricity Cost: 0.19-0.22 \$/kWh



Kharkiv, Ukraine

THANK YOU

FOR YOUR ATTENTION AND SUPPORT

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