

# THINKING ABOUT UKRAINE'S ENERGY FUTURE

Energy demand scenarios and policy targets  
on the road to Europe



Zachmann, Iakovenko, Meissner, Naumenko, Mikhnych  
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A useful discussion on Ukraine's energy strategy needs to be built on

- Realistic scenarios of future energy demand and
  - EU-compatible energy and climate targets

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## PURPOSE

- Energy strategy discussions focus on future infrastructure and energy mix
- We want to zoom-out one level and think about **major guardrails** for an effective strategy

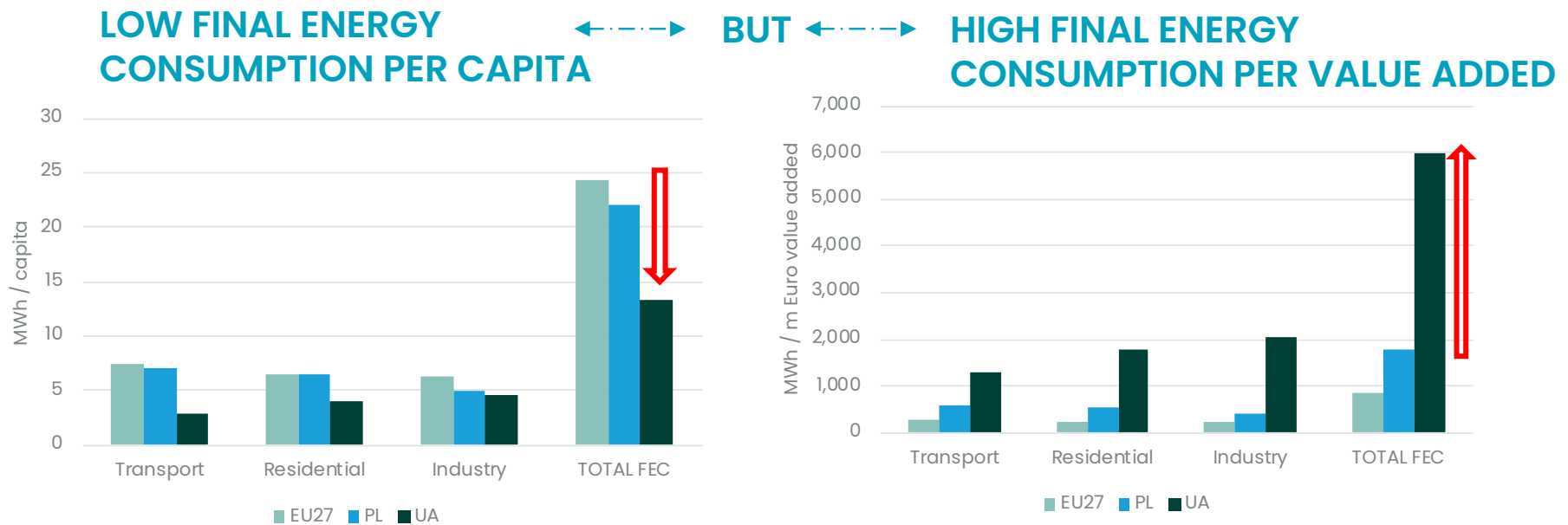
- Presentation structured in three sections:

**1) Current structure of  
Ukraine's energy  
demand**

**2) (Realistic) scenarios  
for Ukraine's future  
energy demand**

**3) Domestic and  
international  
commitments**

# 1) Current structure of Ukraine's energy demand

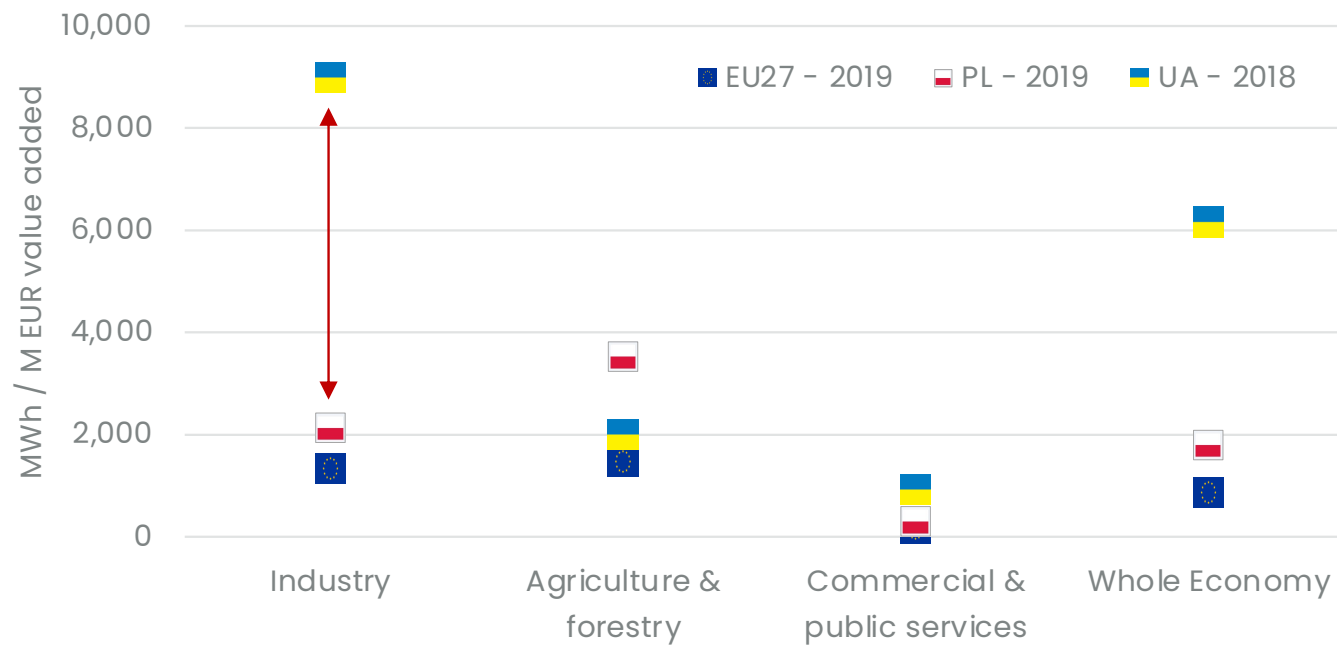


Source: GDU calculations based on EUROSTAT Energy Balances 2019 and value added statistics

- To be on par with the EU-average, Ukraine's energy consumption would double, while its GDP per capita would increase about tenfold
- Ukraine's transport sector consumes a third of the energy per capita of the EU average



## SECTORAL ENERGY CONSUMPTION PER EURO VALUE ADDED

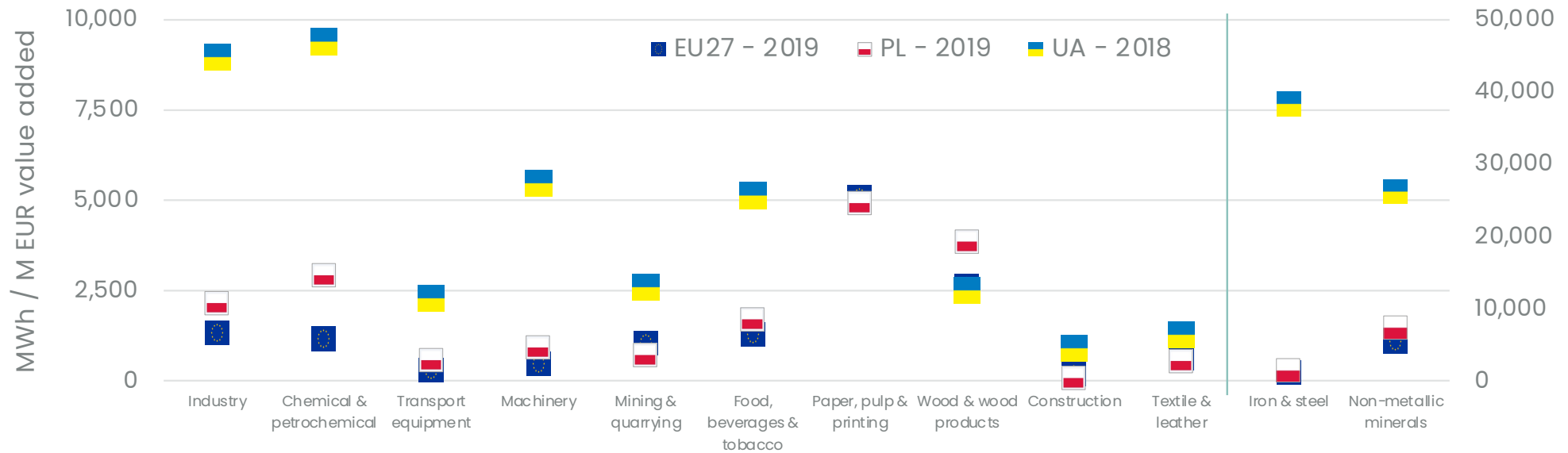


Source: GDU calculations based on EUROSTAT Energy Balances 2019 and Value Added statistics



While energy consumption per euro of value added in the agricultural and service sectors is comparable to the EU, industrial energy consumption is **nine times higher**.

## ENERGY CONSUMPTION BY INDUSTRY PER EURO VALUE ADDED



Source: GDU calculations based on EUROSTAT Energy Balances 2019 and Value Added statistics

- In some energy-intensive industries such as iron and steel (33x) and non-metallic minerals (5x), Ukraine uses much more energy per unit of value added than corresponding sectors in the EU.
- These sectors have disproportionately high importance in the Ukrainian industry.

## CONSEQUENCES

- Simply extrapolating historic energy consumption trends would imply economically inefficient growth in energy consumption.
  
- To decouple the value of production from energy consumption Ukraine should:
  - Reduce contribution of most energy-inefficient sectors.
  - Improve efficiency of existing assets.
  - Gradually replace most inefficient assets by efficient assets.

## 2) Scenarios for Ukraine's future energy demand

### ➤ Scenario 1 : "Economic Progress, EU-Integration and Climate Ambition"

- Significant economic growth based on integration into the internal EU market.
- Switch to (energy) efficient production that is competitive in the EU.
- Follow the EU's climate and energy policy (replace fossil fuels, increase efficiency)

### ➤ Scenario 2 : "Limited growth, slow integration and unambitious climate protection"

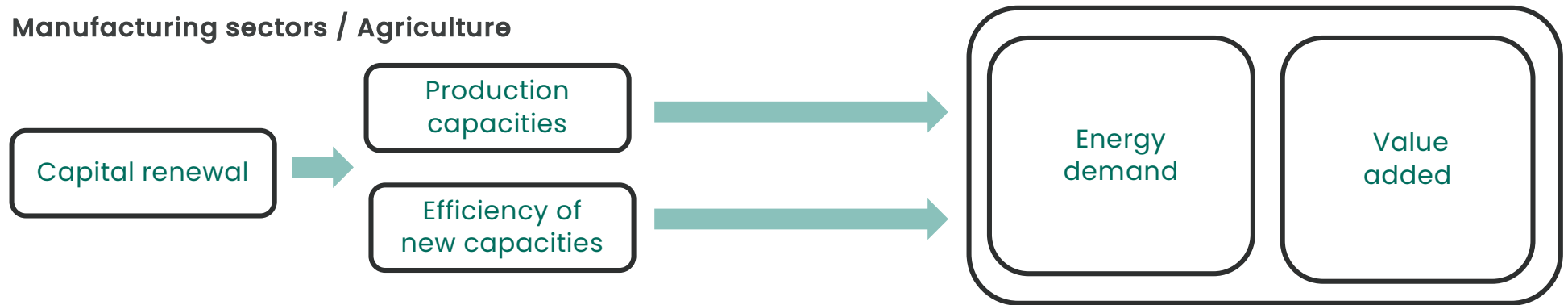
- Staying outside the internal market and experience slower growth.
- Less competitive pressure for (energy) efficient production.
- Less stringent policy goals.

Note: We do not consider (conceivable) scenarios where Ukraine becomes a major exporter of commoditised energy and/or energy-intensive products (e.g., electricity/hydrogen/green-steel/ammonia)

KEY ASSUMPTIONS	Scenario 1	Scenario 2
Population in 2040 (World Bank projections 2018)	38 m	38 m
Annual growth <b>manufacturing &amp; service</b> , value added 2025-2040	~ 8%	~ 4%
Annual growth <b>agricultural sector</b> , value added 2025 - 2040	~ 5%	~ 4%
Total production growth <b>iron &amp; steel</b> 2019 - 2040	~ 40% (30 mt)	~ 20 % (25 mt)
Annual retrofitting rate <b>residential buildings</b> 2025 - 2040	~ 2.7%	~ 1.5%
Increase in residential <b>building stock</b> compared to 2019	~ 25%	~ 10 %
Increase in <b>passenger car stock</b> compared to 2019	~ 65%	~ 35%
Increase in <b>freight transport</b> compared to 2019	~ 110%	~ 60%
Share of <b>battery electric passenger</b> cars in 2040 stock	~ 30%	~ 20 %
Share of <b>battery electric duty vehicles</b> in 2040 stock	~ 10%	~7 %

## METHODOLOGY

### Manufacturing sectors / Agriculture



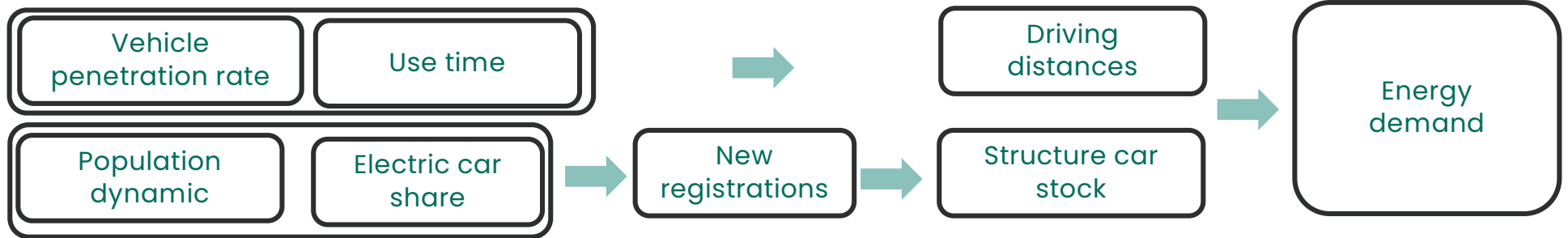
### Building sector - Heating





## METHODOLOGY

### Transport sector – Passenger cars



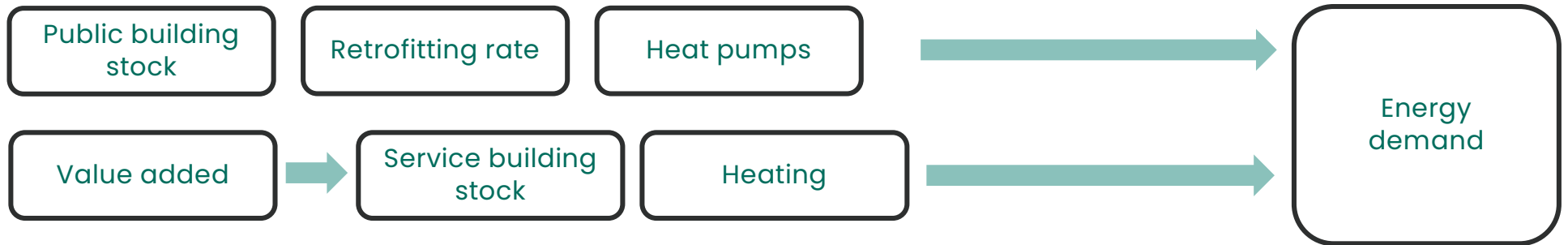
### Transport sector – Duty vehicles



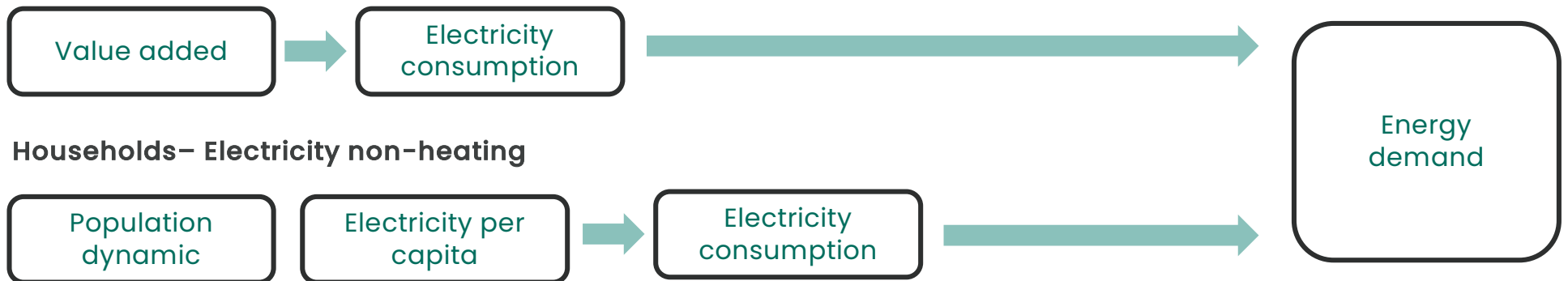


## METHODOLOGY

### Service sectors - Heating



### Service sector - Electricity non-heating



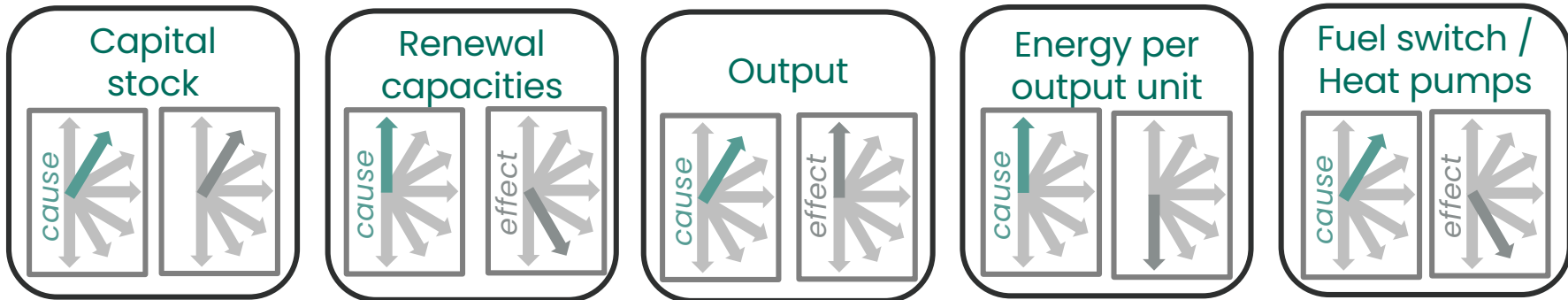
### Households - Electricity non-heating



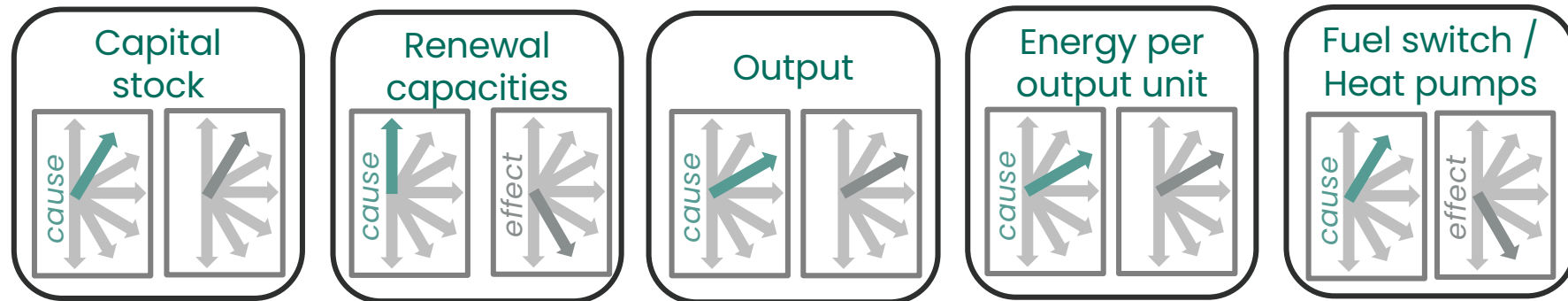


## DRIVERS & EFFECTS ON ENERGY CONSUMPTION

### Manufacturing sectors / Agriculture / Services



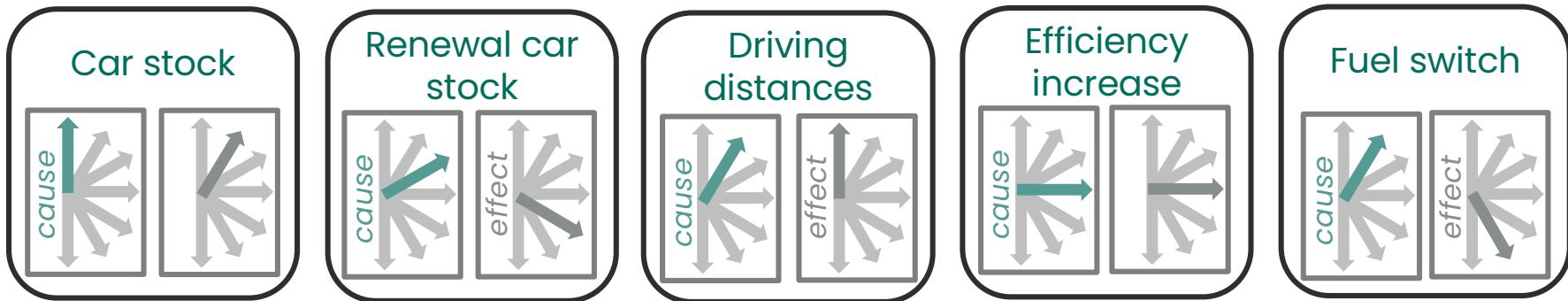
### Iron and steel sector



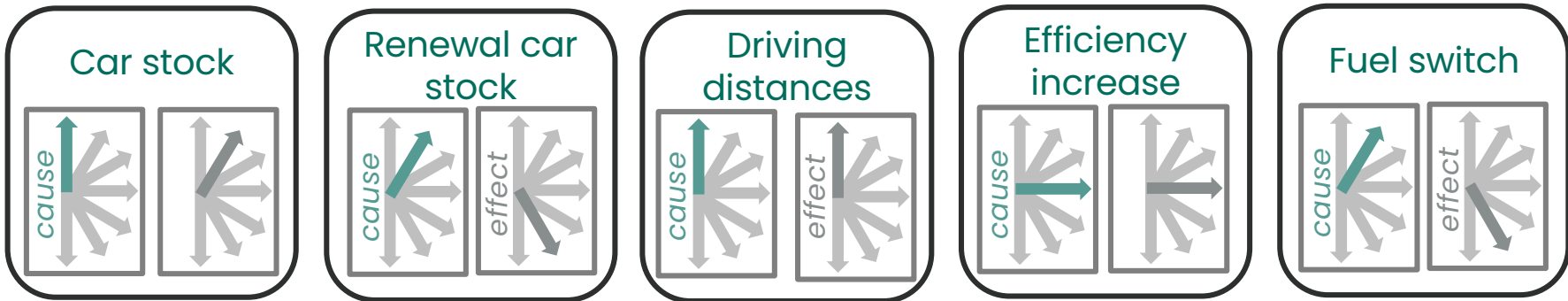


## DRIVERS & EFFECTS ON ENERGY CONSUMPTION

### Transport sector – Road – Passenger cars

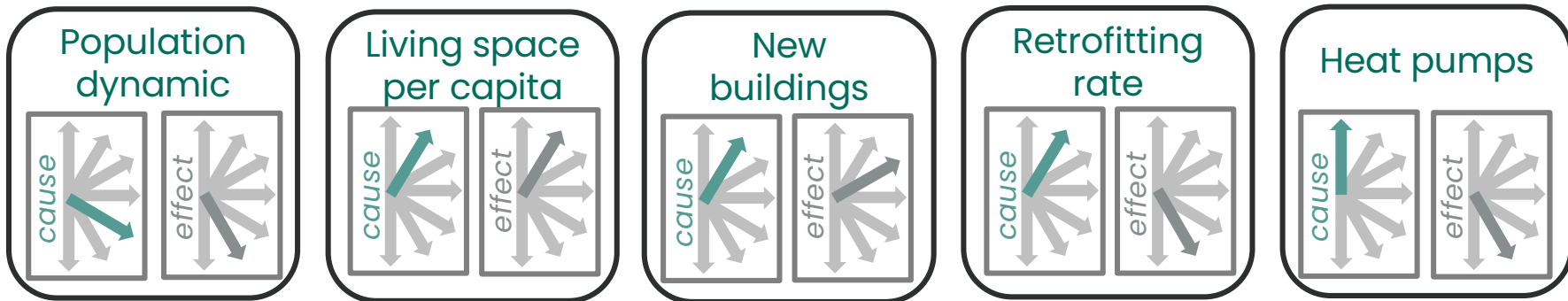


### Transport sector – Road – Duty vehicles

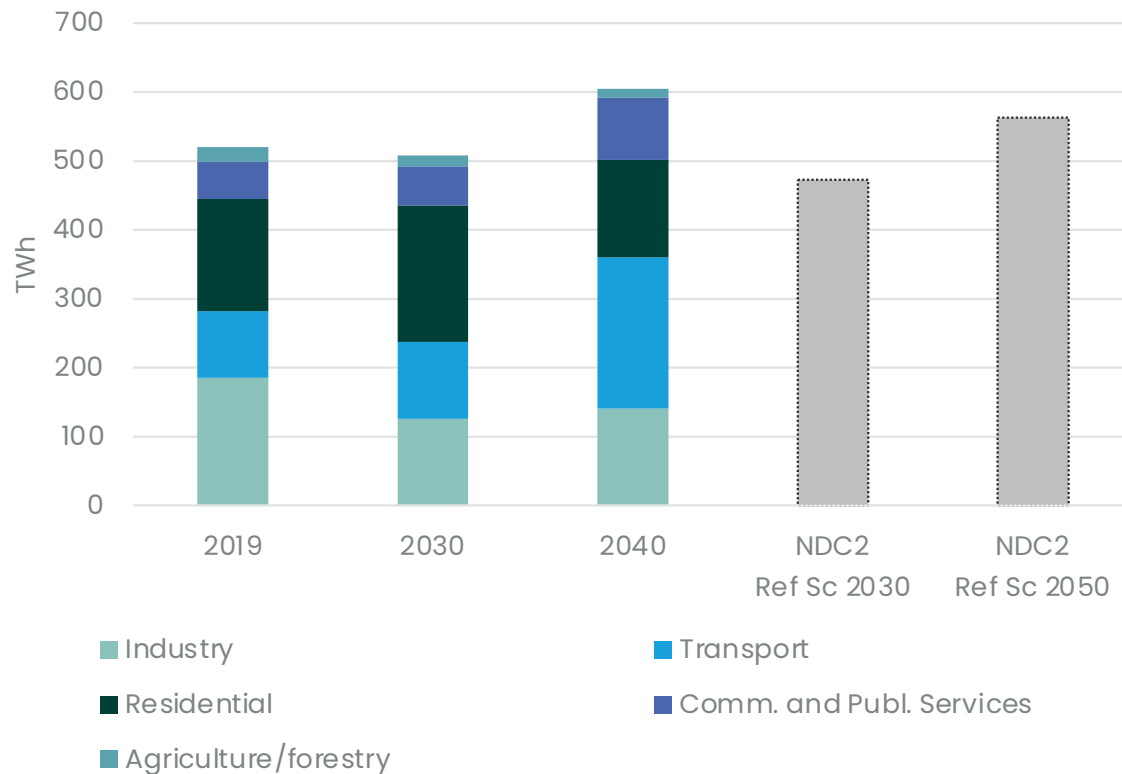


## DRIVERS & EFFECTS ON ENERGY CONSUMPTION

### Building sector – Residential buildings



## ENERGY DEMAND – SCENARIO 1

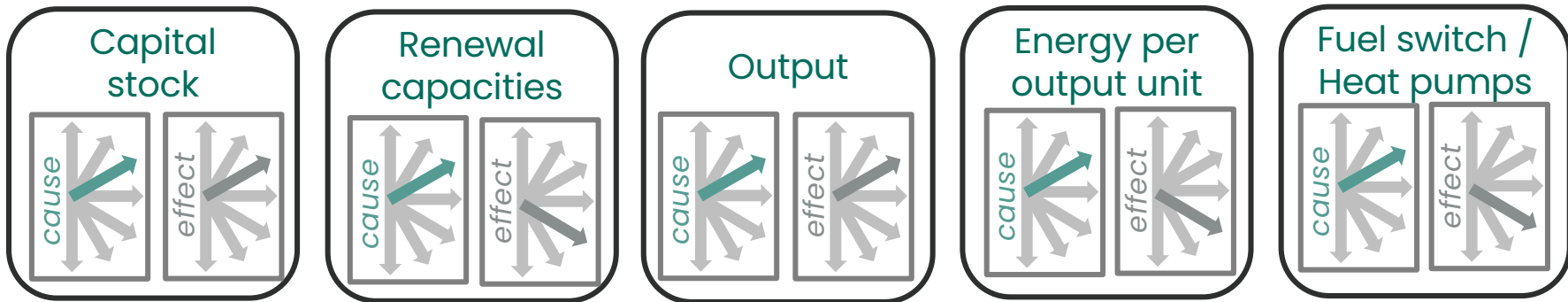


- In Scenario 1 energy demand in 2030 is **below 2019** demand (in contrast to ESU) – driven by lower energy intensity of industry.
- If Ukraine converges to European averages, massive increase in **transport** energy demand would dominate (other) efficiency improvements by 2040 – implying higher demand.

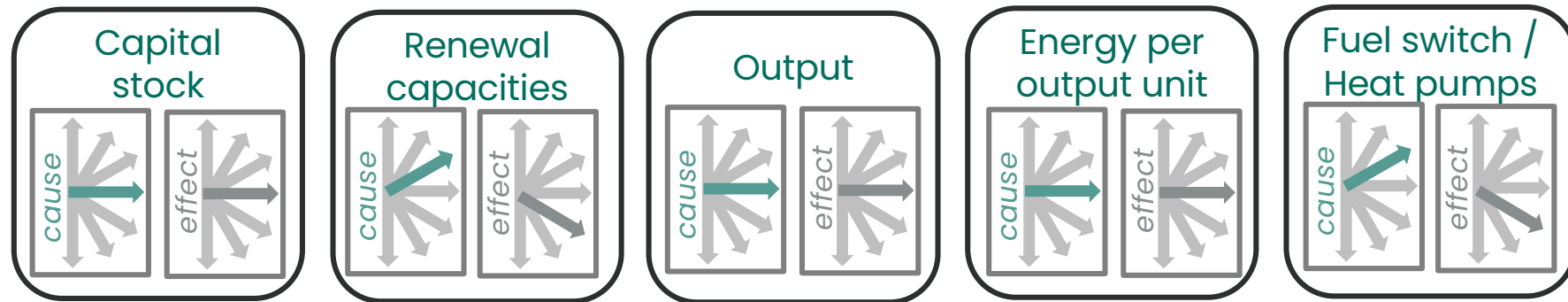


## DRIVERS & EFFECTS ON ENERGY CONSUMPTION

Manufacturing sectors / Agriculture / Services



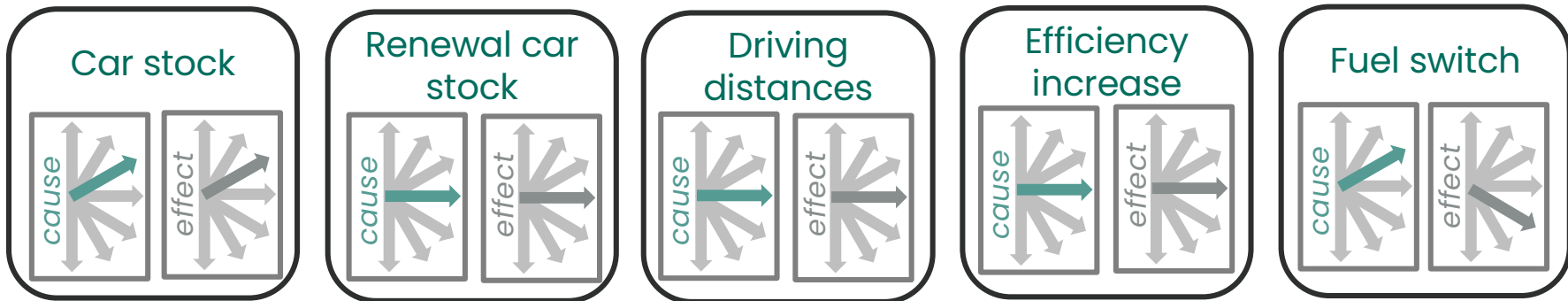
Iron and steel sector



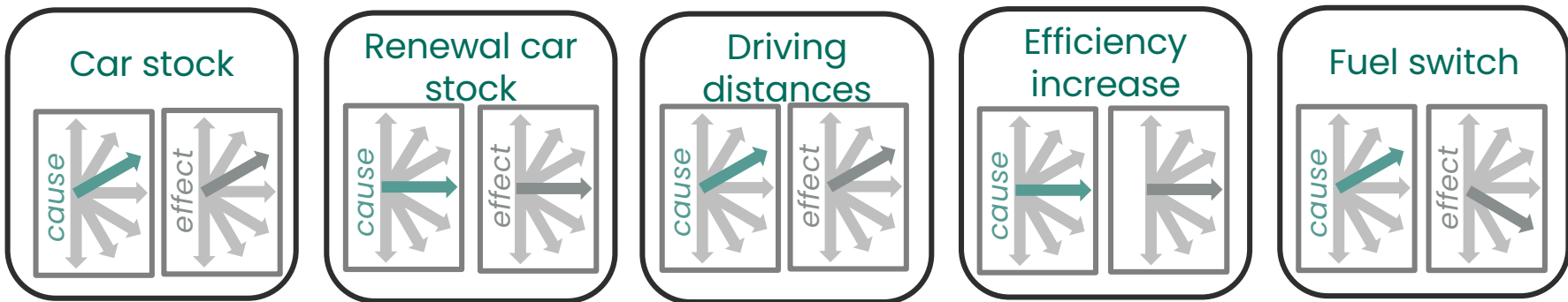


## DRIVERS & EFFECTS ON ENERGY CONSUMPTION

Transport sector – Road – Passenger cars

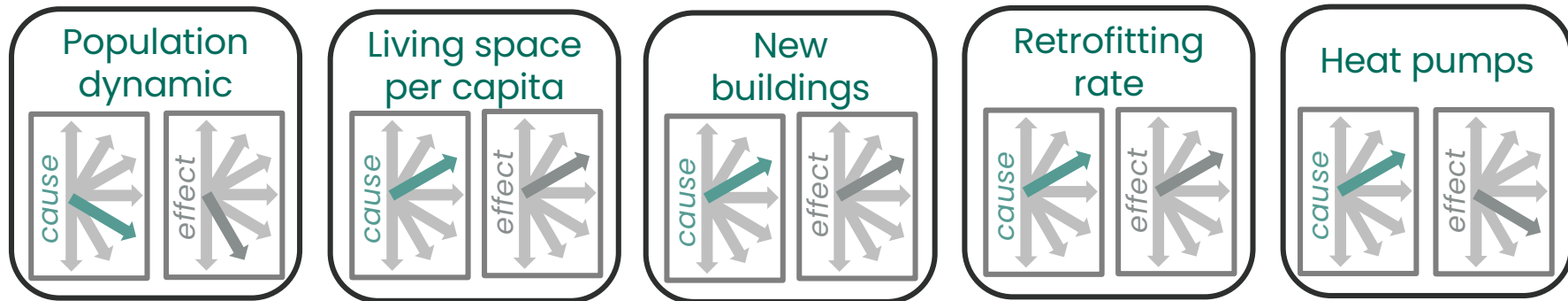


Transport sector – Road – Duty vehicles



## DRIVERS & EFFECTS ON ENERGY CONSUMPTION

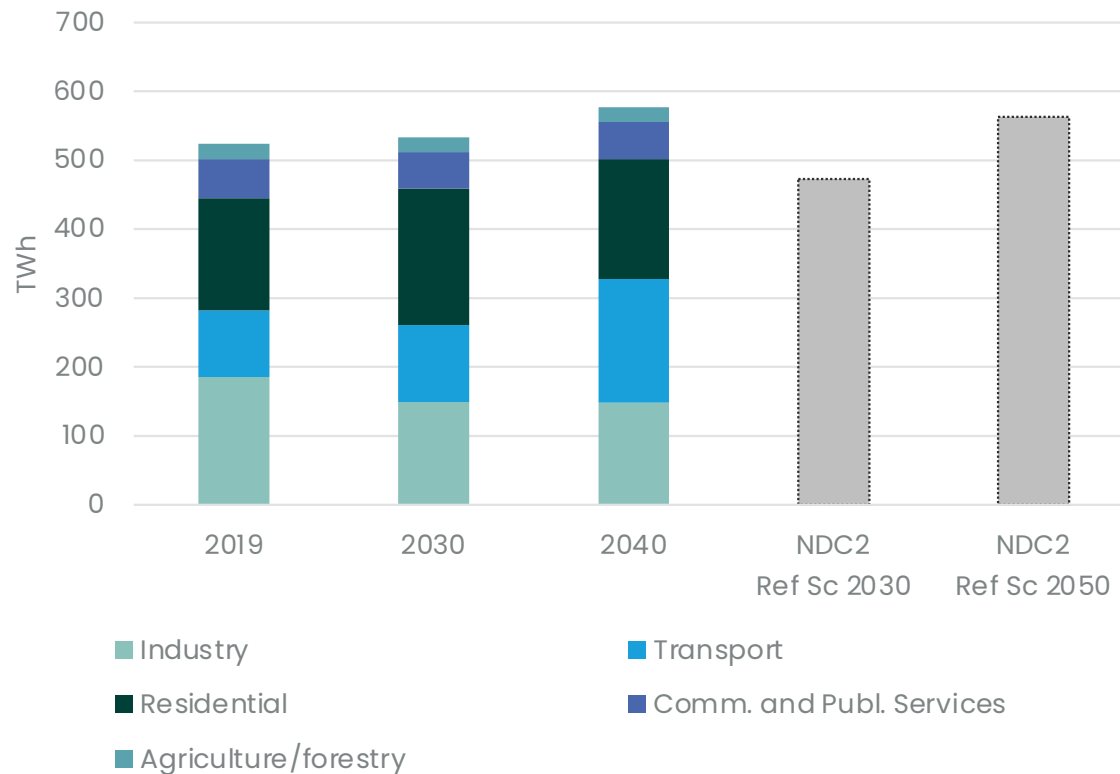
Building sector – Residential buildings



● ● Scenario 2 – “Limited growth, slow integration and unambitious climate protection”



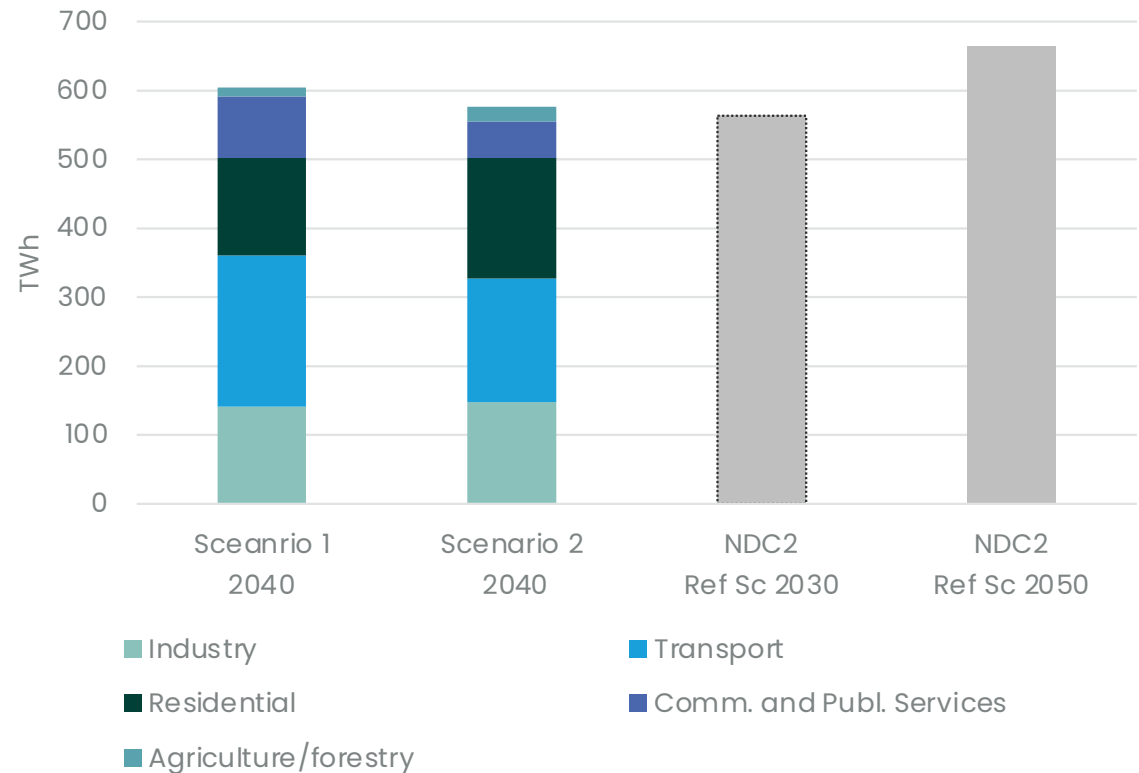
## ENERGY DEMAND – SCENARIO 2



- Higher demand by 2030 than scenario 1 due to lower efficiency gains
- But lower demand in 2040 due to slower economic progress
- Still, in scenario 2, transport sector would also become the largest consumer

### SUMMARY

- In Scenario 1 GDP doubles between 2019 and 2040 while energy demand only increases by 10%.
- In Scenario 2 GDP only increases by 30% while energy demand is still 2% higher.
- Scenario 1 features a lower energy demand in 2030, but by 2040, the demand surpasses that of Scenario 2.



## CONCLUSION ON DEMAND SCENARIOS

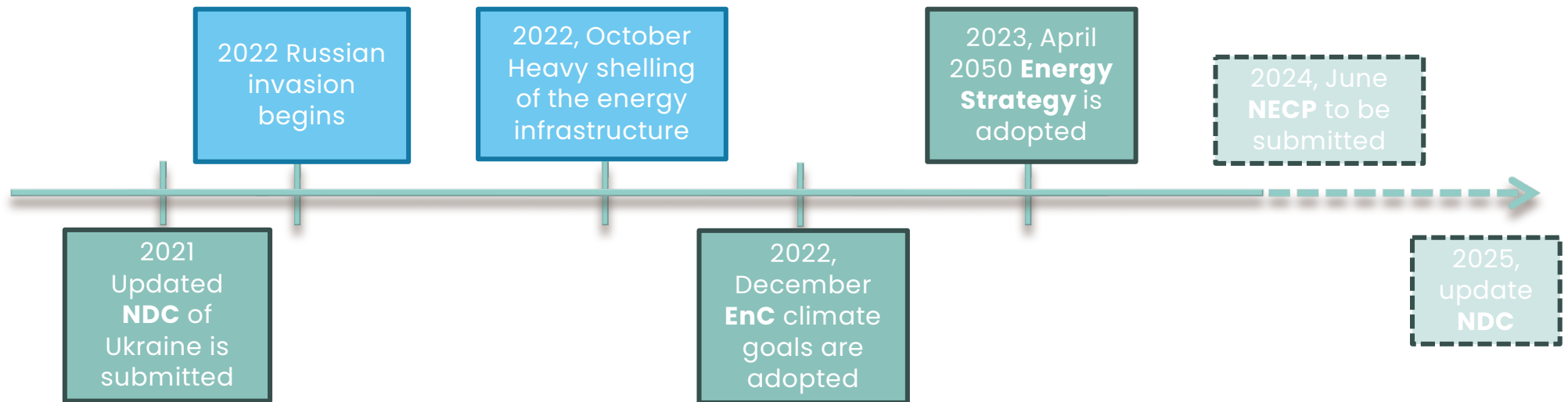
- Our scenarios see 2030 energy demand to be below 2019 values.
- A highly efficient and highly productive economy (Scenario 1) might have relatively similar energy consumption to a less efficient and economically successful one (Scenario 2).
- Several sectoral levers stick out:
  1. Iron and steel production was a driver for high energy demand in industry.
  2. Exports of hydrogen, ammonia, electricity and green steel can have significant impacts on energy demands.
  3. The transport sector might become a main driver for an increase in energy consumption.
- Deeper sectoral analyses needed - especially on the three above-mentioned levers.



### 3) Domestic and international commitments

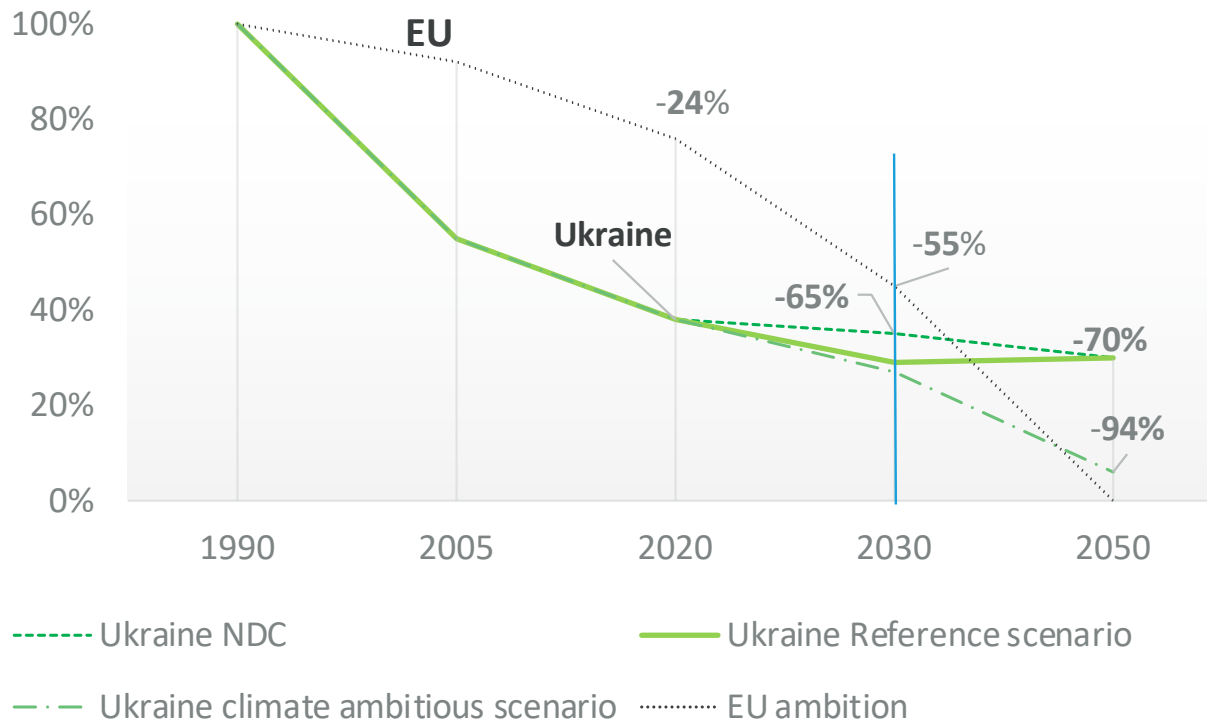
- The Ukrainian Government has been supporting the implementation of the EU Green Deal since its introduction, also having climate **obligations** under Paris Agreement and Energy Community Treaty.
- As an EU candidate country, Ukraine will also have to adjust its long-term energy and climate targets to **meet EU climate ambitions**.
- Clear climate goals will be necessary for attracting needed **investment** into Ukraine's energy sector.
- An EU-aligned energy and climate policy plan makes it easier to receive support from the EU, prevent carbon tariffs, and participate in burden-sharing (allocation of allowances).

## THE CURRENT STATE OF AFFAIRS



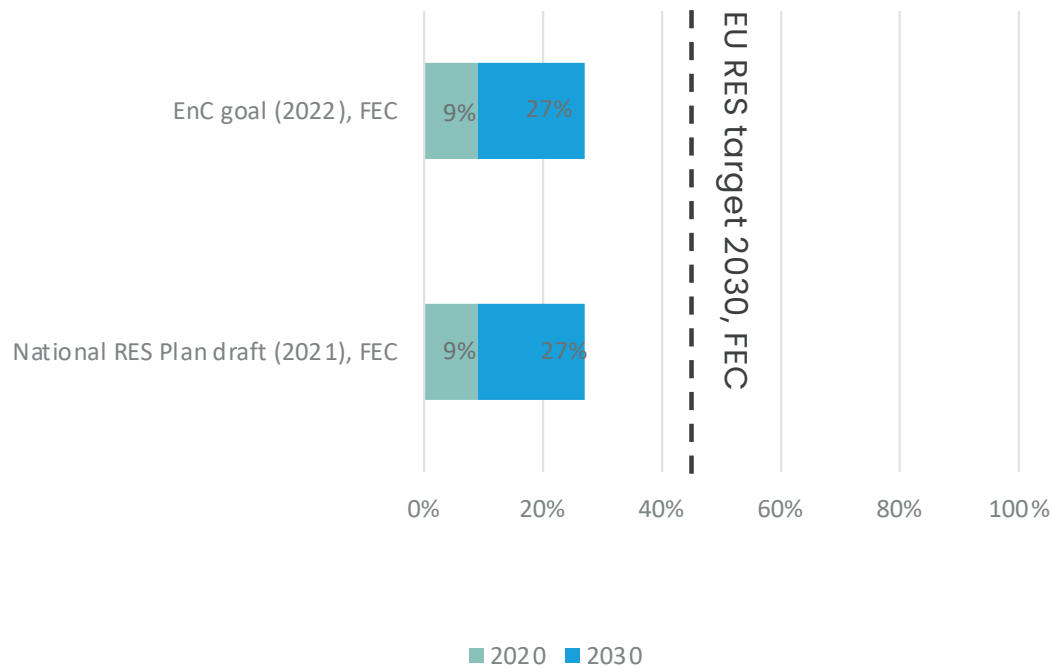
## EMISSION REDUCTION TARGETS IN UKRAINE

GHG Emissions to 1990 (incl. LULUCF)



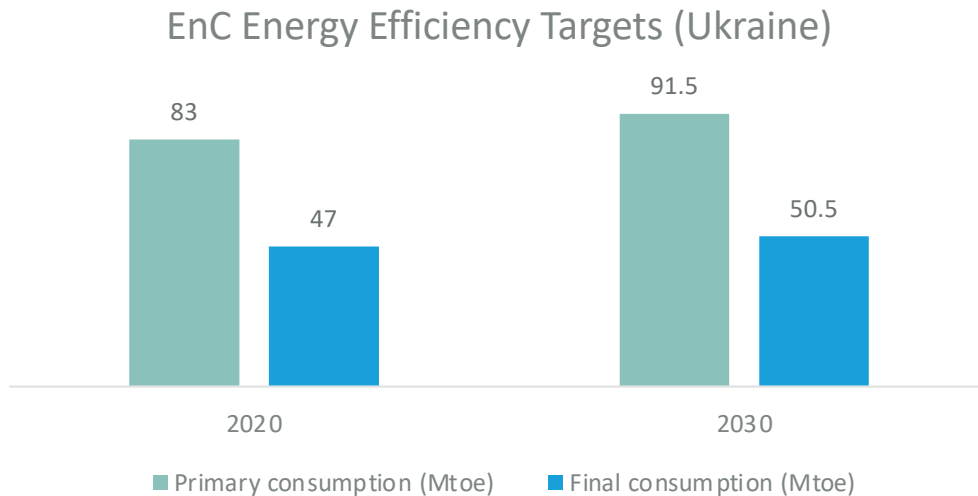
- Ukraine's updated NDC (2021) contained moderate emission reduction ambitions, falling behind EU goals in the 2040s.
- In addition, several alternative scenarios are still discussed in Ukraine, including the high climate neutrality ambition, considered in Ukraine's Low-carbon development strategy (2018).
- The existing strategic documents in Ukraine were adopted before 2022 and do not account for current realities in Ukraine and the EU.

## RENEWABLES TARGETS IN UKRAINE



- Ukraine agreed to achieve 27% of RES in final energy consumption (FEC) vis-à-vis the EnC.
- Achieving the goals implies doubling the RES share compared to the pre-war situation.

## ENERGY EFFICIENCY TARGETS IN UKRAINE



- Energy efficiency goals were established for EnC Contracting Parties in 2022.
- The proposed goals are expected to meet overall EnC targets (not exceeding increase of 7.5% of energy consumption in the Community).
- The goals for Ukraine correspond to the level of the pre-war EE plan of Ukraine (2022) and may require revision.

\*Reference scenario of the second NDC Report

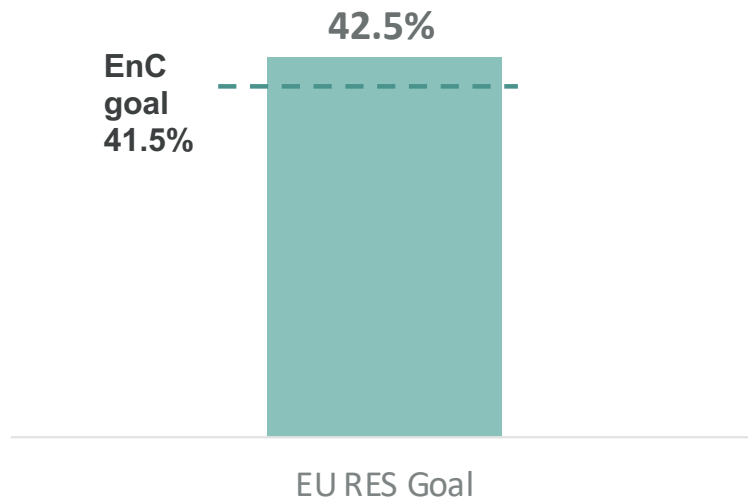
## DO CURRENT TARGETS REFLECT UKRAINE'S ACCESSION AMBITION?

With the Green Deal and REPowerEU (2022) the EU has been moving towards more ambitious 2030 targets:

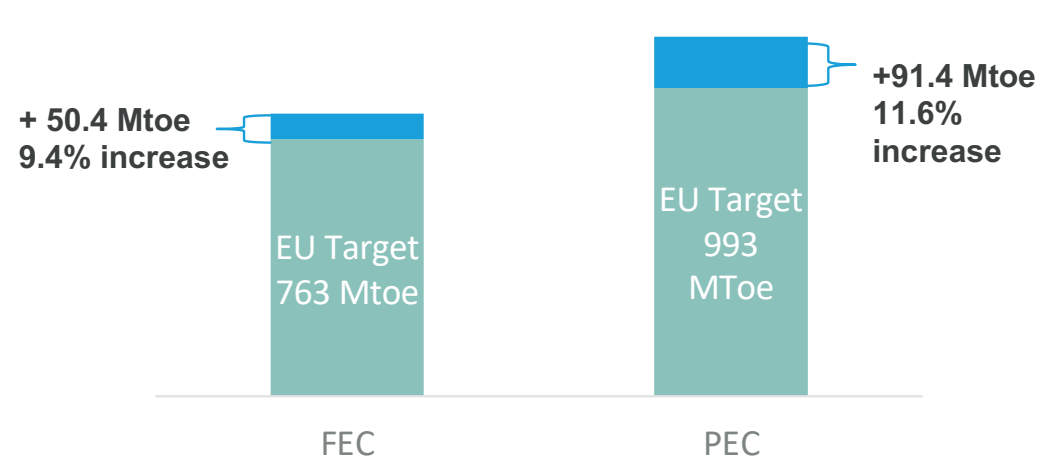
- Energy efficiency (11.7% reduction vs. 2020 projections)
- RES development (42.5%)
- Reduction of GHG emissions (55% vs. 1990).

Ukraine's current targets would imply that an enlarged EU (incl UA) would miss its targets:

Impact of UA Targets on EU RES Goal



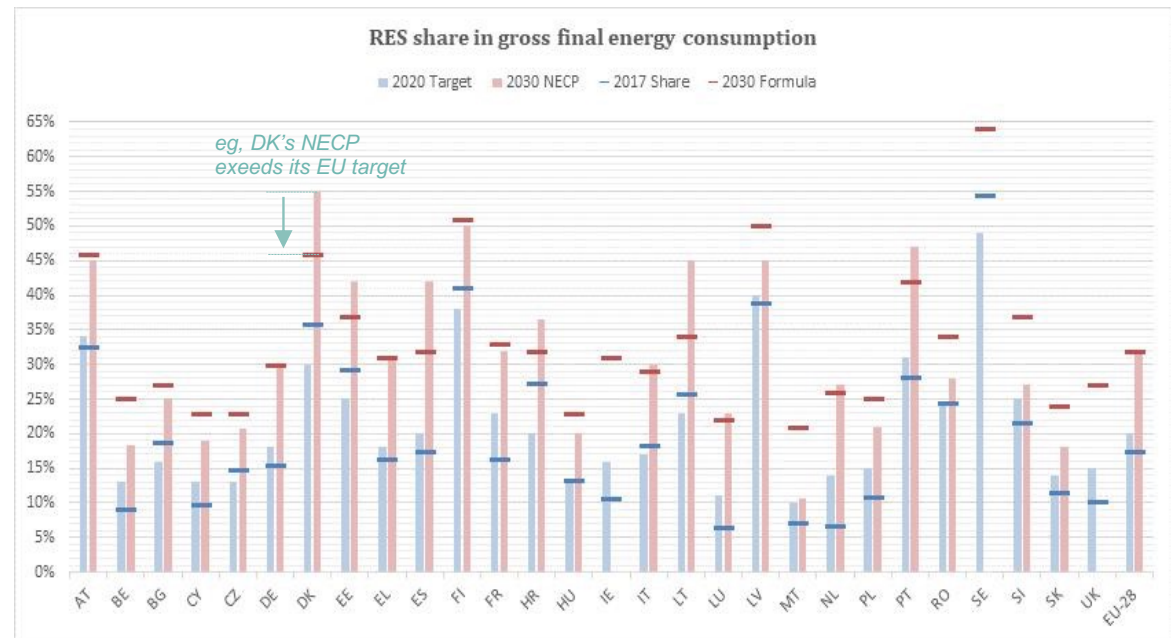
Impact of EnC Targets on EU EE Goal



But requiring Ukraine to meet EU overall targets is neither realistic nor fair.

## RE-SHARING THE BURDEN BETWEEN EU MEMBER STATES

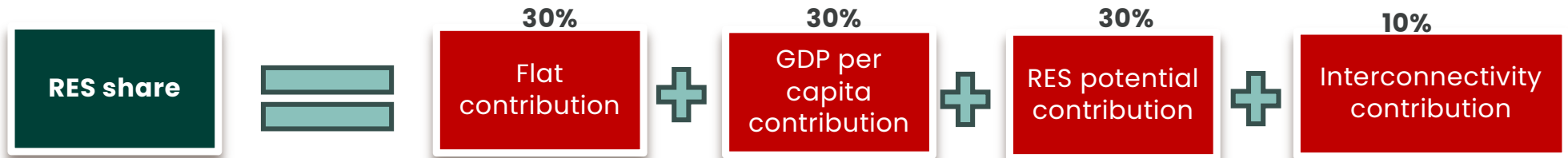
- Energy Union Governance Regulation distributes Member States targets according to:
  - uniform contribution
  - GDP level
  - national RES-projections
  - interconnectivity
- This allows more realistic national targets.



Source: Commission's reassessment of national RES contributions (2019)

## APPLYING THE FORMULA TO AN ENLARGED EU

- The formula for sharing the RES-target in Annex II of Regulation 2018/1999 is based on
- objective measures (flat rate, GDP)
- and less clearly-defined criteria (potential, interconnectivity)

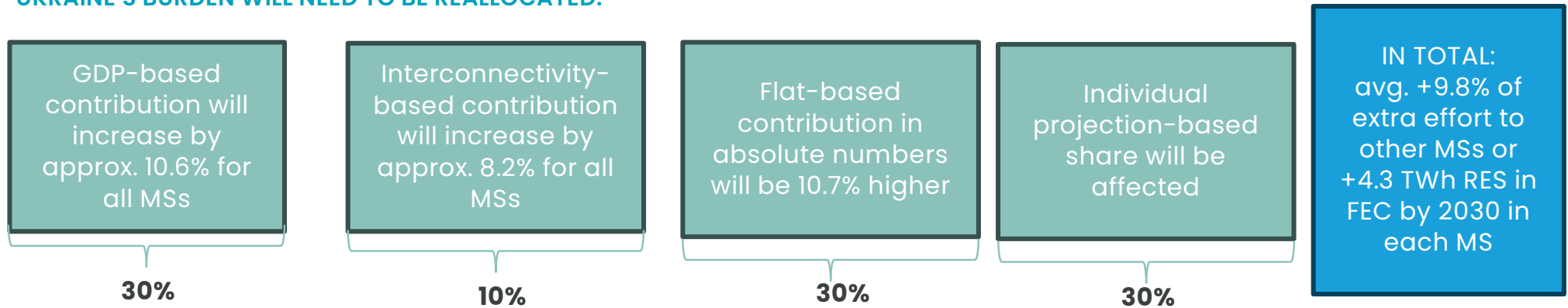


Flat contribution Ukraine 19.3 TWh	Same for each country	GDP contribution Ukraine 7.7 TWh	Approx. 58 % lower than EU average	Inter- connectivity contribution Ukraine 1.1 TWh	Approx. 75% lower than EU average	Potential- based contribution Ukraine 19.3 TWh	Approx. 59.5 TWh remains in excess
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- RES potential contribution is based on individual projections,
- GDP and Interconnection are assessed against corresponding EU average for each MS.
- If corresponding target would exceed potential – some readjustment is possible.

## HOWEVER, EXISTING EU MEMBER STATES' INTERESTS NEED TO BE ACKNOWLEDGED TOO

EXAMPLE OF APPLYING EU APPROACH TO UKRAINE ALSO DEMONSTRATES THAT A SIGNIFICANT PART OF UKRAINE'S BURDEN WILL NEED TO BE REALLOCATED.



- The compromise solution may acknowledge the interests of both EU countries and Ukraine, e.g. by changes in the formula to reduce burden for all parties.
- The first step can be made within the NECP process, where realistic projections need to be included and the process organized in line within EU standards.

## NEED FOR A SOUND STRATEGIC APPROACH

- A new approach to the energy sector's planning is needed to objectively assess the post-war demand and supply factors, opportunities for Ukraine's recovery and ensure alignment between existing policies and EU-compatible targets.
- Currently there are still gaps in clarity regarding the necessary costs, policy instruments, and measures to ensure the sector's transformation in line with Ukraine's EU ambitions.

### Utilizing EU approach to sector's modeling

Ensuring the high-level projections of energy demand, supply and prices will clarify the realistic possibilities for sector's development.

### Integrating climate and energy policy and goals

The coordination of planning of the key areas for energy and decarbonization will ensure the well-harmonized vision of the policy reforms resulting in clarity for potential investors and donors.

### Ensuring EU support and integration

Developing the NECP in line with Regulation's 2018/1999 will allow to determine Ukraine's contribution as future MS, and the support needed.

## 4) Policy Conclusion

- A useful strategy should take into account that a “European road” will imply a different structure and volume of energy demand than assumed in previous strategies.
- The NECP-process can be used to discuss consistent scenarios of future economic structure / energy demand.
- Ukraine’s EU-accession will likely require Ukraine and current EU-members to readjust their energy and climate commitments.
- A document that acknowledges fundamental uncertainties and strategic choices reduces uncertainties for investors, policy-makers and donors.

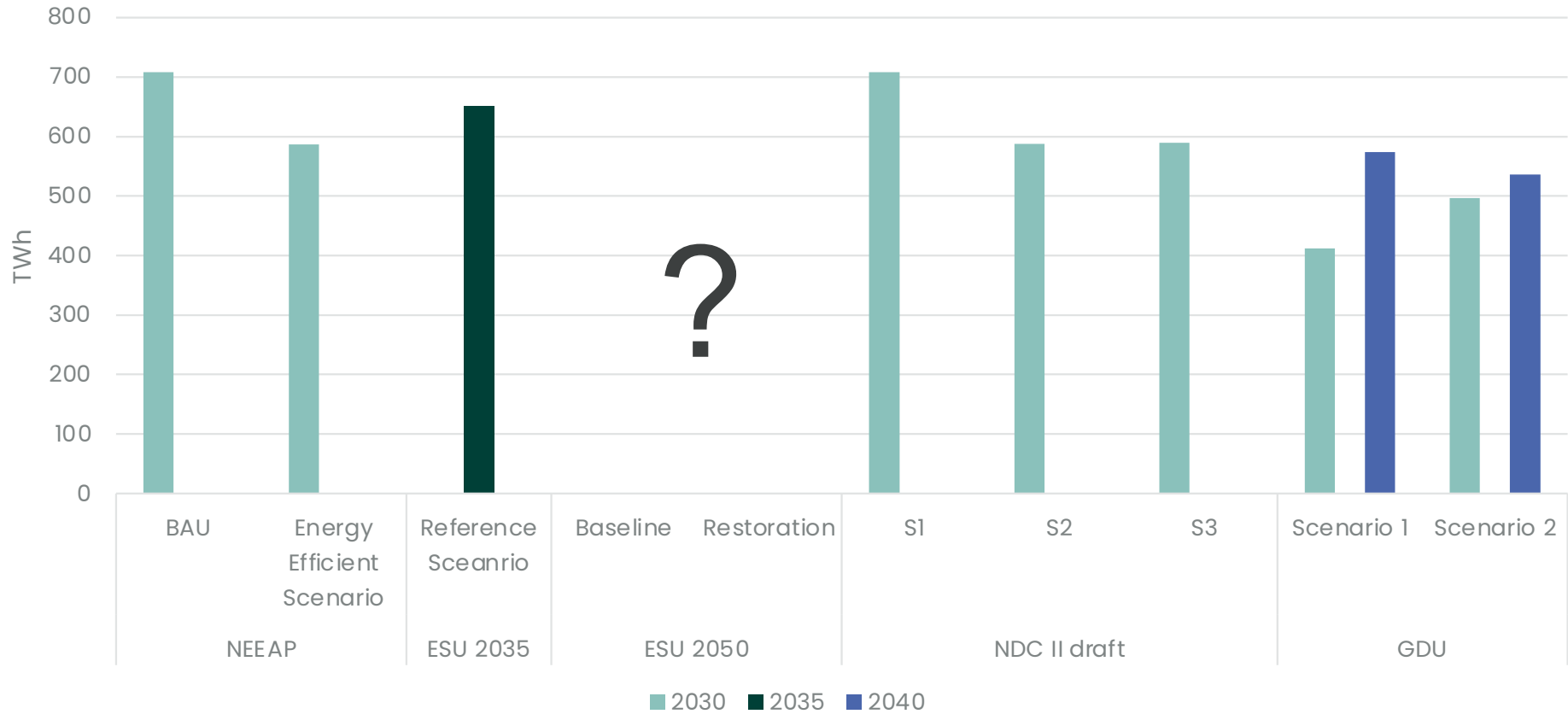


Thanks for your attention

[www.GreenDealUkraine.org](http://www.GreenDealUkraine.org)



## COMPARISON FEC PROJECTIONS



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