The green agenda and its impact on monetary and macroeconomic policies

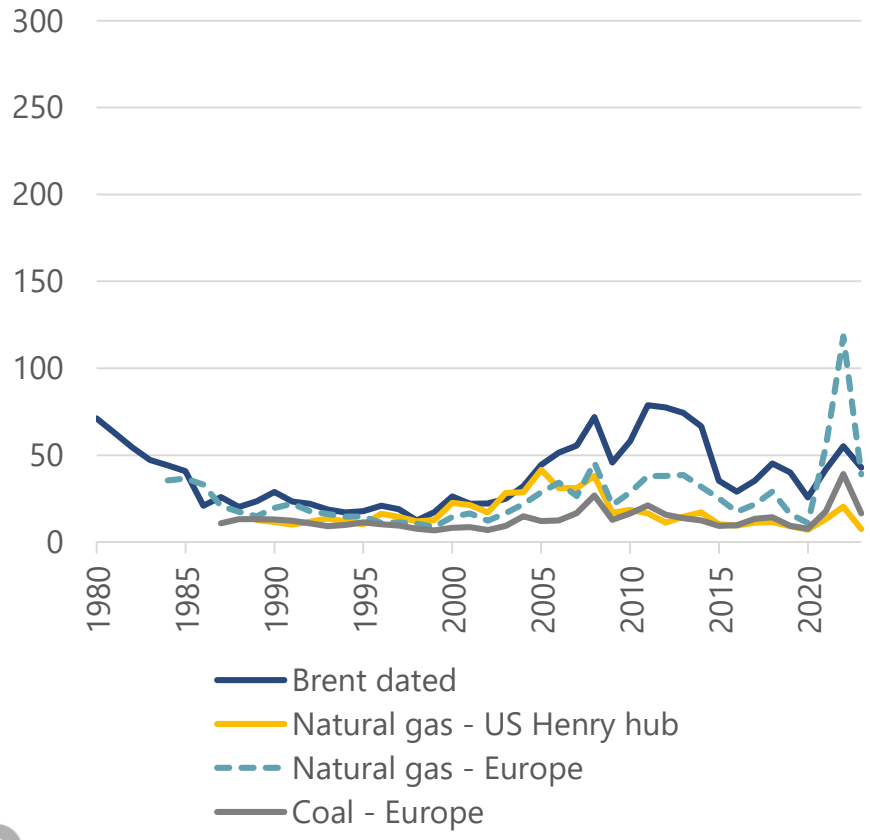
Pierre Wunsch, Governor

Banka Slovenije, 28 October 2024

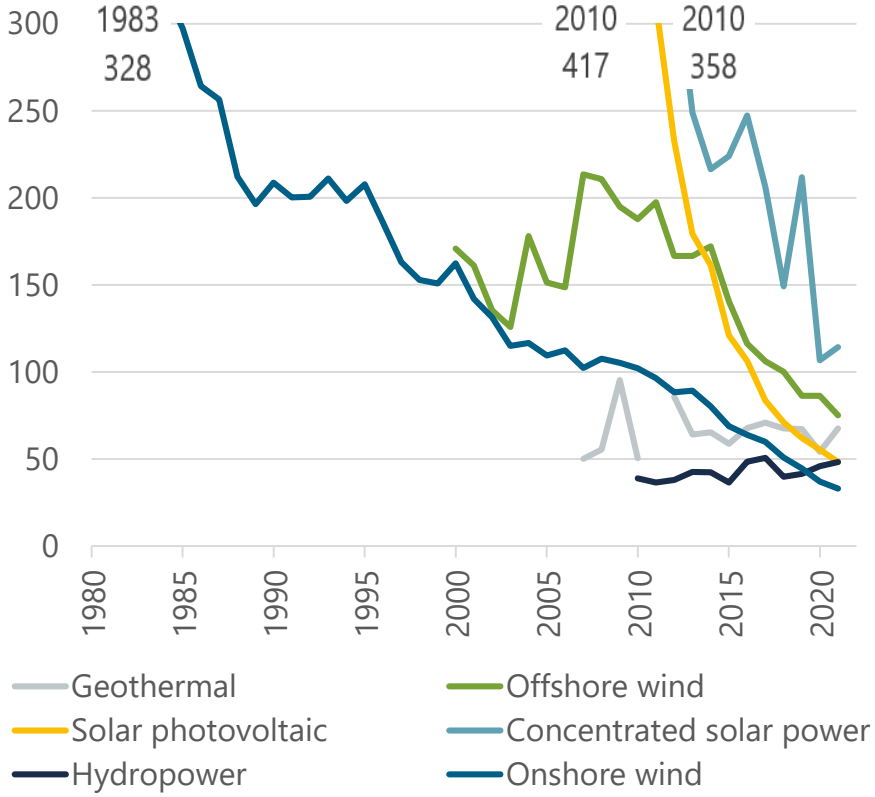
National Bank OF BELGIUM
Eurosystem

Setting the scene: transition to climate neutrality is mostly about relative energy prices

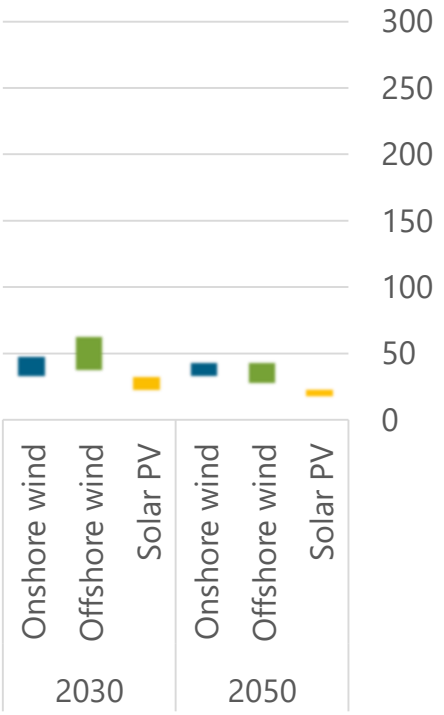
Fossil fuel prices
(in $2021/MWh)



Levelised costs of renewable generation today …
(in $2021/MWh – worldwide)



… and in 2030-2050



Min. onshore wind = US
Min. offshore wind = Europe
Min. solar PV = China

Source: BP statistical review of world energy (June 2022) – Our world in data based on "IRENA Renewable power generation costs in 2021" – "IEA World energy outlook 2022".

Cheap fossil fuels will be replaced by cheap renewables (and some more)…

… but they are not perfect substitutes

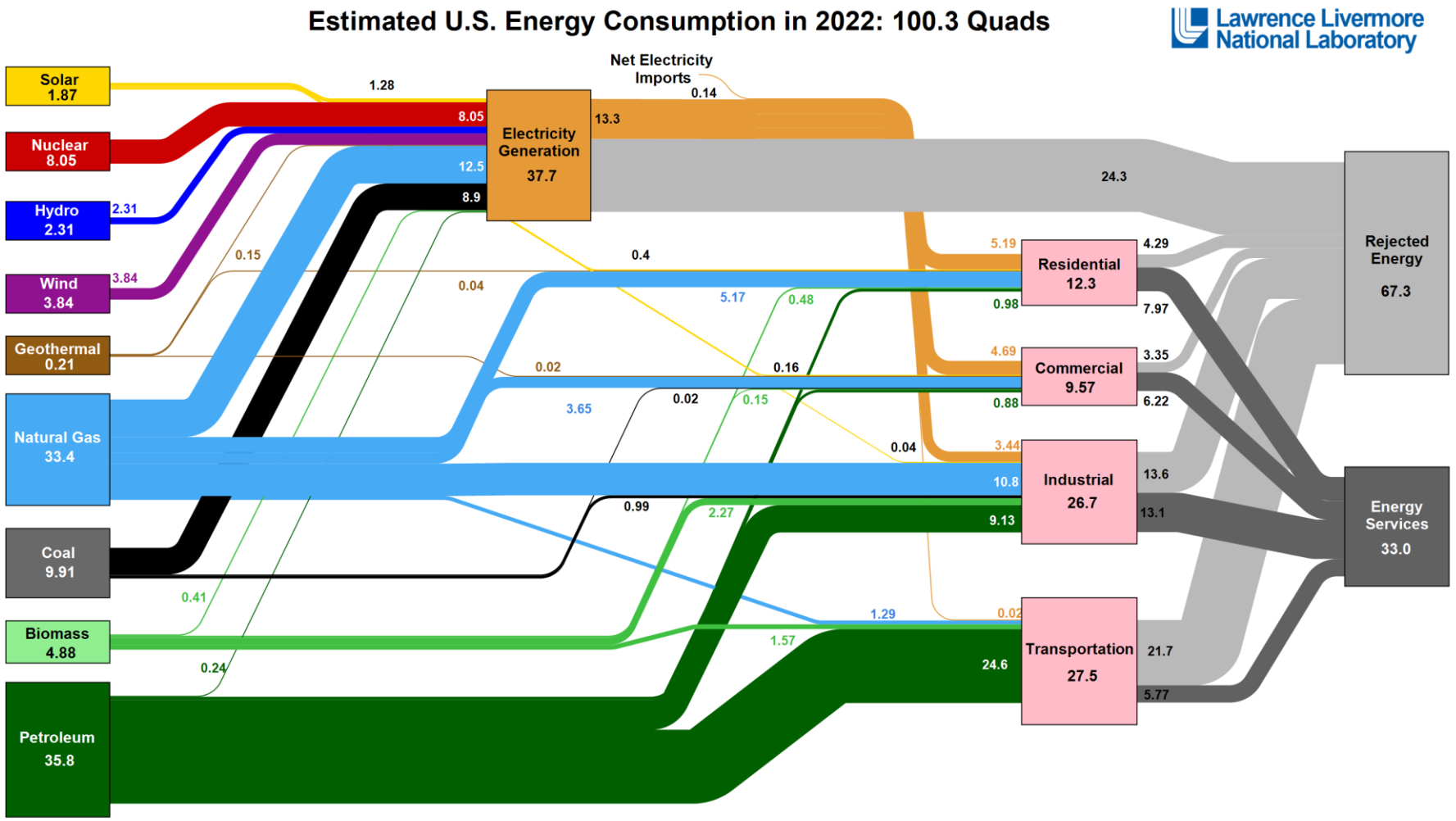
The not so good

- (Most) renewables are intermittent
- Electricity is not easy to store
- Batteries are heavy and bulky
- Potential bottlenecks in the sourcing of materials

And the better

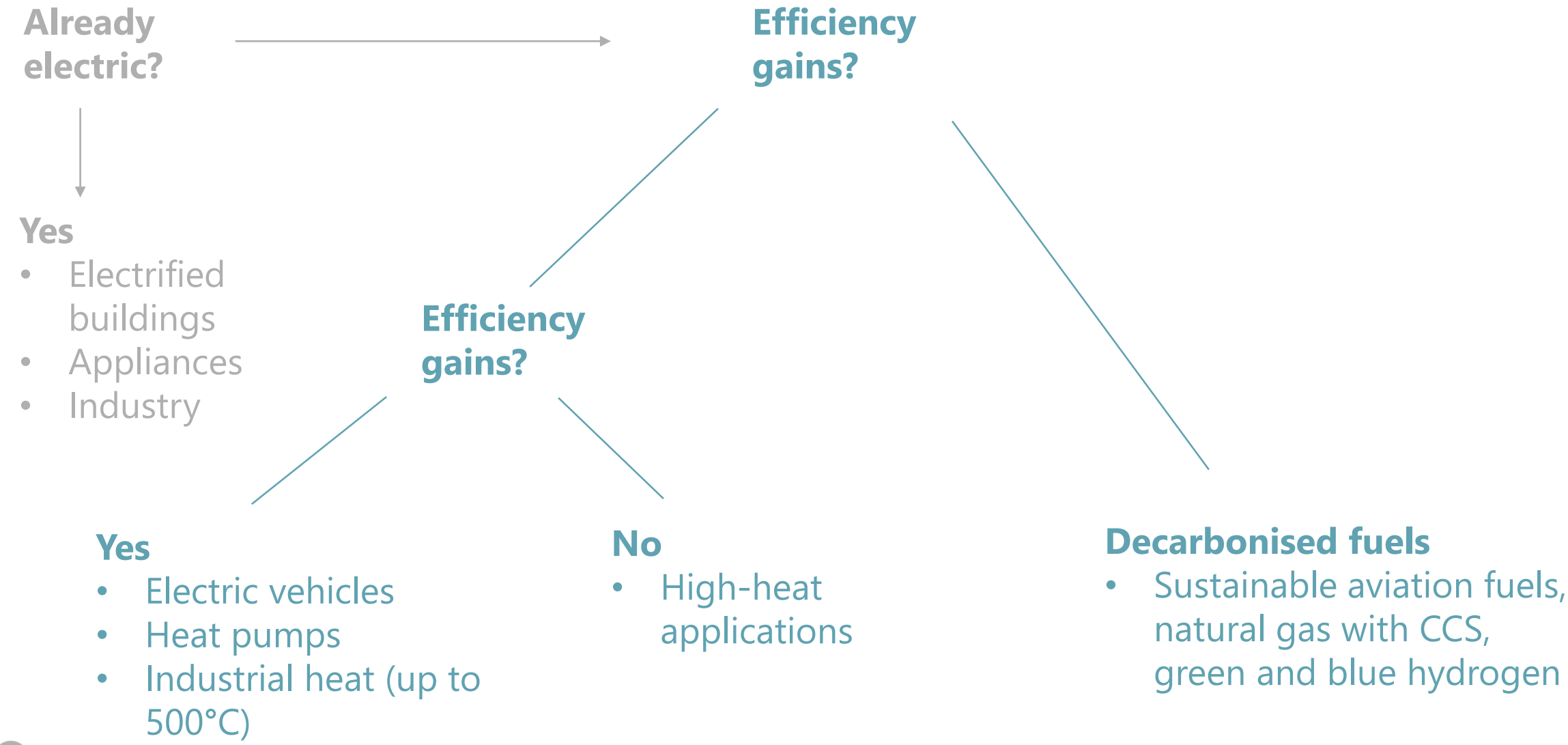
- Electric cars are 300-400% more efficient than combustion engine cars
- Heat pumps are 300-400% more efficient than gas or oil boilers
- Increasing electrification of heating and transport will increasingly allow for grid balancing via demand-side management
- Phase-out of fossil fuels leads to substantial, immediate air quality co-benefits
- Reduced fossil fuel import bill improves trade balance and allows for flexible foreign policy

Aside: direct use of electricity avoids rejected energy since energy is used directly – no conversion losses



Source: Lawrence Livermore National Laboratory, 2023.

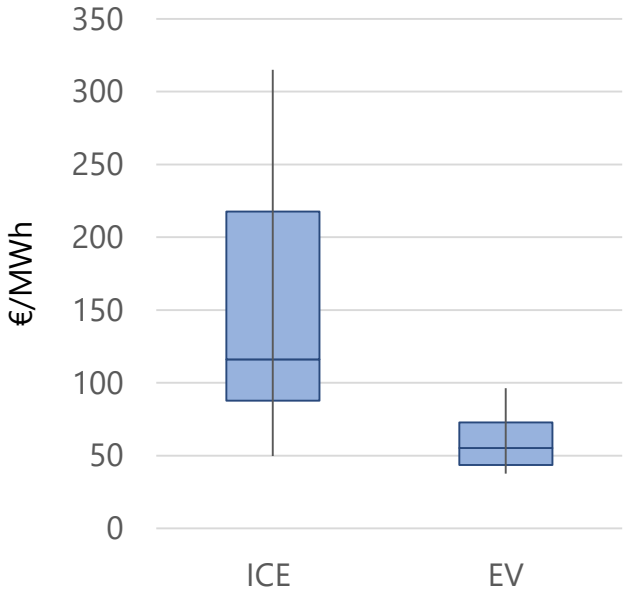
Electrification is the key choice for decarbonisation in the next decade



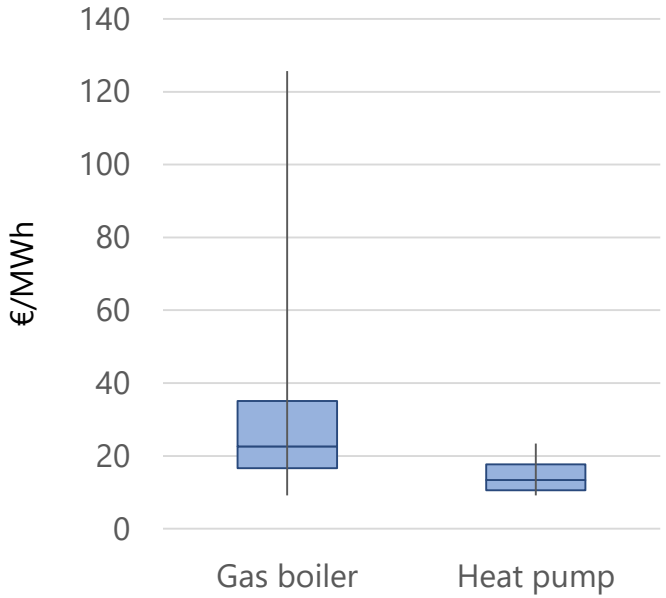
Source: NBB analysis.

Technological progress in road transport and buildings has made decarbonised technology close to cost-competitive

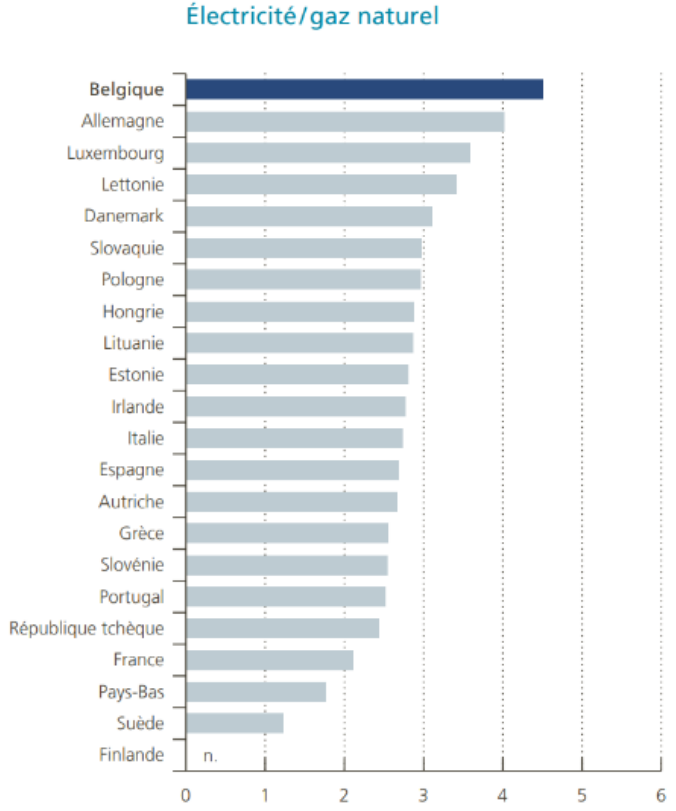
Road transport



Buildings



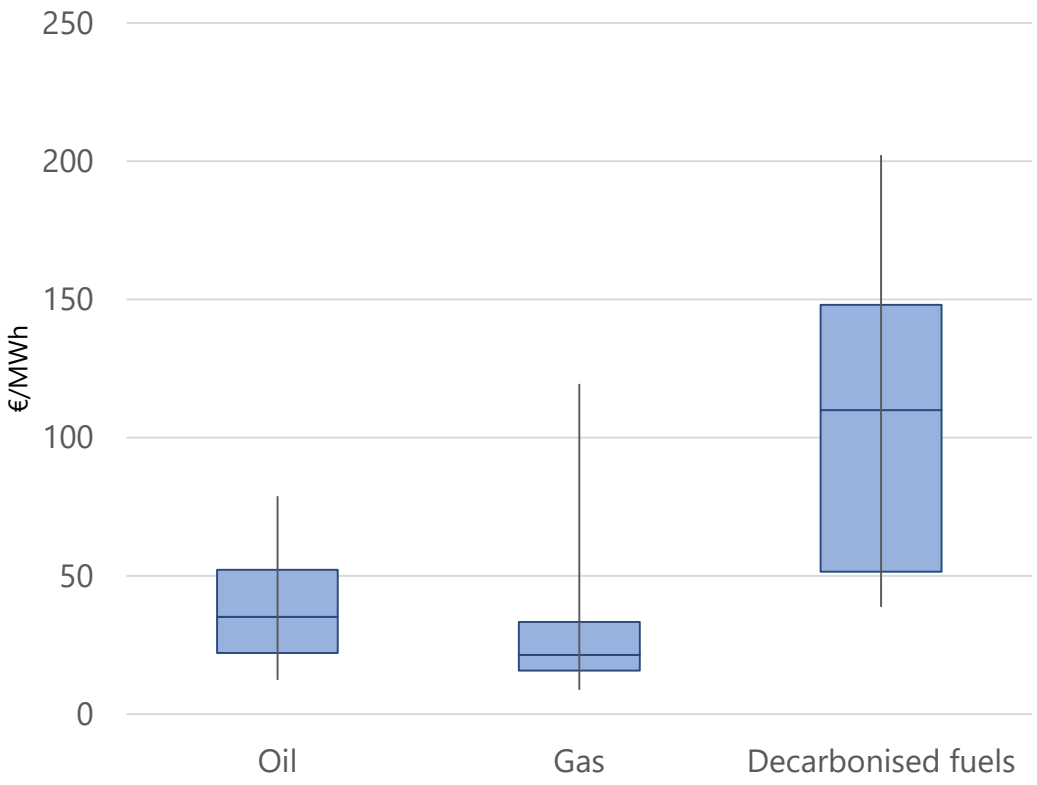
Key for roll-out: end consumer price ratio of electricity to fossil fuel price



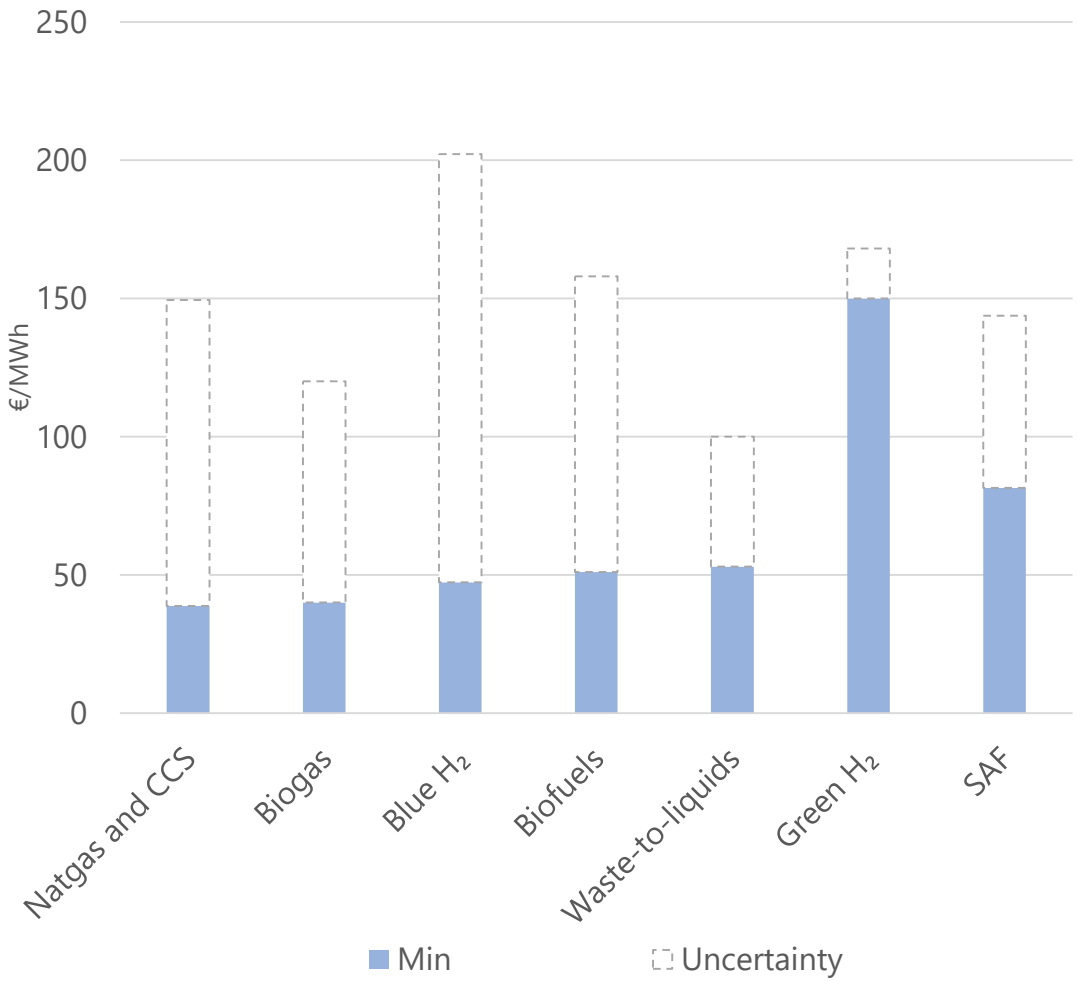
Source: NBB analysis as well as IEA database. The graphs depict mobility-equivalent and heat-equivalent costs per MWh of energy used. Graph based on wholesale energy price data shown in previous slide. Efficiency of ICE at 25%, EV at 85%, gas boiler at 95%, and heat pump at 350%.

Fuel use where electrification is not economical/possible

Fossil fuels vs. decarbonised fuels

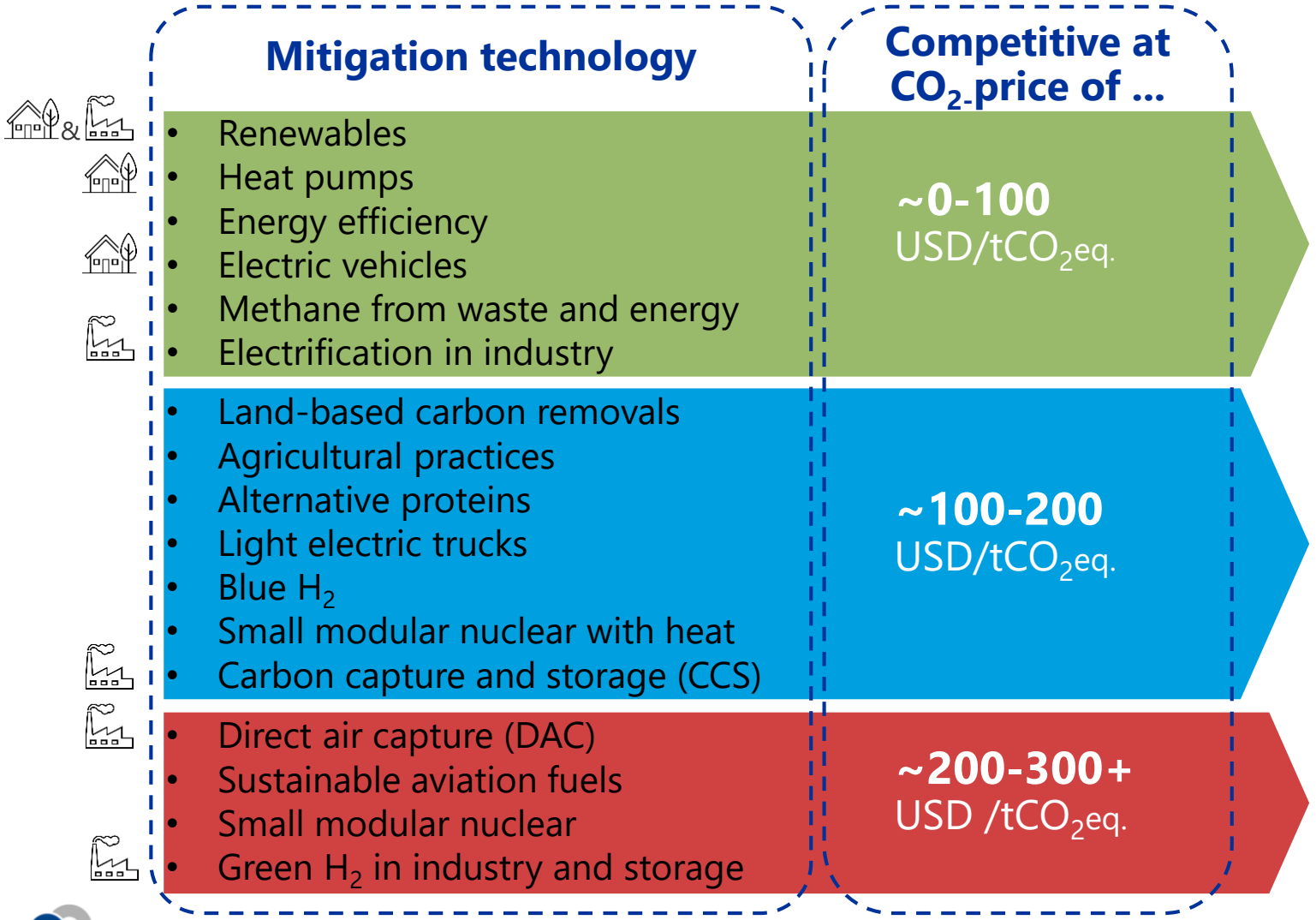


Decarbonised fuels in detail



Source: NBB analysis.

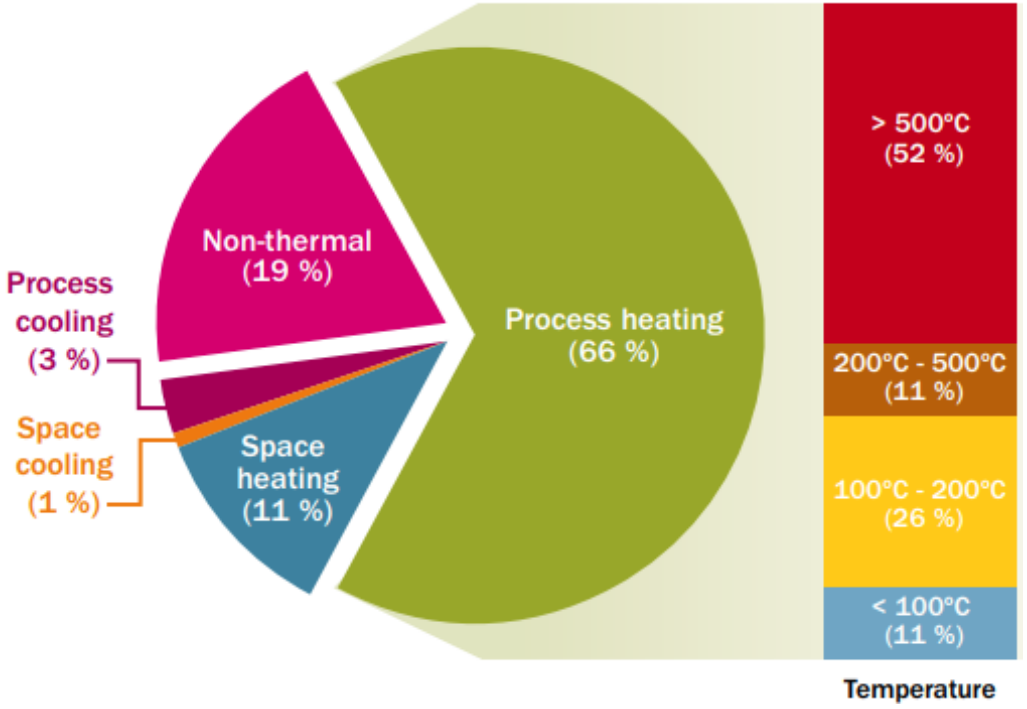
Cheapest decarbonisation are likely for households



Industrial energy use: electrification

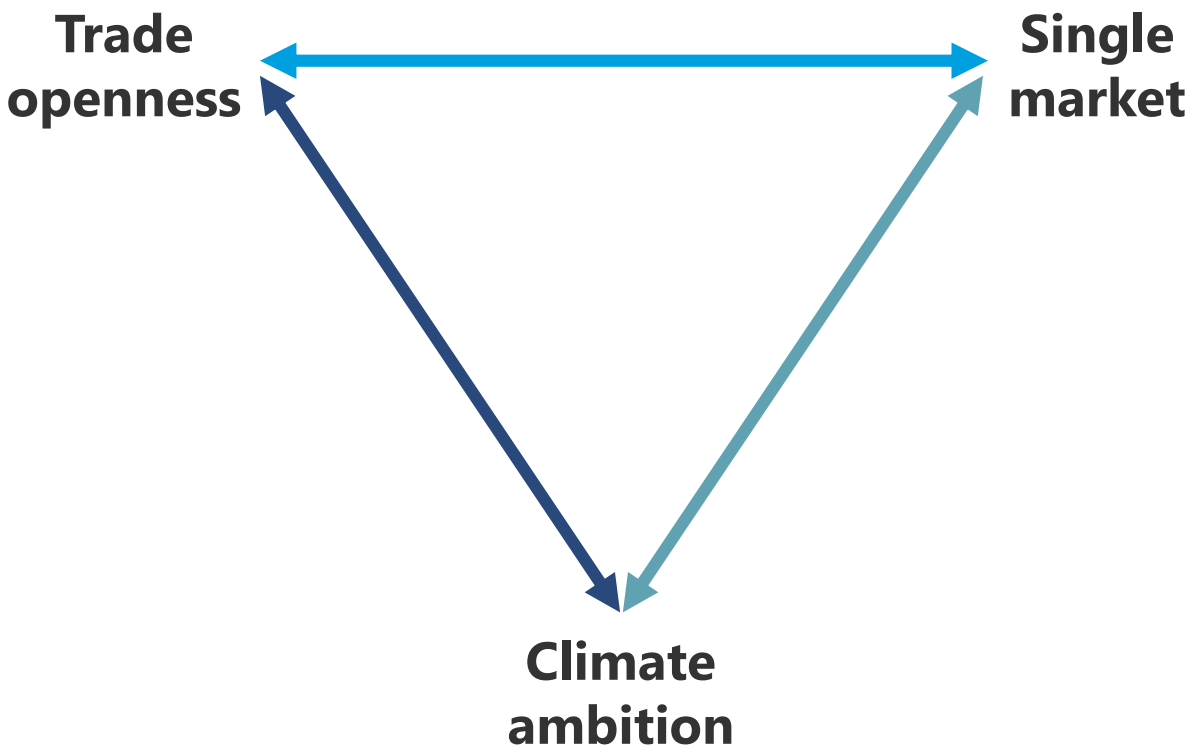
Background on energy use in EU industry

- 77% of energy demand in EU industry comes from providing heat.
- Most of that heat today is provided by burning fossil fuels, leading to large GHG emissions (20% of EU total GHG emissions). These emissions were previously seen as hard to abate.
- *The bad news:* Hope for industrial decarbonization has thus rested on CCS and green H_2, neither of which are likely to materialize any time soon at scale or at low cost.
- *The good news:* Deep electrification of this industrial heat demand, often via heat pumps, has since been shown to be able to cut industry GHG emissions by 75% (assuming a decarbonized grid).
- The million dollar question: is it profitable to electrify?



Source: de Boer et al. (2020): "Strengthening Industrial Heat Pump Innovation. Decarbonizing Industrial Heat" & Madeddu et al 2020 Environ. Res. Lett. 15 124004.

The climate trilemma



Signs of tension

- Calls for a pause… or more (e.g. housing renovation in Belgium, 2035 EU phase-out of new ICE cars)
- (European!) subsidy war with little direction from the European Commission
- CBAM and tariffs on Chinese EVs

Dedicated support for households part of EU ETS 2. Quid manufacturing industry?

- Carbon price and CBAM help, but only for domestic market
- Instead of unconditional free allocation, use parts of the EU ETS 1 proceeds to provide industry decarbonisation support via conditional carbon contracts for difference (cf. Delbeke et al. proposal)

Climate transition: not a free lunch, but manageable

Is the transition to climate neutrality macro-critical?

One view: “The transition is a great opportunity …“

Given that abatement is still costly across many activities: rather a negative supply shock?

While no free lunch, full decarbonisation appears manageable from a macro perspective

- Comparable to an oil shock but spread over 25 years (cf. Pisani-Ferry 2021)
- For Belgium: cost of about 2-3.5% of current GDP (Wunsch, 2024, Ch. in The Green Frontier) (can be interpreted as a loss of about 0,1pp growth rate per year)

Climate transition: not a free lunch, but manageable

With, as a result:

- Need for major resource reallocations (workers and investments)
- Higher aggregate investments (~2% of GDP on a net basis)
- Higher r* (and inflation?)
- Lower consumption

And also:

- Significant distributional - and therefore fiscal - consequences (vs. “double dividend” argument)

Main issue 1: There is little time left!

Public economics 121 on externalities

1. Set a Pigouvian price
2. Pay attention to distributional issues (of course!)
3. … enjoy your holidays

But

- The carbon price necessary to reach net zero GHG emissions is quite high (again, DAC >300€/ton)
  → Not politically feasible in one "jump"
- Increasing the carbon price progressively implies that there is no movement on all fronts (see previous slide) → Unless one assumes perfect markets and foresight, time is quickly running out

Therefore

- An increasing carbon price can be seen as the wave that will ultimately lift all boats in an efficient way
- But other instruments (subsidies, regulation, R&D support) will be needed to move on all fronts in time

Still

- Waiting is not always bad: one should not roll-out technologies before they are cheap enough
- A carbon price allows to focus first on the most efficient technologies, which makes sense

Main issue 2: Keeping the (voting) public on board

Do not overestimate popular support

- Many people have been told the "great economic opportunity story", not the "significant supply shock" one
- Surveys that estimate public climate policy support often fail to mention trade-offs

Need to stress tests political support for

- Household heating solutions (cf. German gas boiler debate)
- Household insulation obligations and supply-side constraints in the construction industry
- Risks to industrial activity

Main issue 3: Financing the transition

"We need to *find* hundreds of billions for the transition"

- We used to be in a World with excess savings and negative rates
- How much crowding-out of green investments on other investments ?
- (Less than) 2% of GDP is well without the historical variation of investments in Europe

"We cannot finance the transition without a Capital Market Union"

- EV's and heat pumps: Banks can do it
- Industry : Banks and the bond market should be able to do it
- Innovation & start-up: CMU would help but more of an issue for digital & AI than the green transition

My take :

- The issue is not about "finding" money as such
- But rather who should pay for the transition and how (policy instruments)
- And whether the public will remain supportive

Impact on monetary policy?

Back to impact on r* and inflation

- "We need to invest" vs. assimilation of a carbon price to a form of oil shock (without terms of trade)
- Not even sure investments will go up

If investments do go up, r* should go up

- By how much is less than clear (as in any discussion on r*)
- The supply shock implies higher costs of ~0,1% GDP growth per year
- But, in theory, higher costs do not necessarily imply higher inflation

We start from a period of high energy prices and inflation

- Energy prices should be lower in 2050 than in 2022, at least in Europe
- Volatility will come less and less from fossil fuels and more and more from bottlenecks in materials or expert skills

Some measurement issues may blur the picture at the margin

- Electric vehicles are more expensive than internal combustion cars but their price is dropping faster
- This will have a *negative* impact on inflation as the share of electric cars in consumption goes up
- This is because new goods, even though close substitutes, typically enter the price index as different items, and the chain-linked methodology of price indices removes any level effects (NB: solar panels and batteries for domestic use are considered investment goods, however)

When the concept of risk becomes somewhat blurred

Credit risks

- No brainer in theory, like any other risk
- Prevailing idea that the banks or the markets “do not get it” or that the risks should be “huge”
  - True if we do nothing in the (very) long run
  - Probably much less so considering (1) the typical duration of a banking credit portfolio and (2) the gradual impact of the transition (no like a “shock”)
- I would focus more on project finance and mortgages, not on short term credits

Financial stability & stress testing

- How to deal with regulatory risks?
  - See ECB disorderly scenario with ETS price equivalent to 450 USD per barrel of oil → Now, is it realistic to believe authorities would impose such price without compensatory measures ?
- Stop assuming static balance sheet until 2050: In the US, most firms would disappear anyway (less so in the EU)

Stranded assets

- Overall estimate of around 1-2 trillion USD worth of assets that could be stranded by 2050 (~1% of global GDP) – but this highly depends on how well transition is managed. Moreover, the net present value of long-lived assets is relatively low (1.05^30 = 4.3, assuming a discount rate of 5%)

When the concept of risks becomes somewhat blurred (ctd.)

Green bubbles ?

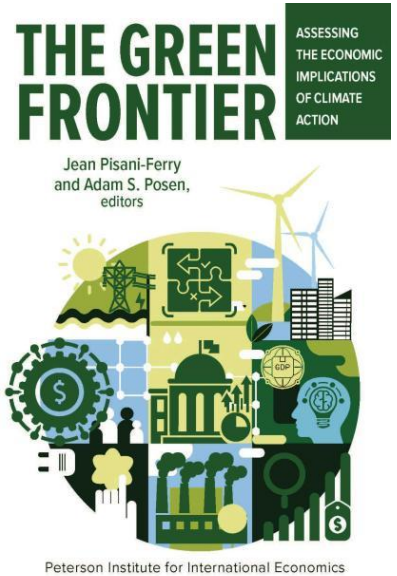
- No, but green investments are risky and have not done well recently
- Significant overcapacity in China
- Losses or issues with wind industry in Europe, green H_2 costs, investments in recycling
- Reducing transition risks to some sort of carbon intensity metrics is unlikely to work

"Knightian" uncertainty justifying additional buffers?

- Uncertainty is indeed significant but, again, not a "shock". We should have some time to learn about risks
- Physical risks will increase over time → Actually an opportunity for insurers (protection gap issue)?
- Transition risks: we do not start from nothing. The war in Ukraine is a good proxy for an carbon price increase; much more sudden than regulation is likely to be
- Credit risk analysis is a data intensive and heavily regulated business, with well defined metrics and back testing of models. I would not replace it with guts feelings without a fight.
- We need to remain disciplined when discussing risks: policy issues vs. credit risks stricto sensu (e.g. collateral framework)
- I do not buy the argument that risks are so significant and uncertain that financial regulators have a mandate to impose additional buffers BUT the pressure is real (see also the role of monetary policy)

Role of central banks

- The no brainer: study the impact of climate change on the macroeconomy
  - For decarbonization: need to get one's hands dirty by looking at technologies beyond single agent models or production functions
- The conceptually clear but maybe overblown: understand the impact on credit risks
  - See previous slides
- The controversial: act on relative prices
  - Tilting of monetary policy portfolio; green supporting factors in capital regulation; collateral framework
  - Here, the Atlantic divide is HUGE, which is a first indication that the issue has a political dimension



What falls under ECB's remit? Article 3

ECB mandate is anchored in the EU Treaty:

- price stability is the primary objective
- without prejudice to that objective, support the general economic policies in the EU with reference to Article 3 of the Treaty

Article 3 lists many objectives:

- a high level of protection and improvement of the quality of the environment …
- … but also balanced economic growth, a highly competitive social market economy, full employment, social progress, scientific and technologic advance, social exclusion and discrimination, equality of women and men, …

  Risk of cherry picking: "Animal Farm" reading of the Treaty ("All animals are equal but some are more equal than others")

Key role of carbon pricing: the relative price changes needed to fully decarbonize need to come from the elected fiscal policy makers

"Supporting" is not well defined and the constraint is not binding

- As soon as one recognises that fighting climate change implies trade-offs, there is a very fine line between supporting policy and making policy
- The "without prejudice" constraint is not a binding : one can give a 100bp subsidy for green credit without jeopardising our primary mandate (one only needs to hike the policy rate to compensate)
- At the end of the day, the question is whether central banks have an instrument that is not available to policy makers and that is part of the first or second best solution
  - Textbooks: generally no role for central banks in allocative efficiency

Supporting policy : for EU industry, the Emissions Trading System (EU ETS) is close to a first best solution

- Discrimination between firms that fall under the EU ETS (tilting against some of them) is against the objective of an efficient allocation of the effort → flirting with autonomous policy making
  - Discrimination against firms that operate in jurisdictions that are not « Paris compatible » (or less ambitious than the EU) may be closer to supporting EU policy → Depends on the efficiency of the Carbon Border Adjustment Mechanism (CBAM), and on whether firms operate in sectors covered by CBAM
  - But this points to the issue of "extra-territoriality" : should one, e.g. EU Multinational firms or banks, follow EU emission targets (net zero) or a weighted average of targets in jurisdictions in which they operate (see scope 3 issue)?

Communication issue : Dealing with symbols

"Tinbergen's rule" vs. "We all need to do our part to save the planet"

Many people believe central banks are just … another kind of banks

- Tilting for climate contributes to the communication challenge that, no, we cannot save the planet and finance the transition

Admittedly, just saying that the EU ETS will take care of it all is… a bit boring. Still, one needs to choose (in)-between:

- "The great opportunity / party time" narrative …
- … and the "Risks are huge, and banks do not get it" one

Thank you for your attention

Pierre Wunsch, Governor

Banka Slovenije, 28 October 2024

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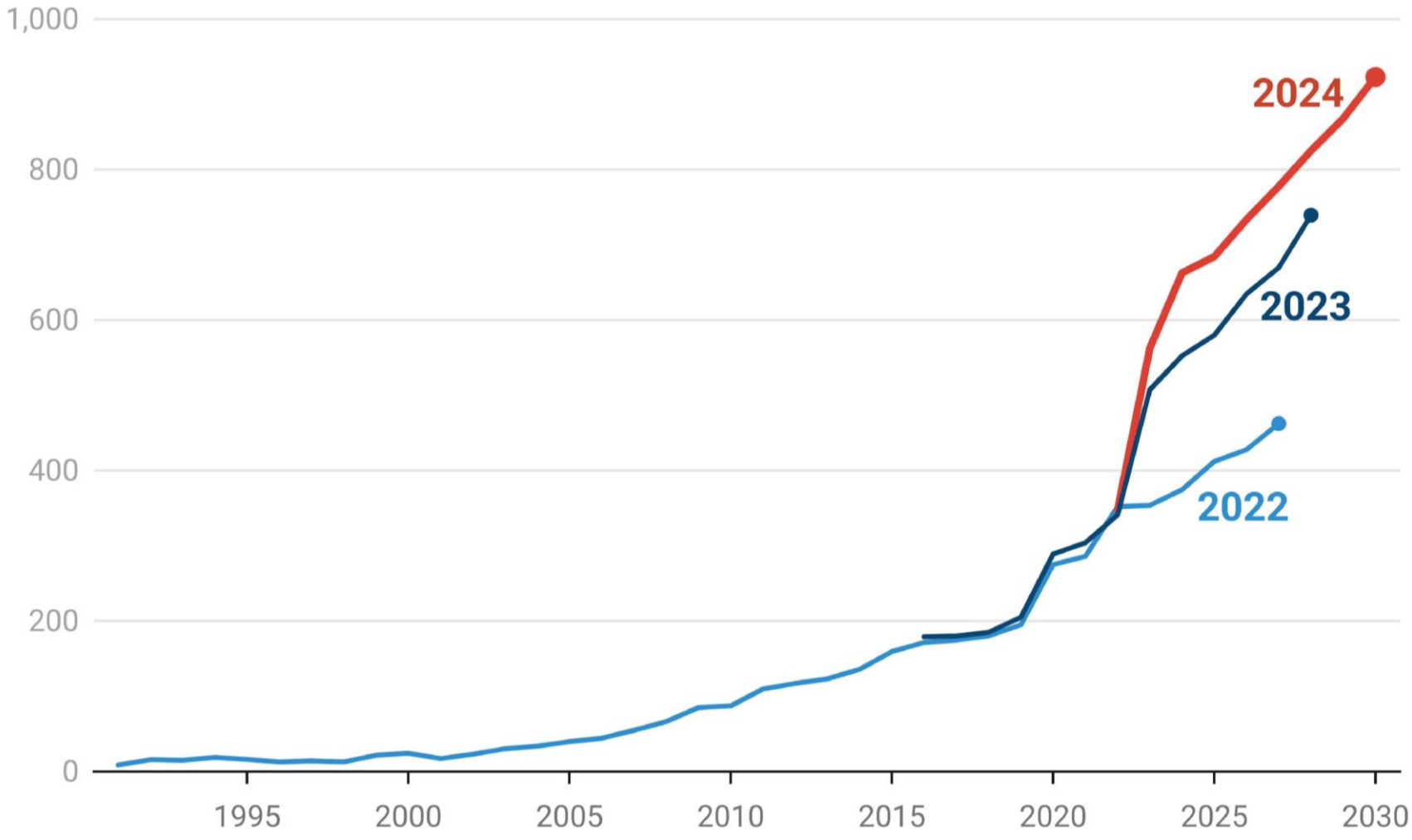
The IEA has boosted its latest renewable forecast by another 16%

(Annual global additions of renewable capacity, gigawatts)



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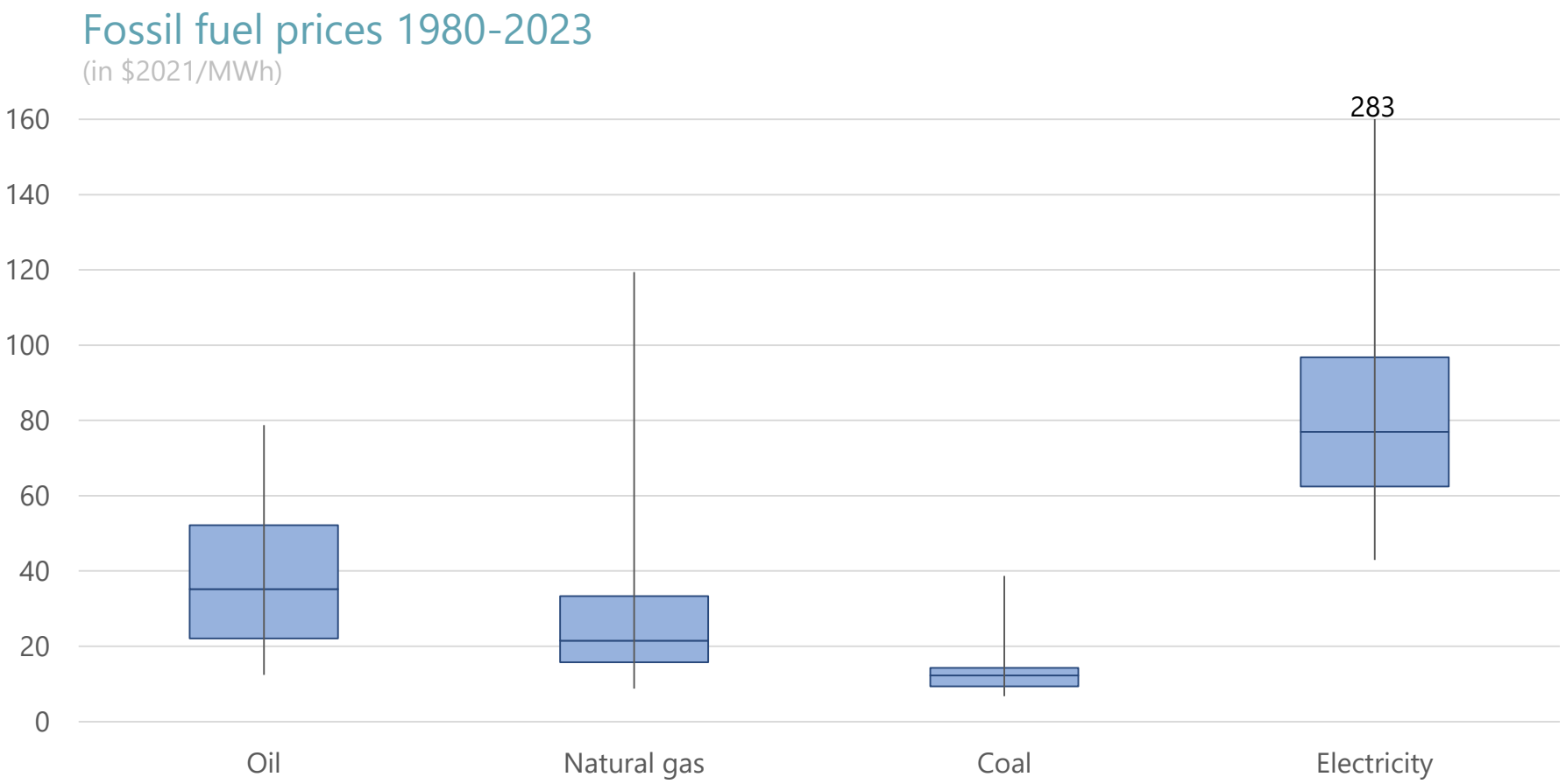
Source IEA renewables 2022, 20223 and 2024.

Looking back: electricity prices were clearly higher than fossil fuel prices

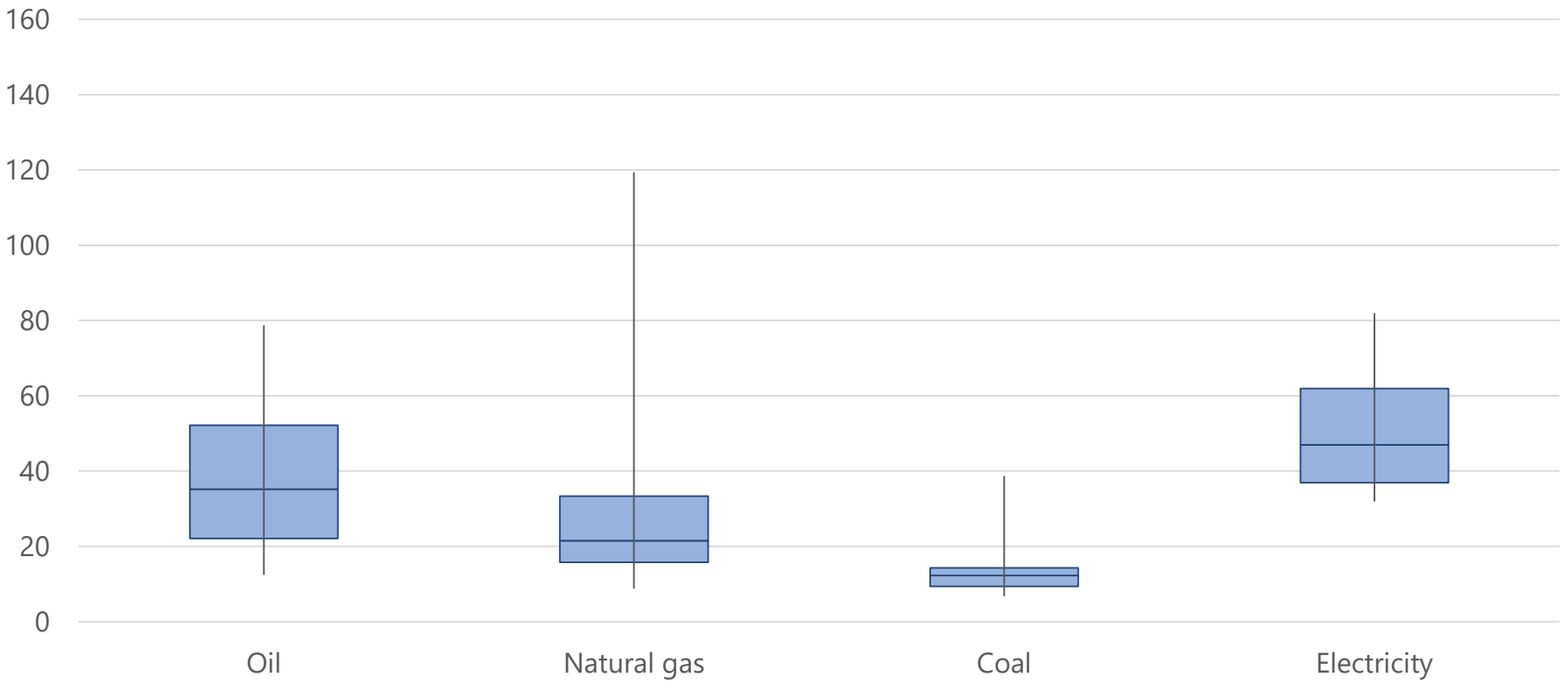


Source: NBB analysis.

Looking ahead: electricity prices (electrification) should become cheaper

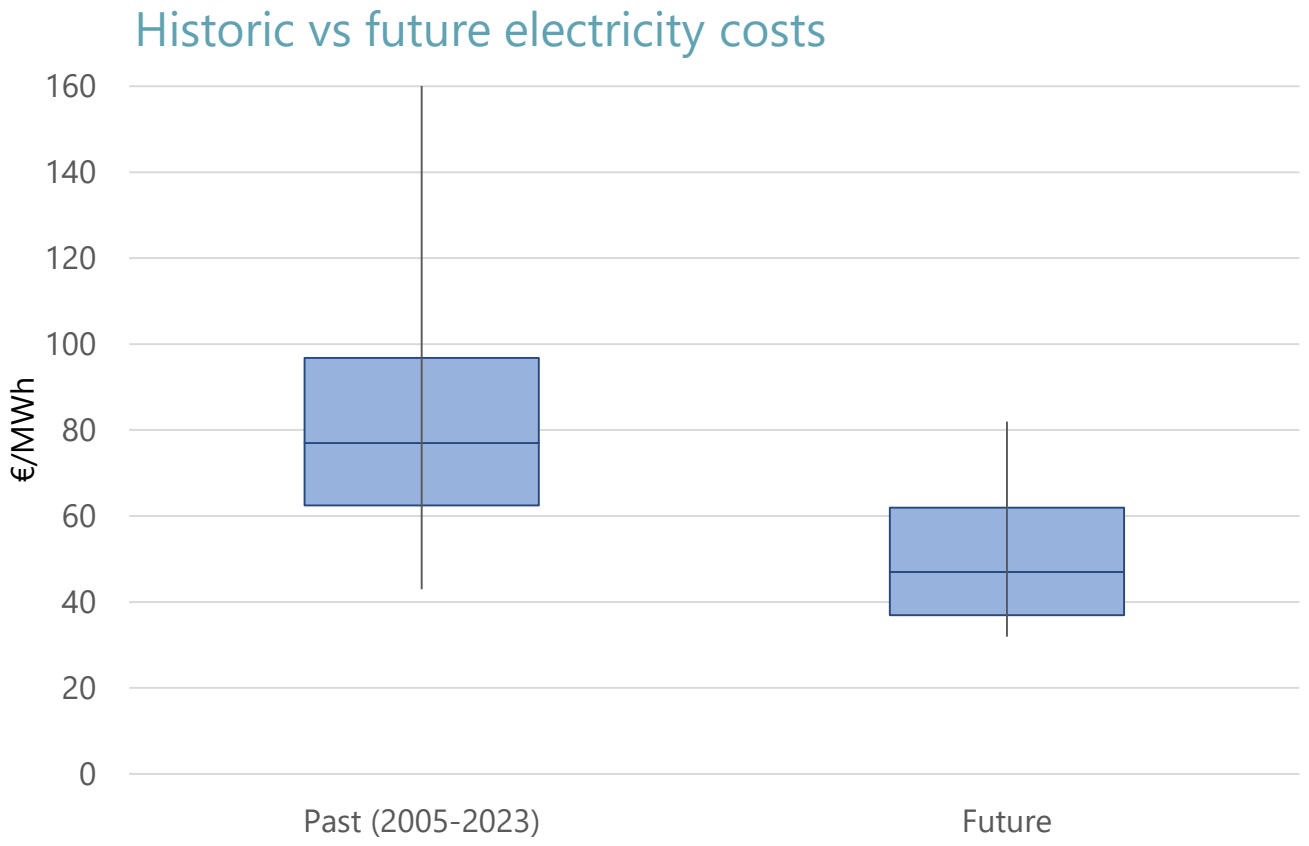
Fossil fuel prices until now vs electricity going forward

(in $2021/MWh)



Source: NBB analysis. Electricity includes recent LCOE estimates plus illustrative cost of grid balancing and storage.

Gains from cheaper electricity despite lack of efficiency gains



Source: NBB analysis based on energy costs presented in earlier slides. Future cost of electricity based on projected LCOE plus illustrative balancing and storage cost.

Market-based EU carbon pricing (EU ETS) vs. US subsidies (IRA)

The jury is still out on what will be more effective in guiding the climate transition but wholesale prices for energy are significantly higher in the EU than in the US

The difference in climate policy measures amplifies the already large divergence in base energy costs between EU and US

- Prices for natural gas (before distribution costs etc!) are currently 6 to 7 times higher in Europe than in the US
- Similarly, renewable electricity is currently 5-10 times more expensive, with decarbonized fuels (gas with CCS, green H2, SAF) at an additional premium
- On that note: the US will definitely *not* decarbonize its economy with a gas price at 10$/MWh