Forschungsinstitut für die Gesamtanalyse der Wirtschaft

Heating up Houses instead of the Climate

A transparent and realistic pathway for transforming the German housing sector

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1. **Motivation:**
   Do we really need another study on the German building sector?
2. **Main Data Sources**
3. **Method:**
   Seven steps to the goal
4. **Conclusion**

Motivation: Why do we need an additional study?

- There already exists a plethora of studies on the transformation of the German housing sector toward carbon-neutrality.

- *So why do we need another one?*

Motivation: Current studies have similar short-comings

Current studies…

- are ***difficult to compare & synthesize***
  - heterogenous approaches and assumptions
  - central terms are not defined uniformly (e.g. renovation rate)
- are ***not transparent and replicable***
  - impact of single assumptions of unclear
- have ***important omissions***
  - distributional impacts are usually overlooked

Main findings

- In order to reach the German **climate goals**:
  - ***The renovation rate must increase to 3%***

- **Necessary add. Costs = 57 bio € p.a.**

- Distributional considerations are necessary, given the high concentration of net wealth and real estate wealth in the Top 10%

Main Data Sources

- Some aggregate observations (‚macro data‘)
  - Number of residential units and their distributions across types (houses vs. flats) and efficiency classes.
  - Total carbon output of the housing sector, also broken to different energy sources (fossile, district heating, electricity)
  - Current aggregate costs related to energetic renovation + renovation rate
  - Information on the aspired transformation pathway (‚climate goals‘)
- Sectoral data
  - Input-Output Tables of the German Economy
- Micro data sets
  - A quite non-representative data set of residential units in Germany (from an online real estate broker): RWI-GEO-RED
  - A quite representative data set on private wealth: HFCS

Step 1: Create a more representative Dataset

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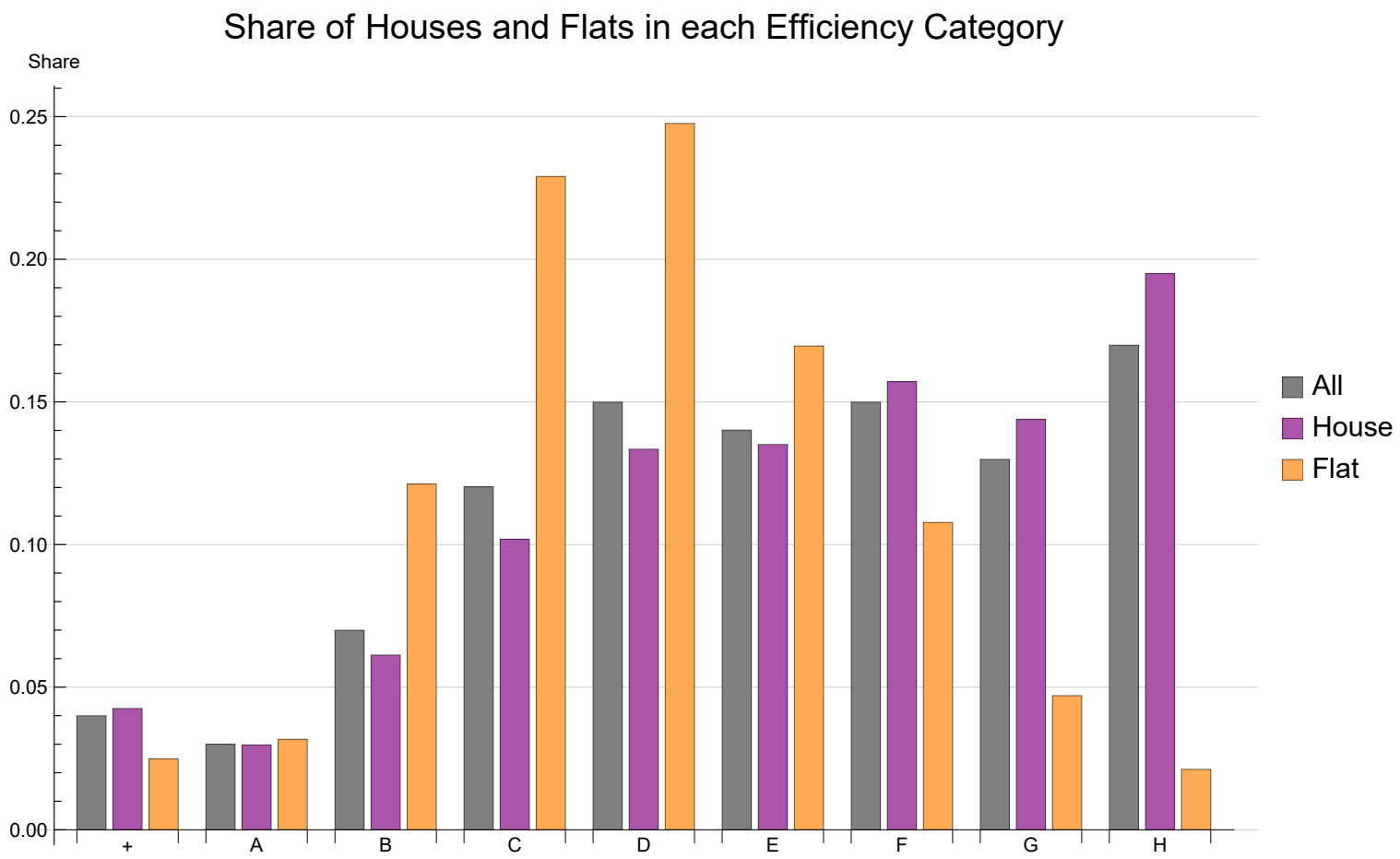
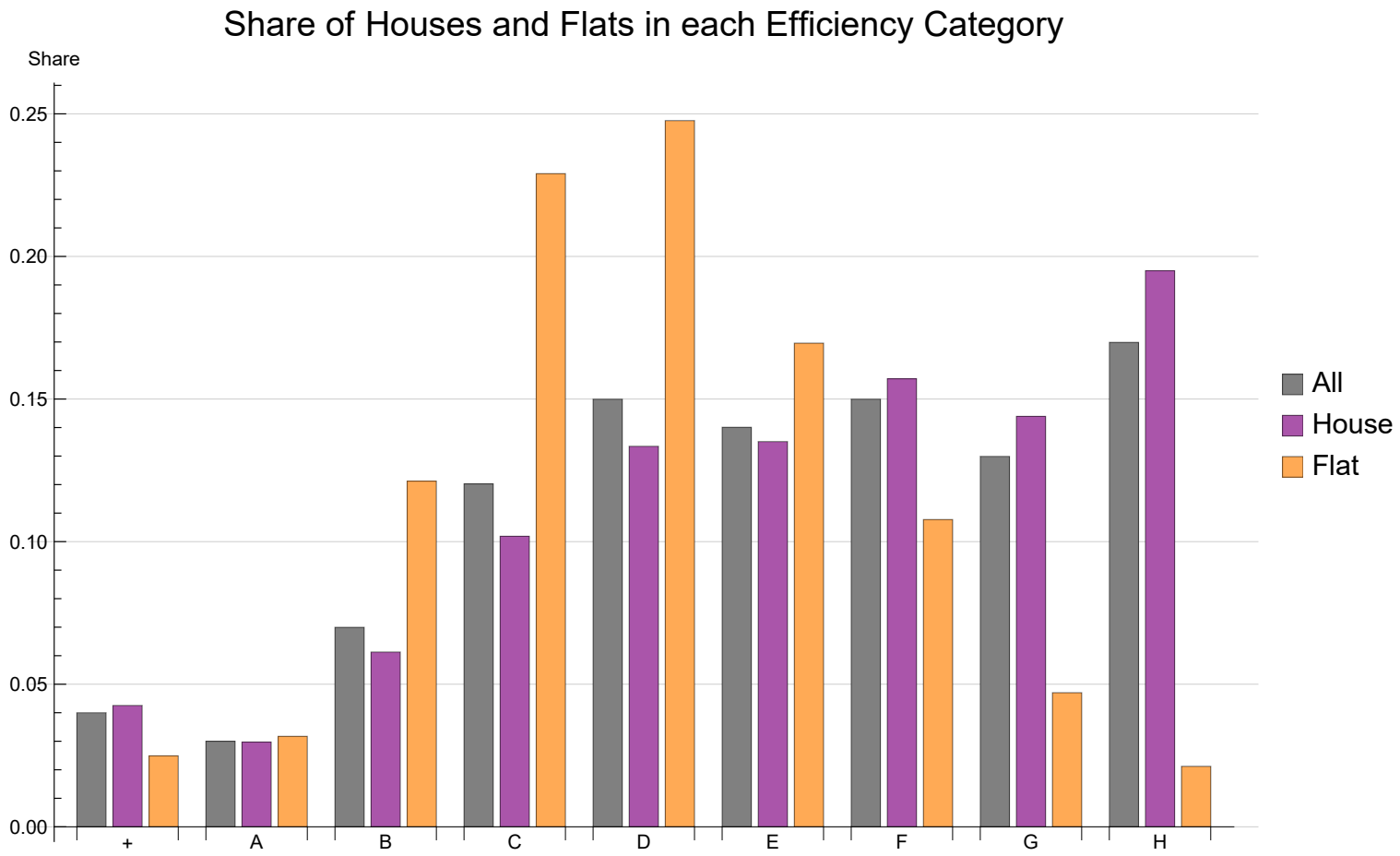


- RWI offers very detailed info
  - e.g. flat/house, kWh, heating system, size etc.
- But it is not representative: Based on immoscout24.de
- To make it more representative (at least for our use-case) we map the info that we have on
  - the distribution of houses vs. flats and
  - the distribution of efficiency categories

  to the data.

Step 1: Create a more representative Dataset



- The majority of single-family houses in Germany are in the worst efficiency categories (F, G, H)
- The situation does look better for apartment buildiings.
- However: most buildings in Germany (83%) are single-family houses

Suggested Measures

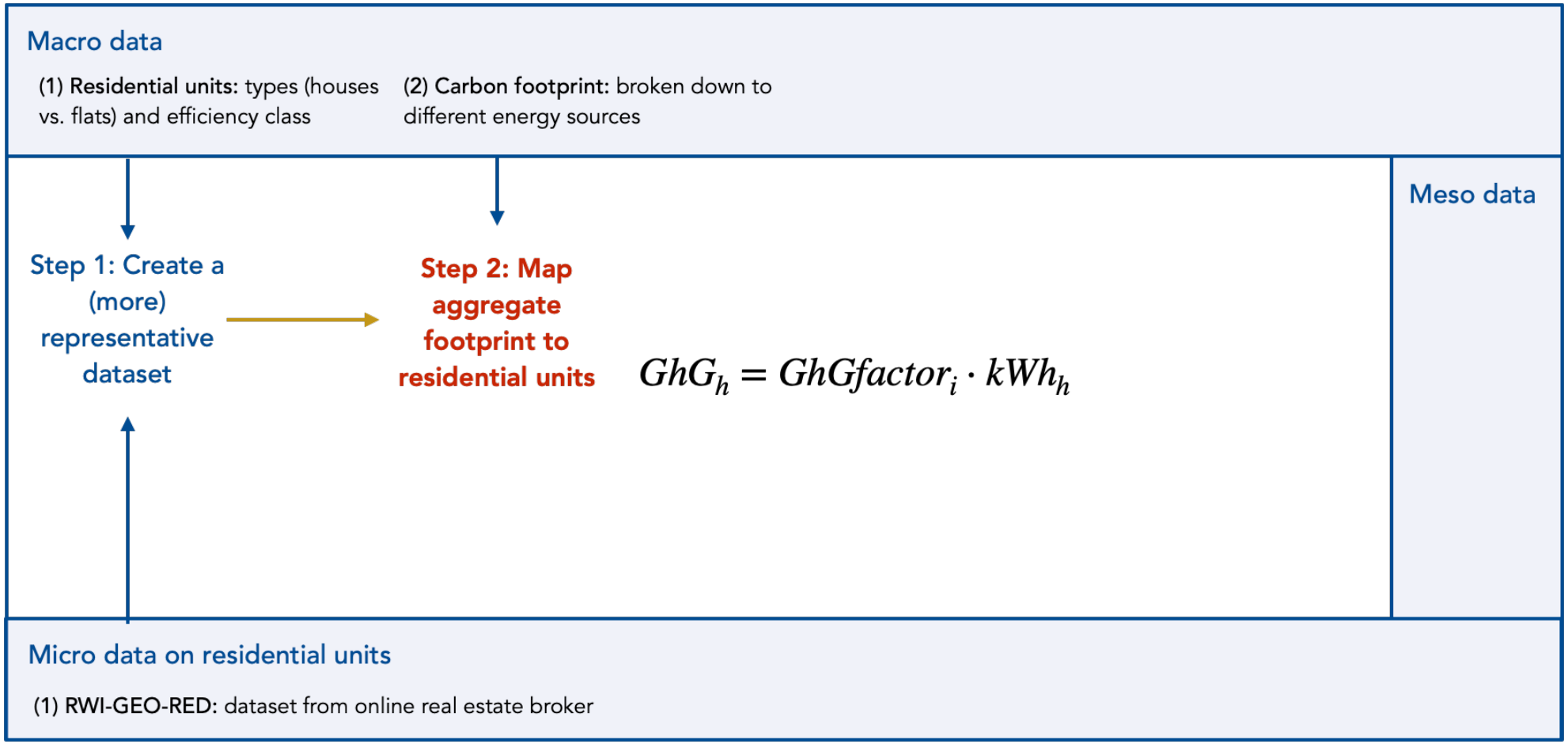
- **Renovation:**
  - Improving insulation (up to 60 kWh/m^2)

- **Prioritization:**
  - **Worst performing buildings** should be renovated first
  - To ensure this, regulation will be needed *(current incentives are seemingly not sufficient ;)*

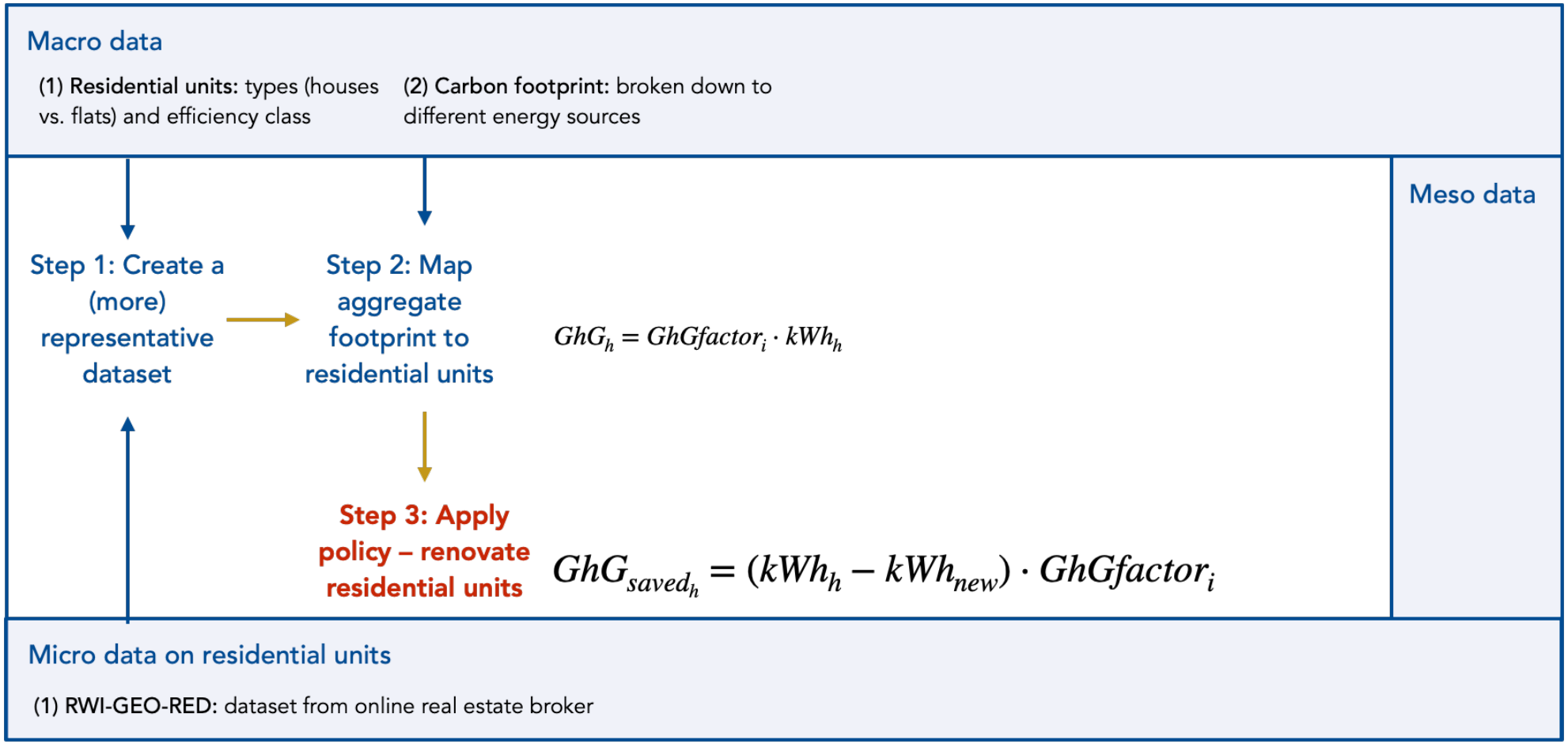
- **Decarbonization:**
  - Change of fossile heating systems to heating pumps (p=0.75) or district heating (p=0.25)
  - We assume that the energy sector is successful in reaching its own climate goals, resulting in a decarbonization of energy provision and district heating

- Existing studies agree on these measures, however,
  it is unclear what renovation rate is necessary in order to reach the climate goals!

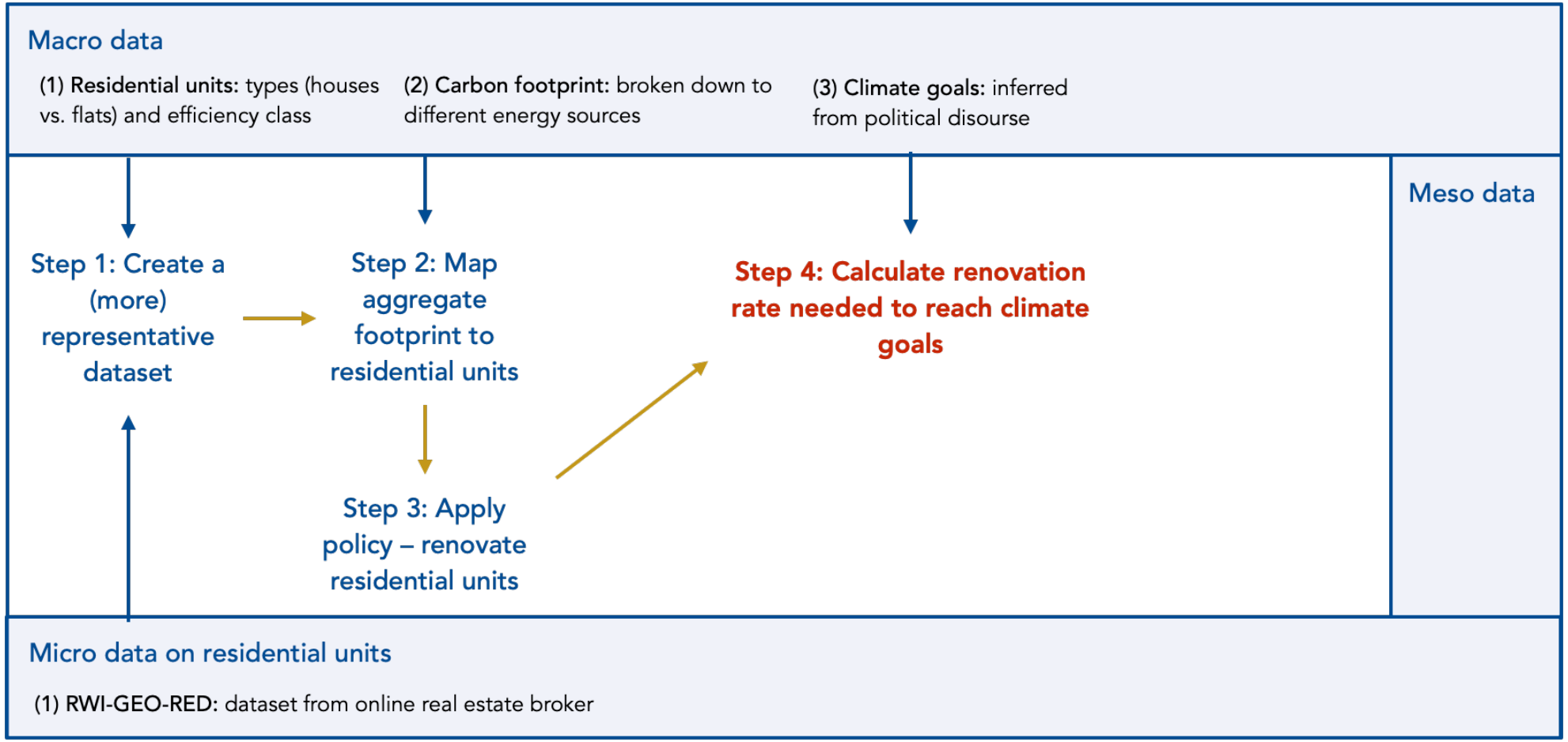
Step 2: Get greenhouse-gas emissions for every object



Step 3: Renovate residential units and assess the amount of saved emissions



Step 4: Finally! calculating the required renovation rate



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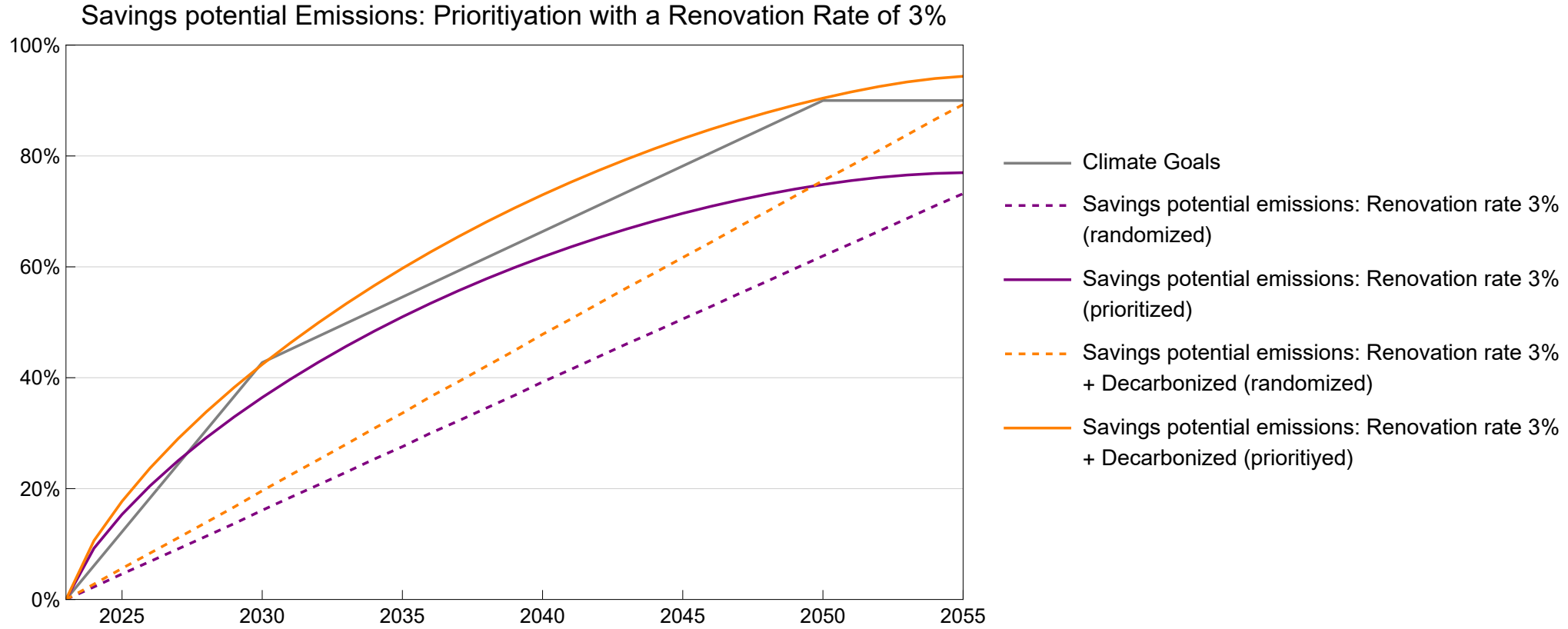
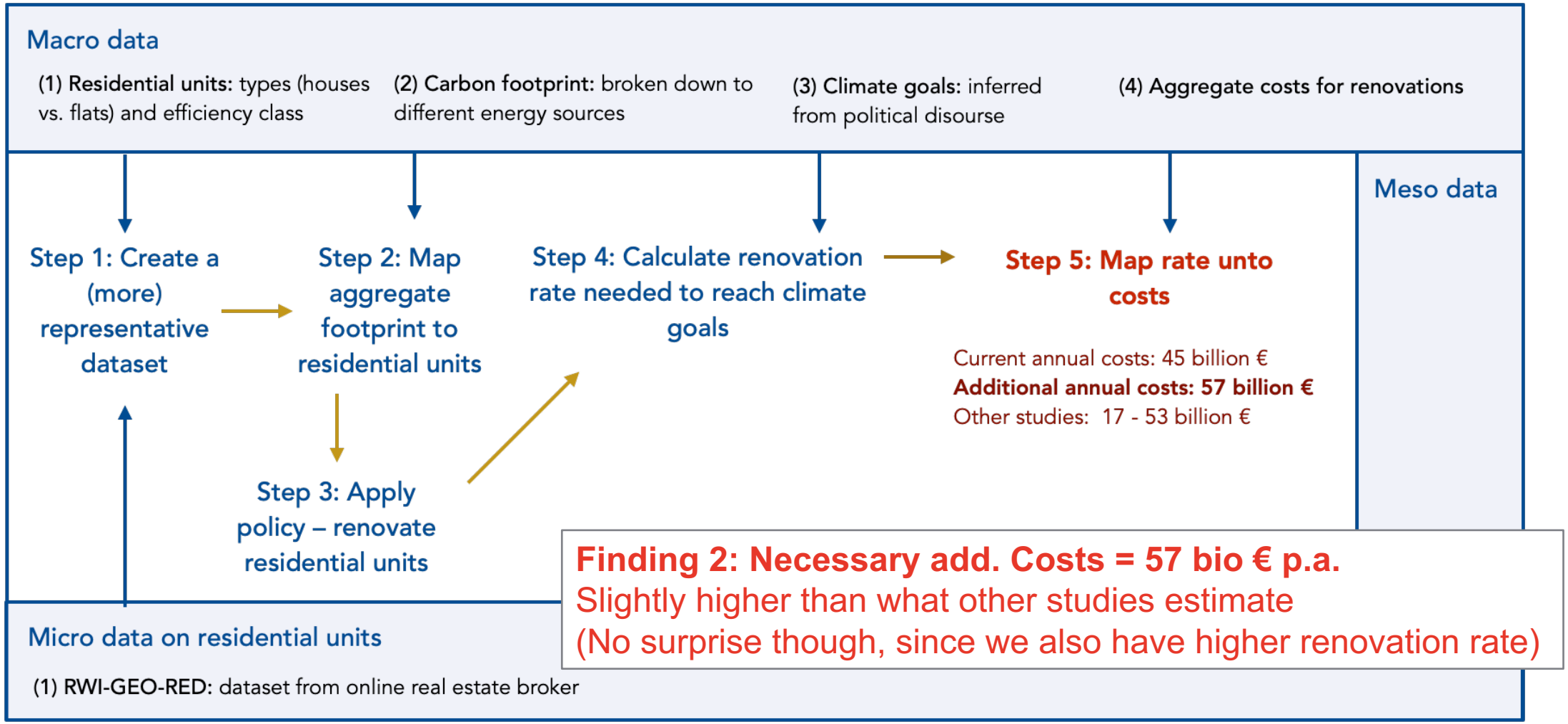


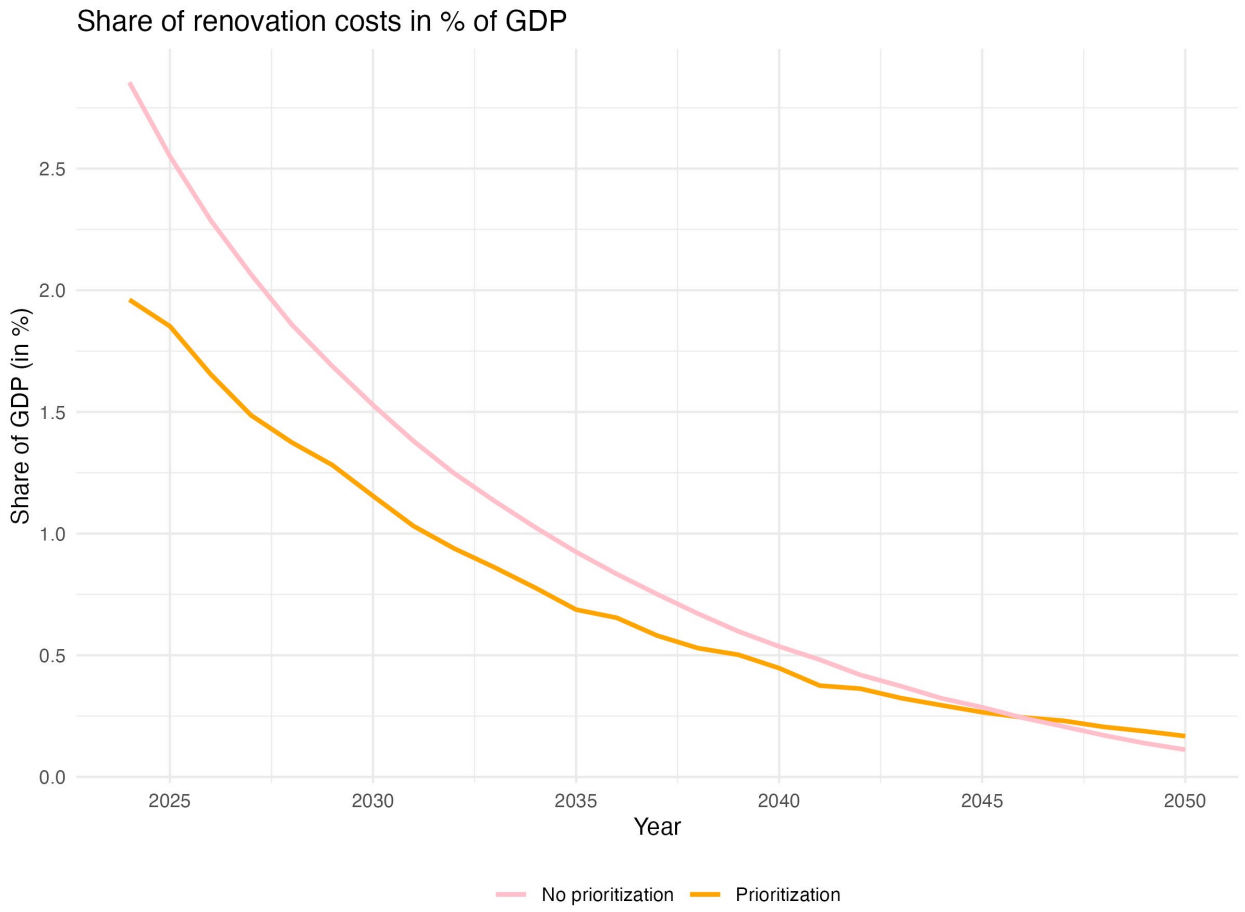
Finding 1: Necessary renovation rate = 3%
The current renovation rate (1.4%) is too low.
Other studies tend to underestimate the the need for action!

Step 5: Assessing the necessary costs



Finding 2: Necessary add. Costs = 57 bio € p.a.
Slightly higher than what other studies estimate
(No surprise though, since we also have higher renovation rate)

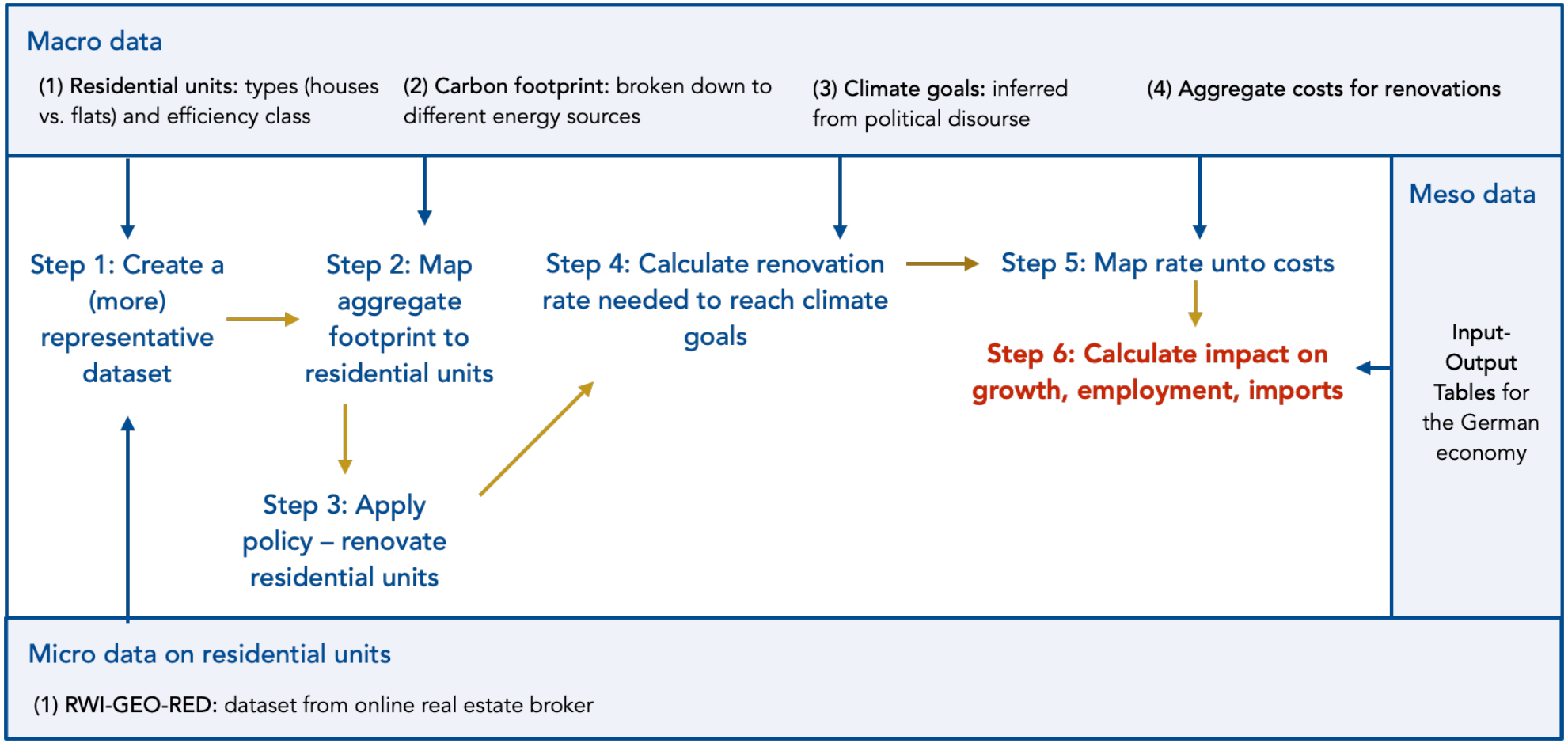
Step 5: Relative to GDP, costs will decline over time



- Assumption 1: Inflation in renovation sectors = overall inflation
- Assumption 2: 1% real GDP growth

- Decline is higher in the prioritization-scenario since the renovation of the worst performers is more costly

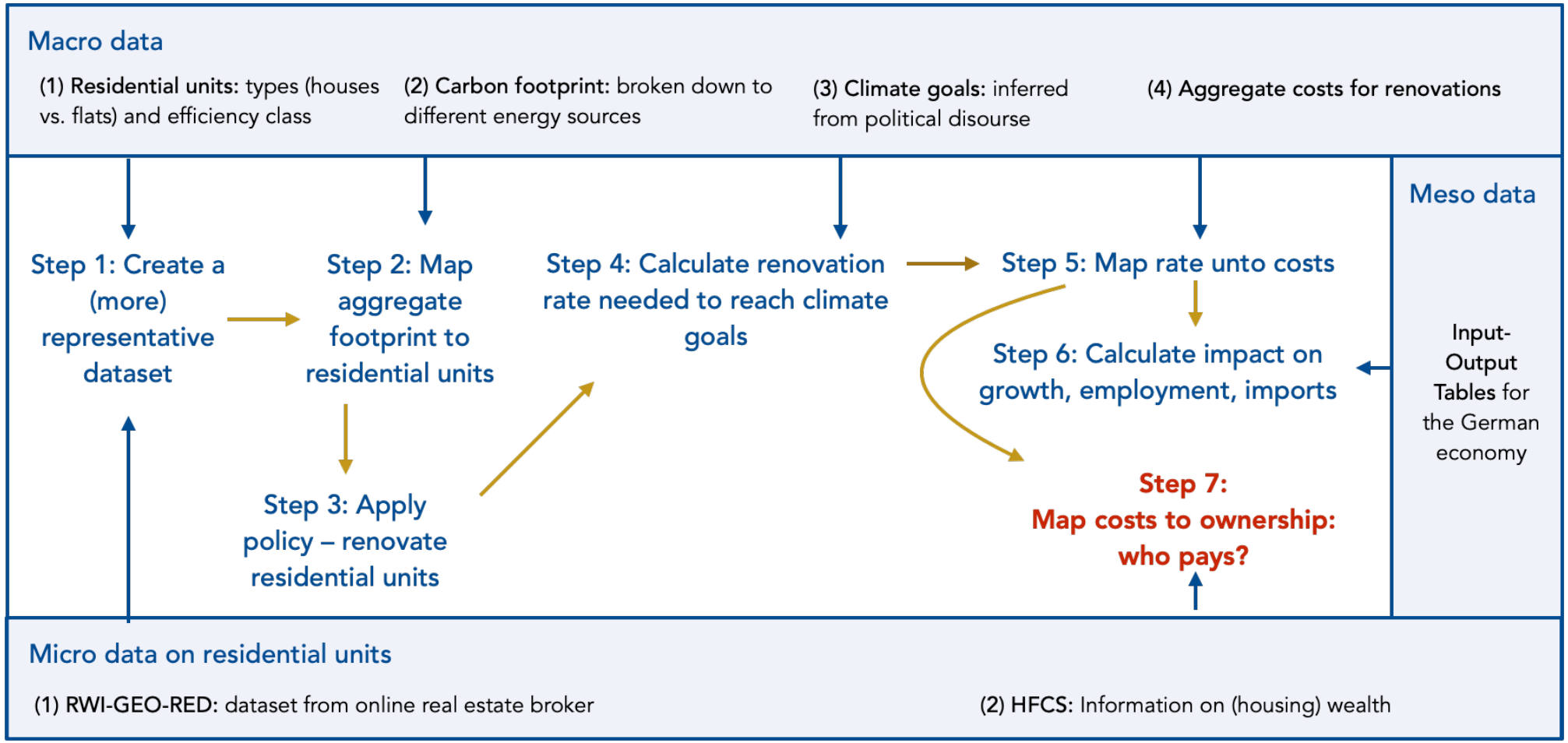
Step 6: Analyzing the impact on Growth, Employment and Trade



Growth, employment and trade (Preliminary findings 3)

- GDP will rise by 48.7 billion € (multiplier of 1.2)
- Import dependency becomes visible: 12.6 billion € of additional imports are required
- About 650,000 new jobs emerge – about half of them in construction & related sectors

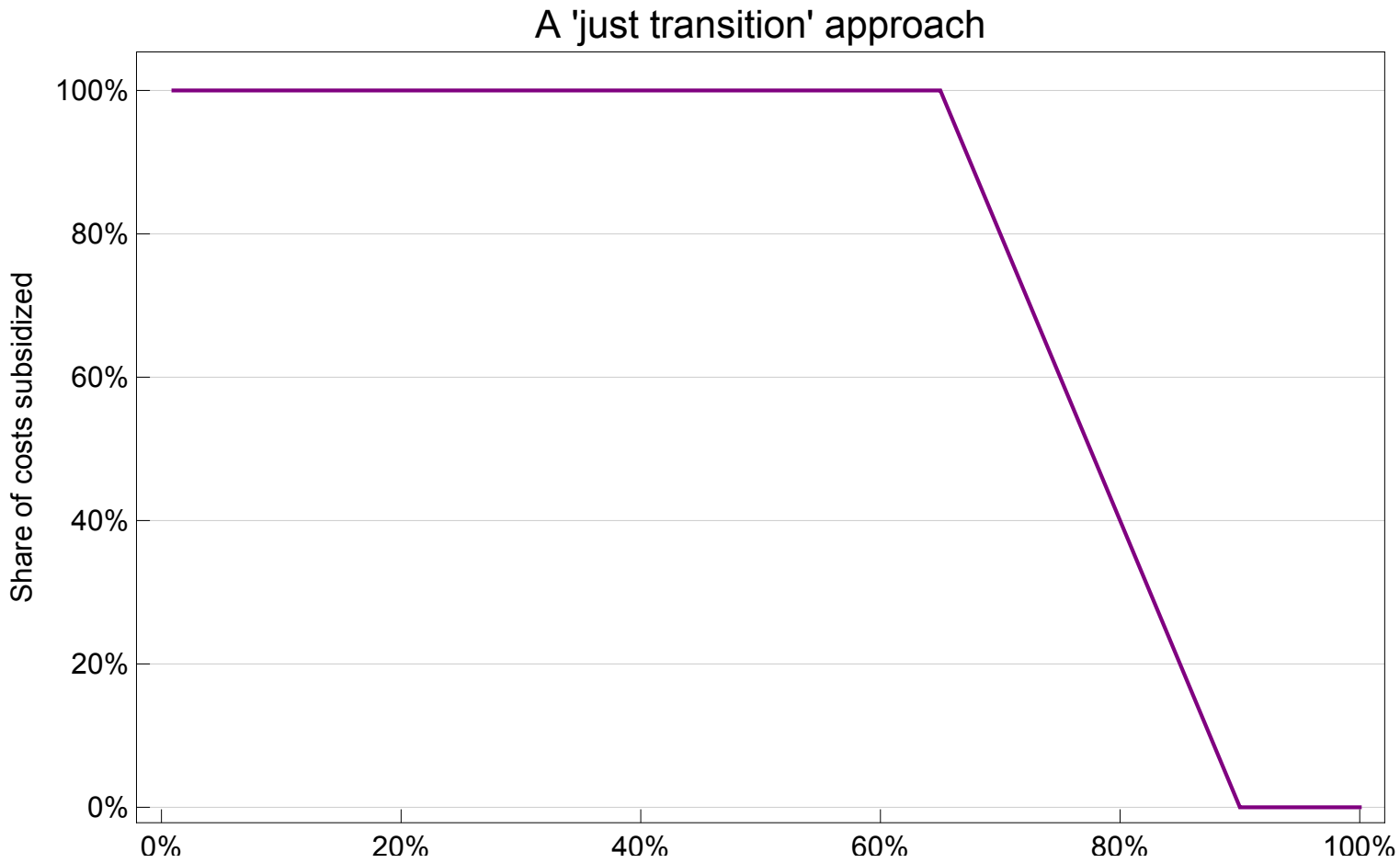
Step 7: Considering wealth inequality – who should finance the transformation?



Step 7: Wealth distribution is highly unequal (a short reminder)

- In Germany, the Top 1% owns about 35% of all private wealth
- Housing wealth has a stronger middle class, but correlation between net wealth and real estate wealth is extremely high
- Subsidizing the socio-ecological transformation of the housing sector risks subsidizing the Top 1% (and those who own more in general)

Step 7: A ‚Just Transition' – Financing Proposal



- Use subsidies that take the wealth position of individual households into account – self-reporting with audits as cheap best practice
  - **Finding 4:** Costs for subsidies are about 25-30% of total costs – major burden is carried by wealthy households (Top 10%)

Conclusion

- In order to reach the German **climate goals**:
  - ***The renovation rate must increase to 3%***
  - Worst performing buildings need to be renovated first
  - ➢ Requires regulatory means!
  - District heating and electricity need to be decarbonized

- **Necessary add. Costs = 57 bio € p.a.**
  - In a scenario with prioritization, costs will be higher in the first years and decline over time

- In line with a **‚just transition‘,** subsidies need to take the wealth distribution into account

- **Economic impact** (preliminary):
  - GDP multiplier = 1.2
  - Import dependency will rise
  - 650,000 new will emerge

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Thank you!

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Key differences between existing studies and our approach

Conceptual differences	Our study	Other studies
Underlying models	Are provided open-source to ensure transparency and replicability. The model can be modified to explore the impact of certain parameters and adopted to other cases (e.g. countries).	The underlying models and calculations used to produce results can only be inferred from graphical or verbal descriptions. The impact of single assumptions remains opaque.
Data used		Can we provide some general statement here? (Are data sources transparent / accessible) mein eindruck war da ist viel in-hosue data im spiel
Explicit information on policy-relevant variables	Our approach speaks explicitly to key policy questions and either makes clearly traceable assumptions or allows to trace the impact of political decision directly.	Assumptions on key policy variables are often not clearly explicated or derived ad-hoc.
A ‚just transition' approach to transformation	We explicitly factor in distributional considerations.	Other studies have no explicit focus on distributional considerations.
IO Model??		
Differences in assumptions		
Investment costs	We use discounted net present values only for institutional owners, but full investment costs for households to increase validity.	Most studies use discounted net present values to represent investment costs.
Carbon-neutrality requires priorisation: regulation!	We are explicit with regard to the need for an explicit priorization of renovations.	Most studies that prioritization is necessary, but many assume it will arise endogenously due to cost differentials.
Decarbonisation of heat sources	We are explicit with regard to the need for a decarbonization of energy provision and district heating.	Most studies agree that a decarbonization of energy provision is necessary, but are silent about district heating.