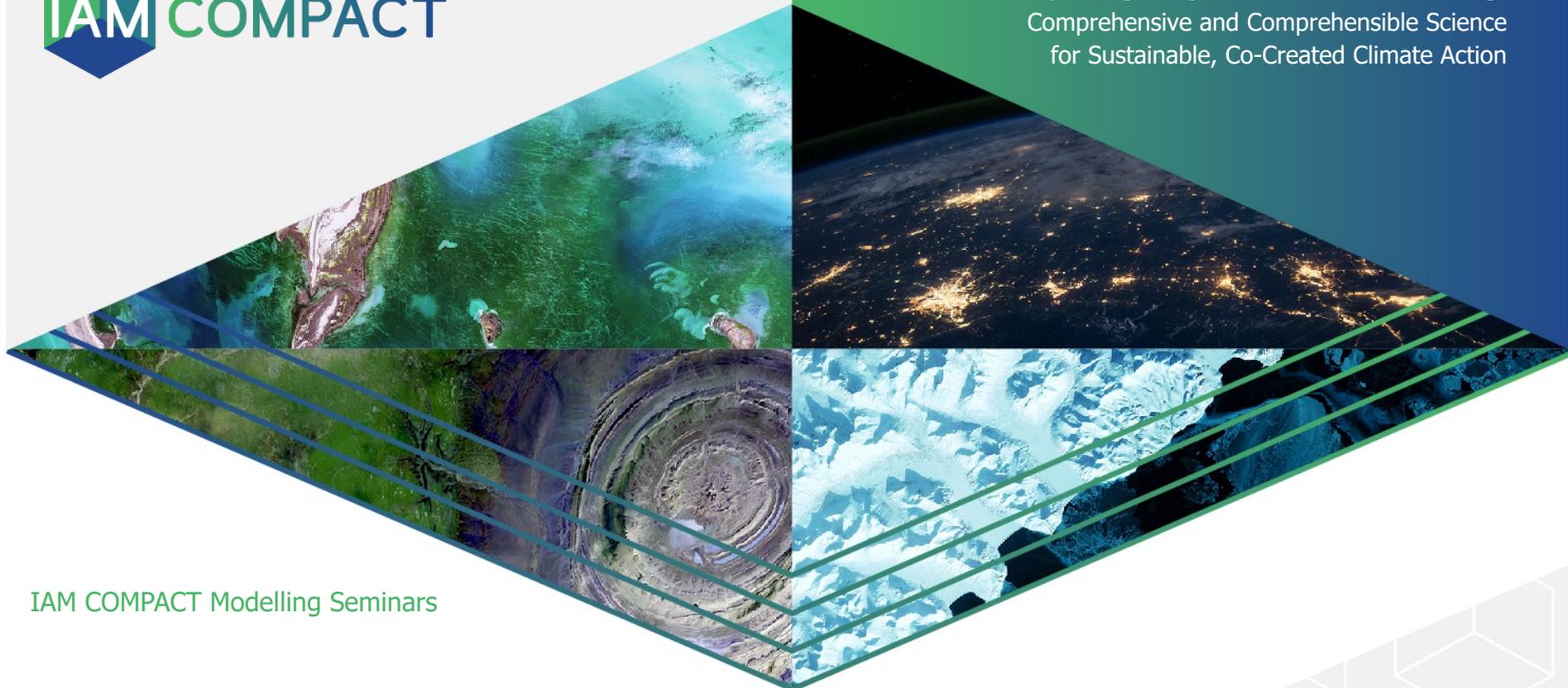




Expanding Integrated Assessment Modelling:  
Comprehensive and Comprehensible Science  
for Sustainable, Co-Created Climate Action



IAM COMPACT Modelling Seminars

## Model Presentation: CHANCE

Basque Centre for Climate Change (BC3)



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- CHANCE is a multiregional, multi-sectoral General Equilibrium Model that includes a large information of the European households.
- It is a disaggregated multiregional and multisector model that includes information for several households covering almost all EU regions, ensuring a large representation of the behaviour of the European households.
- The integration of microdata allows CHANCE to investigate climate protection in greater depth from both perspectives and help identify measures that have progressive effects with a reasonable loss of efficiency.
- Similar approaches used in the CHANCE model have been applied in:
  - X. Garcia-Muros, C. Böhringer, and González-Eguino, (2022) "Who bears the burden of greening electricity?" Energy Economics.
  - Garcia-Muros, X., J. Morris and S. Paltsev (2021): Distributional Impacts of Low-Carbon Policies in USA and Spain: Does One Size Fit All?. Joint Program Report Series Report 354, August, 12 p. (<http://globalchange.mit.edu/publication/17562>)
  - Garcia-Muros, X., J. Morris and S. Paltsev (2022). Toward a Just Energy Transition: A Distributional Analysis of Low-Carbon Policies in the USA. In the SI of Energy Economics for the EMF 36: CarPri





Macro-models (CGE)

- They are able to look at the **economy as a whole**
- Analysis from the **efficiency and macro-economic perspectives**

- Only **one representative household**



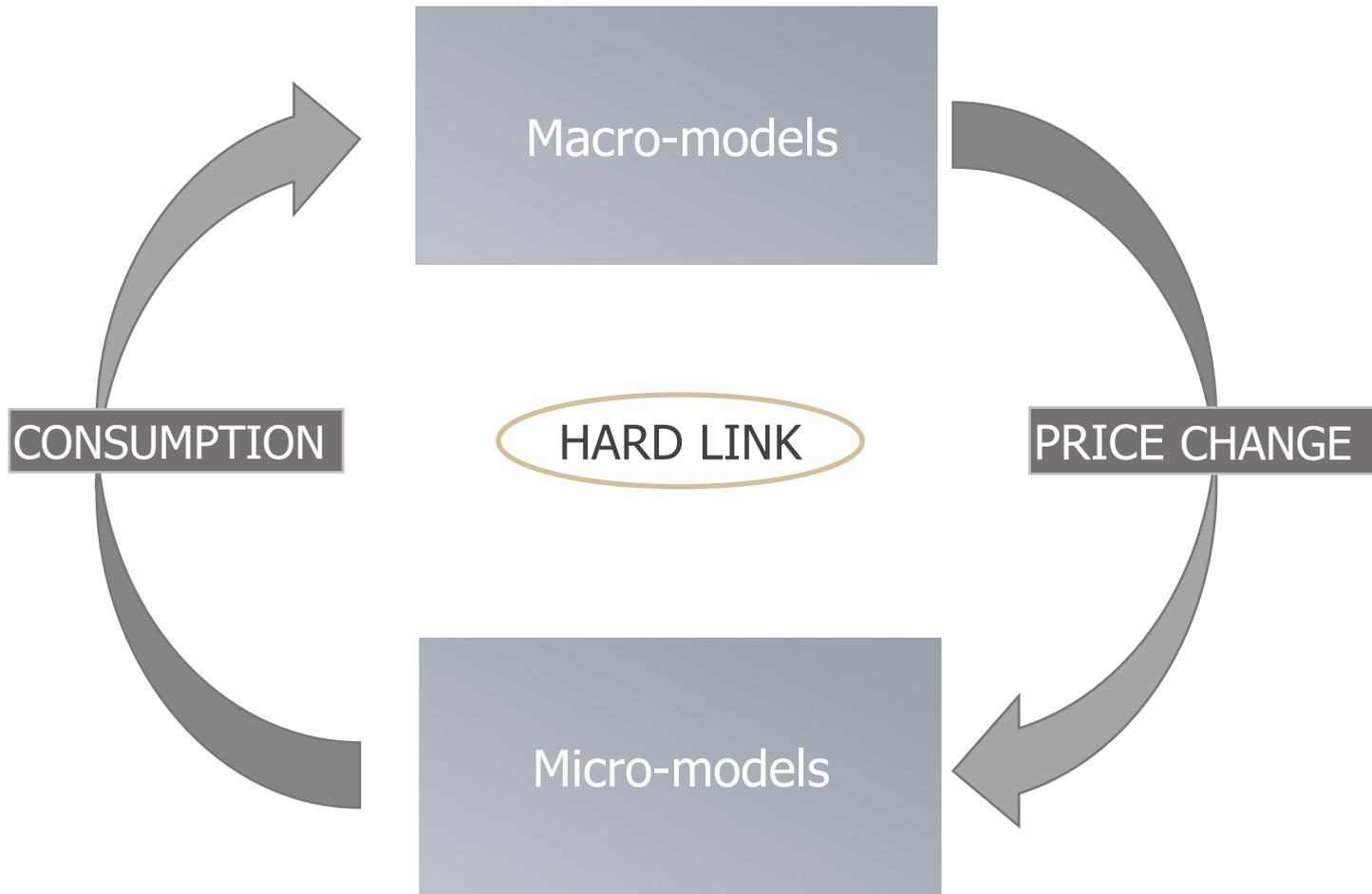


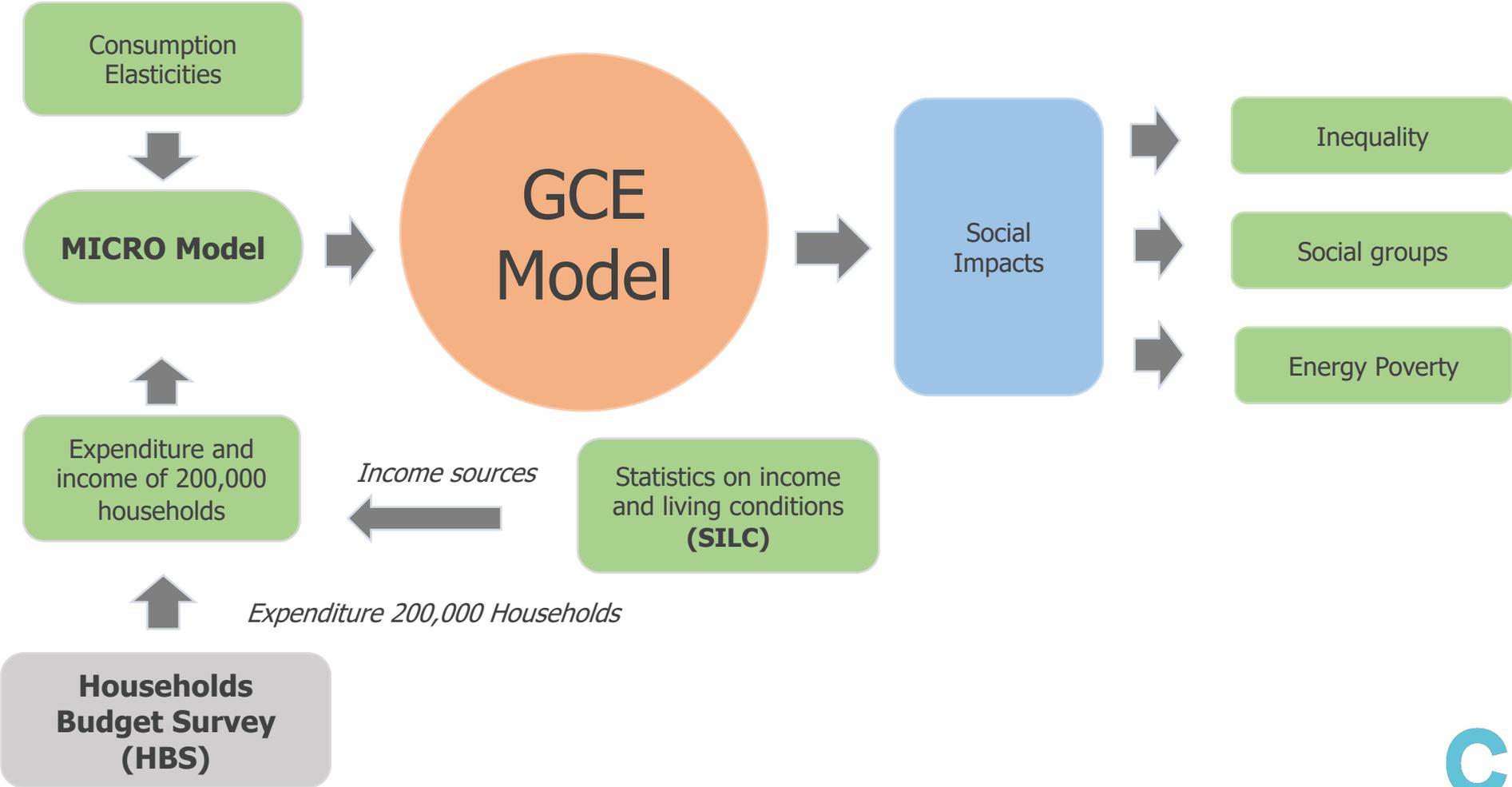
- +
- Surveys with **many individuals**
  - Capture the **behaviour of households**
  - Provide a **realistic picture** of substitution, demand and income effects

- 
- Only focus in **one economic side**
  - **Difficult** to evaluate **macro policies**

Micro-models









## Regions

<i>European Countries:</i>	<i>European Countries:</i>
Austria (AUT)*	Poland (POL)
Belgium (BEL)	Portugal (PRT)
Czech Republic (CZE)	Slovakia (SVK)
Denmark (DNK)	Slovenia (SVN)
Estonia (EST)	Spain (ESP)
Finland (FIN)	Sweden (SWE)
France (FRA)	United Kingdom (GBR)
Germany (DEU)	Croatia (HRV)
Greece (GRC)	Cyprus (CYP)
Hungary (HUN)	Latvia (LVA)
Ireland (IRL)	Lithuania (LTU)
Italy (ITA)	Malta (MLT)
Luxembourg (LUX)	Romania (ROU)
Netherlands (NLD)*	Bulgaria (BGR)

## *Non-EU Countries:*

## Rest of the World (ROW)

\*All European Countries include household information except: AUT and ROW

## Sectors and commodities

### *Primary and secondary fuels sectors:*

Coal (COL)  
 Petroleum and coal products (refined) (OIL)  
 Crude oil (CRU)  
 Natural gas (GAS)  
 Electricity (ELE)

### *Final Consumption:*

Food (FOOD)  
 Housing without energy (HOUS)  
 Electricity (ELEC)  
 Heating (HEAT)  
 Fuels for private Transport (FUEL)

### *Other sectors:*

Energy-intensive and trade-exposed goods (EIT)  
 Transport aggregate (TRN)  
 Agriculture (AGR)  
 Other manufactured goods (MFR)  
 Services (SER)

### *Final Consumption:*

Transport services without durables (TRAN)  
 Education and leisure (EDUC)  
 Other goods and services (OTHG)  
 Durables (DURA)

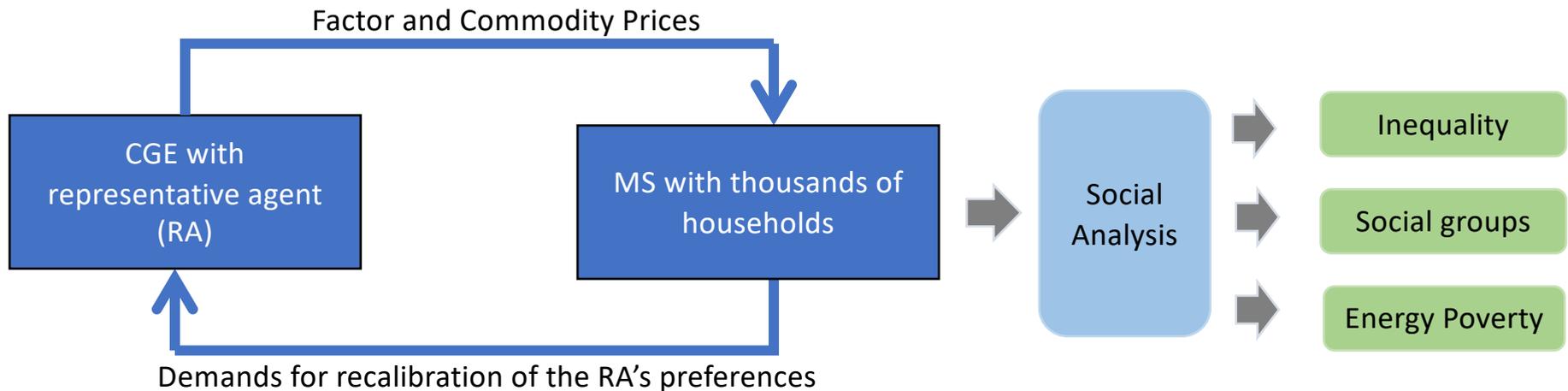




- Develop an in-depth distributional analysis beyond the classical income distribution. Social impacts, inequality, focus on specific vulnerable groups, explore the trade-offs between efficiency and equity.
- The recursive calibration of the microdata allows introducing of a better representation of consumer behaviour. For example: Replace the CES function with AIDS models.
- Explore the role of household behaviour and inequality in different climate pathways.



- We apply a decomposition algorithm to integrate all several households from the Household Consumption Survey (HBS) as individual agents into a CGE model
- Sequential Recalibration (SR) algorithm is based on the solution of a sequence of representative agent economies and successive recalibration of preferences of an representative agent based on partial equilibrium household demand.
- Integrating CGE models and microdata making it possible to capture a rich representation of the heterogeneity of households, allowing us to develop deep social analysis, along with inter-sectoral and price-related effects, which are fundamental for analysing the implications of low carbon pathways.





Thank you!



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