Role of population heterogeneities in energy consumption behaviour

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Session 1: Behavioural change

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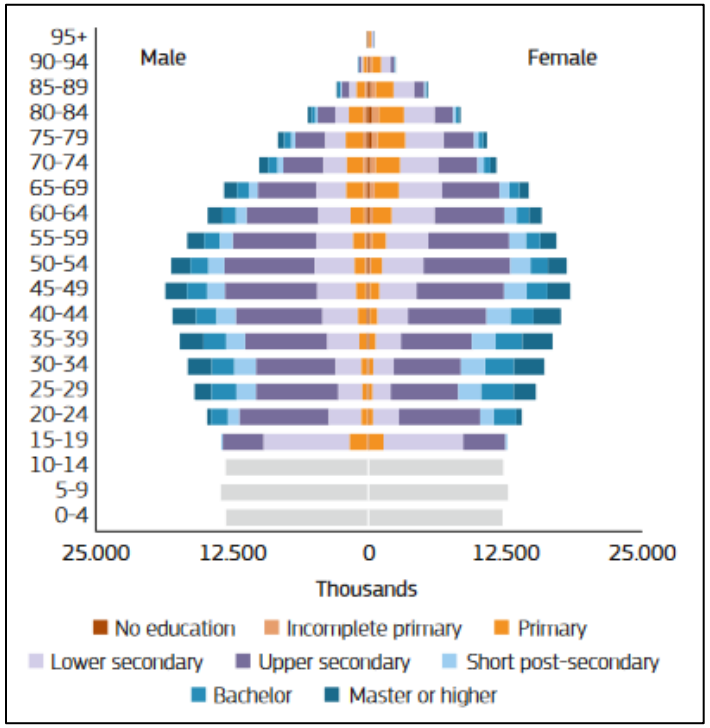
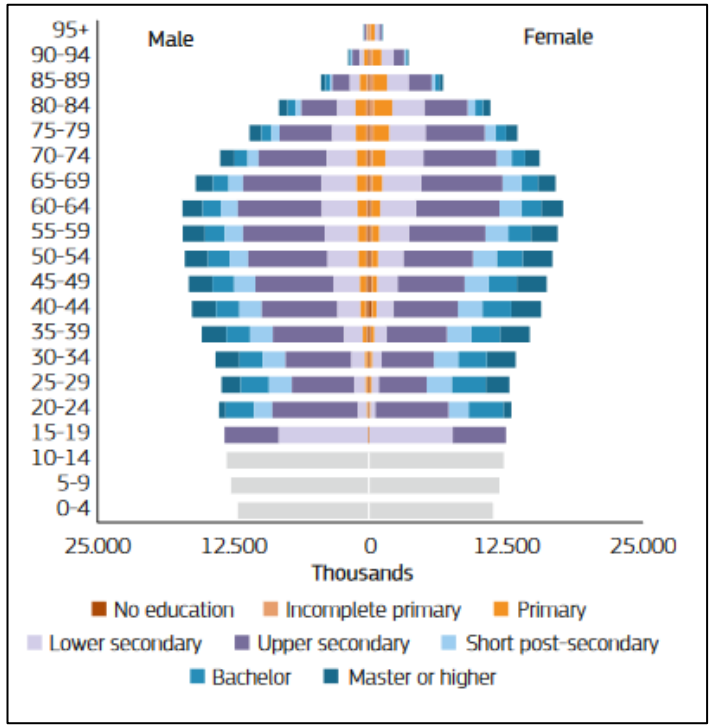
Motivation and Background

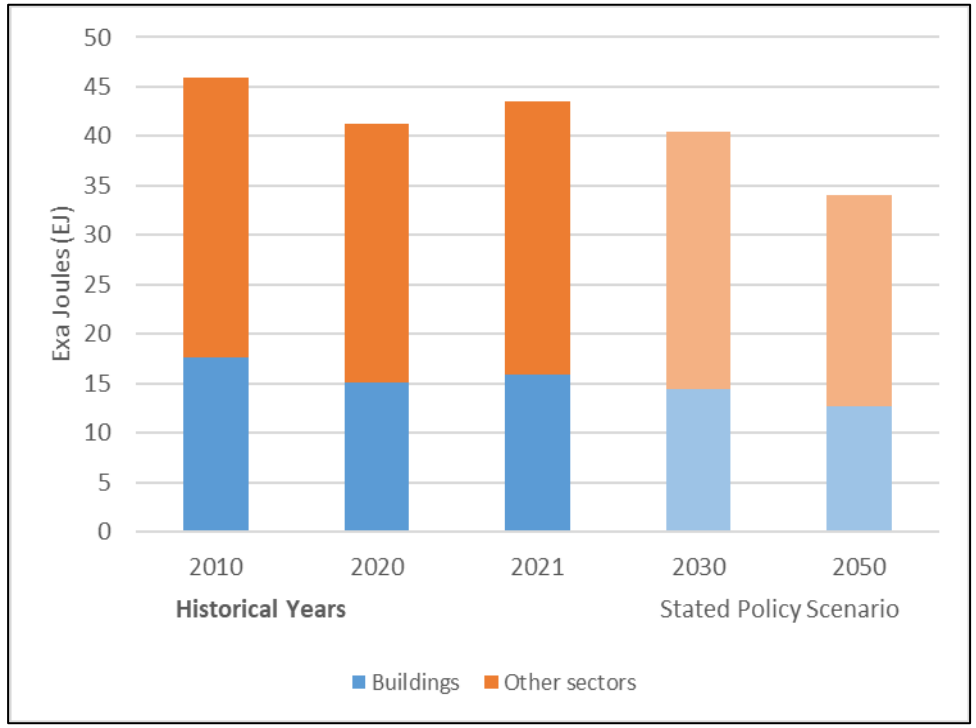
a) EU Population pyramid by education (2015)



b) EU Population pyramid by education (2030 projections)



c) Energy consumption in the EU (Past and future projections)



- Energy consumption in households - space conditioning, cooking, lighting, appliances
- In EU, buildings account for around 40% of total final energy consumption (IEA, 2022)
- Beyond income, population heterogeneities like age, gender, and education are important to understand lifestyle choices and consumption (Muttarak, 2021; Roy et al., 2012)
- Future energy consumption in the EU may get affected by the ongoing demographic transitions (population aging, migration, and female education) (KC & Lutz, 2017; Lutz et. al., 2018)

Sources & Notes: a) and b) Lutz et. al. (2018) Demographic and human capital scenarios for 21st century c) IEA (2022) World Energy Outlook. 2030 population projections in b) based on the Shared Socioeconomic Pathways (SSP) - 2 scenario. Energy consumption projections in c) based on the Stated Policy Scenario of the International Energy Agency (IEA)

Research Question and Methodology

How population heterogeneities interact with life-style change in driving the transition towards more sustainable energy consumption?

- Integrative literature survey – synthesis of interdisciplinary evidence to develop new frameworks and research agenda (Snyder, 2019; Torraco, 2005)
- Database(s): Google Scholar
- Keywords related to population heterogeneities and energy consumption (example, "age" + "energy consumption")
- Inclusion criteria: period (2010-2023), context (industrialized economies), language (English) and type of publications (peer-reviewed journal articles)
- Scan abstracts of the shortlisted articles to select key publication
- Scan through the references of selected publication to ensure all relevant articles from our inclusion criteria are considered

Preliminary Results

Age and Generation cohorts

- Role of age is extensively documented in the literature, older population is associated with higher energy consumption (Estiri & Zagheni, 2019)
- Older households in cold climates invest in energy efficiency and renewables (Pais-Magalhães et. al., 2022)
- Energy consumption also rises from older to younger generations (Bardazzi & Pazienza, 2020)
- Elderly population consumes more gas but less electricity (Brounen et. al., 2012)

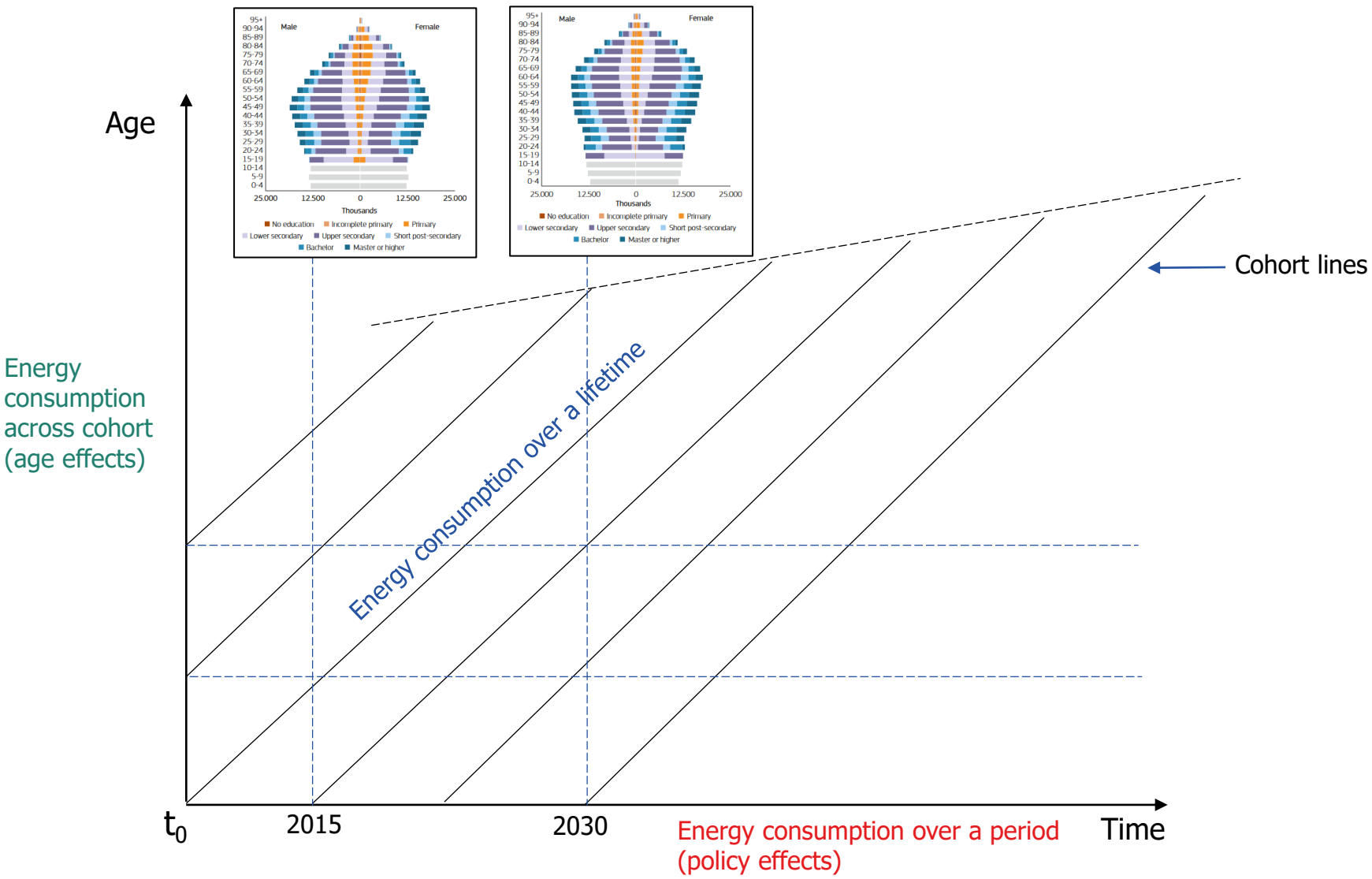
Gender, Education and Household size

- Debate on gender-energy linkage, activity- versus expenditure-based studies (Grünewald & Diakonova, 2020)
- Single men households consume more energy than single women households (Grünewald & Diakonova, 2020; Räty & Carlsson-Kanyama, 2010)
- Role of gender in household thermostat settings (Sintov et. al., 2019)
- Household size and education level associated with energy conservation behavior (Bedir & Kara, 2017)
- Household's tendency to incorporate the feedback on energy conservation measures goes up with education and age (Aydin et. al., 2018)

Migration

- Energy consumption behavior is shaped by values, beliefs and life choices (Acuner & Kayalica, 2018)

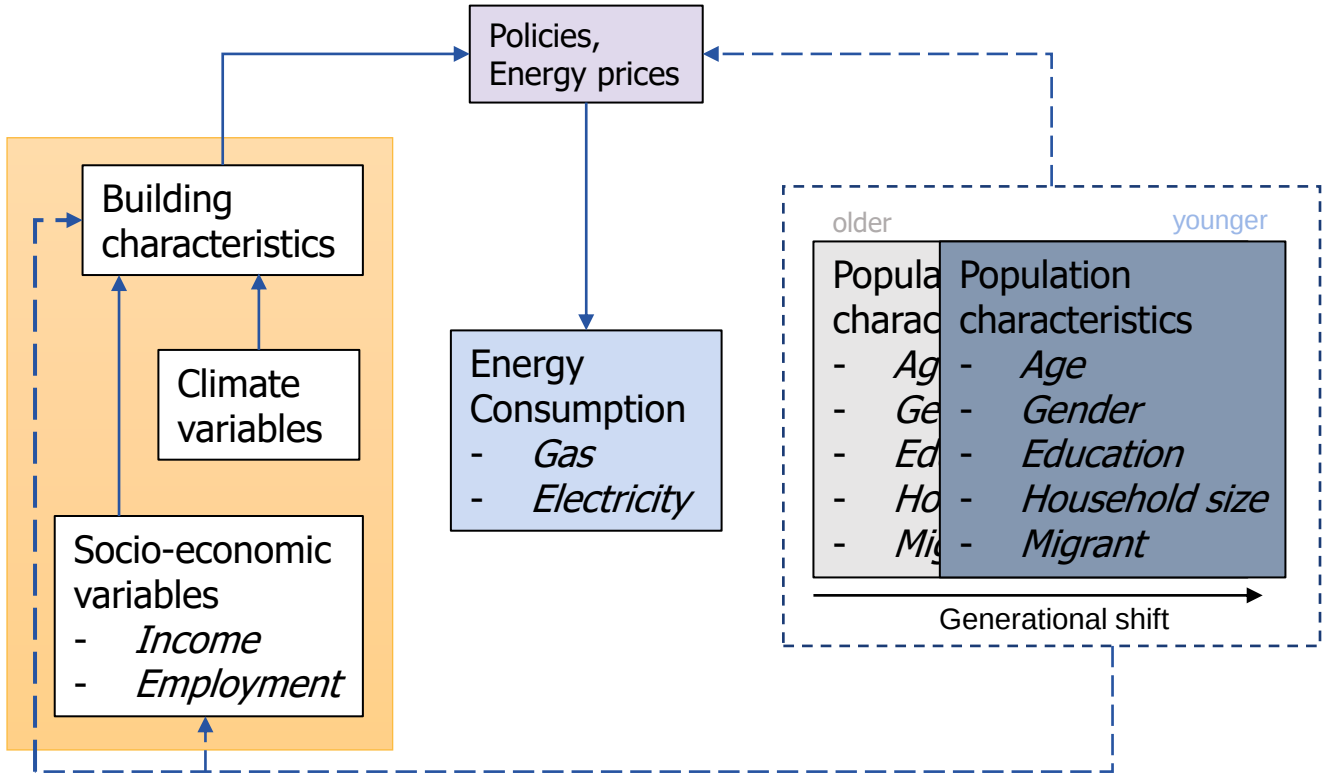
Key takeaways



Lexis diagram: Energy consumption-Demography Nexus

Key takeaways

- In general, energy consumption is modelled using average population characteristics (Rao & Wilson, 2022)
- However, population heterogeneities do play an important role in energy consumption behaviour
- Lifestyle and behavioural shift linked with dynamics along the life-cycle, across generations and in terms of changes to the socio-economic composition
- Further, population heterogeneities also interact with contextual factors in determining energy consumption behaviour
- Policy instruments to promote sustainable energy consumption need to consider heterogenous populations with life-cycle and overlapping generations perspective



Conceptual framework to understand the role of population heterogeneities in energy consumption behaviour

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