

How do age and generational shifts affect energy consumption in urban China?

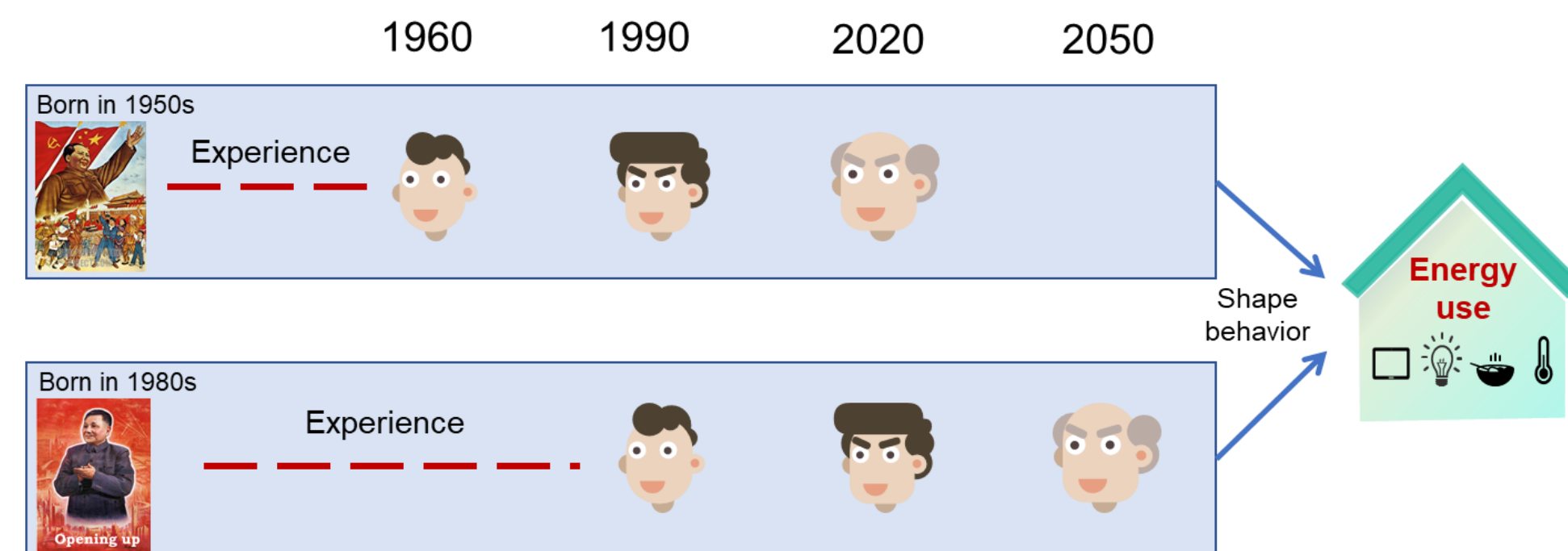
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Introduction

Background

Energy use habits and environmental awareness are critical to people's daily energy consumption, the dynamic changes of which are rooted in generations and age cohorts. Thus, demographic trends of population aging and generational shifts are likely to reshape future energy consumption patterns.

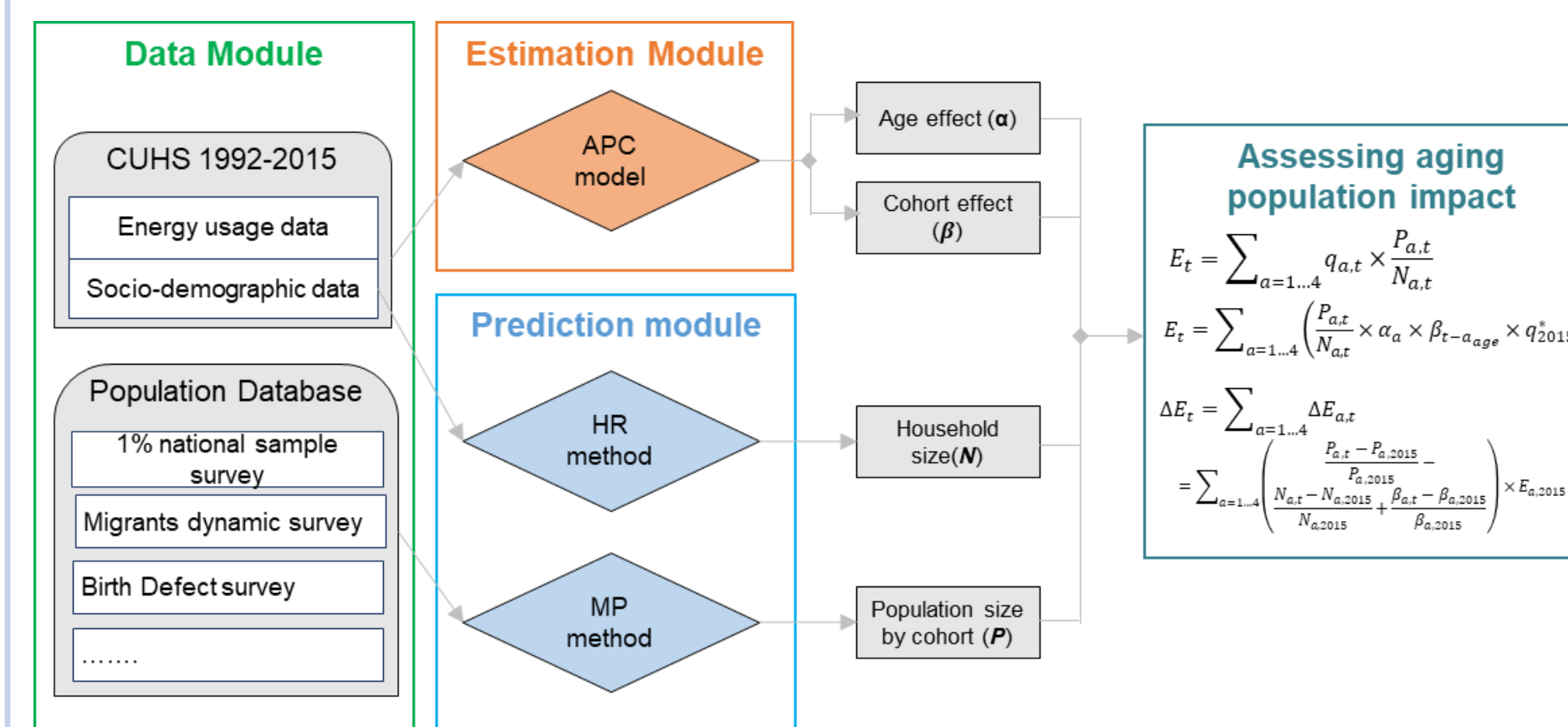


Objective

This study aims to investigate age and generation effects on energy consumption, and further explore the future impact of the demographic transition on China's residential energy consumption.

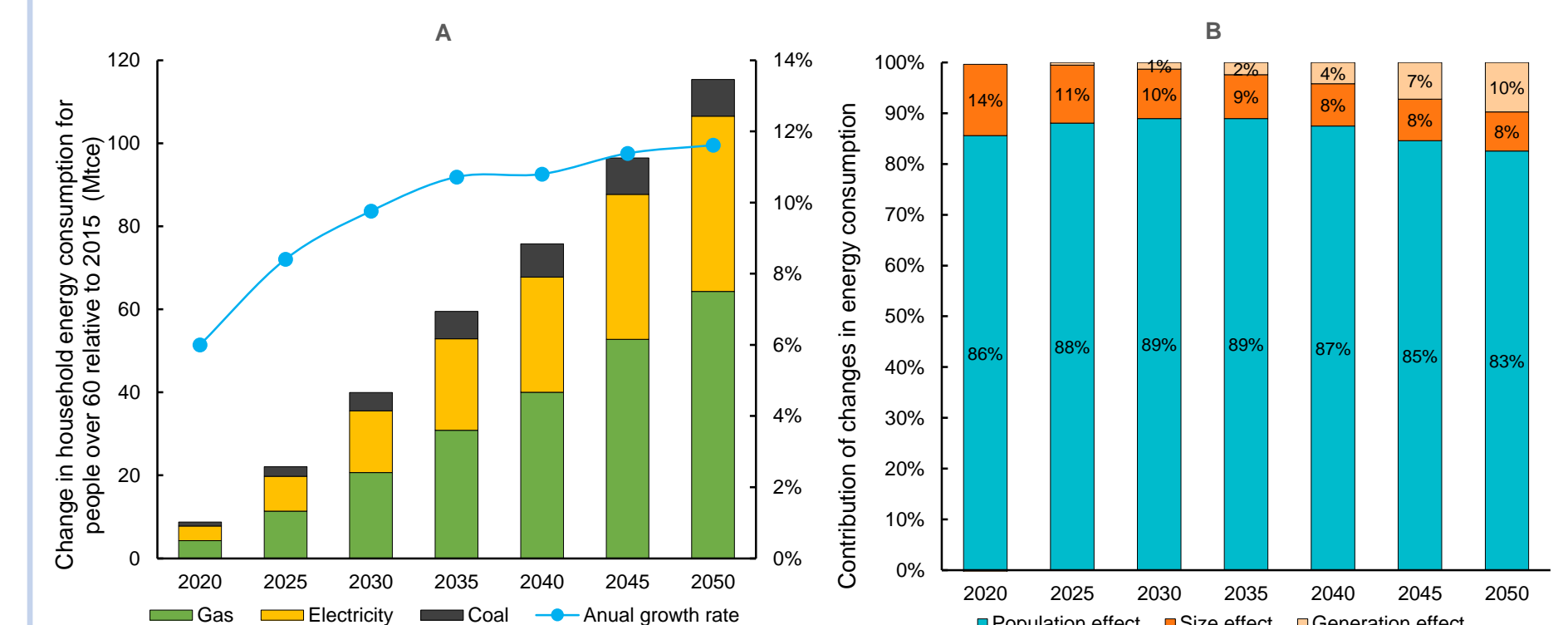
Methods

- Use a detrended age-period-cohort (APC) model to estimate age and cohort effects that are constant across age and generation;
- Project household size using the head rate (HR) method and project the population size of each cohort using the multistate population (MP) method;
- The above results as inputs to the formula to calculate energy changes due to population aging from 2020 to 2050.



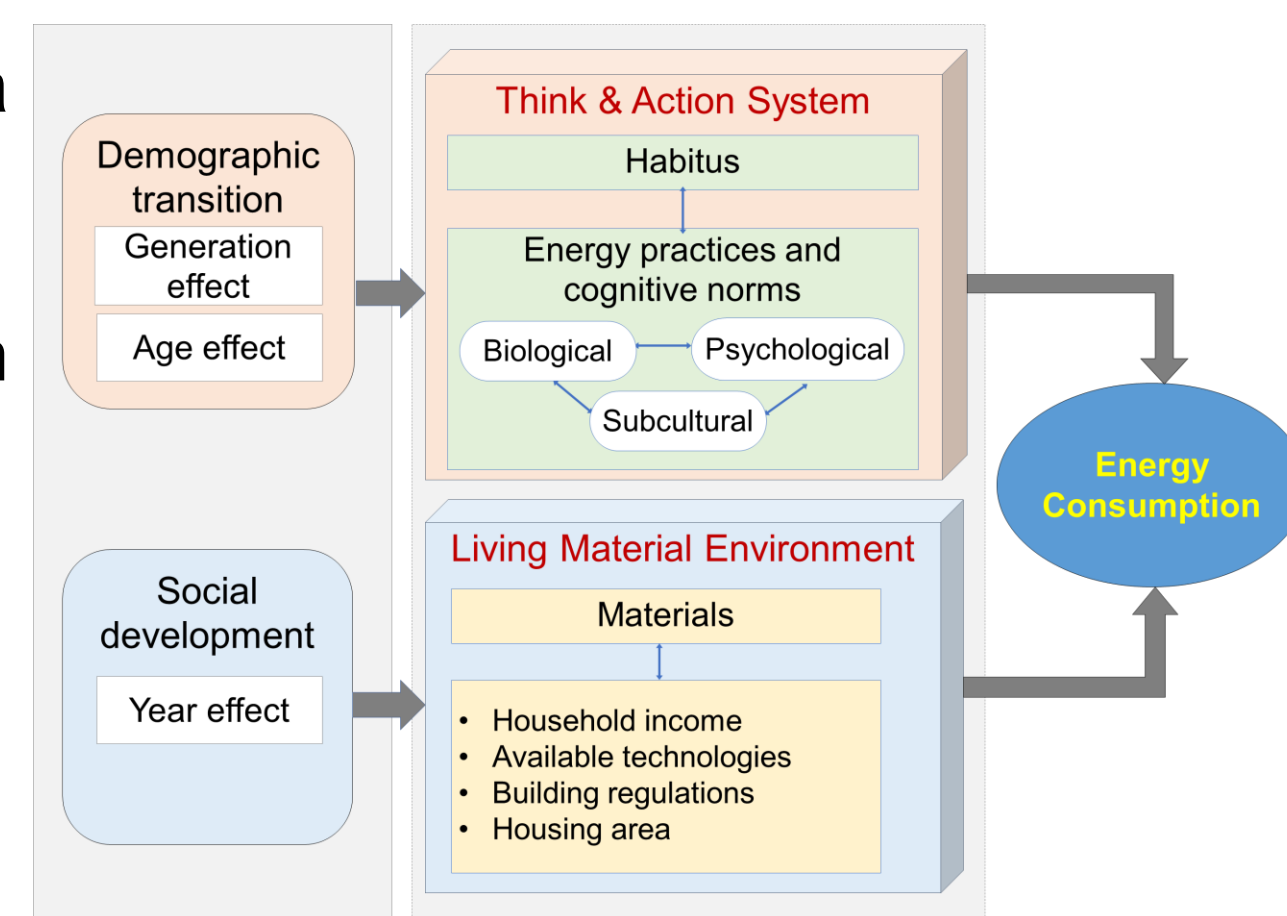
Results

- The change in total consumption caused by demographic transition increases from 9 Mtce in 2020 to 115 Mtce in 2050, with an annual growth rate from 5.7% to 10.8%.
- The increment accounts for about 17–26% of the energy consumption in the residential sector in 2050.
- Population and household size effects explain about 90–95% of the changes and show a downward trend.
- Generation effects explain about 5–10% but show an increasing trend.



Mechanism

The figure presents a summary of the energy consumption influence mechanism determined by socioeconomic development and demographic transition.



Data

- Household energy consumption data used from CUHS dataset, which is surveyed by the National Bureau of Statistics of China (NBS) to monitor the dynamic changes in the living conditions of urban households;
- We grouped households based on the age of the household head and tracked the cohorts over time, with cohorts defined by date of birth. The bandwidth was set five years.

Conclusions

- Our findings suggest that the generation shift may result in a significant increase in the energy consumption of Chinese households in the future.
- Population aging will increase Chinese energy demand in the future.
- Related pension policy with lifting household income and quality may indirectly impact on energy consumption.

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Reference

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