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The significance
of energy poverty
on the assessment
of residential
energy demand
and emissions in
Germany

Motivation and analysis

Consumers at the heart of the energy transition are key to unlocking the potential to achieve energy and climate change targets. Households are not a homogenous group and several key factors (such as income) influence how they are able to participate in the energy system.

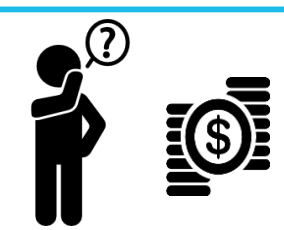


Households

Significant consumers of energy:

Households consumed ~**28% of the final energy consumption** in 2013. Together with personal *transport*, households are responsible for **47% of final energy consumption**.

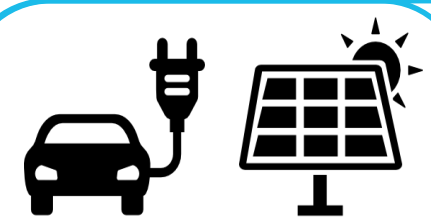
The majority of the household energy budget is for transport (42%) followed by space heating (40%).



Energy Poverty

Energy poverty on the rise:

Estimates put **11-21%** of the population vulnerable to or in **energy poverty** due to *high energy bills* (increasing energy prices and low efficiency), *low income* (incomes increase slower than energy prices) and *poor energy efficiency* (in buildings and appliances).



Energy Transition

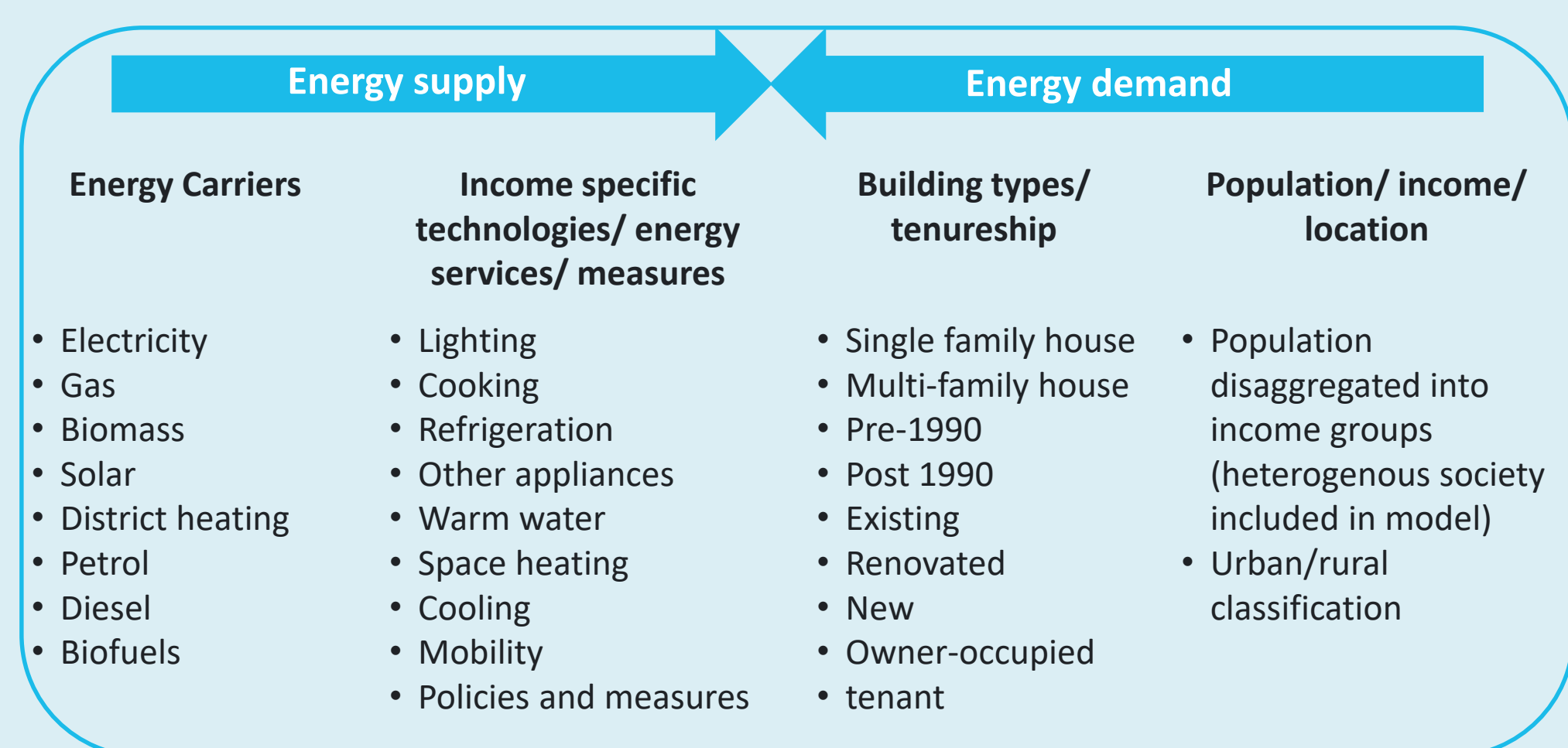
Households key to successful energy transition and to contribute to 2020 targets with:

- 14% heating with renewables
- 10% renewables in transport
- -10% electricity demand (compared to 2008)
- -20% heating demand
- -10% transport demand (compared to 2005)

Methodology

Adaptation of the TIMES-Germany model with disaggregated representation of households into heterogenous groups based on socio-economic characteristics. The model will account for budget constraints and investment decision making profiles in a two-step process (investment + operation) through a mix of capacity constraints and discount rates.

Reference Energy System for model



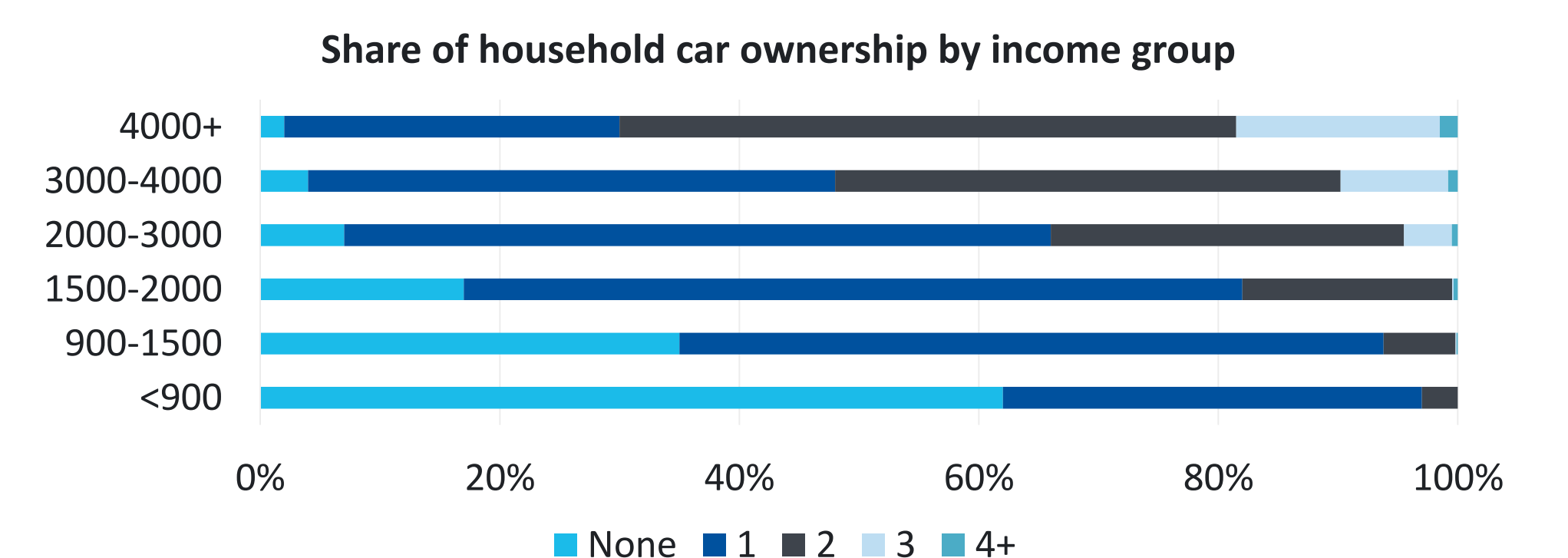
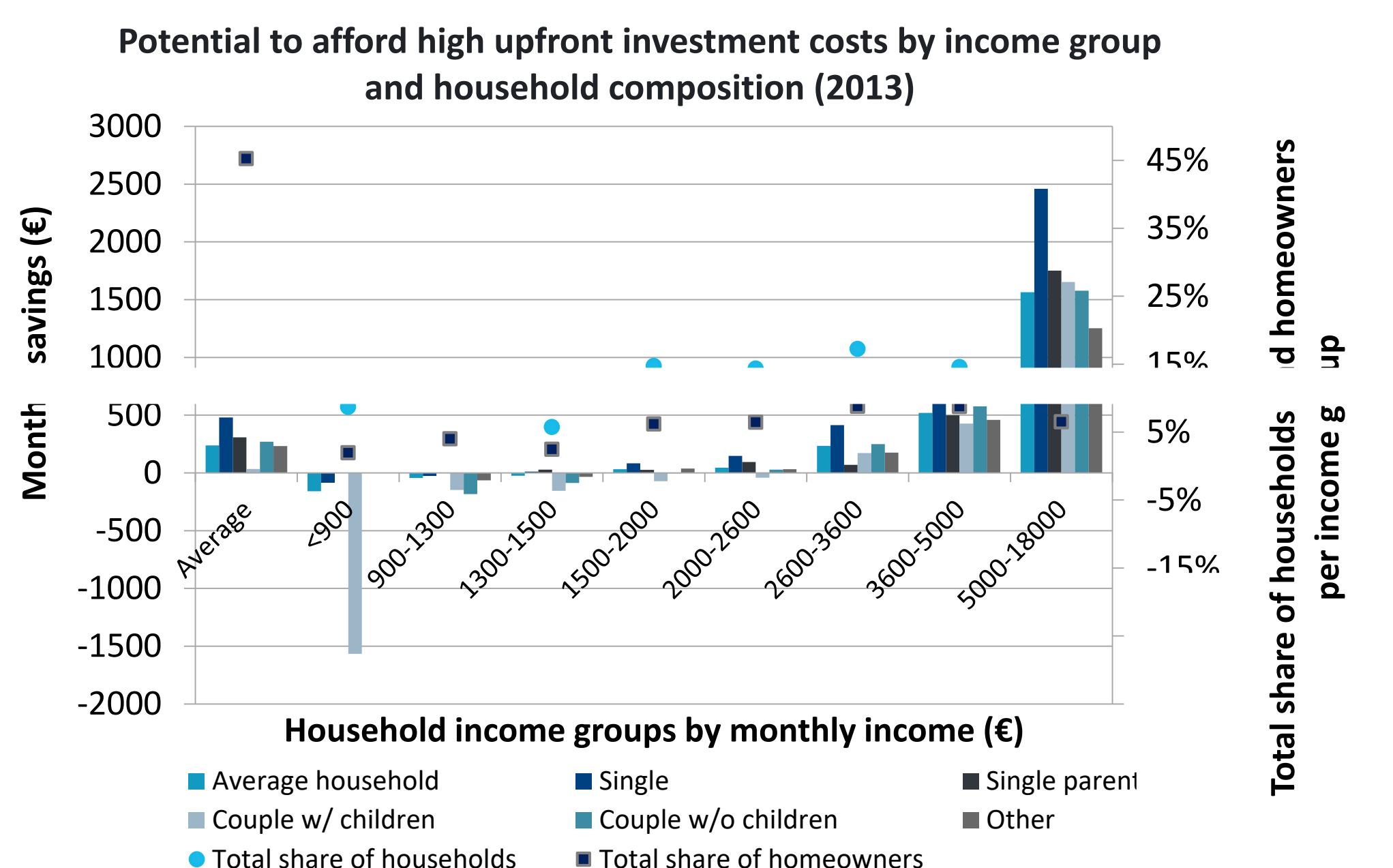
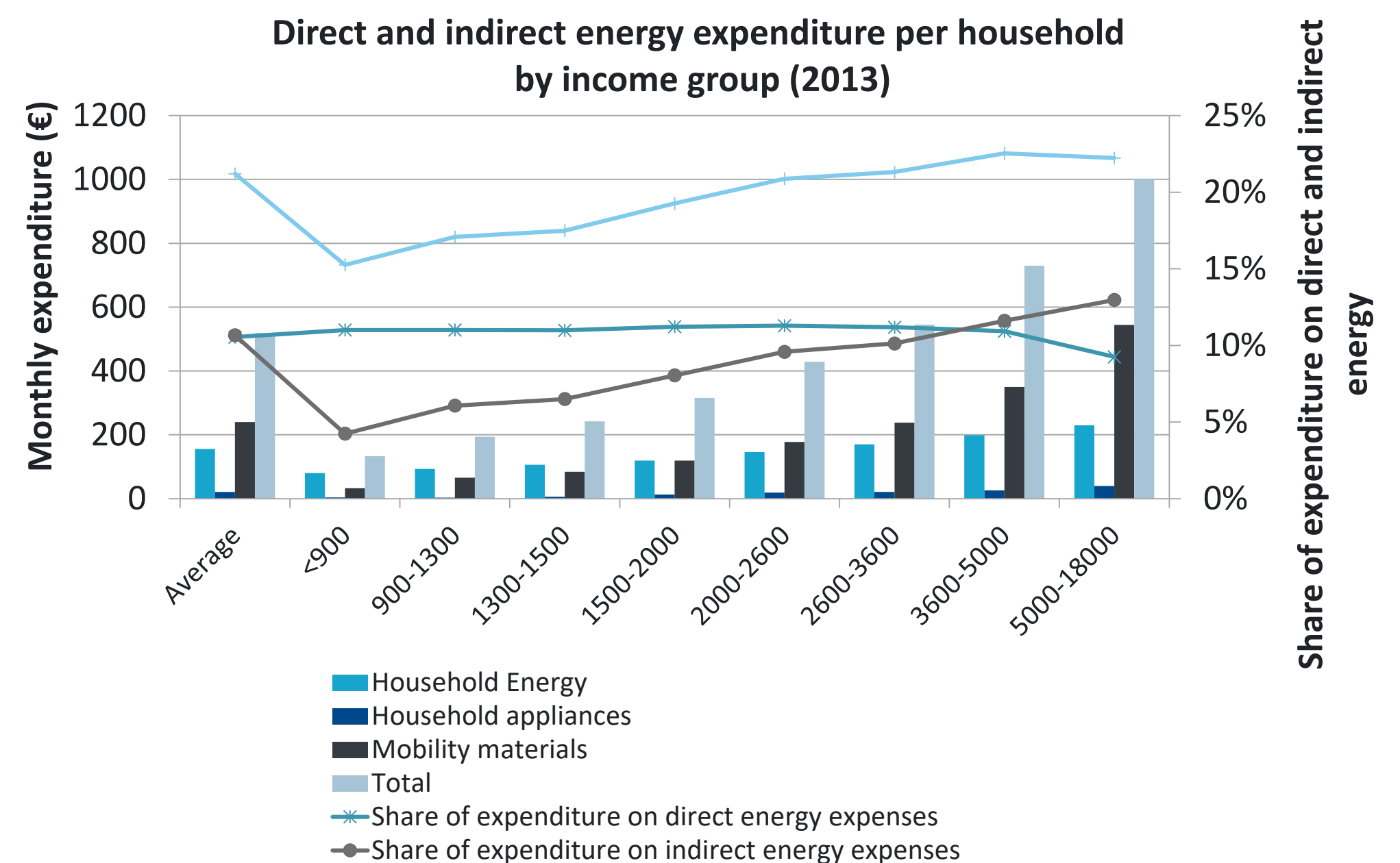
Next steps and expected outcomes

Scenario analysis

Reference scenarios	Status Quo	Aggregated household sector, baseline, business as usual, all expected policies implemented
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Investment scenarios	Investment costs	Constraints for financial ability of households to invest in technologies (budget constraints for each income group plus disposable income for energy)
	Measures	Including additional measures, such as: <ul style="list-style-type: none">• Energy Savings Check (<i>Stromsparcheck</i>)• Building renovation• Renewable and energy efficient heating and household appliances• Subsidies

- Recognition of and accounting for energy poverty in a holistic energy system analysis towards an integrated policy response
- Improved representation of households providing income group specific insights into expected contribution towards targets
- Exploring the significance of household energy and emissions and energy poverty on achieving the objectives of the energy transition by accounting for budget constraints per income group
- Exploring the improvement of the energy welfare of low income households through policies and measures through differentiated policy response

Case for a disaggregated assessment



- The majority of households (have insufficient funds or do not have the decision-making power to invest in energy efficient and renewable upgrades and technologies (i.e., not homeowners)
- As income increases, so does the indirect energy expenditure (e.g., investment in appliances, home improvements)
- 39% of all households have higher than average disposable income (>239€ monthly) available for potential investments
- 24% of all households have higher than average disposable income available and are home owners
- Space heating and transportation (largest consumption) needs vary greatly depending on income and require a differentiated analysis