



APERC Workshop at EWG55

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3-2. Building (Residential and Commercial) Sector Demand

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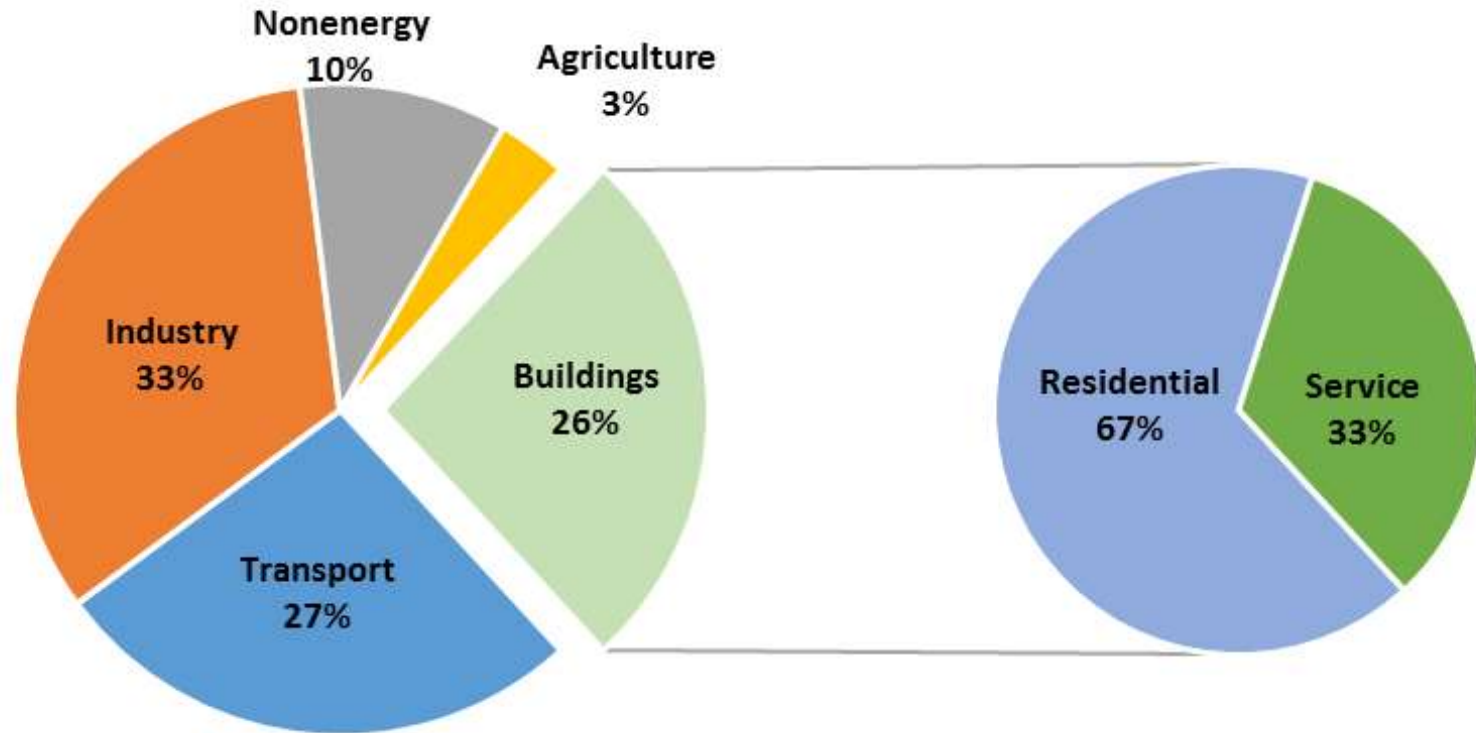
- I. Building sector overview**
- II. Building model methodology**
- III. Preliminary results (BAU scenario)**



I. Building sector overview

Buildings represented 26% of energy demand in 2015

APEC final energy demand in 2015



Source: IEA 2017

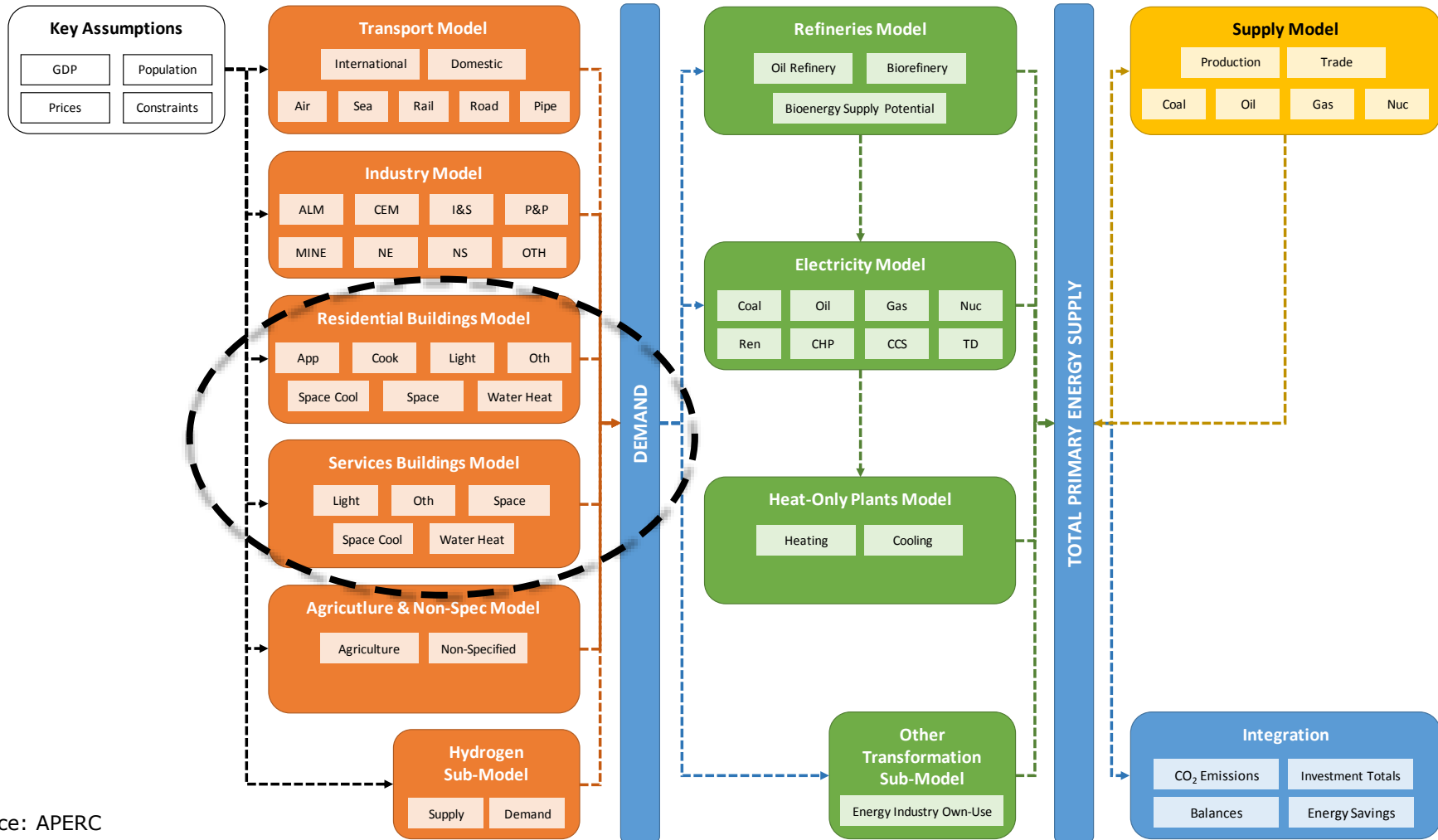
- **Building sector is the third largest energy consuming sector.**
- **Demand in residential buildings was about twice that in services.**



II. Building model methodology

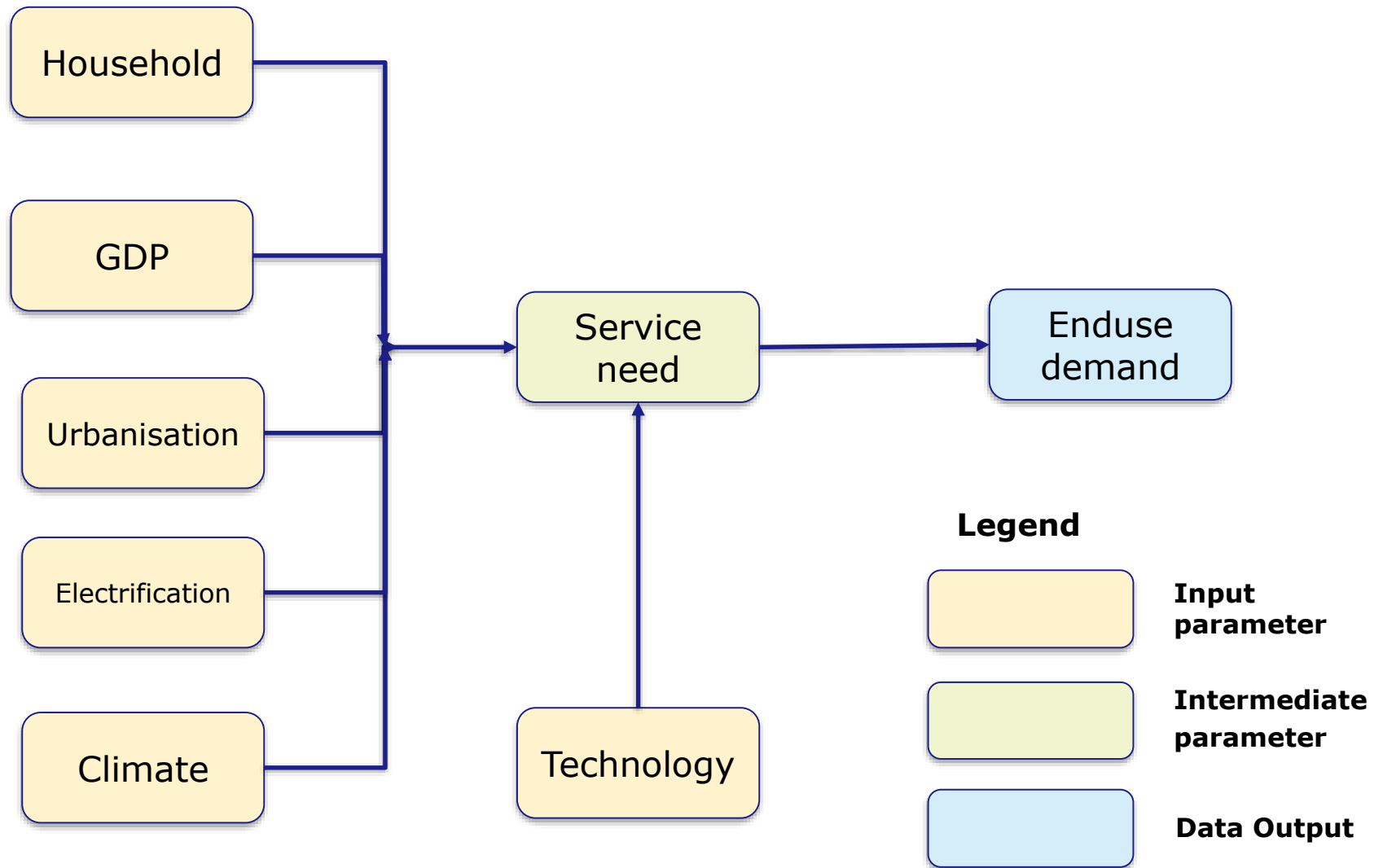
Building model - a small part of the big picture

APERC's energy demand and supply model structure



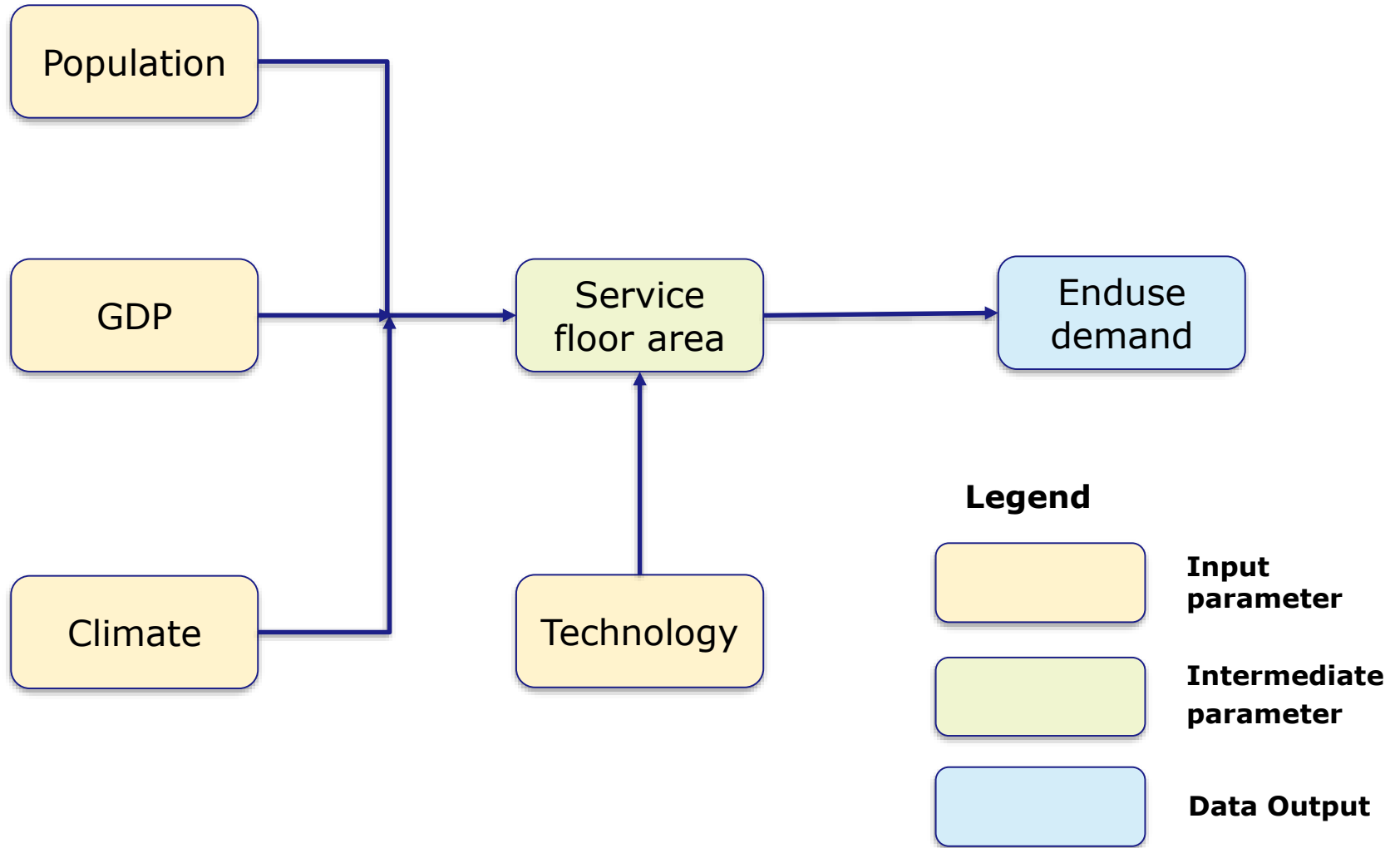
Source: APERC

Modelling residential demand - key steps



Source: APERC

Modelling service demand - key steps



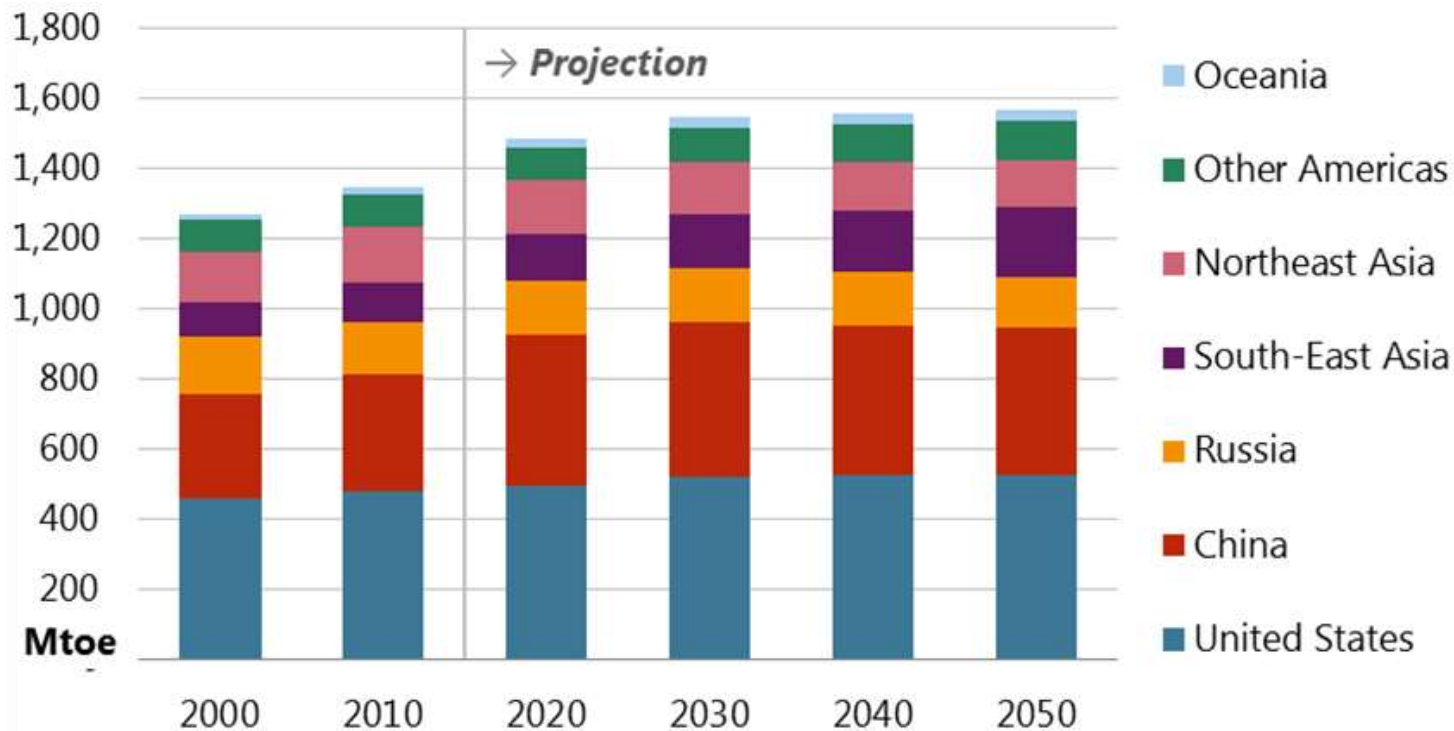
Source: APERC

An aerial composite image showing a city with a complex highway interchange, a large solar panel array, and a volcanic eruption with lava flows in the background.

III. Preliminary results (BAU scenario)

Demand growth varies with regions

APEC demand for all buildings, 2000 - 2050

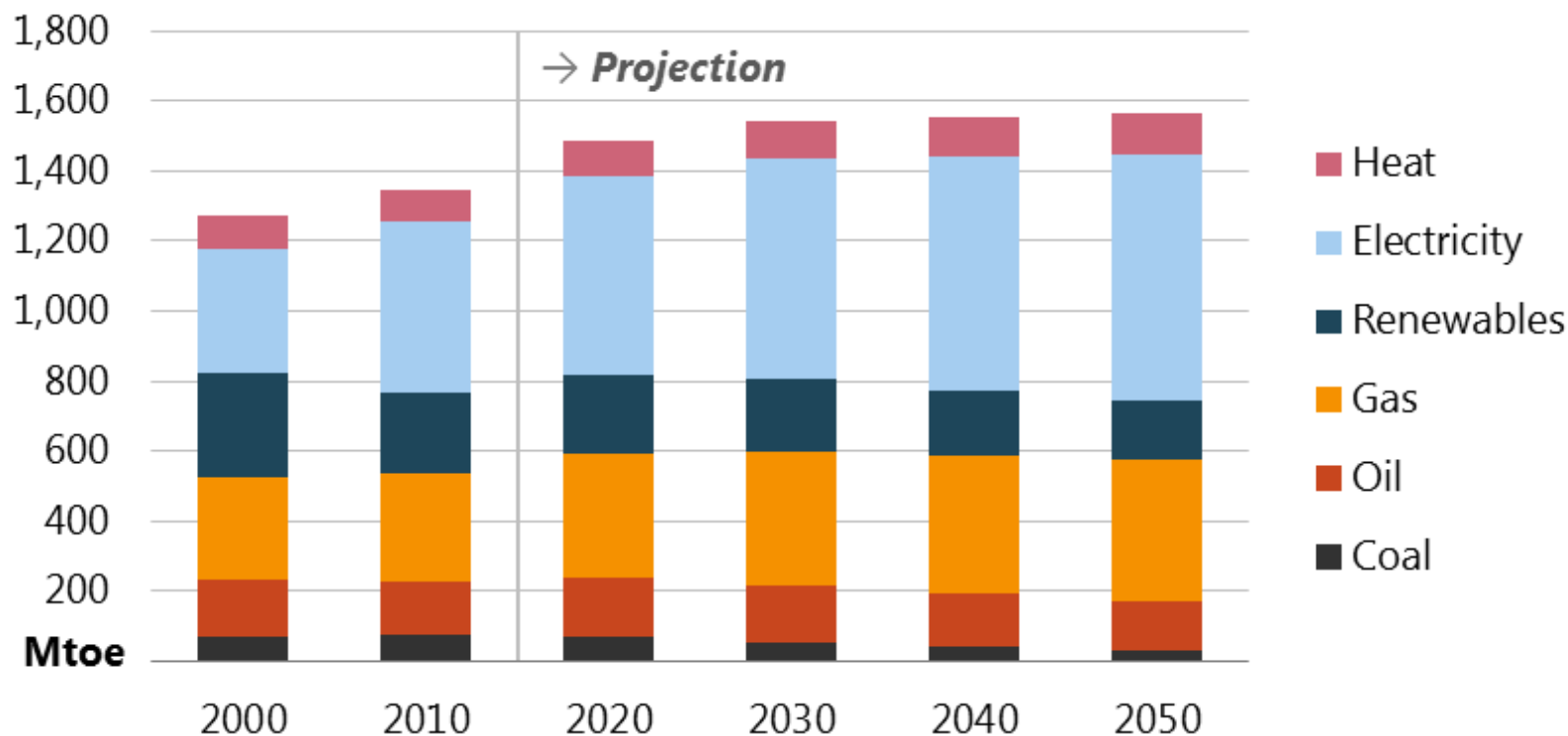


Source: IEA 2017, APERC analysis

- **USA and China have the largest combined share, around 60%, throughout the projection period.**
- **South-East Asia is the fastest growing region. Demand grows by 56% due to high GDP and population growth.**

Electricity remains the major fuel

APEC building demand by fuel type, 2000 - 2050



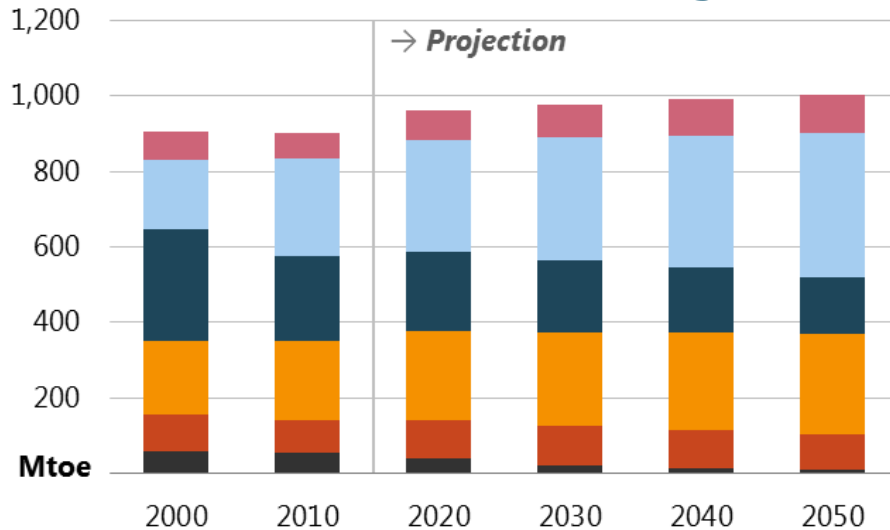
Source: IEA 2017, APERC analysis

- **Electricity, gas and heat increase in share because of urbanisation, electrification and development.**
- **Renewables (mainly biomass), coal and oil decrease in share.**

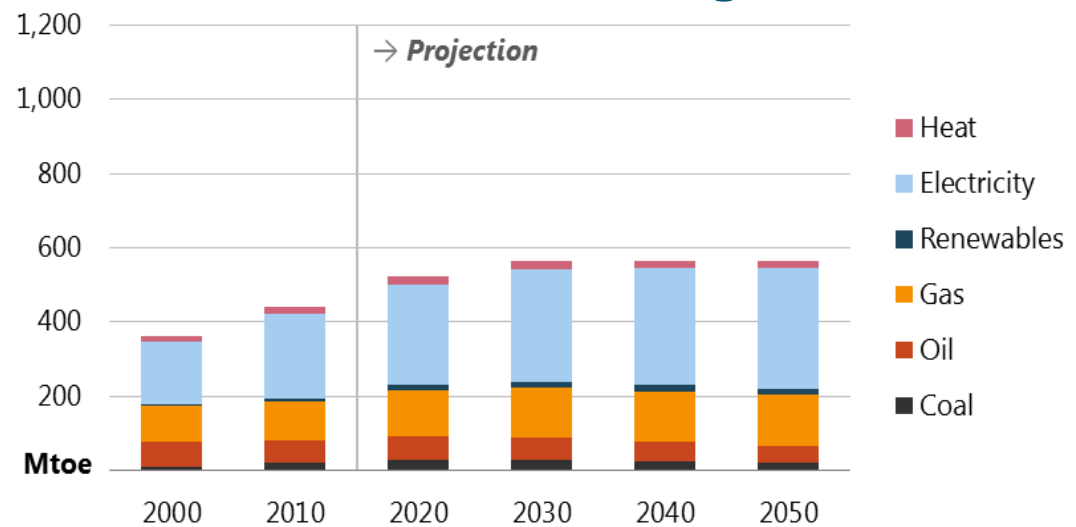
Demand by fuel type – changing trend

APEC building demand by fuel type, 2000 - 2050

Residential Buildings



Service Buildings

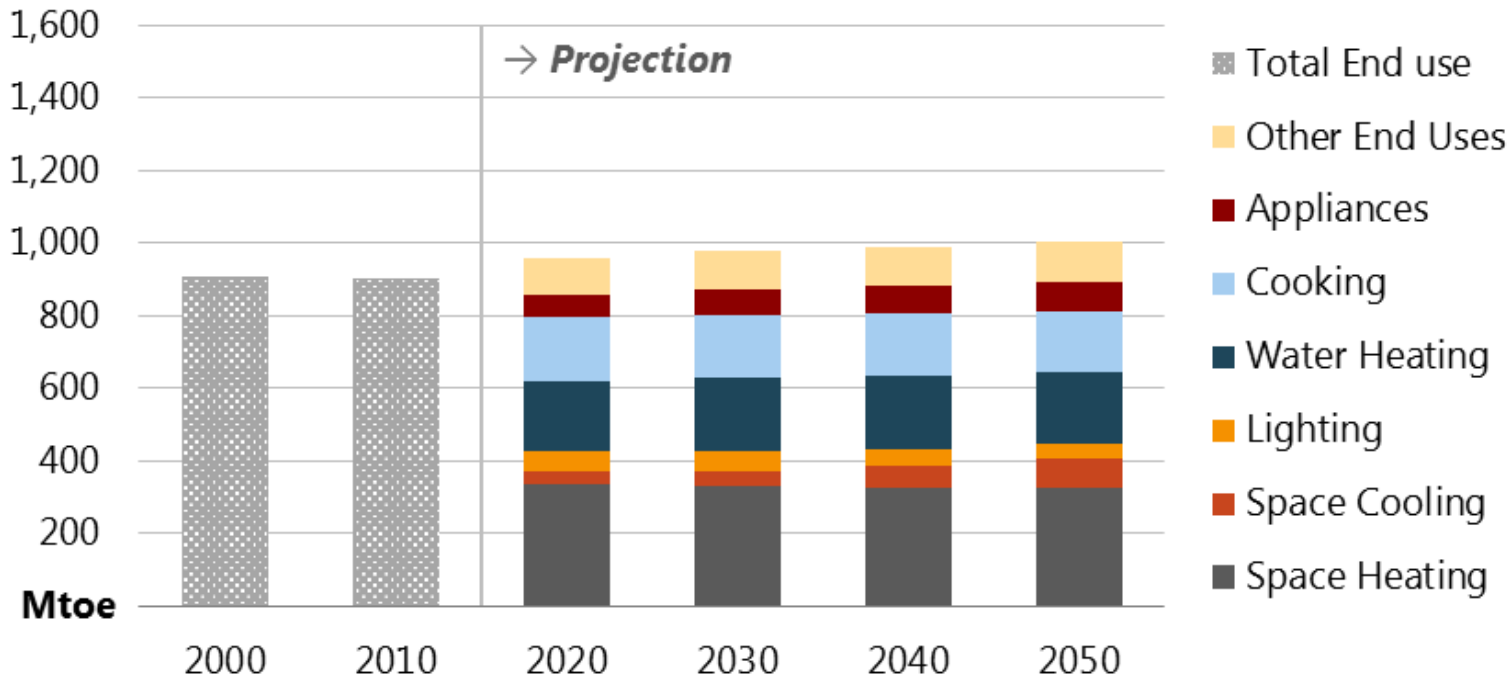


Source: IEA 2017, APERC analysis

- **Electricity and gas are the major fuel types in all buildings.**
- **Share of electricity grows faster in residential buildings than in service buildings.**
- **Use of biomass decline in residential buildings.**
- **Renewables are not major fuel types in service buildings.**

Space heating - major enduse in residential buildings

APEC residential building demand by enduse, 2000 - 2050

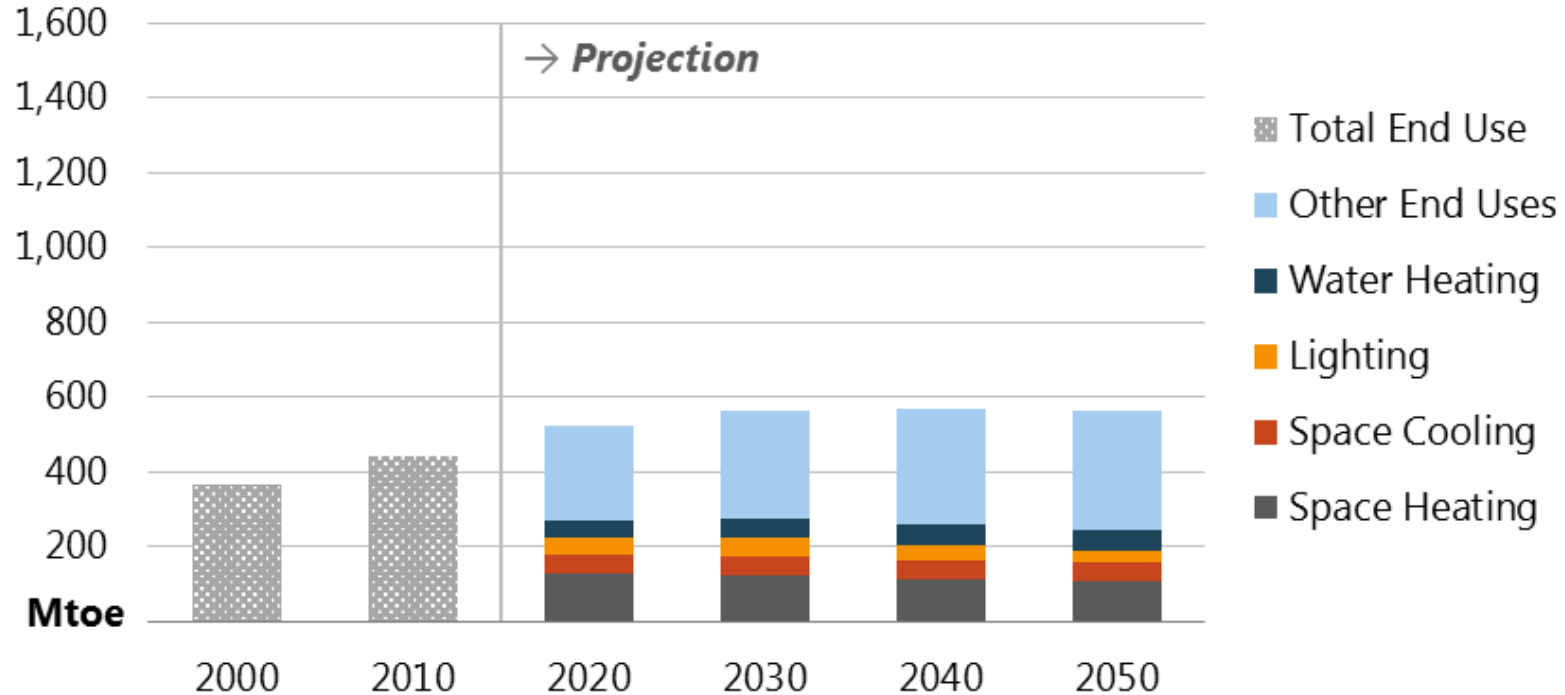


Source: IEA 2017, APERC analysis

- **Over 50% of energy is consumed by space heating and water heating.**
- **Space heating, cooking and lighting decline in share, while space cooling and appliances increase in share.**

Other enduse - major enduse in service buildings

APEC service building demand by enduse, 2000 - 2050

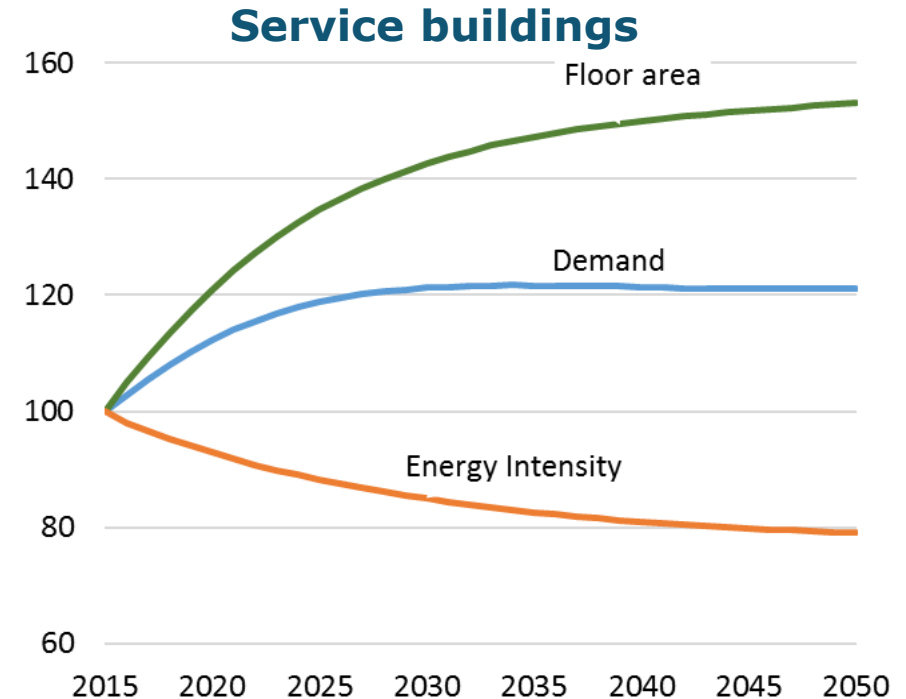
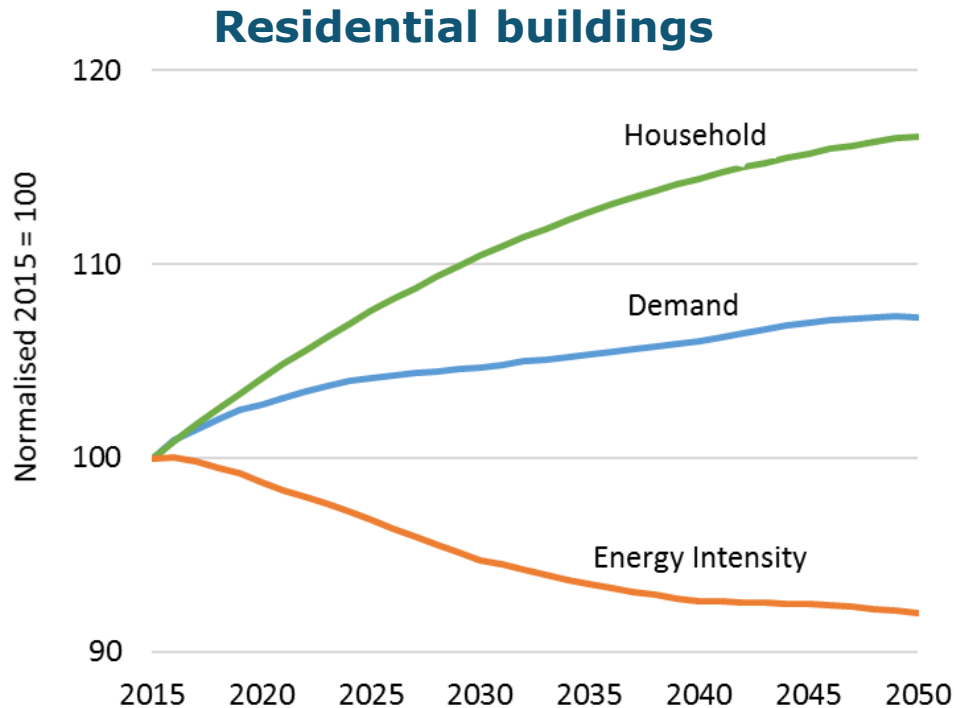


Source: IEA 2017, APERC analysis

- **Other enduse (e.g. elevators, office equipment) grows, consuming over 50% of total demand by 2050 compared with 47% in 2015.**
- **Space heating and lighting decline in share (consistent with residential buildings), while other enduse and water heating increase in share.**

Policies and technology cause energy intensity to fall

APEC energy intensity in buildings, 2015 – 2050

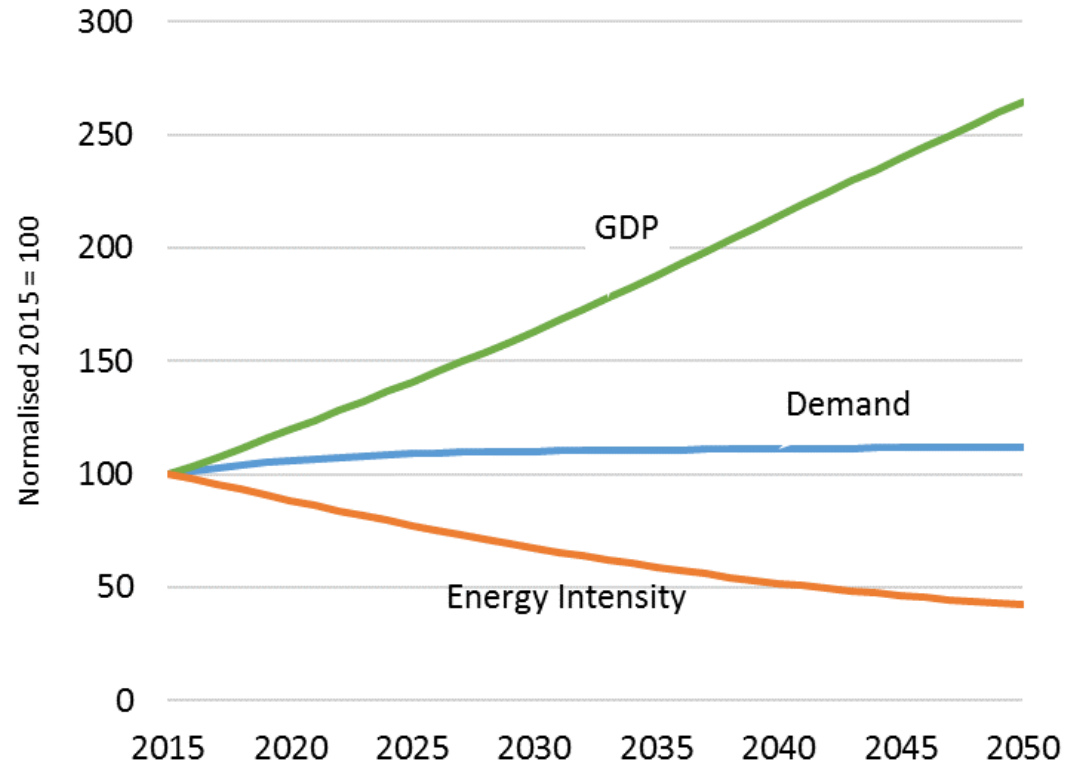


Source: IEA 2017, APERC analysis

- **Demand increases at slower rate than households.**
- **Energy intensity declines by 8%.**
- **Demand increases at slower rate than floor area.**
- **Energy intensity declines by 21%.**

Energy intensity of GDP declines even faster

APEC energy intensity in all buildings, 2015 - 2050

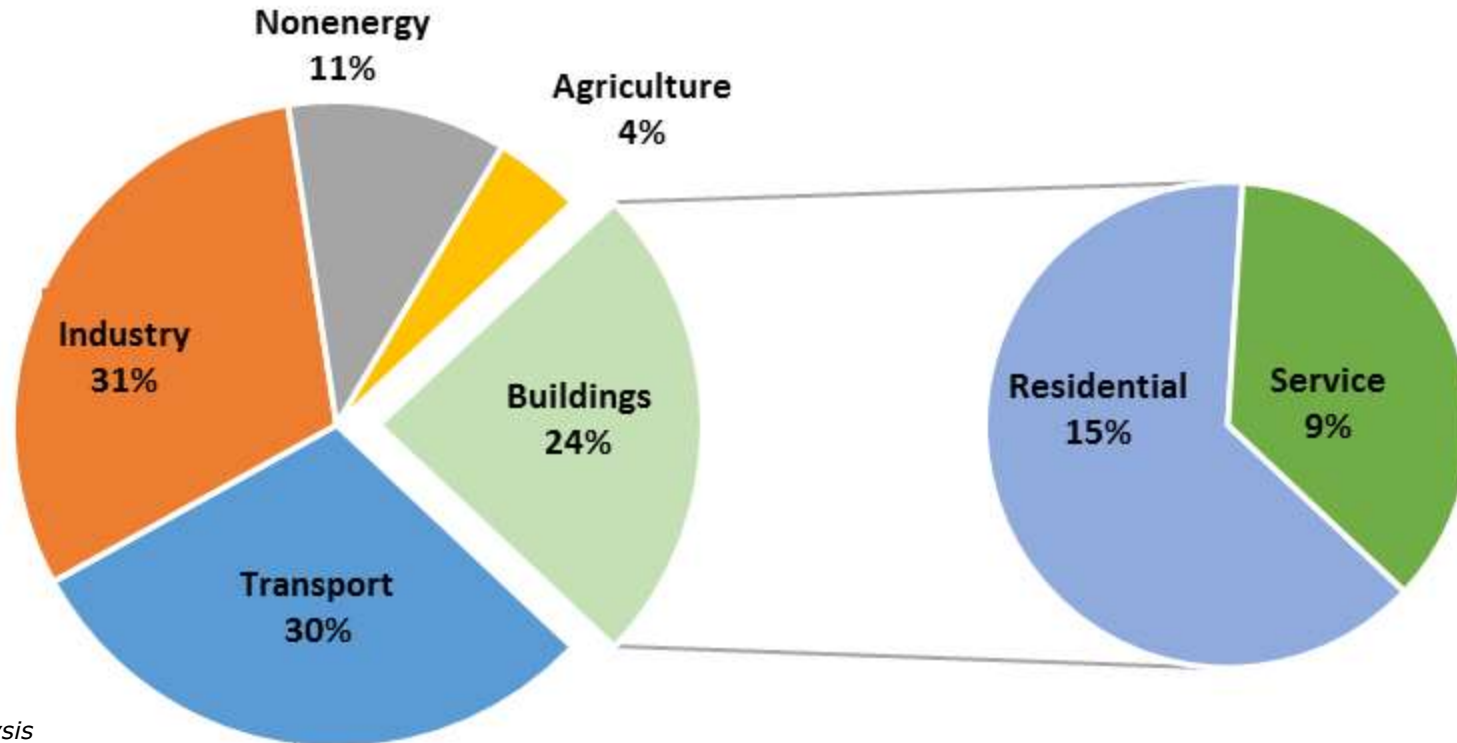


Source: IEA 2017, APERC analysis

- ***GDP increases at a faster rate than households or service floor area.***
- ***Energy intensity of GDP declines faster, by 58% by 2050.***

Buildings represent 24% of energy demand in 2050

APEC final energy demand in 2050



Source: APERC analysis

- **Building demand is not growing as fast as other sectors.**
- **Share of demand by buildings declines from 26% in 2015 to 24%.**
- **Demand by service buildings grow faster than residential buildings.**

Preliminary conclusions and future work

- Building demand is projected to grow, driven by GDP and population.
- Energy intensity falls in the BAU scenario.
- Electricity remains the major fuel.
- Future work includes:
 - ✓ More detailed breakdown of enduses;
 - ✓ Refine technology improvement rate at economy level;
 - ✓ Model the effect of changes in commercial activities; and
 - ✓ Model the effect of shifting of population in major economies.



Thank you for your kind attention

<http://aperc.ieej.or.jp/>