

McKinsey&Company

Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost?



U.S. Greenhouse Gas Abatement Mapping Initiative

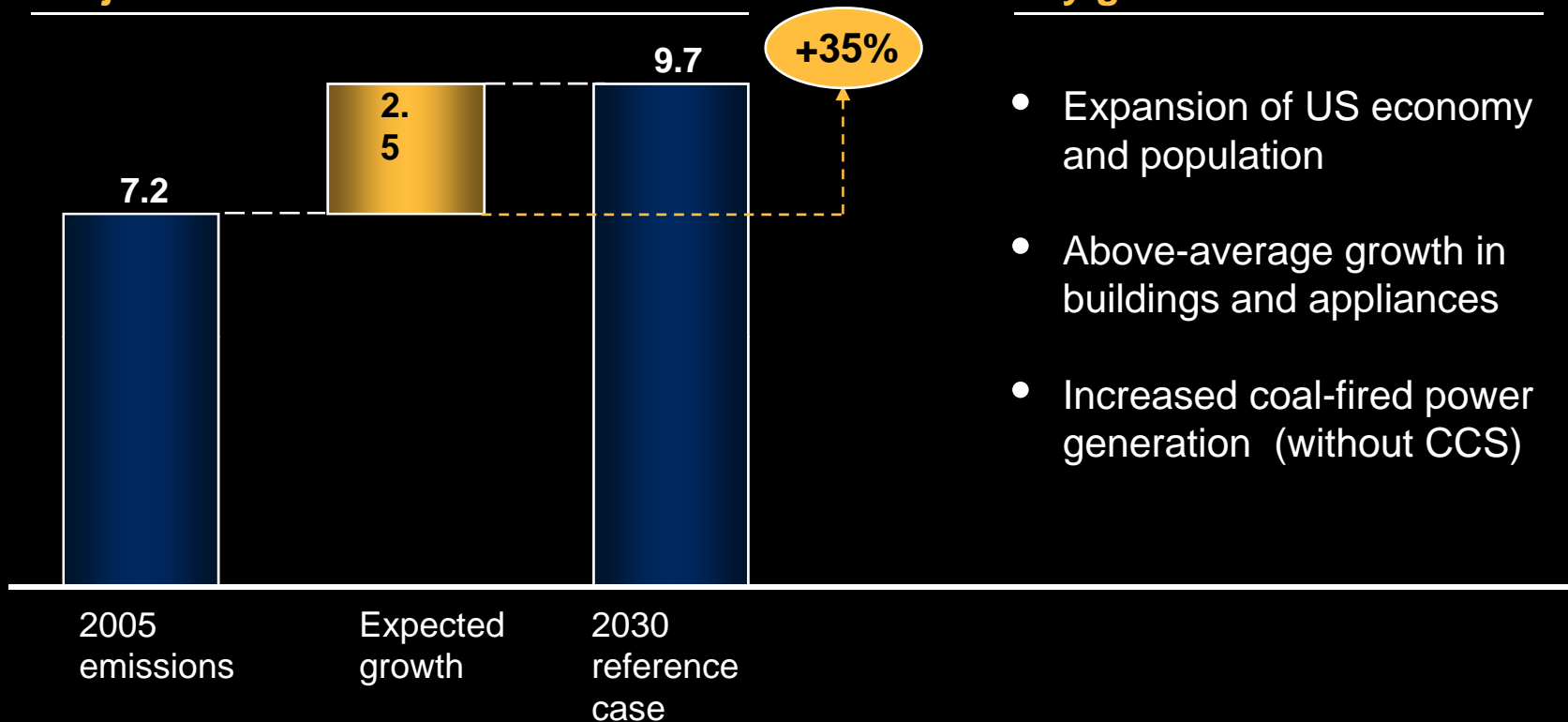
The Wild Center

November 18, 2008

U.S. government agencies forecast emissions to rise 35% by 2030

Gigatons CO₂e per year

Projected GHG emissions



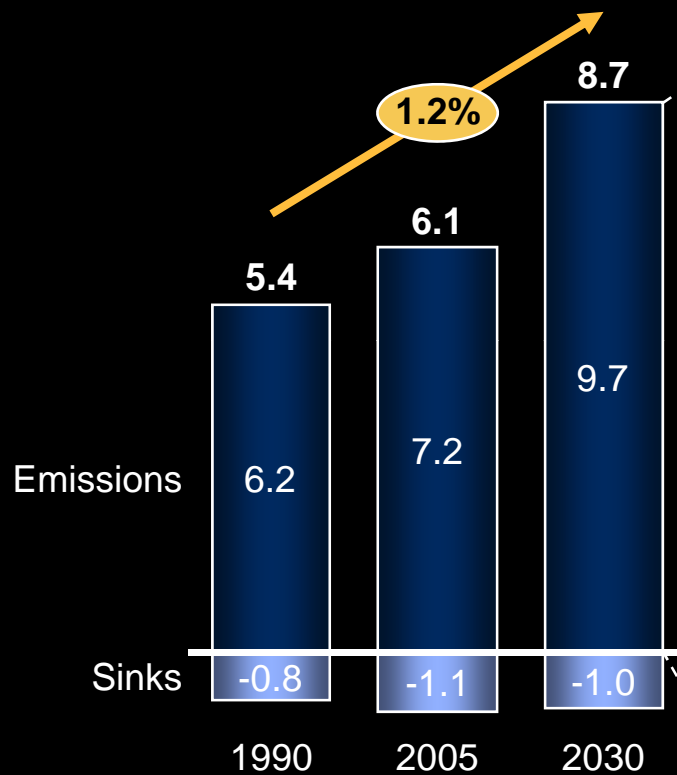
Key growth drivers

- Expansion of US economy and population
- Above-average growth in buildings and appliances
- Increased coal-fired power generation (without CCS)

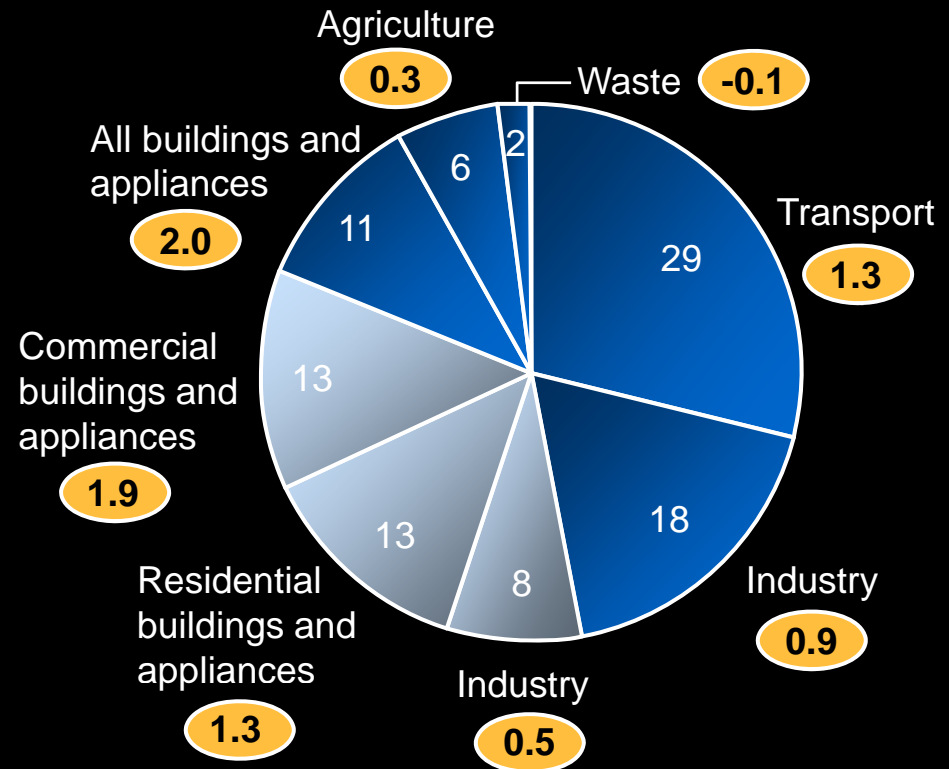
Driven by buildings, transport and industry....

- Direct emissions from end-user sectors
- Power sector emissions allocated to end users
- % 1990-2030 annual emissions growth rate

Overall GHG emissions – 1990-2030
Gigatons CO₂e

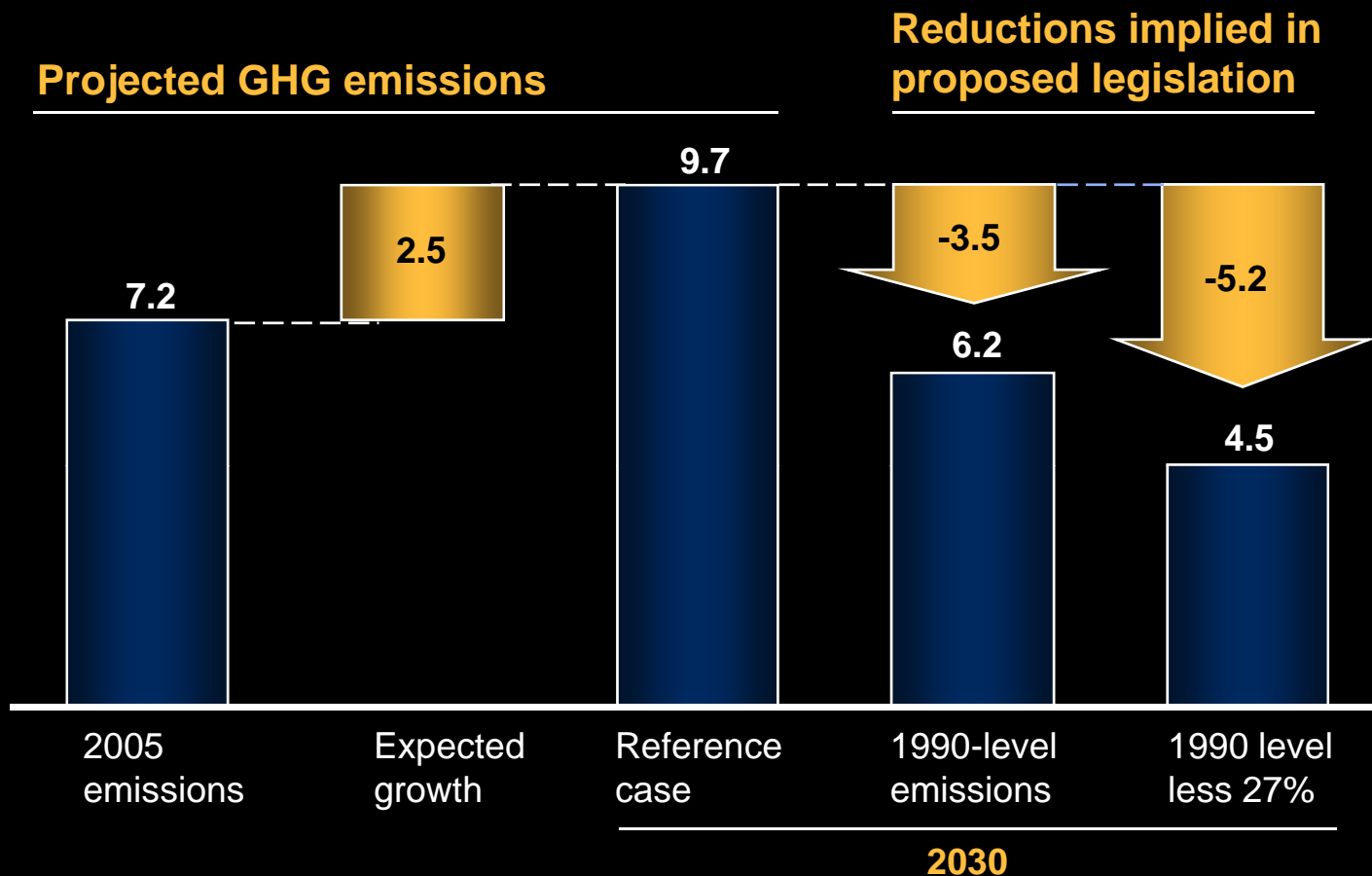


GHG emissions by sector – 2030
Percent



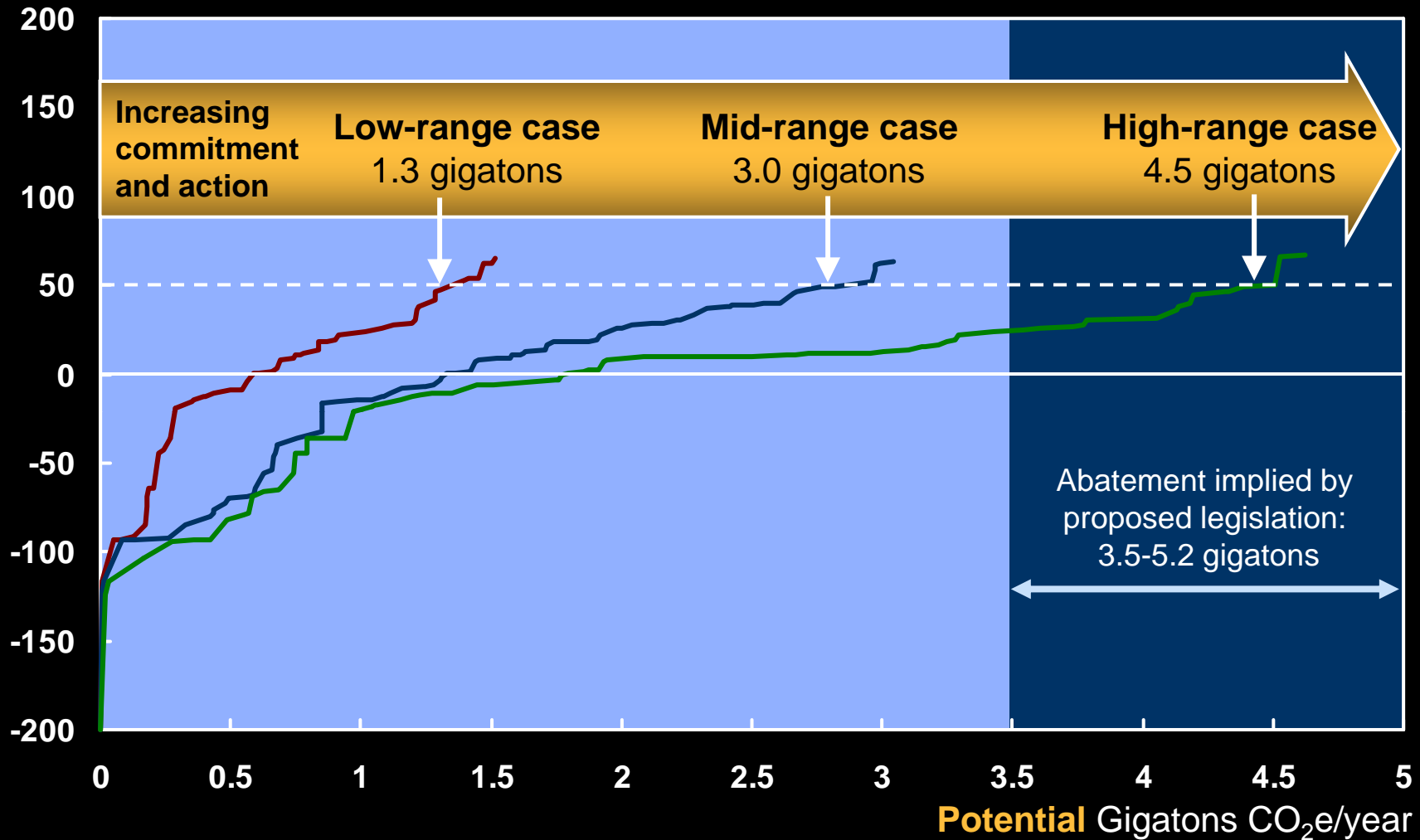
Projected emissions substantially exceed proposed targets

Gigatons CO₂e

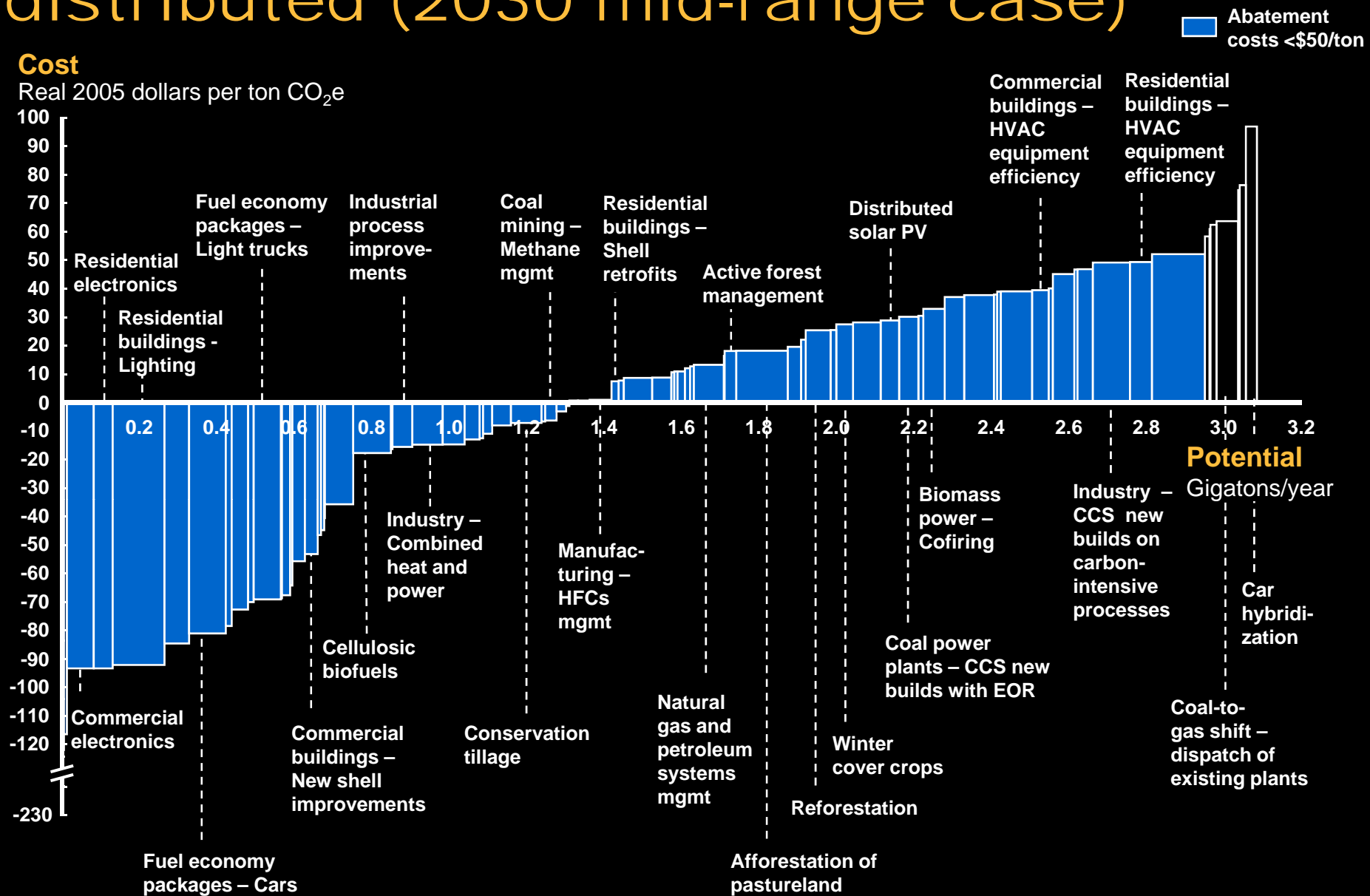


3.0 to 4.5 gts of reduction potential available with concerted economy-wide action

Cost \$(2005 real) ton CO₂e



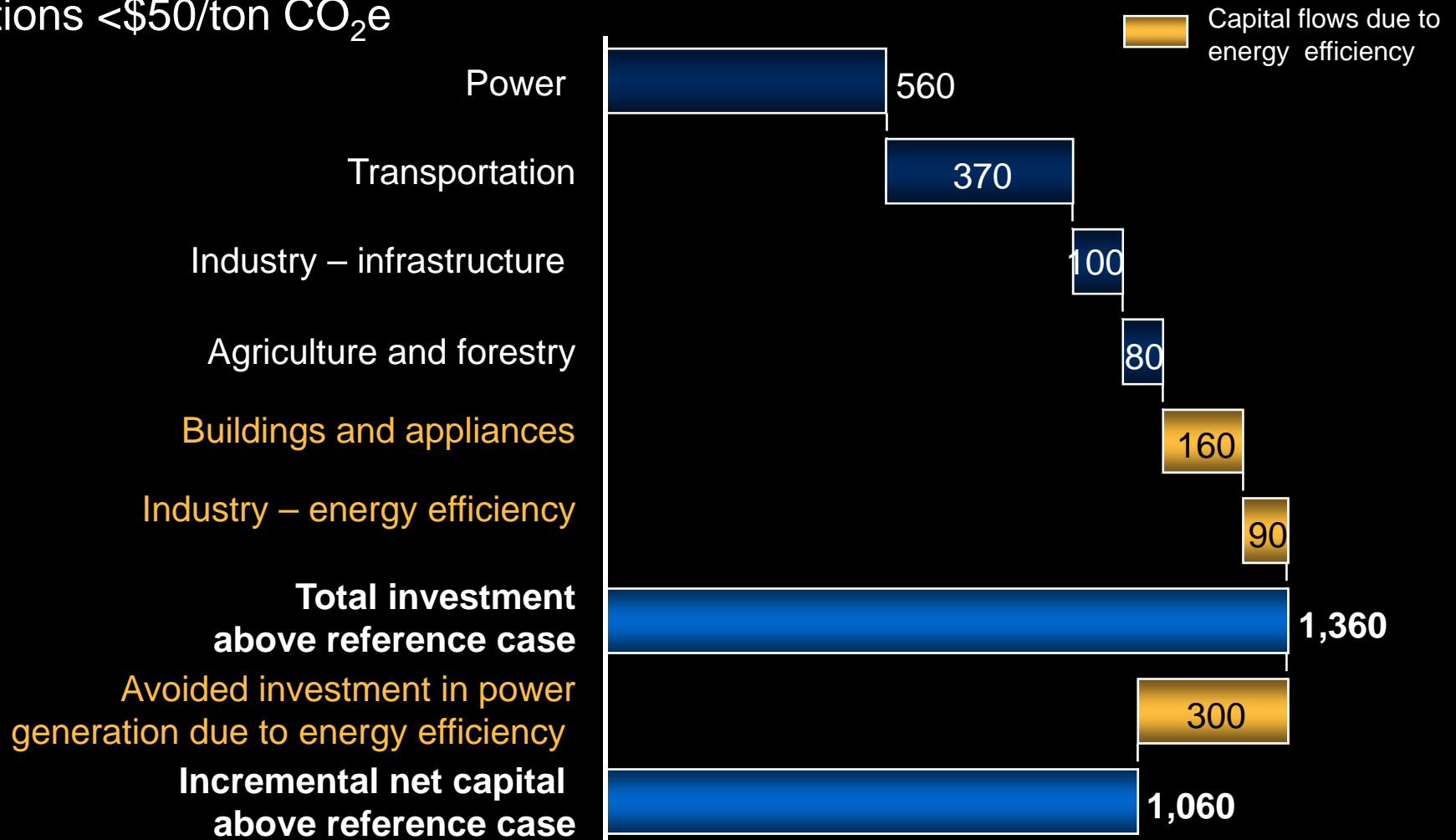
GHG reduction opportunities widely distributed (2030 mid-range case)



Incremental capital investment in mid-range case

Real 2005 \$ billions, cumulative through 2030;
options <\$50/ton CO₂e

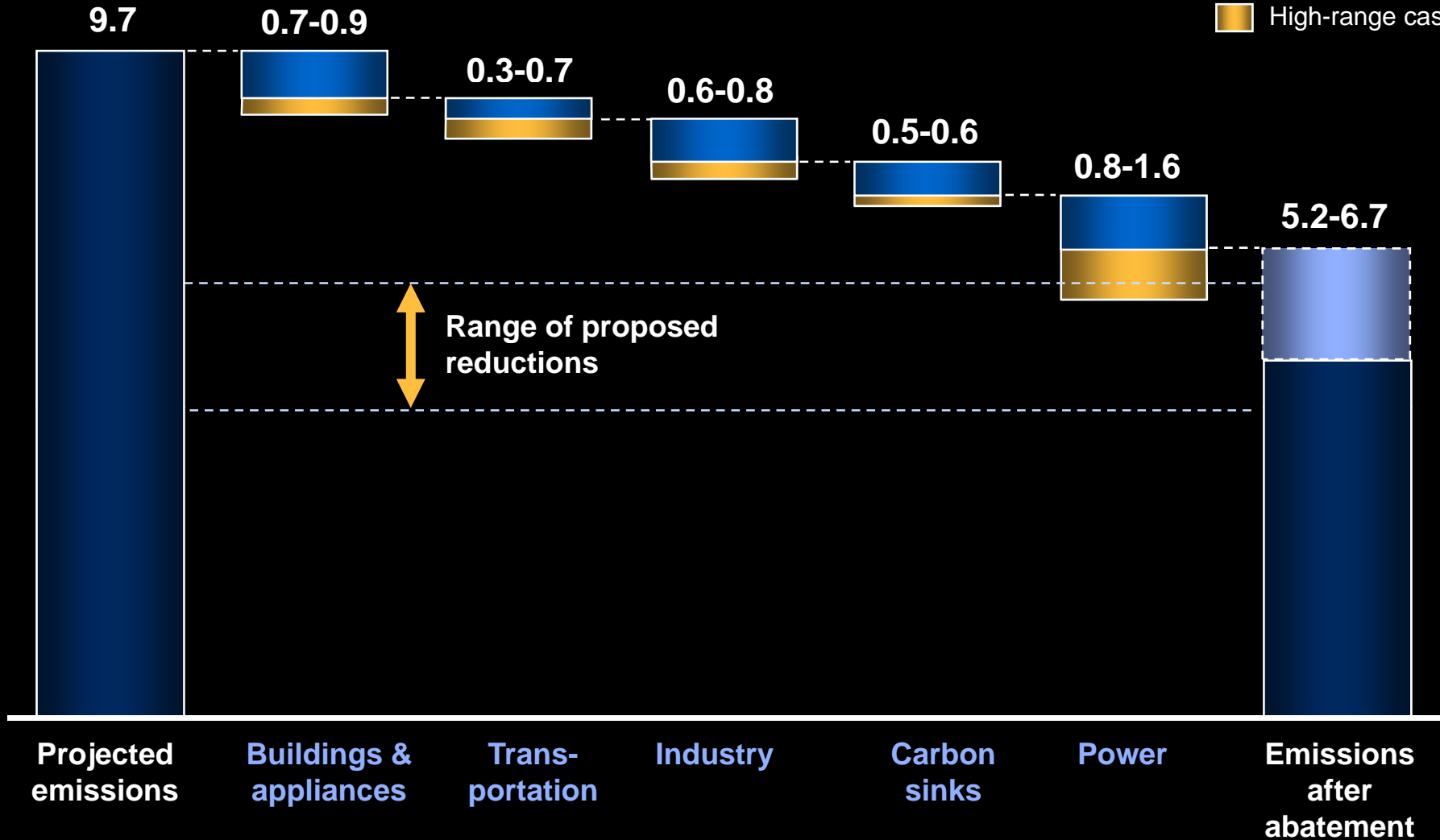
MID-RANGE
CASE – 2030



Five "clusters" offer significant potential

Gigatons CO₂e, options less than \$50 per ton CO₂e

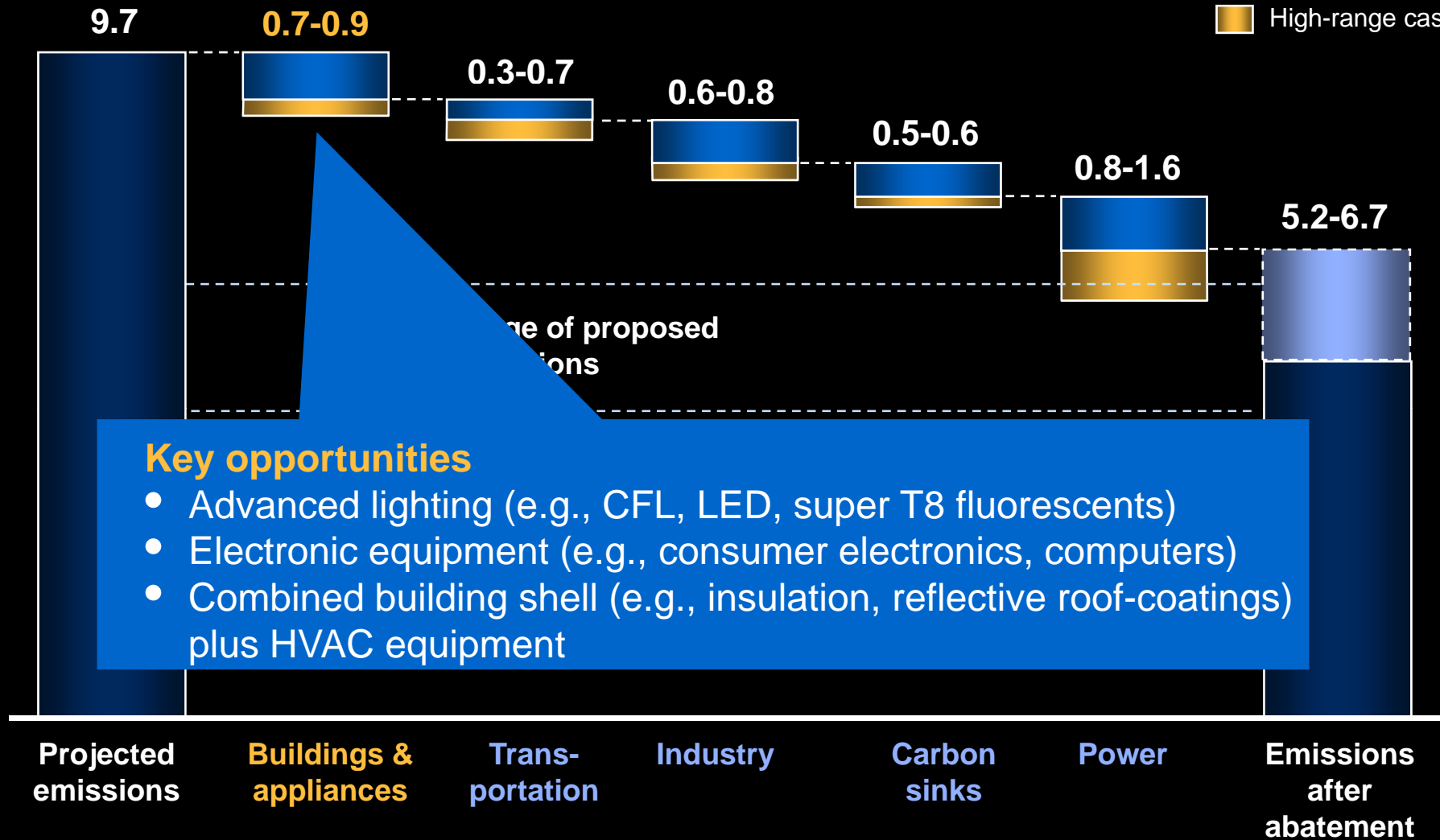
Mid-range case
High-range case



Key abatement opportunities: Buildings & appliances

Gigatons CO₂e, options less than \$50 per ton CO₂e

Mid-range case
High-range case



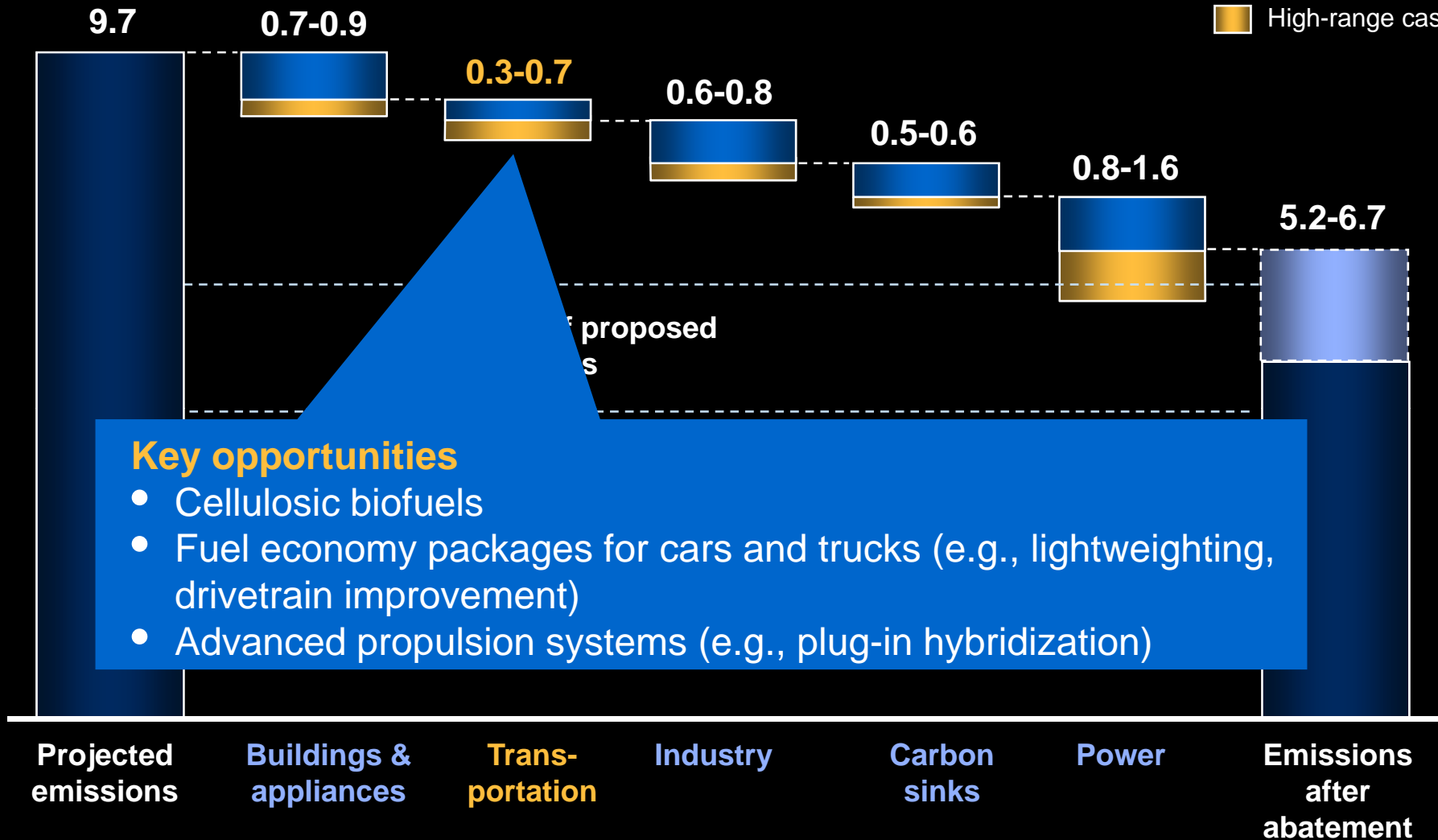
Key opportunities

- Advanced lighting (e.g., CFL, LED, super T8 fluorescents)
- Electronic equipment (e.g., consumer electronics, computers)
- Combined building shell (e.g., insulation, reflective roof-coatings) plus HVAC equipment

Key abatement opportunities: Transportation

Gigatons CO₂e, options less than \$50 per ton CO₂e

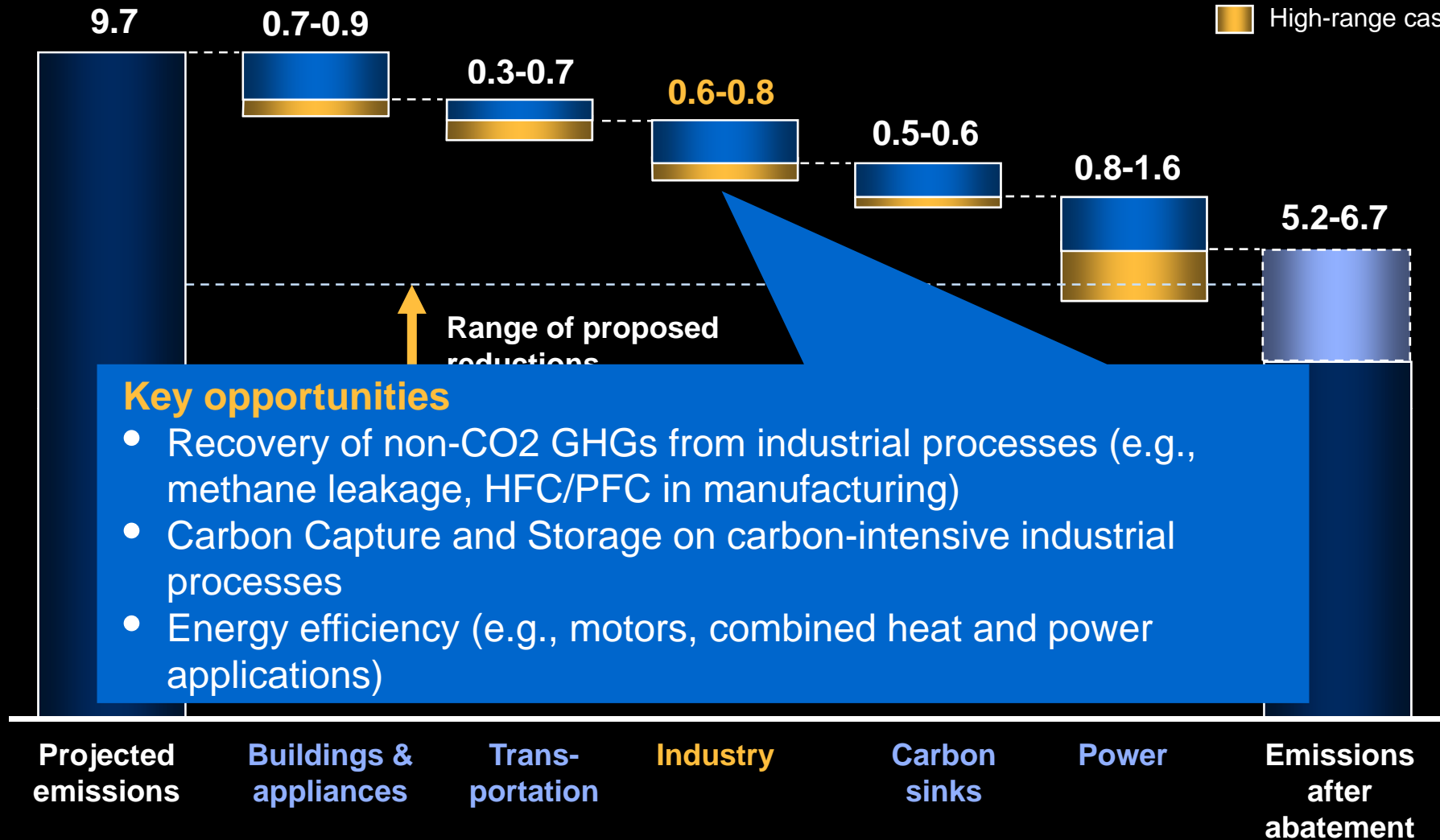
Mid-range case
High-range case



Key abatement opportunities: Industry

Gigatons CO₂e, options less than \$50 per ton CO₂e

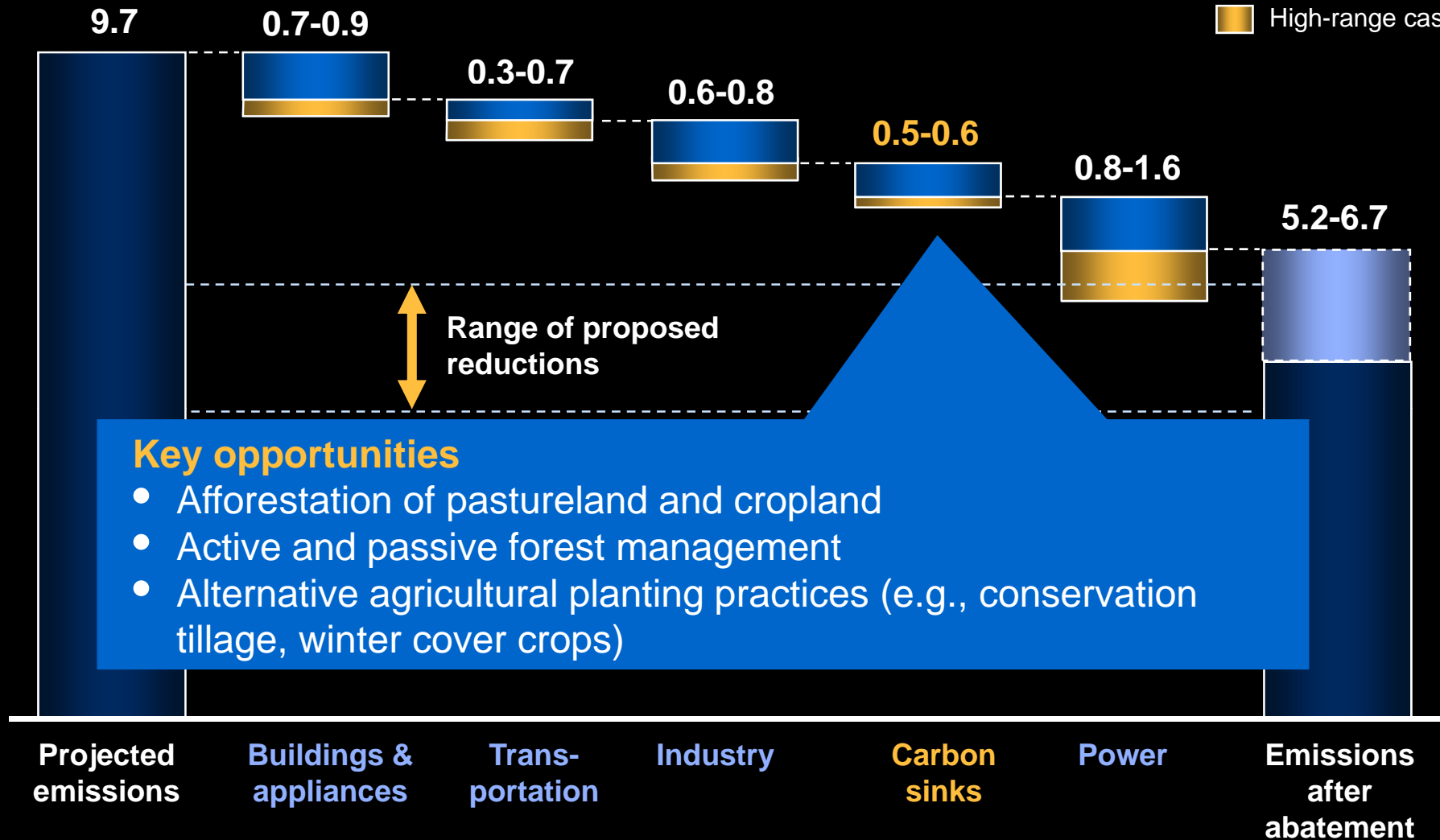
Mid-range case
High-range case



Key abatement opportunities: Carbon sinks

Gigatons CO₂e, options less than \$50 per ton CO₂e

Mid-range case
High-range case

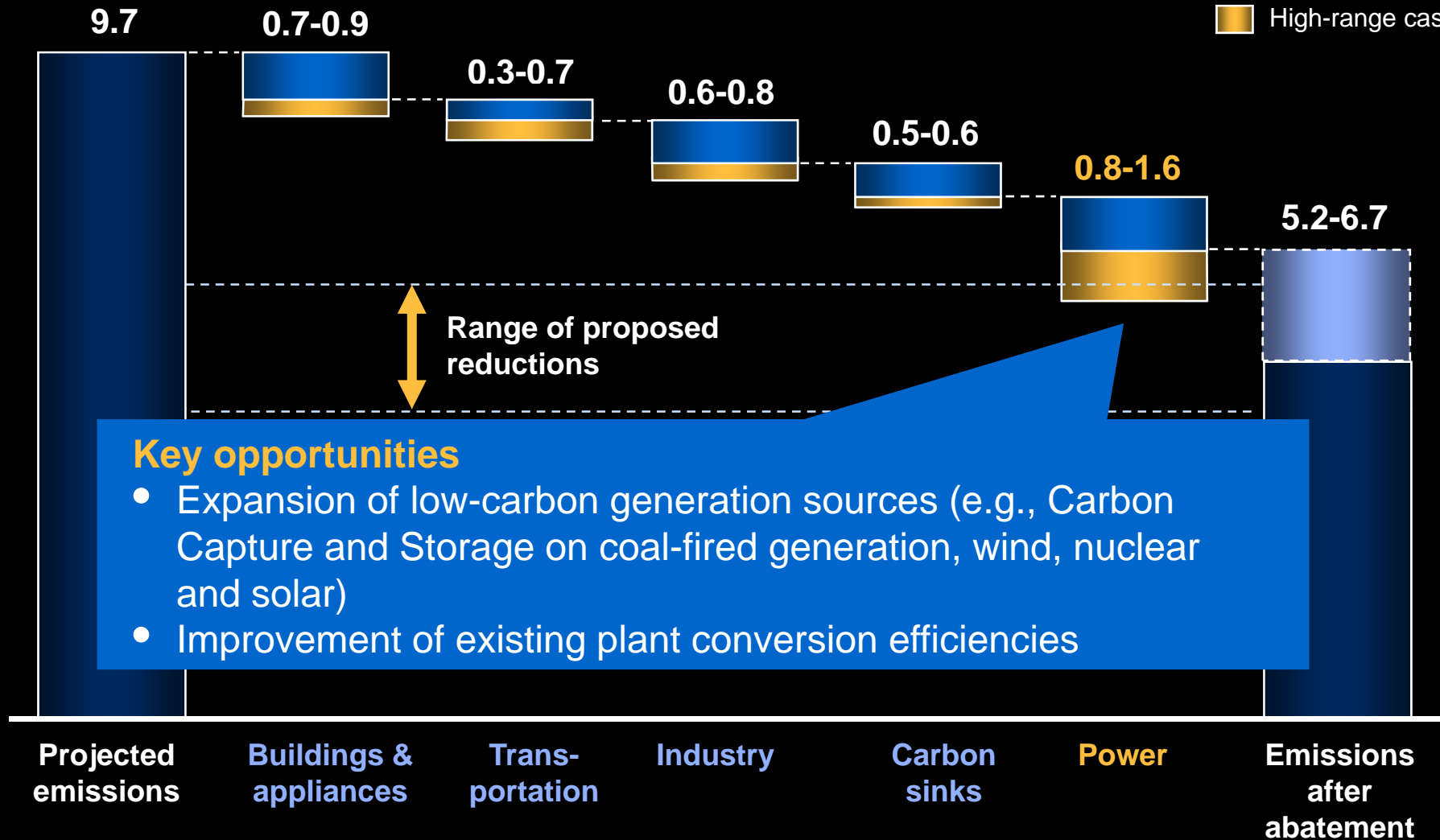


Key abatement opportunities:

Power

Gigatons CO₂e, options less than \$50 per ton CO₂e

Mid-range case
High-range case



Key opportunities

- Expansion of low-carbon generation sources (e.g., Carbon Capture and Storage on coal-fired generation, wind, nuclear and solar)
- Improvement of existing plant conversion efficiencies

Some economic benefits of moving to a low carbon economy

- **Many existing industries will boom (e.g., ESCOs)**
- **New industries/businesses will form, providing more jobs**
- **Energy efficiency in buildings and vehicles will benefit consumers' wallets**
- **Energy efficiency will reduce peak power demand, moderating energy prices/reducing capital needs**
- **Renewable energy businesses (wind, biomass) will benefit rural areas**