

## Assessment of Low-Carbon Technologies for the Chinese Urban Residential Sector

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### Introduction

Since 1990, China’s economy has grown fourfold, especially in the residential building sector, improvements in living standards have caused a high growth of household related CO<sub>2</sub> emissions. To cope with this issue, it is necessary to promote efficiency policies.

In this study we use a techno-economic approach to examine the technological feasibility of CO<sub>2</sub> emission reductions in 31 Chinese administrative divisions. We also perform a detailed analysis on cost-effectiveness of low-carbon technologies.

### Methodology

We first use a 3-step model to simulate the demand for final energy based on future trends in a variety of factors.

Figure 1 illustrates the general modeling process.

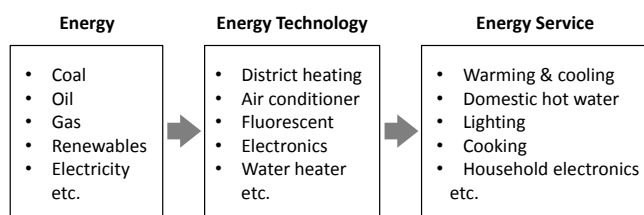


Figure 1 Modelization of household energy system

Estimates of future energy demand are used as inputs of AIM/Enduse model. The model selects technologies by linear programming algorithms that minimize the total system cost. Table 1 shows a partial list of low-carbon technologies that are included in AIM/Enduse model.

### Results

Figure 2 and 3 show results of CO<sub>2</sub> emission and

marginal abatement cost respectively. It appears that efficiency technologies will bring CO<sub>2</sub> emission reduction and financial profits (negative abatement cost).

Table 1 Technology options (partial)

	Initial Investment Cost	Payback Time
Thermal retrofitting	30,100 USD per toe	30 years
High-efficiency air-conditioner	17,300 USD per toe	15 years
High-efficiency Water heater (NG)	16,400 USD per toe	15 years
Electric range	32,000 USD per toe	15 years
LED	1,100 USD per toe	10 years
High-efficiency refrigerator	39,800 USD per toe	10 years

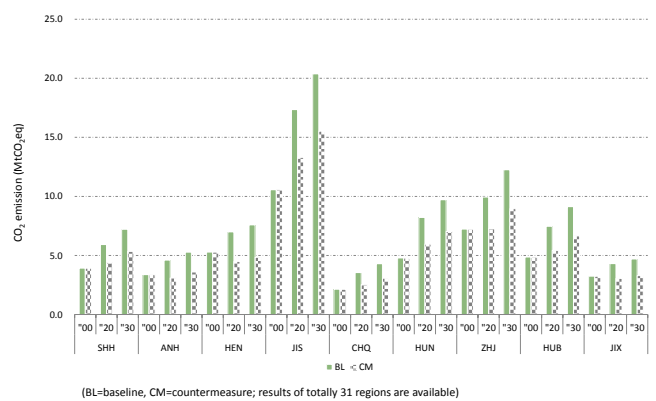


Figure 2 CO<sub>2</sub> emission prediction of 9 eastern regions

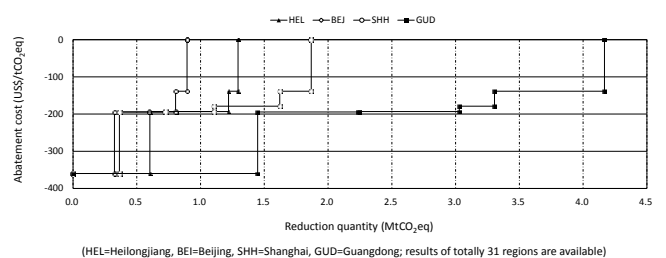


Figure 3 MAC curve (countermeasure scenario, 2030)