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## Book of Abstracts

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**Comparison of two Methods for Finding Least Cost Solutions for Heat Saving and Heat Supply**

*Richard Büchele*, TU Wien, Energy Economics Group, Gusshausstrasse 25-29, A-1040 Vienna*
*Phone +43 1 58801 370368, E-mail: buechele@eeg.tuwien.ac.at,*
*Marcus Hummel, Lukas Kranzl, Andreas Müller, TU Wien, Energy Economics Group*
*Marie Münster, Stefan Petrovic, Sara Ben Amer, DTU*

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## Overview

Energy demand in buildings contributes with a large share to the total final energy demand. Existing buildings are known to provide a remarkable potential for energy savings. In this context two important questions arise: 1) which heat savings in the building stock can be reached at which costs?, and 2) what could be the optimal combination of heat savings and the supply of heat by individual heating systems or district heating? Cost curves for heat savings and for heat supply can contribute to find answers to these questions by linking heat saving costs and potentials with heat supply costs and potentials. However, there are different ways to determine and use heat saving and supply cost curves. In this paper two methods to determine the cost-optimal amount of savings versus supply via heat saving and supply cost curves are compared. In Method 1 a heat saving cost curve is developed containing selected possible renovation options and then compared with a heat supply cost curve in order to find an optimal mix between saving and supply for each building in a given building stock. In contrast, in Method 2 a combined heat saving cost curve for savings via renovation measures and change in heating systems is developed, choosing the least cost option for each building to be reflected in the resulting cost curve.

## Method

The comparison of two different methods to derive cost optimal levels of savings in currently existing buildings is made for two different municipalities in Europe. The stock of buildings is structured in different building classes and building segments (Building classes are building categories like single family house, multi-family house, office buildings etc. with different construction periods and different renovation states leading to different useful energy demands; Building segments are building classes with different heating systems). In Method 1, first heat saving cost curves as well as heat supply cost curves on the basis of annualized costs for the different building classes in the stock are derived. From both curves the cheapest saving and supply options are chosen in order to meet the existing demand, thereby valuing savings as a form of supply. In Method 2 for each building segment the costs of all possible combinations of renovation measures and changes in supply technologies are calculated and compared to the resulting energy saving on the basis of net levelized costs of heat savings. For each building segment then the cheapest combination is chosen to be reflected in the resulting cost curve for the overall building stock. The calculations with both methods thereby are performed underlying the same input data regarding costs, saving options and performance of heating systems. For each of the methods the resulting savings in useful and final energy demand compared to the actual state are calculated and compared, as well as the mix of supply technologies in the resulting cost optimal solutions.

## Results

The main differences between both methods is the indicator for the comparison of energy savings and supply (useful vs. final demand) and the combined vs. separated calculation of costs of savings and supply. It is expected that this leads to slight differences in the resulting optimal levels of savings and changes in heating systems. Also the visualization in form of cost curves is different in both methods: in method 1 cost curves for all different classes of buildings are derived, thus allowing an easy visualization of the resulting least cost combinations for each building; in method 2 one cost curve is derived allowing for an easy visualization of the costs and overall savings of the least cost combinations of savings and supply options for all buildings.

A detailed analysis and discussion of the difference in the results for both methods will be presented in the full paper.