EuroSciCon

3rd World Summit on

Climate Change and Global Warming

February 27-28, 2019
Prague, Czech Republic

S Kozarcanin et al., Expert Opin Environ Biol 2019, Volume: 8
DOI: 10.4172/2325-9655-C1-044

# END-OF-CENTURY CLIMATE IMPACTS ON THE COST-OPTIMAL DECISION OF DECENTRALIZED HEATING TECHNOLOGIES IN EUROPE

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**Today, it is well accepted that energy related CO2-emission is a key driver in global warming. In fact, the production of electricity and heating alone in the EU27 in 2015 was accounted for approximately 30% of the total CO2-emission. Political and regulatory actions have had, so far, a key role in pursuing clean options for heat generation. In this talk, we adapt a technical standpoint and assess the impact of climate change on the cost optimal generation of heat. Reconstructed CO2-concentration pathways, RCP, provided by the Intergovernmental Panel on Climate Change, IPCC, are applied to simulate various climatic conditions for the 21st century. Nine climate models provide temperature data with a spatial and temporal resolution of 12x12 km and 3h, respectively, based on the RCPs. We model the demand side by calculating the heat load factors at each grid location. The supply side is modelled by a simple approach to the economics of heat generation. We find that $CO_2$-emission from space heating decrease by at most 5% in low and intermediate concentrations pathways. This value reaches 10% for an extreme concentration pathway. For the historical period, we find that countries that are dominated by the cold Atlantic climate unveil high heat load factors. Mediterranean countries show a similar behaviour, reasoned by a high ratio between the hot water and space heat demand. In both cases, heat pumps serve as a cost optimal option of heat generation. Mainland European countries show a low heat load factor for which gas boilers serve as a cost optimal choice of heat generation. Increasing ambient temperatures toward the end-century force an increasing penetration of heat pumps in all concentration pathways.**

## Biography

Smail Kozarcanin is a PhD Fellow at the Renewable Energy and Thermodynamics group, Aarhus University, Denmark. His expertise is on the impact of climate change on highly renewable-dominated large-scale electricity systems. During the last year, his focus has turned towards the heating sector. Currently, his main research area is the impact of climate change on large-scale electricity and heating coupled energy systems.

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