Influence of emerging technologies deployment in residential built stock on electric energy cost and grid load

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Objectives

- Estimate the likely penetration levels of EV and PV, DHW storage, SWH systems in one residential built stock typology semi-detached house;
- Evaluate the resulting changes in power grid interaction;
- Compare the associated cost of energy under the various pricing models.



Seed model identification



Stochastic process of building's evolution



TAR = 0.07, uniform PMF for technologies



Seed model extension





(One) likely future state of built stock



TAR = 0.07, uniform PMF for technologies, 1000 units



1001 load duration curves at a built stock level



TAR = normal PDF ($\mu = 0.05, \sigma = 0.015$) , uniform PMF for technologies, 1000 units, 1000 iterations



Cost of energy at the built stock level



TAR = normal PDF ($\mu = 0.05, \sigma = 0.015$) , uniform PMF for technologies, 1000 units, 1000 iterations



Limitations



An account for other technologies and their variations?

A justified choice of PDF for TAR and PMF for technologies is needed.



Estimating the contribution of other typologies?



Conclusions

- Proposed methodology combines statistical inference, detailed building energy performance simulation and stochastic modelling;
- With the technologies considered, peak load is expected to decrease by 1 13%, peak feed-in can reach up to 40%;
- Time-of-use tariff is best so far (from consumer's standpoint).

