Fernando Figueroa Ortega

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Personal information:

Fernando considers that an Industrial Ecologist (IE) must be a professional capable of understanding quickly complex problems with a systemic and multidisciplinary approach. Besides building knowledge, the IE also develops a broad range of skills over his/her career.

Over the last year Fernando has worked on projects related with the transitions towards cleaner energy systems, particularly those that involve the use of natural gas. The first project explored the diversity of stakeholder perspectives for future scenarios of the gas sector in the Netherlands with the use of participatory methods (Q Methodology). His thesis project explored the evolution of novel residential heating technologies, evaluating their costs and performance, with a Dutch household as baseline. The thesis also examined supporting policies and the context of residential energy use in the Netherlands. Fernando graduated from the University of Leiden and the Delft University of Technology, spending his first MIND year in Graz, Austria. Besides Industrial Ecology, he holds a MSc. Degree in Environmental Science and Engineering from King Abdullah University of Science and Technology (KAUST, Saudi Arabia) and a degree in Industrial and Systems Engineering by Monterrey Institute of Technology and Higher Education (ITESM, Mexico).

Title of thesis: Technology Life Cycles for foresight of performance and price development in residential heating and cogeneration technologies: the EcoGenie House study

Abstract:

Households are large consumers of energy in Europe, particularly for space heating. A step towards more sustainable households is to increase the energy efficiency and the utilization rate of primary energy. The major area for improvement is within the refurbishment of existing households.

This thesis analyzes the opportunity space for a home energy system that combines different energy sources, cogeneration, heat storage and weather forecasts, covering the house heat demand at the lowest cost possible. Since such technologies were recently introduced into the market, their costs are higher than the widespread technologies.

The concept of technology s-curves is used as foresight tool to evaluate the evolution in costs and performance of the technologies used in the prototype. A model was created to evaluate if the evolutionary changes will be sufficient to render the system economically feasible under several scenarios for energy prices and government support.

The results suggest the prototype is economically feasible only after some price reductions are achieved in the involved technologies. The scenarios for government support draw up some possible mechanisms to accelerate economic feasibility and therefore market uptake. In all scenarios the value of the investment increases with price reductions, but upfront costs remain as the major barrier for the uptake of such technologies.