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Research Article

Potential Economic Impact of LENR Technology in Energy Markets

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Abstract

There has been a huge discussion about the technology of Low Energy Nuclear Reaction (LENR) devices. Some of the common assumptions about this technology discuss the projected major transformation of our present society in points of infrastructure, cost of power and power storage, but a clear economic impact simulation in a business plan systematic review manner with different parameters and scenarios is still missing. The question is how will the lives of people be affected by LENR and how will power industry adapt the potential huge changes in infrastructure and cost of power. There is no doubt that access to LENR will change the lives of average citizens for that matter. The here described model is a monte-carlo simulation scenario model to find a proposed business and socio-economic value of the LENR technology as impact on current infrastructure, economy and citizens of a given country. The simulation is a good tool for pricing discussions, price modeling and predictive modeling on the technology impact. The validation of the model over common mechanisms is work-in-progress.
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1. Introduction

Simulation Models are a good way to calculate the impact of a technology. For the calculation there are different ways to model simulations. Modeling simulations classically needs 4 different categories of validations to determine simulation accuracy. In detail:

(1) Face validation which means plausibility check with experts groups in interdisciplinary workshops and different expert interviews in the field

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(2) Internal validation which means the reproducibility of results with different methods and cross over validation with other models
(3) Predictive value validation of the simulation, which means the ability of the simulation to predict outcomes in a simulated pre-post comparison with real data and a fictive future, and
(4) The pure plausibility and mathematical validation, which means the validation of the model in terms of pure technical correct functionality

The here described simulation model was developed following the methodology of FDA approved health care simulations and adopts different scenarios for the German energy market. It includes a part simulating the gross economic and business value simulation, a part on the simulation of the socio-economic impact for the single households and a geographical simulation to project the impact on different geographical regions in Germany. In this paper only a rough overview of meta-results is given and the broad geographical and detailed result distribution is kept out, as of too much data and detail validation still being in progress.

The validation of the simulation is still in progress, as different expert interviews are conducted and the different validation methods are in progress.

2. Technical Work Preparation

The adopted simulation was programmed in common tools using Microsoft Office and .NET Technology / Microsoft Maps and is able to project effects of LENR on different countries.

The simulation was done with the example country of Germany but can also be projected over common parameters to any other country.

2.1. Input parameters of the simulation and computation

The Input Parameters of the simulation are:

(1) The Present Value of the Countries Power Infrastructure with fixed rate for yearly maintenance.
(2) The Cost of Energy for the average family and number of families in the country for heating and other scenario purposes.
(3) Cost of the LENR Device with consumption and maintenance.

The simulation is then able to compute different scenarios with different assumptions on the possibility of the break down of power infrastructure and different scenarios of LENR use just for heating and/or for all other purposes like power generation and other energy purposes.

The saved money is then distributed over the available income of the population and generates local spill-over effects on the economics of the given country.

The economics effect is then computed as a increase in QALCs (Quality adjusted Lifetime Consumptions) of the average family.

The model further assumes, that the work force freed in the power industry is completely absorbed in other or the new LENR market and will be neutral for the economy.

2.2. Data sources for the simulation

The simulation input parameters were pulled from the German statistical database Destatis. This paper cites only the major data sources used for the model and skips the detailed geographical statistical data, that was gathered in an individual tailored analysis requested from the German Statistical Bureau.

Table 1. Present value of German energy infrastructure

No.	Type of energy	p.a.Investments in MIO Euro	Investment multiple for infrastructure value	Value of infrastructure in billion Euros
1	Electricity	8.279	24.3	201.2
2	Gas	1.280	22.6	29
3	Warm/Cold Supply	325	19.5	6.3

In detail three main data sets were used for the basic simulation model. Using the Hoppenstedt data source [1], a set of different financial statements of the different participants of the power industry was analyzed and a consistent assumption on the value of the power infrastructure was done. The meta assumption is pictured in Table 1.

The validation of the data and the computation of the multiples was done with additional data from Destatis/Section of Energy Infrastructure Investments [2].

3. Results of the Simulation

Overall the simulation was used to determine the business value of a LENR unit being installed in a normal household with 2 or more persons being able to perform the complete heating and power resource supply and to do only the heating supply for the household.

For simplicity reasons only these two scenarios are plotted here in Table 2. The source data of the simulation would also allow the modeling of other scenarios including industry power consumption and different gradations of power equivalents for power/heating substitution by LENR.

Additionally we tried to calculate a substrate of wealth being distributed over the population. Therefore it was assumed that all workforce finds a new allocation in the German System and the cost of power can be reduced by 43%, as the value of LENR systems will not fully translate into pricing.

Following this model, the wealth of a typical German household would increase by 6.1% in the full substitution model and by 2.2% in the heating substitution model, which would both mean a significant increase and acknowledgeable increase in value of life for each single household.

4. Conclusions And Discussion

The programmed simulation is able to compute different scenarios with different assumptions on the possibility of the break down of power infrastructure and different scenarios of LENR use just for heating and/or for all other purposes.

We were able to do a simple cross-check with common methods of simulation validation, but further evaluation of the model is needed. The geographical sub-simulation turned out not be of too much value, as the meta-data is sufficient for a gross evaluation oft he technology.

Overall the first results of the simulation show promising results as for the big business and social-economic value of the technology.

Table 2. Output parameters of the simulation - extract

No.	Parameter name	Value (in Euros)	Comment
1	Value of a LENR device for private house hold for power and heating substitution	52. 632	Total cost of ownership value for a lifetime of 10years including consumption and maintenance of the device
2	Value of a LENR device for private household for heating substitution	18.421	Total cost of ownership value for a lifetime of 10 years including consumption and maintenance of the device

The model assumes, that production oft he technology is cheaper then the value generated and saved money is then distributed into the available income of the population and generates local spill-over effects on the economics of the given country. The model needs further cross-validation and also a business-calculation fort he cost of distribution and manufacturing oft he LENR technology. Therefore, the flexible simulation model is an ideal basis for performing target costing and pricing simulations in the field of LENR technology.

Acknowledgment

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References

[1] www.bilanzen.de data source of Hoppenstedt company informations “Hoppenstedt Firmeninformationen GmbH Havelstrasse 9 in 64295 Darmstadt, Postfach 10 01 39 in Germany visited online on April 25^{th} in the year 2012.

[2] Destatis German statistical data driven taken from the web https://www.destatis.de/DE/ZahlenFakten/Wirtschaftsbereiche/Energie/BeschaeftigteUmsatzInvestitionen/Tabellen/K SEDaten.html visited online on April 25, 2012