

# Energy modeling in Estonia in cooperation with Estonian TSO Elering

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27.01.2016

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- Introduction
- Cooperation and modelling in Estonia
- Model development
- New challenges and Flex4RES Nordic Energy Research Project



# TUT - Introduction

- Tallinn University of Technology
- My position: PhD student and a Junior Researcher at the department of Electrical Power engineering
  - Worked in the university since 2013



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# Elering - introduction

- Estonian TSO for electricity and gas
- Started operating as an independent TSO in 2010
- Started using the Balmorel model in Estonia
- Very open and innovative ideas about energy markets





# Baltimore electricity market model

- Baltimore is a model for analysing the electricity and combined heat and power sectors in an international perspective
- Countries around the Baltic sea region are included
- Open-source
- Possible to develop new modules, improve the model
- „There are no Baltimore users, only experts.“



# Investing in competence

- Why?
  - Increase competence in Estonia
  - Use the model in various analysis
- How so far?
  - Elering internship programme
  - Elering scholarship programme
  - Mutual cooperation agreement



# Mutual cooperation agreement

- The agreement set specific goals for model development and competence increasing in Estonia
- Among other agreements it was decided that:
  - Elering shares a model version to TUT
  - TUT starts teaching courses on Balmorel



# Partnership in public modelling

- Extensive modelling was performed with Balmorel in the process of developing the Estonian Long Term Energy Strategy
- The model was created and the first modelling runs done by EA Energy Analysis consulting
- The final modelling was done by TUT and Elering as cooperation project



# Model development

- Model development has been taking place and multiple new functionalities have been developed
  - Production and transmission unit maintenance planner module
  - Hydro module prototype
  - A flow-based capacity allocation module
  - DSM functionality
  - Numerous small improvements over the time
- Constant data renewal process



# The flow-based capacity allocation module

- Flow-based methodology already implemented in Central-Western Europe
- Elering found it necessary to evaluate the feasibility of implementing of the flow-based methodology in the Baltic countries
- A fully functional Flow-based capacity allocation module was developed with region-specific features
- Interesting challenges related to modelling Russia



# Using Balmorel in new problems

- Socio-economic impact of large scale implementation of electricity vehicles in the system
  - Impact on electricity market, security of supply etc
- Impact of DSM on the security of supply in Estonia
- Integration of new VRE in the power system



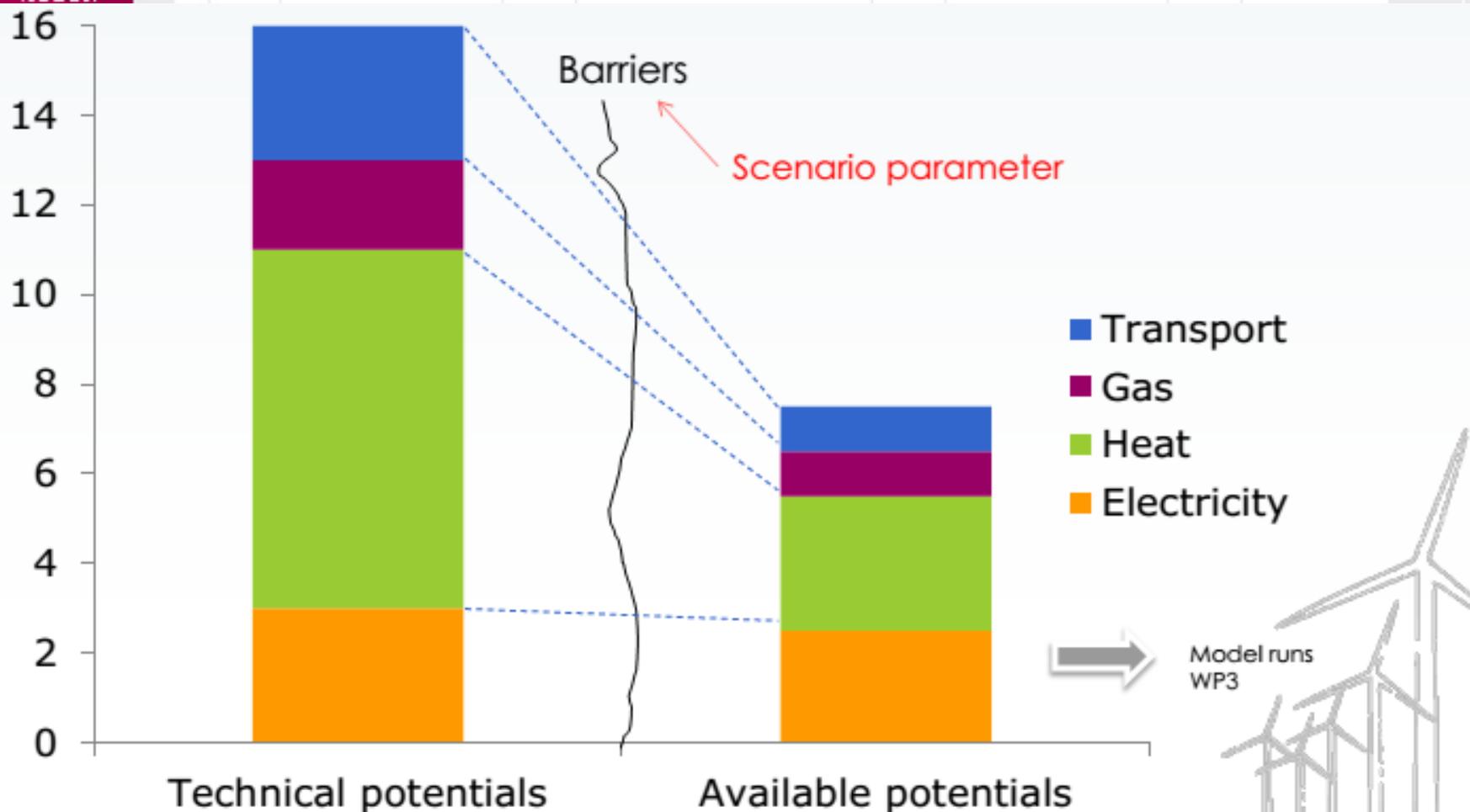
# Flex4RES

Flexible Nordic Energy Systems

- Flex4RES is an ambitious Nordic Energy Research Project, that aims to investigate the possibilities to increase flexibility in the energy system to integrate renewable energy to electricity system
- TUT participating in the Project as a partner, Elering as a member of the advisory board

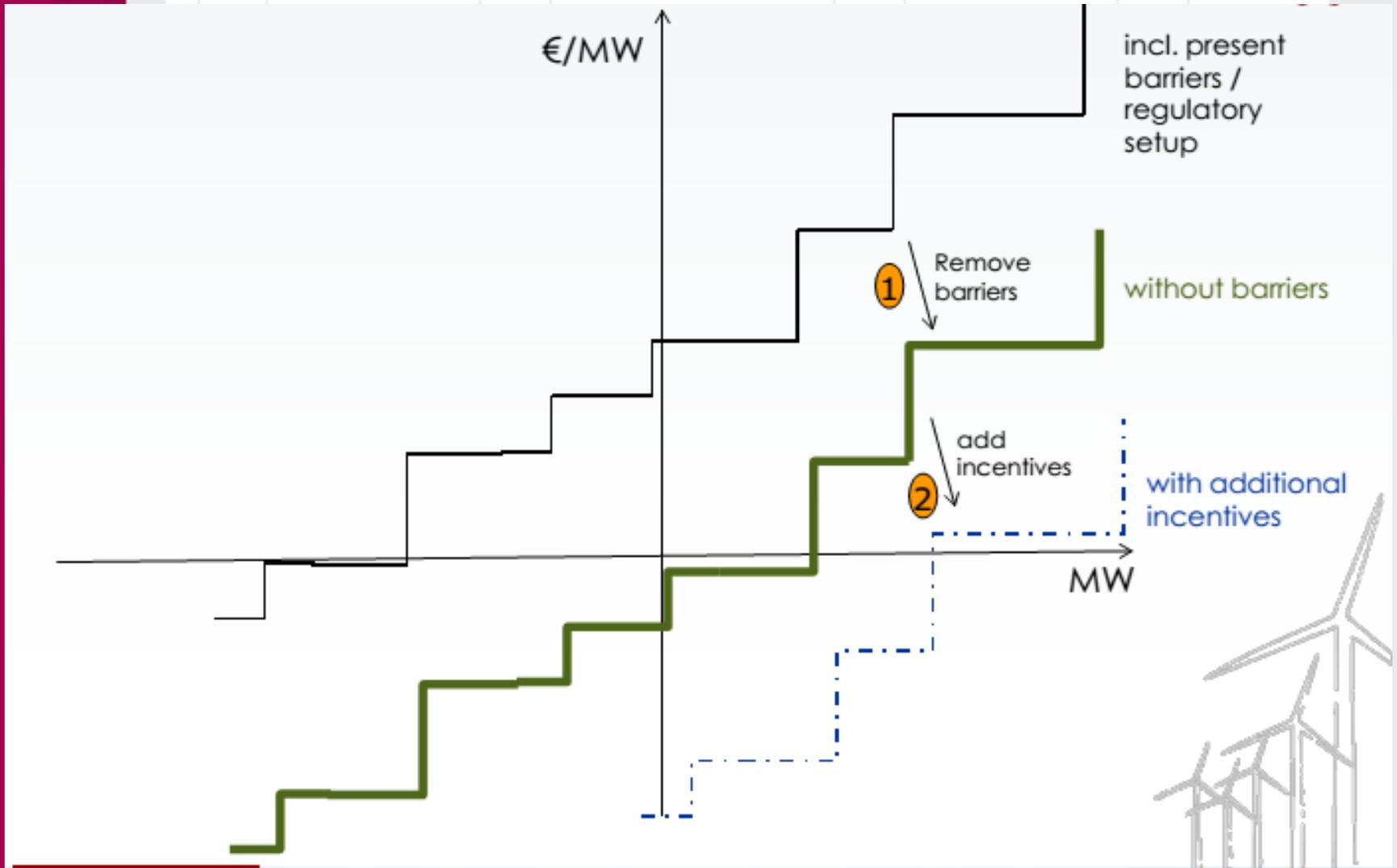


# Flex4RES – identifying barriers





# Flex4RES – removing barriers





# Flex4RES

- The Flex4RES project offers excellent opportunities to invest in model development and competence
- Extensive model renewal planned – both in data and functionality
- How to change the largely inflexible Estonian energy system into a flexible one to meet the new challenges of VRE



# Conclusion

- Elering has invested greatly in Balmorel competence
- The model has already been improved in many aspects, and work continues with increasing pace
- Balmorel used in increasing number of different analysis – constant use and improvement of the model



Thank you for your attention!