Analysis of the European energy system
under the aspects of flexibility and technological progress

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Deliverable

D7.5: Final Stakeholder Workshop / Closing Event

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Reviewer(s):	Andrea Herbst (ISI)

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Document history

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0.1	06.05.2019	Steffi Schreiber	Initial version, sent to reviewers
0.2	07.05.2019	Steffi Schreiber	Initial version after internal review
1.0	07.05.2019	Steffi Schreiber	Final version after review

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1. Short Description of the Closing Event

1.1 Workshop Planning

The Final Stakeholder Workshop and Closing Event was organized to present on discuss the results of the REFLEX project to the European Commission and other interested stakeholders from policy and industry. The communication of the projects achievements to interested stakeholders included insights regarding the scenario framework, the implementation of experience curves, the model-based sector-specific analysis, the LCA results as well as policy recommendations. The workshop was hold on April 3rd, 2019 from 13:00 to 19:00 and took place in the Saxony Liaison Office Brussels in Brussels, Belgium.

Invitations to the workshop were distributed by email to contacts of all REFLEX partners, and were sent to researchers in the fields of experience curves, energy modelling and environmental assessment. Furthermore, personal contacts from various stakeholder groups (business, policy) were invited. The invitation that was sent to the intended participants is shown in Figure 1. When registrations were closed, over 40 people had registered for the workshop. Final attendance of the workshop was about 29 persons, of which 10 participants were from external organisations.

The workshop consisted of three keynote speeches and eight REFLEX specific presentations including welcome and wrap-up. The results of REFLEX were presented as joint presentations between the REFLEX partners with focus on the sector specific model results. The agenda is shown in section 3. On the evening a reception was organised to encourage networking.

1.2 Proceedings

The workshop started with a presentation by Dominik Möst (TU Dresden) welcoming the participants and introducing the REFLEX project's organization and overall goals. Furthermore, he presented the REFLEX scenario framework as well as general assumptions which are influencing all models outcomes.

After the introductory presentation the first keynote speech was held by Dr. Andreas Zucker (DG ENER, European Commission) about "A Clean Planet for all - A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy". He talked about the vision of the European Commission for a "Clean Planet" and corresponding scenario analysis.

This presentation was followed by the presentation of Dr. Atse Louwen (Utrecht University) about "Technological learning in energy modelling" with insights on the implementation of experience curves in energy models in general and with particular focus on the REFLEX project. Stephanie Heitel (Fraunhofer ISI) further contributed with her presentation on the model outcomes regarding transport sector ("Decarbonisation of the transport sector considering global learning and flexibility potential for the electricity system"). Dr. Andrea Herbst (Fraunhofer ISI) and Dr. Ulrich Reiter (TEP Energy GmbH) discussed results regarding "The future energy demand developments and demand side flexibility in a sector coupled energy system", during which the measures required to achieve decarbonisation

goals in the energy demand sectors were presented, particularly for the industry and tertiary sector.

In the second keynote speech Dr. Kátrin Schweren (tiko Energy Solutions AG) talked about the application and technical realization of demand side management in practice, based on the work at tiko Energy Solutions AG.

Steffi Schreiber (TU Dresden) followed with her presentation about the results regarding "The optimal combination of flexibility options in the European electricity and heat sector". She talked particularly about cross-sectoral results on flexible technology mixes, as well as about detailed outcomes for the electricity and district heating market. Christoph Fraunholz (KIT-IIP) hold his presentation presenting the results regarding "Investments in flexibility options under different electricity market designs". He compared the optimal flexibility provision in an energy-only-market with national and international capacity mechanisms. Maryegli Fuss (KIT-ITAS) presented the assessment of the environmental and societal impacts of a future decentral and central European energy system.

After this, the third keynote speech was held by Prof. Dr. Thierry Coosemans (Director EVERGi at MOBI). He talked about local energy systems and his experience with real-life test beds.

Finally Prof. Dominik Möst wrapped-up the workshop by presenting key policy recommendations and by summarising the presented REFLEX results, before closing of the workshop.

1.3 WORKSHOP OUTCOMES

The workshop succeeded in summarising and communicating the achievements of the REFLEX project in a joined and consistent manner. The audience had insights in the efforts resulting in the outcomes presented. Each of the presentations was followed (and alternated) by open discussions with the participants. The combination of research fields experience curves, energy system modelling and Life Cycle Assessment (LCA) together with the harmonized model coupling represents the state-of-the-art research on multi-coupled international energy systems. Key topics dealt with the policy recommendation the project team can derive from the holistic model couplings.

Regarding the introduction to REFLEX project by Dominik Möst key issues related to the need for model-based insights for the energy system transformation were presented. Details of the scenario framework and storylines were discussed and built the basis for the further presentations.

The derivation of the experience curves was of high interest, since future cost developments are very important for researchers dealing with energy system models. Issues regarding the consideration of economy of scales and possible solutions (e.g. multi-factor experience curves) were discussed. Additionally, the data availability was identified as main challenge for the development of experience curves. Furthermore, the trade-off between computational time and the detailed endogenous or exogenous implementation

of experience curves into energy system models was topic of the discussion with the audience.

Regarding the transport sector three main strategies were identified and discussed with the audience, which are required decrease emissions in this sector. These measures are a shift to more efficient transport modes, diffusion of low/zero-emission technologies as well as the use of alternative fuels. Key challenges were identified concerning the future battery capacities of batter electric vehicles and the origin of the synthetic fuels (biomass and hydrogen).

During the presentation and discussion about the results of further energy demand sectors the role of energy efficiency to decouple energy demand and resource use was identified as crucial. Focus was also led on the required incentives and acceptance of particularly households to apply new energy technologies (e.g. power-to-x, demand-side-management), but also to adapt energy efficient lifestyles.

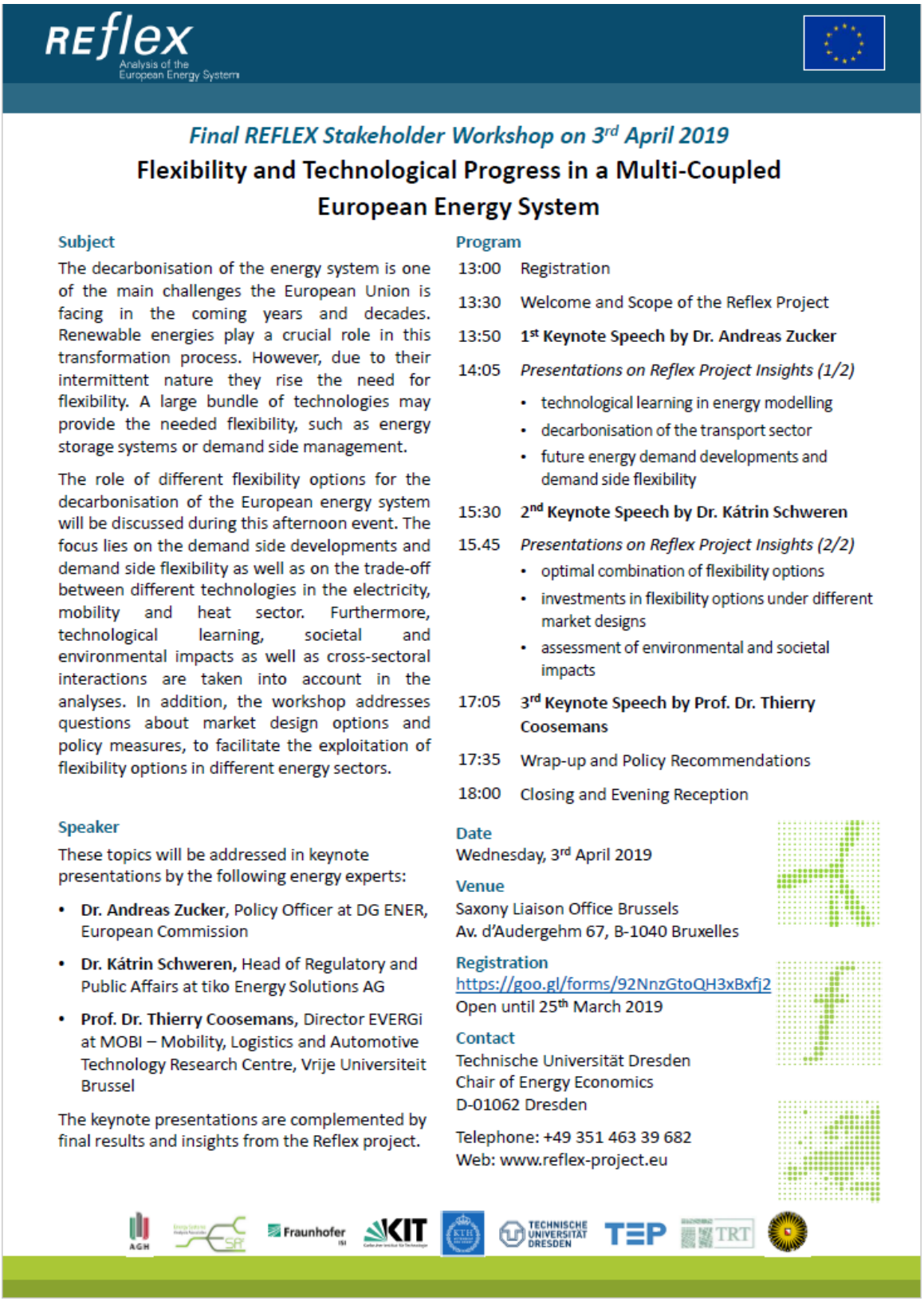
The residual conventional capacities in the optimal mix of flexibility options were key discussion points for the results in the electricity market. The presented sensitivities with higher renewable energy shares showed the decreasing generation based on fossil fuels. Nevertheless, dispatchable back-up capacities are still required within the REFLEX scenario framework. Feedback with the audience identified similar results in comparable studies. Concerning the modelling of different market options, key issued were discussed regarding the implementation of investment decisions and the influence of model-endogenous iterations on the computational time.

Furthermore, the audience showed great interest in the results regarding the environmental and societal impacts of the energy system transformation. The implementation and combination of these methods with energy system models was identified as very important to cover future challenges in a holistic approach.

By bringing together researchers and experts from the fields of experience curves and energy modelling, interesting state-of-the-art presentations, and fruitful and helpful discussions were held. Many participants were very positive of the workshop contents and outcomes. Large interest was raised by the announcement to publish a book combining the REFLEX results in a joined contribution volume. The presentations of the workshop are made available on the REFLEX project website (http://reflex-project.eu/public/).

2. INVITATION

The invitation (2nd version) emailed to the target group is shown in the following Figure 1.



REflex
Analysis of the European Energy System

Final REFLEX Stakeholder Workshop on 3rd April 2019

Flexibility and Technological Progress in a Multi-Coupled European Energy System

Subject

The decarbonisation of the energy system is one of the main challenges the European Union is facing in the coming years and decades. Renewable energies play a crucial role in this transformation process. However, due to their intermittent nature they rise the need for flexibility. A large bundle of technologies may provide the needed flexibility, such as energy storage systems or demand side management.

The role of different flexibility options for the decarbonisation of the European energy system will be discussed during this afternoon event. The focus lies on the demand side developments and demand side flexibility as well as on the trade-off between different technologies in the electricity, mobility and heat sector. Furthermore, technological learning, societal and environmental impacts as well as cross-sectoral interactions are taken into account in the analyses. In addition, the workshop addresses questions about market design options and policy measures, to facilitate the exploitation of flexibility options in different energy sectors.

Speaker

These topics will be addressed in keynote presentations by the following energy experts:

- **Dr. Andreas Zucker**, Policy Officer at DG ENER, European Commission
- **Dr. Kátrin Schweren,** Head of Regulatory and Public Affairs at tiko Energy Solutions AG
- **Prof. Dr. Thierry Coosemans,** Director EVERGi at MOBI – Mobility, Logistics and Automotive Technology Research Centre, Vrije Universiteit Brussel

The keynote presentations are complemented by final results and insights from the Reflex project.

Program

13:00 Registration

13:30 Welcome and Scope of the Reflex Project

13:50 **1st Keynote Speech by Dr. Andreas Zucker**

14:05 *Presentations on Reflex Project Insights (1/2)*

- technological learning in energy modelling
- decarbonisation of the transport sector
- future energy demand developments and demand side flexibility

15:30 **2nd Keynote Speech by Dr. Kátrin Schweren**

15.45 *Presentations on Reflex Project Insights (2/2)*

- optimal combination of flexibility options
- investments in flexibility options under different market designs
- assessment of environmental and societal impacts

17:05 **3rd Keynote Speech by Prof. Dr. Thierry Coosemans**

17:35 Wrap-up and Policy Recommendations

18:00 Closing and Evening Reception

Date
Wednesday, 3rd April 2019

Venue
Saxony Liaison Office Brussels
Av. d'Audergehm 67, B-1040 Bruxelles

Registration
https://goo.gl/forms/92NnzGtoQH3xBxfj2
Open until 25th March 2019

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AGH · Fraunhofer ISI · KIT · KTH · Technische Universität Dresden · TEP · TRT

Figure 1: Invitation for the Stakeholder Workshop sent to the target group

3. AGENDA OF THE EVENT

The final agenda is shown in Figure 2 below.

REflex
Analysis of the European Energy System

Final REFLEX Stakeholder Workshop on 3rd April 2019

Flexibility and Technological Progress in a Multi-Coupled European Energy System

Date: 3rd April 2019, 13:00-19:00
Venue: Saxony Liaison Office Brussels, Av. d'Audergehm 67, B-1040 Brussels

from 13:00	Registration
13:30 - 13:50	**Welcome and scope of the Reflex project** *Prof. Dr. Dominik Möst, Project Coordinator, TU Dresden*
13:50 - 14:05	**1st Keynote Speech: A Clean Planet for all - A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy** *Dr. Andreas Zucker, Policy Officer at DG ENER, European Commission*
14:05 - 14:30	**Technological learning in energy modelling – implementation of experience curves** *Dr. Atse Louwen, Researcher at Copernicus Institute for Sustainable Development, Utrecht University*
14:30 - 14:45	Coffee break
14:45 - 15:05	**Decarbonisation of the transport sector considering global learning and flexibility potential for the electricity system** *Stephanie Heitel, Researcher at Fraunhofer Institute for Systems and Innovation*
15:05 - 15:30	**The future energy demand developments and demand side flexibility in a sector coupled energy system** *Dr. Andrea Herbst, Researcher at Fraunhofer Institute for Systems and Innovation and Dr. Ulrich Reiter, Senior Project Manager at TEP Energy GmbH*
15:30 - 15:45	**2nd Keynote Speech: Demand side flexibility in the residential sector – the use case of tiko Energy Solutions** *Dr. Kátrin Schweren, Head of Regulatory and Public Affairs at tiko Energy Solutions AG*
15:45 - 16:15	**The optimal combination of flexibility options in the European electricity and heat sector** *Steffi Schreiber, Researcher at Chair of Energy Economics, TU Dresden*
16:15 - 16:30	Coffee break
16:30 - 16:50	**Investments in flexibility options under different electricity market designs** *Christoph Fraunholz, Researcher at Institute of Industrial Production (IIP), Karlsruhe Institute of Technology*
16:50 - 17:20	**Comparing a future decentral and central European energy system and the assessment of their environmental and societal impacts** *Maryegli Fuss, Researcher at Institute for Technology Assessment and Systems Analysis (ITAS), Karlsruhe Institute of Technology*
17:20 - 17:35	**3rd Keynote Speech: Local energy systems and communities for future mobility concepts: the need for real-life test beds** *Prof. Dr. Thierry Coosemans, Director EVERGi at MOBI – Mobility, Logistics and Automotive Technology Research Centre, Vrije Universiteit Brussel*
17:35 - 18:00	**Wrap-up and policy recommendations regarding the transition to a low-carbon European energy system** *Prof. Dr. Dominik Möst, Project Coordinator, TU Dresden*
18:00 - 19:00	Closing and Evening Reception

Web: http://reflex-project.eu/

Figure 2: Agenda of the Reflex Stakeholder Workshop