Institut für Höhere Studien
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DEFINE: Aim, Scope and Points of Intersection

Presentation at the DEFINE Kickoff Workshop

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Structure of Presentation

1. Aim of DEFINE
2. Scope of DEFINE
3. Work Packages (WPs)
4. Points of Intersection
5. Points for Discussion for Session Seven Tomorrow
6. Timeline of WPs

Aim of DEFINE I

Electromobility is often seen as the solution to combining an individual transportation system with ecologically sustainable development. However, DEFINE will be defined broader, analysing an anticipated change in the mobility paradigm from a fossil fuel-based individual transportation system to one relying on electromobility, public transport and in-between solutions. Thus, DEFINE aims at:

- Estimating and assessing the full economic costs associated with a higher share of electric mobility, taking account of the impact on electricity grids, the provision of electric energy and environmental externalities such as GHGs.
- The development of an evaluation framework, with a hybrid CGE model and two electricity market models as its core, to meet this end.

Aim of DEFINE II

- Models are constructed in a way that allows for mutual inputs between the models (not necessarily a soft link), where results of the one model e.g. enter the other as exogenous (e.g. scenario) parameters.
- Comparable scenarios are simulated in the various models, with different foci and outcomes. Evaluation Framework for Austria and Germany is extended to Poland.
- Integrated, comparative studies on the impact of a large-scale shift to electromobility for Austria, Germany and Poland are the result.
- The environmental impacts (costs and benefits) are quantified according to the outcomes of the modelling framework.
- Policy briefs by various partners and a policy guide (The “Path to Electromobility”) are published at the end of the project.

Scope of DEFINE: Evaluation Framework I

DEFINE is focused on the development of an **evaluation framework** for a higher share of electromobility, the envisaged components of which are:

- A hybrid top-down bottom up CGE model, with a detailed depiction of both the mobility behaviour of households and the electricity sector.
- Two detailed electricity market models, providing a more detailed view on the electricity market, the production of electricity, the electricity grid and electric vehicles as storage devices for electric energy.
- Scenario data on the development of vehicle technology, market potential of of EVs, potential user groups and typical usage patterns, etc., enter the models for simulation purposes.
- Emission reduction potential of electric mobility and the quantification of environmental costs and benefits conclude the evaluation framework.

Scope of DEFINE: Evaluation Framework II

A consumer survey and subsequent micro-estimation for Austria and Poland furthermore provide

- An empirical basis for the CGE model and
- Allow for the construction of detailed micro models (discrete choice models on household level) depicting mode choices and the take-on of electric vehicles by consumers.
- Parameters and outcomes from the micro model can enter the CGE model as exogenous parameters, and vice versa.
- A link between the micro and macro models might be constructed.

Scope of DEFINE: Dissemination to Academic Audience

The academic audience is reached for by

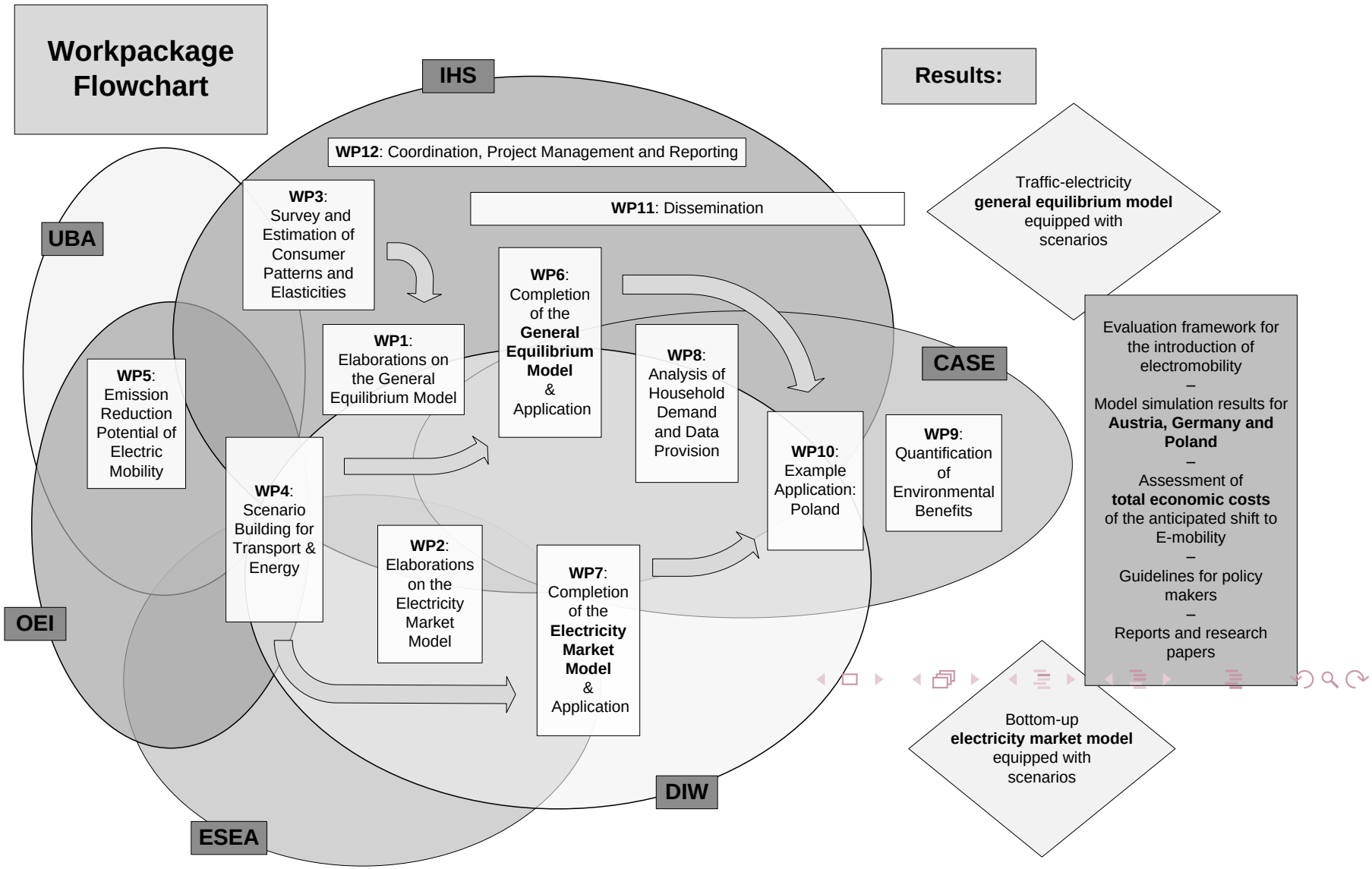
- publication of working papers,
- submission of papers to peer-reviewed journals,
- attendance of members of the DEFINE project at relevant conferences, and by
- inviting experts to the DEFINE dissemination events.

Scope of DEFINE: Dissemination to Policy Makers and Stakeholders

The non-academic audience (policy makers and stakeholders) is reached for by

- the publication of policy briefs, bringing a short, comprehensible summary of the results of the studies conducted with the to-be-developed evaluation framework,
- a more detailed policy guideline, describing a feasible and sensible "Path to Electromobility" taking account of the scientific outcomes of DEFINE in a manner suitable for policy purposes, and
- invitation to the DEFINE dissemination events.

Structure of WPs (Flowchart)



List of WPs I: CGE Model

- **WP1 Elaborations on the General Equilibrium Model:** Deals with the further development of an existing economic model, which is a top-down bottom up dynamic computable general equilibrium (CGE) model, into a model which describes in detail the economic effects of changes in policies, technological shifts as well as behavioural changes on the electricity and traffic sector triggered by a change in the mobility paradigm from a fossil fuel-based system to electromobility.
- **WP6 Completion of General Equilibrium Model & Application:** Includes a calibration of the hybrid general equilibrium model, the implementation of the scenarios developed in WP4 in the model and an application of the model, i.e. simulations for Austria and Germany.

List of WPs II: Electricity Market Models

- **WP2 Elaborations on the Electricity Market Model:** Deals with the interdependencies between an e-mobility roll out and European electricity grids and the development of model frameworks to address these interdependencies for Austria and Germany.
- **WP7 Completion of Electricity Market Model & Application:** Deals with the calibration, validation and application of the bottom-up partial equilibrium electricity market model.

List of WPs III: Consumer Survey and Micro-Estimation

- **WP3 Survey and Estimation of Consumer Patterns and Elasticities:** Includes a survey on mobility behaviour, stated preference experiments on mode and vehicle choice and micro-estimation of willingness-to-pay, needs and expectations of consumers towards alternative transport modes and drive technologies. It provides price-demand-elasticities to be included into the general equilibrium model.
- **WP8 Analysis of Household Demand and Data Provision:** Identifies determinants and barriers for purchasing low carbon vehicles and estimates the willingness-to-pay in Poland.

List of WPs IV: Scenarios and Emission Reduction Potential

- **WP4 Scenario Building for Transport & Energy:** Embraces the development of scenarios for electromobility and its impact on the transport and energy sectors. Scenarios are developed for the vehicle technology, the European electric vehicle market and its technical potential, for the real market potential, modal split, vehicle usage patterns and energy consumption. The scenarios are developed for Austria and Germany up to 2030.
- **WP5 Emission Reduction Potential of Electric Mobility:** Comprises the calculation of the well-to-wheel energy consumption and the contribution of the future electric vehicle fleet to emission reductions in Austria and Germany depending on the related provenance of electricity.

List of WPs V: Quantification of Environmental Benefits and Application to Poland

- **WP9 Quantification of Environmental Benefits:** Quantifies the environmental benefits of an increased uptake of electromobility derived from the quantification of external costs of both, electricity generation and vehicle use.
- **WP10 Example Application Poland:** Applies both economic models, the hybrid general equilibrium model and the electricity market model to Poland as a case study.

List of WPs VI: Dissemination and Reporting

- **WP11 Dissemination:** Deals with dissemination of project results.
- **WP12 Coordination, Project Management and Reporting:** Deals with coordination, administration and management of the project. The objective is to secure a proper and smooth management of the project including reporting on progress and project results.

Points of Intersection in DEFINE I: Hybrid CGE Model (WPs 1, 6)

- Collaboration regarding development of hybrid CGE model.
- Input of data and price-demand elasticities from WPs 3,8.
- Input of scenario data (WP 4), development of model in view of scenarios.
- Interaction between CGE model and electricity market models (WPs 2,7).
- Provision of German and Polish Macro-Data (WPs 6, 10), in the form of a SAM (Social Accounting Matrix).
- Application of hybrid CGE model to Germany (WP 6) and Poland (WP 10).

Points of Intersection in DEFINE II: Electricity Market Models (WPs 2, 7)

- Collaboration regarding the development of the two electricity market models.
- Input of scenario data (WP 4), development of model in view of scenarios.
- Interaction between electricity market models and CGE model (WPs 1,6).
- Application of German electricity market model to Poland (WP 10).

Points of Intersection in DEFINE III: Consumer Survey and Micro-Estimation (WPs 3, 8)

- Data requirements of CGE model are discussed at Kickoff Workshop.
- Survey design is elaborated until Workshop 3 (Scenario Building and Data Implementation, month 10, February 2013).
- Survey design is presented at Workshop 3.

Points of Intersection in DEFINE IV: Scenarios (WPs 4, 6, 7)

- Scenario building for transport and energy in WP 4.
- Implementation of scenarios developed in WP 4 into hybrid CGE model (WP 6).
- Implementation of scenarios developed in WP 4 into electricity market models (WP 7).

Points of Intersection in DEFINE V: Emission Reduction Potential (WP 5)

- Inputs from WPs 2, 4, 7 to calculate emission factors of additional electricity demand for electric vehicles.
- Comparison of scenarios as input for quantification of impact on e-mobility on GHG emissions.

Points of Intersection in DEFINE VI: Application to Poland (WP 10)

- Provision of Polish price-demand elasticities for CGE model (WP 8).
- Provision of Polish data for CGE model, calibration (WPs 6, 8).
- Provision of Polish data for German electricity market model, calibration (WP 7).
- Transformation of Austrian and German scenarios into “Polish” scenario, application in CGE model and German electricity market model.

Points of Intersection in DEFINE VI: Quantification of Environmental Benefits (WP 9)

- Inputs from CGE model, electricity market models and micro-level studies for quantification of environmental benefits (WPs 3, 6, 7, 8).
- Model building in view of quantification of environmental benefits regarding model outcomes (WPs 6,7).

Points for Discussion in Session Seven: Integrating Models (WPs 1, 2, 6, 7)

- DIW, TU Vienna: Similarities and differences between electricity market models regarding use and purpose of the models and kinds of studies/scenarios possible to be conducted. Comparison with CGE model.
- IHS, DIW, TU Vienna: Purpose of extensions of the models, inputs envisaged from other partners .
- IHS, DIW, TU Vienna: Use and interaction of all relevant models for comparative studies.

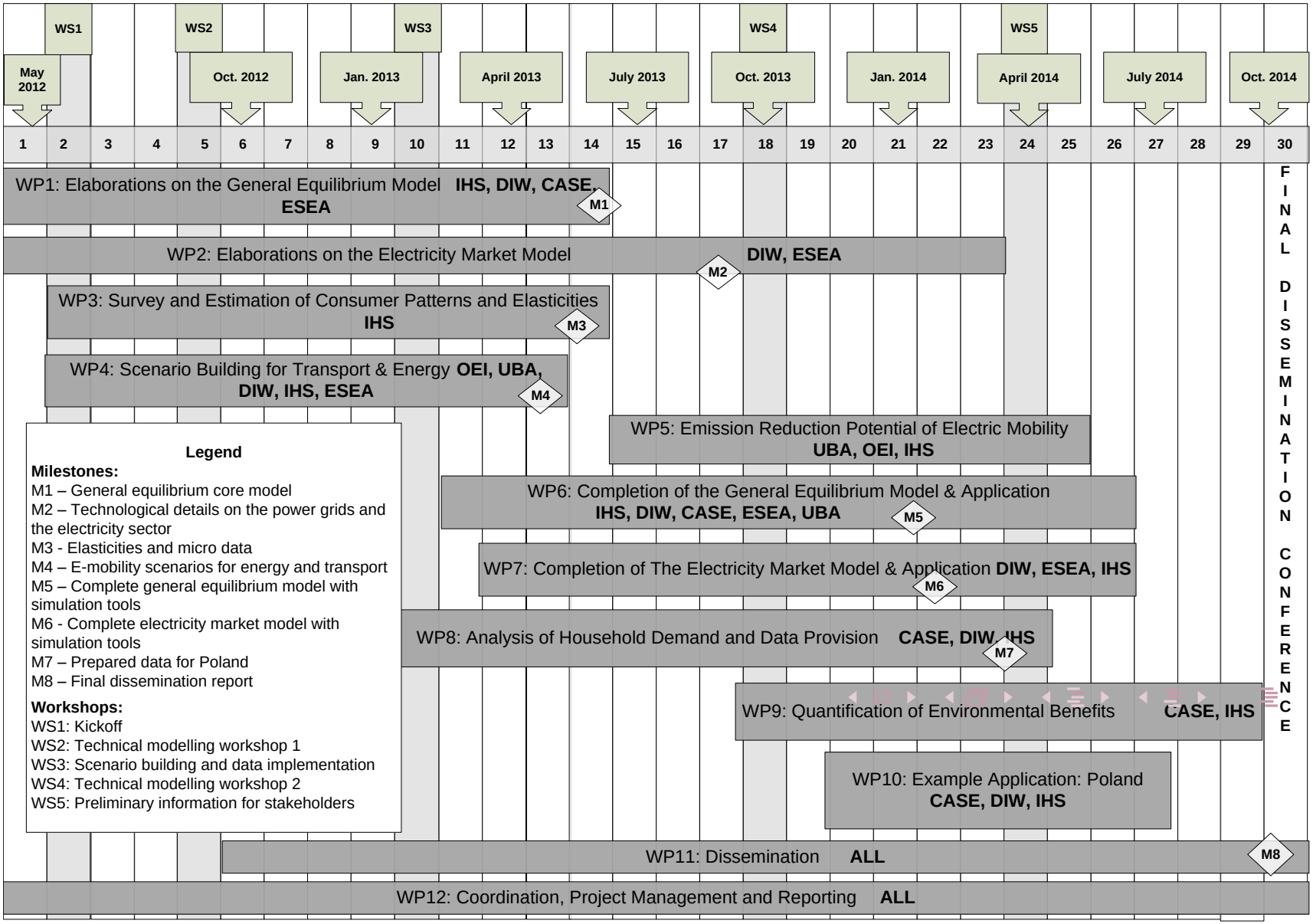
Points for Discussion in Session Seven: Scenario Integration

- All Participants: Integration of scenarios and data input into the three models. Parts of scenarios covered by respective models.
- UBA,OEI: Future political trends and resulting implications for scenarios.

Points for Discussion in Session Seven: Application of Models to Austria/Germany/Poland, Interactions between WPs

- IHS, DIW, TU Vienna, CASE: Application of hybrid CGE model/electricity market models to Austria/Germany/Poland.
- All Participants: Points of intersection between WPs; results/outputs serving as inputs for other WPs. Outline of procedure and timeline.

Timeline of DEFINE



Milestones I

- M1 - General equilibrium core model (WP 1): June 2013
- M2 - Technological details on the power grids and the electricity sector (WP 2): September 2013
- M3 - Elasticities and micro data (WP 3): June 2013
- M4 - E-mobility scenarios for transport and energy (WP 4): May 2013

Milestones II

- M5 - Complete general equilibrium model with simulation tools (WP 6): February 2014
- M6 - Complete electricity market model with simulation tools (WP 7): February 2014
- M7 - Prepared data for Poland (WP 8): April 2014
- M8 - Final dissemination report (WP 11): October 2014

Workshops in DEFINE

- Kickoff (WS 1): June 2012
- Technical modelling workshop 1 (WS 2): initially planned September 2012, October/November 2012 more likely at the moment
- Scenario building and data implementation (WS 3): February 2013
- Technical modelling workshop 2 (WS 4): October 2013
- Preliminary information for stakeholders (WS 5): April 2014
- Final dissemination conference: October 2014

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Thank you for your attention!

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