

# REEEM PROJECT MANUAL

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# 1. PROJECT SUMMARY

Grant Agreement number	691739
Project Acronym	REEEM
Project Title	“Role of technologies for an energy efficient economy – a model-based analysis of the impacts of policy measures and transformation pathways to a sustainable energy system”
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Aarhus University	AU	Denmark
Danmarks Tekniske Universitet	DTU	Denmark
Energy Institute Hrvoje Požar	EIHP	Croatia
KIC InnoEnergy SE	KIC-IE	Netherlands
Lietuvos Energetikos Institutas	LEI	Lithuania
Reiner Lemoine Institute	RLI	Germany
Tokni SpF	TOKNI	Faroe Islands
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## 2. WORK PACKAGES (WP)

### 2.1 WP 1: Transformation Strategies and Pathways

WP Lead: **KTH**

#### **Objectives:**

1. Help to ensure that pathways are of political relevance to the EU energy policy dialogue
2. Define the pathways consistently across the various work packages and modelling tools
3. Develop environmental, economic and social indicators for assessing the impacts across the pathways
4. Synthesize assessment results from WPs 2 – 6 in a single process, ensuring that a distinct, holistic assessment of energy technology implications is provided for each pathway, balanced across society, environment and economy. This will include energy strategy recommendations.

#### **Description of work**

As part of this proposal, numerous future energy system pathways will be analysed. Within each pathway, drivers will be identified, such as global fuel price trends, geopolitical developments, technological progress, demographic developments, and user acceptance of technologies, macroeconomics trends and environmental goals. These drivers will be translated into key assumptions regarding their development. Guided by these assumptions, the specific pathways will be defined and translated into both, key input data (e.g., GDP growth, demographic projections) and qualitative descriptions (e.g., for user acceptance). This will ensure consistent assessments within the pathway clusters and across the work packages. **Task list:**

T1.1 Formulation of pathways and pathway clusters [M1-M18, intensive phase: M1-M12]

**Lead: KTH; Other partners: AALTO, DTU, EIHP, KIC-IE, LEI, RLI, UCL, USTUTT**

Pathway definition: Define the major pathways and pathway clusters in more depths and selection of individual pathways to help embed case studies (to be elaborated on in the WPs 3-6) within pathway clusters. Identification of drivers and quantification of key assumptions: The main drivers for each pathway will be identified, such as assumptions regarding economic growth, societal development or technological innovation. The key input assumptions will be quantified to ensure their consistent representation throughout the work packages. Stakeholder engagement will be included in this process through the Stakeholder Interaction Portal developed in WP7. Further, 2 stakeholder workshops with 30 participants each will be organised. Stakeholder input will be sought in this process to ensure the policy-relevance of the approach.

T1.2: Pathway diagnostics [M1-M12]

**Lead: KTH; Other partners: DTU, KIC-IE, UCL, USTUTT**

This task will define technology, environmental, economic and social indicators for the pathways, to be calculated from the outputs of the modelling results. This will ensure the comparability of the impacts across the pathways and impact dimensions. The close involvement of the leaders of WPs 2-6 will ensure the indicators are well defined and integrated into the assessment tools.

T1.3: Impact assessments and strategy recommendations [M13 – M42]

**Lead: KTH; Other partners: DTU, KIC-IE, UCL, USTUTT**

Quantitative results from the various work packages will be consolidated and individual pathways, from the qualitative narratives to model-based quantifications, will be interpreted. This consolidation will ensure that a single comprehensive analysis will be performed, placing the assessment dimensions (technology, environment, economy, society) on an equal footing and employing the pathway diagnostics developed under task 1.2.

Energy strategy recommendations will be developed based on the interpretations of the individual pathways. Results from the various pathways will be compared to gain an in-depth understanding of the energy system under different assumptions. This will allow deriving strategy recommendation which ensure a system that is both robust (it can absorb changes in key assumptions) and flexible (it allows later adjustments to react to changing circumstances).

Further, all REEEM outputs will be subject to an internal peer-review mechanism established within this task.

*Person-Months (PM) per Participant in WP1*

KTH	AALTO	AU	DTU	EIHP	KIC-IE	LEI	RLI	TOKNI	UCL	USTUTT
17.5	4	1.5	9.5	4	5	4	3	0.5	10.5	10.5

## 2.2 WP 2: Technology and Innovation

WP Lead: **KIC-IE**

### Objectives:

1. Develop Technology Roadmaps and Market Potentials for key technologies
2. Map out the Innovation Readiness Level of energy technologies
3. Develop a methodology for linking technology innovation to energy-economic models
4. Improve the technology representation in energy system models
5. Measure the impacts of technology innovation through economic, societal and environmental indicators

### Description of work

WP2 “Technology and Innovation” will identify key parameters and indicators to measure technology development. Using the SET-Plan as a basis, WP2 will consolidate a comprehensive inventory of energy technologies and explore their role in the transformation pathways of the overall energy system. Primary outputs of this WP will be Technology Roadmaps that are supplemented with Innovation Readiness Level assessments – which represent the “market pull” aspect of energy technology deployment.

### Task list:

#### T2.1: Develop Technology and Innovation Roadmaps for key technologies [M1 – M42]

**Lead: KIC-IE; Other partners: AALTO, KTH**

In this task, expert panels will guide the development of Technology Roadmaps along the dimensions of technology maturity and market acceptance potential. The expert network will involve decision makers and actors from industry, academy and finance, which will regularly participate in programme and project assessments as well as in-house internal foresight exercises. In addition to engagement through online tools, three technology workshops with 10 participants each are foreseen for this purpose. The scheme will also be extended to advanced cost evaluation models enabling future cost projections that will then be used directly in the definition of pathways in WP1 and the modelling tools. The resulting Technology Roadmaps will identify the points in technology R&D at which the value chain can positively be influenced to reduce costs and increase market deployment potential.

#### T2.2: Map out the ‘Innovation Readiness Levels’ of energy technologies [M1 – M42]

**Lead: KIC-IE**

There have been recent efforts to transfer global Technology Roadmaps to an operational, decision-making level through the introduction of Demand Readiness Levels (DRL) in addition to the well-known Technology Readiness Levels (TRL). Although the DRL is a good attempt to consider a market perspective, it fails to represent the innovative process dynamics. For innovative programme management purposes, this vision has thus been extended Innovation Readiness Level (IRL) concept in REEEM. Based on a set of indicators, this approach can be used to select individual technologies or portfolios of technologies based on their potential to access markets and on the associated risks. Risk analysis will be a full part of this assessment, enabling an evaluation of uncertainty in the innovative process. This classification is expected to help inform the assessments of the technology pathways on a systematic basis, in accordance with technology deployment reality and R&D priorities. Refer to Section 1.3.2.3 for further background on the approach.

T2.3: Develop a methodology of linking technology innovation to energy system models [M10 – M18]

**Lead: KTH; further partners: KIC-IE**

In this task, the key parameter quantified in Tasks 2.1 and 2.2 will be used to develop a methodology to better represent technology innovation in energy system models. This methodology will focus on defining different energy system configurations representing various aspects and degrees of technology innovation to be able to investigate the implications on cost projection pathways. Further factors such as technology learning, cost projections, efficiency curves will be considered to assess and anticipate the impact of different technologies of the SET-Plan in an energy system. The methodology will be adjusted to “technology rich” Integrated European Model used in REEEM (WP6) and its ability to enable detailed investigations of the roles and system wide impacts of technology.

T2.4: Case study on co-evolution of technologies [M10 – M25]

**Lead: UCL**

This case study focuses on the technology portfolio patterns across a high number of pathways and draws insights from the dynamics that are observed across the pathways ((co)evolution and crowding out of technologies). A special energy system tool built for the UK will be used for the analysis and the generalisability of the insights to other member states is then assessed.

*Person-Months (PM) per Participant in WP2*

KTH	AALTO	AU	DTU	EIHP	KIC-IE	LEI	RLI	TOKNI	UCL	USTUTT
5.5	4	0	0	0	27	0	0	0	8	0

## 2.3 WP 3: Economy

WP Lead: **USTUTT**

### Objectives:

1. Analyse interactions and interdependencies with the energy system and the economy
2. Provide macroeconomic energy demand feedbacks
3. Analyse allocative impacts of different policies and technological developments in the EU economy
4. Assess distributional impacts and identify “winners and losers” (e.g., gains and losses of sectoral competitiveness, net job creation or budgetary implications for households)
5. Derive and present strategy recommendations

### Description of work

The centrepiece of WP3 is the global CGE model NEWAGE, which will be linked to the Integrated European Model (WP6). The interface will be defined by the technology mix and energy costs (TIMES input to NEWAGE) as well as energy demand feedbacks (NEWAGE output to TIMES). Through the links to the Integrated European Model developed in WP6 (and the respective links to the satellite models in WP3-5), this WP will capture the economic implications of specific policy instruments, innovation developments and consumer behaviour. Further, results on international trade will inform the integrated analysis in WP6. WP3 results include allocative impacts (e.g., net job creation jobs, growth) as well as distributional impacts of energy transition strategies (e.g., gains and losses in household income and sectoral competitiveness). The generated policy recommendations involve the identification of “winners and losers”.

### Task list:

#### T3.1: Model refinement and database update [M1 – M20]

**Lead: USTUTT; Other partners: EIHP, LEI**

This includes energy technology information (e.g., intermediate inputs from the remaining economy that are needed for new or existing technologies in different stages), updates of data from relevant sources (e.g., GTAP) and adjustments to the regional resolution of the NEWAGE model. An appropriate regional resolution of the EU and the world economy will be specified. Consumer preferences/utility of the representative agent and different household types will be improved. Representative agent will be disaggregated to different household types. Innovation and represent technological change will be adequately captured.

#### T3.2: Model interfaces and data processing [M3 – M20]

**Lead: LEI; Other partners: EIHP, USTUTT**

Input requirements and outputs from other WPs will be defined. The most central interface is the one with WP6: price induced energy demand adjustments in the whole economy will be fed back to the energy system model, whereas energy cost information as well as intermediate consumption changes caused by changing energy structure (different energy technologies requires different inputs from the remaining economy) are used as inputs in WP3.

#### T3.3: Model application, evaluation of results and policy recommendations [M20 – M42]

**Lead: USTUTT; Other partners: EIHP, LEI**

This task includes the general macroeconomic impact assessment of pathways defined in WP1. The pathway analysis will take place at the same time as the other WPs conduct their pathway analysis, i.e. ideally between months 20-32. This will facilitate the exchange of data for iterations requiring data inputs and outputs to and from other WPs. All generated results will be gathered and evaluated, in order to identify “winners and losers” as well as strength and weaknesses of the EU

regarding the analysed pathways. Finally, policy recommendations will be derived and provided for WP7.

T3.4: Case study on carbon leakage and competitiveness [M12 – M30]

**Lead: USTUTT; Other partners: LEI**

This case study on EU carbon leakage and competitiveness puts the EU economy in a global context and analyses the significance of energy and CO<sub>2</sub> costs for EU energy intensive industries (with inputs from task 3.1). One workshop with 10-15 participants is foreseen to further refine the scope of this case study.

*Person-Months (PM) per Participant in WP3*

KTH	AALTO	AU	DTU	EIHP	KIC-IE	LEI	RLI	TOKNI	UCL	USTUTT
0	0	0	0	4	0	14	0	0	0	19.5

## 2.4 WP 4: Society, Consumers and Behaviour

WP Lead: **UCL**

### Objectives:

1. Improve the understanding and modelling of consumer choice
2. Assess how consumer preferences may differ across countries and how these differences might affect energy system transitions
3. Assess and downscale the distribution impacts of specific SET pathways
4. Evaluate the energy poverty related policies in the context of the SET-Plan and provide recommendations
5. Derive and present strategy recommendations

### Description of work

Firstly, the work done under this WP uses a range of dedicated models and other tools to produce inputs for WP6, in which the system level modelling is to be done. These inputs improve the modelling of behaviour and consumer response (e.g., consumption profiles, uptake of measures and technologies, energy choices, affordability, load curves) in WP6, thus allowing taking endogenously into account the impact behaviour may have on the system transition.

Secondly, this work package uses the outputs of the WP6 (e.g., technology pathways) and assesses the impacts of the SET-Plan on individuals across different demographic and income groups, member states and local areas (rural vs urban). The purpose of this activity is to identify the distributional and equity impacts a fundamental energy system transition may have, analyse their consequences on the societal level and assess what policy implications the findings may have.

Thirdly, a case study is used for “downscaling” and remodelling the impacts of the European-wide transition pathways assessed in WP6.

### Task list:

T4.1: Role of individual actor behaviour and heterogeneity in the adoption of novel and energy efficient technologies [M1 - M30]

**Lead: UCL; Other partners: AALTO, EIHP**

This task will enable the better modelling of the adoption of energy efficient, innovative and novel technologies in homes and private transportation as described in the SET-Plan. Specifically, this task will collect empirically-derived stated-preference and revealed-preference data on individual actors’ technology preference, sensitivity to supply interruptions and demand flexibility. Data from a sample of countries will be used to estimate differences in preferences across the EU member states. Tools will be developed for analysing technology uptake for end-uses (e.g., discrete choice models) and to determine the key factors influencing decision. Their outputs will be used to inform the modelling in WP6 (e.g. technology specific discount rate parameters, inconvenience costs, price response) and harmonise the aggregation of the data (e.g., consumer groups) for input into the EU-wide

T4.2: Distributional, societal and equity impacts of the SET-Plan [M6 - M40]

**Lead: UCL; Other partners: USTUTT**

This task focuses on exploring how different socio-economic groups, primarily private households, will be impacted by different technology transitions, in terms of household expenditure on energy for heating, cooling and transportation, and how these impacts are spread across, and within, the Member States and demographic groups. Existing energy poverty focused policies are collected and the policy implications of the SET-Plan to these policies are assessed. More specifically, this task will assess the most important impacts vectors and related pathway metrics. Impact vectors are further used to determine the dimensions across which impacts are disaggregated by societal groups. Tools

are downscaled for translating the pathway metrics to variables needed to assess the impacts (from Task 6.3) on individual groups across pathways and member states. The impacts and their distribution are then assessed across the pathways, based on the indicators developed under WP1. Existing energy poverty policies and the implications of the SET-Plan to these policies will be assessed.

T4.3: Case study on district heating [M13 – M36]

**Lead: AALTO; Other partners: LEI**

One workshop with 10-15 participants is foreseen for to refine the scope of a case study on district heating, focusing on cities. The outputs will be used to evaluate how new, innovative district heating concepts can best contribute to lower expenditures and to reducing energy poverty. Technological choices for different pathways will be assessed regarding reliability, carbon neutrality and affordability.

*Person-Months (PM) per Participant in WP4*

KTH	AALTO	AU	DTU	EIHP	KIC-IE	LEI	RLI	TOKNI	UCL	USTUTT
0	9	0	0	9	0	6	0	0	27	6

## 2.5 WP 5: Environment, Health and Resources

WP Lead: **DTU**

### Objectives:

1. Assess health impacts from air pollution associated with different pathways
2. Perform Life Cycle Assessments for alternative energy systems
3. Investigate the role of critical materials in different transition pathways
4. Evaluate the robustness of pathways to the impact of climate change
5. Study the impacts and links of the energy system with water, land-use and ecosystem services

### Description of work

Reducing greenhouse gases and reaching renewable and energy efficiency targets will influence pollution levels, use of resources and the related impacts on the environment. Implementing the SET-Plan can increase the total system costs, but this might be outbalanced by environmental benefits, less damage to human health and other externalities not included directly in a standard economic evaluation of system costs. This WP will look into the SET-Plan's environmental benefits and resulting constraints within four tasks focussing on different environmental impacts and on how they link to changes in the European energy system.

### Task list:

T5.1: Impact of climate change on the Energy-Water-Land-use nexus [M1 – M36]

**Lead: DTU; Other partners: USTUTT**

In this task we focus on climate change impacts on Europe's energy system, which might challenge the implementation of the SET-Plan. WP5 will look at changes in the water balance and thereby the access to water for power production. Simulation of such changes will be performed for different regions in Europe. This will be achieved using statistical analysis and down-scaling of future climate pathways. Possible changes in temperature and the influence on heating and cooling needs will also be assessed. Further, WP5 will carry out a desktop study on the links between the energy system and agricultural and land-use pathways as well as related emission trajectories. Land-use pathways for the EU will be identified that are consistent with the overall narratives developed in WP1. Non-energy emissions will be taken into account as well as links between water use and energy demand (e.g., water for irrigation of biofuels) resulting from these land-use pathways.

T5.2: Health and environmental impacts from pressures to the environment [M1 – M36]

**Lead: USTUTT; Other partners: DTU, AU**

The impact pathway approach (IPA) developed in the ExternE project series and then further developed in the EU projects NEEDS, CASES, INTARESE, HEIMTSA, TRANSPHORM and others will be used to quantify the health and environmental effects of the different technology pathways. The IPA will be applied to assess health impacts aggregated to DALYs (disability adjusted life years) and environmental impacts (biodiversity losses and land use change) quantified as pdf/m<sup>2</sup> (potentially disappeared fraction of species per m<sup>2</sup>). Further, impacts are then converted into damage costs. Using emissions from the EMC<sub>2</sub> regional gridded concentrations are calculated using a parametric version of the EMEP model<sup>46</sup>, a multi-layer atmospheric dispersion model for the long-range transport of air pollution. An urban increment model<sup>47</sup> is used as for estimating this PM<sub>10</sub> and PM<sub>2.5</sub> increment for all European cities > 50 000 people.

Results from the non-linear EVA system will be compared to the linearised ECOSENSE system. This includes more realistic source-receptor relationships and estimation of the urban increment. New

relationships found by using the process based EVA system will be transferred to ECOSENSE for improved results. The EVA system will be applied for calculation of unit costs of emissions from the energy sector for each country in Europe. These costs will be used as inputs to the Integrated European Model. This will be done for present and future conditions based on emissions and climate changes from Representative Concentration Pathways (RCPs). The information flow between the tools is explained in more depths in Section 1.3.3.6.

T5.3: Life Cycle Assessment for energy systems and demand for critical materials [M18 – M40]

**Lead: DTU/UCL; Other partners: USTUTT**

Environmental assessment of energy technologies will be performed, informed by the other tasks within this WP and following the EU ILCD Handbook for the application of LCA released in 2010. The results will serve to characterise the environmental sustainability of the systems and provide recommendations to energy policy makers. Life cycle inventories (LCIs) of different energy technologies will be modelled, building on inputs from WP6, in particular Task 6.2, combined with recent developments in LCI knowledge, e.g., via the release of the spatially differentiated EcoInvent 3.1.

Many of the key technology investments of a future low carbon society rely on and increase the demand for critical materials. This task will identify these critical materials and analyse the likeliness for availability bottleneck. Starting with a literature review, these materials will then be mapped against the technologies included in the Integrated European Model, taking into account the uncertainties as described in the literature. The pathways developed in WP1 will be used to assess the material requirements of each pathway. These material requirements will then be further evaluated against the causes of criticalities to assess whether bottlenecks seem likely and under what conditions.

T5.4: Case study on Ecosystem Services [M12 – M24]

**Lead: KTH**

This case study will use the Ecological Assessment (EcA) Tool, which consists of modules for simulation of forest management and growth, as well as resulting bioenergy yield, carbon storage and habitat networks for relevant and prioritized biodiversity components. Habitat changes, the equivalent connected area of habitat networks will be estimated for prioritized biodiversity components. One workshop with 10-15 participants is foreseen for to refine the scope of the case study.

*Person-Months (PM) per Participant in WP5*

KTH	AALTO	AU	DTU	EIHP	KIC-IE	LEI	RLI	TOKNI	UCL	USTUTT
9	0	8	17	0	0	0	0	0	6	15

## 2.6 WP 6: Energy Systems Integration

WP Lead: **USTUTT**

### Objectives:

1. Develop an Integrated European Energy System Model which holistically represents energy resources, supply and demand technologies and infrastructures
2. Determine the impact of technological development and innovation on the energy system
3. Model the impact of policy measures in the framework of key EU policy documents

### Description of work

The centrepiece of WP6 is the Integrated European Energy Systems Model based on TIMES-PanEU, which is applied to provide in-depth assessments of the pathways identified in WP1. In order to capture all relevant topics of the SET-Plan and other key EU policy documents, the energy system communicates through model linkages with specific subjects (e.g., technology, society, economy, and environment) in the satellite models applied in WP3, WP4 and WP5. The data from all components of the energy system are compiled, available technologies, measures and other options (e.g., policy) integrated and pathways are developed and analysed. In order to address specific questions, case studies using sectoral energy models are assessed. Data and information for the model are contributed and integrated from all other work packages and partners. The work package includes the following tasks.

### Task list:

#### T6.1: Pathways Database development and model interface [M1 – M36]

**Lead: RLI; Other partners: AALTO, DTU, EIHP, KTH, LEI, UCL, USTUTT**

A flexible open-source and SQL-based Pathways Database will be set-up to service all models. It will be accessible through an interface on the project Web Platform (WP7, in particular T7.1). Existing databases within the Consortium will initially serve to populate the database, enabling open access as far as possible (Section 1.3.3.2). Data gaps will be identified and filled to refine the models. The database will be updated to include additional technologies, demand categories, emission factors, etc. Additional data will be accessed through a range of public and private sources as well as drawing on data gathered for the case studies. Transparent data processing scripts and stand-alone tools will be developed to facilitate the communication between the various models used in REEEM, and to process basic to higher level datasets.

#### T6.2: Model refinement [M7 - M36]

**Lead: USTUTT; Other partners: DTU, KTH**

The existing TIMES-PanEU energy optimisation model will be further developed/updated, which will include the incorporation of new insights derived from the case studies assessed in the other work packages in order to provide a more detailed overview of the EU energy system. The existing supply and demand sectors will be updated to adequately represent the SET-Plan in the model, including new behavioural aspects driving energy demand (WP4). The model targets appropriate horizons, e.g., 2030 or 2050, to assess the reaction of the energy system in terms of emissions and energy demands (WP3). The horizon chosen reflects important energy and climate objectives. The existing load curves will be adapted for the various demand sectors (e.g., transport, residential, industry) in response to the changing energy system (e.g., due to the integration of renewables).

#### T6.3: Model application [M13 – M40]

**Lead: USTUTT; Other partners: DTU**

The model runs include several iterations (where calibration would take place if new information becomes available such as a new statistical output or input through the stakeholder consultation)

and pathway analysis in collaboration with the stakeholder consultation and pathway development process carried out in WP1 and WP7. The developed pathways are in line with the descriptions detailed in Section 1.3. Reference case runs will act as a basis for the pathways and the analysis of results. The additional model runs will allow the analysis of the costs and benefits of that particular pathway in relation to the reference case.

Results will be presented to the stakeholders and will also act as input to other work packages (WP2-5) for more detailed case study assessments. The results and pathways will be analysed to inform the strategy recommendations developed in WP1.

T6.4: Case studies [M13 - M36]

**Lead: LEI/EIHP; Other partners: AALTO**

The proposed case studies could be utilized to test and demonstrate modelling approaches and to ensure similar groups of Member States are reflected in the developed EU-28 model consistently and realistically. One workshop with 10-15 participants is foreseen for each case study to refine their scope. The anticipated case studies are:

- Regional energy security of the Baltic region and Finland
- Grid and dispatch in South Eastern Europe

*Person-Months (PM) per Participant in WP6*

KTH	AALTO	AU	DTU	EIHP	KIC-IE	LEI	RLI	TOKNI	UCL	USTUTT
6.5	6.5	0	10	8.5	0	6.5	10	0	0.5	21.5

## 2.7 WP 7: Stakeholder Engagement and Dissemination

WP Lead: **TOKNI**

### **Objectives:**

1. Provide information about the project to stakeholders and the public
2. Establish an information system which will ensure that assumptions, input data, methods and results used and produced in the project are transparent and verifiable by external parties
3. Lower the barriers for stakeholders to engage in energy modelling by creating an Open-source Engagement Model based on OSeMOSYS
4. Create an integrated Energy Systems Learning Simulation to enable relevant stakeholders to "eye-level" discussions about the transformation of the energy system
5. Engage with stakeholders with very different focuses on the energy system transformation process and the public

### **Description of work**

WP7 is the primary vehicle for complete and effective communication, dissemination and engagement with the project's primary stakeholders and the general public.

### **Task list:**

T7.1: Web platform with Stakeholder Interaction Portal and Pathways Diagnostic Tool [M1 – M42]

#### **Lead: TOKNI**

A Web Platform will serve as an information hub for all internal and external communication in the project. For internal communication, it will provide tools for project management, document storage, collaborative writing, discussion, and knowledge repository (wiki). For external communication, a Stakeholder Interaction Portal will be used to inform about the project and actively engage stakeholders. It will provide access to pathways, assumptions, sources, modelling tools and the learning simulation. It will enable to retrace the simulation results and enable modellers to compare them with their own simulations or to reproduce the simulations done. Further, it will host the Pathways Diagnostics tool (Section 1.3.4.2), which will be seamlessly connected to the Pathways Database developed task 6.1 in WP6. TOKNI will create and technically maintain the web platform based on open source tools. RLI will contribute with suggestions of features to include, while all partners will contribute to the discussion of needed features and will test them in their work packages.

T7.2: Stakeholder dialogue and dissemination [M1 – M42]

#### **Lead: RLI**

This task will focus on engaging a variety of stakeholders throughout the project, disseminating the results to a broad audience, and feeding the findings into EU discussions, especially related to the SET-Plan. Various interest groups will be addressed and involved through a multidisciplinary stakeholder dialogue building on online exchanges as well as expert workshops. These will serve to get additional input for the pathway and case study assessments performed in WPs 1-6, to cross-check assumptions, to peer-review, discuss and communicate the results and to engage decision makers. A plan to organise internal and external communication will be developed. It will define the roles of stakeholders and the appropriate modes of communication along the project process.

Further, the Stakeholder Interaction Portal (designed in task 7.1) will provide manifold opportunities to contact and exchange with stakeholders, e.g., through the learning simulation (see task 7.4) or the Open-source Engagement Model (see task 7.3). Newsletters and social media like webinars, blogs, and tweets will be used to engage with stakeholders. Further, contributions to existing energy system modelling related forums and conferences are foreseen. In line with one of the

recommended actions of the SET-Plan, a European modelling forum will be held. The possibility will be investigated to place a regularly-held energy system modelling conference under the umbrella of the EUROSIM<sup>48</sup> congress.

A plan to organise internal and external communication will be developed. It will define the roles of stakeholders and the appropriate modes of communication along the project process.

T7.3. Development of Open-source Engagement Model based on OSeMOSYS [M13 – M24]

**Lead: KTH**

A multi-regional engagement model will be set up and aligned with input data and results of the more detailed tools applied in this proposal, especially the Integrated European Model and the satellite models applied in WP3-5. It will be set up to combine the key dynamics of these tools in a single framework which is usable and accessible to stakeholders. It will go beyond a pure energy systems focus and include simple metrics to consider environmental, economic and societal aspects. It will on the one hand be used as engine behind the learning simulation (task 7.4). On the other hand a web-based interface will enable external stakeholders to modify key parameters (or download the tool and modify any parameter), run this tool remotely, see how the results change and thus get a better understanding of how sensitive the model is to certain key assumptions. While the tool will be delivered by month 24, it will be updated throughout the project.

T7.4: Development of an integrated Energy System Learning Simulation [M13 – M24]

**Lead: TOKNI; Other partners: KTH, KIC-IE, RLI**

The objective of this task is to create an integrated Energy System Learning Simulation that enables teaching of decision makers as well as non-experts to better understand the multidisciplinary factors and their interdependencies in an energy system. Moreover, the learning simulation will help them understand the energy modelling process from data input to shaping the model and interpreting the results. The case studies from WP1, the Integrated Energy System Model from WP6 and the Open-source Engagement Model (task 7.3) will form the basis for the specification, design, implementation and testing of the learning simulation. The community will also play a key role in specifying, designing and testing the learning simulation. The learning simulation will be run at stakeholder meetings held throughout this project, and will also be made available to educational institutions and the general public online. While the simulation will be delivered by month 24, it will be updated throughout the project.

*Person-Months (PM) per Participant in WP7*

KTH	AALTO	AU	DTU	EIHP	KIC-IE	LEI	RLI	TOKNI	UCL	USTUTT
12	1	0	1	1	6	1	11	21	1	1

## 2.8 WP 8: Project Management

WP Lead: **KTH**

### Objectives:

1. Coordinate the Consortium and ensure effective communication between the work packages
2. Implement effective financial and risk management as well as project controlling
3. Ensure high quality and timely progress and cost reporting, including an effective communication with the EC. This includes ensuring the high quality of the results achieved

### Task list:

#### T8.1: Coordination of the Consortium, organisation and communication [M1 – M42]

**Lead: KTH; Other partners: All**

Given the dimension and the timing of the endeavour, the coordination of the Consortium needs to provide efficient structures and processes enabling the Consortium to focus on the project objectives. This will facilitate the fulfilment of the formal obligations resulting from the Grant Agreement. For this purpose the following activities will be performed:

- Coordination of the refinement of the work plan: To achieve this, the elaboration of the detailed plans per WP and task (specifications of the Description of Work) will be coordinated in T 8.1. In the course of this refinement, sub-tasks will be defined, responsibilities for them assigned and interactions between different WP further detailed. Any risks that might occur or conflicts that might arise will be identified and mitigated.
- Establishment and execution of the internal reporting process: To monitor project activities all WP leaders report on the WP progress; partners report on the activities performed and the use of resources and the costs incurred. This will be compiled to consolidated reports on the overall project status and will be elaborated and evaluated on a regular basis to ensure the quality and timelines of the outputs as well as to stay within the provided budget. To facilitate the internal reporting standardised templates will be provided.
- Knowledge and information management: This will entail regular conference calls on project progress with the whole Consortium, organisation of regular meetings per management body but also WP focused meetings and establishment and maintenance of the online collaboration platform enabling all project partners to have the access to relevant project information.

#### T 8.2 – Formal reporting [M1 – M42]

**Lead: KTH; Other partners: All**

Timely and adequate progress and cost reporting to the EC as defined in the General Annexes (Annex IV of the Horizon 2020 Grant Agreement) requires that project partners are at all times aware of the respective requirements and that the reporting process is well structured and coordinated. This will be ensured through the project manual as well as a workshop in which the progress and cost reporting requirements will be explained.

The inputs for the reports (Periodic Reports and the Final Report) will be collected via templates. This task comprises also cost control and justification as well as the distribution of the EC contribution.

#### *Person-Months (PM) per Participant in WP8*

KTH	AALTO	AU	DTU	EIHP	KIC-IE	LEI	RLI	TOKNI	UCL	USTUTT
17.5	1	0.5	2.5	1	1	1	1	1	2.5	2.5



## 3. MANAGEMENT STRUCTURE

In order to ensure a smooth and effective project realisation, the Consortium has agreed to implement the project management structure presented below. The management structure is designed to enable sophisticated mechanisms and procedures in order to ensure fast decision making and conflict and risk resolution, the assurance and implementation of an effective project monitoring, the efficient handling of ethical issues, information and knowledge emerging within the project, and the dissemination of project results.

### 3.1 General Assembly

#### Roles and responsibilities

The General Assembly consists of one representative of each partner. It will have the overall responsibility of all administrative, financial, legal, and dissemination issues of the project. Furthermore, the General Assembly will monitor the use of financial resources (aggregated level) and will make decisions by vote on dissemination measures of project results. In addition the General Assembly is the forum for technical and scientific exchange among the project partners. Thus, all Work Package Leaders will attend the General Assembly and jointly decide on the project direction, priorities and technical strategies. Another important aspect of its work will be the resolution of any conflicts that may appear during project realisation (last escalation level).

#### Meeting frequency

The General Assembly will meet on twice a year during the project implementation. The exact place and time of the General Assembly meetings will be decided in accordance with the planned work package leader meetings in order to avoid excessive travelling.

### 3.2 Project Coordinator

#### Role and responsibilities

The Project Coordinator from KTH, will have the overall responsibility for an efficient administration and coordination of the project in terms of resources and time schedule. The Project Coordinator will serve as the official interface between the European Commission and the Consortium. All communication with the European Commission, especially with regard to the submission of deliverables, as well as the financial administration and aspects related to third parties, is part of his responsibilities. Furthermore, the Project Coordinator will lead the project on the operative level and will keep regular contacts with the Consortium partners to ensure the achievement of the objectives established in the project scope and fulfil the instalments.

#### Meeting Frequency

The Project Coordinator will attend all General Assembly Meetings as well as other relevant meetings and telephone conferences as required. There will be a close communication and coordination between the Project Coordinator and the Executive Committee.

## 3.3 Executive Committee

### Roles and responsibilities

The Executive Committee will consist of all WP leaders along with the Project Coordinator. It will take key decisions regarding the steering and direction of the Consortium's work. Further, it will be the single entry point for all EC inquiries on content-related issues. It is also a forum where all the WP leaders can collaborate and discuss cross-WP aspects of the work plan. In particular, the Executive Committee's tasks include:

- Devising and agreeing on concrete implementation plans for all WPs: Scoping of topics, approach definition and model selection, coordination of expert teams, organisation of the peer-review process and result validation
- Monitoring progress of the project and reporting to the General Assembly and the Project Coordinator
- Coordinating cross-WP tasks and ensure timely delivery of results needed by other WPs
- First validation of project deliverables and quality control
- Ensuring that resources and facilities are available within the remit of the individual WPs and reporting any shortcomings to the Project Coordinator.

### Meeting Frequency

The Executive Committee will meet every 2 weeks (mostly through online meetings using a web platform, such as WEBEX) during the project implementation.

## 3.4 Work Packages

### Roles and responsibilities

The WPs are led by one institution each (work package leader) as defined in the work programme. The work package leaders are responsible for managing their work packages as a self-contained entity by coordinating their work package, including the management of inputs from other partners participating or leading tasks within the work package. Furthermore, the WP Leaders are responsible for assessing and monitoring all WP related activities in order to ensure that performance, budget, and timelines are met. The WP Leader will report to the Executive Committee and to the General Assembly.

### Meeting frequency

As the organisation of the work packages falls within the scope of the responsibilities of the work package leaders, they will define the number and the frequency of the meetings to be held within their respective work package. WP leaders will participate in General Assembly Meetings.

## 4. FINANCIAL PLAN

### 4.1 Budget

Below is budget for personnel costs per partner, according to the indicative PM. These values will be used to while filling in the Reporting Templates for each output (Annex I: Reporting Template).

No	Participant short name	Country	Total estimated eligible costs / € personnel costs/€	Reimbursement rate (%)	Max. grant / €	Requested grant / €
1	KTH	SE	675845,00	100	675845,00	675845,00
2	AALTO	FI	304008,75	100	304008,75	304008,75
3	AU	DK	116686,25	100	116686,25	116686,25
4	DTU	DK	478278,75	100	478278,75	478278,75
5	EIHP	HR	172750,00	100	172750,00	172750,00
6	KIC-IE	NL	263158,75	100	263158,75	263158,75
7	LEI	LT	156135,00	100	156135,00	156135,00
8	RLI	DE	275797,50	100	275797,50	275797,50
9	TOKNI	FO	239200,00	100	239200,00	239200,00
10	UCL	UK	718870,00	100	718870,00	718870,00
11	USTUTT	DE	596728,75	100	596728,75	596728,75
Total			3997458,75		3997458,75	3997458,75

### 4.2 Financial Reporting

#### Pre-payment

- Approximately 50% of the total budget
- Transferred to the Coordinator, KTH, within 30 days of the date of entry of the Grant Agreement
- 5% of total EC contribution to guarantee fund (financial safety in case unexpected termination of a partner and will be adjusted in the last payment in the end of the project).

#### Interim payments

Interim costs will be reimbursed within 90 days after approval of costs from the EC for each official reporting period. The payment will be calculated on the basis of the accepted eligible costs and reimbursement rates per activity (RTD etc.). The total amount paid is equal to the approved requested EC contribution reported for the period (NOTE: no consideration is taken to the funds left from the pre-financing).

The EC withholds 10% until the last payment, at the end of the final reporting period.

#### Official Reporting

- Three reporting periods:
  - February 1, 2016 – July 31, 2017
  - August 1, 2017 – July 31, 2018

- August 1, 2018 – July 31, 2019
- Reporting is done using official Form of the EC's online relevant reporting tool (see Annex for example)
- Coordinator has 60 days to submit Form C from all partners to EC

### Eligible Costs

All eligible costs to be reimbursed are required to be:

- Stated costs must be reasonable compared to work reported
- Actual
- Incurred during duration of project (with some exceptions)
- In accordance with beneficiary's usual accounting and management principles
- Recorded in the accounts of beneficiary
- Used for the sole purpose of achieving the objectives of the project

Eligible costs before the start of the project include:

- Travel expenses to attend the Kick-off meeting
- Equipment purchased in relation to the project (not foreseen in the REEEM project)

Eligible costs after the end of the project include:

- Costs incurred within 60 days after end of the project
- Costs in connection to final reporting and review meeting
- Personnel costs for producing the final report
- Travel to final review
- Organisational costs of final review meeting
- Cost of audit certificate (if required for the period)

Non-eligible costs are those not meeting the criteria stated above, as well as **indirect taxes** and **VAT**.

For detailed information, please read *Guide to Financial issues relating to H2020 Indirect actions*:

[https://ec.europa.eu/research/participants/portal/desktop/en/funding/reference\\_docs.html#h2020](https://ec.europa.eu/research/participants/portal/desktop/en/funding/reference_docs.html#h2020)

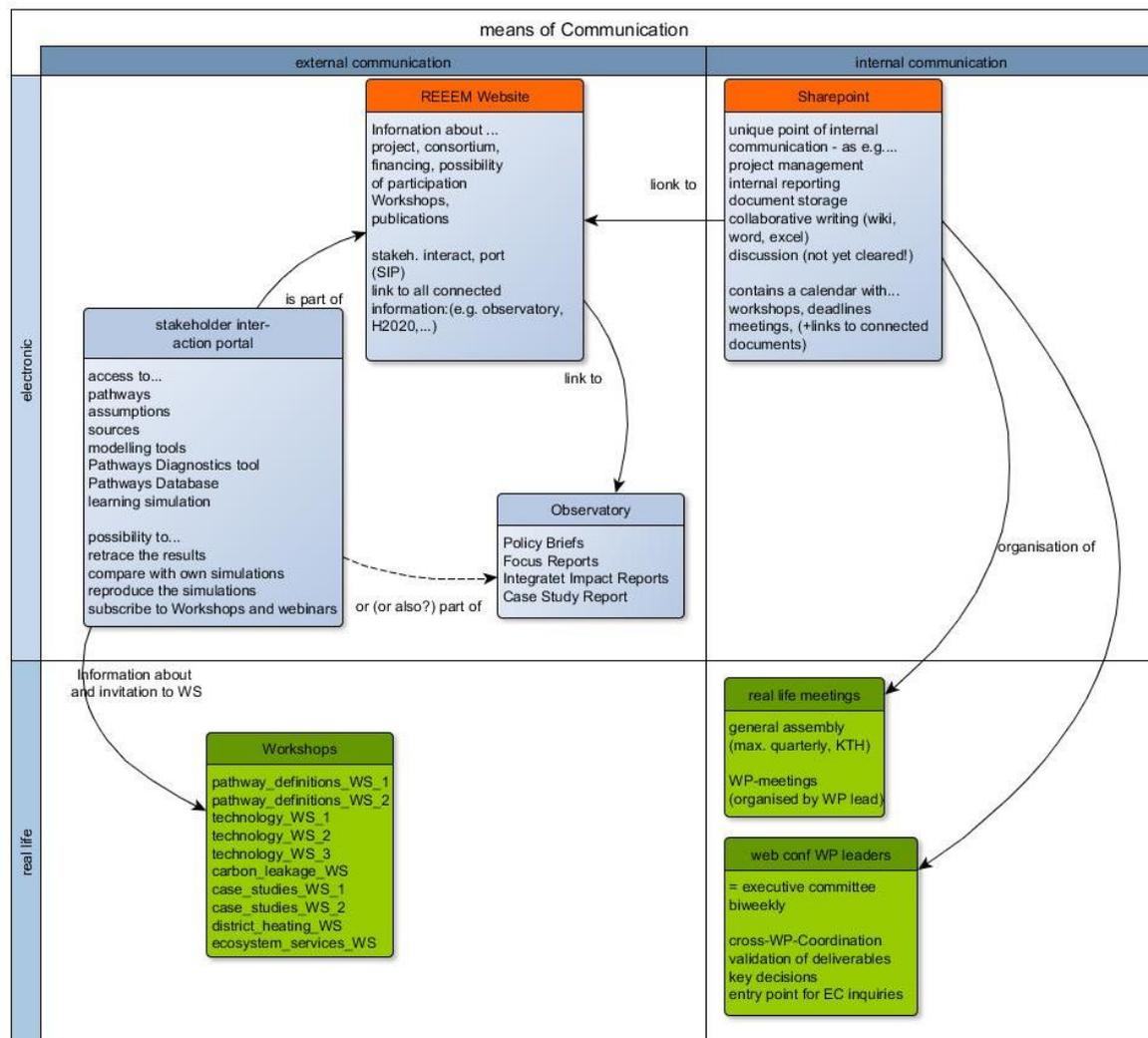
### Contact

For any financial assistance, contact KTH Financial administrators at [eu@itm.kth.se](mailto:eu@itm.kth.se).

## 5. COMMUNICATION AND OUTREACH

REEEM communication includes two important fields: the internal communication for efficient and harmonized project work as well as the stakeholder communication for the integration of expert knowledge and relevance and outreach of the results of the project.

The means of communication of REEEM are summarized in the following chart and explained in the text below:



The communication guide of the project will be included in the internal communication platform based on Sharepoint as a wiki. That will allow the participative adaptation of processes along the project. As a starting point, the content of this chapter (chapter 5 of the project manual) will be transferred to the wiki. First the Internal Communication was added and introduced to the partners, later on the External Communication chapter will be transferred. An introduction is planned for the second GA taking place on November 3<sup>rd</sup> and 4<sup>th</sup> 2016.

## 5.1 Internal Communication

The first address for internal communication is SHAREPOINT. All defined processes for the overall project can be found here. The communication pathway within the Work Packages is organized by the WP leaders; within the tasks the task leaders are responsible for the communication. For all definitions of communication flows you are invited to communicate that through to Sharepoint.

The communication in between the WPs beyond Sharepoint is facilitated by the biweekly web conferences of the Executive Committee (minimum monthly). The WP leaders are responsible that always someone of the WP attends as well as it is their responsibility to transport the information between the WPs and between WP and Project Management (KTH)<sup>1</sup>.

Furthermore there will be project meetings for thematic and organizational discussions about 4 times per year.

All partners should be well informed about the deliverables of the project. Please read the description of the communication flow concerning deliverables to know how to reach that.

For REEEM publications and publications using the output of our common research please have a look at communication flow concerning publications.

If you want to suggest a change concerning the communication guidelines please discuss that with the lead of task 7.2. (RLI: Berit Müller). Approval of any changes has to be done by the Project Management (KTH: Georgios Avgerinopoulos).

### Sharepoint

The working space for REEEM on Sharepoint is provided by DTU for optimal communication and exchange between the consortium members and to facilitate optimal project management. Access to Sharepoint is restricted to consortium partners and the Project Officer (need to log in) and all of them have access to all content of the REEEM working space on Sharepoint.

For any communication or exchange issue in REEEM - please reflect prior to any other solution if you can manage that with Sharepoint.

E.g. instead of writing mails and sending documents you can work on it together in your WP-Folder on Sharepoint and you can set alerts<sup>2</sup> to be informed immediately when something has been added.

The central sites of Sharepoint - REEEM are the **Tasks**, the **Calendar**, the **Documents** and the **Wiki** (REEEM manual). You find all that (and more) on the left side navigation bar. If you are on a site where you don't see the navigation bar and you want to come back to it (e.g. while working on a common document) you can use the "REEEM-flag" on the left top of the site.

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<sup>1</sup> You find detailed information about "General operational procedures for all Consortium Bodies" in chapter **6.2** of the consortiums agreement

<sup>2</sup> On the wiki-page explanations of how to work with Sharepoint are included (e.g. editing a wiki, setting alerts etc.)



### Pilot thought experiment: 80% CO<sub>2</sub> emissions

The pilot thought experiment is simply set up to facilitate the c

**Tasks:** Going on "Tasks" you find the Gantt chart of the project. To look into the single tasks you have to go to "all tasks" and then click the one you want to see.

The screenshot shows the REEEM web application interface. On the left is a navigation menu with items: Home, Notebook, Documents, Tasks, Calendar, Invite Users, Recent, REEEM manual (wiki), and Site Contents. The 'Tasks' menu item is highlighted. In the main content area, the word 'Tasks' is displayed with two downward-pointing arrows below it. Below 'Tasks' are three tabs: 'Gantt chart', 'All Tasks', and 'Calendar'. The 'Gantt chart' tab is active, showing a table of tasks and a corresponding Gantt chart. The table lists tasks under two work packages: WP1 'Transformation Strategies and...' and WP2 'Technology and Innovation'. The Gantt chart shows horizontal bars representing task durations on a timeline from 1/31/2016 to 2/7/2016.

Task Name	1/31/2016	2/7/2016					
WP1 "Transformation Strategies and..."	[Gantt bar]						
T1.1: Formulation of pathways and...	[Gantt bar]						
T1.2: Pathway diagnostics	[Gantt bar]						
T1.3: Impact assessments and strate...	[Gantt bar]						
WP2 "Technology and Innovation"	[Gantt bar]						
T2.1: Develop Technology and Inno...	[Gantt bar]						
T2.2: Map out the 'Innovation Read...	[Gantt bar]						

For the beginning KTH decided that they edit all the tasks and all partners have to send the information they want to include to them.

You can activate an [alert](#) for any Task you want to see if it is changed. And you can share the Task with other partners. The following picture shows you how to do so and informs you about all the information stored in the tasks.

BROWSE VIEW

Version History Alert Me

Shared With

Delete Item

Manage Actions

Home

Notebook

Documents

Tasks

Calendar

Invite Users

Recent

REEEM manual (wiki)

Site Contents

Task Name T1.2: Pathway diagnostics

Start Date 2/1/2016

Due Date 1/31/2017

Assigned To

% Complete 0 %

Description

Predecessors

Priority (2) Normal

Task Status Not Started

Related Items

Date and Time

Content Type: Task

Created at 3/1/2016 12:04 PM by  Giorgos Avgerinopoulos

Last modified at 3/1/2016 12:07 PM by  Giorgos Avgerinopoulos

See also

- WP 1 Transformation...
- WP 1 Transformation...
- T1.1: Formulation of ...
- READ ME FIRST!!!
- WP7 Stakeholder en...

Close

It is very useful to attach the links to the according folders and documents. So it is easy to start working on a task. That will also be the way to attach discussions directly to a task (if we don't find an easier way).

**Calendar:** You have access to a Calendar via the left side bar of Sharepoint. The shared calendar enables to show, add, delete, and edit common events.

2016

April 2016

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
28	29	30	31 11:00 - 12:00 WP conference cal	1	2
4	5	6	7 11:00 - 12:00 WP conference cal	8	9
11	12	13	14	15	16
18	19	20	21 11:00 - 12:00 WP conference cal	22	23
25	26 1st Workshop (Stockholm)	27	28	29	30 Deadline for

Calendars in View

Calendar

Home

Notebook

Documents

Tasks

Calendar

Invite Users

Recent

REEEM manual (wiki)

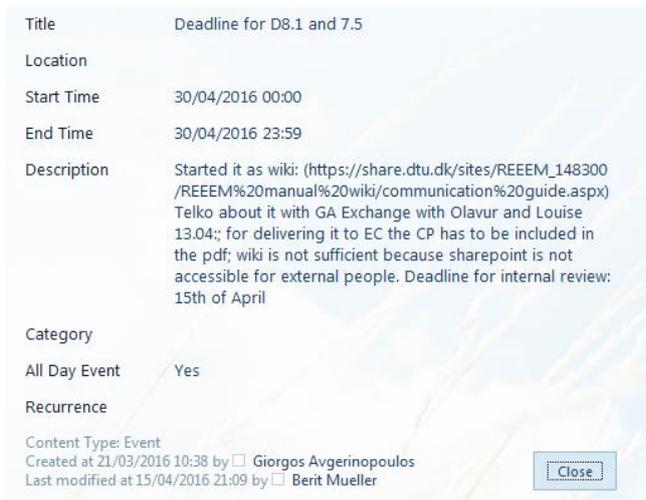
Site Contents

Partners are invited to indicate on the calendar:

- Dates of meetings – Executive Committee meetings, General Assemblies, meetings with EC
- Internal deadlines related to deliverables
- Dates of Workshops and Conferences

Please link all further information about the events to the calendar entries.

You can also put updated information in the event. The events template looks like the following example:



Also the tasks can be displayed as a Calendar through to a flag on the Tasks side - then you see all the Tasks in a Calendar-Form. These two calendars are not yet synchronized (or coupled) but this is a future task.

**Documents:** Here you find all shared documents in order of the work packages. All final deliverables are in an extra-folder. The documents space is not only to store documents but also to collaborate on documents.



In the documents space folders for all WPs and Tasks have been created. In order to sustain a certain level of consistency, please follow the instructions below.

1. Upload documents only to the relevant task folder. For instance, if you want to upload a document related to T1.2, use folder T1.2 Pathway diagnostics. Here you can upload draft and

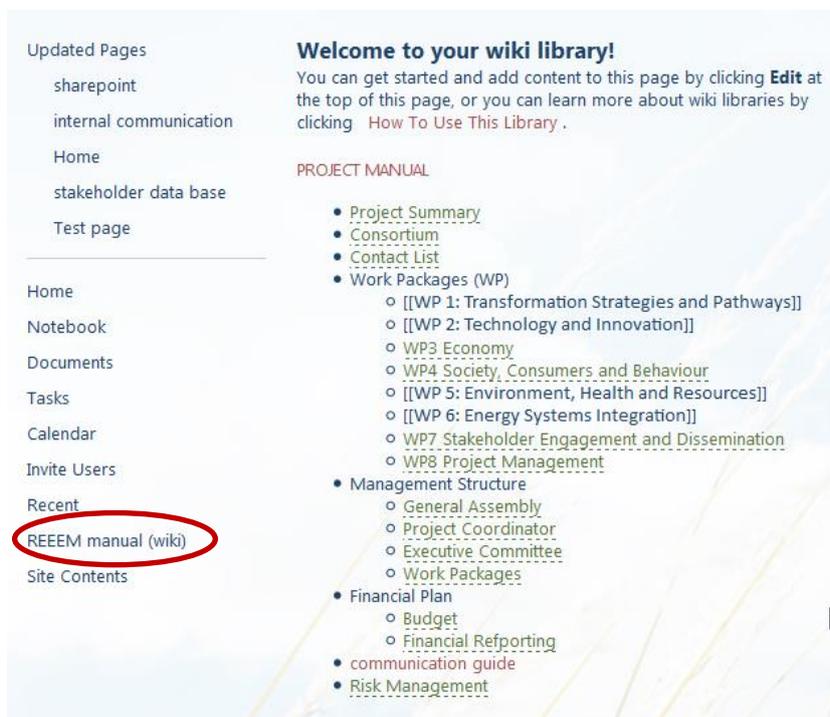
working documents, in other words whatever you want to share with other people and would make your life easier.

2. The final documents that have to go public (in other words, the deliverables) must be uploaded to the relevant folder (Deliverables). Whether or not you want to keep a copy in the subtask folder as well is entirely up to you. Please name the deliverables using the terms as defined in the proposal. In case one deliverable consists of 2 or more parts, please use letters to define the order. For example, D4.1a and D4.1b.

3. Anything related to meetings (general assembly, executive committee, workshops) has to be sent to KTH (Georgios Avgerinopoulos) and not uploaded directly.

4. Always edit documents using the Web Apps and not the offline Microsoft Office tools. If it is not working please always upload a document that you changed in your office with the same name as before. That will assure the version control.

**Wiki:** The wiki is our REEEM information point for organisational questions, technical explications and everything beyond the content of the calendar, tasks and documents. Use the entry through to the main wiki page or the search function to find the according wiki pages.



If you discover new functions that might be interesting for others share it! => describe it and link it in the wiki.

If there is something unclear in processes of the project than that has to be worked out with the Project Management and finally it has to be added to the project manual/communication guide in the wiki.

### Communication flow concerning deliverables

The following process is shaped for all deliverables of REEEM. If for any reason it cannot be met for a deliverable that has to be communicated with the project management and the partners should be informed.

When you start working on a Deliverable please note that in the calendar in the deliverable event already created by PM. The responsible person has to point out the involved partners from whom he wants to get feedback by putting their names in the same calendar entry. The partners should be asked for in an early enough stage.

All partners should have the possibility to comment the deliverables before they are finalized and sent to the commission. Therefore the deliverable should be at least 2 weeks before deadline sent<sup>3</sup> to the Project Management (KTH: Georgios Avgerinopoulos) (PM) who will forward it to the partners. The partners have one week time to comment on it.

The final version will be uploaded to the deliverables folder by the PM and he will send it to the Project Officer (INEA: Manuela Conconi) earliest 3 days after putting it in deliverables folder => everybody should have an alert on the folder to be informed about deliverables that will be sent soon.

#### Communication flow concerning publications

In order to ensure that all partners are aware of REEEM upcoming, ongoing and recent research work, the following practices are suggested<sup>4</sup>:

Publications that are part of the deliverables shall be treated according to the communication flow of deliverables.

For any other planned publication a prior notice shall be given to the other partners at least 45 calendar days before the publication. Any objection to the planned publication shall be made in accordance with the Grant Agreement in writing to the Coordinator and to the Party or Parties proposing the dissemination within 20 calendar days after the date of the abovementioned prior notice. If no objection is made within the time limit stated above, the publication is permitted.

This process shall be regarded during the project and for a period of 1 year after the end of the project not only for publications and presentations but for any form of dissemination of own Results with the exception that every joint owner of a result shall be entitled to use their jointly owned results for internal noncommercial research and teaching activities on a royalty-free basis, and without requiring the prior consent of the other joint owner(s).

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<sup>3</sup> Best is: send a link to the document on Sharepoint

<sup>4</sup> You find detailed information about dissemination and ownership of results in chapter 8 of the consortiums agreement

## 5.2 External communication

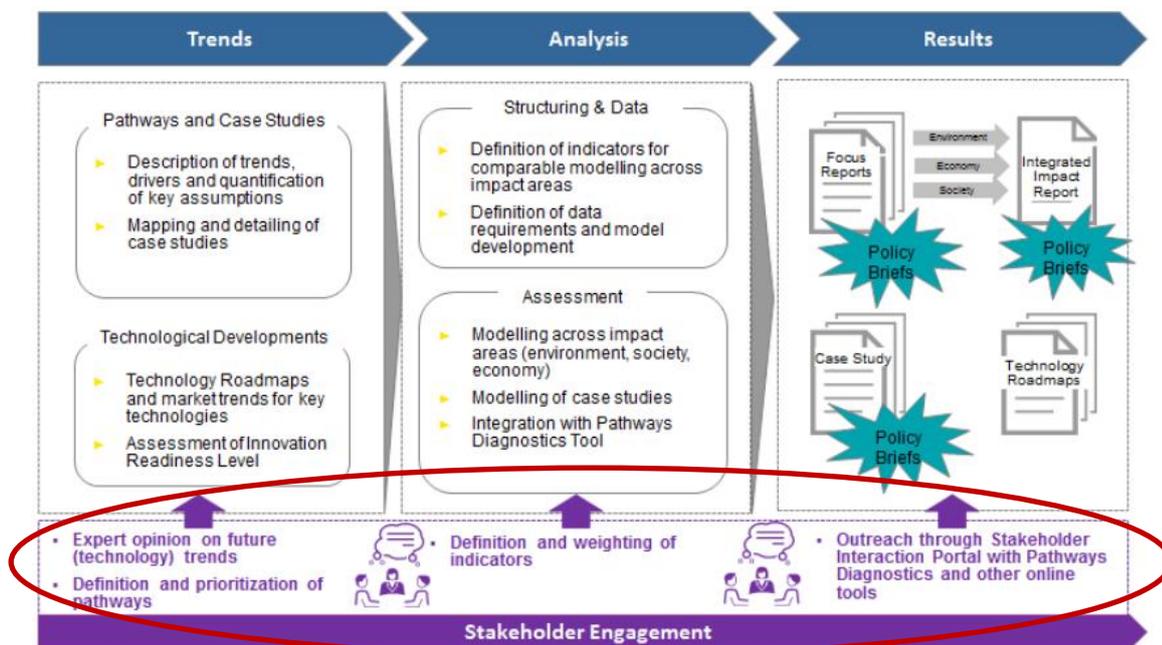
Two of the four main objectives of the project are concerning stakeholder communication:

1. **Creating a science-policy interface:** Enable policy makers to understand the implications of the pathways and derive supportive strategies. Process the knowledge on the implications of different technology measures adjusted to the needs of decision makers involved in policy making and energy strategy formulation. Provide a range of dissemination materials and decision support tools to raise awareness and increase the participation in the energy policy debate.
2. **Establishing Transparency:** Enable others to challenge assumptions by ensuring all model development will be open source, by publishing data sets developed within this project and by providing thorough and clear documentation of the work developed within REEM. Develop educational material such as e-learning tools for this purpose, (Note: If the use of proprietary data will be beneficial for the final output, access to this data will need to comply with any proprietary requirements. The use of such data will however be avoided).

As already mentioned in the two points this includes that a lot of tools and deliverables are due to stakeholder communication.

One objective of the project is to fuel the common debate about the transformation of energy supply in Europe on the one hand with relevant and valid simulation results and on the other hand with publicly available tools and information to get involved into the development of new pathways.

Therefore a very broad variety of stakeholders have to be reached. The following chart taken from the proposal shows the continuous stakeholder integration along the whole project.



Various means of communication will be used for that. The description below of the already planned means as the REEEM website (<http://reeem.org/>), the Stakeholder Interaction Portal and the Observatory site as well as publications and workshops are the state of planning at the beginning of the project. The table is included on Sharepoint and has to be updated by the partners throughout the project.

### Stakeholder communication

As the stakeholder community is addressed from the side of various WPs this has to be harmonized. The following table gives an overview of the already planned events and publications with the months of submission and the responsible partners:

	3	6	9	12	15	18	21	24	27	30	33	36	39	42
Stakeholder Interaction Portal														TOK
Pathways Diagnostic Tool														TOK
European Modelling Forum					RLI									
Open-source Engagement Model							KTH							
Energy Systems Learning Sim							TOK							
Policy Briefs							UCL	KTH, DTU, LEI		UST, UCL		DTU, UST, EIHP		KTH, UST, UCL, DTU
Focus Reports														
Integratet Impact Reports														
Case Study Report														
Technoology Roadmaps						KIC				KIC				KIC
Project Reports						KTH				KTH				KTH
3 technology WSs with 10 participants		?	KIC	?	?	?	?	?	?	?	?	?	?	?
1 WS carbon leakage, 10-15 partic.				?	?	UST	?	?	?	?	?	?	?	?
2+ WS case studies (WP6), 10-15 partic.					?	?	?	LEI	?	?	?	?	?	?
1 WS district heating, 10-15 partic.					?	?	?	AALTO	?	?	?	?	?	?
1 WS Ecosystem Services, 10-15 partic.				?	?	KTH	?	?						
2 WS pathway definitions, 30 partic.			KTH	a.o.										
T 1.2: pathway indicators		KTH	a.o.			report								

**Dates of Workshops have to be planned and harmonized**

Table: Timetable on deliverables for stakeholder communication

Every partner has to include the planned events also in the Sharepoint calendar.

In the Sharepoint folder of Task 7.2 you find the following table that gives an overview of the already planned stakeholder communication and the involved partners. Find below the planned workshops and more with subject, scope, target audience and tentative timeline.

linked to Task	responsible	subject	communication tool/channel/ scope	audience	date (tentative timeline)
1.1	KTH	stakeholder engagement for the definition of pathways	Stakeholder Interaction Portal 2 Workshops with 30 participants/WS	broad variety of SH (including Politicians, civil society, Economy,...)	2017
2.1	KIC	guidance of the development of Technology Roadmaps along the dimensions of technology maturity and market acceptance potential	expert panels programme and project assessments as well as in-house internal foresight exercises Stakeholder Interaction Portal 3 Workshops with 10 participants/WS	decision makers and actors from industry, academy and finance	not yet defined
3.3	USTUTT	allocative impacts (e.g., net job creation jobs, growth) and distributional impacts of energy transition strategies	policy recommendations	politicians	
		refine the scope of this case study on EU carbon leakage and competitiveness	Workshop (1 with 10-15 participants)	not yet defined	not yet defined
4.3	AALTO	refine the scope of a case study on district heating, focusing on cities	Workshop (1 with 10-15 participants)	not yet defined	not yet defined
5.4	KTH	refine the scope of a case study on ecosystem services	Workshop (1 with 10-15 participants)	not yet defined	not yet defined
6.4	LEI	refine the scope of the case studies on energy security of the Baltic region and Finland and about Grid and dispatch in South Eastern Europe	Workshop (2 or more with 10-15 participants)	not yet defined	not yet defined
6.1	RLI	Transparent description of assumptions and the resulting data, ensuring the reproducibility of the case studies	promotion of the open data base	Energy system modellers, Researchers	end of 2017
7.2	RLI	exchange on European energy model development and application	modelling conference (European modelling forum )	Energy system modellers, Users of energy system models	2017
7.3	KTH	enable external stakeholders to modify key parameters in a multi regional model to get a better understanding of how sensitive the model is to certain key assumptions	open source engagement model	Interested stakeholders from the various groups, Energy system modellers	end of 2017
7.4	TOKNI	Strengthening the knowledge base for decision-making and constructive dialogues	Learning Simulation	All interested stakeholders, educational institutions	Qu 1 of 2018
WPs 1,3,4,5, 6	KTH, USTUTT, UCL, DTU	An analyses of the implications of the technology pathways on the EC's work and a proposition of energy strategy recommendations	policy briefs	Policy makers	see Time-table on deliverables for stakeholder communication
WPs 3,4,5	USTUTT, UCL, DTU	improve the present knowledge base regarding the impacts of developments in sustainable energy technologies	focus report	Stakeholders from the three impact areas economy, society and environment; Policy makers	see Time-table on deliverables for stakeholder communication
WP 1	KTH	Provide a balanced assessment of the implications of various technology pathways based on their impacts across the economy, the society and the environment	Integrated Impact Reports	Policy makers, Industry stakeholders	see Time-table on deliverables for stakeholder communication
all	all	ensure that the project work is highly relevant from an academic perspective and known to peers within the research community	Publication of peer reviewed papers	Scientists/ researchers, Academics	not yet defined

Beside this first overview a stakeholder data base will be created that has to be updated regularly by the partners to prevent double addressing of stakeholders and to coordinate the Workshops. The table with the first overview will be used in the beginning and later on it will be replaced by actualized views of the stakeholder data base. The database (in the beginning the table) should be

used to plan events and publications. Please always involve RLI in the planning of stakeholder communication.

#### Means of communication

**The REEEM website (<http://reeem.org/>)** will inform about the project, the consortium, the financing of the project and the possibilities of participation (Workshops, conferences, publications, stakeholder interaction portal (SIP)). From the REEEM website all relevant connected information or portals can be reached through to links (e.g. observatory, H2020).

The **Observatory** is the already established organ of the project “INSIGHT-E” which will end by the end of the year 2016. It may be planned to shift the responsibility for the Observatory to REEEM to have continuity for the stakeholders already familiar with it. The deliverables of REEEM (policy briefs, reports, etc.) could then be published primarily through to the Observatory site. As there are already interactive functionalities on this site it will be evaluated if the Stakeholder Interaction Portal can be completely integrated in the Observatory site.

The **Stakeholder Interaction Portal** will actively engage stakeholders. It will provide access to pathways, assumptions, sources, modelling tools and the learning simulation. It will enable to retrace the simulation results and enable modellers to compare them with their own simulations or to reproduce the simulations done. Further, it will host the Pathways Diagnostics tool and it will link to the Pathways Database.

#### Stakeholder data base

As already mentioned above the stakeholder data base is the base for the external communication of REEEM. We will start with the expert database from the project INSIGHT\_E. Every partner is going to add the contacts he wants to involve in the stakeholder engagement (please always be sure that they agree to be part of the stakeholder list) and stakeholders will be able to subscribe to the database themselves as well.

The stakeholder data base is the heart of our outreach. It allows the consortium to find relevant experts to be consulted for its research work, and enables to keep in touch with this network and it allows external experts to be contacted for consultations, workshops, webinars, and other potential REEEM activities, specifically for those activities that concern their fields of expertise.

We have to work on having really European wide experts being part of it. The stakeholder data base gathers information on the experts like contact details, function, fields of expertise, and previous experience with REEEM.

It is planned to improve the stakeholder data base along the project to serve also as information point about stakeholder involvement in REEEM.

The stakeholder database is only accessible to consortium partners. You are all able to search through and update the database.

Consortium partners are encouraged to add to the database new experts they have been in touch with as part of their research for REEEM. In this case, they can:

- Create a profile for them if they have their agreement, and sufficient data corresponding to their expertise. Please note that profiles can be updated.
- Send to RLI the names and email addresses of these persons; They will send them a link to create their profile.

The stakeholder database should be continuously updated with the information concerning REEEM (e.g. who will get the produced information/publications) or who should be invited to which WS to facilitate a harmonised planning of the events) that will allow to harmonize stakeholder approach between the WPs.

For a regular update of the database all stakeholders should be remembered that they are part of it and get the possibility to update or delete their profile (responsibility has tbd).

The Data Base is not yet prepared to work with. The EC will be informed as soon as this is the case.

In case a member of the EC is to gain access to Sharepoint in order to review the entire communication plan at any point, he/she could get it by contacting KTH (Georgios Avgerinopoulos).

#### Communication flow concerning stakeholder engagement

In the case you plan a publication, an interview or an event where you address stakeholders in the name of REEEM communicate that to task leader of task 7.2 (RLI) as soon as you plan it. It will be checked that there is no cross posting to the stakeholder. If there is another contact planned with the same stakeholder it has to be checked if that can be done in one action (mail, personal contact, etc). The planned contact and reason will be added to the information in the data base.

For all WS there should be the information about who has been invited to it and who attended the WS. The information should be uploaded to the meetings folder in Sharepoint.

The planning of the approximate dates of the upcoming events (Workshops etc.) will be done in accordance with the consortium (preferably at the common meetings).

As soon as the date is fixed the event has to be inserted in the Sharepoint calendar. All partners are requested to put an alert on calendar changes to be informed about the events.

All partners have to be informed about the invitation to a REEEM event as soon as it is sent to the stakeholders.

#### Communication to EC

The communication to the EC concerning project management of REEEM and deliverables has to be done by the PM (KTH: Georgios Avgerinopoulos). As already mentioned above they will be the only contact person for that.

## 5.3 Tools for Communication

The tools for communication that are recommended from Project Partners will be collected and spread along the project. You will find the growing list on the wiki page. So far you can find: Sharepoint as project management platform and yED (open source software) for flow charts; that should be extended with communication methods/tools used in Workshops etc.

## 6. RISK MANAGEMENT

### Lead Author/sub WP Leader

Risk will be managed starting from the smallest possible functional unit, i.e., the Authoring Teams of sub-WP (e.g., Scenario Information System, Report Consolidation, etc.). In a first approach, the aim will be to mitigate any identified risk within these teams. E.g., if key personnel falls sick, a substitute will be identified. In the case that a mitigation within the teams is not possible, the Lead Author or sub-WP Leader will inform the WP Leader, who will then take corrective actions. For example, this could be to identify an additional partner to join the Authoring Team.

### WP Leaders

The WP Leaders will be in charge of ensuring the overall timely delivery of the outputs by proactively engaging with the teams to ensure they are on top of the process. They will be in charge of taking any corrective/mitigation action in case they identify any potential risks or if asked to do so by the Lead Author/sub WP Leaders. Further, they will ensure that sufficient effort is allocated to the individual outputs, keeping in mind the upcoming deliverables over the project period. In case there is a chance that a mismatch will occur, i.e., that too many or too few work months might be available within the work package, the WP Leader will immediately notify the EXCOM.

### Executive Committee

The Executive Committee will keep an overview of the time allocations within each work package and ensure that the requirements of each WP from the others are adequately met.

### General Assembly

Major risk mitigation measures will be reported to and approved by the General Assembly. This may include, for example, declaring a party as a Defaulting Party. Refer to the Consortium Agreement for further details.

### Critical Implementation risks and mitigation actions

<b>Risk number</b>	<b>Description of risk</b>	<b>WP Number</b>	<b>Proposed risk-mitigation</b>
R1	Managerial risk - Partner leaving the Consortium	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP8	The setup of the Consortium allows for most tasks to be taken over by another project partner. Every WP relies on at least two very experienced partners. Should it still be impossible to identify another Consortium partner to take over a task, a replacement needs to be found outside the Consortium.
R2	Managerial risk – Change of personnel	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP9	A system with open files accessible to all project partners facilitates a change of personnel. The Consortium will take measures so that knowledge for carrying out each set of tasks is not concentrated at a single person or partner.
R3	Managerial risk - Staffing & Recruitment Problems	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP10	The partners already employ a high number of qualified staff in the fields required. This risk is balanced as every partner is responsible for their own staffing.
R4	Managerial risk - Costs are higher than budgeted	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP11	The budget of the project partners has been calculated accurately. However, additional resources may be mobilised in case the costs are higher than calculated.
R5	Technical risk – Unsynchronised outputs from different WPs	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP12	While some of the final deliverables are dependent on other deliverables, the WP structure is designed to allow for the work itself to be developed largely independently by experts in each WP. WP1 and WP8 will ensure that synchronicity of delivering the outputs is maintained across all WP and that all cross-WP linkages are functioning well.

R6	Technical risk - Specific output does not satisfy	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP13	The consortium members are well experienced in the elaboration of reports and the provision of policy advice. As a close cooperation and continuous exchange with the EC is foreseen, possible difficulties with regards to output quality can be identified at an early stage and eliminated immediately.
R7	Technical risk – Maintaining consistency of pathways across the various work packages and modelling tools	WP1	Frequent meetings and teleconference calls with WP2, WP3, WP4, WP5, and WP6 to discuss pathways defined in WP1. Specific assumptions used in the model(s) of each WP will be made explicit and harmonised across all WPs.
R8	Technical risk – Ensuring consistency of outputs of Integrated Energy System model	WP6	A consolidation of results to ensure that a unified, comprehensive analysis will be performed, placing the assessment dimensions (technology, environment, economy, society) on an equal footing and employing the pathway diagnostics developed WP1.
R9	Technical risk - Malfunctioning of the online platform	WP7	The Consortium is highly experienced in setting up and maintaining online platforms and databases. In case of technical difficulties, each project partner can make use of qualified own personnel/inhouse staff.

# ANNEX I: REPORTING TEMPLATE

## Official Financial Reporting Template: Form

### FINANCIAL STATEMENT FOR BENEFICIARY KUNGLIGA TEKNISKA HOEGSKOLAN FOR THE REPORTING PERIOD 1

A. Direct personnel costs		Eligible <sup>1</sup> costs (per budget category)								Receipts		EU contribution		Additional information	
		B. Direct costs of subcontracting		C. Direct costs of fin. support		D. Other direct costs		E. Indirect costs <sup>2</sup>		Receipts	Reimbursement rate %	Maximum EU contribution <sup>3</sup>	Requested EU contribution		
		Actual	Unit	Actual	Actual	Actual	Actual	Flat-rate <sup>4</sup>	Total costs						
A.1 Employers (or equivalent) A.2 Natural persons under direct contract A.3 Seconded persons [A.6 Personnel for providing access to research infrastructure]		A.4 SME owners without salary A.5 Beneficiaries that are natural persons without salary		D.1 Travel D.2 Equipment D.3 Other goods and services		D.4 Costs of large research infrastructure		Flat-rate <sup>4</sup> 25%		Receipts of the action, to be reported in the last reporting period, according to Article 5.3.3				Costs of in-kind contributions not used on premises	
Form of costs <sup>5</sup>	a	Total b	No hours	Total c	d	e	f	g	h=0,25x (a+b+c+f+g) =0						i=0,25x (a+b+c+f+g) =0
KTH	100419.18	8.00			8.00	910.22	12170.14		5106.33	27967.87		100	27967.87	27967.87	0.00

The beneficiary/linked third party hereby confirms that:  
 The information provided is complete, reliable and true.  
 The costs declared are eligible (see Article 6).  
 The costs can be substantiated by adequate records and supporting documentation that will be produced upon request or in the context of checks, reviews, audits and investigations (see Articles 17, 18 and 22).  
 For the last reporting period, that all the receipts have been declared (see Article 5.3.3).

Please declare all eligible costs, even if they exceed the amounts indicated in the estimated budget (see Annex 2). Only amounts that were declared in your individual financial statements can be taken into account later on, in order to replace other costs that are found to be ineligible.

- (1) See Article 6 for the eligibility conditions
- (2) The indirect costs claimed must be free of any amounts covered by an operating grant (received under any EU or European funding programme; see Article 6.2.E). If you have received an operating grant during this reporting period, you cannot claim any indirect costs.
- (3) This is the theoretical amount of EU contribution that the system calculates automatically (by multiplying the reimbursement rate by the total costs declared).
- (4) See Article 5 for the form of costs
- (5) Flat rate: 25% of eligible direct costs, from which are excluded: direct costs of subcontracting, costs of in-kind contributions not used on premises, direct costs of financial support, and unit costs declared under budget category F if they include indirect costs (see Article 6.2.E)
- (6) Only specific unit costs that do not include indirect costs

None

## ANNEX II: GANTT CHARTS

