Environment and Climate Regional Accession Network ECRAN

Environment and Climate Regional Accession Network (ECRAN)

Modelling: Training Module 1

04-07 November 2014, Skopje

Enviroment and Climate Regional Accession Network ECRAN

ENVIRONMENTAL AND CLIMA REGIONAL NETWORK FOR ACCESSION - ECRAN

WORKSHOP REPORT

Activity No 3.1. SUBTASK 1.1.C

ECRAN MODELLING: TRAINING MODULE 1

PRACTICAL TRAINING ON QUANTITATIVE MODELS AND SCENARIO DEVELOPMENT ON ASSESSING CLIMATE AND ENERGY POLICY OPTIONS AND SETTING EMISSION TARGETS

04-07 NOVEMBER 2014, SKOPJE, MACEDONIA

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LIST OF ABREVIATIONS	
LEAP	Long-range Energy Alternatives Planning System
EE	Energy Efficiency
EED	Energy Efficiency Directive
EMF	Energy Modelling Forum
ESD	Effort Sharing Decision
EU	European Union
GHG	Greenhouse Gas
IEA	International Energy Agency
IEA DSM	International Energy Agency Demand Side Management Programme
LEDS	Low Emission Development Strategies
LULUCF	Land use, Land use change and Forestry
MS	Member State
NEEAP	National Energy Efficiency Action Plan
PAM	Policies and Measures
RES	Renewable Energy Sources
SEI	Stockholm Environment Institute
UNFCCC	United Nation Framework Convention on Climate Change

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I. Background/Rationale

There is a need to start developing concrete climate policies based on full alignment with the EU Climate acquis and GHG emission reduction target setting. At present the absence of national or regional targets and roadmaps towards implementation of these targets hamper the development of robust climate policies in the region and thus low emission development. ECRAN could provide the platform to start a regional work on this topic. Climate policy related strategy development as well as fulfilling the reporting requirements of Annex I countries towards the UNFCCC, similarly to the EU acquis requires detailed modelling of emission scenarios on country level.

In most ECRAN beneficiaries there is experience in modelling aided scenario work, especially in the framework of the preparations of National Communications. However, in many cases this work has been designed and outsourced by international organisations or other external organisations without adequate involvement or ownership of the results by the countries. As such, the knowledge base within the administrations on modelling aided scenario work is limited.

In terms of technical requirements, the focus of the training will be on one specific modelling platform, the Long-range Energy Alternatives Planning System (LEAP*)* which has been developed by the Stockholm Environmental Institute. Of the 8 beneficiaries 6 are already using LEAP, and one (Kosovo*[1]) has expressed interest in using it. The training program will be organized into four modules to be conducted during one year:

- Module 1 – Introduction to modelling techniques and assessing data needs for the base year;
- Module 2 – Development of a baseline (without measures) scenario;
- Module 3 – Development of with measures and with additional measures scenarios and sensitivity analysis;
- Module 4 – Gap analysis and identification of further technical capacity building needs

The modules 1 and 4 will be organized back to back with Regional Training Workshops to ensure that capacity building of technical skills is delivered in combination with capacity building related to the selected EU Climate Acquis. This integrated delivery of capacity building related to policy and technical skills will increase the understanding of modelling as a policy tool which can promote policy-making based on evidence and analysis.

As the aim of the exercise is to increase capacity in public administrations, the tasks will as a general rule, target staff working at the public administration. In particular, the involvement of staff working on the climate, energy and transport policy in ministries, in providing technical support at government agencies and bodies, as well as staff, working at national statistical offices, is desirable. However, the heterogeneity of institutional arrangements for modelling among the ECRAN beneficiaries warrants a flexible approach in selecting the target audience of the trainings and follow-up activities. In some cases the national public administrations are working together closely with academia and prefer the continuation of existing working arrangements. In addition, although a general focus of capacity building activities on the public administrations seems to be the preferred option, low levels of capacity and overburdened staff may be an obstacle to active participation in trainings and follow-up activities. In such cases targeting academia in addition to staff of public administrations may be a better solution than inadequate participation on behalf of some of the beneficiaries.

To ensure active participation, ECRAN beneficiaries will be asked to commit that the experts nominated for the bottom-up exercise are allowed sufficient time for carrying out the work required under the different tasks, including attending seminars and conducting the follow-up activities. Experts from the beneficiaries are expected to spend 12 days participating in workshops, and a minimum of 15 days in follow-up activities

[1] *This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ opinion on the Kosovo declaration of independence.

implementing the regional pilot modelling exercise. The ECRAN team will be monitoring work progress to ensure that the exercise, which requires a significant commitment, is advancing as foreseen.

II. Objectives of the training

General objectives

The **wider** objective is to strengthen regional cooperation between the EU candidate countries and potential candidates in the fields of climate action and to assist them on their way towards the transposition and implementation of the EU climate policies as a key precondition for EU accession.

Specific objectives

The specific objective of the training program is to increase technical capacities in the countries to allow them to carry out modelling of emission scenarios. The modelling aided scenario work will benefit countries by helping them meet their future EU and UNFCCC reporting requirements, and to form a rational position on national efforts contributing to the EU 2050 roadmap and the 2030 Framework. It may also assist them by promoting evidence based planning in energy policy, including development of an energy strategy, energy efficiency action plan and a renewable energy action plan.

Depending on the circumstances of the national public administrations and their future plans to build modelling capacity inside or outside the public administration, the technical modelling skills can be used in one of two ways. If the chosen option is to carry out modelling work within the public administration the exercise will help building technical capacity and will provide a basis for future work. If the chosen option is to outsource modelling work, the exercise can help beneficiaries gain a better understanding of modelling work which will enable better communication with consultants, thereby ensuring that modelling is relevant to policymakers and that policymakers understand the limits of the work and are able to better interpret the results.

Results/outputs

The following results were expected from the regional exercise:

- The training workshop contributes to building technical capacities to carry out modelling of emission scenarios.
- The training enhances a better understanding of modelling work which will ensure that (future) modelling is relevant to policymakers and that policymakers understand the limits of the work and are able to better interpret the results
- The training provides a proper introduction on LEAP as well as provides the initial steps in filling the LEAP structure with country relevant data and building up a basic model
- The regional network of experts is strengthened.

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III. EU policy and legislation covered by the training

- **Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions** and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC. This regulation lays down a mechanism for monitoring and reporting GHG emissions and for reporting other information at national and EU level relevant to climate change. These provisions also apply to:
  - Reporting on the EU and its MS low-carbon development strategies;
  - GHG emissions from sectors and sources and the removals by sinks covered by the national GHG inventories;
  - GHG emissions;
  - The non-CO2 related climate impacts, which are associated with emissions from civil aviation;
  - the EU and its MS's projections of anthropogenic emissions by sources and removals by sinks of GHG not controlled by the Montreal protocol, and the MS' policies and measures relating thereto;
  - MS' actions to adapt to climate change.

- **The 2030 Framework for climate and energy policies**

  EU leaders agreed on 23 October 2014 to the internal 2030 greenhouse gas reduction target of at least 40% compared to 1990 together with the other main building blocks of the 2030 policy framework for climate and energy, as proposed by the European Commission in January 2014. This 2030 policy framework aims to make the European Union's economy and energy system more competitive, secure and sustainable and also sets a target of at least 27% for renewable energy and energy savings by 2030.

  While the EU is making good progress towards meeting its climate and energy targets for 2020, an integrated policy framework for the period up to 2030 is needed to ensure regulatory certainty for investors and a coordinated approach among Member States.

  The framework presented will drive continued progress towards a low-carbon economy. It aims to build a competitive and secure energy system that ensures affordable energy for all consumers, increases the security of the EU's energy supplies, reduces our dependence on energy imports and creates new opportunities for growth and jobs.

  - <u>Reducing greenhouse gas emissions by at least 40%</u>

    A centre piece of the framework is the binding target to reduce EU domestic greenhouse gas emissions by at least 40% below the 1990 level by 2030.

    This target will ensure that the EU is on the cost-effective track towards meeting its objective of cutting emissions by at least 80% by 2050. By setting its level of climate ambition for 2030, the EU will also be able to engage actively in the negotiations on a new international climate agreement that should take effect in 2020.

    To achieve the overall 40% target, the sectors covered by the EU emissions trading system (EU ETS) would have to reduce their emissions by 43% compared to 2005. Emissions from sectors outside the EU ETS would need to be cut by 30% below the 2005 level. This will need to be translated into Member State targets. The European Council has outlined the main principles to achieve this.

  - <u>Increasing the share of renewable energy to at least 27%</u>

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Renewable energy will play a key role in the transition towards a competitive, secure and sustainable energy system. The Commission proposed an objective of increasing the share of renewable energy to at least 27% of the EU's energy consumption by 2030. The European Council endorsed this target which is binding at EU level.

- Increasing energy efficiency by at least 27%

  The European Commission proposed a 30% energy savings target for 2030, following a review of the Energy Efficiency Directive. The proposed target builds on the achievements already reached: new buildings use half the energy they did in the 1980s and industry is about 19% less energy intensive than in 2001. The European Council, however, endorsed an indicative target of 27% to be reviewed in 2020 having in mind a 30% target.

- Reform of the EU emissions trading system

  The EU ETS will be reformed and strengthened. A 43% greenhouse gas reduction target in 2030 in the ETS translates into a cap declining by 2.2% annually from 2021 onwards, instead of the rate of 1.74% up to 2020.

  In January 2014 the Commission proposed to establish a market stability reserve from 2021 onwards. This is to address the surplus of emission allowances in the EU ETS that has built up in recent years and to improve the system's resilience to major shocks. This will ensure that in the future the EU ETS is more robust and effective in promoting low-carbon investment at least cost to society.

  The European Council underlined that a reformed, well-functioning ETS with an instrument to stabilise the market in line with the Commission's proposal will be the main instrument to achieve greenhouse gas emission reductions.

- New governance system

  The 2030 framework proposed a new governance framework based on national plans for competitive, secure and sustainable energy as well as a set of key indicators to assess progress over time. The European Council agreed that a reliable and transparent governance system will be developed to help ensure that the EU meets its energy policy goals.

- **Effort Sharing**

The current Effort Sharing Decision (Decision No 406/2009)) establishes binding annual greenhouse gas emission targets for Member States for the period 2013–2020. These targets concern emissions from most sectors not included in the EU Emissions Trading System (EU ETS), such as transport (except aviation and international maritime shipping), buildings, agriculture and waste. In the framework of the Effort Sharing Decision the sectors covered by the EU Emissions Trading System (EU ETS) would have to reduce their emissions by 30% compared to 2005. Emissions from sectors outside the EU ETS would need to be cut by 10% below the 2005 level.

In the framework of the 2030 Framework, the sectors covered by the EU Emissions Trading System (EU ETS) would have to reduce their emissions by 43% compared to 2005. Emissions from sectors outside the EU ETS would need to be cut by 30% below the 2005 level. This will need to be translated into Member State targets using the same methodology as in the current Effort Sharing Decision (Member State targets will vary between 0% -40%; Current GDP data will be updated; Member States with GDP/capita above the EU average: targets will be adjusted with cost effectiveness). The European Council agreed in October 2014 that a reliable and transparent governance system will be developed to help ensure that the EU meets its energy policy goals.

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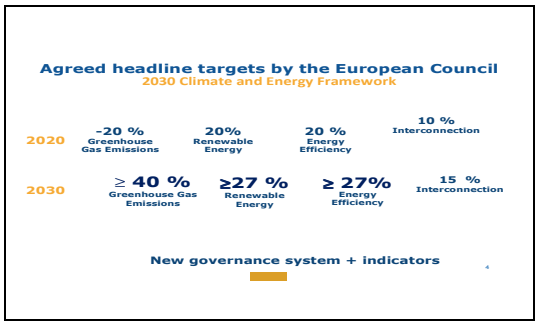
IV. Highlights from the training workshop

Reference is made to Annex I for the agenda, and Annex III for the presentations.

Introductory part to the training (theory)

Introduction to the Workshop – Imre Csikós

- Reference was made to Working Group 1 of ECRAN-Climate on Climate Policy and Climate Awareness, that aims at preparing the groundwork for further activities in the ECRAN beneficiaries on developing climate policies and legislation converging with the EU Climate *Acquis*
- The agreed headline targets of the European Council of the 2030 Climate and Energy Framework were presented.



- In terms of emission reductions in the ETS sector this will mean an additional reduction from the current pathway of -21% in 2020 to -43% in 2030. For the non-ETS Sector this will imply an additional reduction from the current pathway of -10% in 2020 to -30% in 2030.
- A 43% greenhouse gas reduction target in 2030 in the ETS translates into a cap declining by 2.2% annually from 2021 onwards, instead of the rate of 1.74% up to 2020.
- For the non-ETS sectors Member State targets will vary between 0% to -40%. The current methodology to determine the effort sharing between Member States will be maintained (with an update on GDP data). For Member States with GDP/capita above the EU average, the targets will be adjusted with cost-effectiveness. There will be enhanced flexibility to ensure cost-efficiency, including new flexibility subject to several constraints. There is a possibility to convert a limited number of allowances for auctioning in the EU ETS into non-ETS emission budgets.
- ECRAN has increased ambition to engage candidate countries and potential candidates to converge with the EU Climate acquis and with the EU Climate policies. Key issues are to ensure building capacity of the beneficiaries, and not of local consultants, as well as to ensure higher involvement from other sectors with direct relevance to climate issues. Achievements of previous ECRAN workshops within this WG were briefly presented including::
    - Workshop on Regional Capacity for Developing Low Emission Strategies and Modelling, in January 2014, in Zagreb, Croatia;
    - Training Needs Assessment on Modelling and Emission Scenario Development from February to April 2014;
    - Contributions to the 2015 Global Climate Agreement Seminar in October 2014, in Brussels, Belgium.
- In order to carry out the Regional Training Exercise a series of 4 modules will be implemented. These are the following:
    - Module 1 – Introduction to modelling techniques and assessing data needs for the base year (current workshop);
    - Module 2 – Development of a baseline (without measures) scenario;

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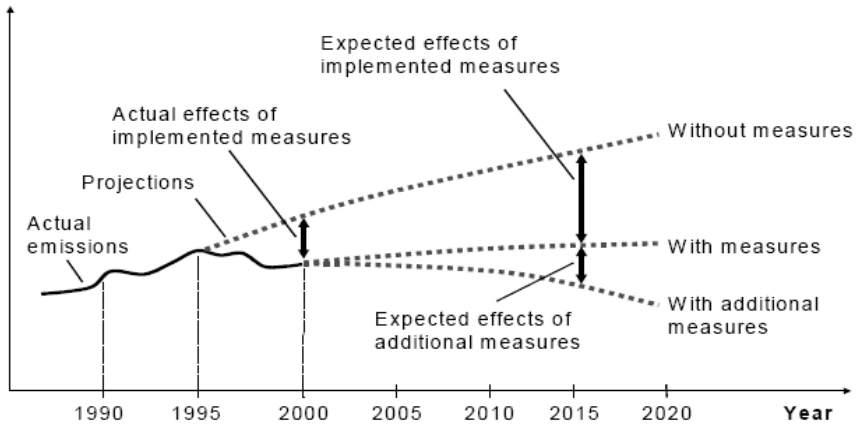
- Module 3 – Development of with measures and with additional measures scenarios and sensitivity analysis;
- Module 4 – Gap analysis and identification of further technical capacity building needs.

- The specific objective of the Regional Training Exercise is to increase technical capacities in the countries to carry out modelling of emission scenarios. The modelling aided scenario work will benefit countries by helping them meet their future EU and UNFCCC reporting requirements, and to form a rational position on national efforts contributing to the EU 2050 roadmap and the 2030 Framework. It, may also assist them by promoting evidence based planning in energy policy, including development of an energy strategy, energy efficiency action plan and a renewable energy action plan.
- Depending on the circumstances of the national public administration and their future plans to build modelling capacity inside or outside the public administration, the technical modelling skills can be used in one of two ways. If the chosen option is to carry out modelling work within the public administration the exercise will help to build technical capacity and provide a basis for future work. If the chosen option is to outsource modelling work, the exercise can help beneficiaries gain a better understanding of modelling work which will enable better communication with consultants, thereby ensuring that modelling is relevant to policymakers and that policymakers understand the limits of the work and are able to better interpret the results.

Reporting on Emission Scenarios – Jozsef Feiler (ECRAN)

- The presentation introduced the evolution of project reporting to UNFCC dating from 1994. The presentation gave the structure and key elemtns of reporting which are required by the UNFCCC rules and checked by the expert review tems. Differences of without measures, with measures and with additional measures scenariosn were introduced. Along with the UNFCCC reporting requirements the EU reporting requirements were presented on the basis of a presentation provided by DG Clima.
- A hypothetical Party's projection for emissions of one gas was explained as graphically shown in picture 1:

Figure 1: Hypothetical Party's projection for emissions of one gas



Picture 1Ex-post and ex-ante evaluation of GHG mitigation policies and measures – Alexandra Novikova (IKEM, Germany)

- The presenter provided a historical overview of the energy policy evaluation, looking back to the past 40 years. She gave an introduction to the EU Directive on Energy End-Use Efficiency, the Effort Sharing Decision and energy efficiency action plans - and provided relevant examples of utilisation of bottom-

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up modelling as well as top down modelling examples in connection to policy evaluation. Several US evaluation protocols were also introduced.

- Energy policy evaluation started more than 40 years ago. In 1973, a first large oil shock occurred, leading to an understanding that energy security may be addressed not only with additional production of energy, but also with energy efficiency. Since then, numerous energy efficiency and later on climate mitigation policies have been designed and introduced worldwide.
- The evaluation of policies and measures under the EU Directive on Energy End-Use Efficiency and Energy Services (2006/32/EC) was briefly presented. According to the Effort Sharing Decision (ESD), member states have to report regularly on their energy efficiency activities and achievements in the National Energy Efficiency Action Plans (NEEAPs) to the European Commission. Bottom-up calculation methods for ESD calculation and harmonisation include:
    - Step 1: unitary gross annual energy savings (in kWh/yr. per participant or unit, average or individual);
    - Step 2: total gross annual energy savings (taking into account the number of participants or units, in kWh/yr.);
    - Step 3: total ESD annual energy savings in the first year of the EEI measures (taking into account double counting, multiplier effect, and other gross-to-net correction factors, in kWh/ year);
    - Step 4: total ESD energy savings achieved in 2016 (in kWh/ year, taking into account of the timing of the end-use (EEI) action and its lifetime.
- In addition, three levels of the harmonisation of data collection, and five general bottom-up methods for data collection and evaluation were shown, as well as Top-down calculation methods
    - Calculation of additional and all energy savings;
    - Three top-down calculation methods;
    - 14 case studies.
- The Energy Efficiency Directive (EED) contains Annex V, which provides a common framework for the measurement of the impacts of energy efficiency obligation schemes and equivalent measures. The envisioned methods are:
    - Deemed savings
    - Metered savings
    - Scaled savings (engineering estimates)
    - Surveyed savings
    - The calculation methods listed in the EED are similar to those used by EEO schemes today in the EU
- By the end of 2013 Member States had to inform the EC on their calculation methods chosen (alternative methods are allowed). Overall steps of evaluation standards were shown, including calculation of unitary gross energy savings, calculation of total gross annual energy savings, and calculation of total annual energy savings, followed up by detailed steps for each of the overall steps.
- International evaluation protocol will be published soon, and it stands for estimating and reporting the change in GHG emissions and removals resulting from policies and actions.
- Several US evaluation protocols were presented, such as :
    - State and Local Energy Efficiency Action Network. 2012. Energy Efficiency Program Impact Evaluation Guide;
    - National Action Plan for Energy Efficiency (2007). Model Energy Efficiency Program Impact Evaluation Guide;
    - U.S. EPA. 2008. *Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers*. National Action Plan for Energy Efficiency, etc.
- Cost-effectiveness of energy efficiency programs was presented, stating the key question and the approach to the solution. For example, for Participation Cost Test (PCT), whether the participants will benefit over the measure life, the summary approach would be the comparison of costs and benefits of the customer installing the measure.

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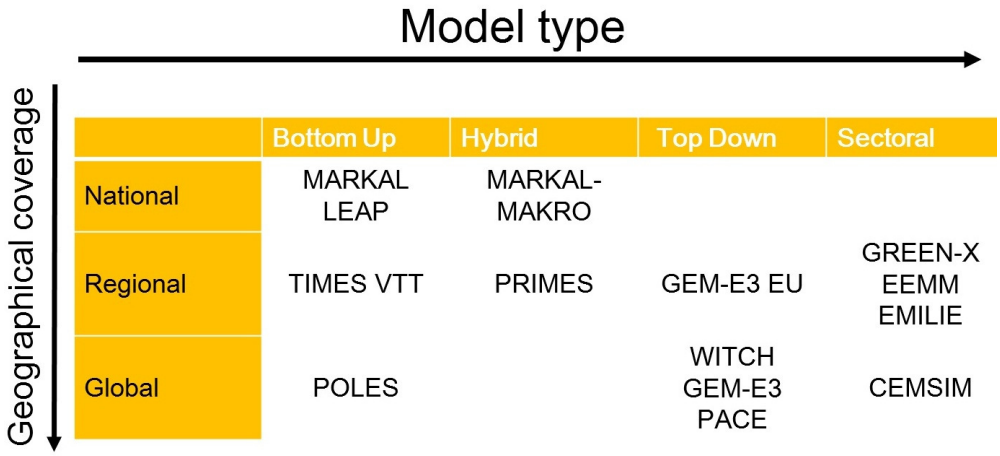
- Numerous resources website were provided to the evaluators and the participants.

Modelling Choices for Emission Scenarios – Laszlo Szabo (REKK, Corvinus University, Hungary)

- The main modelling objectives were explained, regarding the type of results we expect from the climate-energy models, which are the following:
  - Emission reporting (UNFCCC reporting, EC biennial reporting, etc.);
  - Scenario Assessment (differences in policy options to reduce GHG emissions, price impacts, system-wide impacts, etc.);
  - Impact Assessment (overall economic impact of GHG policies, impact on fossil fuel import bills, co-benefit of GHG policies, etc.);
  - Sectoral Assessment (Impacts on a power supply sector and on the transport sector, LULUCF, etc.).
- Modelling categories were presented to the participants, as shown on picture 2:



Picture 2

- The difference between global and national models was shown. Advantages of the global model are that global and regional fuel markets could be captured. However, the problem that occurs in the global model is that usually the model is not as detailed as national model regarding applied technologies and national Policies and Measures (PAMs).
- Energy models can be used for multiple purposes, such as in composition of climate policy assessment and national energy policies and strategies. Climate policy assessment has a long term outlook, usually from 15 to 30 years and it includes full emission coverage and full coverage of economy and/or environment, including LULUCF. On the other hand, national policies have a midterm outlook, usually from 5 to 15 years, and they focus on a specific sector.
- Some countries in the region have already selected a model to work with. usually, those models are:
  - MARKAL – calibrates to the national energy and economy;
  - LEAP – modelling in the national energy system in a more open framework.
- Both of these models are suitable for climate policy modelling, both are bottom-up models type, with detailed representation of energy consuming sectors and energy use technologies, with the possibility of incorporation of PAMs. However, the models are dependable of exogenous model results, where in order to set up consistent GHG reduction scenarios, input of certain data is needed, such as fuel prices, carbon price, GDP, technology learning rates, energy prices of neighbouring markets, etc. On the Energy Modelling Forum (EMF), comparison of different models was shown, as on the following picture:

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	Type	Coverage	Solution methodology
EPPA	CGE	global	Market equilibrium
FARM	CGE	global	Market equilibrium
GEM-E3	CGE	global	Market equilibrium
PACE	CGE	global	optimization
MERGE	Economic optimal growth model	global	optimization
WITCH	Economic optimal growth model	global	Market equilibrium
POLES	Partial equilibrium energy model	global	optimization
TIAM-UCL	Partial equilibrium energy model	global	optimization
TIMES-VTT	Partial equilibrium energy model	global	Market equilibrium
PRIMES	Partial equilibrium energy model	EU	Market equilibrium
Times EU	Partial equilibrium energy model	EU	optimization
PET	Partial equilibrium energy model	EU	optimization
EMELIE	Partial equilibrium electricity model	EU	Market equilibrium

Picture 3

- The conclusion is that no single model could answer all relevant policy questions. Nationally developed and operated energy models are essential and can incorporate the most precise, up to date information available at national level.

Experience of Promitheas – 4 project regarding policy analysis – Anna Flessa (National and Kapodistrian University of Athens, Greece)

- Promitheas – 4 "knowledge transfer and research needs for preparing mitigation/ adaptation policy portfolios" was a three-year project aiming to develop and evaluate mitigation/adaptation (M/A) policy portfolios and prioritization of research needs and gaps for twelve (12) countries (Albania, Armenia, Azerbaijan, Bulgaria, Estonia, Kazakhstan, Moldova, Romania, Russian Federation, Serbia, Turkey and Ukraine).
- The presentation demonstrated the development of policy portfolios, which included an overview of climate change policies, data collection and verification, scenario development, selection and implementation of LEAP, conclusion with LEAP results and the development of an effective policy mixture. Afterwards, a draft version of national reports was presented in national workshops held in 2013, and disseminated to relevant ministries. First training on LEAP was held in 2011 in Vienna with the aim to present the programme together with data requirements, and familiarize the participants with LEAP. The training had participants from 12 countries.
- A Knowledge transfer workshop was organized in Athens, having participants from 9 countries. The aim of the workshop was to present the previous four month preparation of scenarios together with the problem solving. Also, knowledge transfer contingency workshop was organised in Athens, with three group members from Ukraine, Russian Federation and Kazakhstan regarding the development of national policy mixtures for more complicated country cases.
- Needs and gaps of the Promitheas – 4 project were tabular shown:

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Countries	GHG inventory	Reporting	Verification	Availability of data
Albania	N	N, G	N	G+
Armenia	N, G+	N	N	N, G
Azerbaijan	N, G+	N	N	N, G+
Bulgaria	N	N	N	Go
Kazakhstan	N,G	N,G	N,G	N, G+
Moldova*	N, Go	N, Go	N, Go	G
Romania	N,G-	N	N	Go
Russia	N	N	N	N, G+
Serbia	N,G	N,G	N,G	N, G+
Turkey	N/A	N	N	G-
Ukraine	N	N	N	N, G+

Source: PROMITHEAS-4

N - needs, G – gaps with no clear picture, G-- limited amount of gaps, Go – moderate amount of gaps, G+ - considerable amount of gaps

*non-Annex I party with submitted GHG inventory for NAMAs and REDD+ (*Source:* https://unfccc.int/ghg_data/items/3962.php)

Picture 4

- Since the programme was concluded in 2013, the follow up activities included organisation of International Training Seminar on Climate Change Policies in Athens and participation in proposals under Horizon2020. Also, the Framework for Various Approaches under UNFCCC aims to promote cost effectiveness of mitigation actions stating that parties may individually or jointly develop and implement such approaches in accordance with their national circumstances.

<u>An example of good practice – PAMs and projections in Lithuania – Dovile Vaitkute (Ministry of Environment, Lithuania)</u>

- Reporting requirements of EU are covered by:
  - Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions (MMR);
  - Commission Implementing Regulation (EU) No 749/2014 of 30 June 2014;
  - Biennial report and National communication.
- Policies and measures are reporting on:
  - Updates relevant to their low-carbon development strategies;
  - Information on national policies and measures and on implementation of Union policies and measures;
  - Information on planned additional national policies and measures;
  - Information on domestic action and the use of flexible mechanisms under the Kyoto Protocol;
  - PaMs interactions.
- On the other hand, Projections are reporting on:
  - Projections without measures where available, projections with measures, and, where available, projections with additional measures;
  - The impact of policies and measures;
  - Results of the sensitivity analysis performed for the projections;
  - All relevant references to the assessment and the technical reports that underpin the projections.
- National System for policies and measures and projections Institutional arrangements in Lithuania was graphically shown and briefly described.

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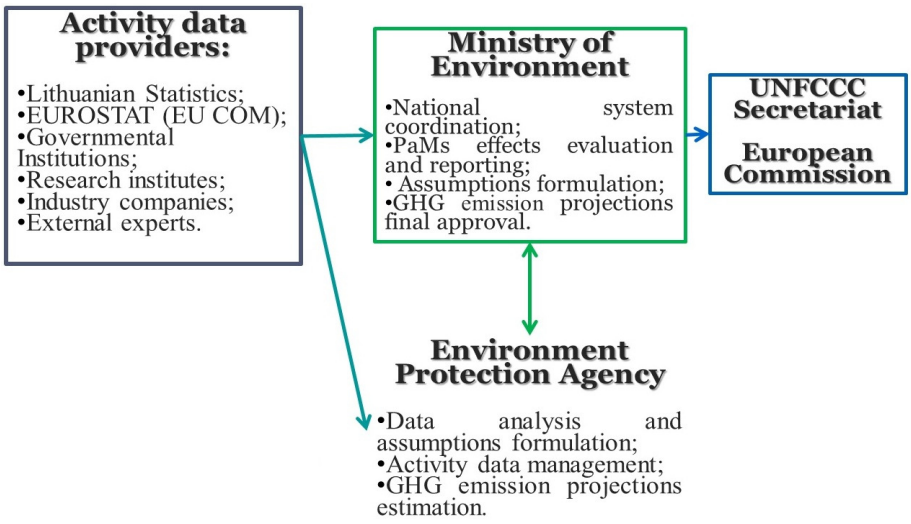
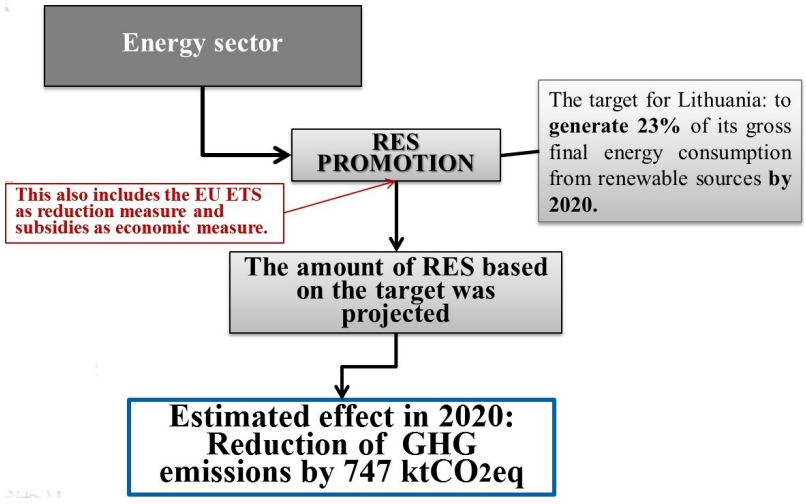


Picture 5

- Main steps in PAMs selection include identification of PAMs related with actions reducing GHG emissions. It is important to define the dates of adoption, implementation and expiration of PAMs. Assumptions were defined based on the selected information from analysis of PAMs and additional information in different sectors.
- National strategy documents in Lithuania are:
  - National Reform Programme (2011)
  - National Sustainable Development Strategy (2003, 2011)
  - National Progress Programme (2012)
- Sectoral strategies and programmes were mentioned, including the National Renewable Energy Resources Development Strategy (2010), National Energy Independence Strategy (2012), etc. The Strategy for the National Climate Management Policy by 2050 includes the strategic goal to achieve that the national economy growth would be faster than the increase of GHG emissions, and that the evaluation parameter (the GHG emissions per GDP unit) will be applied for the monitoring of the implementation of this strategic goal. The Strategy covers Renewable Energy Sources (RES) and Energy Efficiency (EE) targets, 17% EE and 23% RES increase by 2020, and 30% EE and 30% RES increase by 2030, which is under approval in Lithuania.
- Evaluation of PAMs effects example was shown, (top down approach):



Picture 6

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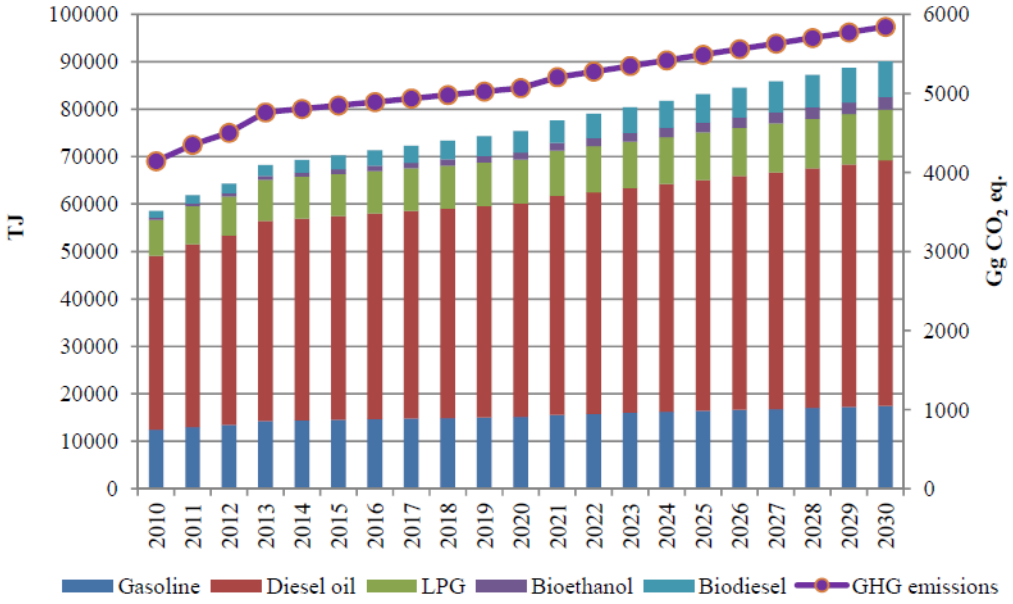
- The GHG projection in Lithuania in 2012 was composed of 34% energy, 23% agriculture, 21% transport and 22% of other, including waste, industry and etc. Examples of assumptions for several sectors were shown, for example the transport sector. The main assumptions were used for the projection of GHG emissions with existing measures. According to the data provided by the Ministry of Transport and Communication the number of passengers and cargo transportation turnover in road transportation subsector will increase up to 3550 million passenger km and 52000 million cargo ton km by 2030. It was assumed that biofuel use target will be achieved. The water borne navigation 40 % reduction by 2050 target will be achieved and the emissions will be reduced from 16.9 Gg CO2 eq. in 2005 to 10.1 Gg CO2 eq. in 2050. The emissions from this subsector mainly follow the trend of gasoil consumption as it is the main fuel used in this subsector. It was assumed that in order to secure safe primary need, Lithuania would require stable supply of 0.9–1.5 billion m3 of natural gas in 2020. Therefore the projections of GHG emissions in natural gas transportation sector were prepared as a linear interpolation between actual GHG emissions in 2010 and assumed needs in 2020.



Picture 7

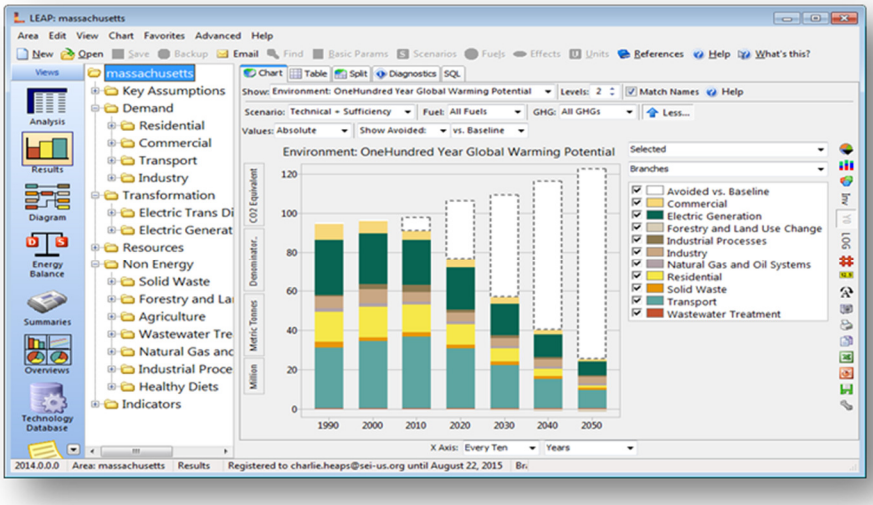
- Quantitative annual GHG emission reduction targets and projected emissions with additional measures were shown, presenting million tonnes of CO2 equivalent in the non EU ETS sector for the period from 2013 to 2020.
- Improvements are planned in Lithuania regarding GHG projections. One of them is to improve the data collection process, to optimise the list of parameters that shall be used as an activity data for GHG projections in separate sectors. It is also important to develop and apply the model at least for the energy sector since it will help to reduce uncertainty and will allow to assess different case scenarios more efficiently.

<u>LEAP Training – Introduction to LEAP – Charles Heaps</u>

- LEAP is a tool for Energy Planning and GHG Mitigation Assessment. It was developed by the Stockholm Environment Institute (SEI), an international organisation working on sustainable development, with its Headquarters in Stockholm and having centres in the United Kingdom, United States, Estonia, Kenya and Thailand. SEI develops and distributes LEAP at no charge to academic, non-profit and government organisation in the developing world and supports LEAP users around the world. SEI also supports Low Emission Development Strategies (LEDS) together with other international organisations. Key stages in LEDS include:
  - Organising the LEDS Process;
  - Assessing the Current Situation;
  - Analysing options;

- Prioritising Actions;
- Implementation and Monitoring.

- Assessing the current situation and analysing options is covered by LEAP programme.
- LEAP stands for Long-range Energy Alternatives Planning System. It is a scenario-based modelling software for energy planning and GHG mitigation assessment. It is a decision support tool for creating models of different energy systems. The LEAP tool is shown on the following picture.



Picture 8

- LEAP can be used in numerous situations, such as to create national scale energy models, forecast demand and supply, create energy balances, assess GHGs and local air pollutant emissions forecasts, etc. Transformation Analysis in LEAP includes analysis of energy conversion, transmission and distribution as well as resource extraction. LEAP also allows for analysis of capacity expansion plans, plant dispatch, GHG and local air pollutant emissions, costs and benefits.
- Social Cost-Benefit analysis in LEAP starts with Demand (costs of saved energy, device costs, and other non-fuel costs). The second step is transformation of capital and operational and management costs. The further step is primary resource costs or delivered fuel costs, while the final step is analysis of environmental externality costs.
- There are three approaches for Demand Modelling in LEAP:
  - Bottom-Up/ End-use approach – detailed accounting for all the various sectors and end uses that consume energy;
  - Top – down. Econometric – more aggregate approach with energy consumption broken down into sectors and fuels;
  - Hybrid. Decoupled – using baseline scenario forecast of top-down approach but alternative scenarios are modelled as policy measures that reduce energy consumption over time.
- General transformation module layout was shown:

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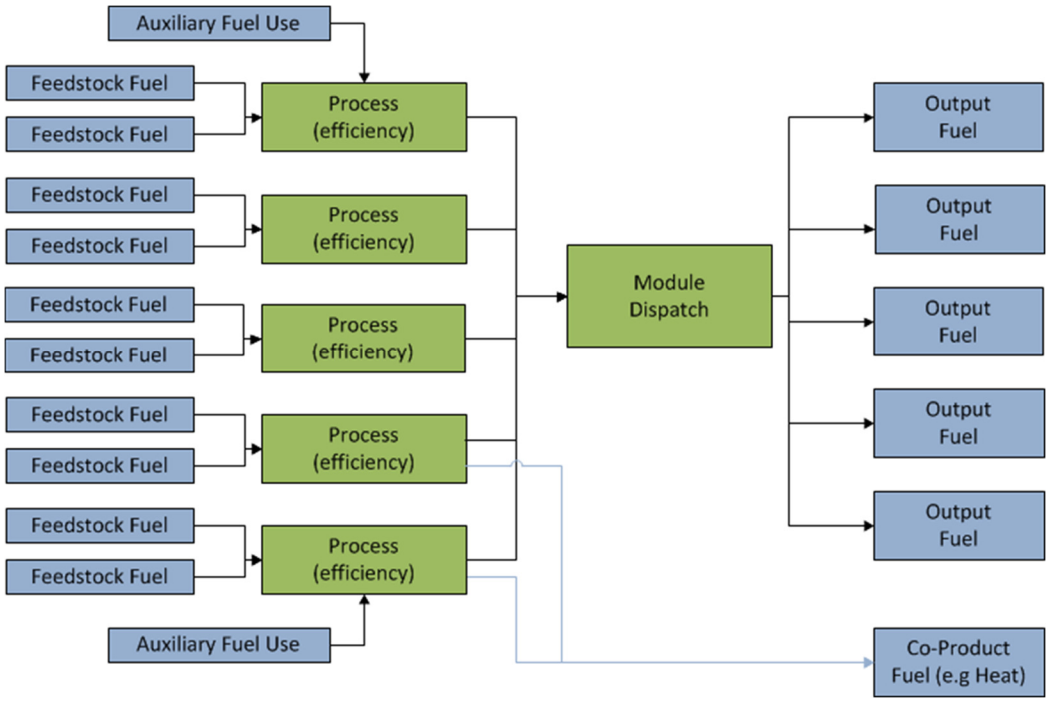

Picture 9

- Several other models of transformation were shown, including transformation module for electricity generation, transformation module for oil refining as well as a simple, non-dispatched transformation module.
- Load-Duration Curve and System Dispatch in LEAP was presented, together with the steps of making a load shape:
  - Step 1: Divide year into time slices;
  - Step 2: Make a load shape with data for each time slice;
  - Assign the load shape to our electricity system.
- Load shape presented was with regards to electricity generation, since there are two issues to consider regarding electricity generation, capacity expansion and dispatch. There are two dispatch modes
  - Mode 1: Historical: LEAP simply dispatches plants based on historical generation.
  - Mode 2: Simulation: plants dispatched based on various dispatch rules ranging from very simple (% of total generation) to more sophisticated (dispatch by merit order or in order of running costs)
- Set the First Simulation Year variable for each process to determine when to use historical mode and when to use simulation mode. Modes can be mixed and rules dispatched in neighboring processes.
- LEAP is very convenient tool for making energy balances. Results are automatically formatted in standard energy balances tables. Balances can be viewed for any year, scenario or region in different units. Also, balance columns can be switched among fuels, fuel groupings, years and regions. Results can be displayed in any unit in table, chart or energy flow diagram formats.
- LEAP terminology was briefly presented, defining the parts of the tools such as area, current accounts, scenario, tree, branches, etc.

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LEAP Training (Practical part)

- After theoretical part of the workshop and all the presentations provided by the moderators/ speakers, a practical part took place in the afternoon session which lasted until the end of the fourth and the final day of the workshop. The training was moderated by Charles Heaps with hands on assistance to participants from the moderators team
- Every necessary part of the LEAP tool was described and a temporary LEAP software was provided for each of the participants. Afterwards, a step by step guidance was provided through the tool explaining the participants the way how to deal with LEAP.

The following exercises were completed by the participants under the guidance of Mr Heaps and with the assistance of the TAIEX experts:

- Setting basic parameters
- Developing a data structure
- Viewing results of basic data structures
- Reference scenario setting in the electricity sector
- Adding emission related data to the scenarios
- Demand-side management scenario building
- Transformation
- Cost-benefit analysis
- Creating policy scenarios
- Entering cost data
- Current accounts data including emission data

The above exercises were presented in four blocks of exercises:

Exercise 1: Preliminary demand.
This preliminary demand analysis exercise considers only the energy used in Freedonia households. Participants started by developing a set of “Current Accounts” that depict household energy uses in the most recent year for which data are available (2010). Following that participants constructed a “Reference” scenario that examines how energy consumption patterns are likely to change in the coming years in the absence of any new policy measures.

Exercise 2: Demand.
Exercise 2 further develops the demand analysis begun in Exercise 1 covering three other sectors: industry, transport, and commercial buildings. Information provided in the background documents were used to complete (1) the Tree Structure, (2) the Current Accounts data and (3) the Reference scenario analysis for these sectors.

Exercise 3: Transformation
In this fourth exercise the participants further developed the simplified Transformation data set constructed in Exercise 1. In this exercise new modules were added to examine charcoal production, oil refining and coal mining.

Exercise 4: Cost Benefit Analysis
In this exercise participants learned how to enter data to describe the costs of various demand and supply-side technologies.

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Follow-up exercise (homework)

Following the training exercise, the participants were provided "homework" to prepared for the next Module 2 Training workshop to be held in April or May 2015 (tbd).
The exercise consists of two parts. Participants are requested to complete both tasks and report on their progress to the ECRAN team by the deadlines indicated. If participants need support in conducting the exercise they were informed to please contact ECRAN team for help.
The tasks have to be understood in connection with the LEAP exercises introduced at the training in Skopje and they are based on the data sets provided for the countries by Charlie Heaps (further referred to as Charlie's data). [2]

Task 1.

Step 1: Please open the LEAP model for your country distributed by Charlie. Using "the current accounts" view please check the input data needed to populate the variables. At present, these variables are filled with Charlie's data sets gathered from the IEA balances and other sources. They are compiled until the base year 2011 and include

a) key social and economic data such as population, urbanisation rates, human development indicators, GDP, sectors' value added, income, transportation intensity and others listed in "Assumptions"
b) historical energy balances for the energy demand sectors and the transformation sector listed in "Demand" and "Transformation"
c) GHG emission factors entered for the Demand and Transformation sectors.

Please, identify locally available input data for these variables in your countries and compare it to Charlie's data for at least 5 years (2007-2011) but if data is readily available for a longer period according to Charlie's data please use longer time series.

Step 2: Please see how GHG emissions calculated by LEAP using Charlie's data match the latest GHG inventory available for your country[3]. If there are significant differences among these, then please try to find out causes for the differences. For this compare Charlie's input data and the locally available input data, which you identified in the previous sub-task 1.1.

As a result of the work participants are requested to prepare:

a) **a brief report on the coincidences and differences between GHG emissions** calculated by LEAP based on Charlie's data sets and emissions as reported in the national inventories**.** Participants are also to report on the similarities and differences in the input data which could be the reason for differences. Participants are further requested to provide their judgement which data is the better one.
b) **an improved data-set** based on the participant's research with the indication of data sources in "notes" in LEAP and saved under a different name. Participants will need it at the next training.

Deadline for submitting the improved data set and a short report (maximum 2 pages) **by the January 31st, 2015.**

[2] Unfortunately, we do not possess the data set for Kosovo*. The training participants from Kosovo may chose for which country they complete the exercise. Alternatively they may take a model of any country and start populating it with the data available locally and improving it. Please also see the Kosovo* balances of IEA available online for 2000-2012 (http://www.iea.org/statistics/statisticssearch/). .

[3] You can check for inventory data from local experts at http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php - usually National Communications contain a chapter on inventories, but the data might not be enough detailed – varies by country.

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Task 2.

Step 1: Please review the modelling tree for the demand and transformation sectors in the LEAP model for your country. Please make suggestions how to improve the tree based on the data identified in the Task 1; you may also wish to think about the further sector disaggregation into branches. These could be, for instance, disaggregation of the residential sector by end-use or by types of buildings; disaggregation of the services sector by branches, by end-uses, or by types of buildings; further disaggregation of transport or industry, etc. The tree should include the following sectors:

- buildings (including residential and services)
- transport
- industry
- electricity and heat production and distribution
- agriculture and fisheries (only energy use!)

Step 2: Please, **choose two of the above mentioned sectors** (e.g. transport, industry) for which you would be interested to build later detailed scenarios to the future. Identify what historic data is available for these sectors in your country in addition to the level of disaggregation of the Task 1. Identify also the data available in your country to build mitigation scenario to the future. The scenarios should include at least a reference scenario and one scenario with policies and measures. Such data include assumptions about the development of social and economic indicators, technology stocks (shares or saturations of technologies), and energy intensities of end-uses/technologies. Some assumptions are common for the reference and mitigation scenarios (social and economic data). Technology stocks and energy intensities of end-uses/technologies are different for the reference and mitigation scenarios and depend on policies and measures assumed. **Please, provide a list of data and its sources in a note which also identifies data gaps and/or data quality problems.**

Step 3: For the chosen two sectors prepare **detailed branches** in LEAP in the "current account" view, which will enable you later to conduct analysis on emission reduction scenarios, keeping in mind data availability identified by the previous step 2.

Step 4: For the two sectors selected in Step 1 and modified in Step 3 please populate their variables with the historic input data identified in Step 2 until the base year (2011 or 2012 until the data is available). Where the data is not available please try to find data in literature, obtain information from relevant experts, or make assumptions. Please use the current accounts of LEAP only, no need to prepare scenarios at this point in time. Please indicate source of the data in notes in LEAP. Please keep the data gathered for building reference and mitigation scenarios, you will need it at the next training .

Deadline for submitting the outputs and a short report (maximum 2 pages) to describe steps 1) to 4) above for Task 2 by **February 28th, 2015.** The submission address of the outputs of Task 1 and Task 2 is jozsef.feiler@ecranetwork.org, with a copy to imre.csikos@ecranetwork.org.

If participants are having difficulties in carrying out these tasks, they are requested to contact Jozsef Feiler at jozsef.feiler@ecranetwork.org, who will appoint members of the helpdesk to assist you. For this purpose please appoint a single contact point in your country who will communicate any difficulties to the ECRAN team.

Participants are encouraged to join the LEAP Facebook group or the COMMAND website and ask there your questions.
The Facebook group is here: https://www.facebook.com/groups/LEAPSoftware
The COMMEND web site: http://www.energycommunity.org/

Resources:
http://www.energycommunity.org/

Energy Statistics Manual - http://www.iea.org/publications/freepublications/publication/energy-statistics-manual.html
GHG Projection Guidelines – European Commission
http://ec.europa.eu/clima/policies/g-gas/monitoring/docs/ghg_projection_guidelines_en.pdf
http://ec.europa.eu/clima/policies/g-gas/monitoring/docs/ghg_projection_guidelines_a_en.pdf
http://ec.europa.eu/clima/policies/g-gas/monitoring/docs/ghg_projection_guidelines_b_en.pdf

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V. Evaluation

The following summary of the training evaluation report, developed on the basis of analysis of the training questionnaires can be given. A number of 24 participants filled the evaluation form. It shows that the expectations of the workshop were met.

Statistical information

1.1	Workshop Session	ECRAN Modelling: Training Module 1
1.2	Facilitators name	Imre Csikós/ József Feiler/ Alexandra Novikova/ Laszlo Szabo/ Anna Flessa/ Dovile Vaitkute/ Charles Heaps
1.3	Name and Surname of Participants (evaluators) optional	As per participants' list

Your Expectations

Please indicate to what extent specific expectations were met, or not met:

My Expectations	My expectations were met		
	Fully	Partially	Not at all
1. The training workshop contributes/helps us for building technical capacities to carry out modelling of emission scenarios.	**IIIII IIIII IIIII III (75%)**	IIIII I (25%)	
2. The training helps us to gain a better understanding of modelling work which will enable us to ensure that (future) modelling is relevant to policymakers and that policymakers understand the limits of the work and are able to better interpret the results.	**IIIII IIIII IIII (58%)**	IIIII IIIII (42%)	
3. The training gave us a proper introduction on LEAP as well as providing the initial steps in filling the LEAP structure with country relevant data, building up the basic model	**IIIII IIIII IIIII IIIII (83%)**	IIII (17%)	

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Workshop and Presentation

Please rate the following statements in respect of this training module:

Aspect of Workshop	Excellent	Good	Average	Acceptable	Poor	Unacceptable
1 The workshop achieved the objectives set	**IIIII IIIII II (50%)**	IIIII IIIII (42%)	II (8%)			
2 The quality of the workshop was of a high standard	IIIII III (35%)	**IIIII IIIII IIII (61%)**	I (4%)			
3 The content of the workshop was well suited to my level of understanding and experience	IIIII III (33%)	**IIIII IIIII (42%)**	IIIII (21%)	I (4%)		
4 The practical work was relevant and informative	**IIIII IIIII IIII (61%)**	IIIII II (30%)		II (9%)		
5 The workshop was interactive	**IIIII IIIII IIIII I (67%)**	IIIII II (29%)		I (4%)		
6 Facilitators were well prepared and knowledgeable on the subject matter	**IIIII IIIII IIIII IIIII (87%)**	III (13%)				
7 The duration of this workshop was neither too long nor too short	IIIII III (33%)	**IIIII IIII (38%)**	IIIII I (25%)	I (4%)		
8 The logistical arrangements (venue, refreshments, equipment) were satisfactory	**IIIII IIIII IIII (61%)**	IIIII (22%)	IIII (17%)			
9 Attending this workshop was time well spent	**IIIII IIIII IIIII (63%)**	IIIII IIII (37%)				

Comments and suggestions

I have the following comment and/or suggestions in addition to questions already answered:

Workshop Sessions:

- In my opinion the workshop could have been conducted in 3 days;
- More interactive and guided exercises;
- OK;
- Suggestion is to minimise other ppt-s and fully focus on model exercises;
- Perhaps more common activity on the first day or some exercise in which different countries have to collaborate would result in better networking;
- Understandable and good;

Facilitators:

- Excellent;
- Good job!
- OK;
- Charlie Heaps – excellent!
- Charlie is a great between countries. Teacher/ speaker/ moderator/ He makes it easy for everybody to follow. A+!
- They were very helpful;
- They were very friendly and help us;

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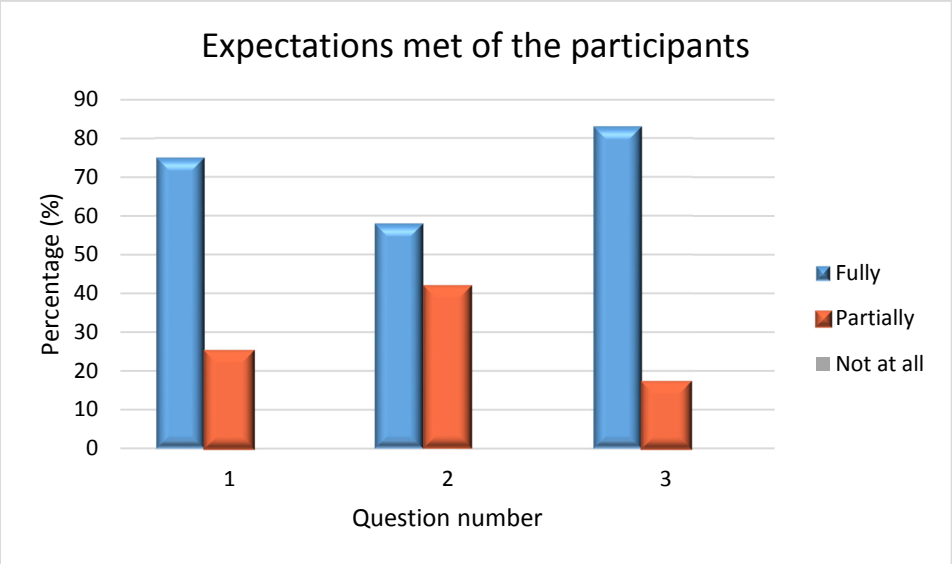
- Should be a little slowly during explaining on presentation. For me, this first time to me this software and I need a bit more time. Also, I think on some people, who is in some position;
- Facilitators were very helpful and had a lot of patience in answering our questions;
- Logistical arrangements – Internet connection which was terrible

Workshop level and content:

- Everything was good. I have previous experience in LEAP so maybe I expected a little advanced level. Otherwise everything great;
- Excellent;
- Workshop is very helpful – personally, I found the country exercise with country data most useful;
- For the first time dealing with the programme, so the introduction was very good;
- Other: Hotel's Wi-Fi is very bad.

EXECTATIONS OF PARTICIPANTS

1. Improved technical capacities to carry out modelling regarding to LEAP.
2. Better understanding of modelling, crucial for policy makers.
3. Better understanding of LEAP structure especially when including country relevant data



WORKSHOP AND PRESENTATION

1 The workshop achieved the objectives set
2 The quality of the workshop was of a high standard
3 The content of the workshop was well suited to my level of understanding and experience
4 The practical work was relevant and informative
5 The workshop was interactive
6 Facilitators were well prepared and knowledgeable on the subject matter
7 The duration of this workshop was neither too long nor too short

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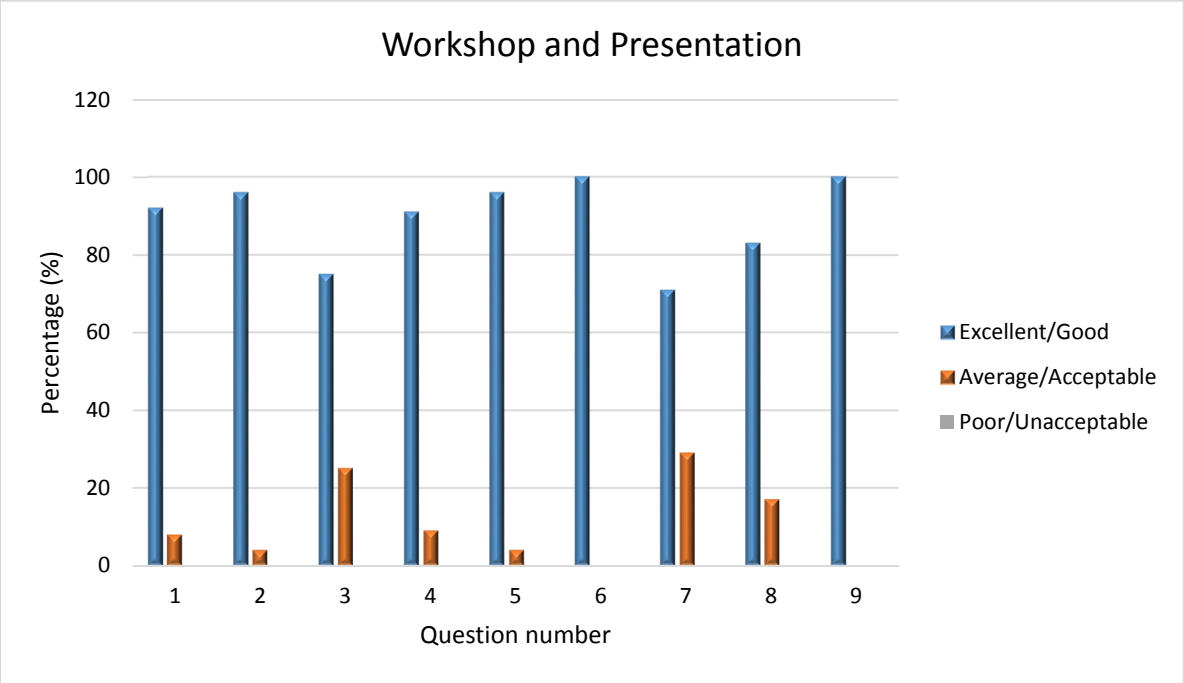
8 The logistical arrangements (venue, refreshments, equipment) were satisfactory
9 Attending this workshop was time well spent



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ANNEX I – Agenda

Day 1 – Tuesday, 04 November, 2014

Topic: Introduction to the use of models for climate and energy policy planning in the EU - General overview of models used for emission projections in the EU and for UNFCCC reporting **Chair and Co-Chairs:**			
Start	**Finish**	**Topic**	**Speaker**
08:30	**09:00**	**Registration**	
09.00	09.30	Introduction to the training exercise	Imre Csikós, ECRAN
09.30	10.15	Reporting requirements by the EU (PaMs and modelling) and UNFCCC	Jozsef Feiler ECRAN
10.15	11.00	Ex-post and ex-ante evaluation of GHG mitigation policies and measures	Alexandra Novikova, IKEM, University of Greifswald Germany
11.00	11.15	Coffee break	
11.15	13.00	Modelling choices for emission scenarios	László Szabó, REKK, Corvinus University, Hungary
13.00	14.00	Lunch break	
14.00	15.30	Experiences of the Promitheas-4 project regarding policy analysis	Anna Flessa, KEPA, National and Kapodistrian University of Athens, Greece
15.30	15.45	Coffee break	
15.30	16.30	First Introduction to LEAP	Charles Heaps
16.30	16.45	Summary of the day	Imre Csikós, ECRAN

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Day 2 – Wednesday, 05 November, 2014

Topic: Introduction to good practice examples for projecting emissions from the power sector, industry, transport and buildings sector

Introduction to the structure of LEAP 1-2

Chair and Co-Chairs:

Start	Finish	Topic	Speaker
08:30	**09:00**	**Registration**	
9.00	9.20	Introduction of the trainers and why LEAP	Jozsef Feiler, ECRAN
9.20	10.00	An example of good practice – PaMs and projections in Lithuania	Dovilė Vaitkutė, Ministry of Environment, Lithuania
10.00	10.45	LEAP TRAINING – Introduction to LEAP • Overview of LEAP • Basic parameters • Demand • transformation • Emissions A second scenario-demand side management Q and A	Charles Heaps, Stockholm Environmental Institute with assistance from TAIEX experts
10.45	11.00	Coffee break	
11.00	12.45	LEAP TRAINING continued	
13.00	14.00	Lunch break	
14.00	15.30	• LEAP TRAINING – Industry, Transport, Commerce: Useful energy analysis; Total final demands Demand • Q and A	
15.30	15.45	Coffee break	
15.45	16.30	LEAP TRAINING	
16.30	16.45	Summary of the day	Ágnes Kelemen, ECRAN

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Day 3 – Thursday, 06 November 2014

Topic: Introduction to the structure of LEAP 3-4 **Chair and Co-Chairs:**			
Start	**Finish**	**Topic**	**Speaker**
08:30	**09:00**	**Registration**	
09.00	10.45	LEAP TRAINING - Transformation • Electricity generation • Oil refining • Coal mining • Resources Viewing results Q and A	Charles Heaps, Stockholm Environmental Institute with assistance from TAIEX experts
10.45	11.00	Coffee break	
11.00	12.45	LEAP TRAINING – Transformation continued	
13.00	14.00	Lunch break	
14.00	15.30	LEAP TRAINING- Cost Benefit Analysis • CBA in LEAP - intro • Creating Policy Scenarios • Entering Costing Data Cost-Benefit Results Q and A	
15.30	15.45	Coffee break	
15.45	16.30	LEAP TRAINING- Cost Benefit Analysis continued	
16.30	16.45	Summary of the day	, ECRAN

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Day 4 – Friday, 07 November 2014

Topic: Case study – development of the basics, Further work – structure, arrangements **Chair and Co-Chairs:** **Venue: November 2014, Skopje, FYROM**			
Start	**Finish**	**Topic**	**Speaker**
08:30	**09:00**	**Registration**	
09.00	11.00	LEAP TRAINING – Case study Case study – CRF 1 sector	Charles Heaps, Stockholm Environmental Institute with assistance from TAIEX experts
10.45	11.00	Coffee break	
11.15	12.45	LEAP TRAINING – Case study Data availability issues Data structure Data sensitivity Q and A	
13.00	14.00	Lunch break	
14.00	15.45	LEAP TRAINING Entering base year data	
15.30	15.45	Coffee break	
16.00	16.30	Assessment of the training	Imre Csikós, ECRAN
16.30	17.00	Further work Details of work in Module 1	József Feiler, Ágnes Kelemen, ECRAN

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ANNEX II – Participants

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Petar	Krasic	Ministry of Construction, Transport and Infrastructure	Serbia	petar.krasic@mgsi.gov.rs
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First Name	Family Name	Institution Name	Country	Email
		and seismology of Montenegro		
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Gjergj	Simaku	Ministry of Energy and Industry	Albania	Gjergji.Simaku@energjia.gov.al
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ANNEX III – Presentations (under separate cover)

Presentations can be downloaded from:

http://www.ecranetwork.org/Files/Modelling_Module1,November_2014,_Skopje,_materials.rar

Homework exercise can be downloaded from:

http://www.ecranetwork.org/Files/Homework_Exercise_ECRAN_Modelling_Module_1.zip

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