Environment and Climate Regional Accession Network ECRAN

Environment and Climate Regional Accession Network (ECRAN)

Modelling: Support mission to Module 1

01-03 April 2015, Belgrade

Enviroment and Climate Regional Accession Network ECRAN

ENVIRONMENTAL AND CLIMA REGIONAL NETWORK FOR ACCESSION - ECRAN

WORKSHOP REPORT

Activity No 3.1. SUBTASK 1.4

ECRAN MODELLING: SUPPORT MISSION TO MODULE 1

PRACTICAL HANDS ON ASSISTANCE ON QUANTITATIVE MODELS AND SCENARIO DEVELOPMENT TO BE USED TO ASSESS CLIMATE AND ENERGY POLICY OPTIONS AND TO SET EMISSION TARGETS

01-03 APRIL 2015, BELGRADE, SERBIA

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LIST OF ABBREVIATIONS	
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

[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.

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 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

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- 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.

Aim of the workshop in Belgrade

The first four-day long meeting was organized in Skopje in November 2014 and aimed to give an introduction to the participants to the policy environment, give an introductory training on LEAP as well as provide initial steps in filling the LEAP structure with country relevant data, building up the basic model. Three more modules of training will follow along with homework within the yearlong program.

In order to provide support for those participants of the training programme who are less familiar with modelling and the LEAP modelling environment a need for additional training was identified for the beneficiaries from Serbia. Completion of the support workshop is necessary to be conducted before the start of the second module of the training program in order to have similar knowledge basis for the participants who came with different background. It also allows for few new participants – who are identified to join the program lately to join the training with a chance to catch up with the curriculum of the program.

Also a separate training, with less participants allows for more interactive on-hand exercises than the general training programme with nearly 30 participants. The training is provided by ECRAN and TAIEX experts engaged in the year long program.

Participants of the training are required to bring with themselves a portable computer where they have administrator privileges in order to allow the installation of the LEAP software environment for the exercises.

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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.

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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.

- Increasing the share of renewable energy to at least 27%

  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

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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. Hereunder only the highlights are presented.

1. Introductory part to the training (theory)

Introduction (Imre Csikós, ECRAN)

- Paris COP and the need to prepare INDCs
- Long-term need to align policy of accession and candidate countries with EU climate policy
- Modelling of climate scenarios and emission reduction pathways needed to underpin both INDCs and actions to be taken as EU Member States
- From this follows the need to train people working in public administrations to understand and if necessary carry out modelling work
- LEAP chosen for flexibility, capabilities and free access
- Aim of workshop to reach level where participants can carry out basic modelling work
- Participants from some countries have difficulties in doing this after the Skopje workshop, current workshop an opportunity to catch up with training as well as to involve additional participants

Basics of Climate Change (József Feiler, ECRAN)

- Climate change to date and projections for the future: Models project substantial warming in temperature extremes by the end of the 21st century: increase by about 1°C to 3°C by the mid-21st century and by about 2°C to 5°C by the late 21st century. The frequency of heavy precipitation or the proportion of total rainfall from heavy falls will increase in the 21st century, extra- tropical cyclone activity will increase, droughts will intensify, mean sea levels will rise. As the 2 degree temperature increase is reached and surpassed the likelihood of passing a climate threshold beyond which positive feedback mechanisms and abrupt changes will occur, increases.
- Reaching the 2 degree target is still possible and mitigation is affordable, but delays will inevitably increase the cost of mitigation, and large scale action is needed. Delayed action would necessitate significantly steeper emission reductions. Cumulative emissions need to be considered instead of the annual emissions, which makes late action more challenging.
- Emission trends and role of population and economic growth in emission growth: A Kaya identity decomposition of the change in emissions shows that in the past few decades GDP growth and population growth have been responsible for most of the growth in emissions, with energy intensity having decreased throughout.
- Global distribution of emissions: The distribution of per capita emissions shows a very wide range, with per-capita emissions between 1.4t median for Low Income Countries and 13t median for High Income Countries. Few countries are responsible for much of today's emissions with ten countries emitting roughly 70% of GHGs.
- Costs and benefits of mitigation including co-benefits: Although there is a high uncertainty regarding costs of mitigation which are estimated to cause between 0.04-0.14% (median

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0.06%) in reduction of GDP growth, the benefits are significant, including co-benefits in terms of energy security and public health.

- Investment in energy generation: USD 30bn/yr divestment from fossil extraction and combustion between 2010-2029 is required as well as USD 147bn/yr additional investment in low carbon electricity.
- GHG emission trends by sector: The electricity sector has the highest contribution to emissions, and provides the cheapest emission reduction possibilities. The transport sector has the fastest growing emissions and poses a challenge in terms of emission reduction, necessitating a complex approach consisting of technical, behavioural, modal-shift, and urban planning measures which can reduce final energy demand in 2050 by 40% below BAU. Buildings are also responsible for a significant share of emissions and pose a threat of lock-in if not addressed with retrofit measures.
- Policy instruments for mitigation include cap and trade systems, carbon taxes and reducing fossil fuel subsidies.

Reporting requirements by EU and UNFCCC (József Feiler, ECRAN)

- The UNFCCC reporting requirements for Annex I and non-Annex I are different, countries will need to report according to Annex I requirements, which will mean:
  - National Communications will have to include emission projections
  - Biennial report instead of Biennial update report
- UNFCCC rules and requirements:
  - given format, summary of key assumptions required
  - at least two scenarios of 'without measures' and 'with measures', and possibility to submit 'with additional measures' scenario
  - have to be presented on a sectoral and gas-by-gas basis, with results presented for every 5 years until 2020
  - rules on treatment of bunker fuels

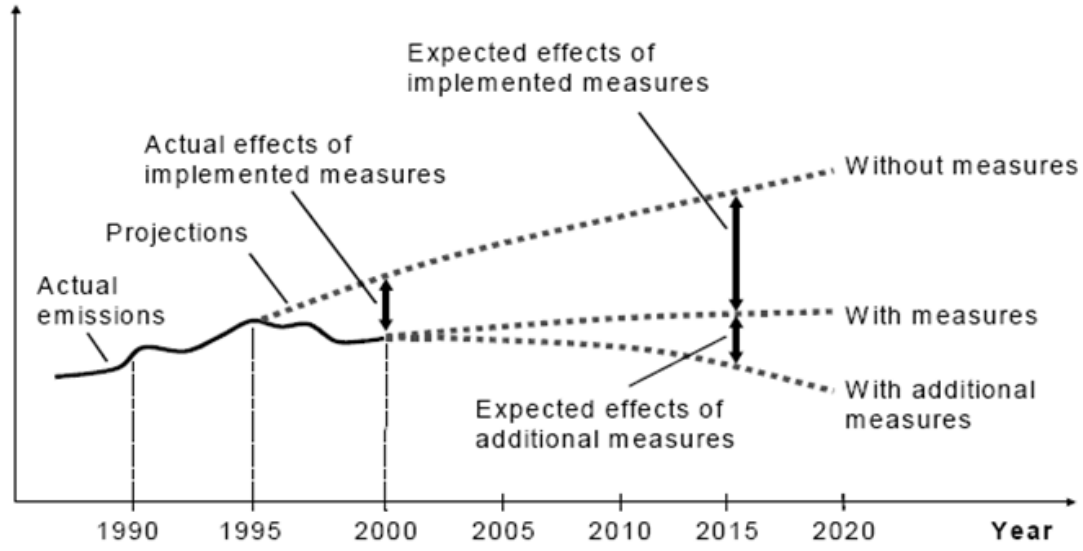

Figure 1: Hypothetical party' projection of one gas

- UNFCCC National Communications checklist:
  - the estimated and expected total effect of implemented and adopted policies and measures
  - an estimate of the total effect of policies and measures, in accordance with the 'with measures' definition, compared to a situation without such policies and measures, presented in terms of GHG emissions avoided or sequestered
  - present relevant information on factors and activities for each sector
- Biennial report reporting and review requirements
  - shall provide information on mitigation actions, including on the policies and measures implemented or planned
  - shall organize the reporting of mitigation actions by sector and by gas
  - shall report the updated projections for 2020 and 2030 consistent with the relevant guidelines
  - use Biennial Report Common Tabular Format
- EU Monitoring Mechanism Regulation
  - Replacing Decision 280/2004/EC, entered into force in July 2013
  - To enhance reporting rules on greenhouse gas emissions to meet UNFCCC requirements and to implement internal legislation
  - MMR 525/2013 + implementing regulation 749/2041 + delegated regulation C(2014) 1539
- Contents of MMR:
  - low carbon development strategies,
  - historical emissions and removals,
  - GHG inventories,
  - registries,
  - PaMs and projections,
  - other information relevant to climate change,
  - EU expert review, progress towards commitments.

Energy balances for the estimation of GHG emissions (Aleksandra Novikova, Germany)

- Energy balance as an accounting framework for compilation of data on all energy traded and used in a country
- Main sources of energy balances: UN Statistical Division, IEA and EUROSTAT
- Energy balances handed out to participants were reviewed and explained, including:
  - representation of energy carriers in columns
  - different flows (shown in 3 blocks of TPES, transformation, final energy use) in rows
  - statistical difference

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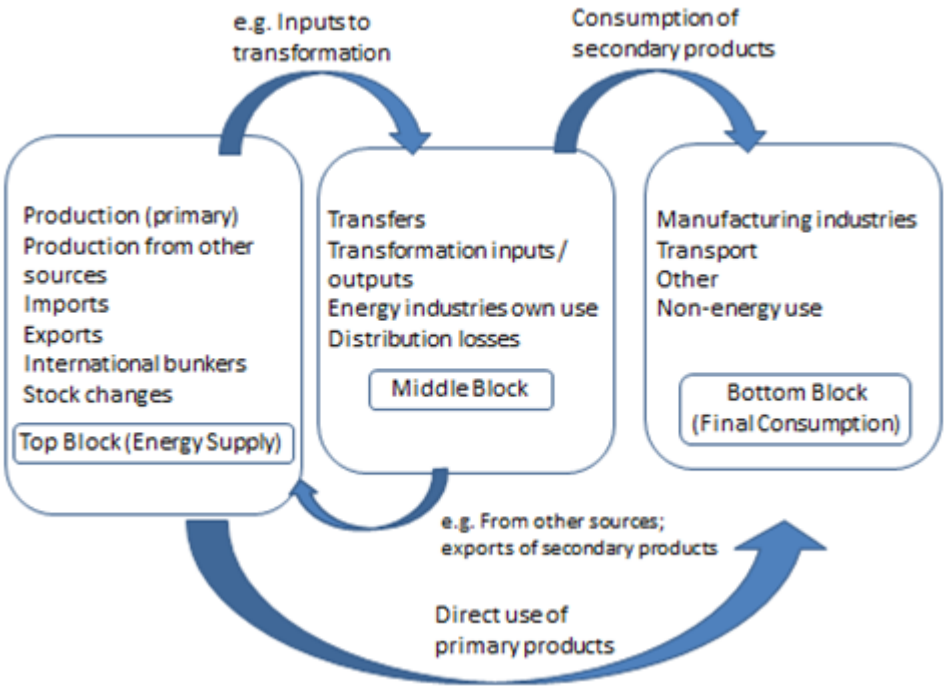

Figure 2: Energy flows in an energy balance

- Principles of energy balances
  - all entries expressed in same energy units
  - net calorific value vs gross calorific value approach
  - calculation of primary energy equivalent for electricity using the partial substitution method vs the physical energy content method
- Estimating GHG emissions from energy balances
  - Basis for reporting: Revised 1996 IPCC Guidelines, Uncertainty Management National GHG Inventories and Good Practice Guidance for LULUCF
  - Interpretation of Tiers and examples of calculations representing different levels of detail and accuracy
  - steps of the sectoral approach of the IPCC guidelines (1996 and 2006)

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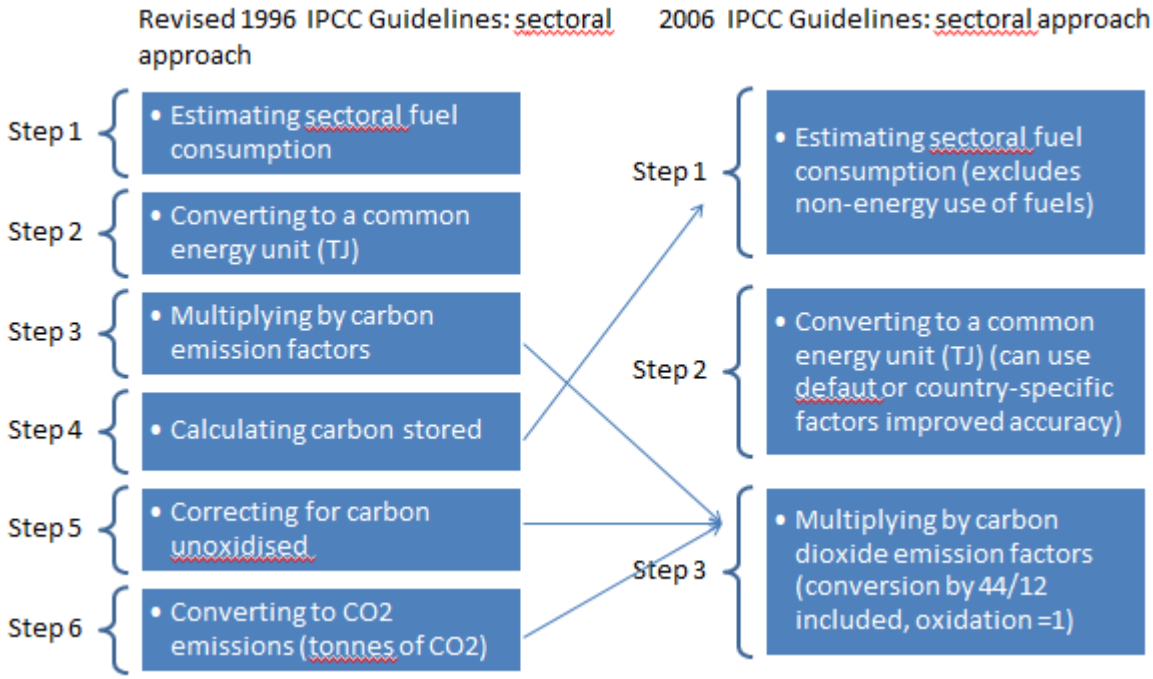

Figure 3: Differences between 1996 and 2006 IPCC Guidelines

- Differences between IEA and UNSD energy balances and between IEA and UNFCCC GHG emission estimates

Basic economic concepts of Climate Change - Cost-benefit analysis, MAC curve (Ágnes Kelemen, ECRAN)

- Climate/energy policy modelling methodologies:
  - Bottom-up models (e.g. optimisation or simulation engineering models): Detailed and physically realistic energy sector, explicit representation of technologies, use disaggregated data, based on an engineering philosophy, often only single sector and single country, partial equilibrium approach, exogenous inputs for useful energy demand, the drivers of demand (e.g. GDP) and prices
  - Top-down models (e.g. Computable General Equilibrium or econometric models): Aggregate representation with little attempt at physically realistic representation, uses aggregate data, based on economic foundations, focus on entire economy, can be single country, regional or global, general equilibrium approach which can address macro-economic feedbacks, endogenous prices, quantities and GDP.
- LEAP:
  - Modelling platform/tool which enables flexible use depending on needs and data availability
  - Energy and non-energy related GHG emissions
  - Generally bottom-up methodology using physical accounting of energy
  - Optimisation (only energy transformation) and simulation (all sectors)
- Cost-benefit analysis/NPV
  - CBA generally based on market prices, for non-market goods estimation of value needed

- price only good indicator of value if changes are marginal and if framework conditions (competition, legislative framework, technologies, infrastructure) are unchanged
- calculation of Net Present Value by discounting difference between benefits and costs and summing
- calculation of equivalent annual cost

- MACC

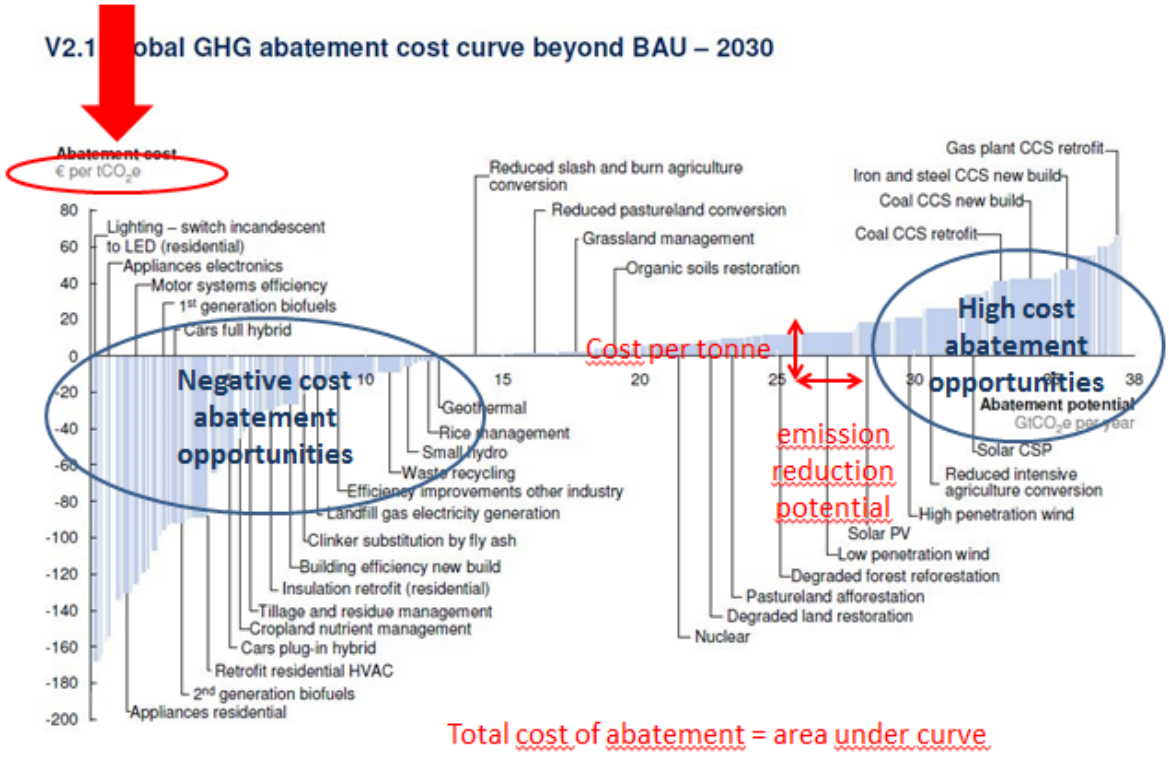

Figure 4: Interpretation of the Marginal Abatement Cost Curve

- Steps of expert-based MACC calculation
- Differences between a simple expert MACC curve and a MACC generated as an output of modelling

2. *LEAP training*

(All presentations by Anna FLESSA, Greece, training by Eleni-Danai MAVRAKI, Greece, with the support of Ágnes KELEMEN (ECRAN), Aleksandra NOVIKOVA, Germany, Anna FLESSA, Greece)

The format of the workshop consisted of blocks of presentations which addressed both practical modelling tips and theoretical background to the modelling exercise. These presentations were followed by practical exercises in model building.

Introduction to LEAP (use, examples of use, user interface)

- Basics
  - scenario based software for energy planning for building models of energy systems of different scales (cities to national and global applications)
  - used for UNFCCC reporting and national strategies
  - low initial data requirements and user friendly
- User interface and main uses
  - introduction to user interface including menu, status bar, area, view options
  - introduction to different views, including analysis view for creating variables, entering data and functions, results view for displaying results in table or chart format, diagram view for detecting errors, etc.
- Data requirements including demographic, economic, energy data
- Scenario analysis steps
- Use of 'help' function

Modelling energy demand sectors (Households)

- Common modelling approach for all energy delivered to final consumer, including for residential, industrial, services, transport, and other sectors
- Creating an Area
- Defining the basic parameters of the analysis
- Creating Tree branch structures
- Data entry tables
- Use of the function wizard

Scenario analysis (Households)

- Definition of the concept of scenario analysis and demonstration of use in LEAP
- Use of 'expression' function and 'expression builder' to control change in value of variables over time, including use of 'branch variable wizard' to link expressions to variables in other branches, use of 'function wizard'

Modelling Transformation sectors (Electricity)

- Definition of energy transformation (transmission and distribution, energy conversion and extraction)
- Transformation modules/sectors in LEAP and their properties
- General module structure (feedstock and auxiliary fuels, processes, dispatch and output)
- Modelling losses in transmission and distribution

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- Modelling electricity generation
- Modelling oil refining
- Steps of setting up a transformation model
- Definition and steps of defining a load shape curve
- Dispatch rules

GHG emission assessment

- Definition of GHGs, emission factors, global warming potential
- direct emissions accounting
- inserting environmental loading factors through either the technology database of LEAP or entering directly
- adding new environmental effects through the 'effects' screen

Demand side management

- defining alternative emission reduction scenarios by inheriting data from reference scenario
- use of time series wizard
- modelling electricity sector load factor improvements

Industry and transport

- defining a tree for industrial sectors
- alternative methods for industrial energy consumption analysis based on value or physical units
- using the category with energy intensity branch
- use of the branch variable to reference data in other branches
- defining a tree for the transport sector
- automatic cancellation of units
- modelling income elasticity of demand
- defining key variables

Transformation

- modelling charcoal production, oil refining and coal mining
- entering data on primary resource constraints (stocks for non-renewable energy and annual yields for renewables)
- using the energy balance view

Cost-benefit analysis and Optimization without/with CO2 cap

The originally planned cost-benefit analysis and optimisation were not addressed due to shortage of time. CBA and optimisation will also be the subject of the next training workshop.

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V. Evaluation

Reference is made to Annex IV for the detailed evaluation results for this workshop.

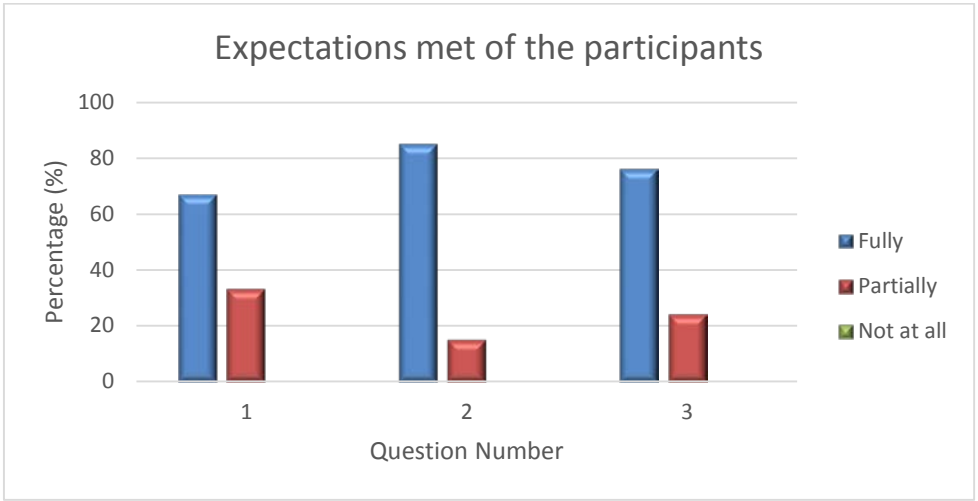
The evaluation results indicate that the majority of the trainees indicated that the training contributed to building technical capacities to carry out modelling of emission scenarios and helped to gain a better understanding of modelling work which will enable trainees to ensure that future modelling is relevant to policymakers and that policymakers understand the limits of the work and are able to better interpret the results (75 % of the participants indicated that their expectations were met fully, while 25% indicated that this was achieved partially).

All participants indicated that the training provided for a proper introduction to LEAP.

In terms of quality of the training all participants indicated that the facilitators were well prepared and knowledgeable on the subject matter (100 % of the participants) and that attending the workshop was time well spent (100% of the participants)

EXECTATIONS OF PARTICIPANTS

1.	The training workshop contributes/helps us for building technical capacities to carry out modelling of emission scenarios.
2.	Participants gained 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
3.	The training provided 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



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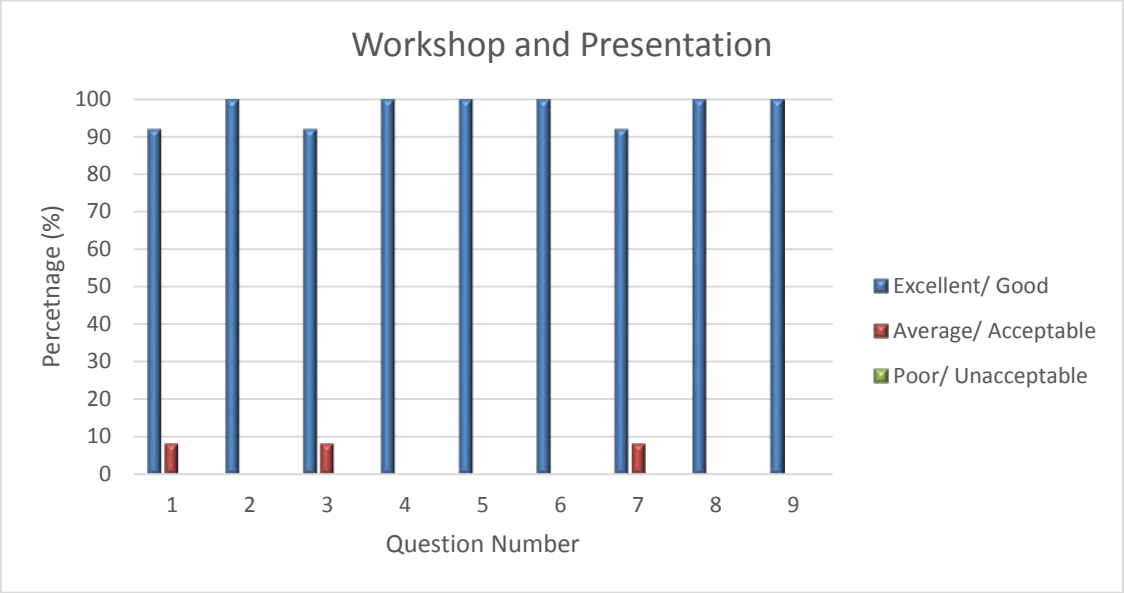
WORKSHOP AND PRESENTATION

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



ANNEX I – Agenda

Wednesday 1 April 2015

Chair and Co-Chairs: Imre Csikos and Jozsef Feiler				
Start	**Finish**	**Topic**	**Speaker**	**Sub topic/Content**
08:30	**09:00**	**Registration**		
9.00	9.15	Introduction	Imre Csikós	
9.15	10.00	Assessment of Scientific knowledge on Climate Change	József Feiler , ECRAN	• Main findings of the IPCC AR5 • Scenarios considered • Impacts of scenarios • Mitigation implications of various scenarios
10.00	10.45	Reporting requirements by EU and UNFCCC	Jozsef Feiler, ECRAN	• UNFCCC reporting rules on emission scenarios for Annex I Parties (NCs and BURs) • EU reporting requirement in relation to emission scenario projection
10.45	11.00	***Coffee Break***		
11.00	11.45	Energy balances	Alexandra Novikova, Germany	• Concept of energy balance • Energy flows • Sectors considered • Data collection and sources
11.45	12.30	Basic economic concepts of Climate Change (Cost-benefit analysis, MAC curve)	Ágnes Kelemen (ECRAN)	• Basic terms for energy economics and economic modelling • Cost benefit analysis • Marginal abatement curves

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13.00	14.00	***Lunch Break***		
14.00	14.30	Introduction to LEAP (use, examples of use, user interface)	Anna FLESSA, Greece,	Overview of Freedonia case study Basic parameters Demand Transformation Emissions
14.30	15.00	*Familiarization with user interface*	Eleni-Danai MAVRAKI, Greece, with the support of Ágnes KELEMEN (ECRAN), Alexandra NOVIKOVA, Germany, Anna FLESSA, Greece	Practical exercise with the LEAP tool
15.00	15.30	Modelling energy demand sectors	Anna FLESSA, Greece	
15.30	15.45	***Coffee Break***		
15.45	16.30	*Households in Freedonia*	Eleni-Danai MAVRAKI, Greece, with the support of Ágnes KELEMEN (ECRAN), Alexandra NOVIKOVA, Germany, Anna FLESSA, Greece	Practical exercise with the LEAP tool
16.30	17.00	Scenario analysis	Anna FLESSA, Greece	

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Thursday 2 April 2015

Chair and Co-Chairs: Imre Csikos and Jozsef Feiler				
Start	**Finish**	**Topic**	**Speaker**	**Sub topic/Content**
08:30	**09:00**	**Registration**		
9.00	9.30	*Scenarios for households in Freedonia*	Eleni-Danai MAVRAKI, Greece, with the support of Ágnes KELEMEN (ECRAN), Alexandra NOVIKOVA, Germany, Anna FLESSA, Greece	Practical exercise with the LEAP tool
9.30	10.00	Modelling Transformation sectors	Anna FLESSA, Greece	
10.00	11.00	*Electricity generation in Freedonia*	Eleni-Danai MAVRAKI, Greece, with the support of Ágnes KELEMEN (ECRAN), Alexandra NOVIKOVA, Germany, Anna FLESSA, Greece	Practical exercise with the LEAP tool
11.00	11.15	***Coffee Break***		
11.15	11.45	GHG emission assessment	Anna FLESSA, Greece, with the support of TAIEX experts	Emission factors Business as usual and policy scenarios
11.45	12.45	*Freedonia example*	Eleni-Danai MAVRAKI, Greece, with the support of Ágnes KELEMEN (ECRAN), Alexandra	Practical exercise with the LEAP tool

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			NOVIKOVA, Germany, Anna FLESSA, Greece	
13.00	14.00	***Lunch Break***		
14.00	15.00	*Freedonia example: Demand Side Management scenario*	Anna FLESSA, Greece, with the support of TAIEX experts	Practical exercise with the LEAP tool
15.00	15.15	***Coffee Break***		
15.00	16.30	*Industry and Transport in Freedonia*	Eleni-Danai MAVRAKI, Greece, with the support of Ágnes KELEMEN (ECRAN), Alexandra NOVIKOVA, Germany, Anna FLESSA, Greece	Practical exercise with the LEAP tool

Friday 3 April 2015

Chair and Co-Chairs: Imre Csikos and Jozsef Feiler

Venue: tbc

Start	**Finish**	**Topic**	**Speaker**	**Sub topic/Content**
08:30	**09:00**	**Registration**		
9.00	10.00	*Transformation examples*	Anna FLESSA, Greece, with the support of TAIEX experts	Practical exercise with the LEAP tool: charcoal production, oil refining and coal mining
10.00	11.00	*Transformation examples*	Eleni-Danai MAVRAKI, Greece, with the support of Ágnes KELEMEN (ECRAN), Alexandra	Practical exercise with the LEAP tool: charcoal production, oil refining and coal mining

			NOVIKOVA, Germany, Anna FLESSA, Greece	
11.00	11.15	***Coffee Break***		
11.15	11.45	Cost-benefit analysis	Anna FLESSA, Greece, with the support of TAIEX experts	
11.45	12.45	*Example on cost-benefit analysis*	Eleni-Danai MAVRAKI, Greece, with the support of Ágnes KELEMEN (ECRAN), Alexandra NOVIKOVA, Germany, Anna FLESSA, Greece	Practical exercise with the LEAP tool
13.00	14.00	***Lunch Break***		
14.00	15.00	*Example on cost-benefit analysis*	Eleni-Danai MAVRAKI, Greece, with the support of Ágnes KELEMEN (ECRAN), Alexandra NOVIKOVA, Germany, Anna FLESSA, Greece	Practical exercise with the LEAP tool
15.00	15.30	Optimization without/with CO_2 cap	Anna FLESSA, Greece, with the support of TAIEX experts	
15.30	15.45	***Coffee Break***		
15.45	17.00	*Optimization example*	Eleni-Danai MAVRAKI, Greece, with the support of Ágnes KELEMEN (ECRAN), Anna FLESSA, Greece	Practical exercise with the LEAP tool
17.00	17.15	Concluding remarks	Imre CSIKOS	

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ANNEX II – Participants

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ANNEX III – Presentations (under separate cover)

Presentations can be downloaded from:

Homework exercise can be downloaded from:

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

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ANNEX IV – Evaluation

Statistical information

1.1	Workshop Session	ECRAN Modelling: Training Module 1 – Support Mission to Module 1
1.2	Facilitators name	Imre Csikós/ József Feiler/ Alexandra Novikova / Anna Flessa / Ágnes Kelemen / Eleni-Danai Mavraki
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 IIII (95%)	III (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 IIII (75%)	III (25%)	
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 II (100%)		

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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 I (92%)		I (8%)			
2 The quality of the workshop was of a high standard	IIIII IIIII I (100%)					
3 The content of the workshop was well suited to my level of understanding and experience	IIIII III (67%)	III (25%)	I (8%)			
4 The practical work was relevant and informative	IIIII IIIII (91%)	I (9%)				
5 The workshop was interactive	IIIII IIIII II (100%)					
6 Facilitators were well prepared and knowledgeable on the subject matter	IIIII IIIII I (100%)					
7 The duration of this workshop was neither too long nor too short	IIIII IIII (75%)	II (17%)	I (8%)			
8 The logistical arrangements (venue, refreshments, equipment) were satisfactory	IIIII IIIII I (100%)					
9 Attending this workshop was time well spent	IIIII IIIII (83%)	II (17%)				

Comments and suggestions

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

Workshop Sessions:

- It might be a good idea to explain certain parameters, i.e. “peak load shape curve”…;
- It should be organised on a more detailed level.

Facilitators:

- Very dedicated to their task. Very helpful;
- Helpful and very patient! Good work!

Workshop level and content:

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