



CONSULTATION ON EC4MACS MODELLING METHODOLOGY

Please fill in one questionnaire for each model, and provide your comments in the respective boxes.

Please return the questionnaire to the EC4MACS coordinator Hans Benzinger (benzing@iiasa.ac.at) before June 15, 2009.

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<i>Model</i>	GAINS
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We have not had the means to really investigate specific issues addressed in this questionnaire. We also do not wish to repeat issues that were raised during the 2004 RAINS review. We have therefore to a large extent taken advantage of this review to list a number of questions that occurred to us when reading through different GAINS reports.



1 Assessment of model design

To what extent does the structure of each model provide a scientifically credible representation of the reality?

Please fill in text here ...

What are the limitations of the model structure and the implied system boundaries and to what extent may these restrict the validity of the conclusions and policy

Please fill in text here ...

Not being an energy model, GAINS frequently operates in conjunction with PRIMES. How is it assured that no over- or underestimation of reduction potentials and costs or double-counting occurs when running the two models in conjunction, especially with respect to GHG emission reducing measures?

We understand that IIASA generally assumes that all cost-effective measures (at a given carbon price) are taken into account in the energy base-line. On the other hand PRIMES reports to be using parameters that represent subjective perception of technology costs as seen by consumers, standards, etc. which can be used to represent market failures or inertia that may deprive the system from adopting cost-effective solutions.

We also understand that certain types of measures are not explicit in PRIMES but may implicitly be affected or accounted for by elasticities applied in the model (e.g. insulation).

Does the GAINS team have sufficient information about the measures actually accounted for in the different energy scenarios and about their application level? These issues might be specifically relevant with respect to structural and behavioural changes (insulation, transport issues ...), and potentially not only with respect to negative cost measures.

2 Representation of reality in the modules

To what extent does the structure of each model provide a scientifically credible representation of reality?

Please fill in text here ...



3 Treatment of uncertainties

Have the most policy-relevant uncertainties (related to variability of the system inexactness of input data and lack of knowledge) been adequately addressed?

Please fill in text here ...

Is there an alternative formulation conceivable that could provide better policy-relevant insights into uncertainties?

Please fill in text here ...

Do available model results represent uncertainties accurately? Are there other ways conceivable for attaining more robust conclusions?

Please fill in text here ...

There is not much communication in IIASA reports (e.g. NEC reports) about the probability linked to the modelled results.

Maybe use more alternative ('what if') scenarios, in parallel to optimisation, for structural and also (or especially for) behavioural change to get a better idea of additional emission reduction potentials (that may be available at lower costs overall)?

Additional assessments of the potential effects of known biases on the results?

Has the potential effect of the rising number of constraints on the robustness of optimisation been looked into?

Is there a risk that the model gives policy advice that systematically underestimates or overestimates the need for policy measures to protect the environment? What are the major reasons for a bias, if any?

Please fill in text here ...



4 Communication with stakeholders, policy-makers and public

How do the modelling teams verify the quality of input data that are used in model? Is the quality of the input data obtained from national sources and from other models sufficiently guaranteed? In what way do teams give feedback to providers of input to maximise the robustness of model results?

Please fill in text here ...

In what way are users and stakeholders involved in the modelling process, and is this sufficient to ensure transparency and acceptability of the results for policy advice?

Please fill in text here ...

Currently stakeholders seem to be rather involved ex post. This is probably at least partly explained by tight (political) time schedules IIASA is subject to.

Giving the possibility for complete input data checks by national experts before major modelling exercises (as organised in 2005 for RAINS) might further increase acceptability. This point is mainly about informing national experts when input data, control strategies etc. have been updated and providing sufficient time for checks and reactions. This obviously risks increasing time-pressure and work load for IIASA ...

Are the presentations of the results clear? If not, can the communication and dissemination of the results be improved?

Please fill in text here ...

Presentations of results in reports are mostly clear. Sometimes interaction with the GAINS team is necessary to fully understand certain assumptions and their modelling. However, the GAINS team has always been very accessible and willing to provide further explanations and information.

Also, with GAINS-online an excellent communication tool is available.

Cf. further comments at the end of the questionnaire.

Is the model structure transparent? (e.g., are the assumptions clearly exposed and motivated, and is their influence on the model-results explained?)

Please fill in text here ...

The model structure appears transparent. However, probably due to complexity, it is not always obvious to easily understand details.

We have specific questions with respect to assumptions that might concern specific model parameters (cf. the comments at the end of the questionnaire).

Apart from this, it is rather the underlying models (e.g. PRIMES) that appear less transparent. This could affect overall acceptability of model results.

5 Other comments

Please fill in text here ...

We have a number of additional questions that occurred to us when reading through available GAINS reports:

a) Questions concerning certain elements of the objective function

Violation of environmental objectives: *In the CAFE applications of RAINS, the violation of certain environmental objectives was authorised. According to our understanding RAINS then used an additional parameter in the objective function to minimise, apart from the costs, also the violation of objectives. It seems that a further parameter was used to privilege stable solutions. The objective function sought therefore to reach 3 objectives conjointly: minimization of total emission reduction costs, minimization of violations of environmental objectives and stabilization of solutions. A multiplicative coefficient was linked to each of the terms of the objective function defining the relative importance of these three objectives.*

Is this still the case (the answer might depend on specific model applications)? If yes, how are the coefficients set (as they might have an impact on the optimisation results)?

Structural change: *Whereas the treatment of fuel switching options in the objective function (and optimisation) is clearly described in the report IR-07-004, it remains more unclear to us how exactly efficiency improvements are modelled and how they enter the objective function. The GAINS CO₂ (IR-05-053) report mentions for the power sector that autonomous fuel efficiency improvements are solely considered in the baseline while the use of CHP and IGCC enter the optimisation. For the transport sector GAINS considers a number of technology packages, for the industry sector a number of options... Are these options then treated in the same way as EOP measures in the optimisation, or as a replacement of installations/vehicles?*

Do we understand correctly that efficiency improvements in abatement technologies are not taken into consideration?

Modelling of policy instruments: *The approach to modelling an exogenous carbon price is described in IIASA publications, while the approach to modelling other economic instruments (e.g. for air pollution) is not described. Would these also be expressed in terms of a 'penalty term'?*

The IIASA reports describe how the 'climate penalty term' is used in the optimisation mode. Could it be used in a scenario mode as well?

b) Questions concerning the modelling of constraints

Concerning the applicabilities of technologies for NH₃ that are grouped together in packages – do we understand correctly that the maximum applicability of each technology in a package is limited to the applicability rate of the technology with the lowest applicability rate?



We do not understand why IIASA makes the assumption that boiler type shares remain constant in the optimisation (cf. report IR-07-004) and wonder what this implies for the degree of realism of the results.

c) Questions concerning the modelling of vegetation impacts

We are slightly confused about what is currently modelled in GAINS concerning vegetation impacts from ozone (when comparing NEC report results with what is written in the EC4MACS GAINS model report). Does GAINS use the AOT 40 indicator? Or does it rather use the SOMO 35 and really only has vegetation impacts quantified ex post in the benefit assessment?

Thank you for providing this feedback to the EC4MACS team!

Please return this questionnaire to the EC4MACS coordinator Hans Benzinger (benzing@iiasa.ac.at) before June 15, 2009.

You will receive information on the EC4MACS review workshop that is planned for October 2009.