



## 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](mailto:benzing@iiasa.ac.at)) before June 15, 2009.

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<i>Model</i>	<b>GAINS</b>
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### **1 Assessment of model design**

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

*The model strikes a good balance between detail and functionality. At the degree of detail at which it operates the model offers a credible representation of reality.*

**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**

*The model structure is quite flexible and the constraints are principally related to data requirements. However, this is well addressed with an excellent interaction with the user base. Improved harmonisation of national approaches to calibration and so forth would also be of help. Some of this work is already underway.*

*One system boundary that is being assessed in the research community is how to best address non-technical measures within the process in a manner that is sufficiently simple as to be functional, but robust enough to allow for inclusion of the results in the final assessment process. This is no small task, but given that NTMs will have an effect and will influence costs and benefits in some way, then it is better to at least partially account for them than exclude them from the process.*



## **2 Representation of reality in the modules**

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

*The structure is adequate but the caveat is always the quality of the data. The GAINS structure is straightforward in approach but broad in scope. At the level of detail the model operates it does provide a credible representation of reality when carefully calibrated.*

### **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?

*The GAINS model is an excellent, accessible structure which can be relatively easily adapted to improved data. The greatest uncertainty in the process (at present) is probably related to the user defined parameters which are not really problems of the model itself.*

*The energy forecast and the technology forecasts are perhaps the most important. The former is uncertain, but generally provided by national agencies. Some additional effort may be required in terms of adapting the aggregation levels of data from national to model. This work should fall to national teams with IIASA support as is already happening. The latter is not something that is currently generated by many agencies and perhaps the approach of countries in calibrating their control strategies is an important area to address.*

*The introduction of non-technical measures to the process will move NTMs to the top of the uncertainty tree.*

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

*The systems are in place to address uncertainties, and again I would suggest that the approach is to sustain engagement with national teams and to build greater consistency in national approaches to calibration (e.g. methodologies, assumptions).*

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

*There will always be uncertainty from the forecasting point of view. In this context I believe that addressing uncertainty with flexibility in policy mechanisms is more meaningful than trying to ensure the future is predicted with accuracy. The former can be achieved, the latter cannot. It is of course important to have best available data, but shocks – as currently – can and do occur.*

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?

*It all depends on how accurate the abatement measures are – from the other perspective, inflexible targets are a far greater risk in terms of under or overestimating the need to protect the environment.*

### **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?

*IIASA and GAINS have been excellent in their history of national engagement and sustained model improvement. It illustrates how a central modelling team can achieve greater improvement of model parameters where external national teams/experts have bought in to the process. More member states will hopefully get involved and this should further strengthen the model.*

*In terms of verification, the transparency of the model allows for assessment by a broad cross-section of the community.*

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?

*National modelling teams, online access to the model, network of integrated assessment modellers. The process is transparent and well managed. Perhaps the only criticisms are the constraints on the time of the GAINS team and also the time constraints that occasionally arise in the policy process that give insufficient time to respond. Additional time and support is always desirable.*

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

*Results are clear. The online model system is also excellent in terms of structuring output. A novel feature may be to allow the design and calibration of more detailed automated runs and outputs for reporting purposes. This would help national teams in quickly bringing results to wider attention.*

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

*The model structure is clear. However, some further work may be possible in terms of guiding users in their calibration efforts, and explaining some of the more 'advanced' considerations within the model e.g. cost estimation, reasonable approach to technology penetration forecasting.*



## **5 Other comments**

*The GAINS model serves as a very strong example of what can be achieved with an open policy and broad community engagement. There are improvements to be made and perhaps some additional work on communicating approaches for end-users – however, the system and network is in place to do so.*

Thank you for providing this feedback to the EC4MACS team!

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

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