

# Inclusive modelling – incorporating expert opinions in energy models

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## Expert elicitation?

*“People are no damned good, but experts are wonderful.”* Bayesian statistician Ward Edwards

Expert elicitation is employed when statistics are not available as producing these would be too complex or costly or for future predictions.

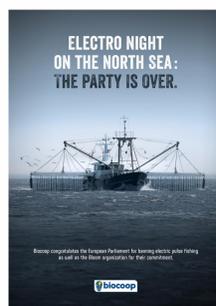
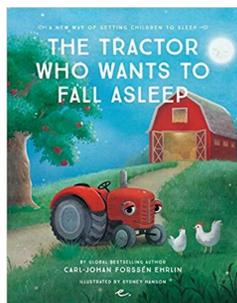
In expert elicitation, experts in a specific field are asked to provide either probabilities of something occurring (direct expert elicitation) or to predict actual parameter values in different scenarios (indirect expert elicitations).

This can be used to build a model (as input parameters) or for sensitivity analysis of an existing model.

## Topics that arose in expert elicitation

MEDEAS-Europe agriculture & fisheries as example:

- How the European pulse trawling ban will affect future energy use in European fisheries
- Energy use in fertilizer production
- Fuel tax rebates in agriculture and fisheries
- Increased energy use in fishing due to fish migrating north due to warming waters with climate change.
- Energy use effects of an increase in organic farming



## Visualisation of some expert responses

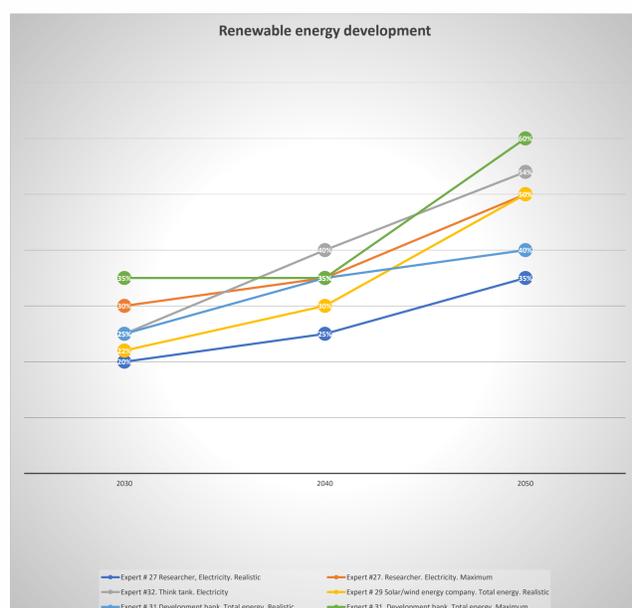


Figure 2. Expert responses on renewable energy development for LEAP-Bulgaria

## Methodology

We asked our modelling teams for the parameters they were most interested in.

1. MEDEAS-Europe: a) Renewable Energy development and b) Energy Use in Agriculture and Fisheries.
2. TIMES-Austria: c) Electricity import and d) Energy Use in Transport.
3. LEAP-Bulgaria: e) Renewable Energy development and f) Energy Use in Transport.

We requested that experts provide us with

- figures they believe realistically to happen (thus without radical course changes or political and financial effort - **“realistic scenario”**)
- what they deem to actually be possible from a technological perspective (hence with political and financial effort, but no silver bullet invention – **“maximum possible scenario”**).

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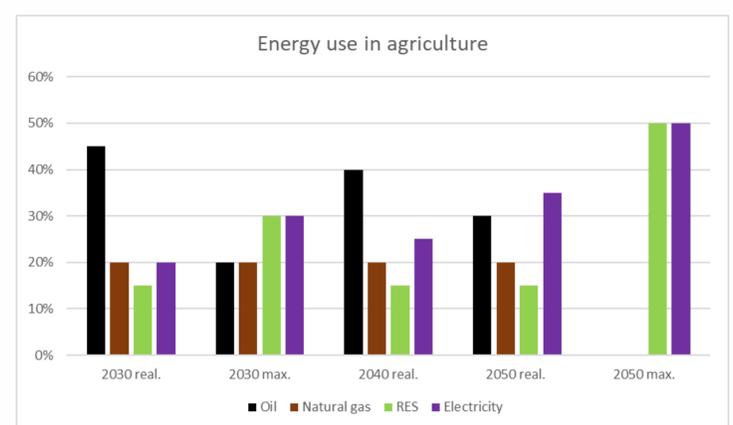


Figure 1. Expert response on energy use in agriculture by Professor for Agroecology & Climate for MEDEAS-Europe

## Discussion

The ranges and estimates produced via the elicitation process are going to inform ranges that will be tested with the sensitivity analysis of the models and will be used to help formulate future scenarios that will be tested with the models.

We wanted to show that, to use Krueger’s et al. words, “modelling itself can be subject to stakeholder scrutiny and input of stakeholder expertise” (Krueger et al., “The role of expert opinion in environmental modelling”, 2012, p. 13).

The expert elicitation had the added benefit of an outreach tool – over 100 people in multiple countries were contacted for a potential interview and received information about MEDEAS.

Some experts were not comfortable with providing figures and were then instead asked to speak about general trends, barriers to and factors in decarbonisation in their field and policies they’d recommend to remedy these. This of course creates questions regarding how such information can be used by the modellers.

Another challenge is that databases, such as WIOD, which MEDEAS-EU employs, group disparate (from an energy perspective) sectors together. There was a general paucity of data in some sectors, e.g. Eurostat agriculture and fisheries energy consumption.



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