

4. Useful scenario variations

- Event based scenarios vs. temperature based scenarios
- Discontinuous/shock scenarios and breakthrough technologies (non-least cost)
- Flows and stocks

Observation by domain expert C. Bertram

- Indicators shall allow use of scenarios in stress tests (here many macro and micro data is used)
- Extreme events (war/crisis) are not explicitly represented in the models. Models rather represent climate impacts/influence on the economy in general.
- Many of the indicators /meta-data are available in principle (if not openly available in database/publication, modeling teams generally willing to provide additional data)

FEEDBACK IN PLENARY

- There is need of **indicators on scenarios**, but also on **models and studies**; they shall be easily identifiable e.g. via tags
- Information on **model version** should be included
- Information on the **short term** (5-10 year time frame) is most relevant for businesses. However, IAMs may not be the best tools for short-term analysis. A possible solution is the use of 'expert judgements' to bring global information down to the user-level.
- The **timeline until 2030** is essential as for policy and paves the way for reaching later targets.

DAY 2

SESSION: LEARNING FROM SCENARIOS – VISUALIZATION WORKSHOP

The overall aim of the visualisation workshop (Boris Mueller, FH Potsdam and team) was to focus on specific insights that can be gained from the scenario space. The stakeholders were given an opportunity to address issues that are directly related to their everyday work - and they should express these issues in a visual way.

The workshop was structured into four sections:

- introduction on data and data visualisation
- concept brainstorm
- visualisation workshop
- presentation

In the introduction, we looked at the available scenario data and at various visualisation techniques. After the introduction, we split the stakeholders in two teams - a policy & business team and a finance team.

The aim of the concept brainstorm was to identify relevant questions and issues than can be answered by the scenario data. Stakeholders from the policy and business panel developed a broad set of questions they wanted to answer by using scenarios. Some questions were highly specific to the needs of the stakeholders who proposed them. But there were also more general questions mostly regarding the relation between scenarios and goals like the SDGs and the Paris Agreements.

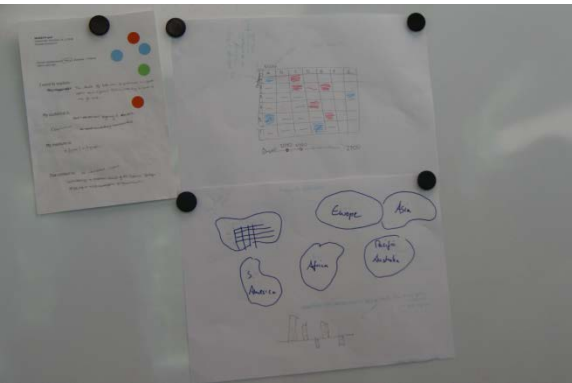
In the visualisation workshop, the task was to create a visualisation (static or interactive) of climate scenario data that is a visual representation of the issue discussed in the brainstorm. The participants in the workshop were asked to design the visualisations by just using pens and paper.

RESULTS

POLICY & BUSINESS PANEL

In the policy & business team, two questions were selected for the visualisation part of the session. The first one on trade-offs between mitigation options and SDGs, resulted in a heat table, which showed the relation between different types of pathways and SDGs.

	SDG1	SDG2	SDG3	SDG4	...	
Pathway A	◊	◊	◊	◊		
Pathway B	◊	◊	◊	◊		
Pathway C	◊	◊	◊	◊		
...						



The matrix would be a tool for assessing which SDGs are fulfilled (green) and which SDGs are not fulfilled (red) by a range of pathways. This is an extremely oversimplified and overarching picture of the relationship between Agenda 2030 and mitigation/adaptation pathways. In reality the SDGs need to be interpreted locally and/or for a sector. The group discussed whether it would be possible still to have a global picture like this, indicating for instance regional differences with bars (longer bars = greater regional differences etc.)

Fig. 6 Connection pathways and SDGs

Different spatial scales is one thing, different temporal scales is another thing. The scenarios usually focus on 2050 and beyond, while the SDGs are explicitly about 2030. Several participants were for instance sceptical to use SDG indicators beyond 2050 (uncertainties are to severe).

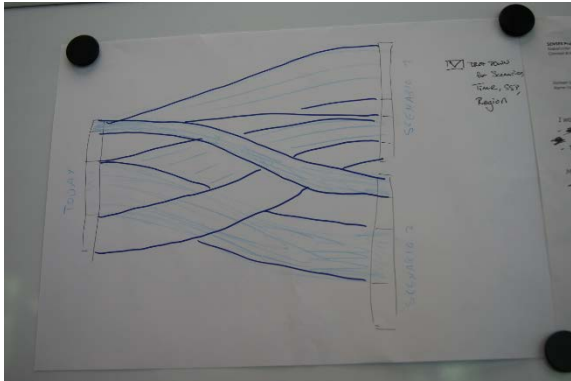


Fig. 7 Sankey diagram bioenergy

The second question we tackled was about the bio energy potential in Africa. This led to a sankey diagram which visualised changes in land use allocation for multiple scenarios.

FINANCE PANEL

Financial stakeholders brainstormed on relevant topics/questions for visualization:

- Long term and global mitigation scenarios
- Data on credit risks, impact on different sectors of the economy
- Technology on regional scale
- Costs and risks of the 2°C target, investment flows, financial stability, risk of concentration
- 2 degree investment pathways in OECD countries; e.g. show how total investment and different investment streams change under a 2 degree target (which shows how electrification will change including the difference between coal and green electricity)
- Climate effects on the financial system (problem of confidentiality of data, that can only be shown in an aggregated form)

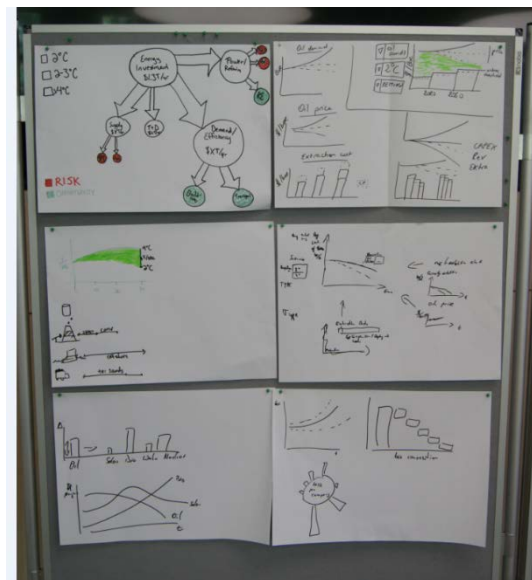


Fig. 8 Impact climate change policies on oil sector

Financial stakeholders agreed to produce first visualizations on the question: **What is the impact of climate change mitigation policies on the oil sector?**

The drawing exercise was accompanied by a discussion on the role of models and the potential of visualization. The REMIND-Magpie models can represent prices, quantities, losses per technology (e.g. oil). Visualization can help showing both risks and opportunities. For instance, if extraction costs rise also prices rise (risk), however, if the price of a technologies rises, another technology may get cheaper (opportunity).

Stakeholders came up with one drawing that brings together best visualization ideas.

1. Lower left: provide context: not all oil investments are created equal: Very different timelines: shale projects anyway have very fast decrease of production -> only very short pay-back period, whereas offshore or tar sand projects are long-term investments (and conventional in between)
2. Upper left: The world market prices for oil increase more slowly with climate policy than without, or might even decrease under strong policies. Therefore profitability (wedge between price and extraction cost will decrease gradually, and especially for projects with higher-than average extraction costs).

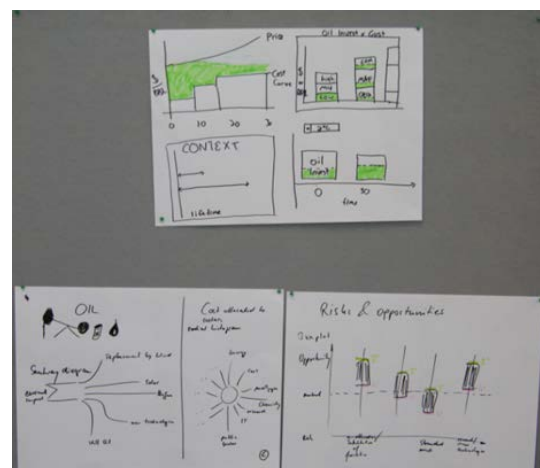


Fig. 9 Summarizing visualizations

3. Right side: Losses in oil sector due to climate policy are unevenly distributed across segments (shale, tar sands, offshore vs conventional), and thus regionally

FEEDBACK IN PLENARY

- **Granularity** is a key issue for all stakeholders
- Early **access to the SENSES Tool** would be very appreciated
- The session was useful to learn about other perspectives, a “**give and take**”
- It would be valuable to have a **cross-stakeholder discussion** at the next workshop
- The main takeaway of the session is the need for **communication, clarity and choice**

The results of the workshop provided several insights. Specifically, we were able to understand and describe the issues and questions the stakeholders are dealing with, when they use climate scenarios. Furthermore, the visualisation sketches provide us with information on the requirements and use cases for the visualisation toolkit.

FEEDBACK, WRAP-UP

Overall the stakeholders found the workshop very valuable. Also the exchange among stakeholders. All presented preliminary results were considered relevant – not equally to everyone, some have high interest in the primer whereas others are strongly interested in the fact-sheets and meta- indicator selector. There is a great curiosity about what the consortium will do with the workshop results and deliver until the next workshop. All stakeholders expressed the wish to be invited again and to be kept updated about intermediate results and prototypes.