2018-IP03: EASAC report on negative emissions technologies (NETs)

The European Academies' Science Advisory Council (EASAC) is formed by the national science academies of the EU member states, plus Norway and Switzerland, and aims at providing independent, evidence based advice to policy makers on scientific issues. EASAC has now published a new report on the real world potential of negative emissions technologies (NETs). The report was written with the help of a group of 10 experts and peer reviewed by nominated EASAC members. The main objective was to assess the real world feasible of a number of NETs, since they are heavily used in current climate models. For example, the IPCC's scenario database contains 400 scenarios with a 50%, or higher, chance to limit warming to 2°C, of which 344 rely on large scale NETs in some form.

The NETs considered in the assessment are:

- Afforestation and reforestation (A/R)
- Soil organic carbon sequestration (SOCS) (including biochar)
- Bioenergy with carbon capture and storage (BECCS or Bio-CCS)
- Enhanced weathering (EW)
- Direct air capture and storage (DACCS)
- Ocean iron fertilisation (OIF)

This IP will provide only a short summary, as the report carries a disclaimer regarding publication or reproduction of the whole report or parts of it. (However, the full report is publicly available via the link at the end.)

The report consists of a summary, a description of the scope, short comparisons of the NETs, policy implications and an annex with more detailed descriptions of each NET.

The main conclusions from the report include:

1. NETs only offer a limited realistic potential for CO_2 removal from the atmosphere, especially regarding the scale that is required in some very stringent climate scenarios, such as 2°C and 1.5°C scenarios.
2. Thus, NETs cannot compensate for other inadequate mitigation measures.
3. However, future scenarios without NETs will have great difficulty in reaching net zero emissions.
4. NET implementation will be very case-specific (in terms of location, technology and other circumstances).
5. The efforts should focus on rapidly reducing GHG emissions (other than NETs).
6. Some of the most technologically credible approaches involve SOCS and forest biomass.
7. It is important to solve the remaining technical challenges of CCS and develop viable business models.
8. We will need all tools to achieve the ambitious targets of the Paris Agreement.

The conclusions above feature in the 1-page summary at the beginning of the report. With short summaries there is usually the danger of oversimplifying and missing out on important details, and this is the case here with points 5 and 6 in particular. In my opinion, SOCS and forest biomass are not more credible than many of the other NET options. While SOCS appears to be a no-regrets option with many co-benefits, there are still issues that need clarification, such as saturation and permanence of the C sink, potential negative effects on the soils, albedo changes etc. Most of these are discussed later in the more detailed sections of the report, so it is not clear to me why those two options mentioned in the summary are deemed more "technologically credible". Similar, there is inconsistent messaging regarding CCS. Assessment of CCS was included, as the author(s) considered it an important

prerequisite for BECCS and DACCS. However, it is confusing if CCS and estimates of its GtC/yr potential are placed together with BECCS, DACCS, A/R etc. in a table with the caption "Summary…of NETs". In addition, the summary underlines the importance of solving technical challenges of CCS. It is not that incremental improvement in the technical part of CCS cannot be made. However, as the main body of the report later elaborates, the barriers are institutional and organisational (and financial, social and political) rather than technical. As the main report sections are mostly balanced, it is quite disappointing that the summary seems less so. A further inconsistency in the report relates to BECCS. At some point, the report mentions that BECCS would still release a significant amount of the carbon fixed in the biomass. However, later on the report cites a study showing that overall chain emissions of BECCS can be negative.

All in all, the report leaves me with mixed feelings. On the one hand, it highlights important issues, such as the necessity to use all options, to act fast and to be very mindful of the real world limitations of NETs. On the other hand, there are inconsistent messages, especially in the summary, which the target group, i.e. policy makers, will likely focus on.

The full report is available on EASAC's website:
https://easac.eu/publications/details/easac-net/

A dissemination event will take place on 8th March 2018, 13:30-15:00, in Brussels, hosted together with the European Parliamentary Research Service (EPRS). Registration is possible by sending an email to info@easac.eu.

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