Tutorial proposal:
Optimal carbon-budget planning with `REMix`

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Tool: `REMix` (Renewable Energy Mix)[1, 2][*]

Abstract

Staying below a global temperature rise of 1.5°C is the formulated benchmark in the Paris Agreement, which implies a remaining carbon budget to not miss that target. However, in contemporary energy system optimisation models this is often only translated to no-emission targets in some future year(s). This does not account for the maximum total emissions along a decarbonisation pathway to stay within the budget. In the proposed tutorial, we would like to present a model that keeps a carbon budget for a chosen modelling region. This model is built in the `REMix` framework and optimised using its path optimisation feature with perfect foresight.

Keywords: equation-based modelling, pathway optimisation, carbon-budget accounting

1   Goals

Goals aimed to reach with the tutorial are:

- demonstrate how to optimise an energy system in `REMix`

- show how to keep a carbon budget in a pathway optimisation with perfect foresight

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[*]The `REMix` framework is planned to be made open source in the first quarter of 2023 (i. e. before the conference).

- showing the effect of employing the carbon-budget approach on modelling results

2 Target audience

To be able to follow the tutorial, some general knowledge of the `Python` programming language and its `Pandas` package is helpful, but not strictly necessary. Basic knowledge of linear optimisation is recommended. The workshop is especially suited for other energy system modellers and people interested in getting to know a new open-source optimisation framework and its inner workings.

3 Presenter's bios

Jens Schmugge is working in the field of energy system optimisation since 2020. His PhD project started in March 2021 and encompasses the optimisation of the European energy system with a distinct focus on the gas infrastructure. While doing this, he is co-developing the `REMix` framework and creating methods and documentation that is aimed to make it more user-friendly. This includes the enhancement and development of tutorials. He is going to present the carbon-budget approach and show its impact on optimisation results.

Eugenio Arellano has been working in the field since 2019. He is also a PhD student and his research area covers the data semantics of energy systems modelling. He is actively developing `REMix` with emphasis in the implementation of the `FAIR` principles in its modelling workflows. He is going to introduce the general setup of a model in `REMix`.

References

[1] GILS, H. C.: *Framework Renewable Energy Mix (REMix)*. https://openenergy-platform.org/factsheets/frameworks/258/

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