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Turkey 2050 Climate Policy Dialogue Project

Technical brief on 2050 Calculators

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About the 2050 Calculator

1.1What is a Calculator?

The Calculator approach consists of a multi-sectoral systems model associated with a web-tool that allows users to explore the options for reducing GHG emissions from now to 2050, and to see the consequences of these choices on multiple sustainability issues. To this end, users are enabled to control "levers", expressing behavior or technology or patterns among the different sectors, which affects the GHG emission trajectory, and a range of sustainability impacts.

The first Calculator was developed in 2009 (we strongly recommend that you check UK 2050 Calculator[1] to get a better understanding) to enable the UK Government to develop their greenhouse gases (GHG) emission mitigation strategy, namely the UK Carbon Plan. Since then, more than 30 national 2050 calculators have been developed worldwide so far, with a few others already in process. These calculators can be used for informing policy making, designing GHG mitigation strategies, reporting on the Intended Nationally Determined Contributions (INDCs), education and research purposes, disseminating knowledge, and contributing to the climate change debate more broadly.

Building on the success of some early national 2050 calculators, the Global Calculator[2] was developed, which was led by the former UK Department of Energy and Climate Change (DECC), and co-funded by Climate-KIC, involving several world leading institutions in the project. The Global Calculator enables users to explore the options for reducing global greenhouse gas (GHG) emissions associated with land, food and energy systems in the period to 2050. The Global Calculator also extends the approach used in the country level 2050 calculators by illustrating the detrimental impacts of climate change associated with global-level choices.

On the EU level, the European Calculator (EUCalc)[3] is an ongoing project supported by the EU Horizon 2020 Programme, which builds on the expertise of the Global Calculator and will develop a sophisticated, yet highly accessible, user-friendly, dynamic modelling solution to quantify the greenhouse gas (GHG) trajectories (at European and Member State scale plus Switzerland), associated with sectoral energy demands, land use, land use change, social implications of lifestyle and energy technology choices. The project is led by PIK-Potsdam (Germany), involving several other European institutions.

1.2Levers and levels concept

Calculators are controlled using a range of levers that represent changes we could make to mitigate climate change from now until 2050. For each lever there are different levels of effort/ambition – for most this will range from level 1 (make minimal effort to tackle climate change), to level 4 (make an extraordinarily ambitious and extreme level of abatement effort).

Levers and their possible *effort/ambition levels* constitute building blocks of the 2050 calculator models. They allow the user to construct possible pathways to 2050 and beyond. The approach looks not only at 2050 as an end point, but also at the sequence of changes that would need to occur over the next 30 years, i.e. for the implementation of a successful climate policy.

[1] For the original UK 2050 Calculator please check:: http://classic.2050.org.uk

[2] The Global Calculator is available at: www.globalcalculator.org

[3] More information on the EUCalc is available on its project's website at: www.european-calculator.eu

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1.2.1 Choice of levers

To identify the most relevant actions that need to be taken across sectors in order to significantly reduce emissions by 2050, it is crucial to take a sectoral view to understand what types of change are technically possible in each sector. Each of these actions constitutes a lever to reduce CO_2 equivalent emissions; the magnitude of this reduction is expressed in the ambition level, which ranges from a minimal to an extraordinarily ambitious effort to tackle climate change. Across all sectors, a large set of levers are modelled (e.g. transport demand per person; insulation level for refurbished houses; lifetime of certain products like cars, efficiency and type of steel production; offshore wind capacity installations, etc.) driving energy demand and supply projections. Thus, they cover a broad range of possibilities, testing the boundaries of what happens in business-as-usual cases or what might be technically feasible. They are not based on specific assumptions about future policies and their impacts and should not be interpreted as such.

1.2.2 Definition of ambition levels

There are four different levels of ambitions (effort) associated with each lever. These four levels offer a broad variation of mitigation choices and sustainability impacts, including intermediate levels. Therefore, the calculators can provide a wide range of pathways arising from a combination of all levers and levels that can be chosen by the end user. Usual definition of levels is as follows.

- Level 1: Business as usual. This level contains projections that are aligned and coherent with the observed trends.
- Level 2: Ambitious but achievable. This level is an intermediate scenario, more ambitious than business as usual but not reaching the full potential of available solutions.
- Level 3: Very ambitious but achievable. This level is considered very ambitious but realistic, given the current technology evolutions and the best practices observed in some geographical areas.
- Level 4: Transformational breakthrough/ This level is considered as transformational and requires additional breakthrough and efforts such as a very fast market uptake of deep measures, an extended deployment of infrastructures, major technological advances, or strong societal changes, etc.

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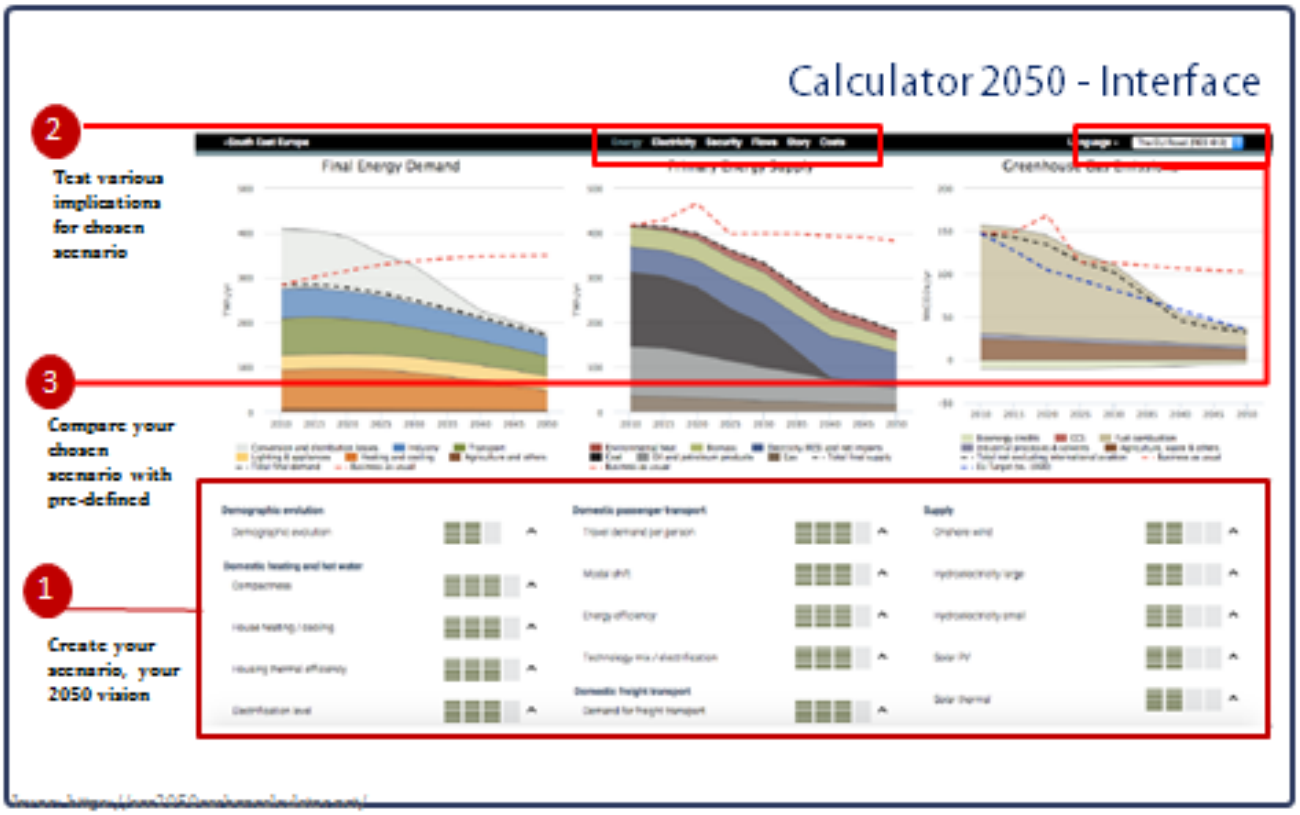

1.3 The critical role of co-design

To develop a 2050 calculator, as an accessible modelling solution, it clearly requires leveraging existing work and significant support from key experts and stakeholders. Co-design is therefore one of the cornerstones of any calculator endeavour. It entails strong and early engagement of relevant audiences and stakeholders from different segments of society (including Civil Society, Private Sector, Policy Makers and Planners, Academia and Science) in order to understand needs, mobilize practical and tacit knowledge and integrate them in the calculator framework.

This is providing a critical input to make sure that the modelling approach and the analysis underlying levers and levels is deep enough to be considered scientifically robust and credible. It also relates to the fact that it does not aim at defining one optimal scenario but rather to simulate and reflect the full scope of what is believed to be possible by 2050. The co-design process thereby supports the 2050 calculator to account for the full range of credible opinions when we consider possible futures by 2050 and beyond.

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2 Project background and context

The project *Turkey 2050 Climate Dialogue* draws on the work of SEE Change Net, CAN-E and 12 other partners in the Western Balkans and the EU on the development of the South East Europe 2050 Calculator, which enabled to transparently and credibly open up a dialogue around possible Policy pathways to achieve EU energy and climate goals for accession and pre accession countries of South East Europe. Within the European Union, given the complex interaction between policy areas of energy, climate and environment, the Horizon 2020 is funding an innovative climate, energy & resource modelling solution (EUCalc) for a scientific underpinning of European energy, emissions policy and the consequent societal, environmental and land use impacts. The EUCalc is composed of the leading European universities, research institutes, SME and constancies, including SEE Change Net. It is believed that the lessons learned through this process can be valuable in Supporting Civil Society Dialogue Between the EU and Turkey and serve as a foundation for building the future Turkey 2050 Calculator.