EUCALC

Explore sustainable European futures

Expert Consultation Workshop on Scenarios for Decarbonising European Buildings

Monday, June 4th, 2018, from 12:00pm to 17:00pm
CEN-CENELEC Meeting Centre, Rue De La Science 23, 1040, Brussels, Belgium

Pre-read document for the workshop

Dear **Participant**,

The team of the European Calculator (EUCalc) project by developing a new state-of-the-art model, with origins in the modelling philosophy of the Global Calculator, will create an online tool for analysing trade-offs and pathways towards a sustainable and low-carbon European future. With this tool, EUCalc aims to provide decision makers with an accessible energy modelling solution to quantify the sectorial energy demand, greenhouse gas (GHG) emissions trajectories and social implications of lifestyles and energy technology choices in Europe.

This workshop is devoted to the Buildings' module of the European Calculator and will investigate the corresponding levels of ambition and effort that reflect the full range of what experts believe could be possible by 2050.

In this document you will find important information including: ***the agenda, the structure of the European Calculator, the building's module, the major discussion points and the informed consent form (!) -complemented with logistics information.***

We look forward to welcoming you in Brussels and having a fruitful debate. Your presence on the expert workshop will provide us with valuable contribution on scenarios for decarbonising European Buildings.

Judit Kockat, Project Manager BPIE
Paraskevi Vivian Dorizas, Project Manager BPIE

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730459.

Expert Consultation Workshop Agenda

Scenarios for Decarbonising European Buildings

Date: Monday, June 4th, 2018, from 12:00pm to 17:00pm
Venue : CEN-CENELEC Meeting Centre, Rue De La Science 23, 1040, Brussels, Belgium

Time	Activity
12:00-12:45	***Lunch*** *(CEN-CENELEC cafeteria, ground floor)*
12:45-13:00	***Registration*** *(in front of Tesla rooms)*
13:00-13:20	***Opening & Welcome*** **Oliver Rapf** Executive Director BPIE, **Jonathan Buhl** Facilitator 4sing
13:20-13:35	***Presentation of the EUCalc project*** **Judit Kockat** Project Manager BPIE
13:35-13:50	***Scenarios for Decarbonising European Buildings: The Commission's perspective*** **Keynote speaker: Mechthild Wörsdörfer** Director at the European Commission's Directorate General for Energy, in charge of renewables, research and innovation, energy efficiency
13:50-14:05	***Scenarios for Decarbonising European Buildings: Industry perspective*** **Keynote speaker: Céline Carré** President of the European Alliance of companies for energy efficiency in buildings (EuroACE), member of EU-ASE
14:05-14:20	***Q & A***
14:20-14:50	***Introduction of the Building module of EUCalc*** **Judit Kockat** Project Manager BPIE
14:50-15:10	***Coffee break***
15:10-16:45	***Interactive dialogue*** **Jonathan Buhl** Facilitator 4sing
16:45-17:00	***Summary and Conclusions***

About the European Calculator

The debate on decarbonizing Europe evolved from being a concern of separated national governments to also encompass a cross-border heterogeneity of economic sectors, businesses, regional decision makers and individuals. Simulation tools supporting policymaking were mostly shaped by focussed scientific debates and miss out to engage with the new diversity of actors willing to drive transformation.

To bridge this gap, we developed the EU Calculator model and its public outlet, the Transition Pathways Explorer. This tool addresses European and national policymakers, businesses, NGOs and other actors of society. Its goal is to equip these users with a mean to create their own low-carbon transformation pathways on the European and member state scale and compare them to other integrated pathways. The results will enable EU policymakers to support the energy, emissions and resources debate on a low carbon transition.

The underlying methodology roots between pure energy simulation and integrated impact assessment, and harmonizes across all sectors to link 1) behaviour, 2) products, 3) material & resources, 4) energy and 5) emissions. It also integrates trade-offs like the impact of eating habits on land-use or buildings renovation on material demand.

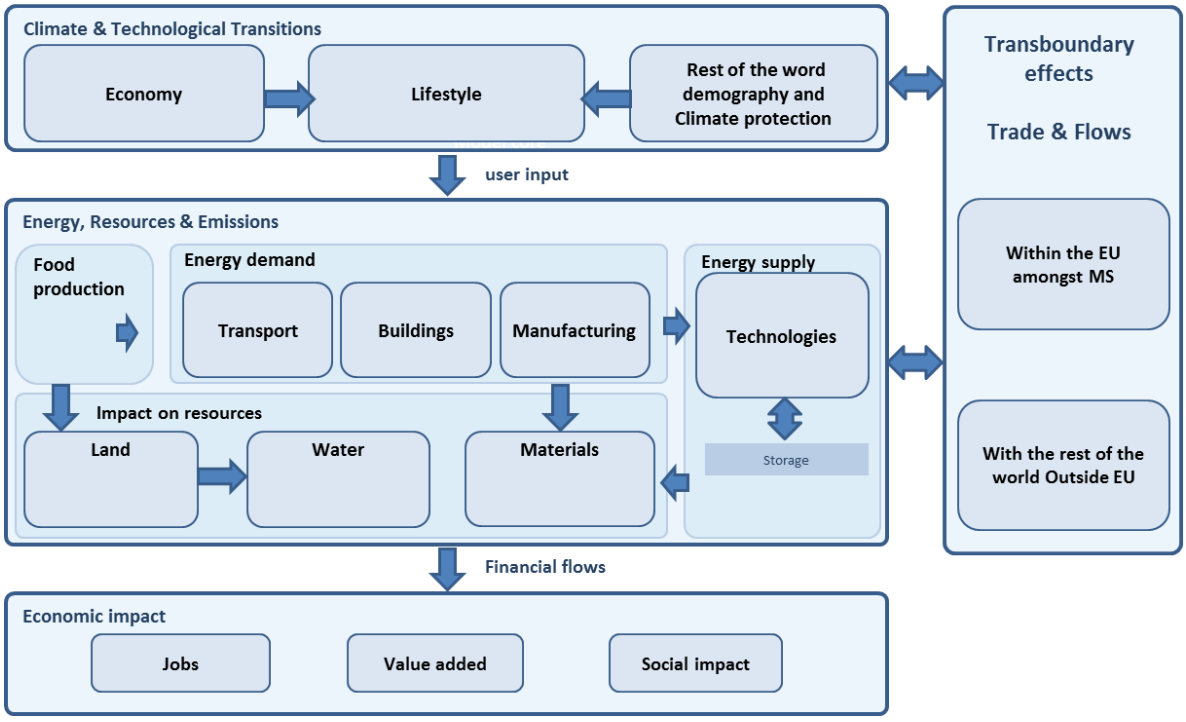


Figure 1 – Modular structure of the EU-Calc model

To share model outputs with a wider audience, we developed the Transition Pathways Explorer, an online, open source tool providing instant results from the EU Calculator model runs. Co-designed with scientific, business and societal actors, the modelling approach defines the options that will be available to the user later for creating their own transition pathway. The model retains an intermediate level of complexity while providing a high level of transparency.

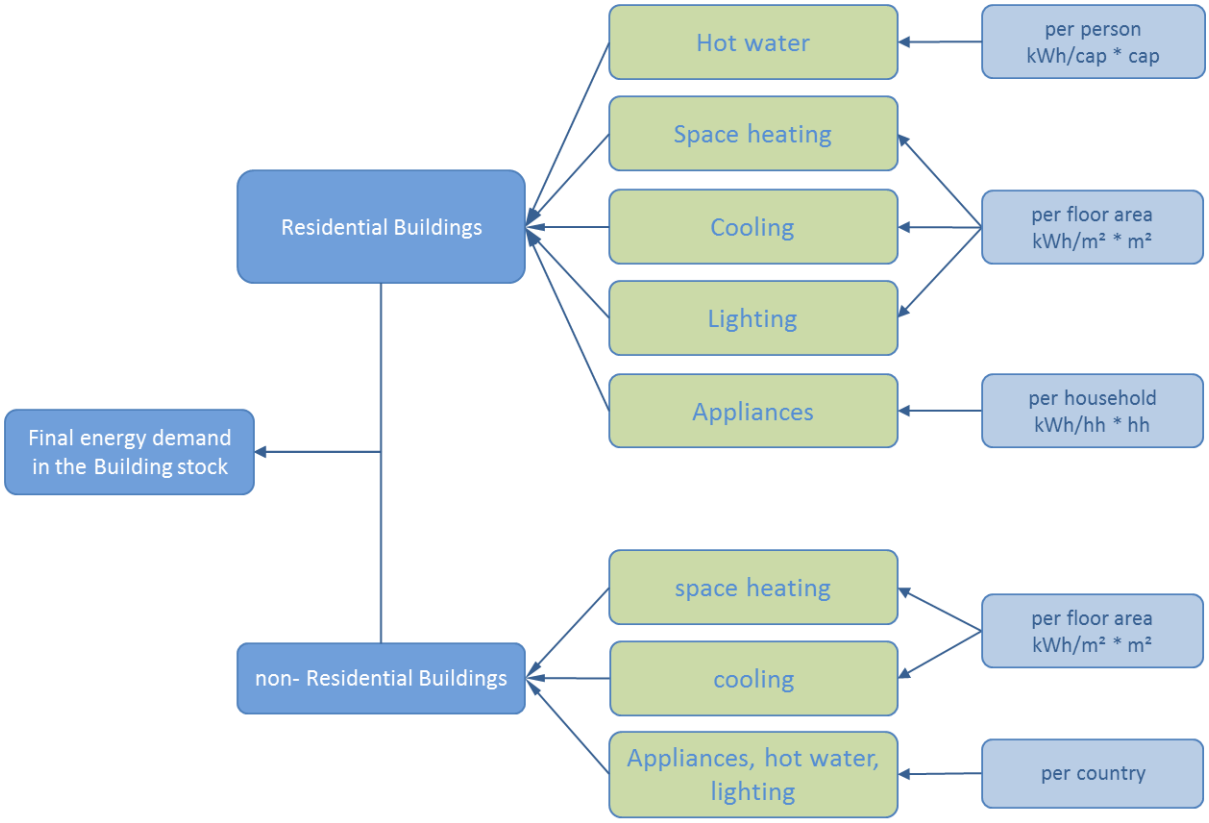
The European Calculator model consists of several interconnected modules (Figure 1).

For more information, please see http://www.european-calculator.eu

Modelling approach in the buildings module

The scope of the buildings module includes residential and non-residential buildings (Figure 2). It seeks to calculate the energy need, delivered energy, primary energy demand and direct CO_2-emissions for space heating and cooling, hot water, lighting and appliances. The overview of the buildings module below, shows the calculation intra-year per country. It frames the scope of the model and highlights the disaggregation of the calculation by energy use (green boxes).

Figure 2: Overview of the annual calculation logic behind the Buildings module



The calculations within the module covers the operational phase of buildings. Shifting building materials from mainly steel and concrete to mostly wood for construction and energy renovation will also be covered in the analysis.

Workshop scope

This workshop aims at selecting the most crucial emission-driving levers within the buildings sector and define how ambitious their levels are. Within this analysis, a lever is a driver for reducing GHG-emissions. The magnitude of this reduction is expressed in the ambition levels 1 to 4.

Levers

As most important drivers for reducing GHG-emissions in the building sector, the identified levers are described in the following table.

Table 1 – Levers to discuss for the buildings module

	Lever	Brief description	Content
1.	**Living space demand per person**	This lever controls the average living space per person.	The living space demand per person affects the energy consumption. The more floor area is heated in total the higher the energy demand. Reducing the average size of dwellings for example by sharing kitchens and common areas will impact emission levels.
2.	**Building insulation**	This lever controls the average heat loss which is reduced by insulation and affects the energy need per floor area.	Heating and cooling accounts for around 30% of all the energy demand of buildings. The amount of energy needed to heat or cool buildings can be reduced significantly by improving external walls, floors, roofs, ceilings, windows and doors so that the building is better insulated. This means that less heat energy can escape from the inside of the building during cold weather, and less heat energy from outside can get in if you are cooling it[1]
3.	**Indoor temperature and hot water demand**	This lever controls the average room temperature during warm and cold times of the year, and also controls the hot water demand per person per year.	Heating and cooling represent a big proportion of the energy demand of buildings. The energy demand will increase when indoor temperatures significantly deviate from outdoor temperatures.
4.	**Material use & lifetime of construction and heating, cooling and ventilation systems**	This lever controls the material used to construct or insulate a building and manufacture the HVAC systems.	The carbon emissions and energy input associated with products such as steel, wood or insulation can be reduced by 3 ways: (i) reduction of required material during manufacturing, which can be done through improvements in the design, (ii) switching to less carbon-intensive materials and (iii) using more recycled material to reduce energy & emissions.
5.	**Heating and cooling (ventilation) system efficiency**	This lever controls the average energy loss in heating, cooling and ventilation systems.	HVAC systems have recently become more energy efficient. Increase in the energy efficiency lowers the emissions impact.
6.	**District heating share**	This lever controls the level of heating energy demand covered by district heating.	District heating can facilitate decarbonisation buildings in dense urban areas even with decreasing heat density. Buildings in dense urban areas are particularly hard to fully release from their energy need partly due to historic or special restrictions.

[1] http://tool.globalcalculator.org/gc-lever-description-v23.html?id=13/en

7.	**Heating technology and fuel switch**	This lever controls the mix of technologies used for spare heating, space cooling, hot water, cooking and lighting.	A variety of different technologies are used in buildings for space heating, water heating and cooking. These technologies can have very different efficiencies and emissions associated with them. Today, the most common forms of heating in urban areas are combined heat and power (CHP), district heating, and gas boilers. In rural areas, solid fuel boilers are most common. In the future, new technologies could be used which have much lower emissions, for example heat pumps (which use electricity to move latent heat energy from the outside of the building to the inside) and solar hot water systems. This lever allows you to change the proportion of buildings using these new forms, and therefore to reduce emissions. Similarly, this lever also increases the proportion of cooling systems that use more efficient and lower carbon technology. The technologies for space cooling within the model are air conditioning, chillers and solar cooling.
8.	**Appliances, cooking, lighting**	This lever controls the average rate of energy use for appliances, cooking and lighting.	A variety of different technologies are used in buildings for cooking, lighting and appliances. This lever allows you to use more electricity in cooking (rather than gas, oil or traditional biomass), and to introduce more efficient lighting options like LED bulbs. The number of white appliances is currently very much related to the number of households. With the spread of a sharing society the total number of appliances may uncouple from the increase in the number of households. The lever allows you to steer the number of white appliances per household. IT and Communication devices follow a different logic. The number of IT equipment per person increases whilst their energy demand decrease. This lever allows you to set the total energy consumption per person for IT and communication.

Levels of ambition

The extend of the GHG-emission reduction within the described levers is embodied in the ambition levels 1 to 4.

The definitions of the four levels tailored for the buildings module are given in Table 2.

Table 2 – Levels of ambition for the Buildings Module

Level 1	Level 2	Level 3	Level 4
This level contains projections that are aligned and coherent with the observed trends.	This level is an intermediate scenario, more ambitious than the trend but not reaching the full potential of available solutions.	This level is considered very ambitious but realistic, given the current technology evolutions and the best practices observed in some geographical areas.	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.

Within this workshop we will verify the definition of the four EU(+Switzerland)-wide levels of ambition for all levers of the building sector.

Discussion items

The objective of the stakeholder consultation is to validate our methodology, select the most crucial emission-driving levers and define how ambitious the levels are. For the discussion we have identified the following framing aspects with respect to the project goals:

- Investigate the main trade-offs and tipping points within energy in buildings, that form important assumptions used within the buildings module,
- Assess the impact of national differences meaning e.g. building stock, fuel mix, policy framework and economic condition
- Identify potential barriers preventing the implementation of the suggested measures and suggest ways of overcoming these barriers,
- Discuss interactions between the building sector and other sectors.

Questions for the stakeholders

Scope of analysis

Is our scope of analysis complete? Or should we add further technologies or drivers?

Levers

- Do you agree with the selection of the most important levers? Do you think our choice of lever is coherent and comprehensive?
- Are there any other important levers missing on the list, i.e. unlisted/ unrecognized drivers of building energy demand? Are there irrelevant levers you think we should remove from the list?
- Are the levers correctly described? How would you re-define them?

Ambition levels

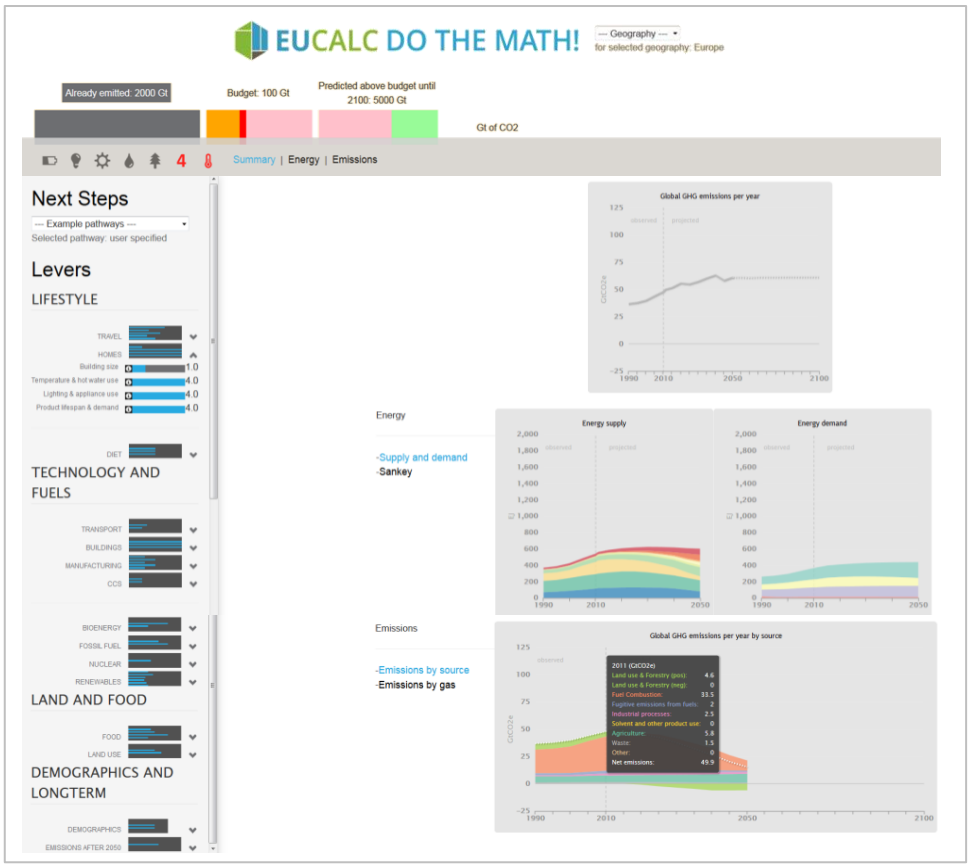
- Do you agree with the levels of ambition in each of the levers? How would you calculate them?
- How would you improve the definition of the levels of ambition? Which indicators or parameters would you use?

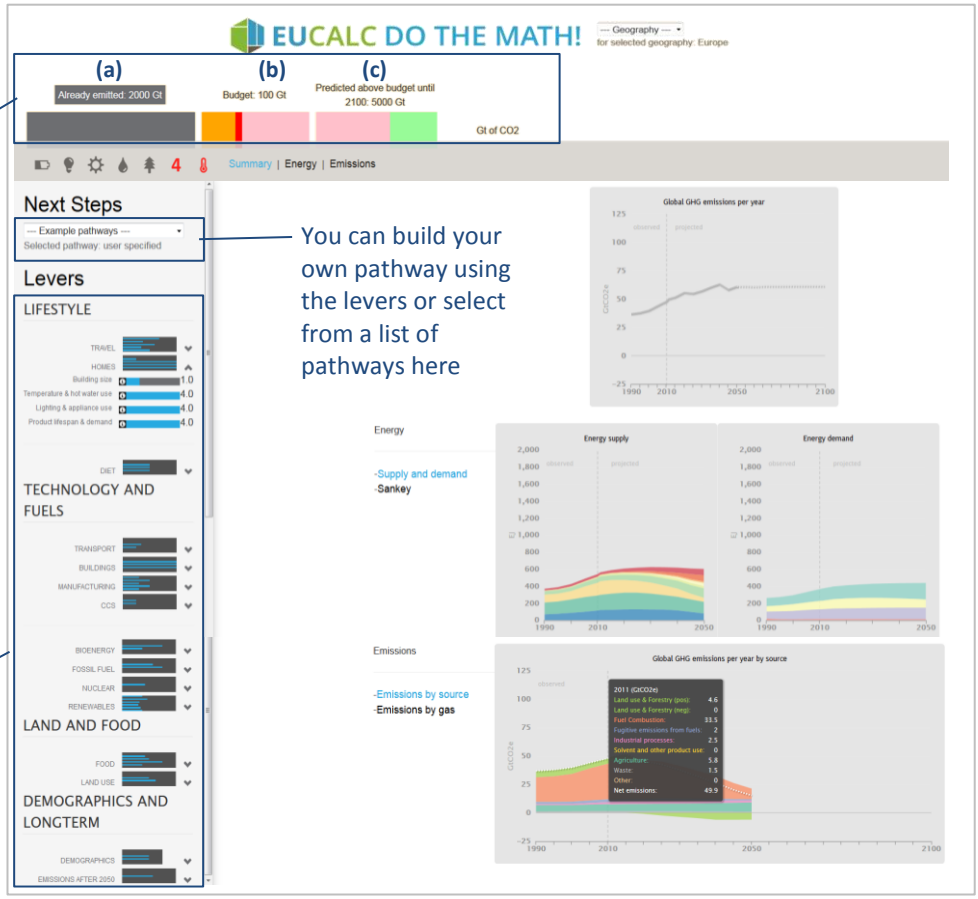
Future scenarios

- Which are the future trends in the building sector? Does the model allow enough flexibility to take them into account? Where could we expect some major disruption in the building sector? Is there an innovative solution that you think would make a positive change?
- How fast will innovation take place? What is the pace of technological and behavioural change?

How will the European Calculator work

Interactive web interface





Graphs show you cumulated GHG-emissions
(a) for the past,
(b) for the projection period until 2050
(c) for the effect on 2050 - 2100

You can build your own pathway using the levers or select from a list of pathways here

15 areas with more than 30 levers to let you vary the way we live in the future.

Practical Information

Venue

CEN-CENELEC Meeting Centre, Rue De La Science 23, 1040, Brussels, Belgium

Lunch

CEN-CENELEC cafeteria, ground floor
Vegetarian options are served at lunch. If you have specific dietary requirements, please let us know before May 30th, 2018.

Accommodation

Adagio Apart Hotel Brussels Europe
Motel one, Rue Royale 120, 1000 Bruxelles

Contact persons

Paraskevi Vivian Dorizas, Project manager, BPIE: vivian.dorizas@bpie.eu, T: +32 (0) 2 789 30 08
Judit Kockat, Project Manager, BPIE: judit.kockat@bpie.eu

Note: The consortium would like to assure you that any personal data or information you provide will be kept strictly confidential and will be securely stored and retained for the lifetime of the project and deleted thereafter. In gathering our data, we will only record information that is necessary to address the central purpose of our research, and ensure contributions are not attributed to any specific participant. Furthermore, should you agree to participate in this workshop, and subsequently feel unable or unwilling to continue, you are free to leave without negative consequences. That is, your participation is completely voluntary, and you may withdraw from this project at any time.

Information Sheet

In advance of attending the workshop we would like to outline our joint understanding of how the workshop will be conducted and how information from it will be used. We take these issues seriously so please take time to read and understand the following. Please let us know in case of any concern. We will ask you to sign a copy of the consent form (overleaf) at the workshop.

I consent to be participant in the Expert Consultation Workshop on Scenarios for Decarbonising European Buildings, to co-design a novel climate, energy and resources model under the framework of the EUCalc project, in Brussels, on June 4th, 2018 based on the principles outlined below.

During this workshop, a group of app. 25 frontline experts from public, private, civil society sectors and academia, will come together to share their perspectives and discuss main social impacts and indicators of climate change mitigation in Europe. The workshop programme (attached) is designed to stimulate interactive knowledge exchange and we welcome your active participation and contribution to this group effort.

The EUCalc project team assures you that we will only record information that is necessary to address the central purpose of our research. While your name and organisation will be acknowledged on the list of participants, your inputs and contribution will not be attributed and will only appear in de-identified form in the publications/reports arising from this research. Anonymity of your input will at all times be safeguarded, except where you have consented or specified otherwise. This principle will be applied effectively on social media sites such as Twitter. Pictures taken at the workshop may be used inside project reports and could be used for the project website (http://www.european-calculator.eu/) and project presentations.

I understand that if at any time during the Workshop I feel unable or unwilling to continue, I am free to leave without negative consequences. That is, my participation in this Workshop is completely voluntary, and I may withdraw from this project at any time.

Co-design is one of the central components of the EUCalc project and we thank you for your willingness to participate. As a benefit of participating we would like to highlight an opportunity to be involved in a significant piece of research, to make connections with other prominent experts and to shape the EUCalc. The EUCalc team is also committed to the continued collaboration and exchange with workshop participants including opportunities for subsequent feedback and access to early releases of the EUCalc. On the other hand, collected information will be stored internally and managed by the EUCalc partners under strict rules defined to safeguard anonymity of your inputs and alleviate any potential participation burdens such as harm for misuse of your identifiable information.

I have been informed that if I have any questions seeking further clarification or assurances about the ethical issues relating to the project, I am free to contact Judit Kockat: judit.kockat@bpie.eu or Paraskevi Vivian Dorizas: vivian.dorizas@bpie.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 730459

Informed Consent Form

EU CALC - Pathways for a sustainable Europe
Expert workshop on Buildings
Date: June 4th 2018
Venue: CEN-CENELEC Meeting Centre, Rue De La Science 23, 1040, Brussels, Belgium

I …… agree to participate in Expert workshop on Buildings.

The purpose of the Workshop has been explained to me in writing.

I am participating voluntarily and understand that I can withdraw from the research project, without repercussions, at any time, before it starts or while I am participating.

I am satisfied that the assurances of responsible and strict data governance, given by the *European Calculator projec*t, will be upheld.

I understand that my name and organisational affiliation will appear as a workshop participant but that anonymity of participants' contributions will be ensured at each research stage in the project, unless otherwise agreed.

I agree that pictures taken at the workshop may be used inside project reports and could be used for the project website (http://www.european-calculator.eu/) and project presentations.

A copy of the information sheet and (this) signed consent form will be given to the signee.

Signed……..

Date……..

EUCALC Factsheet

At a glance:

Title: EU Calculator: Trade-offs and pathways towards sustainable and low-carbon European Societies

Instrument: Research and Innovation Action (RIA)
Total EU contribution: 5,283,351.25€
Duration: 3 years
Start Date: 1st November 2016

Team:

- Potsdam Institute for Climate Impact Research, D
- Imperial College of Science Technology & Medicine, UK
- Climact SA, B
- Buildings Performance Institute Europe ASBL, B
- Austrian Society for Environment and Technology, AT
- University of Copenhagen, DK
- Swiss Federal Institute of Technology of Lausanne, CH
- University of East Anglia, UK
- PANNON Pro Innovations Ltd., H
- Climate Media Factory UG, D
- T6 Ecosystems srl, IT
- SEE Change Net, BIH
- Delft University of Technology, NL

Keywords:

Low-carbon society and economy, technology innovation, interactive pathway exploration, transparent modelling, climate services.

Website:

http://www.european-calculator.eu

The mission:

The European Calculator aims to provide decision makers with an accessible modelling solution on European Member State level plus Switzerland. The novel and pragmatic modelling approach is rooted between pure complex society-energy system and and integrated impact assessment tools. It introduces an intermediate level of complexity and a multi-sector approach that is based on co-design with scientific and societal actors.

The model relates emission reduction with human lifestyles, the exploitation and / or conservation of natural resources, job creation, energy production, agriculture, costs, etc. in one highly integrative approach and tool which enables decision makers to get real-time policy support underpinned by comprehensive trade-off analyses. Consequently, the approach will satisfy practical needs of decision makers.

Expected outcomes:

- A model of intermediate complexity that facilitates the evaluation of trade-offs and synergies arising from interventions at sectoral (buildings, transport, agriculture, etc.), country or incremental levels of emissions and warming.
- An easy to use web-version that is flexible enough to accommodate existing policy pathways from other institutions, and allows users to construct and explore the impacts arising from their own pathways.
- A trusted modelling approach based on a strong co-creation and consultation process between academia, public and business sectors.
- A common platform (Wiki) where science, and policy and civil society stakeholders can share and test their understanding of the interaction between climate change, resource utilisation and evolving policy targets.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 730459.

EUCALC
Factsheet

Objectives in detail:

Introducing a model framework of intermediate complexity

- As a starting point the Global Calculator Model (www.globalcalculator.org) is used and will be scaled down to a generic EU28+Switzerland resolution considering trans-boundary effects and exchange with the rest of the world.
- Implement a fast and novel energy-society model allowing for users to autonomously calculate and visualize European and Member State greenhouse gas emissions and their relation to current and future climate development and policies.
- Transparent derivation and definition levers of ambition representing desirable futures in different sectors as main forcing component of the model instead of a fully dynamic representation of the real world.
- The model approach keeps simplicity if possible, but considers feedbacks and interdependencies between sectors and countries when needed.
- Development of a Transitions Pathways Explorer usable for non-experts and allowing for multi-sectoral tradeoff and synergy analyses.

Extending the "model world" to achieve a better representation of European and Member State facts

- Development of a water module representing the water-energy-food nexus.
- Inclusion of a raw materials module to evaluate resource efficiency and the prospects for an increasingly circular economy.
- Development of a land use change module aligned to the post-Paris reporting requirements.
- Development of a socio-economic module to assess the impacts of de-carbonization pathways on society and its economy (GDP, competitiveness, social impacts, energy security).
- Establishing a module which allows inclusion of low-carbon technologies and assesses their impacts.
- Development a storage module coupled with seasonal granularity to account for the critical variation of energy demand and renewable energy supply throughout the year.

Sound underpinning of European policy making by an advanced outreach strategy which allows co-creation of knowledge

- Support the European 2050 Road Map towards low carbon economies by delivering an integrated interactive tool which is built up from an inclusive and evidence-based approach with stakeholders.
- Promote informed debate around the European competitive low-carbon economy in 2050 and a resilient Energy Union with a forward-looking climate change policy.
- Set up and maintain an open-source energy modelling wiki as the knowledge base to facilitate decision makers, businesses, the public and countries setting up their own energy modelling capabilities.
- Engage stakeholders from short-term participation to long-term research participation/collaboration.
- Develop the My Europe 2050 e-learning tool which can be used for education and by lay people and which will empower citizens to engage in the shaping of European low carbon societies and the transition pathways to them.

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