Global Calculator

Department of Energy & Climate Change

Climate-KIC

A New Approach to Model Pasture Dynamics

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About the Global Calculator

- ✓ **It is global integrated model for energy, food, land use and climate, with open access**

- ✓ **It includes the main greenhouse gases** (CO_2, N_2O e CH_4) from electricity generation, transport, residential and commercial sector, manufacture (industry), food and land use by 2050.

- ✓ **Presents a large variation of potential mitigation efforts for the main sectors of the global economy**.

- ✓ **Shows the potential impacts on the global climate system**, regarding each user's simulation, based on the latest IPCC reports.

- ✓ **Present several graphics and interactive tables** about energy, food and land use for a very large number of possible simulations.

- ✓ **More than 100 international experts involved** in building this tool.

- ✓ **Open public consultation with reputable institutions and** *peer review* **with external experts.**

- ✓ **Project started in Sept 2013 and published at the Royal Society in London in Jan 2015.**

National Calculators vs. Global Calculator

The UK was pioneer in preparing a national calculator, inspiring similar initiatives worldwide.

Reino Unido	Bélgica	China	Coréia do Sul
Japão	África do Sul	Colômbia	Índia
Brasil	Indonésia	México	Taiwan
Hungria	Sérvia e SEE	Bangladesh	Vietnam
Tailândia	Argélia		

Under discussion:

Polônia	Rússia	França	EUA	Filipinas	Etiópia	Nigéria

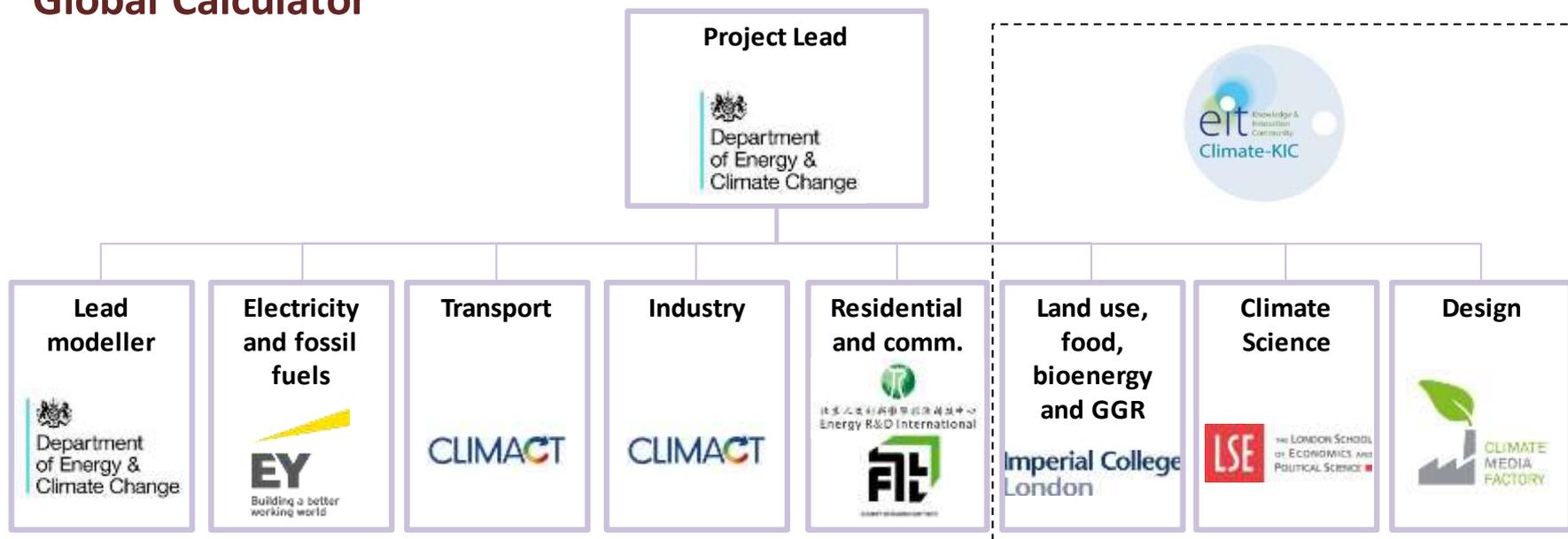**The Global Calculator allows us to model the impacts on the climate system**.

Target audience:

- Policy makers

- Business leaders and NGOs

Main institutions involved in the project

Global Calculator

Total budget: £ 1 million
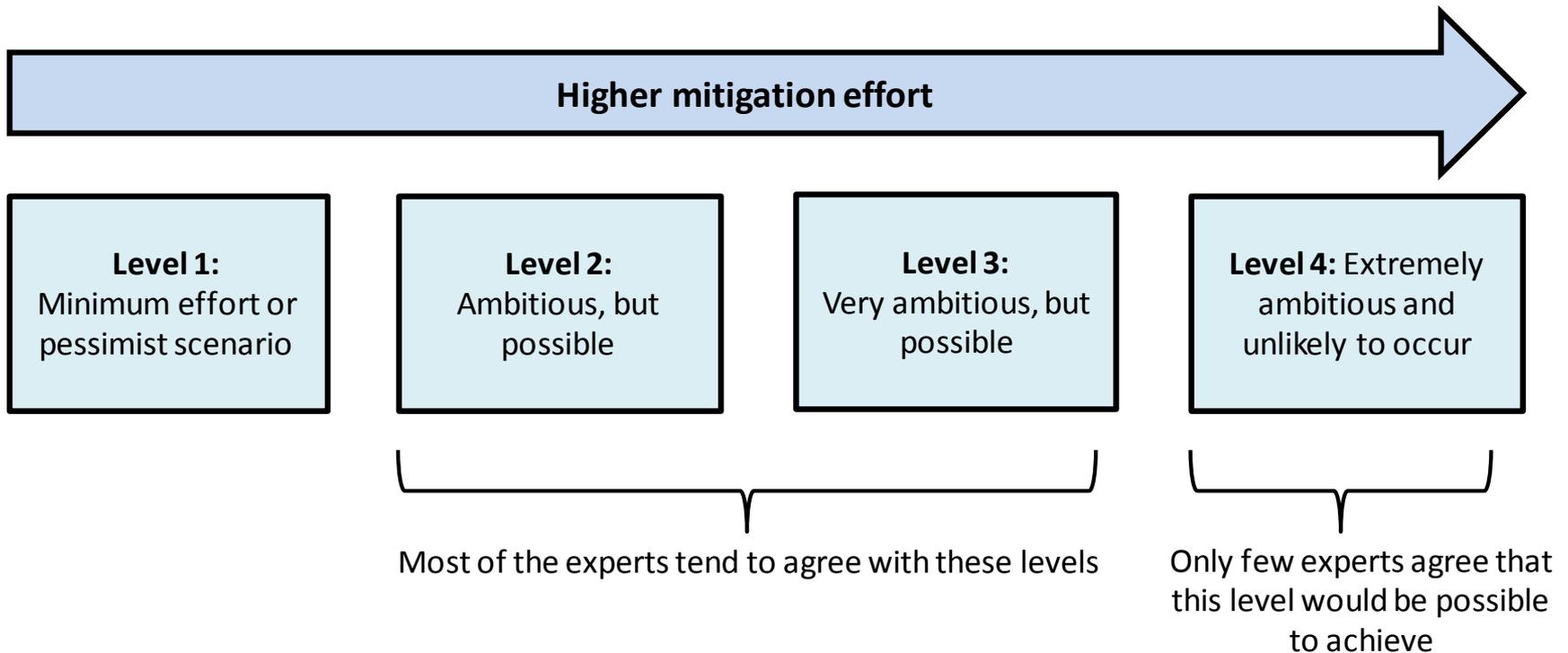
£550K UK DECC (ICF funds)

£480K Climate-KIC (EU)

Partner institutions:

- World Resources Institute (WRI)
- PIK Potsdam
- London School of Economics
- University of Reading
- UK Met Office

- Rothamsted Research
- University of Versailles
- Tyndall Centre
- University of Oxford
- Utrecht / Groeningen Universities

Parameters for reducing emissions

The global calculator's user has 40 parameters (levers) for reducing GHG emissions. For each of them, there are 4 levels of ambition to mitigate emissions.

Higher mitigation effort

| **Level 1:** Minimum effort or pessimist scenario | **Level 2:** Ambitious, but possible | **Level 3:** Very ambitious, but possible | **Level 4:** Extremely ambitious and unlikely to occur |

Most of the experts tend to agree with these levels

Only few experts agree that this level would be possible to achieve

Example for the *quantity of meat* lever

Current global consumption of meat (excluding losses): 187 kcal per person per day

Level 1: Very high consumption of meat per person per day. This level assumes the total meat consumption per person in Europe in 2011 (281 kcal per person per day) as a global target for 2050.

Level 2: The global average meat consumption in 2050 is 220 kcal per person per day, similar to that forecast by the UN's Food and Agriculture Organisation (FAO).

Level 3: World Health Organisation recommended meat consumption of 90 g meat/day (around 152 kcal per person per day) for a healthy diet by 2050.

Level 4: Extremely low global average meat consumption in 2050, which reflects India's 2011 average meat consumption (14 kcal per person per day). It represents an extreme situation and assumes an unprecedented change in dietary preferences worldwide.
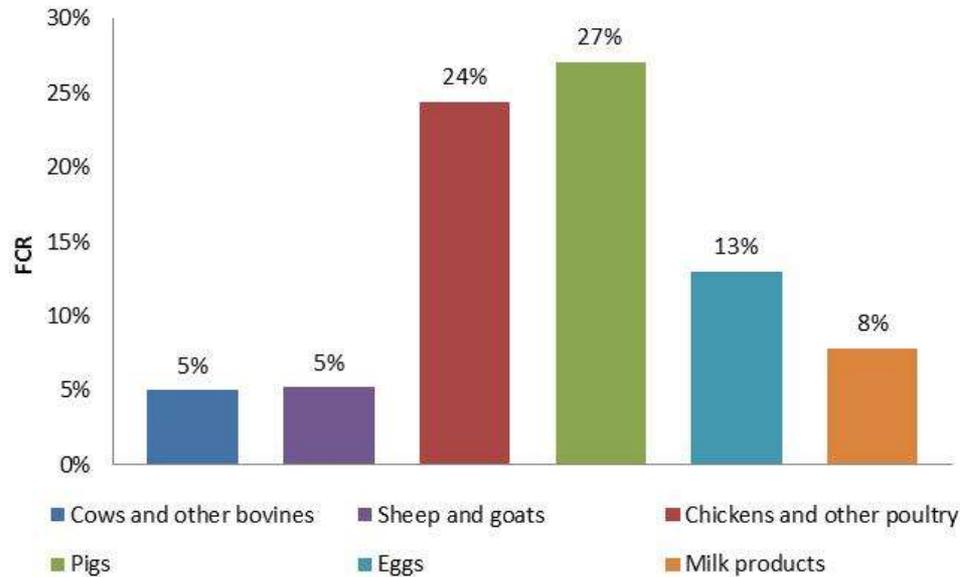
Example for the *quantity of meat* lever
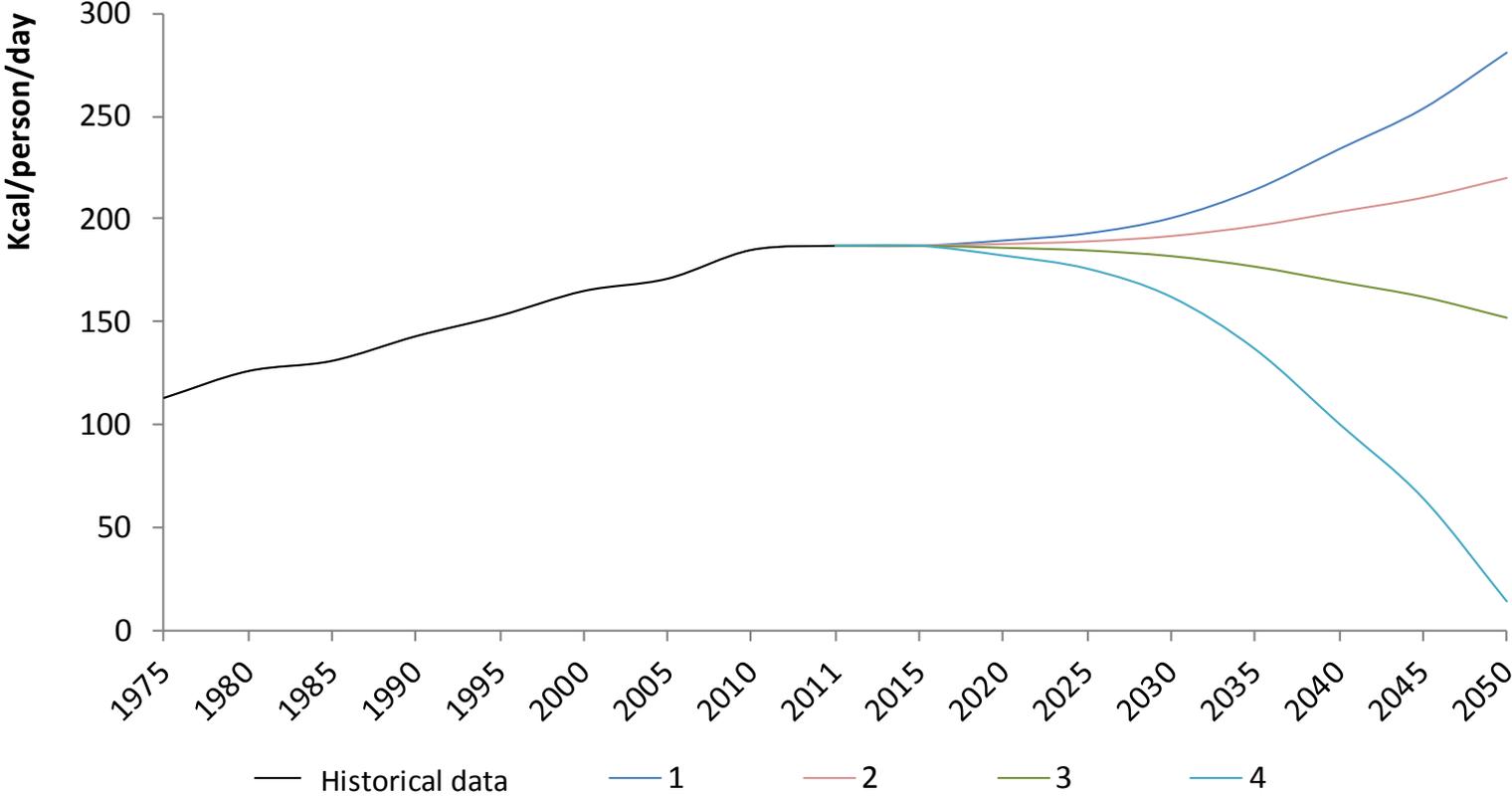
World meat consumption and 2050 pathways as in the Global Calculator (all meat types)

Meat consumption vs. total food consumption
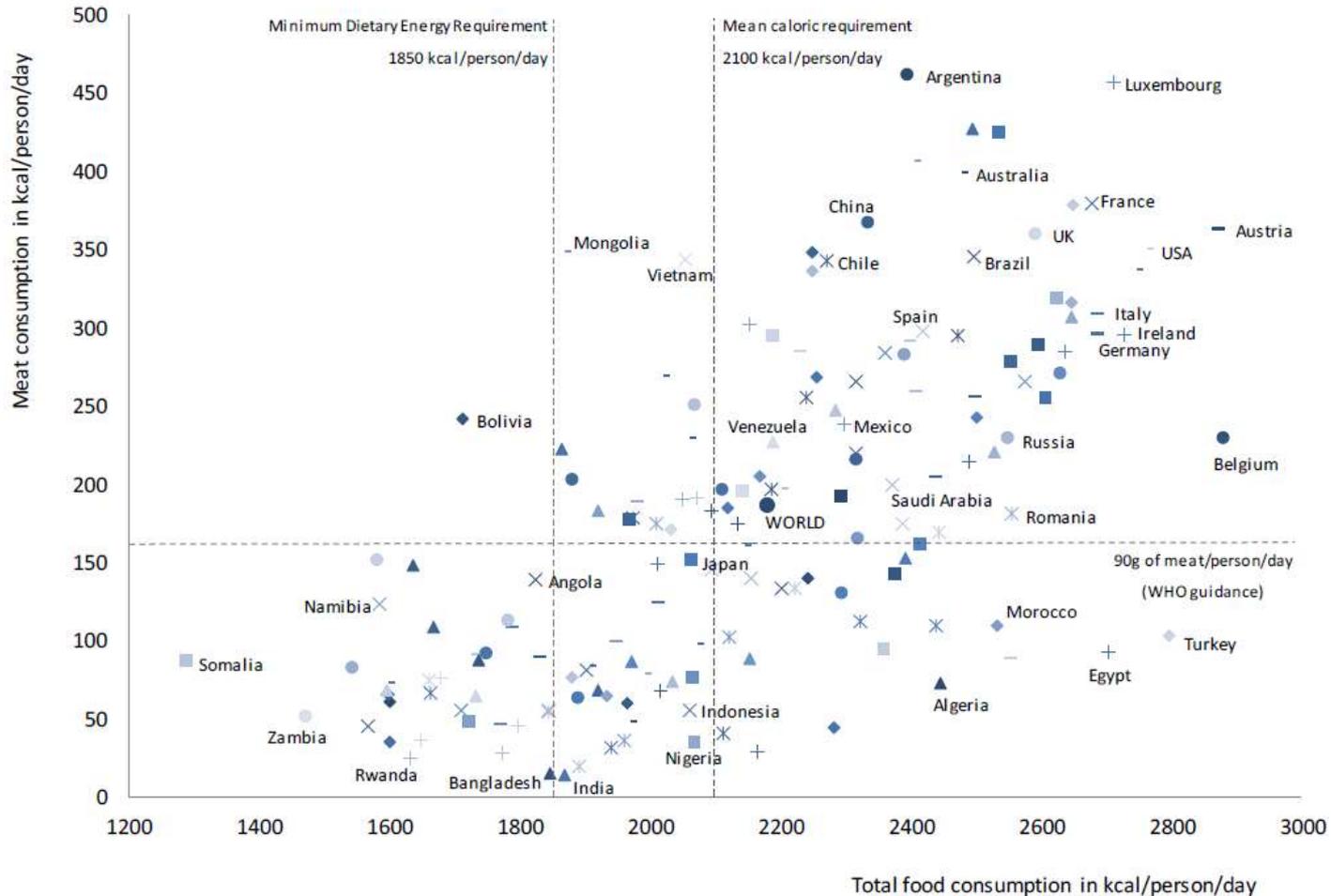
Livestock yields

Current global feed conversion ratios (FCRs), in energy terms

Current global animal density on pasturelands and 2050 ranges:

- **Cattle**: 0.6 animal/ha (0.7 - 1.14)

- **Sheep and goats:** 3.1 animals/ha (3.4 - 5.5)

**Current global proportion of confined systems and 2050 ranges:**

- **Cattle**: 6% (0 − 30%)

- **Sheep and goats**: 1% (0 − 10%)

# Key issues considered in the GC for land use dynamics

- **Global trends for food calories consumed per person**

- **Meat consumed per person**, including the total calories of meat, and meat types (e.g. beef, sheep and goat meat, pork, chicken and fish)

- **Increase of crop yields**

- **Livestock yields**, including changes in feed conversion ratio, use of feedlot systems, and animal density on pasturelands

- **Bioenergy yields and forms**

- **How to use surplus lands** (e.g. for natural regeneration, afforestation/reforestation and/or energy crops)

- **Better use of wastes and residues**

- **Land use efficiency** (or land use integration), e.g. multi-cropping schemes, integrated farming (agro-forestry, agro-livestock systems etc.)

Example of a system dynamics applied in the model

'Land Use, Bioenergy, Food Security and Forest' Sector
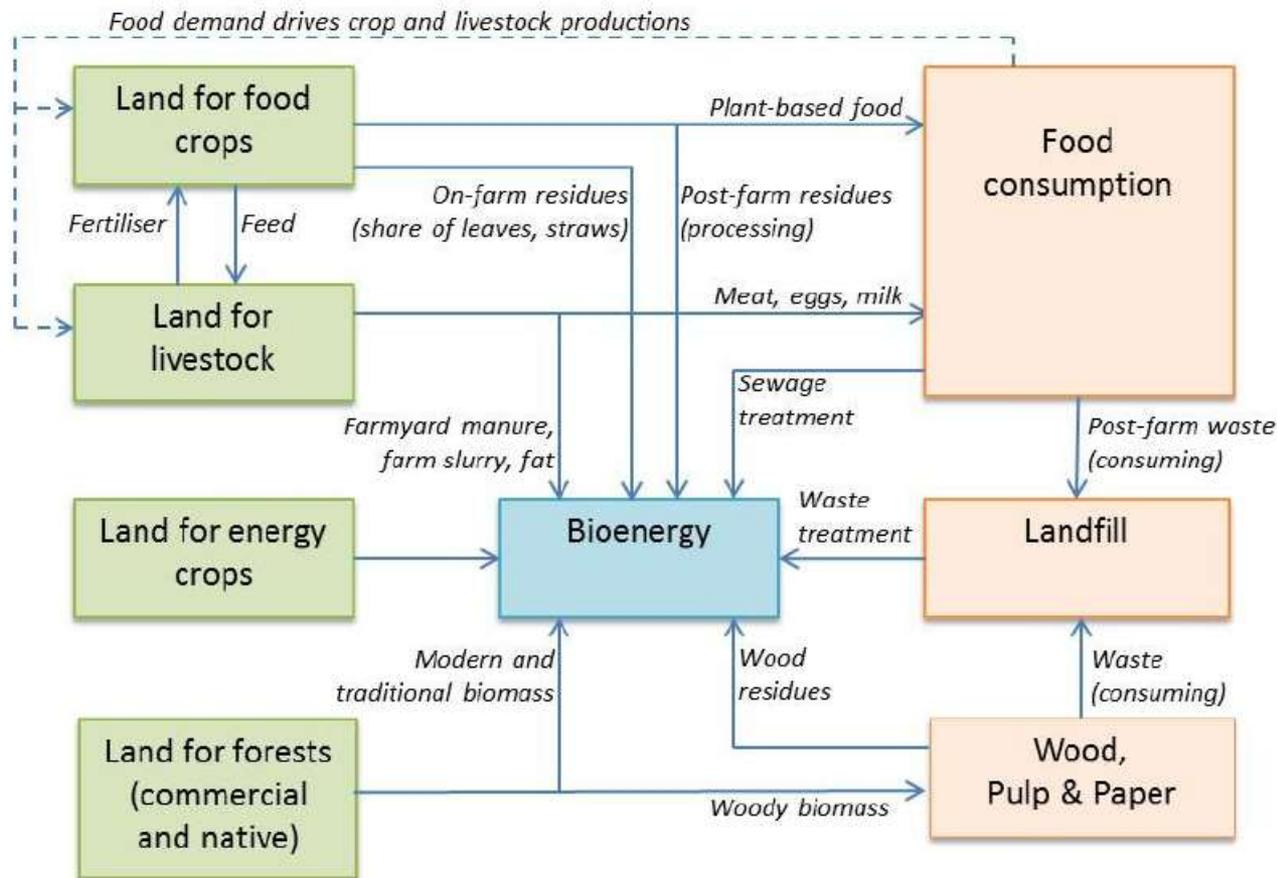
Simulation of bioenergy potentials by 2050 using the Global Calculator Land Use Change Model (GCLUC)
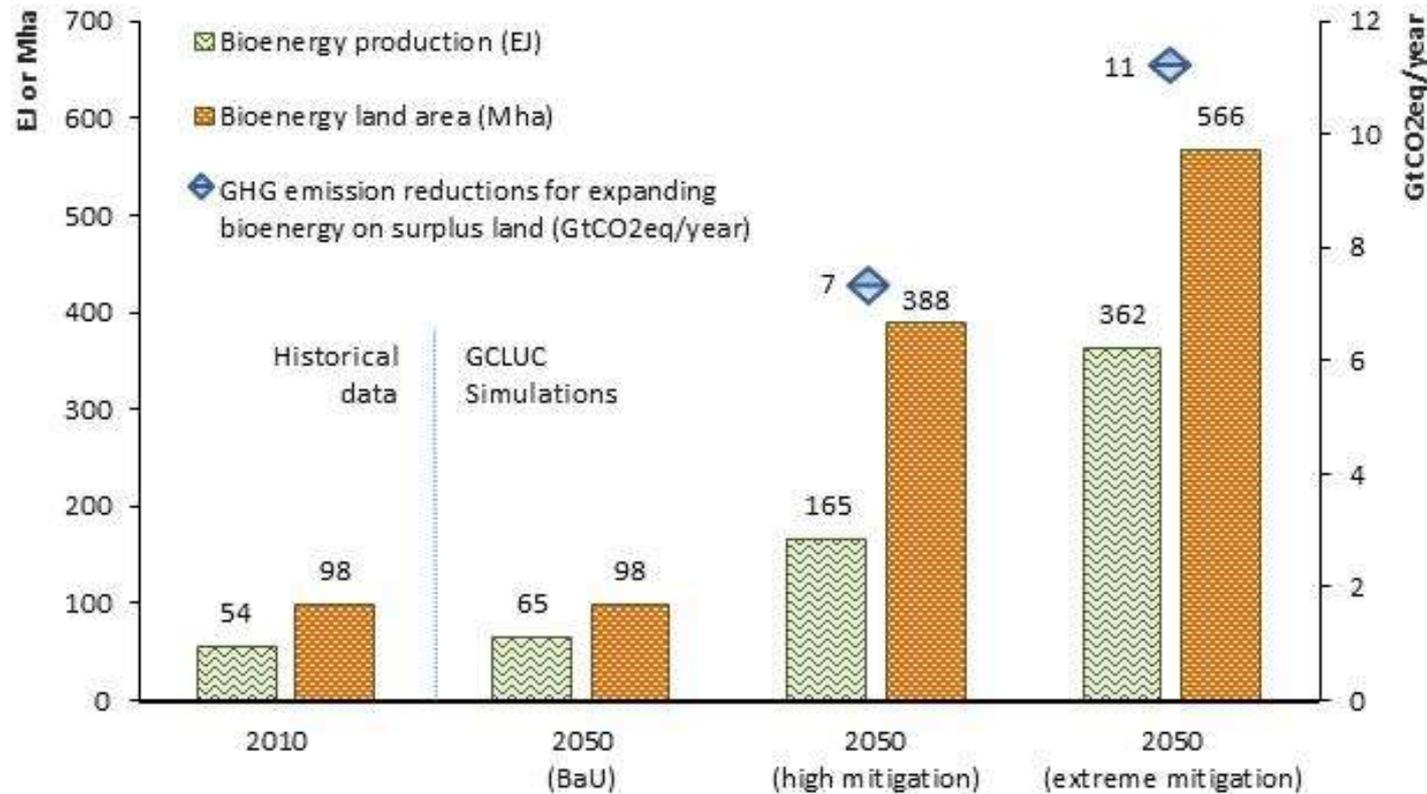
Global bioenergy production, land and emission reductions

Source: Strapasson (2015), using the Global Calculator Land Use Change Model

Accessing the GC webtool

www.globalcalculator.org

This website includes the spreadsheet used in the model, briefing papers, references, notes from the consultation workshops, videos and much more.

Twitter: @GlobalCalc   #GlobalCalculator

Contacts

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