Population, health and urban land use in integrated climate modelling
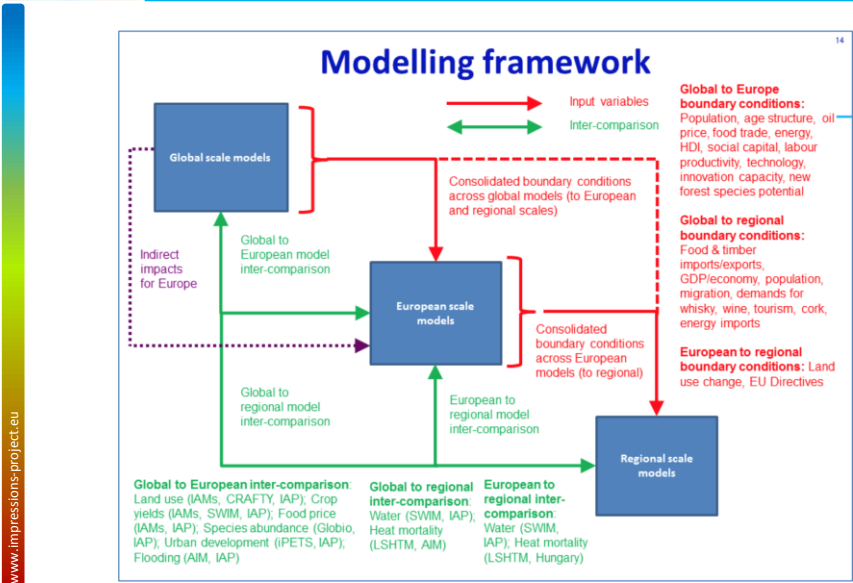
Emma Terama, Elizabeth Clarke,
Sari Kovats, Mark Rounsevell

Population, land-use and health in CCIAV - Integrated Assessment

www.impressions-project.eu

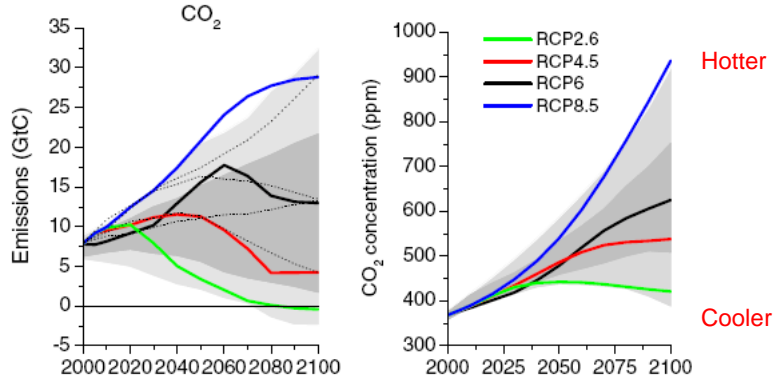## Population, land-use and health in CCIAV - Integrated Assessment
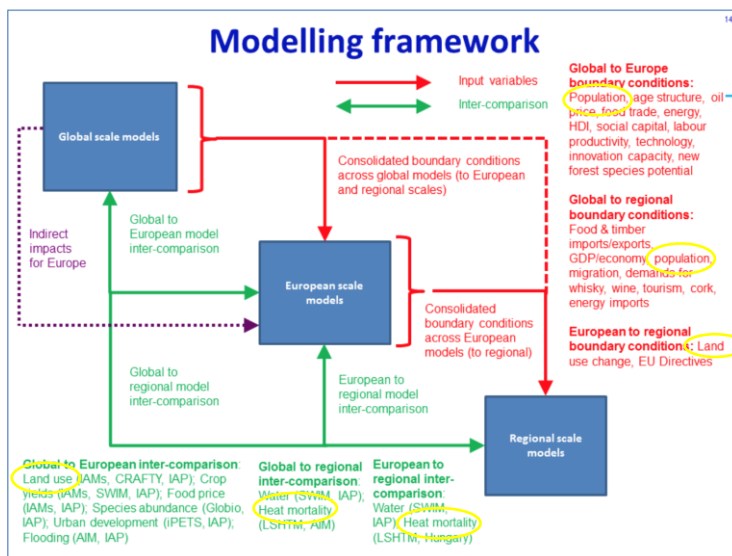
Model inputs/outputs

1) RCP - Climate variables

- Temperature change

2) Socioeconomic

- Direct from SSPs: population data, storylines

- Health (mortality)

3) Land use

- Artificial surface cover-%

- Environment, e.g. water bodies

Representative concentration pathways

van Vuuren et al. 2011
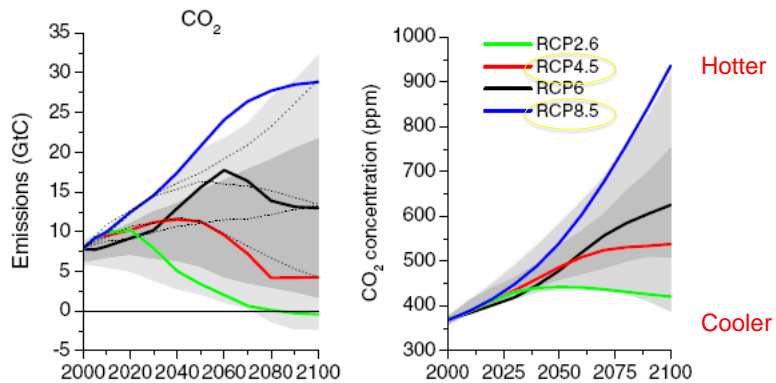
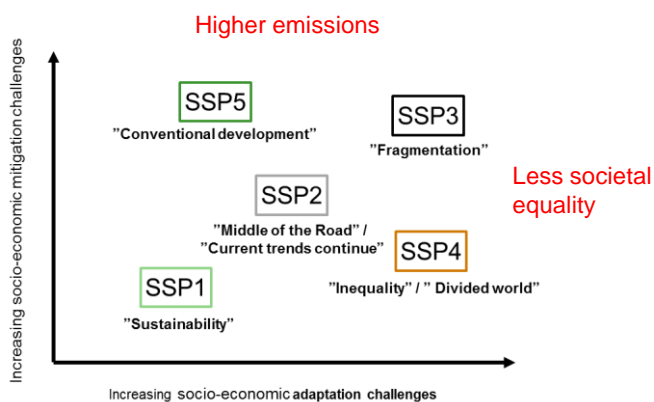# Representative concentration pathways

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Shared socioeconomic pathways

O'Neill et al. 2014

RCPs & SSPs for Health

Table 1. Changes in annual mean temperature for Hungary (Rounsevell)

Time period		25%	50%	75%	Max
2016-2035	RCP4.5	0.8	1.0	1.3	2.4
	RCP8.5	0.8	1.1	1.4	2.4
2046-2065	RCP4.5	1.5	1.8	2.3	3.4
	RCP8.5	2.2	2.6	3.2	4.8
2081-2100	RCP4.5	2.0	2.4	2.8	4.3
	RCP8.5	4.0	4.6	5.5	7.8

Table 2. Scenarios used for the health impact assessment.

| Climate/Population Scenario	Narrative scenario	Adaptation assumption
SSP1 X RCP4.5	Sustainability ('Pink dream' or 'silence before the storm'?)	High adaptation
SSP5 X RCP8.5	Fossil Fuelled Development	Medium adaptation
SSP3 X RCP8.5	Regional Rivalry –Icarus	Low adaptation
SSP4 X RCP4.5	Inequality – Riders on the Storm	Low adaptation

Population downscaling

- Population projections for all European NUTS2 regions were generated for each SSP
- Downscaling architecture was designed to merge SSP-specific national level population projections available up to 2100 (Wittgenstein Centre, 2015) and Eurostat data (2010) for the distribution of age groups across NUTS2 regions
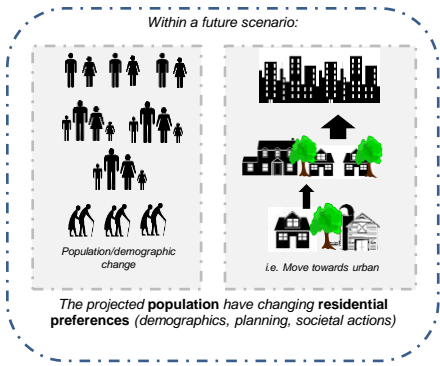- The result was age-specific population numbers by SSP, projection year and sub-national region.
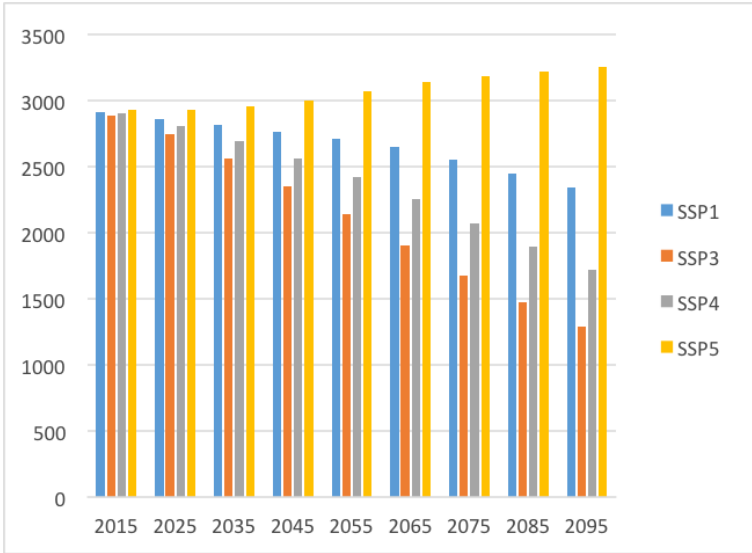
Population HU10

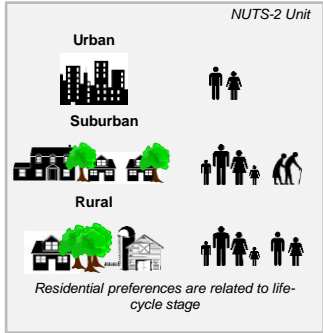# Urban development

SSP1

Residential location: Population

European scale population as a function of residential type at 2100
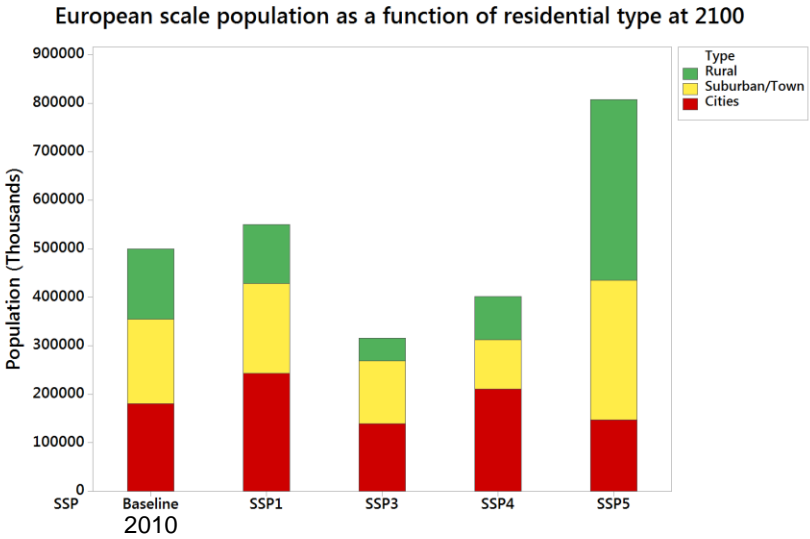
Land use change:
built up area = artificial surfaces

The predicted extent of artificial surfaces within Europe
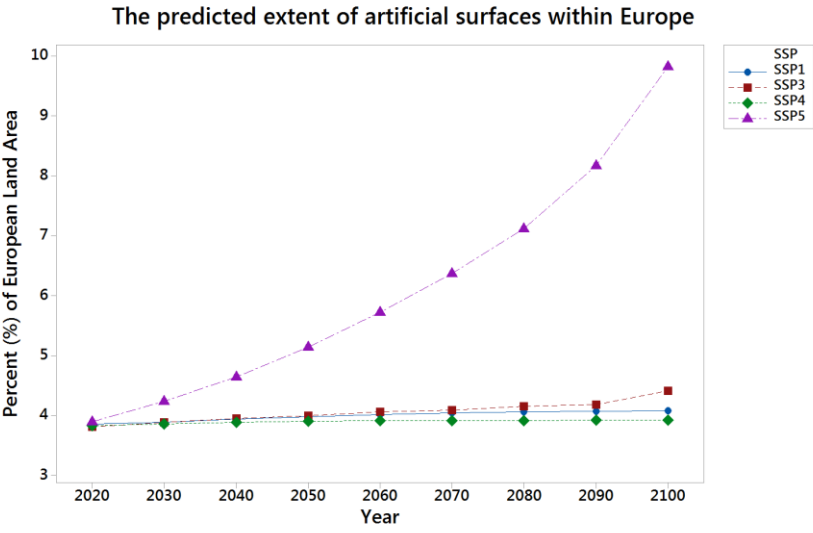
Change in artificial surfaces (all)
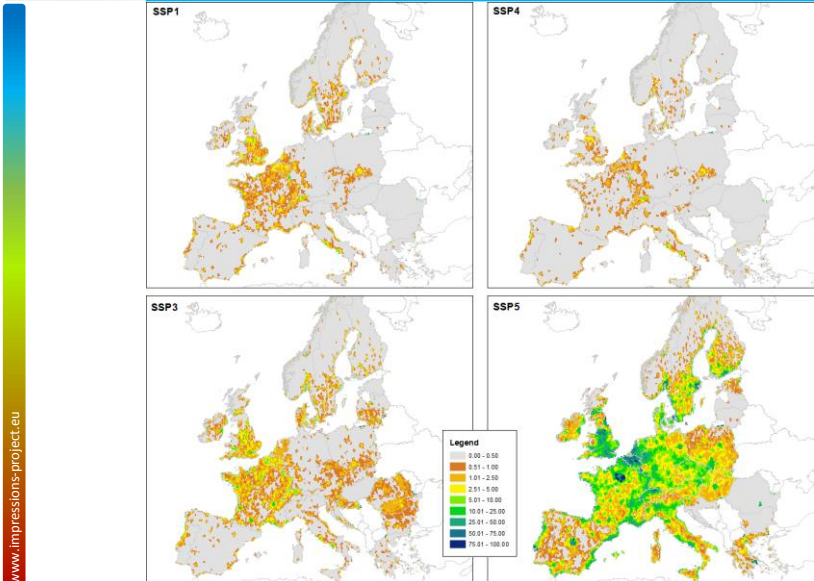
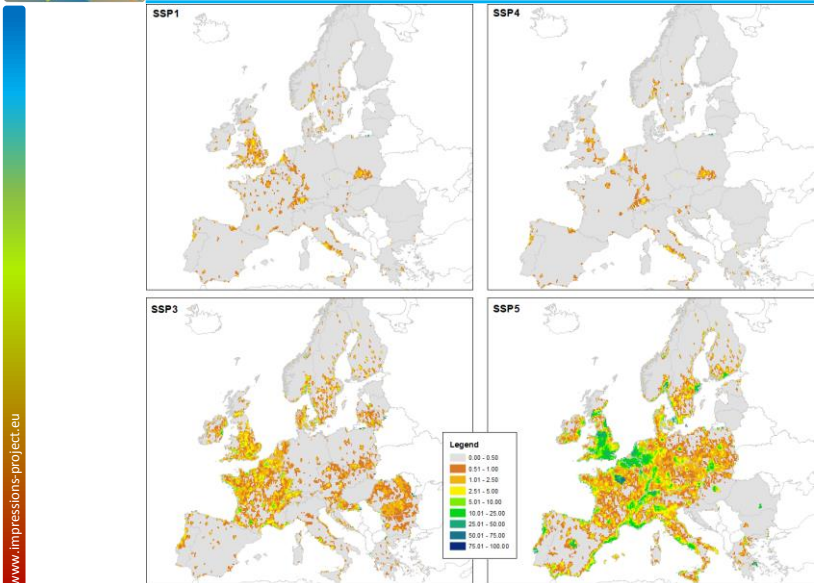The absolute difference in artificial surfaces between 2010 and 2100:
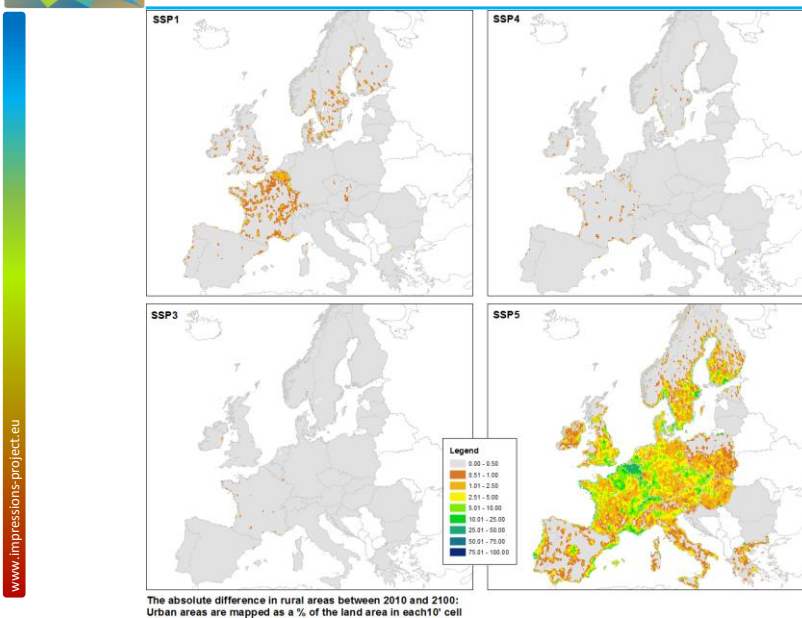Urban areas are mapped as a % of the land area in each10' cell

AS Suburban

The absolute difference in suburban areas between 2010 and 2100:
Urban areas are mapped as a % of the land area in each10' cell

AS Rural

The absolute difference in rural areas between 2010 and 2100:
Urban areas are mapped as a % of the land area in each10° cell

Policy relevance

- Urban areas straddle *social, economic and environmental* policy: influence and shape future urbanisation trends (population, age, built environment..) and the socio-environmental characteristics
- Urban policy is *fragmented* and can be found as part of many: 2/3 of all European sectoral policies on clean air, water, noise, waste, ecosystem services and biodiversity have an impact on urban areas
- In the context of climate change, urban areas are included within policies aimed at both emission reductions (*mitigation*) and *adaptation*
- European urban policy examples:
  - Urban agenda: building on *co-operation*, focus of current EU-presidency
  - Sustainable urban cities, aims to
  - (i) aid cities in becoming more *sustainable*, and
  - (ii) ensure that by 2020 cities within Europe are implementing policies for sustainable urban *planning and design*
- Future urbanisation *trends* and urban areas are important in contributing to the achievement of European *development and climate targets.*

Special thanks

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