



Horizon 2020 Societal challenge 5
Climate action, environment, resource
Efficiency and raw materials

D5.3: USING THE MODELLING APPROACHES IN 12 CASE STUDIES

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PROJECT	Sustainable Integrated Management FOR the NEXUS of water-land-food-energy-climate for a resource-efficient Europe (SIM4NEXUS)
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LEAD BENEFICIARY	WUR-LEI
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ESTIMATED WORK EFFORT	3 person-months
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DOCUMENT HISTORY

VERSION	INITIALS/NAME	DATE	COMMENTS-DESCRIPTION OF ACTIONS
1	DELIVERABLE D5.3 DRAFT	29 JULY 2019	REPORTING INCLUDES SUMMARY OF CONCLUSIONS FROM RECENT PROJECT MEETING IN RIGA (JULY 3 & 4). SHARED WITH PCT FOR THEIR CONFIRMATION
2	DELIVERABLE D5.3	31 JULY 2019	UPDATES OF THE E3ME MODEL, IN SECTION 3 OF THE DELIVERABLE

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Executive summary

Changes with respect to the DoA

None

Dissemination and uptake

The deliverable is primarily to update consortium and network about the planning of work for the Serious Game, and related work including the planning of policy scenarios for the thematic models and the use of the data navigation tool.

Short Summary of results (<250 words)

The project has given proof that all 12 SIM4NEXUS complexity science models have been developed, populated with data, and run, with preliminary results produced for each. WP3 has developed a timeline for the Serious Games in the case studies, conclude on the following tasks and finalise deliverables. A timeline is developed regarding the support from the thematic models to the case studies with model runs of the policy scenarios. Also, the Data Navigation Tool is presented, to allow for a consistency check of the data sets in the tool, achieve transparency of the datasets in the project, and eventually also identify any gaps in the data sets. The tool also offers context to the data, primarily through the dimensions of the variables in place.

Evidence of accomplishment

Report

Glossary / Acronyms

SDM	SYSTEM DYNAMICS MODEL
SIM4NEXUS	SUSTAINABLE INTEGRATED MANAGEMENT FOR THE NEXUS OF WATER-LAND-FOOD-ENERGY-CLIMATE FOR A RESOURCE-EFFICIENT EUROPE

1 Introduction

Chapter 2 presents the timeline for the preparing the Serious Game of the 12 case studies. This timeline is important for the thematic models to deliver model runs to feed the system dynamic models. Chapter 3 there presents an overview of the current state-of-play regarding model runs. The data navigation tool is summarized in Chapter 4 to support the case studies to make explicit and compare the model runs.

2 Planning of the Serious Game

WP3 recently concluded Deliverable D3.4 (Final report on the complexity science and integration methodologies) in May 2019, as well as MS26 (Complexity science models first implementation for all the case studies) (June 2019). SIM4NEXUS developed System Dynamics Models (SDM) as the integration methodology for Complexity Science, selected and suitable for all the Case Studies. The first stage for SDM was the development of the Conceptual Complexity Science models to be used as tools for the development of the SDMs (Deliverable D3.4). This report shows the Conceptual Complexity Science graphs and the System Dynamic Models (structure and components), to be used as tools for the next stage of SDM development, i.e. the population of the models with quantitative data in Year 4 (Task 3.5). Milestone MS26 has given proof that all 12 SIM4NEXUS complexity science models have been developed, populated with data, and run, with preliminary results produced for each. A report is developed for internal use in the project (available only to the project consortium, and the European Commission – upon request). The report provides a short description of the case studies, and more detailed model outputs for every case study.

The consortium met in Riga on July 3 & 4 to take-stock of the achievements until Month 36 in the project (May 2019) and prepare for the final year of SIM4NEXUS. A session was organised to develop a timeline for the Serious Games in the case studies, conclude on the following tasks and finalise deliverables, including T3.5 Implementation of the complexity science tools for each case study under different scenarios (M25-M48), T3.6 Overall assessment of the complexity science models and integration approach in SIM4NEXUS (M37-M48), D4.4 Semantic repository containing all use cases information, stored in a standardised and interoperable way (M39) and D4.5 Serious Games tool final version (M44).

The current state of work is presented, concluding:

- First draft results for the baseline scenario are completed in all case studies.
- There is a need to check and verify models, assumptions, units, and results (WP3 with CS lead).
- Baseline scenarios need to be concluded soon.
- Planning for the next few months.

Follow-up steps and related activities are presented during the project meeting:

- Several cases need to complete population of the SDM for baseline scenario until 2050 (due for July 2019). Steps to be concluded are:
 - Finalise/confirm data and SDMs (where applicable)
 - Check all SDMs (units, equations, assumptions, data)
 - Complete baseline runs, verify results, deliver to WP4
- Case studies need to complete population of the SDM for the 2-degree scenario until 2050 (due for July/August 2019). Steps to be concluded are:
 - Finalise / confirm data
 - Populate all SDMs
 - Run models

- Check/verify results, deliver to WP4
- Case studies need to complete the policy scenarios. Steps to be included are:
 - Finalise policy definitions (thematic models with case study leads) (August 2019)
 - Modify SDM if required (with case study leads)
 - Collect additional data if required (including from Thematic Models). Any new policy-related data to be delivered by the case studies to WP3 by end-September latest.
 - Populate SDMs, run scenarios, verify, deliver to WP4. WP3 aims to conclude all modelling by end of 2019/January 2020.

Modelling of SDM (January 2020, to support D4.5 – Serious Game final version). The policy scenarios include sub-tasks: policy definitions and finalisation; converted to SDM with minor SDM changes if needed; collection and delivery of additional data if needed, including from thematic models.

3 Application of thematic models to the case studies

A timeline is developed regarding the support from the thematic models to the case studies with model runs of the policy scenarios. The following tables present updates regarding the models used in the 12 case studies.

Mapping cases-models

Case study	Thematic model applied						
	E3ME	MAGNET	CAPRI	IMAGE-GLOBIO	OSEMOSYS	SWIM	magPIE-LPjML
Andalusia	XX	XX	XX				
Sardinia	XX		XX				
Southwest UK	XX		XX				
The Netherlands	XX	XX	XX				
Sweden		XX	XX	XX*			
Greece	XX	XX	XX	XX*	XX		
Latvia	XX	XX	XX				
Azerbaijan	XX	XX	XX		XX		
France-Germany	XX		XX			XX	
Germany-Czech Rep-Slovakia	XX		XX			XX	
Europe	XX	XX	XX	XX			XX
Global	XX	XX	XX	XX	XX		XX

E3ME

E3ME		
Case study	Policy scenarios (requested)	Results provided
Andalusia	Baseline and 2-degree	Baseline and 2-degree
Sardinia	Baseline and 2-degree	Baseline results
South West UK	Baseline and 2-degree Brexit	Baseline results Brexit
Netherlands	Baseline and 2-degree Energy: high GHG emission tax in Europe, CCS	Baseline results
Sweden	Baseline and 2-degree	Baseline results
Greece	Baseline and 2-degree Baseline with less policies	Baseline results
Latvia	Baseline and 2-degree	Baseline and 2-degree
Azerbaijan	Baseline and 2-degree Bad scenario (climate change impacts) Good scenario (climate change adaptation)	Baseline results Results for the other two scenarios are expected in August 2019
France-Germany transboundary	Baseline and 2-degree	Baseline results
Czech Republic – Germany – Slovakia transboundary	Baseline and 2-degree Decrease energy demand of housing Decarbonise the energy sector directly Decrease number of nuclear power plants Biofuels	Baseline results
Europe	Baseline and 2-degree 2-degree with improved learning rates	Baseline and 2-degree
Global	Baseline and 2-degree 2-degree with improved learning rates	Baseline and 2-degree

MAGNET

MAGNET		
Case study	Policy scenarios (requested)	Results provided
Andalusia	Baseline and 2-degree	Results could be provided at the national level (Spain). This needs to be discussed with the case study.
Netherlands	Baseline and 2-degree Fixed share of land for energy production in Europe	Baseline Rest will be provided soon pending discussion with case study.
Sweden	Baseline and 2-degree	Baseline
Greece	Baseline and 2-degree	Baseline Pending further discussion with case study
Latvia	Baseline and 2-degree	Baseline
Azerbaijan	Baseline Bad scenario (climate change impacts) Good scenario (climate change adaptation)	Baseline Results for the other two scenarios are expected in August 2019
Europe	Baseline and 2-degree Land & biodiversity Water Food	Baseline and 2-degree
Global	Baseline and 2-degree Land & biodiversity Water Food	Baseline and 2-degree Other scenarios will be run and delivered together with the IMAGE model

CAPRI

CAPRI		
Case study	Policy scenarios (requested)	Results provided
Andalusia	Baseline and 2-degree Water: water price, increase in irrigation efficiency Food: diet shift	Baseline and 2-degree Water price
Sardinia	Baseline and 2-degree Water price: pending further discussion with case study	Baseline and 2-degree
South West UK	Baseline and 2-degree	Baseline and 2-degree
Netherlands	Baseline and 2-degree Energy: renewable energy imposing additional pressure on cultivated land	Baseline and 2-degree
Sweden	Baseline and 2-degree	Baseline and 2-degree
Greece	Baseline and 2-degree Water price	Baseline and 2-degree Water price
Latvia	Baseline and 2-degree Pending further discussion with case study	Baseline and 2-degree
Azerbaijan	Baseline and 2-degree NO other scenarios are needed	Baseline and 2-degree (used only at an early stage, not used in the last version)
France-Germany transboundary	Baseline and 2-degree NO other scenarios are needed	Baseline and 2-degree
Czech Republic – Germany – Slovakia transboundary	Baseline and 2-degree Water: increase in irrigation efficiency Food: meat tax at EU level	Baseline and 2-degree
Europe	Baseline and 2-degree Food	Baseline and 2-degree
Global	Baseline and 2-degree Food	Baseline and 2-degree

IMAGE-GLOBIO

IMAGE-GLOBIO		
Case study	Policy scenarios (requested)	Results provided
Sweden	Baseline and 2-degree	Baseline and 2-degree
Greece	Baseline and 2-degree	Baseline and 2-degree
Europe	Baseline and 2-degree Land & biodiversity Water Food	Baseline and 2-degree Land & biodiversity Water Food
Global	Baseline and 2-degree Land & biodiversity Water Food	Baseline and 2-degree Land & biodiversity Water Food

OSeMOSYS

OSeMOSYS		
Case study	Policy scenarios (requested)	Results provided
Greece	Baseline	Baseline
Azerbaijan	Baseline Bad scenario (climate change impacts) Good scenario (climate change adaptation)	Baseline Results for the other two scenarios are expected in August 2019
Global	Baseline and 2-degree Food Water	Baseline and 2-degree Food Water

SWIM

SWIM		
Case study	Policy scenarios (requested)	Results provided
France-Germany transboundary	Baseline and 2-degree	Baseline and 2-degree
Czech Republic – Germany – Slovakia transboundary	Baseline and 2-degree	Baseline and 2-degree

MAGPIE

MAGPIE		
Case study	Policy scenarios (requested)	Results provided
Europe	Baseline and 2-degree Land & biodiversity Water Food	Baseline and 2-degree Land & biodiversity Water
Global	Baseline and 2-degree Land & biodiversity Water Food	Baseline and 2-degree Land & biodiversity Water

4 Data Navigation Tool

The tool allows for a consistency check of the data sets in the tool, achieve transparency of the datasets in the project, and eventually also identify any gaps in the data sets. The tool also offers context to the data, primarily through the dimensions of the variables in place. Moreover the visualisation tools are helpful to get acquainted to the data. So far, the tool only has data from the thematic models, but case studies are invited to share their full data sets to be able to visualise their data.

The data navigation tool streamlines the exchange of information between the Thematic Models (and other relevant sources) and the Case Studies. It is built upon a harmonized dimensional data model representing the output of the thematic models as defined in Deliverable D5.2, and serves as a central window point for the case studies to locate, query, and export all data. The tool offers the user easy navigation through the complex data sets that the thematic models deliver during the project without having to implement their own logic and processes to make the data useful. It is implemented using Power BI desktop on top of data(warehouse) management solution that keeps data history and also performs data quality checks.

A link is shared to find the latest version of the Data Navigation Tool (<https://dashboards.wecr.wur.nl/reports/powerbi/Reports/S4N?rs:embed=true>) among the participants of the presentation. Case studies not able to attend the presentation are advised to adopt the tool as well. It will allow the case studies to review the baseline scenario from the thematic models. Please contact floor.brouwer@wur.nl, in case you also want to receive the Wageningen UR user account details.

HOME

MODEL	SCENARIO	YEAR	REGION
IMAGE-GLOBIO	Baseline	2020	Former Soviet Union

- LAND
- ENERGY
- MACRO
- WATER
- FOOD
- CLIMATE
- COMPARE



- Land Home
- Energy Home
- Macro Home
- WaterHome
- Food Home
- Climate Home
- LandMC
- LandSC
- Emission Data
- Emission Timeseries
- Emission Modelcomparison

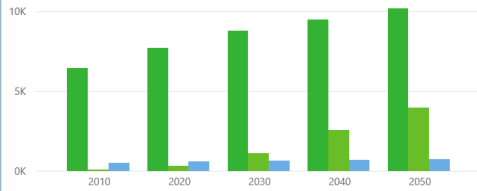
FOOD

MODEL	SCENARIO	YEAR	REGION
IMAGE-GLOBIO	Baseline	2010	All

- DATA
- MODELCOMP.
- SCENARIO COMP.
- HOME

AGRICULTURAL PRODUCTION

● Crops ● Energy Crops ● Livestock



6,48K

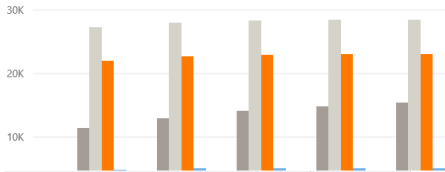
Reported Total Crops ...

114,19

Calculated Total Crop Production

FOOD DEMAND

● Energy Crops ● FeedCrop ● Food ● Food Crops ● Livestock



PRODUCER PRICE INDEX (CROPS AND LIVESTOCK)



CONSUMER PRICE INDEX (CROPS AND LIVESTOCK)

