TWINRD
ECODIGITAL FUTURES

Annual Project Meeting

Introduction to the project

MACROECONOMIC MODELLING OF R&D FOR THE TWIN TRANSITION

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E3 Modelling - Ricardo

Online, 19 February 2025

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Who we are

E3Modelling consultancy specialised in advanced modelling of the economy-energy-environment nexus; spin-off of E3Mlab, a research laboratory operating, within the National Technical University of Athens (NTUA) since 1988;

Research activities and consulting services to the **European Commission, World Bank, IFC, NARUC, National Governments (EU and non-EU), national and international associations (EURELECTRIC, EUROGAS, EPIA, SFEN, AFEP, SITRA)**, **Private companies (TOYOTA, MYTILINEOS, HELPE),** etc.;

We develop and maintain among others, the models **PRIMES (Complete Energy System), PRIMES-TREMOVE (TRANSPORT), PRIMES – BUiMO (BUILDINGS & Energy Efficiency), PRIMES – BIOMASS (BIOMASS - BIOFUELS), PROMETHEUS (WORLD ENERGY SYSTEM), PRIMES – EST (Light version of PRIMES)** and **GEM-E3 (Economy)**; they have received international recognition by the scientific community, the private sector and policy makers;

Economic and energy system projections for **more than 40 countries**.

UNU-MERIT is the UN's institute for comprehensive innovation: a research and training institute that mobilises knowledge, education and policy to unlock the full potential of comprehensive innovation for sustainable development.

UNU-MERIT is a research and training institute of the United Nations University (UNU) which collaborates closely with Maastricht University. UNU-MERIT aims to advance societal policy and innovation research, provide education and mobilise knowledge in order to unlock the full potential of innovation for achieving inclusive sustainable development. The research agenda of UNU-MERIT on 'Comprehensive Innovation for Sustainable Development' (CI4SD) focuses on the interconnected risks and opportunities of innovation, as they relate to climate change, digital transformation, poverty and inequality, migration and population, and the future of work.

SEURECO is a SME specialised in research and studies in quantitative economics and in particular in the establishment and the use of detailed macro sectoral models. In 2012, SEURECO (Société EURopéenne d'ECOnomie) became autonomous from the university team ERASME, which was created in a joint structure with the University of Paris-I and the École Centrale Paris.

SEURECO continues to maintain important links with the academic world. Some members of the team are associate professors, and the company continues to actively participate in research contracts performed within national and European university consortia. This allows us to introduce into the quantitative tools developed by the company, the results of scientific works, and thus to improve them as theoretical and empirical advances are made.

The work of the **SEURECO** is based on applied economic modelling, i.e. the theorisation, construction, implementation and analysis of the properties of applied macroeconomic models incorporating the most recent advances in economic theory.

ISINNOVA, the Institute of Studies for the Integration of Systems, is an independent research institute that supports international, national and local public bodies, as well as private organisations, as they pursue sustainable visions and policies.

ISINNOVA ideates and runs cross-discipline and cross-sector research and innovation projects that bring together public authorities, industries, research institutions and civil society. Co-creating long-term visions for sustainability and advising on the development of coherent systemic (or strategic) plans, ISINNOVA delivers concrete solutions in response to complex challenges

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Objectives

- **Objective 1:** Respond to the absence of applied macro-economic modelling of the Twin transition, by developing a new model, in open access and in open-source format, that will be specifically designed to address the Twin transition.
  - Go beyond the standard dynamic approaches
  - The investments related to the twin transition will not only work through the supply side of the model, but also through demand, driving economic expansion. (both **Supply** and **Demand** driven)

- **Objective 2:** Produce technology flows matrices and R&D data (open access) at a very detailed level on the characterization of the green and digital technologies that will be covered in this project.

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Objectives

- **Objective 3:** Update and improve the two existing large scale applied macroeconomic models widely used by the European Commission (EC), GEM-E3 (GEM-E3 manual) and NEMESIS (NEMESIS manual), for analysing respectively its energy-environment and its R&I policies.

- **Objective 4:** Provide model-based analysis illustrating the usefulness of the new enhanced modelling capabilities to support the EC regarding the Twin transition by analysing the socio-economic consequences of alternative R&I policies.

- **Objective 5:** Opening of the data and of the new model for the Twin transition to the scientific community.

- **Objective 6:** Links with policy makers and stakeholder engagement to co-design the research and diffuse the results.

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Project Results

N°	Title	Objective
PR1	Develop a new open access, open-source model for the Twin Transition	**O1**
PR2	Produce novel data and technology flow matrices to quantify international and intertemporal knowledge spillovers	**O2**
PR3	Update and improve two well-established macroeconomic models (NEMESIS and GEM-E3)	**O3**
PR4	Policy recommendations based on robust modelling of the twin transition	**O3**
PR5	Datasets, models and sets of software open access	**O5**
PR6	Active stakeholder interactions to co-design the research and creation of TWINRD open forum	**O6**

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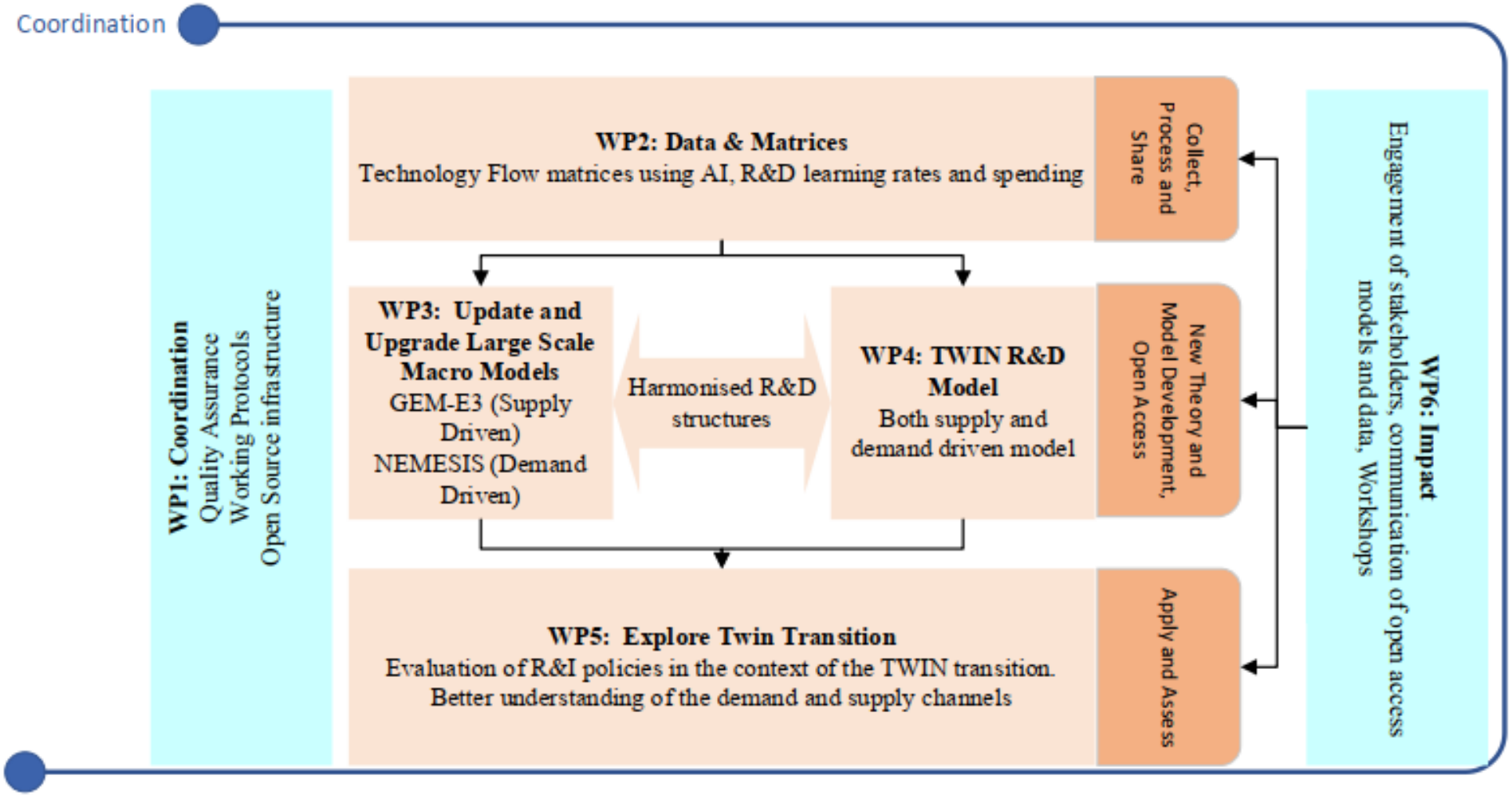
Methodology



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WP1: Coordination and Management

Goals:

- Ensure that all project objectives are met based on the project plan
- Sound financial and administrative management of the project
- Quality control and progress monitoring
- Risk management
- Communication with and reporting to the European Commission (EC)
- Ensure the project execution is as sustainable and low - carbon as possible
- Establish and maintain liaisons with other initiatives with comparable goals.

Tasks:

- Task 1.1 - Administrative coordination
- Task 1.2 - Project internal coordination
- Task 1.3 - Monitoring and quality assurance
- Task 1.4 - Data and knowledge sharing
- Task 1.5 - Coordination with relevant projects and initiatives

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WP2: Data & Matrices

Goals:

- This work-package will produce the technology flows matrices and the R&D data relative to the different energy, green, digital technologies that will be used for the Twin R&D model, and for the upgrade of the GEM-E3 models on respectively energy/green and NEMESIS model on ICT/digital technologies.

Tasks:

- Task 2.1 – Technology flow matrices
- Task 2.2 – R&D data on technologies

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WP3: GEM-E3 & NEMESIS Update

Goals:

- This work-package will focus on the upgrade of the GEM-E3 and NEMESIS models, with an enhanced modelling of R&I and technology flow matrices (from WP2) and an improved representation of energy, green and digital technologies, and of updating theme in terms of data and innovation mechanisms.

Tasks:

- Task 3.1 – Update & Upgrade GEM-E3
- Task 3.2 – Update & Upgrade NEMESIS

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WP4: Twin R&D Model

Goals:

- This work-package will produce the new Twin R&D model. It will start from building a conceptual model rooted in the evolutionary-Keynesian tradition, that will allow us to characterise theoretically the large-scale empirical model that will be then developed and provide guidelines on its parameters calibrations.

Tasks:

- Task 4.1 - Conceptual model
- Task 4.2 – Operational model

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WP5: Explore Twin Transition

Goals:

- This activity will explore the potential of the updated and significantly enhanced models and of the new model to support the Commission priorities including the European Green deal, the Green Industrial plan, and Europe fit to the Digital Age. Based on a foresight methodology to create long-term visions an identify R&I policy that better fit with the Twin transition, it will provide individual model insights and inter-model comparisons from the new modelling capabilities and enhancements developed in the project.

Tasks:

- Task 5.1 – Taking stock
- Task 5.2 – Individual model insights
- Task 5.3 – Inter-models comparison

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WP6: IMPACT

Goals:

- This WP will aim to maximise the impact of the project pursuing three specific objectives:
  1. General visibility of the project and dissemination to potential users (task 6.1);
  2. Communication, Dissemination and Exploitation (CDE) plan and engagement of policy, science, business and social stakeholders in a two-way communication activity aimed to increase the mutual understanding of twin transitions drivers, modelling assumptions and simulation outcomes' usefulness for R&I policy assessment (Task 6.2).
  3. Engagement of researchers and modelling teams in a TWINRD community of practice (task 6.3)

Tasks:

- Task 6.1 - Website and project visual identity
- Task 6.2 – Increasing Impacts (CDE plan and engagement of stakeholders)
- Task 6.3 – Academic, policy, and overall societal

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Expected outcomes

- Support research at the knowledge frontier of macroeconomic models.
- Contribute to the development of innovative and interdisciplinary approaches to modelling of Research & Innovation and R&I policy in Europe.
- Better integrate R&I activities in macro-economic models, leading to better measurement of their impact and a better understanding of the channels through which research and innovation lead to impact (direct and indirect) in Europe.
- Investigate new approaches to R&I macroeconomic models that link R&I related drivers to economic, scientific, and societal outcomes.

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Expected outcomes

- Improve macro-economic modelling for the evaluation of R&I policy on different outcome variables, at different levels of policy intervention (EU, national, regional).
- Produce a novel macro-economic model able to simulate the economy, including the R&I dimension, linking R&I to sustainable and fair growth.
- Provide the full description of the models, codes and datasets, to allow easy access to forefront modelling ideas to the European scientific community and broader audience.
- Prioritising investments and reforms in research and innovation.
- Translating R&I results into the economy to meet the digital and green transition objectives and boost the resilience and competitiveness of our economies and societies.

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Looking forward to a productive meeting!

THANK YOU!

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