IAM COMPACT

Expanding Integrated Assessment Modelling:
Comprehensive and Comprehensible Science
for Sustainable, Co-Created Climate Action

D3.9 – I^{2}AM PARIS v2.0 – Update

WP3 – Exchanging: Open & FAIR science, mutual learning

24/07/2025

Funded by
the European Union

www.iam-compact.eu

Disclaimer

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the European Union nor the granting authority can be held responsible for them.

Copyright Message

Grant Agreement Number	101056306		**Acronym**	IAM COMPACT
Full Title	Expanding Integrated Assessment Modelling: Comprehensive and Comprehensible Science for Sustainable, Co-Created Climate Action			
Topic	HORIZON-CL5-2021-D1-01-04			
Funding scheme	HORIZON EUROPE, RIA – Research and Innovation Action			
Start Date	September 2022		**Duration**	36 Months
Project URL	https://www.iam-compact.eu			
EU Project Advisor	Andreas Palialexis			
Project Coordinator	National Technical University of Athens – NTUA			
Deliverable	D3.9 – I^{2}AM PARIS v2.0 – Update			
Work Package	WP3 – Exchanging – Open & FAIR science, mutual learning			
Date of Delivery	**Contractual**	31/07/2025	**Actual**	24/07/2025
Nature	DEC (Website)		**Dissemination Level**	Public
Lead Beneficiary	National Technical University of Athens (NTUA)			
Responsible Author	Natasha Frilingou		**Email**	nfrilingou@epu.ntua.gr
	NTUA		**Phone**	+30 2107723612
Contributors	Alexandros Nikas, Stratis Alexandrou, Angelos Potiriadis, Stefanos Tsotras, George Xexakis [NTUA]			
Reviewer(s)	Clàudia Rodés Bachs [BC3], Alaa Al Khourdajie [Imperial]			
Keywords	data exchange; platform; open access; climate action; modelling harmonisation; integrated assessment models			

EC Summary Requirements

1. Changes with respect to the DoA

No changes with respect to the work described in the DoA.

2. Dissemination and uptake

The report documents the final developments deployed in the IAM PARIS platform, as part of the work carried out in the context of the IAM COMPACT project; it is intended to benefit developers and users of models employed in support of climate action as well as all other users of the platform, both within and beyond the consortium, by keeping track of all changes and functionalities of the platform.

3. Short summary of results (<250 words)

IAM PARIS is an open data exchange platform for climate and energy policy modelling, developed by the H2020 PARIS REINFORCE project—and supported by a multitude of H2020 and Horizon Europe projects since. This report provides a summary of implemented improvements in the context of the IAM COMPACT project, following up on the strategy documented in the I^{2}AM PARIS Upgrade Plan (D3.1), delivered in the beginning of the project, and their mid-term implementation (D3.8). Notably, efforts have been placed on the redesign of the IAM PARIS platform to focus on dynamic content generation from our researchers and partners. Existing components of the platform have also been improved in terms of functionalities. Users can now create dedicated workspaces in the IAM PARIS Content Management System (CMS), allowing them to organise and present model results and narratives in a structured and customisable format. Four data stories have been created to visualise in a dynamic and interactive way key project outputs. Finally, five new workspaces have been added, corresponding to modelling studies of the 1st Policy Response Mechanism of IAM COMPACT.

4. Evidence of accomplishment

This report, the IAM PARIS platform (https://iamparis.eu/), as well as the platform's GitHub, which keeps track of and provides access to all platform code (https://github.com/i2amparis/i2amparis_platform).

Preface

IAM COMPACT supports the assessment of global climate goals, progress, and feasibility space, and the design of the next round of Nationally Determined Contributions (NDCs) and policy planning beyond 2030 for major emitters and non-high-income countries. It uses a diverse ensemble of models, tools, and insights from social and political sciences and operations research, integrating bodies of knowledge to co-create the research process and enhance transparency, robustness, and policy relevance. It explores the role of structural changes in major emitting sectors and of political, behaviour, and social aspects in mitigation, quantifies factors promoting or hindering climate neutrality, and accounts for extreme scenarios, to deliver a range of global and national pathways that are environmentally effective, viable, feasible, and desirable. In doing so, it fully accounts for COVID-19 impacts and recovery strategies and aligns climate action with broader sustainability goals, while developing technical capacity and promoting ownership in non-high-income countries.

NTUA – National Technical University of Athens	EL	
Aalto – Aalto Korkeakoulusaatio SR	FI	
AAU – Aalborg Universitet	DK	
BC3 – Asociacion BC3 Basque Centre for Climate Change – Klima Aldaketa Ikergai	ES	
Bruegel – Bruegel AISBL	BE	
CARTIF – Fundacion CARTIF	ES	
CICERO – Cicero Senter for Klimaforskning Stiftelse	NO	
E3M – E3-Modelling AE	EL	
KTH – Kungliga Tekniska Hoegskolan	SE	
POLIMI – Politecnico di Milano	IT	
UPRC – University of Piraeus Research Center	EL	
UVa – Universidad De Valladolid	ES	
WI – Wuppertal Institut fur Klima, Umwelt, Energie GGMBH	DE	
IIMA – Indian Institute of Management	IN	
THU – Tsinghua University	CN	
USMF – University System of Maryland	US	
AAiT – Addis Ababa University	ET	
KEI – International Civic Organisation Kyiv Economics Institute	UA	
RUSL – Raja Rata University of Sri Lanka	LK	
TUM – Technical University of Mombasa	KE	
UNIGE – Université de Genève	CH	
Imperial – Imperial College of Science, Technology and Medicine	UK	

Executive Summary

I²AM PARIS is an open data exchange platform for climate and energy policy modelling that was originally developed in the context of the Horizon 2020 PARIS REINFORCE project. This report provides a summary of the final improvements of the platform that have been implemented within IAM COMPACT, following up on the I²AM PARIS Upgrade Plan that was developed in the beginning of the project (Deliverable D3.1), and a mid-term update (D3.8 – *I²AM PARIS v2.0*).

The update to IAM PARIS marks a shift to a more interactive and modular platform that enables direct contributions from partners and ensures transparent access to IAM output data. It features two integrated systems: a Directus-based CMS (https://cms.iamparis.eu) for dynamic content creation and page editing, and a Python/FastAPI back-end (https://api.iamparis.eu) for uploading, processing, and serving IAM modelling results from different scenarios in IAMC format. This architecture supports user-generated graphs, editable model pages, and streamlined data management through a RESTful API.

Apart from new features, existing components of the platform have been improved in terms of functionalities. New model documentation has been added, while the existing documentation and methods for visualising model details will be updated based on the feedback of IAM COMPACT stakeholders, emphasising interpretability by non-experts. The capacity development activities of the project are also featured extensively in the platform, by creating a component with videos and training materials for new modellers and for further supporting the understanding of modelling documentation.

Finally, new result workspaces are being created to showcase the outcomes of the project's modelling exercises. All new modelling documentation and workspaces are publicly available, allowing for easy dissemination and adhering to the FAIR principles for data management.

Funded by
the European Union

Contents

Table of Figures

Funded by
the European Union

1 Introduction

IAM PARIS[1] is an open-source data exchange platform for modelling information in support of climate action. It was created in 2019 by the Horizon 2020 PARIS REINFORCE[2] project to facilitate understanding of the diverse Integrated Assessment Models (IAMs), energy system models, and sectoral models that were used in that project, as well as to provide interactive interfaces for exploring results of model intercomparisons. Nevertheless, the intention from the very beginning was for the platform to evolve into a vessel for knowledge exchange for the wider modelling community and an authoritative source of modelling information for stakeholders.

Towards this goal and to ensure the sustainability of the platform, the development of the platform is continued by the IAM COMPACT project as well as by four other EU-funded projects, the Horizon 2020 projects NDC ASPECTS[3] and ENCLUDE[4], the Horizon Europe projects DIAMOND[5], TRANSIENCE[6], EU-CHINA BRIDGE[7], and DECIPHER[8]. While most new platform development will take place simultaneously among the five projects, each of them has a different scope: NDC ASPECTS focuses on improving the documentation of sectoral models and producing more interfaces to dive into national and sectoral results; ENCLUDE emphasised results on citizen-led climate action; DIAMOND develops applications of modelling results for different audiences; TRANSIENCE uses IAM PARIS as a dissemination channel for climate-economy modelling related to the industrial sector, with interfaces for stakeholders to explore data/insights; EU-CHINA BRIDGE uses the platform to host technology inventories and modelling results focusing on industrial decarbonisation within the two regions; and DECIPHER develops interfaces that would allow platform users to further tailor results to their own needs. In the case of IAM COMPACT, IAM PARIS has been enhanced in terms of content and features to support model intercomparison exercises and capacity development activities of the project. This report provides an outlook of the realised and envisaged platform improvements within IAM COMPACT. In contrast to similar IAM community platforms, such as the Scenario Explorer[9] developed and hosted by IIASA, IAM PARIS prioritises open-source availability[10], and coherent interlinkages among workspaces, and will eventually offer external users the possibility to create their own model profile/documentation and exercise workspaces.

The next section (2) provides an overview of the update of the platform from I²AM PARIS to IAM PARIS. Section 3 summarised the validity checks to ensure the reliability and consistency of modelling results, while Section 5-6 document new features and workspaces that have been added since D3.8 – I²AM PARIS v2.0. The final section (section 7) includes a plan for the continuous use of the platform. Apart from the implemented functionalities, more enhancements can be potentially applied in the platform, based on the needs of the project partners and stakeholders and in coordination with the development work of the other projects.

---

1 https://iamparis.eu
2 https://paris-reinforce.eu/
3 https://www.ndc-aspects.eu/
4 https://www.encludeproject.eu/
5 https://www.climate-diamond.eu
6 https://www.transience.eu/
7 https://www.eu-china-bridge.eu
8 https://decipher-horizon.eu/
9 https://data.ece.iiasa.ac.at/ar6/
10 https://github.com/i2amparis/i2amparis_platform

Funded by the European Union

2 From I²AM PARIS to IAM PARIS

The platform had originally two main functionalities: First, it provided extensive documentation for more than 40 global, national, and sectoral models that are used to support climate policy. Pre-existing functionalities are reported in D3.8 – I²AM PARIS v2.0[11].

The update to IAM PARIS reflects a shift towards a more interactive and modular architecture, enabling direct partner contributions, dynamic content, and transparent access to IAM data. The redesigned platform is focused on dynamic content generation from our researchers and partners. The platform hosts and presents energy models' metadata and their results, while users can use this data to create graphs and edit model pages. Our system includes two databases, one for content generation and one for larger data storage like model results in the IAMC format. The former is based on the directus content management system (CMS) and the latter on a Python / fastAPI implementation. The CMS is hosted at https://cms.iamparis.eu and is used as a website builder where we can assign content editor roles to certain partners so that they can quickly create and edit pages rendered on our front-end. Our back-end is designed as a RESTful API, hosted at https://api.iamparis.eu, and is used to upload model data from local parsers, and to preprocess and format data to serve publicly.

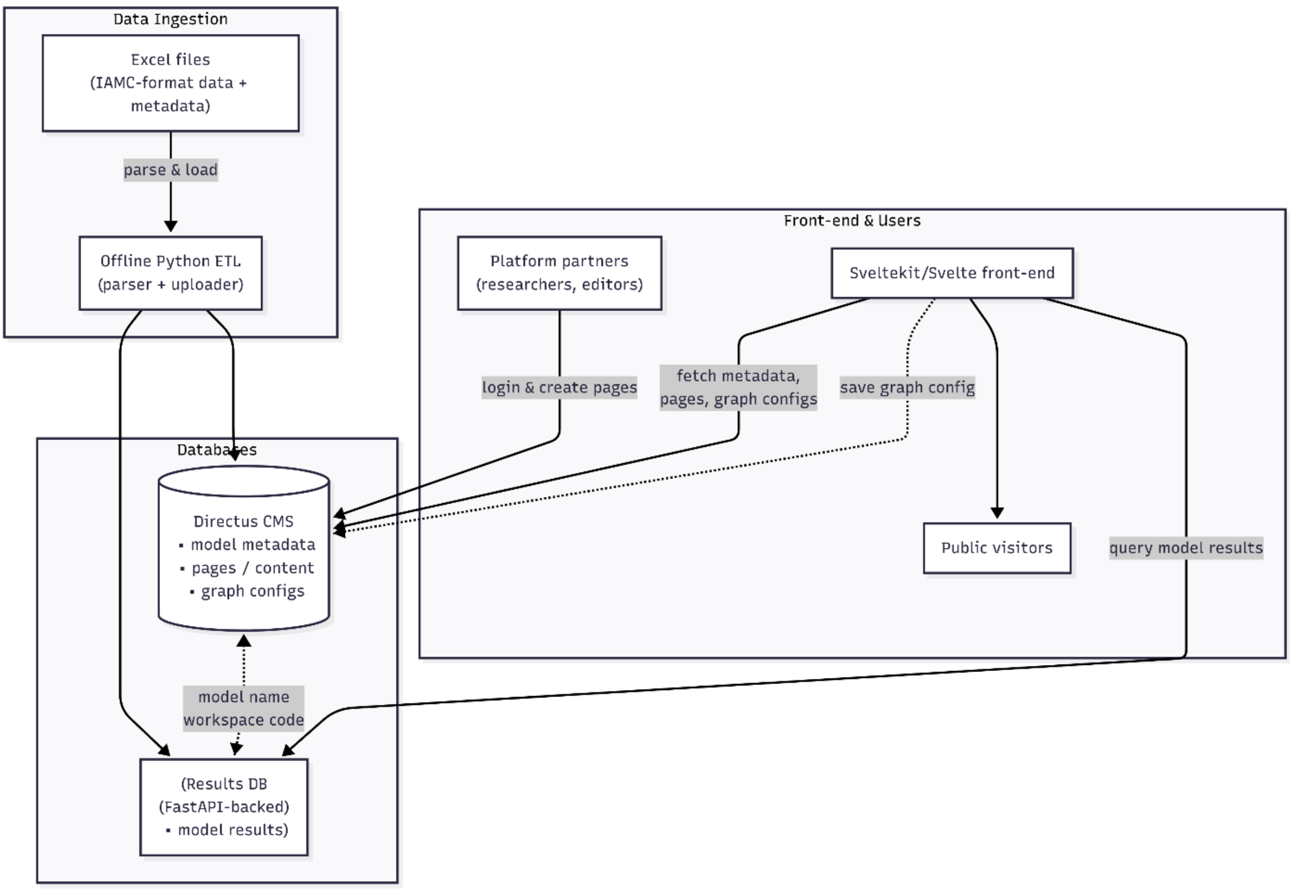

Figure 1: A high-level system design diagram of the IAM PARIS platform

The "IAMC format" refers to a standardised data template developed by the Integrated Assessment Modeling Consortium (IAMC) to streamline the collection, exchange, and analysis of input and output data from integrated assessment model intercomparison projects. Originating from the Asian Modeling Exercise (AME) in 2009/2010

[11] Zenodo

and continuously refined since, the IAMC format defines a common structure, typically including fields for model, scenario, region, variable, unit, and time series data—that allows diverse modelling groups to report results consistently. By using this shared template, modelling teams can more easily participate in comparison exercises, reduce time spent on data cleaning, and enable automated quality checks, which in turn improves transparency, facilitates meta-analyses, and supports the creation of publicly accessible databases for scientific and policy-relevant scenario analysis.

The front-end (https://iamparis.eu) is based on Javascript using Svelte / Sveltekit. It serves both as a public website to present model data and data stories, and as a platform for partners to create graphs using our visualization engine. These graphs can later be placed and formatted into pages using the CMS. While creating content in the CMS, partners can see their page edits in real time on the platform.

For deployments and management, we use the open source dokku[12] to self-host our applications. The architecture is split into three dokku apps, the API, the CMS and the front-end. Each service runs in an isolated dokku container, deployed independently via Git. Environment variables and persistent storage are managed per app, while HTTPS, and domain routing are handled via dokku's nginx-based infrastructure. The platform aligns with open science principles, allowing users to explore model outputs, create and share custom visualisations, and download data for further analysis.

Figure 2: Landing page of IAM PARIS

[12] https://dokku.com/docs/getting-started/installation/

3 Validity checks

To ensure the reliability and consistency of modelling results, the IAM COMPACT project has implemented a comprehensive, automated validation and vetting app based on lessons from PARIS REINFORCE and IPCC practices[13]. Detailed description of the app can be found in D3.8 - I2AM PARIS v2.0.

The app automates processes for validating the modelling results of Integrated Assessment Models (IAMs) and other types of climate-economy models. Validation routines include automated checks for variable and model names, a duplicates finder, and a series of vetting checks based on the IPCC AR6 vetting rules found in the IPCC AR6 Working Group III report, Annex III, Table 11 (link). Using the IAMC template[14] as a standard format, the platform checks model, variable, region, and unit names for consistency, flags duplicates, validates numerical values, and compares aggregated versus disaggregated data. It also applies feasibility checks using IPCC AR6 vetting criteria[15], particularly for historical and projected emissions and energy indicators. These checks are performed via an open-source Python script that modellers can run before uploading data; the tool provides detailed error feedback and allows re-validation after corrections. This process improves data quality and transparency while supporting future integration into a fully automated upload interface. The app is built in Python and Streamlit and will be eventually integrated in IAM PARIS (link).

The script has been integrated in the platform and modellers within the consortium have been encouraged to test it to ensure its usability. The script's code is open source and provided in GitHub[16], allowing every interested user to modify the validity checks, e.g., changing vetting checks or decreasing and increasing the allowed deviation between aggregated variables and sums of disaggregated variables. The script is integrated within an automated data input interface, where data will be directly uploaded in the platform database after it has passed a successful validation check.

We have also uploaded a tutorial on how to use the app on our YouTube channel[17].

[13] https://validation.iam-compact.eu/

[14] https://www.iamconsortium.org/scientific-working-groups/data-protocols-and-management/iamc-time-series-data-template

[15] IPCC AR6 scenario database (Annex 3[15], Section 3.1)

[16] https://github.com/IAM-COMPACT/iamcompact-validation-ui

[17] https://www.youtube.com/watch?v=t3RLKMNGLz0&t=1s

Funded by
the European Union

4 Enhancement of documentation components

The IAM PARIS platform offers a comprehensive Model Documentation section, accessible at https://iamparis.eu/detailed_model_doc, where users can explore in-depth technical information about each model used across various Horizon Europe projects. The documentation is organised by project, allowing visitors to easily identify which models were applied in each research effort and understand their structure, assumptions, input data, and methodological frameworks. Each model entry includes key metadata, such as model version, institutional affiliation, scope of analysis (e.g., global or regional), and the specific scenario outputs generated. This structure fosters transparency and enables researchers, policymakers, and stakeholders to trace model results back to their source and understand the context of their use.

Complementing the technical documentation, the Data Stories section at https://iamparis.eu/datastories provides an accessible narrative layer, translating complex modelling results into visual and textual insights tailored for broader audiences. These stories are curated by project partners and are designed to communicate key findings, scenario comparisons, or policy-relevant implications in an engaging, easy-to-navigate format. By combining graphs, explanatory text, and interactive elements, data stories serve as a bridge between raw model outputs and real-world decision-making, supporting more informed stakeholder engagement and public understanding of climate and energy modelling outcomes. For IAM COMPACT, we have built four Data Stories, detailed below: A recovery database (Section 4.1), a policy catalogue (Section 4.2), key results on country-specific barriers, drivers, policy options, and implemented policies (Section 4.3), and a visualization of the capacity to assess SDGs in the IAM COMPACT models (Section 4.4).

4.1 Recovery database

As part of *Task 5.1: Making a green step forward into the post-COVID era* we qualitatively identified, gathered, and classified announces recovery packages, and passed this information to the IAM PARIS platform with the aim to update its Recovery Policy DB[18]. The Recovery Database (Recovery DB – ***Figure 3***), available at https://iamparis.eu/datastories/recoveryDB, presents a collection of national-level green recovery measures introduced in response to the COVID-19 pandemic.

Developed within the PARIS REINFORCE project, and greatly enhanced in IAM COMPACT, the database now includes the latest available information on fiscal recovery measures by technology, country, and sector across 105 countries with such measures announced and/or implemented, with a particular focus on whether and how these policies contribute to climate and sustainability goals. The Recovery DB (***Figure 4***) includes information on over 250 policy measures, categorising each by country, sector, type of policy, and funding volume. The data story is designed to support transparency, policy evaluation, and scenario modelling by offering a structured view of how post-COVID recovery spending aligns, or conflicts, with climate neutrality targets.

[18] https://www.i2am-paris.eu/rrf_policy_intro

Funded by
the European Union

Recovery Policy DB

The COVID-19 pandemic reshaped global economic priorities at the time, with recovery packages offering unprecedented fiscal stimuli aimed at revitalising the economies from the negative impacts of, and the confinements in response to, the pandemic. While these packages may have also presented, and/or been framed as, a significant opportunity for aligning socioeconomic recovery spending with near- and longer-term climate goals, their composition—in terms of the share of spending with direct or indirect implications for energy systems and emissions trajectories—varies across countries, sectors, and technologies.

Here, we put together a comprehensive database comprising the latest available information on fiscal recovery measures by technology, country, and sector across 105 countries with such measures announced and/or implemented. The database groups announced investments into green technologies, household spending, as well as measures not fitting neatly into predefined categories/sectors yet constituting important chunks of recovery packages (e.g., on critical minerals, methane abatement, recycling, electricity access).

Our methodological approach included identifying and synthesising data from a diversity of reputable sources [1-6], which were systematically examined to ensure a broad, representative dataset of green recovery spending around the world.

Figure 3: Recovery policy database introduction

The data exploration table presents a searchable and filterable interface displaying over 2,800 entries of national recovery measures. Each row corresponds to a distinct policy measure, and the table includes key details such as: Country (e.g., Estonia, United States), Policy name and policy title, announced year, sector and classified sector (e.g., "Just transitions", "People-centered transitions"), funding (in billion USD), and ISO country code.

Data Exploration

The following table contains the Recovery and Resilience Plans for different countries in a tabular format. The data exploration includes ordering, searching and exporting the available data. The full database is also available in Excel format on a Zenodo repository (https://zenodo.org/records/15056809).

Search... Export to CSV Show 5 entries

id	country	policy_name	announced_year	sector	policy_title	funding_billion_usd	iso_code	classified_sector
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
1	Albania	ALL 28 billion for energy price compensation	2022	Energy affordability	null	0.24769627	AL	Energy affordability
2	Antigua and Barbuda	Specified in the 2021 Budget Speech, the Prime Minister confirmed the government's' agreement to guarantee up to $50 million XCD, for business expansion and cash flows to enterprises affected by the pandemic	2021	General	null	0.0186	AG	Other
3	Antigua and Barbuda	Loan financing to be disbursed for the rejuvination of the citrus industry following a progressive decline since 2005, bottoming out in an exceptionally low 2020 crop.	2021	Low-carbon vehicles	null	0.00558	AG	Low carbon and efficient transport
4	Antigua and Barbuda	The capital budget for 2021 is increased 62% on the $103.3 million XCD spent on capital projects in 2020. The increase in capital spending is "part of the Government's strategy to promote economic activity while [they] await a rebound in the tourism sector" (the sector which alone accounts for 80% of GDP and 70% of employment). The total value of the budget for 2021 is $167.2 million XCD, implying a recovery strategy leading to a rise in spending of $63.9 million XCD.	2021	General	null	0.02377	AG	Other
5	Antigua and Barbuda	The Emergency Food Assistance Programme, commenced in April 2020, had by December delivered 50664 food packages. The Government Voucher Programme, partnered with a PDV contribution of $500,000 (XCD), totalled a value of 1.25m XCD. Both were funded by a waiver of sales tax (ABST) to the total value of $5m XCD.	2020	Other efficiency	null	0.00186	AG	General

Showing 1 to 5 of 2838 entries Previous 1 2 3 4 5 ... 568 Next

Figure 4: Data exploration of the entire DB

The "Analysis" section of the Recovery DB data story (*Figure 5*) offers users a set of interactive visualisations that provide high-level insights into the distribution and orientation of COVID-19 recovery measures across countries and sectors. These visual summaries help users understand key trends in how recovery funding was allocated and whether it supported green, brown, or neutral objectives.

Users can explore bar charts and pie charts that show, for example, the sectoral allocation of the green recovery packages, distribution of funding across sectors (like low carbon electricity, energy Affordability), and budget allocation in terms of finding volume by county. The charts are dynamic, and update based on user selections, offering quick and visual comparisons between countries or classifications, and are designed to help policymakers, researchers, and the public grasp the overall direction of recovery spending.

Figure 5: Analysis of the DB through charts

4.2 Policy catalogue

As part of *Task 4.1: Understanding policies, policy needs, and their representation in modelling tools,* IAM COMPACT has produced guidelines to translate policy needs into scenario frameworks for models to explore. This was possible by clustering current policies and plans at global and national level, with feedback from stakeholders (*D4.1 From policy needs to scenario frameworks*[1]) and subsequently identifying potential synergies and trade-offs among policies, as well as assessing which of the models can best explore the identified needs and their interactions (*D4.2 - From policy needs to scenario frameworks – Update*[2]). As a key output from these documents, a comprehensive, online, interactive Policy Catalogue has been launched in the new IAM PARIS website[3], where it is possible to intuitively explore the interrelationships between political objectives and their modelling representations. The catalogue's implementation and functionalities have been documented in **MS9 – Policy Catalogue.**

4.3 Barriers, drivers, and policy analysis

As part of *Task 6.4 - Mitigation drivers, barriers, and policy options*, which supports the transfer of results to WPs 4-5 and capacity development activities, key results on country-specific barriers, drivers, policy options, and implemented policies have been shared in a structured common format, and disseminated across the modelling community via the IAM PARIS platform as well as through several infographics. The data story presents a structured analysis of climate change mitigation challenges and opportunities in four countries: Ethiopia, Kenya, Sri Lanka, and Ukraine, and is designed for policy makers, development partners, researchers, and climate practitioners working on evidence-based climate policy development and international cooperation (*Figure 6*).

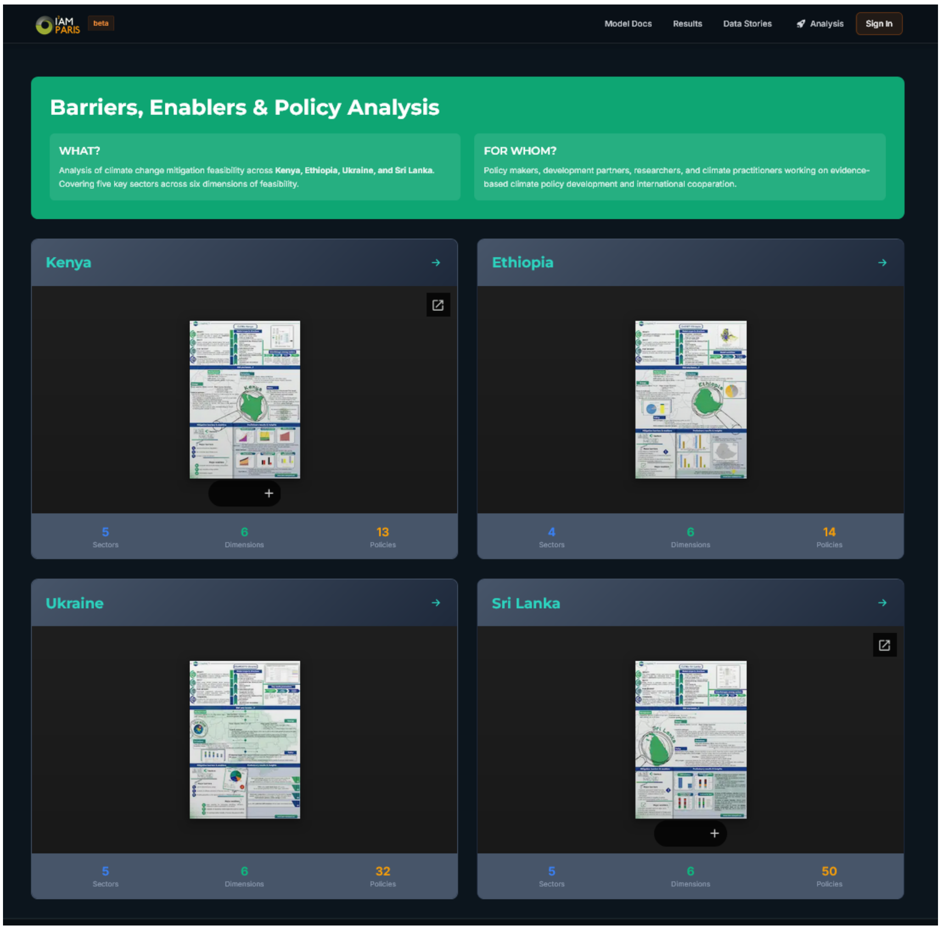

Figure 6: Landing page of data story "Barriers, drivers, and policy analysis"

It focuses on five key sectors: Industry, Energy, Transport, Buildings, and Land Use, and guides users through a step-by-step exploration of each country's decarbonisation landscape. The analysis of enablers and barriers is guided by a framework inspired by the IPCC, organized around six key dimensions of feasibility: geophysical, environmental-ecological, technological, economic, sociocultural, and institutional. Although all sector follows a common overarching structure and set of guidelines, each one is tailored to reflect the unique characteristics and context of the respective sector, resulting in some variation in how the content is structured and presented (for more information, see D6.6 – Report on drivers, barriers, and policy analysis).

By clicking on each country, users can explore enablers and barriers to mitigation, derived from both desk research and expert interviews. These insights are presented in a clear, categorised format, helping users understand the specific technical, economic, institutional, or social factors that support or obstruct climate action in each sector (*Figure 7*).

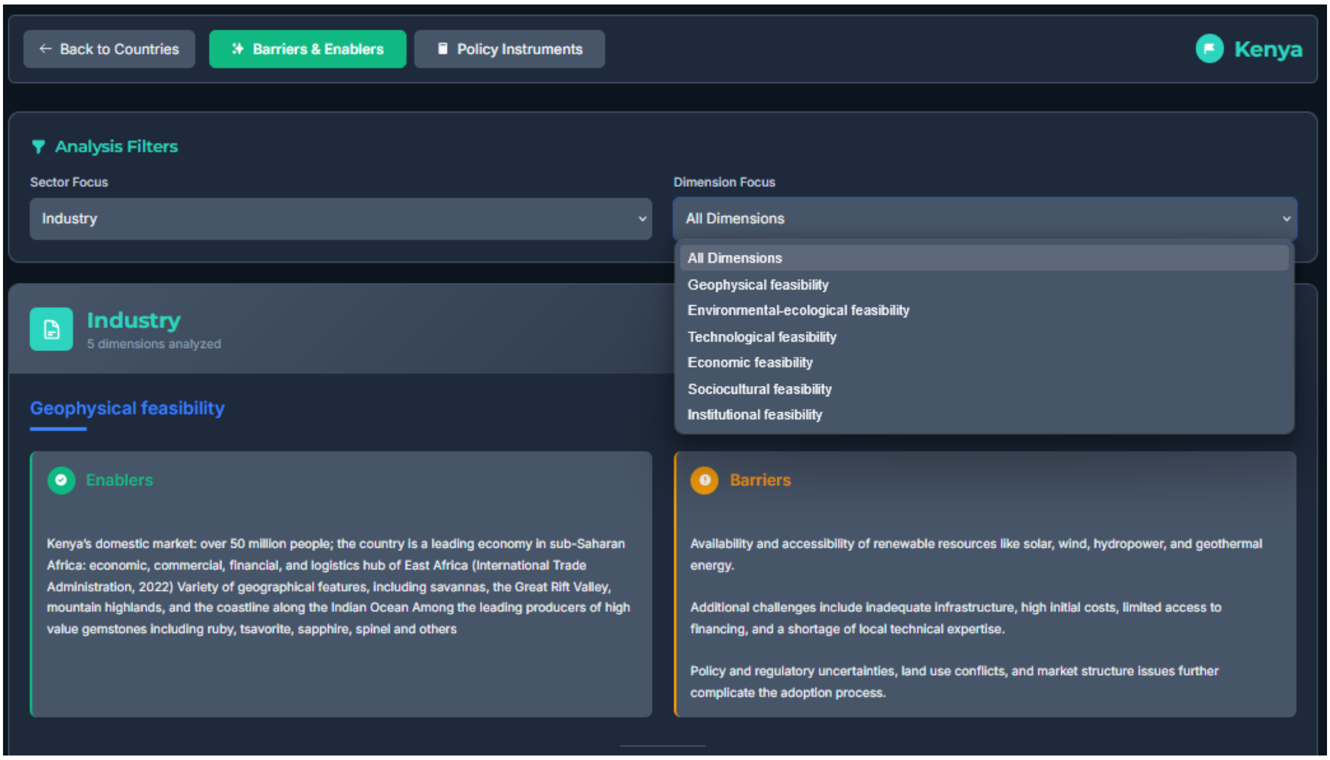

Figure 7: Barriers & Enablers tab in Kenya for the Industry sector across six feasibility dimensions.

Drawing from the enablers and barriers identified, a range of policy measures and instruments have been categorised into four distinct groups to address the enablers and barriers and can be explored from the tab "Policy analysis". There is a wide range of policy and governance instruments available to public authorities supporting decarbonisation / GHG emissions reduction in each sector. The tab below provides a comprehensive overview of policy options categorised into six main types of instruments. These instruments encompass governance and planning, economic, regulatory, "non-economic", educational and informational, international cooperation, and other instruments (*Figure 8*).

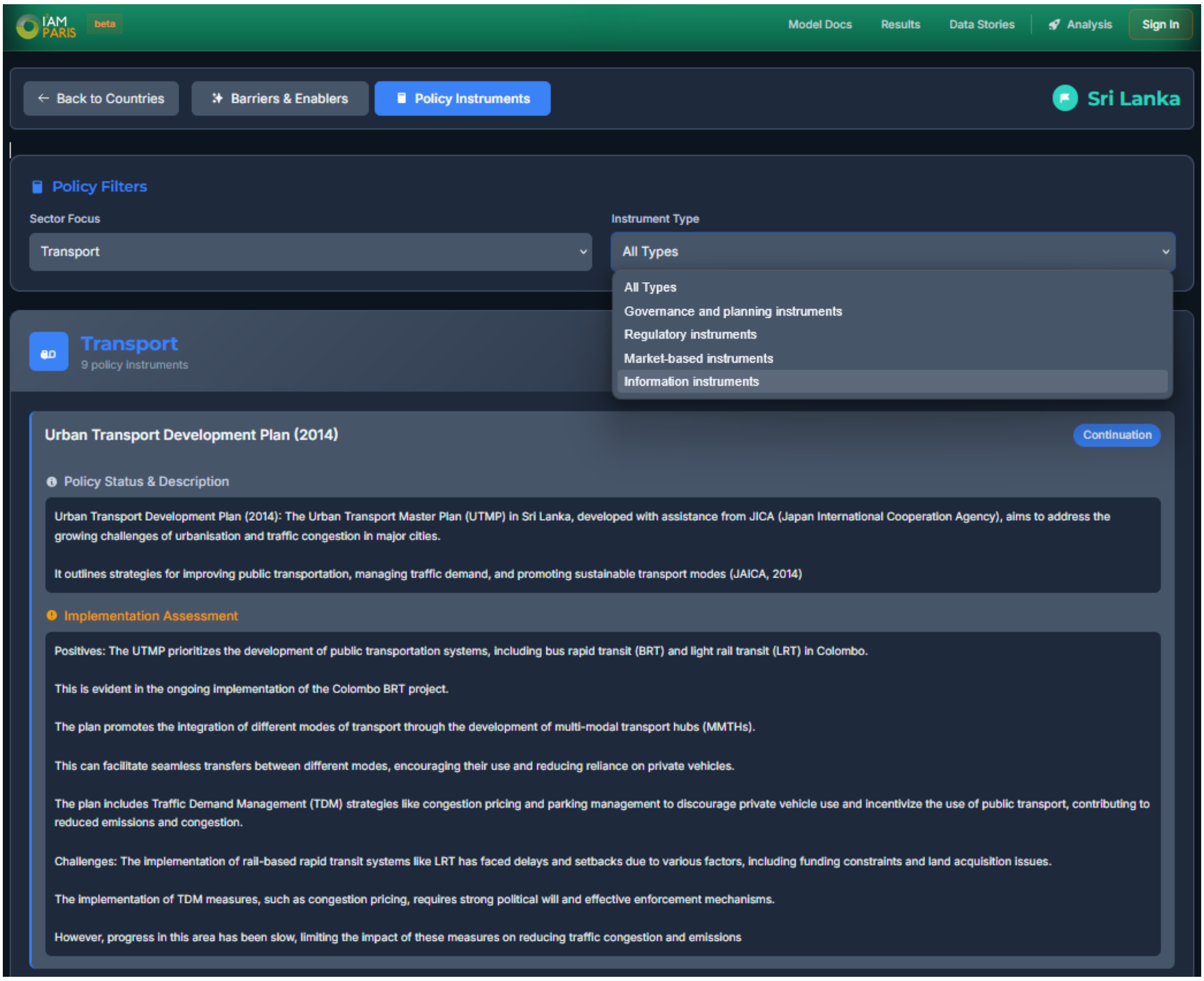

Figure 8: Policy instruments tab in Sri Lanka for the Transport sector across four policy instrument types

4.4 Sustainable development goals in IAM COMPACT models

The Sustainable Development Goals (SDGs), established by the United Nations (UN), serve as a global framework for evaluating progress across a broad range of sectors and life dimensions, from environmental protection to ending hunger and safeguarding marine ecosystems. Due to their wide scope and the complexity of their indicators, it is highly challenging to develop a single model that can comprehensively address all SDGs simultaneously. In this context, as part of *Task 5.6: Truly sustainable decarbonisation pathways, including biodiversity, materials, biophysical limits*, modelling teams have been asked to evaluate the capacity to assess SDGs in IAM COMPACT models. The results of the evaluation for the 17 SDGs are shown in ***Figure 9***. By hovering over the green ticks, users can assess more information about each SDG. A more detailed analysis for a set of 116 indicators across all the SDGs can be found in *D5.9 – Climate action in the sustainability spectrum – Update.*

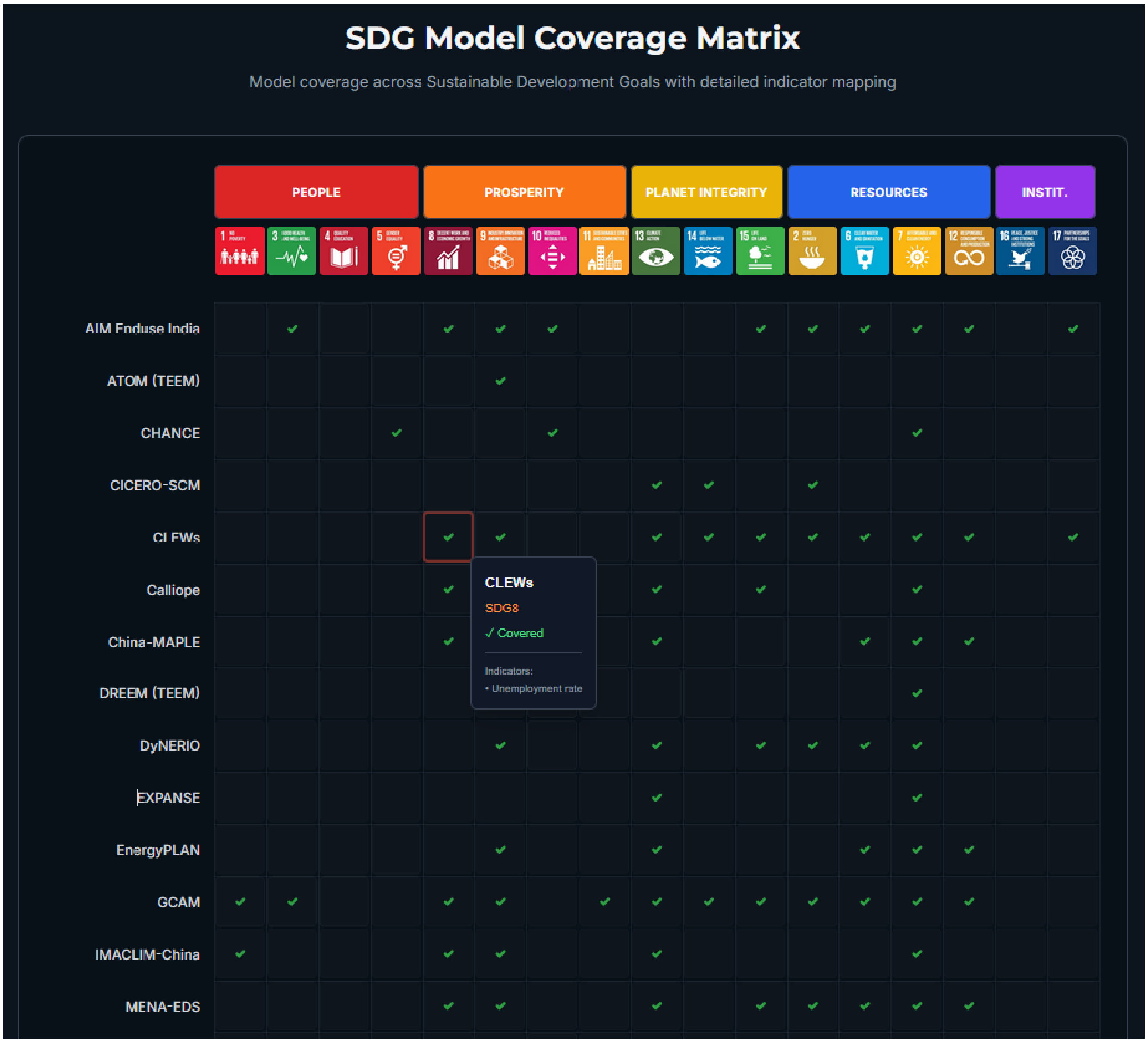

Figure 9: SDG model coverage matrix

5 Enhancement of result components

Similar to the documentation component, a key motivation for the result components includes creating an interface for platform users to add modelling results automatically. Until now, the development team of the platform needs to manually initiate the parsing of new modelling results in the database and create the respective workspaces and interactive visualisations to visualise these results. This requires many development hours and iterations between the providers of the modelling data and the development team, which can be potentially subject to errors. In the context of IAM COMPACT, the process of data parsing has been automated and integrated with the validation checks described in D3.8, including a step-by step guide in case checks fail, along with a video demo[19]. Thus, platform users are able to directly initiate data parsing and checks from a dedicated user-friendly interface and iteratively fix potential problems in the data without the time-consuming intervention by the development team. Similarly, an interface was made to create a results workspace connected to a specific data stream by choosing specific visualisations and by adding explanations, analysis, and relevant research questions. While such functionalities can be partly found in tools such as the Scenario Explorer from IIASA[20], the added value of IAM PARIS is that workspaces (and all other functionalities of the platform) are open source and can be further improved or modified by any interested individual. Additionally, the IAM PARIS workspaces can provide tailor-made interfaces for policymakers and other users, helping them to better understand and potentially use modelling results. IAM PARIS workspaces can be also linked to all available data in the platform (both for modelling documentation and results), e.g., allowing users to compare the features of models participating in a modelling exercise. To ensure data quality and avoid cyber-attacks through code injection, visitors that want to add data need to provide proof that are related to a specific modelling team or organisation, for instance, by registering with their professional email account. Registered users can add new data and modify data that was already added by them. In case of a major data entry or change, a platform admin will be able to check and confirm the change. Registered users can also change the visibility settings of their workspaces, for instance, by keeping the workspace private during its implementation and then releasing it for all users in the platform. Last but not least, new workspaces related to the modelling work of IAM COMPACT have been developed.

5.1 Configurable analysis

The scientific module of the platform has been updated to allow users to explore modelling results in an interactive way and create custom visualisations and workspaces. This new feature enables users to compare multiple scenarios and models side-by-side, dynamically filter data by multiple fields (e.g., model, scenario, variable, region, year) and search within any table or chart, making it easy to locate specific data points or trends. Visualisations are embedded within the platform, requiring no external software, and users may switch between table view and chart view, or export to CSV for advanced analysis. The users can also choose to "Import" data in IAMC format and use the scientific module of the platform to visualise results. Finally, users can create, save, and return to personalized workspaces, making it easier to build consistent analyses over time or collaborate with others.

To create a workspace, first, users need to click on the "Analysis"[21] tab, on the top right corner of the website, and then select "Create First Visualisation".

[19] https://www.youtube.com/watch?v=t3RLKMNGLz0

[20] https://data.ece.iiasa.ac.at/ar6/#/workspaces

[21] https://iamparis.eu/scientific_module

Funded by the European Union

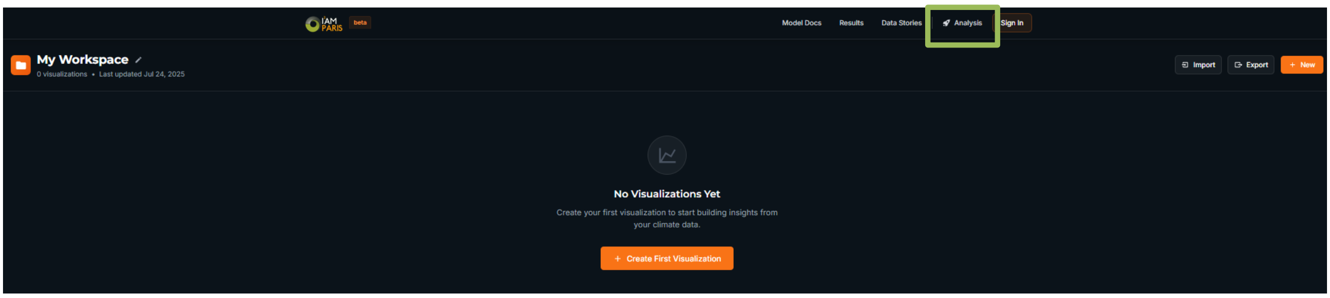

Figure 10: "Analysis" tab of IAM COMPACT

Then, from the "Data" tab, the user can select the project and the study they are interested in. Using Query filters, the user can create custom graphs based on the modelling results of the selected study, which are reported in IAMC format.

For example, in *Figure 11* below, selecting the project "IAM COMPACT", the study "Behavioural changes for climate policy", filtering scenarios, regions, variables, and years, and clicking "Generate", the user can see the results of "Final Energy|Residential and Commercial|Commercial|Electricity" from all scenarios of the study, in the "EU-27" region, from the "GCAM" model, from 2005-2050, and export them in .csv format.

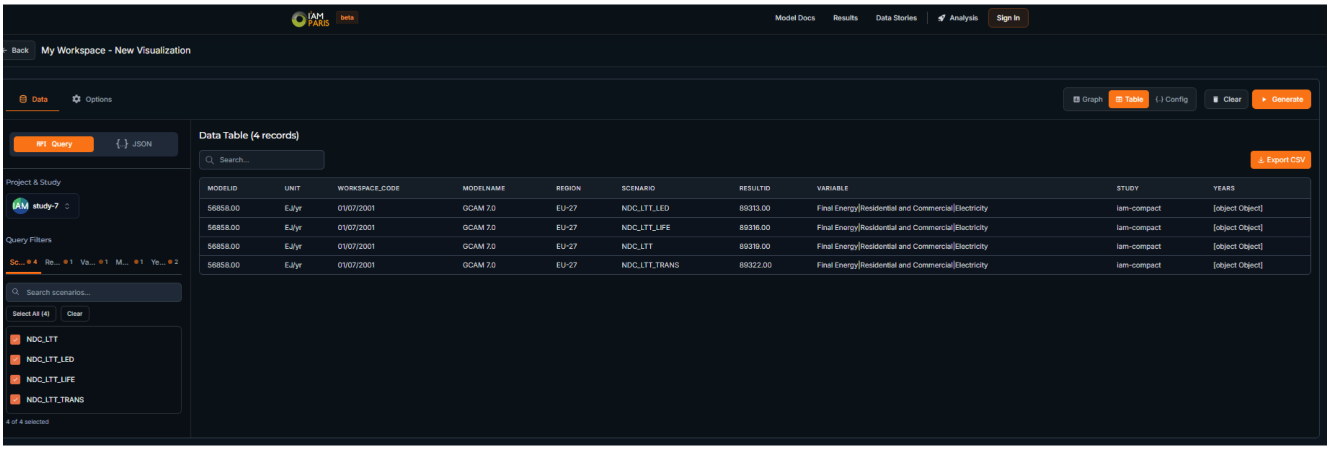

Figure 11: Scientific module queries under "Data tab"

Under "Options" the user can then provide a chart title, a chart description, select visualisation type (line or bar graph), and how the data should be grouped (by region, scenario, model name or variable). In the example above, selecting line chart and grouping by scenario gives the graph in *Figure 11*. In case there are missing values in the dataset provided, the user may also select to "interpolate year data". These flexible settings are key to creating meaningful, tailored analyses that serve both technical developers and non-scientific experts looking for clear, relevant insights.

Funded by
the European Union

Figure 12: Scientific module options for generating graphs

The workspace has been created, and the user can rename it by clicking on the pencil icon, open it, or delete it.

Figure 13: Rename, open, or delete a workspace.

Thus, the IAM PARIS scientific module provides a powerful and user-friendly interface for exploring results from integrated assessment and energy system models. Details on the new workspaces created through this feature can be found in Section 6.

Funded by
the European Union

6 New workspaces

A workspace acts as a container for content, where users can build pages using modular blocks, such as formatted text, images, and interactive graphs generated from IAMC-compliant data. The process involves creating a new workspace, defining a page policy, and then assembling content and graph blocks. Graphs can be created using either database queries or custom JSON inputs via the IAM-PARIS visualization module. Once finalized, these workspaces are published to the main platform and can be accessed at https://iamparis.eu/results, making them an essential tool for transparent communication of modelling insights.

The "Results"[22] section of IAM PARIS platform serves as the main entry point to explore the results and narratives from various Horizon Europe projects hosted on the IAM PARIS platform. Each icon on the page represents a different project. By clicking on one, users are taken into that project's dedicated workspace, where they can browse interactive graphs, model results, and content blocks created by the project team. The structure allows for clear, project-specific storytelling and data sharing, making it easy for users to navigate across multiple modelling efforts and explore their outcomes in a consistent, visual format.

[22] https://iamparis.eu/results

Figure 14: "Results" section of the platform (left) and workspaces in IAM COMPACT project (right)

Each workspace (*Figure 11*) features meaningful, user-friendly, and interactive visualisations that show the input and output data from these activities, including related policy questions as well as links to scientific publications.

Funded by
the European Union

For a more detailed description of workspaces, see also Deliverable D3.1 – I^{2}AM PARIS Upgrade Plan[23]. For workspaces created until January 2024, see D3.8 – I2AM PARIS v2.0[24].

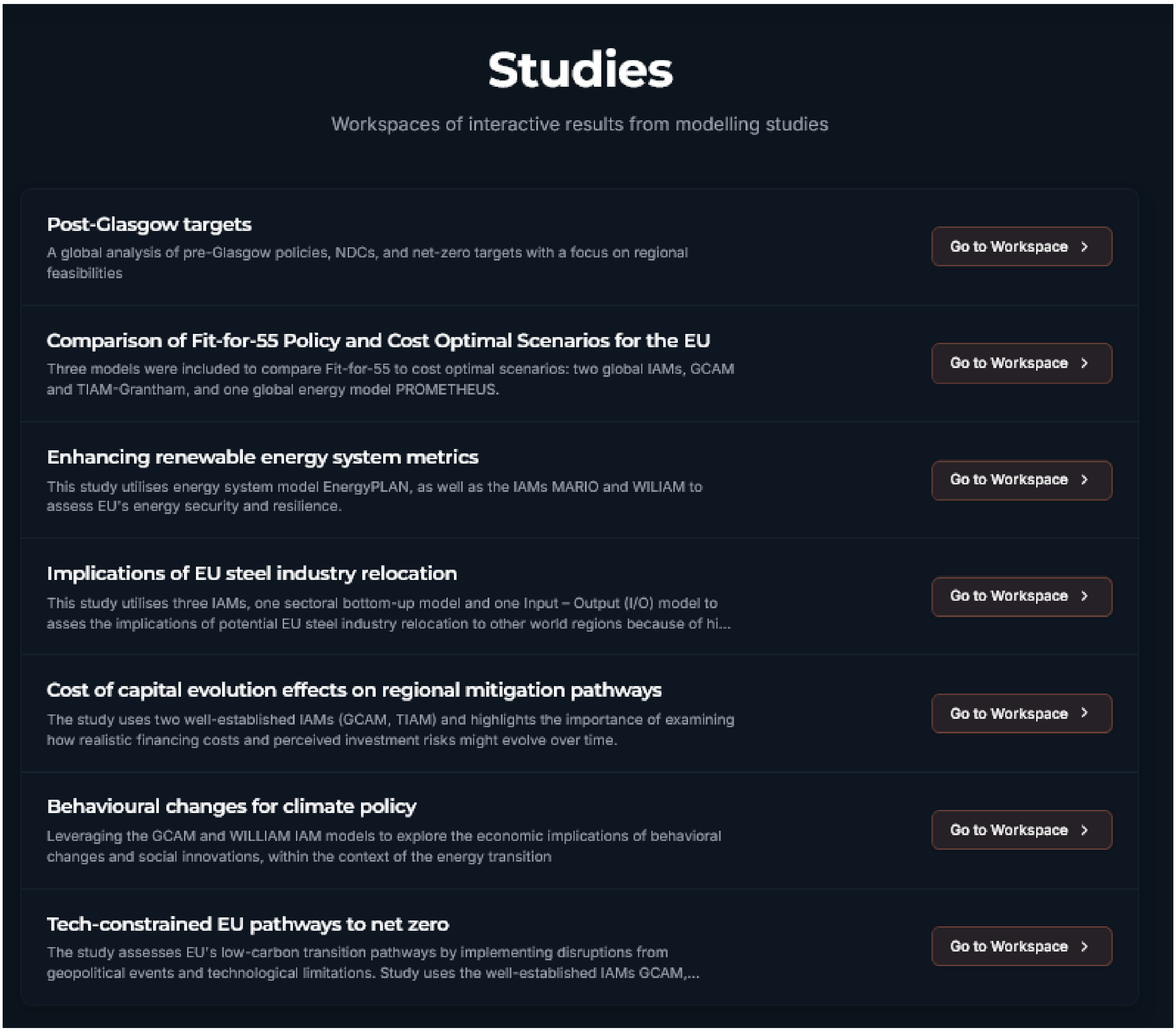

Figure 15: Available workspaces in the IAM COMPACT project

Each workspace is structured into four main sections: Graphs, Methods, Harmonisation, and Virtual Library, each serving a distinct purpose in presenting and contextualizing the modelling results. "Graphs" section provides a set of interactive visualisations, and users can explore variables like emissions, energy mix, technology deployment, and investment needs across time and scenarios (*Figure 12*). The graphs are dynamically generated from model data and support custom filtering by model, region, variable, and scenario, enabling a transparent and comparative view of key outputs. "Methods" section offers a detailed explanation of the modelling approach behind the results. It outlines how scenarios were designed, what assumptions were made, how policy targets were translated into model constraints, and what differences exist across modelling teams. This section provides transparency into the scenario logic, model calibration, and policy framing, helping users understand the

[23] DOI 10.5281/zenodo.10464760
[24] DOI 10.5281/zenodo.10722203

methodological backbone of the results. "Harmonisation" section shows whether the results from different models align well, since different IAMs often have different regional structures, or base years. In case a modelling study features only one model (e.g., Enhancing renewable energy system metrics), this section provides a scenario comparison. Finally, "Virtual Library" links to related resources, including academic publications, project deliverables, datasets, and supporting documentation relevant to the workspace.

The following sections 6.1 – 6.6 are used to describe new workspaces created explicitly in the context of IAM COMPACT. For the workspace "Post-Glasgow targets" see deliverable D3.8 – I2AM PARIS v2.0[25].

6.1 Comparison of Fit-for-55 Policy and Cost Optimal Scenarios for the EU

This modelling exercise was carried out to directly answer the stakeholder question "How does the implementation of the updated draft National Energy and Climate Plans compare to the cost optimal EU approach?", corresponding to Study 1 and reported in D4.5 National, regional, global mitigation pathways[26]. Due to delays in the release of the National Energy and Climate Plans by EU member states and model limitations in representing granular national policies, cost-optimal model scenarios to achieve the EU emissions mitigation targets are compared here to EU-wide modelling of the Fit-for-55 policy package. While this may not capture all national idiosyncrasies, it captures a number of key EU-level targets for mitigation pathways that differ from the cost optimal outcomes in IAMs. The Fit-for-55 package includes policies limiting energy sector and industrial emissions, promoting renewable deployment, and limiting energy demand in order to reach the EU goal of 55% emissions reduction in 2030, compared to 1990. The workspace elaborates on the models included in this analysis and the Fit-for-55 components included in the study.

[25] DOI 10.5281/zenodo.10722203

[26] https://doi.org/10.5281/zenodo.13767329

Funded by the European Union

Figure 16: Harmonisation section of the workspace

6.2 Enhancing renewable energy system metrics

This modelling exercise was carried out to directly answer the stakeholder question "What are the different cost, energy security and resilience metrics and how do they compare for different scenarios?", corresponding to Study 2 and reported in D4.9 European sub-national deep dives[27]. To address the research question, the European energy system is modelled with the EnergyPLAN tool, a deterministic hourly simulation model for modelling of complete energy systems i.e., heating and cooling (including district energy solutions), electricity and gas grids, transportation, and infrastructure. Three scenarios for the EU are analysed and compared; the European Commission's "Baseline 2050" and "1.5 Tech" scenarios based on PRIMES modelling, in addition to a 100% renewable "Smart Energy Europe" scenario (*Figure 13*).

[27] https://doi.org/10.5281/zenodo.13784964

Funded by
the European Union

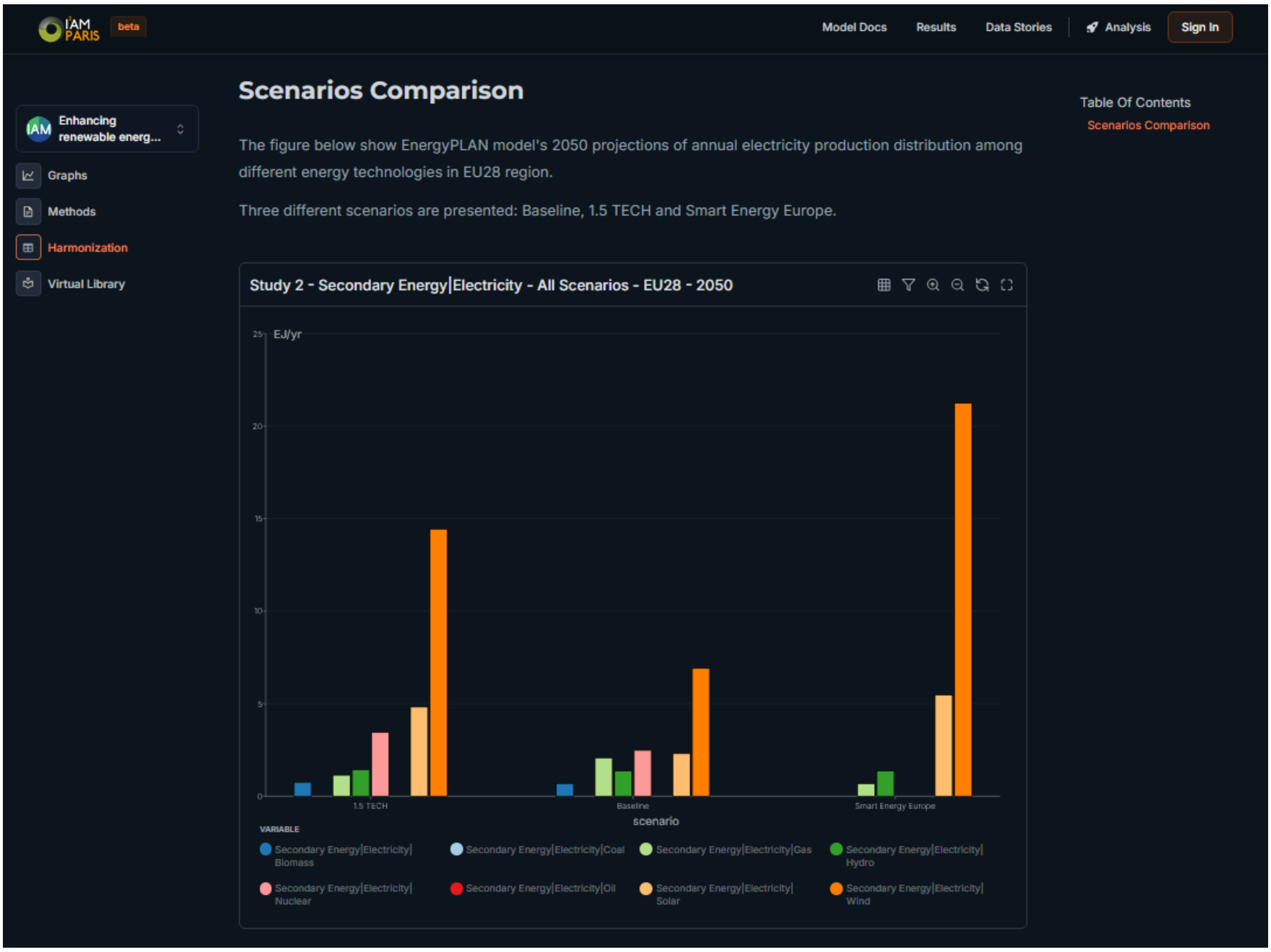

Figure 17: Harmonisation section of the workspace

6.3 Implications of EU steel industry relocation

This modelling exercise was carried out to directly answer stakeholder questions on the impacts of trade restrictions on steel, specifically regarding EU steel decarbonization, costs, CO2 emissions, energy demand, and labour within the transition to a carbon-neutral EU, corresponding to Study 4 and reported in D4.7 Sectoral and cross sectoral analysis.[28] To assess the questions, five models have been (soft-)linked: three Integrated Assessment Models (GCAM, TIAM, WILIAM), a sector-specific bottom-up model (WISEE EDM-I), and an Input-Output model (MARIO). The study investigates the impact of varying levels of trade restrictions on steel under three scenarios. In each scenario, all countries implement their current climate policies and meet the GHG reduction targets outlined in their respective NDCs and long-term commitments, while differing assumptions are made regarding steel trade constraints.

[28] https://doi.org/10.5281/zenodo.13839232

Funded by the European Union

Figure 18: Methods section of the workspace

6.4 Cost of capital evolution effects on regional mitigation pathways

This modelling exercise was carried out to directly answer the stakeholder question "How do interest rates affect decarbonisation pathways?", corresponding to Study 6 and reported in D5.6 – Behaviour social and disruptive

Funded by the European Union

innovation[29]. The study looked at how regionally and technologically differentiated cost of capital projections could affect decarbonisation pathways in Europe and around the world. It applied an empirical dataset of costs of capital, differentiated by technology and country, and explore the impacts of various plausible, expert-informed trends of (de-) risking investments in clean energy versus fossil-fuel technologies on decarbonisation pathways.

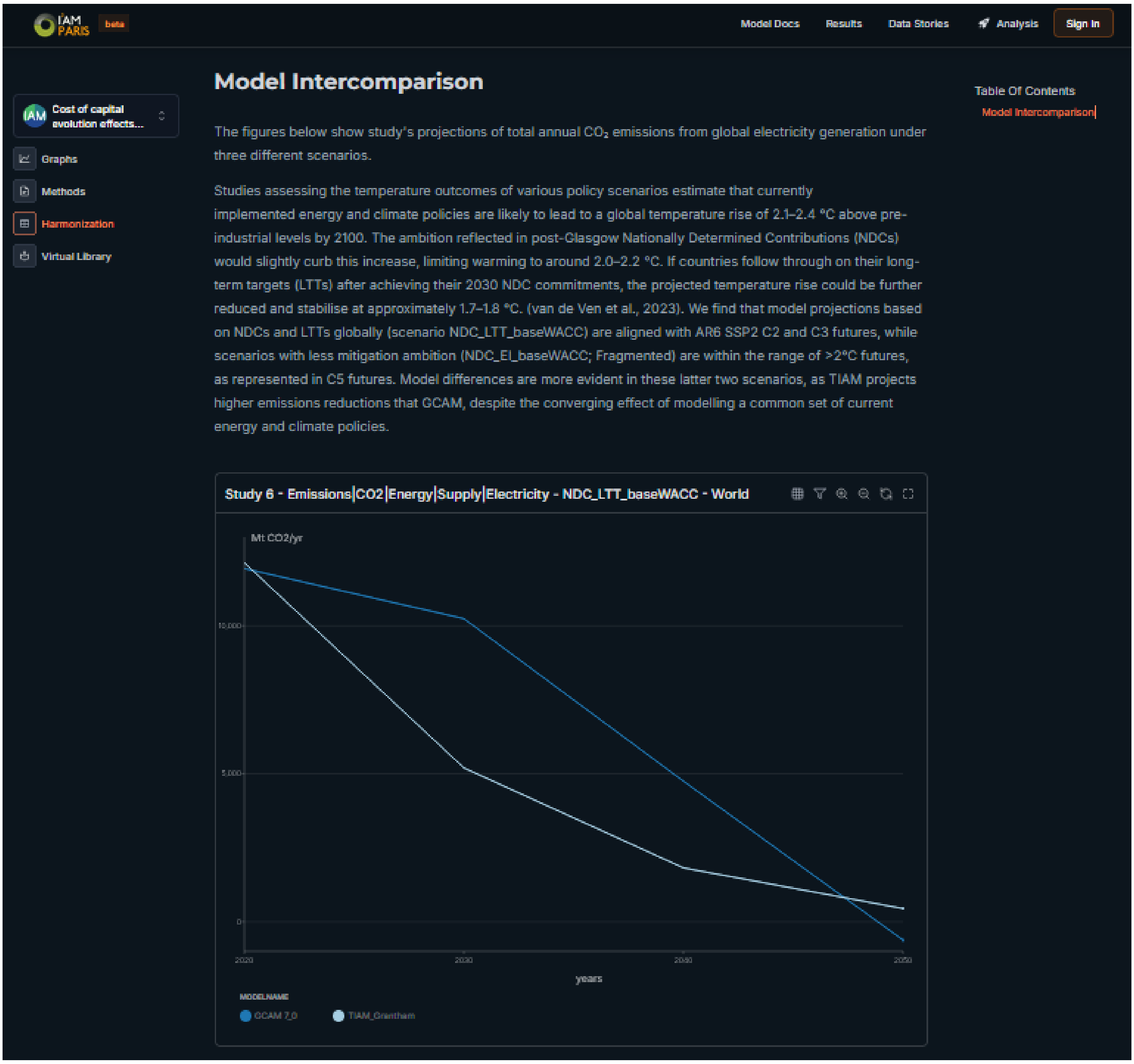

Figure 19: Harmonisation section of the workspace

6.5 Behavioural changes for climate policy

This modelling exercise was carried out to directly answer stakeholder questions on the economic effects of behavioural change and the role of varying discount rates across consumer categories in clean technology adoption, corresponding to Study 7 and reported in D5.6 – Behaviour social and disruptive innovation[30].

[29] https://doi.org/10.5281/zenodo.12751959
[30] https://doi.org/10.5281/zenodo.12751959

The goal of the study is to explore how behavioural change, and social innovation can drive climate action, with objectives like creating storylines, quantifying policies, and modelling multi-scenario impacts on climate efforts. Initially focused on transport at the EU level, the study assesses the effects on GDP, GHG emissions, investments, employment, and the potential for regional uniformity in the impacts of behavioural change.

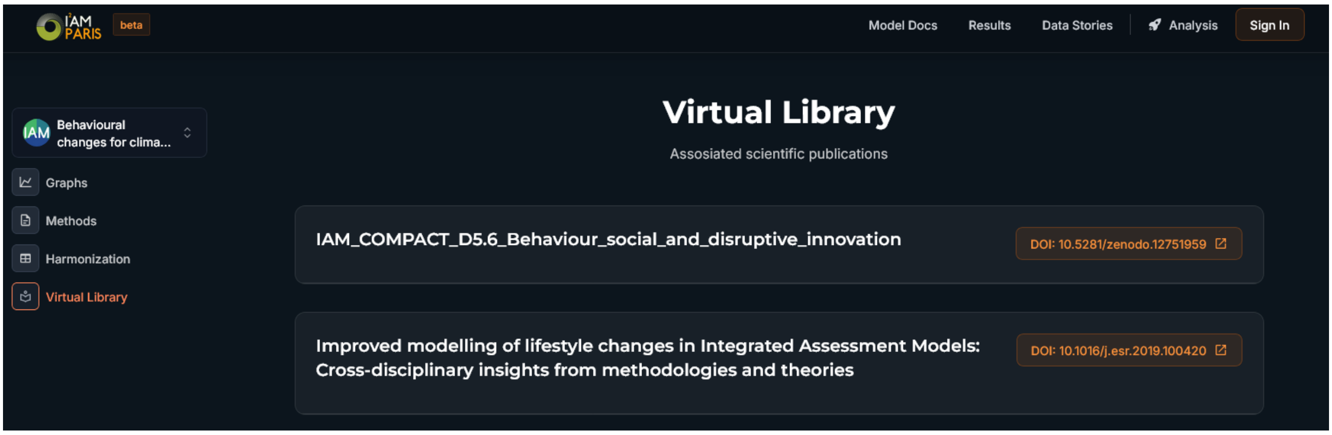

Figure 20: Virtual library section of the workspace

6.6 Tech-constrained EU pathways to net zero

This modelling exercise was carried out to directly answer the stakeholder question "How could geopolitics affect decarbonisation pathways?", corresponding to Study 3 and reported in D5.4 – Modelling out-of-ordinary extremes[31]. The study investigates how supply chain constraints and geopolitical uncertainties may hinder the EU's decarbonisation efforts. Using three leading Integrated Assessment Models (IAMs), the analysis evaluates the implications of limitations and constraints in the uptake of key low-carbon technologies by developing four scenarios.

[31] https://doi.org/10.5281/zenodo.13840865

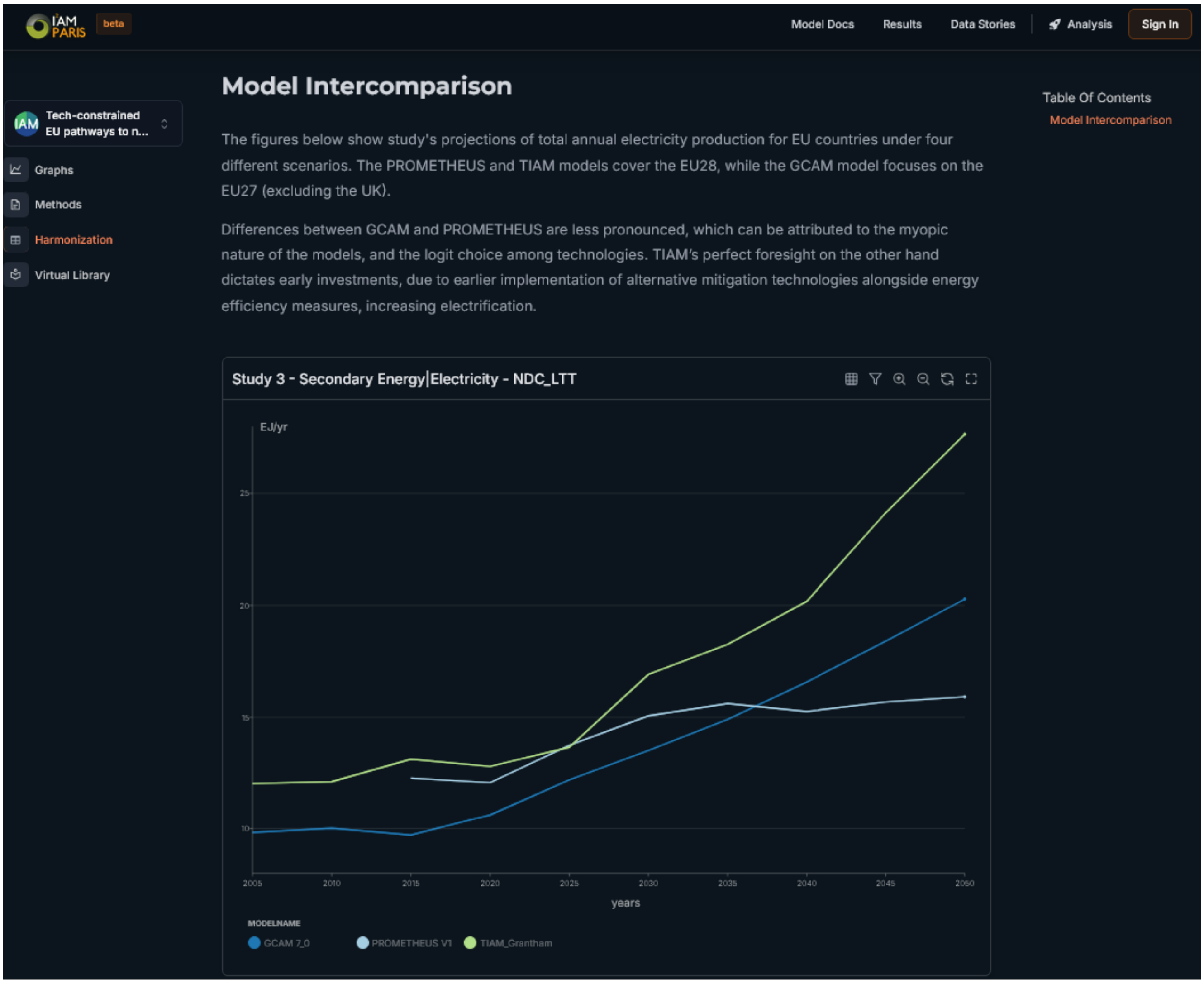

Figure 21: Harmonisation section of the workspace

7 Future use of the platform

The IAM PARIS platform aims to serve as an open, collaborative, and evolving digital infrastructure for modelling knowledge exchange in support of climate action. In the context of IAM COMPACT, the platform will integrate the results from the 2nd modelling cycle of the project as soon as they are available. It will also feature a new data story, "Pathways for analysis mapped to stakeholder groups", which will be documented in the deliverable *D3.3 – Open data management plan – Update.* The platform is now being sustained and expanded through the collective efforts of IAM COMPACT and four other EU-funded projects: DIAMOND, TRANSIENCE, EU-CHINA BRIDGE, and DECIPHER. Each of these projects brings a unique focus: from tailoring modelling outputs for diverse audiences (DIAMOND), to building stakeholder-facing tools for industry-related mitigation data (TRANSIENCE), hosting technology inventories and modelling results focusing on industrial decarbonisation within EU and China (EU-CHINA BRIDGE), and developing interfaces that would allow platform users to further tailor results to their own needs (DECIPHER).

Looking ahead, IAM PARIS is set to become not only a repository of modelling results, but a customisable workspace ecosystem, enabling external users, including researchers, institutions, and policymakers, to create their own model profiles, documentations, and intercomparison workspaces. Key priorities for future development include enhancing interoperability with other IAM tools, offering more intuitive interfaces for non-experts, and supporting interactive scenario design and validation. As an open-source platform[32], IAM PARIS invites continuous contributions and refinements from the wider community, ensuring long-term adaptability and technical sustainability. With its strong emphasis on transparency, reusability, and stakeholder relevance, the platform is poised to support a growing ecosystem of modelling efforts aligned with the global climate and sustainable development agenda.

[32] https://github.com/i2amparis/i2amparis_platform

Funded by the European Union