LOCOMOTION

Rewiring Climate Policy

How next-generation models can help create a more equal and inclusive net-zero future

2022

LOW-CARBON SOCIETY: AN ENHANCED MODELLING TOOL FOR THE TRANSITION TO SUSTAINABILITY (LOCOMOTION)

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EXECUTIVE SUMMARY

The report presents WILIAM, a next-generation integrated assessment model (IAM) developed by the HORIZON 2020 LOCOMOTION project consortium to help policy-makers explore sustainable pathways toward a net-zero future.

Combining heterodox economics, innovative features, and user-centered design, WILIAM allows policy-makers to make better decisions amid complexity and uncertainty. The model includes many innovative features, such as the modelling of material recycling and hydrogen energy, integration of planetary boundaries, and setting goals for sufficiency and equality.

Table 1. WILIAM model core parameters and modules

Model type	Temporal scope	Geographical Scope	
Complex simulation model	1995-2050	Global, regional, and national	
Modules			
Land and water	Climate	Energy	Materials
Demographics and Society	Economy and Finance		

WILIAM stands out from many other IAMs based on several factors.

Table 2. WILIAM design and functionality highlights

Interdisciplinary	Beyond growth	Multi-objective	User-centred
WILIAM has been designed by researchers across many disciplines and with diverse stakeholder inputs.	WILIAM shows the possible implications of post-growth and equality-focused policies.	WILIAM helps to design policies considering environmental, social and economic goals.	The interface allows users to adjust parameters, analyze changes, and extract results seamlessly.
Open source	**Innovative**	**Advanced features**	**Fit for purpose**
No hidden equations. Everyone has the right to know the code.	Systems dynamics allow for capturing complex connections that matter.	WILIAM has more features than many state-of-the-art models.	Tailored versions for policy-makers, civil society, and educators.

The report provides an overview of the WILIAM model and how policy-makers can use it to address real-world sustainability issues. Chapter 1 outlines how scientific models inform policy-making and the urgent need for rethinking current approaches. Chapter 2 reviews WILIAM's design, modules, components and limitations. Chapter 3 outlines applications of the new IAM in climate policy development. Chapter 4 presents model modifications tailored to different stakeholder groups. The conclusion summarizes the vision for rewiring the climate policy agenda.

1. RETHINKING CLIMATE ACTION

1.1. How IAMs inform sustainability policies

Global environmental change and social crises increasingly require us to act faster and more effectively. They also create the need to think in more complex ways than ever before. Researchers have created a wide range of tools to inform policy development, and modelling is among the most widely used. This report focuses on climate policy-making within the broader context of sustainability transitions.

Scientific models are increasingly used to explore the implications of different policies based on available knowledge and scenarios of possible futures. Every model has unique parameters that define how it can be used and what issues it can help us address. The outputs of modelling help to better understand how the world could look like in the years and decades ahead depending on the choices we make today.

Table 3. Three common types of models are used to support climate change policy-making[1,2].

Type	Description	Examples
Optimization	These models are run to minimize or maximize a certain objective function within given boundary conditions, such as the planetary thresholds or climate targets. An example is searching for the cost optimal way to net zero.	RICE, DICE, TIMES
Simulation	Such models simulate time series based on predefined patterns, considering complex system dynamics and how choices in one area affect the rest of the world. They are used to answer "what-if" questions, providing users with the flexibility to experiment with various policy options.	IFs, MEDEAS_W, POLES_JRC, C-ROADS, En-Roads
Hybrid	Hybrid models combine simulation of complex dynamics and optimization features.	GEM-E3, REMIND, FIDELIO, GAINS

Many IAMs have been used to inform policies that we rely on today. For example, GEM-E3, a model that allows comparing the economic effects of different instruments, such as taxes, pollution permits, and regulatory requirements, has informed the development of the EU's 2030 Climate and Energy Framework. The GAINS model has complimented it on supporting the European Green Deal and the EU Climate Target Plan.

1.1. Moving past outdated narratives

The past decade has witnessed unprecedented climate pledges and action. Yet, the pace and scope of changes remain behind what is needed to build a sustainable society below 1.5 °C warming. More inclusive and transparent processes of climate policy development, and accounting for a broader range of environmental and social goals beyond growth and net zero are needed.

In part, this can be made possible through developing more transparent and accessible models,[3] accounting a wide range of significant social and environmental goals. The LOCOMOTION consortium has embarked on a journey to address those issues.

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[1] García-García, P., Carpintero, Ó., & Buendía, L. (2020). Just energy transitions to low carbon economies: A review of the concept and its effects on labour and income. *Energy Research & Social Science*, *70*, 101664.

[2] Eggler, L., (2020). *Review of information on IAMs.* https://www.locomotion-h2020.eu/resources/main-project-reports/ Accessed on: 13.08.2022

[3] Peng, W., Iyer, G., Bosetti, V., Chaturvedi, V., Edmonds, J., Fawcett, A. A., ... & Weyant, J. (2021). Climate policy models need to get real about people—here's how. *Nature (comment), 594.*

2. CHANGE BY DESIGN

2.1. Interdisciplinary roots and complexity

The key outcome of the HORIZON2020 LOCOMOTION project, WILIAM, is created by an international team of experts with experience in developing and applying IAMs to real-world problems. It represents a synthesis of leading developments in interdisciplinary modelling, building upon the MEDEAS project and knowledge from other advanced models (World6, TIMES, LEAP, GCAM, C-Roads, and others).

WILIAM is a simulation model that applies a systems dynamics methodology and can be used to compare outcomes of different climate scenarios and policy options. Systems dynamics has been developed to grasp how diverse elements of a certain system (country, region) behave and interact with each other, for example, how energy prices can influence quality of life or how drought in one part of the world can undermine food availability elsewhere.

The model simulates how the system may evolve in time and space, allowing to track and compare the implications of different choices. Across its submodules, WILIAM applies diverse methods such as Input-Output Dynamics, Energy Return on Energy Investment (EROI), Life Cycle Analysis (LCA), land and carbon footprint estimates and microsimulation, allowing for in-depth policy insights.

2.2. Participatory and open-source approach

WILIAM has been designed on the presumption that science is a common good and climate policy is a shared journey. WILIAM has been co-created by its users. The *participatory design* makes WILIAM representative of what different people care about and *open-source design* ensures anyone can access the model and its results.

2.3. Thinking across scales

WILIAM is structured on three geographical levels: global, European, and national (for some of the 27 EU member states based on the availability of data and the United Kingdom). At the global level, the model divides the world into nine regions: EU-27, United Kingdom, China, EASOC (East-Asia & Oceania), India, LATAM (Latin America excluding Mexico), Russia, USMCA (US, Mexico & Canada) and LROW (Locomotion Rest of the World).

The model helps to analyse how global variables affect specific countries and how local changes manifest globally. The national scale and the possibility to examine discrete regions and countries, as well as their interactions and impacts on each other, differentiates WILIAM from many other models, which are often limited to analysis at global, regional or national scales. This facilitates detailed analysis and insights.

2.4. Unlocking stories of sufficiency and equality

Most IAMs, including those used by the IPCC (Intergovernmental Panel on Climate Change), share the same basic assumptions about how the world works, such as that more consumption or perpetual economic growth are always desirable. This impacts overall model design and which policy options are considered.

However, research suggests that perpetual growth may not be possible and feasible over the long term, while overconsumption has been linked to negative social and environmental impacts. The idea of a doughnut economy has emerged to align societal well-being with planetary boundaries. Recent studies have also highlighted the potential of sufficiency measures in reaching net zero targets while improving social equality[4]. And yet, the IPCC still vastly relies on scenarios that focus on ensuring climate action does not interfere with economic growth, with only two out of 230 scenarios reviewed by the panel considering sufficiency measures.

Chapter on scenarios and storylines

WILIAM storylines have been selected based on a mixed participatory approach, which included focus groups with senior experts and anticipated model users. The approach allowed to introduce options that have been considered significant by diverse stakeholders such as planetary boundaries, sufficiency policies and a wide range of social and environmental goals. WILIAM works under the logic of "adaptive scenarios'' where initial simulation features current trends and a range of policies that can be enacted. Over time, some policies and events take place while others do not, making the model closer to real life.

Table 4. Defining scenarios and storylines

Storyline	A general narrative about how the future might unfold, describing economic, social, technological, and environmental trajectories that the world may follow.
Scenario	The mathematical equivalent of the storyline is defined through inputs such as development trends and policy interventions that simulate a storyline with the model and get results.

The five shared socio-economic pathways (SSPs) are among the most widely used scenarios, including by the IPCC, while alternative scenarios are continuously developed. WILIAM uses two types of scenarios.

Table 5. Types of scenarios[5]

Baseline	Baseline scenarios represent an interpretation of the continuation of current trends. SSP2 and SSP3 are baseline scenarios for the WILIAM model, against which others are compared.
Policy-action	Policy-action scenarios include the additional or enhanced policy measures to attain the selected overall goals. WILIAM features three policy-action scenarios: Green Growth (GG), Green Deal (GD), and Post-growth (PG).

Table 6. WILIAM storylines/scenarios selected through consolidating research and stakeholder inputs

SSP2	SSP2 closely resembles current trends: minor achievements in sustainability, with failure to meet major social and environmental goals.
Green growth	The Green Growth scenario aims to address the climate crisis with market instruments, green technologies and greening consumption while keeping the use of materials at the same levels and sustaining GDP growth.
Green Deal	Based on the European Green Deal, this scenario combines green development with just transition policies aimed at reducing inequalities, heavily relying on innovation, regulation, and large public expenditures.
Post Growth	Maximization of GDP per capita and consumption is replaced by re-localization of economy, sufficiency and a greater focus on well-being and quality of life, paired with behavioural change and lower production.

The scenarios allow users to visualize and compare policy options to better understand their differences.

[4] D'Alessandro, S., Cieplinski, A., Distefano, T., & Dittmer, K. (2020). Feasible alternatives to green growth. *Nature Sustainability*, *3*(4), 329-335.
[5] Markovska, N., Capellán-Pérez, I., Gusheva, E., Duic, N., Wergles., N., Distefano, T. (2021). *Review of storylines applied in global environmental assessments.* https://www.locomotion-h2020.eu/resources/main-project-reports/ Accessed on: 13.08.2022

2.5. More objectives for greater inclusion

Each WILIAM scenario has economic, environmental, and socio-economic goals. The researchers initially selected goals from academic studies[6] and sustainability frameworks (Paris Agreement, UN Sustainable Development Goals). The goals were refined based on technical feasibility, data availability, their impact on GHG emissions and environmental degradation, and their contribution to social welfare and the precautionary principle[7].

SSP2 is not included in the table because it does not represent the model's overall goal. It is a scenario in which the world's social, economic, and technological trends do not deviate significantly from historical patterns. Development and income growth are unevenly progressing, with some countries making relatively good progress while others falling short of expectations.

Table 7. Scenario goals, simplified representation[8]

Overall Goal	GG	GD	PG	Overall Goal	GG	GD	PG
Do not reach climate tipping points	✓	✓	✓	Universal energy services access [G2]		✓	✓
Sustainably manage land	✓	✓	✓	Preserve or improve life expectancy		✓	✓
Limit biodiversity loss	✓	✓	✓	Universal well-being		✓	✓
Use fresh water sustainably	✓	✓	✓	Minim. climate-induced migration	*Expanded overall goals*		
Sustainably manage nutrient flows[G1]	✓	✓	✓	Gender equality			
Universal access to good food		✓	✓	Full employment		✓	✓
Sustainably manage mineral resources		✓	✓	Equality within countries		✓	✓
Universal access to health care		✓	✓	Equality between countries		✓	✓
Universal access to education		✓	✓	Achieve absolute decoupling [G3]	✓	✓	
Universal access to social security		✓	✓	Sustained economic growth	✓	✓	
GG – Green Growth, GD – Green Dead, PG – Post-growth, [G1] Nitrogen and phosphorous, [G2] modern, affordable, and reliable, [G3] environmental pressure from economic growth							

There are seven overall goal options in the GG scenario, eighteen goals in the GD scenario, fourteen goals in the PG scenario, and two expanded goals, which are auxiliary to meeting the main goals and are not linked to any specific scenario. Two alternative scenarios to GG consider a wider palette of options, including additional social and environmental goals. The PG scenario does not focus on decoupling and sustained economic growth, allowing greater flexibility for achieving other goals.

2.6. Modules and features

WILIAM applies multiple distinct feature categories. The model is based on interconnected modules and submodules that aim to closely reflect the real world. The features have been selected on ranking,

[6] For example: Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., ... & Sörlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. science, 347(6223), 1259855.
[7] Luzmozati T., Distefano, T, Böck E., Wergles, N. (2022). *Interim synthesis of the model, selected results and scenario analysis:* https://www.locomotion-h2020.eu/resources/main-project-reports/ Accessed: 29.08.2022
[8] Luzmozati T., Distefano, T, Böck E., Wergles, N. (2022). *Interim synthesis of the model, selected results and scenario analysis:* https://www.locomotion-h2020.eu/resources/main-project-reports/ Accessed: 29.08.2022

balance between complexity and accessibility, time constraints, researcher experience and stakeholder preferences.

Table 9. WILIAM Modules and their components, simplified and partial representation[9]

Module	Component highlights
Economy	● Diversified household demand, Labour supply and demand, price feedbacks ● Government interactions and progressive tax systems ● Production dynamics and international trade flows
Finance	● Households, non-financial companies, financial companies, government, rest of the world ● Monetary flows across sectors derived and not derived from financial instruments
Demography	● Population dynamics by age, sex and region ● Differentiation by the urban and rural populations and six household types
Society	● International migration, considering cultural and economic links between countries ● Health (nutrition, air pollution, life expectancy) ● Inequality and well-being (Gini Index, unemployment, labour participation, education)
Land and water	● Land and water availability and demand locally and globally ● Land submodules: Forests, Wood Production, Croplands, Yields, Grasslands and Land Uses ● Implications for diets, land-use and land-use change-related emissions
Climate	● Temperature rise, precipitation, sea level rise, ocean acidification ● GHG cycles and interactions between them ● Climate impacts on land, water and crops
Materials	● Material flows: hydrocarbons, copper, aluminium, iron, nickel, and lithium ● Extraction and market dynamics, recycling rates
Energy	● Biophysical and temporal constraints, supply and demand dynamics ● New technologies (electric vehicles, energy storage, hydrogen) ● Energy return on energy invested (EROI) ● Energy capacity, energy transformation, intermittency

The modules are related to each other in complex ways. For example, rising energy demand in the economy module might cause fuel prices to rise in the energy module. This might feed back into the economy and, in turn, depress demand. Similarly, a rise in food demand might increase the need for land in the agriculture module, leading to deforestation, rising prices and increased greenhouse gas emissions.

Among other innovative features implemented within WILIAM are changes in household and government consumption[10], working time reduction, water-food-energy nexus, and improved representation of relationships between variables.

[9] Luzzati T., Distefano, T, Böck E., Wergles, N. (2022). Interim synthesis of the model, selected results and scenario analysis: https://www.locomotion-h2020.eu/resources/main-project-reports/ Accessed: 29.08.2022

[10] Cazcarro, I., Amores, A. F., Arto, I., & Kratena, K. (2022). Linking multisectoral economic models and consumption surveys for the European Union. *Economic Systems Research*, *34*(1), 22-40.

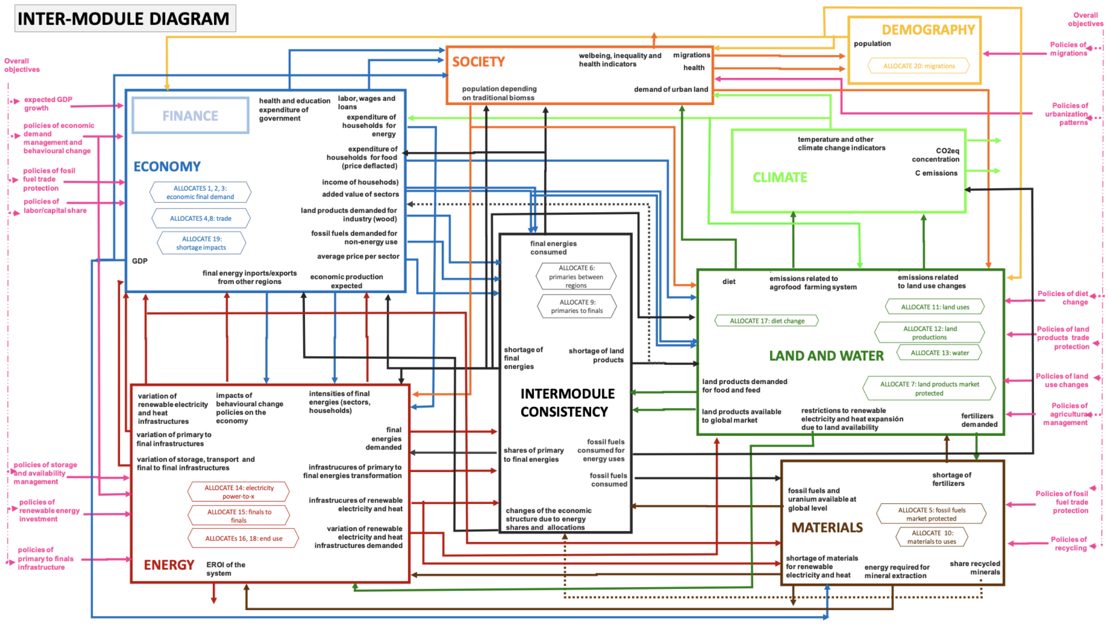

Figure 1. Visualization interconnections between WILIAM modules [11]

2.7. The limits of modelling

2.7.1. Common limitations of IAMs

Every model is a simplified view of the world that is only as good as the assumptions behind it. Some factors are particularly hard to grasp, such as non-economic losses from the climate crisis, the interplay of different goals, and how various actors might change their behaviours in response to new policies. Many other complex impacts (disrupted supply chains, COVID-19) are still making their way into the models.

Another important limitation of models is the inherent uncertainty of the future. Wildfires can accelerate the carbon cycle, glaciers can melt faster than expected, and people may not adjust their habits based on policy interventions. Even if governments adopt a fuel tax, street protests and geopolitical forces can soon push a reverse, as we have seen in France.

Things may also turn out better than expected: the global renewables capacity as of 2019 exceeded IEA 2002 forecast by 50 times. This means that only part of our assumptions will remain relevant over time, and we have to continuously reflect on whether the model captures what matters in the real world.

2.7.2. Specific limitations of WILIAM

WILIAM is a next-generation IAM, and it is expected to continue evolving. Data availability and other constraints meant that some initially planned features could not be fully implemented within the project cycle. Key limitations identified during the recent review[12] include:

- Absence of disaggregated data for some EU countries and limited data for some other regions.
- Differences in the rigour of climate impacts and adaptation measures modelling across sectors.

[11] Luzzati T., Distefano, T, Böck E., Wergles, N. (2022). *Interim synthesis of the model, selected results and scenario analysis*: https://www.locomotion-h2020.eu/resources/main-project-reports/ Accessed: 29.08.2022

[12] Luzzati T., Distefano, T, Böck E., Wergles, N. (2022). *Interim synthesis of the model, selected results and scenario analysis: https://www.locomotion-h2020.eu/resources/main-project-reports/* Accessed: 29.08.2022

- Different levels of complexity across models, such as simplified modelling of some land uses.
- Absence of some features, such as technological learning curves or their limited application, such as modelling energy intermittency based only on European data.

Those limitations do not undermine WILIAM's highly innovative and versatile nature and can be addressed over time. The LOCOMOTION consortium has mapped significant prospective features to be considered in further development in WILIAM and identified models (IFs, FeliX, EUROGREEN, and En-ROADS) which could be integrated within the model in the future[13]. Some prospective features include eco-infrastructure, democracy, the likelihood of conflict, pollution levels and biodiversity.

3. HOW TO INTERPRET WILIAM RESULTS

WILIAM allows users to run diverse scenarios and compare their results across geographical scales, sectors or other contexts, improving understanding of how different aspects of the world are related and dependent on each other. The model makes complex sustainability challenges and possible solutions accessible to many different users.

Even the most elaborate IAM is still an approximation of reality, and this also applies to WILIAM. It has not been created to predict the future but it can discover and compare various policy options and the implications of different choices. IAM results should not be used as a direct guide to action but as a basis for better-informed decisions.

3.1. Build awareness

WILIAM allows to structure and analyse current knowledge, revealing areas where the policies are lagging. Gained insights can help build capacities for enhanced data collection, resource allocation and mitigation of risks. The model can be used to build individual and shared awareness about human interactions with the natural world and how different aspects of society are related. WILIAM can be particularly useful for learning to identify gaps in knowledge and act on them at different levels and stages of policy making.

3.2. Develop better policies

WILIAM highlights that there is no single path toward implementing a European New Deal and other EU sustainability priorities and that policies come with a complex mix of possible trade-offs and synergies. This allows designing new legislation on reducing EU GHG emissions while supporting a more fair, just, and inclusive transition aligned with multiple social and environmental goals.

Policy-makers can benefit from WILIAM in formulating National Energy and Climate Plans using the national-level WILIAM model. They can identify the implications of specific policies and decisions on a wide range of parameters, for example, considering how a higher carbon tax would impact water scarcity and land use and how different land uses may be linked to diets, quality of life and human well-being. By consulting model results, policy-makers can opt out of policies with potentially undesirable consequences while prioritising those that deliver favourable results across a wide range of variables.

3.3. Zoom in and out

[13] Luzzati, T., Distefano, T., Eggler, L., Arto, I., Olafsdottir, A. H., Ferreras, N., Ramos, I., Mediavilla, M., Parrado, G., Sverdrup, H.U., Cieplinski, A. (2020). *Prioritising features and functionalities to be implemented in the LOCOMOTION's models.* https://www.locomotion-h2020.eu/resources/main-project-reports/ Accessed on: 13.08.2022

WILIAM modules and features have been designed with a high degree of precision, allowing users to zoom in and out on specific issues and processes. For example, it is possible to model material requirements for different EV battery technologies and the prospects of their application, as well as to analyse what this means in the broader contexts of the energy transition, circular economy and future mobility.

The model results show how any ambition is subject to specific constraints, such as technological and biophysical boundaries[14]. Based on simulations[15], researchers identified significant gaps between demand and available reserves for materials such as aluminium, copper, cobalt, lithium, manganese, and nickel. The dilemmas captured through simulations provide a ground for further research on feasible alternatives and more productive discussions.

3.4. Connect the dots

The model features and interdependencies can help enhance coordination across departments within authorities and improve collaborations across sectors. This is made possible through each model module being connected to other modules in ways that are clear and easy to trace. One example is the society module, which is related to other modules in various ways. Demographic indicators (well-being, education, health) depend on and sometimes also influence other variables across modules, including land and water (food availability, diet change), demography (population, migration, consumption), energy (demand, emissions) and economy (labour force, income, consumption). Greater alignment and integration of policies can be made possible by considering complex dependencies between and within modules, contributing to enhanced synergy and greater generation of co-benefits across sectors.

3.5. Think beyond direct impacts

As the EU aims to lead on the export of green energy solutions, we need to better understand what might be happening in other regions based on our choices. This is also linked to the EU's historical responsibility for GHG emissions and indirect ecological and social impacts on other parts of the world. WILIAM can help us understand how EU policies impact other regions, make cross-regional comparisons and analyse interactions among regions.

In practice, such capabilities allow paying greater attention to impacts that have often been overseen in the past, for example, understanding the degree to which material demand in EU countries may be linked to growth in GHG emissions or resource depletion in other regions. Understanding whether policies that lead to favourable outcomes in the EU might have negative implications in other parts of the world would be particularly significant over the long-term, considering issues such as climate-induced migration, resource-driven conflicts, and growing inequality.

3.6. Manage uncertainty

WILIAM is developed with consideration of various uncertainties by describing their range and probabilities and allowing to test modelling results using uncertainty analysis and sensitivity analysis. Such capabilities make the results more useful and relevant across many alternative futures. Uncertainty can be framed in many ways, including ranges of possible values for certain variables (such as those that

[14] Adam, A., Papagianni, S., Rigopolous, A., Capellan-Perez, I., de Castro, C. (2021). Assessment of the global wind energy potential considering technical and sustainability boundaries. *EPM-E 2021: https://www.locomotion-h2020.eu/wp-content/uploads/2022/05/ALEXAN1.pdf* Accessed: 29.08.2022

[15] Pulido-Sanchez, D., Capellan-Perez, I., Mediavilla-Pascual, M., de-Castro-Carranza, C., & Frechoso-Escudero, F. (2021). Analysis of the material requirements of global electrical mobility. *Dyna, 96*(2), 10-6036.

are not possible to control), most likely values, best available estimates, standard deviation and probability distribution, among other approaches.

It is important to avoid the “false security” that may arise due to highly detailed uncertainty analysis. Carefully accounting for uncertainties does not mean that we eliminate them. It provides greater capacity to manage their implications and can help to develop solutions that would perform well under various futures.

4. CLIMATE POLICY IS A SHARED JOURNEY

Everyone can use WILIAM based on their needs without years of modelling training. With civil society, cities and companies taking the lead on climate action, the uses of WILIAM can expand to inform national, regional, and global policies, as well as action by diverse actors, supporting broader systems change. Different versions of the WILIAM model are being developed with varying levels of sophistication based on the needs and capacities of their intended users.

4.1. Model Analyzer: a powerhouse for policy-makers

The Model Analyzer is user-centred software with an intuitive visual interface and powerful features. It allows policy-makers to design better informed alternative decarbonization policies. Users can assess different scenarios’ environmental, social, and economic costs and benefits, adjust model parameters, and obtain customised results. The Model Analyzer can also be used to explore WILIAM functionality and get an accessible, hands-on experience in climate change modelling. Inherent complexity taken to the background, prioritising user experience and practical utility.

4.2. Model Explorer: empowering civil society

The Model Explorer is a simple and user-friendly web-based application that can explore the model, learn about climate change impacts, and motivate citizen engagement with climate policy. The tool design allows users to easily navigate complex links between energy production and consumption, climate change, land use, economy, and other variables, including unique scenarios and features of WILIAM. The application can be particularly effective among civil societies and communities.

4.3. Sustainability Crossroads II: an educational role-playing game

Global Sustainability Crossroads II is a participatory simulation game based on WILIAM. Its simple interactive interface allows players to intuitively experiment with environmental, social and economic futures and grasp the complexity of human-environment interactions. The game can stimulate discussions on topics such as the relationship between economic growth and sustainability, how the biophysical constraints limit human desires, and how human actions influence the planet.

5. CONCLUSION

Over the past years, our understanding of environmental and social challenges has evolved drastically. It is increasingly clear that effective climate policies require new narratives and thinking patterns that span beyond net zero targets and economic growth. WILIAM presents such an opportunity by putting state-of-the-art interdisciplinary science into use. The IAM outlines the path for rewiring climate policy and making social equality, sufficiency, and well-being indispensable to sustainability transitions.

Complex features accessible through an engaging interface allow users to explore, experiment and compare policies while encouraging participation of various stakeholders in shaping our shared future.

More robust and reliable tools will be a cornerstone of effective sustainability policies and action. WILIAM can enable a transparent, inclusive and insightful foundation for those efforts.