Data-to-Deal: A Framework of Activities and Analytical Workflow to Mobilise Finance

Mark Howells,
Loughborough University and Imperial College London

June 2025

Climate Compatible Growth

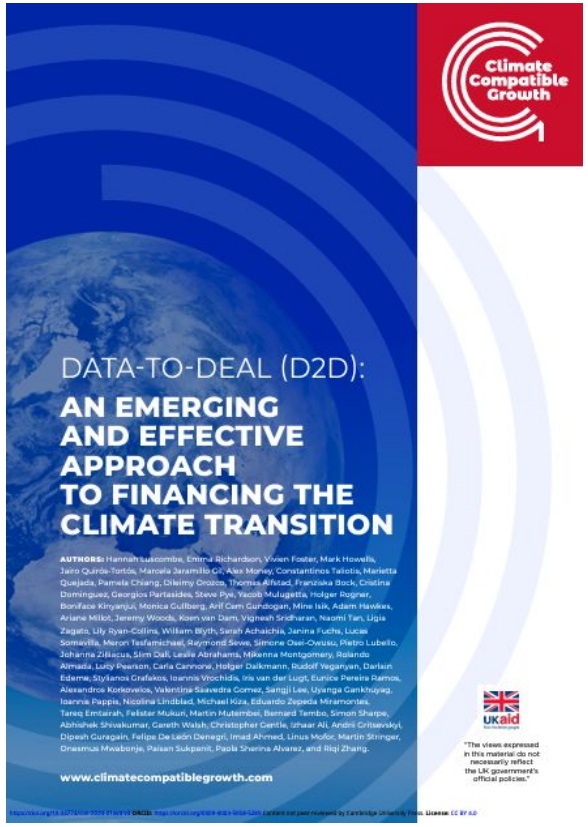
UKaid from the British people

"The views expressed in this material do not necessarily reflect the UK government's official policies."

University Partnership:

Data-to-Deal (D2D)

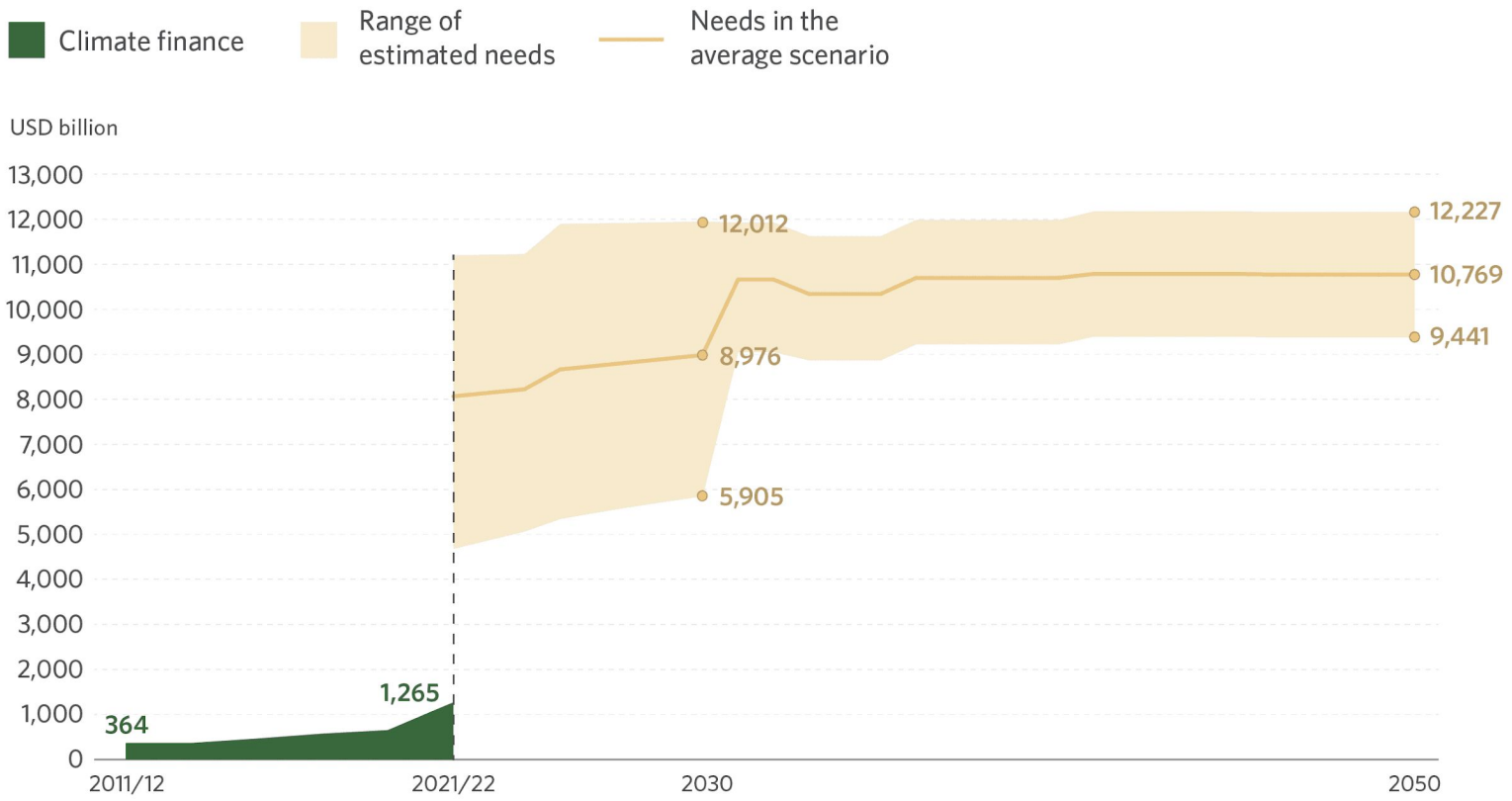
Introduction



"The term Data-to-Deal refers to actions taken throughout an entire process that runs from data collection, system modelling, and development planning, all the way through to national financing strategies and project finance arrangements to the agreement of a deal (investment), all driven by a strong stakeholder engagement process"

Closing the Climate Finance Gap: A Crucial Step towards Achieving the 2015 Paris Agreement Mid-Century Goals

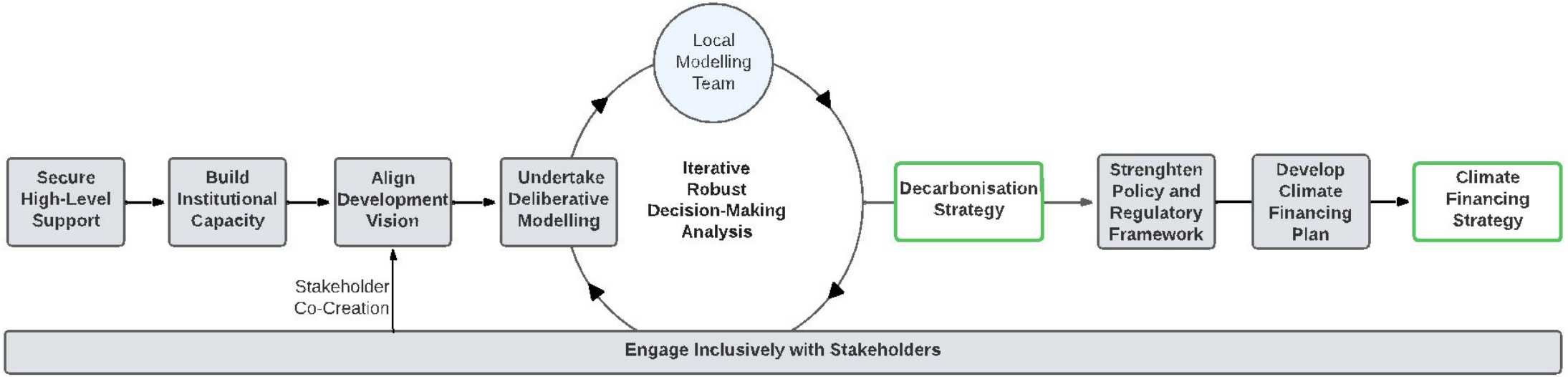
Figure ES3: Global tracked climate finance and average estimated annual needs through 2050



Source: Climate Policy Initiative

Data-to-Deal: A holistic approach aimed at mobilising finance

The term **Data-to-Deal** *refers to actions taken throughout an entire process that runs from* **data** *collection, system modelling, and development planning, all the way through to national financing strategies and project finance arrangements to the agreement of a* **deal** *(investment), all driven by a strong stakeholder engagement process.*

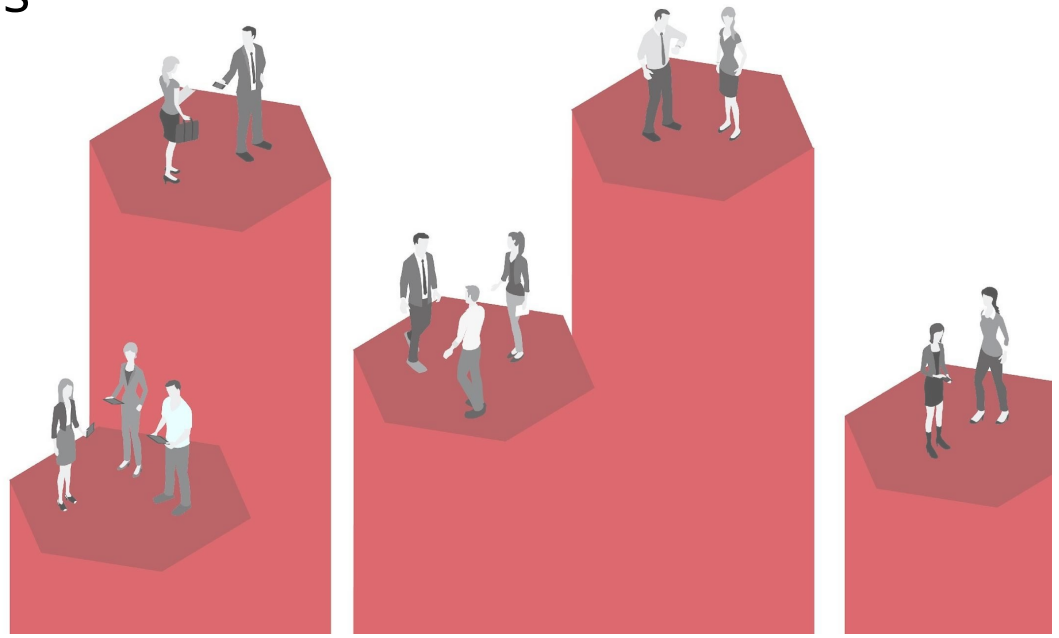


1. Politics: Securing high-level support for decarbonisation

High-level political mandates break down working siloes within governments and help to:

- Align policy priorities across ministries
- Ensure consistency across different areas of planning
- Enable collaborative cross-sectoral workflows

This can be supported by the formation of a central coordination team



2. Preparation: Laying the foundations of institutional capacity

Sustainable:
Ensure sustainable capacity development through long-term engagement and peer learning

In-Country:
Establish the necessary human and institutional capacity within national and local governments

Capacity Building

Technical Proficiency:
Cultivate collaborative understanding among specialists: policymakers benefit from basic technical understanding.

3. Vision: Aligning climate objectives with broader development goals

- Countries need to begin by identifying their broad development aspirations beyond climate issues
- Open discussion with a wide range of stakeholders fosters consensus-building and identifies the most critical policy questions
- Country ownership ensures that the country's context is adequately reflected: including political, economic, and social factors
- Once a long-term vision is drafted and validated, a work plan must be decided allowing the country to move into a deeper phase

The existence of a widely **shared vision** and associated **political commitment** will increase the chances of more **funding** being made **available** at this point to support the subsequent work plan.

4. Consultation: Engaging inclusively across stakeholder groups

Engage early: Engagement should begin early and be deep, iterative, and transparent. Emphasising the ongoing and unfinished nature of the consultation builds transparency and trust, which are pivotal factors in successfully mobilising funds

Communicate effectively: Stakeholder engagement is greatly enhanced when communication is tailored to stakeholders' specific language and interests

Involve the MoF: The Ministry of Finance has the power to shape economic norms and policies and brings a comprehensive understanding of the overall national landscape, including the economic and distributional impacts of different policies

5. Modelling: Undertaking the data-driven quantification of scenarios

Calibration:

- Establishing a strong partnership enables access to accurate and reliable data sources
- Calibrating the model using data provided by stakeholders instils confidence in a model, ensuring it reflects reality accurately

Scenario Development:

- Clear mechanisms should be established to effectively integrate stakeholder feedback into the modelling process: to facilitate this models should be understandable, subject to scrutiny, and capable of garnering support from stakeholders
- Scenarios must align with political objectives to foster trust
- Analyse sectoral interlinkages and incorporate social aspects for buy-in and finance

Co-creating scenarios with stakeholders is crucial as it fosters a sense of involvement in the assessment, enhances **transparency**, and **empowers** stakeholders to embrace and **trust** the analysis.

6. Operationalisation: Strengthening the policy and regulatory framework

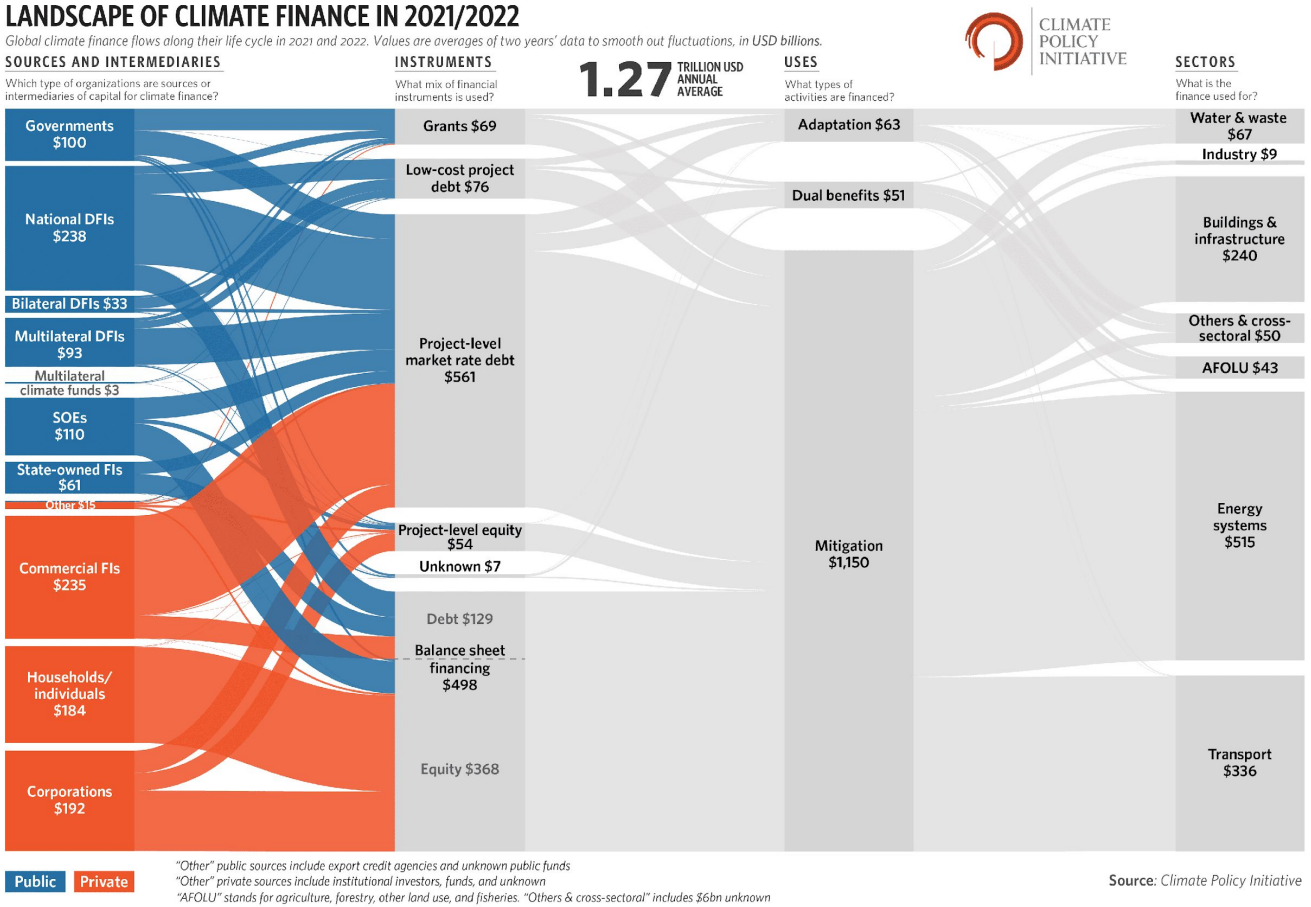
- Shifting away from standalone projects towards providing strategies that incorporate integrated, multisectoral, and cross-cutting policies offers certainty to investors

- These strategies must articulate a clear strategic vision, supported by tangible short-, medium- and long-term milestones and strong accountability frameworks

7. Finance: Developing investment plans and financing strategies

- Ministries of Finance should be engaged to convert decarbonisation plans into specific financing requirements
- MoF's should tap into a diverse range of financial sources, and realign existing streams of finance towards decarbonisation objectives
- It is important to quantify associated long-term benefits and related fiscal and macroeconomic impacts as this will impact the viability of projects

Figure ES1: Global climate finance flows in 2021/2022

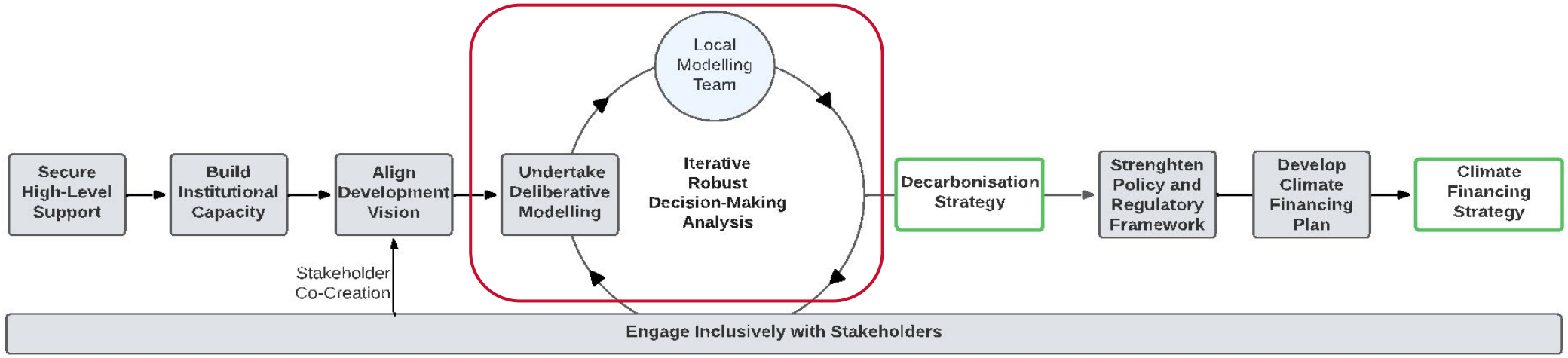


Data-to-Deal (D2D)

Introduction

Data-to-Deal involves two key frameworks:

1. **Qualitative** framework known as **D2D Investment Pipeline**

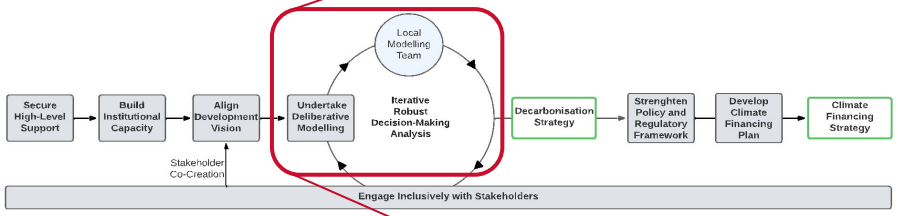


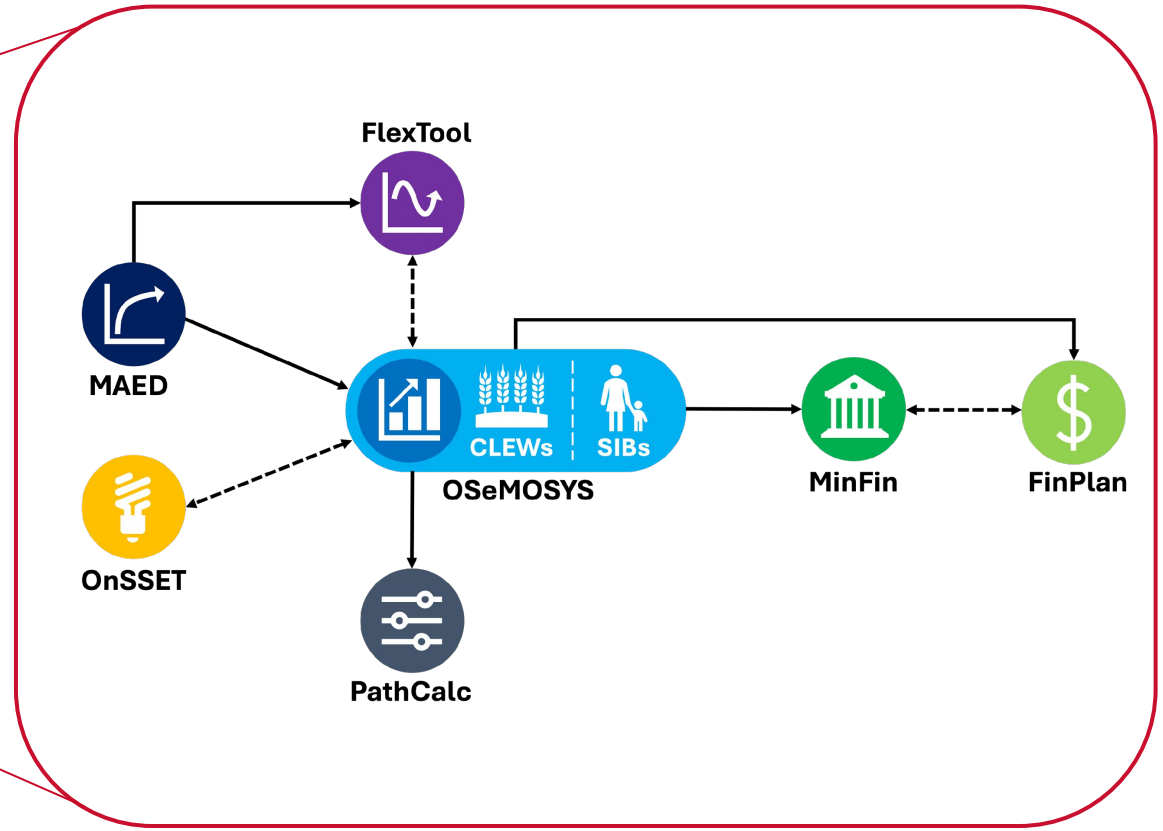
Data-to-Deal (D2D)

Introduction

Data-to-Deal involves two key frameworks:

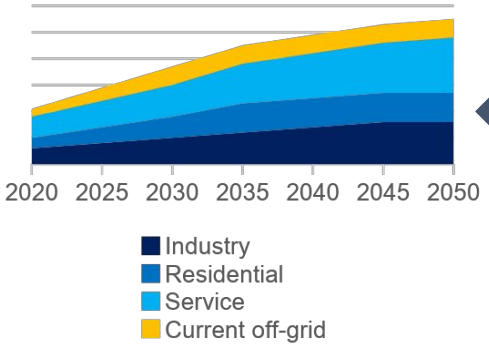
2. **Quantitative** framework known as **D2D Analytical Workflow**



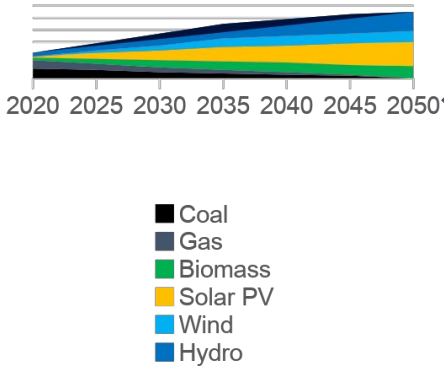


D2D Analytical Workflow

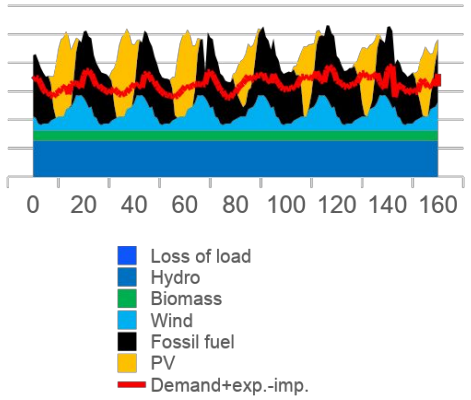
OnSSET & MAED:
Energy demand projections



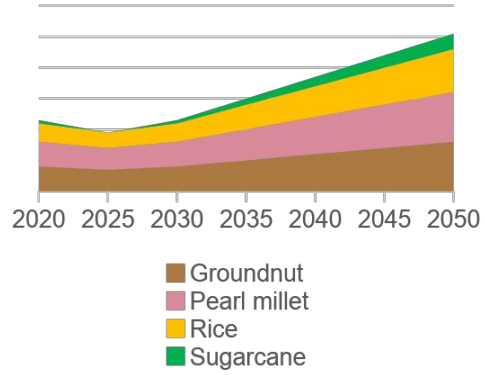
OSeMOSYS:
Optimized capacity mix



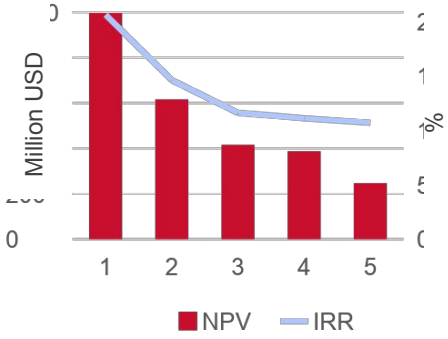
FlexTool:
Power system flexibility



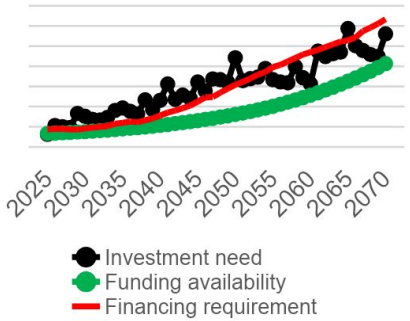
CLEWs:
Energy-land-water nexus



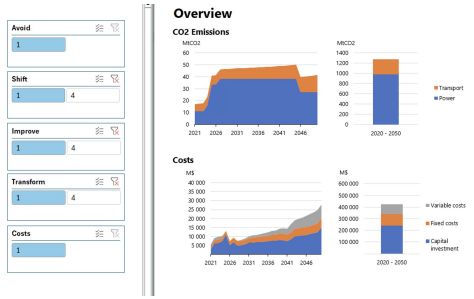
FinPlan:
Financing strategy



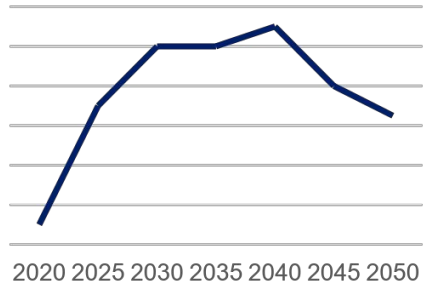
MinFin:
Financing strategy



PathCalc:
Visualization dashboard

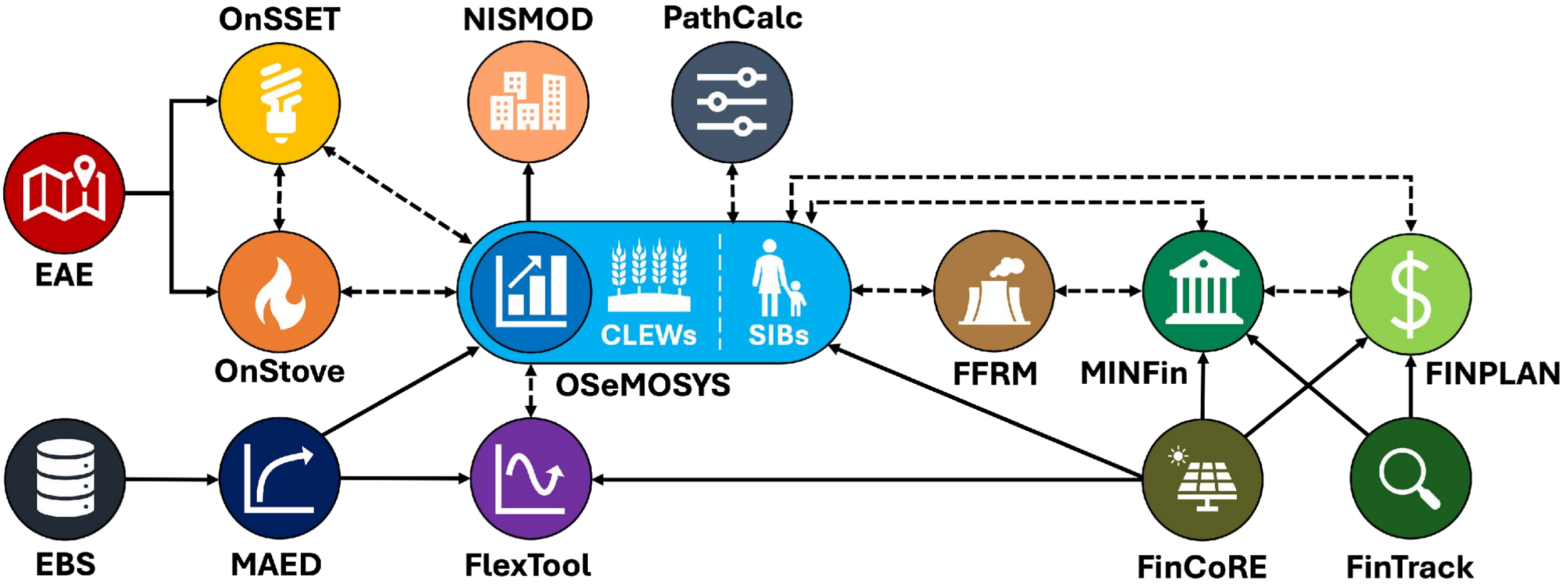


SIBs:
Social and environmental impacts



D2D Analytical Workflow

Future Development



D2D Analytical Workflow

Online Report

Data-to-Deal: Developing an Energy Modelling Analytical Workflow to Enhance Political and Financial Decisions

Naomi Tan[a,b,*], Ioannis Vrochidis[c], Hannah Luscombe[d], Emma Richardson[a,b], Fernando Plazas-Niño[a], Kane Alexander[a,b], Leigh Martindale[a,b], Neve Fields[a], Mark Howells[a,b], John Harrison[b] and Vivien Foster[b]

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ARTICLE INFO

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Energy Systems
Energy Planning
Energy Policy
Energy Economics
Energy Transition
Soft-linking
Sustainable Finance

ABSTRACT

As global environmental challenges increase, the need for energy modelling to facilitate data-driven decision-making in energy policy and finance is critical. However, modelling tools are often used in silos, resulting in gaps in the energy transition landscape and duplicated efforts, which can lead to fragmented information flows between stakeholders. To address this, the article presents a comprehensive 'Data-to-Deal' Analytical Workflow that integrates seven significant open-source tools – *Model for Analysis of Energy Demand (MAED); Open Source Spatial Electrification Tool (OnSSET); Open Source Energy Modelling System (OSeMOSYS), which includes the Climate, Land (Food), Energy and Water systems (CLEWs) approach and the Social Impacts and Benefits (SIBs) approach; FlexTool; Pathways Calculator (PathCalc); Ministry of Finance (MinFin); and Model for Financial Analysis of Power Sector Projects (FinPlan)* – to form a new modelling framework. The Data-to-Deal Analytical Workflow projects energy demands from the electrified and unelectrified populations and calibrates the least-cost capacity mix option to meet the demands while taking into account carbon emissions, power flexibility, land availability, water use, social factors, and the financial strategies to achieve the least-cost capacity mix and expected financial returns. By outlining a new, streamlined technical process with open-source, user-friendly interfaces that require no coding expertise, this paper increases accessibility and ease of use, allowing a broader range of users to develop integrated energy models. Overall, this article presents the Analytical Workflow and practical guidance to support the implementation of Data-to-Deal. By soft-linking seven widely-used open-source modelling tools into a cohesive framework, a significant leap in energy modelling, policy development, and sustainable finance is delivered. The study advances our understanding of the technical planning phase while unlocking new opportunities for informed decision-making and strategic investment, specifically allowing for efficient and consistent information flows between stakeholders. This enhances the ability to mobilize finance more effectively, paving the way for an impactful energy transition for sustainable development.

CCG & Partners (IAEA, IRENA, WRI) Ecosystem of Tools

OnSSET

Optimizes the expansion of electricity access whilst considering locations and infrastructure constraints

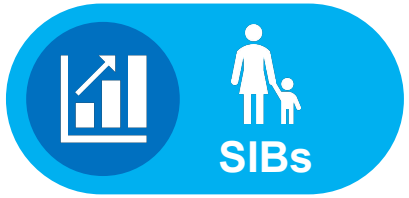
MAED

Evaluates future energy demand based on socioeconomic, and technological assumptions

OSeMOSYS

Optimizes the least-cost capacity expansion plan based on a pre-defined demand and its associated emissions, land, and water use (CLEWs)

OSeMOSYS



Optimizes the least-cost capacity expansion plan based on a pre-defined demand and investigates the associated social implications and benefits (SIBs)

FlexTool

Performs least-cost power system flexibility assessments based on national capacity investment plans and forecasts

PathCalc

Visualizes the pathways and carbon emissions based on ‘levels of ambitions’

FinPlan

Analyzes the financial performance of power plant projects over their lifetime by comparing cost components and available financing sources

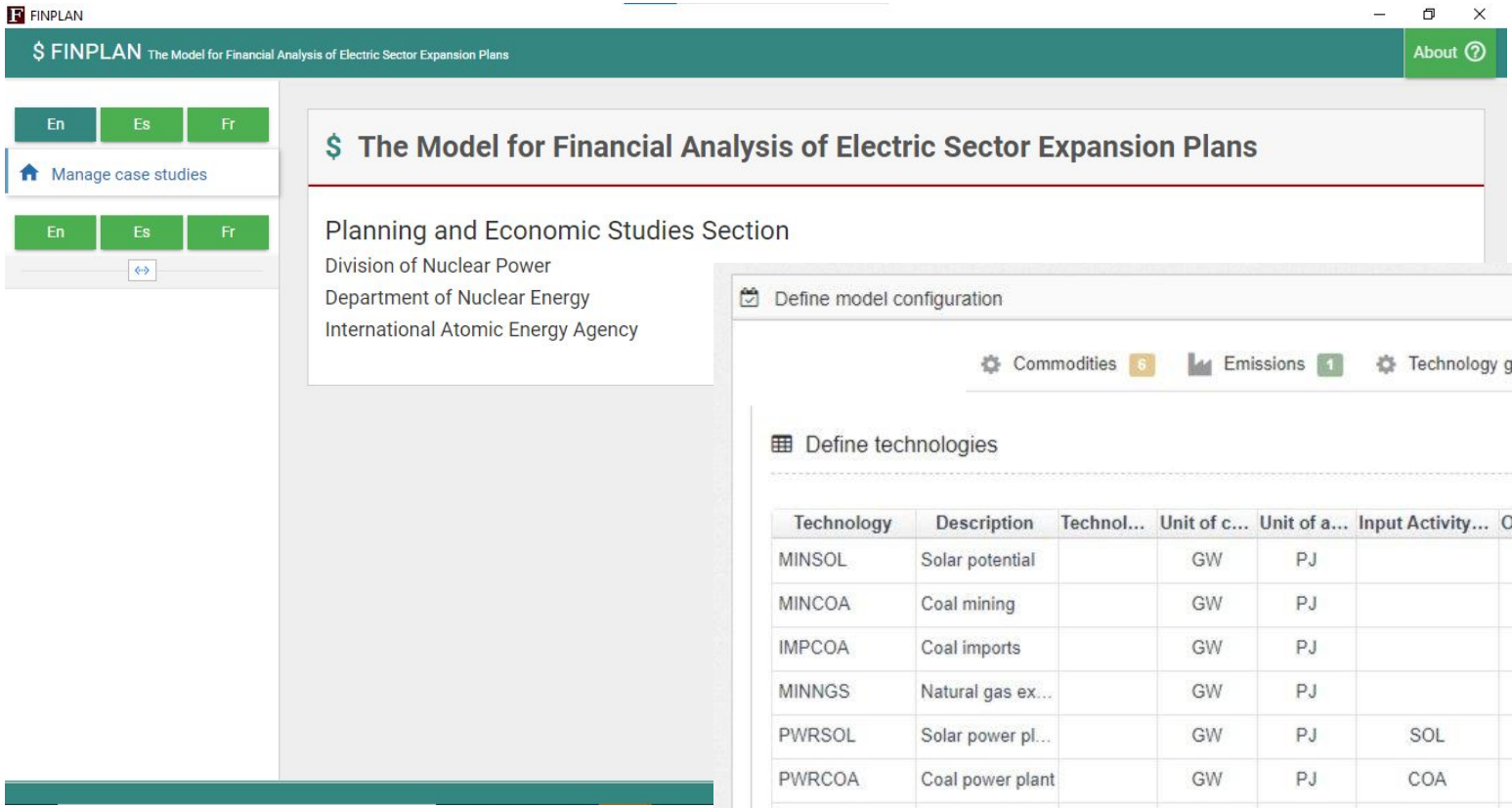
MinFin

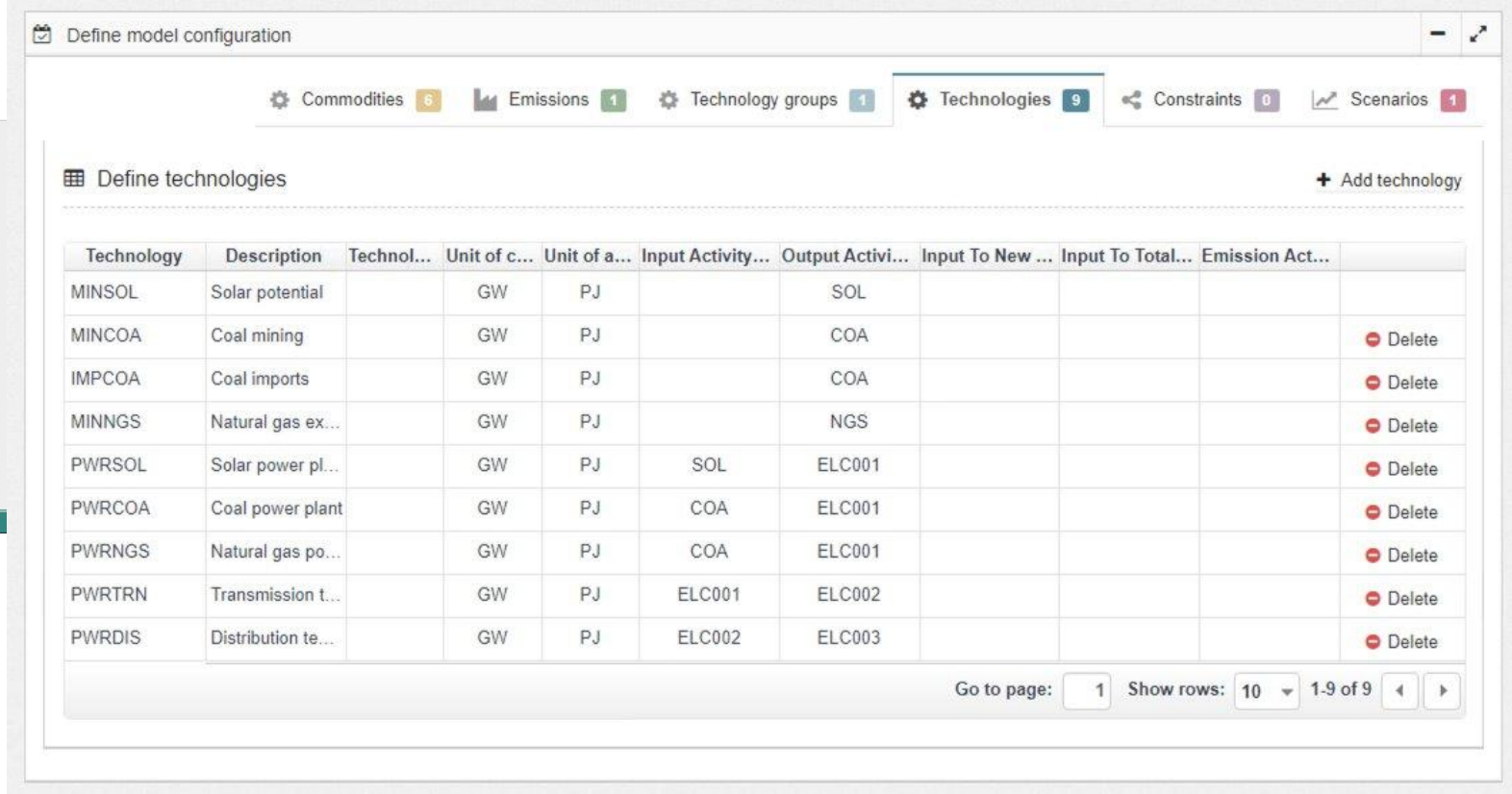
Determines the financial viability of energy transition plans, identifies gaps, and explores strategies to address them

KTH VETENSKAP OCH KONST · IAEA International Atomic Energy Agency · IRENA International Renewable Energy Agency · Department for Energy Security & Net Zero · IMPERIAL · UNIVERSITY OF OXFORD

CCG's Ecosystem of Tools

Open-source User Interfaces





CCG's Ecosystem of Tools

Online Learning Courses

Geospatial clean cooking access modelling using OnStove

In this course you will be introduced to OnStove, an open-source spatial clean cookingtool identifying the best cooking solutions across any given area based on their costsand benefits. The track will take you from start to finish, from creating your own spatia

Try this course >

Geospatial Data Management for E Access Modelling and Planning

An introduction to geospatial data management throu SDI design principles and data governance good prac

Try this course >

Energy Access Explorer: Data-driv Integrated and Inclusive Energy Pl

Participants will learn to identify high-priority areas wh access can be expanded using multi-criteria decision Energy Access Explorer platform.

Try this course >

Course

24+ hrs

OnSSET/The Global Electrification Platform

In this course, participants will learn about geospatial energy modelling in the tools Open Source Spatial Electrification Tool (OnSSET) and World Bank's Global Electrification Platform.

Try this course >

Course

24+ hrs

Energy and Flexibility Modelling: OSeMOSYS & FlexTool (Windows)

(WINDOWS version) Participants will learn to use energy modelling tools to understand the investments needed to meet growing energy demands alongside environmental and energy security constraints, while assessing system flexibility to account for high renewables...

Try this course >

Course

24+ hrs

Energy and Flexibility Modelling: OSeMOSYS & FlexTool (MAC)

(MAC version) Participants will learn to use energy modelling tools to understand the investments needed to meet growing energy demands alongside environmental and energy security constraints, while assessing system flexibility to account for high renewables...

Try this course >

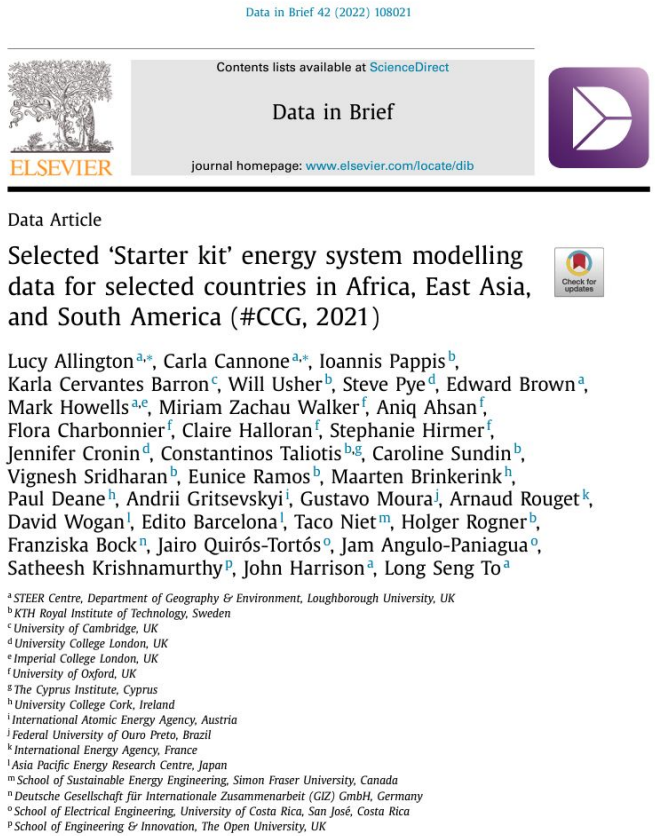
Course

24+ hrs

CCG's Ecosystem of Tools

Starter Data Kits

Region	Continent	Energy Dataset	Energy Data Note	Transport Dataset
All Countries	Global			TR- Data
Algeria	Africa	EN- Data	EN- Pre-print	TR- Data
Angola	Africa	EN- Data	EN- Pre-print	TR- Data
Benin				
Botswana				
Burkina Fas				
Burundi				
Cameroon				
Cambodia	Asia	EN- Data	EN- Pre-print	TR- Data
Indonesia	Asia	EN- Data	EN- Pre-print	TR- Data
Lao People's Democratic Republic	Asia	EN- Data	EN- Pre-print	TR- Data
Malaysia	Asia	EN- Data	EN- Pre-print	TR- Data
Myanmar	Asia	EN- Data	EN- Pre-print	TR- Data
Philippines	Asia	EN- Data	EN- Pre-print	TR- Data
South Korea	Asia	EN- Data	EN- Pre-print	TR- Data
Taiwan	Asia	EN- Data	EN- Pre-print	TR- Data
Thailand	Asia	EN- Data	EN- Pre-print	TR- Data
Viet Nam	Asia	EN- Data	EN- Pre-print	TR- Data



Data in Brief 42 (2022) 108021

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data Article

Selected 'Starter kit' energy system modelling data for selected countries in Africa, East Asia, and South America (#CCG, 2021)

Lucy Allington[a,*], Carla Cannone[a,*], Ioannis Pappis[b], Karla Cervantes Barron[c], Will Usher[b], Steve Pye[d], Edward Brown[a], Mark Howells[a,e], Miriam Zachau Walker[f], Aniq Ahsan[f], Flora Charbonnier[f], Claire Halloran[f], Stephanie Hirmer[f], Jennifer Cronin[d], Constantinos Taliotis[b,g], Caroline Sundin[b], Vignesh Sridharan[b], Eunice Ramos[b], Maarten Brinkerink[h], Paul Deane[h], Andrii Gritsevskyi[i], Gustavo Moura[j], Arnaud Rouget[k], David Wogan[l], Edito Barcelona[l], Taco Niet[m], Holger Rogner[b], Franziska Bock[n], Jairo Quirós-Tortós[o], Jam Angulo-Paniagua[o], Satheesh Krishnamurthy[p], John Harrison[a], Long Seng To[a]

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[c] University of Cambridge, UK
[d] University College London, UK
[e] Imperial College London, UK
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[p] School of Engineering & Innovation, The Open University, UK

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Data Article

Transport starter data kit: Historical passenger and freight transport data for selected countries in Africa, Asia, and South America

Naomi Tan[a,b,*], Robert Ambunda[c], Nikola Medimorec[c], Angel Cortez[c], Agustina Krapp[c], Erin Maxwell[a], John Harrison[a], Mark Howells[a,b]

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[c] SLOCAT Partnership on Sustainable, Low Carbon Transport, Belgium

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Dataset link: Transport Starter Data Kit: Historical socio-transport data for selected countries in Africa, Asia, and South America (Reference data)

Keywords:
Transport
Transport systems
MAED
OSeMOSYS

ABSTRACT

The demand for data-driven models to inform sustainable transportation planning has become more important as countries address the complexities of urban mobility. However, data collection and curation are time-consuming and can be challenging due to data inaccessibility and inaccuracy. The Transport Starter Data Kit therefore aims to address these challenges, offering a one-stop-shop for transport modelling-related data. The Kit contains historical annual data (1990–2021) on passenger and freight activity, energy intensities, load factors, and vehicle stock, segregated by mode and fuel where available. Additionally, population and GDP data, which influence transport activity, are included. The value of the dataset lies not only in the range of variables it offers but also in the compilation from multiple authoritative sources, providing researchers, consultants, and policymakers interested in data-based transport modelling with a foundational base for their model development. By adopting, adapting, and applying the data, clear policies may be developed which can underpin the necessary finances for sustainable transport development.

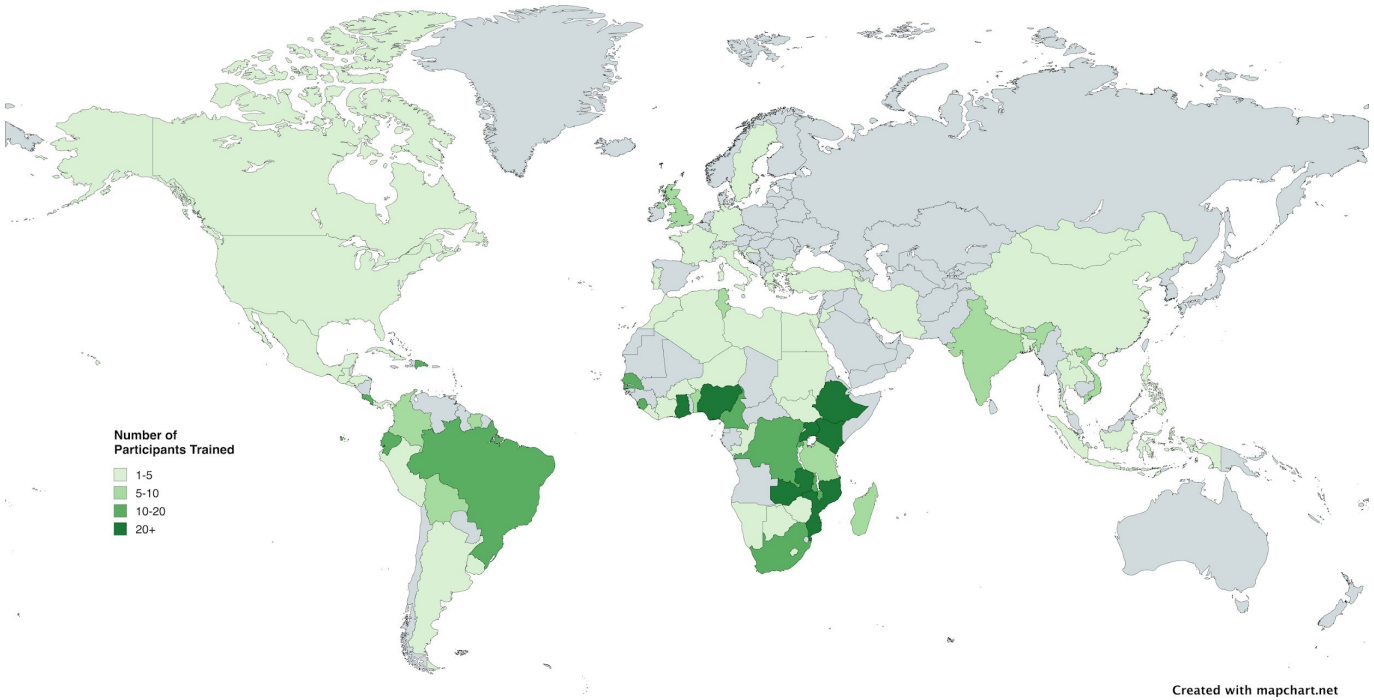
SLOCAT Partnership on Sustainable, Low Carbon Transport

International Road Federation
Fédération Routière Internationale
Federación Internacional de Carreteras

INTERNATIONAL UNION OF RAILWAYS

CCG's Ecosystem of Tools

Capacity Building Events



Case Studies

Using this approach

- **Costa Rica** mobilised over **US$2.4 billion**
- **Chile** mobilised over **US$2.2 billion**
- **DR** mobilised over **US$6.5 billion**
- **Uruguay** mobilised over **US$0.8 billion**

in Climate Finance

Data-to-Deal currently provides the guiding framework for Climate Compatible Growth's ongoing National Partnership engagements in Ghana, Kenya, Lao PDR, Vietnam, Zambia and more

Being adopted by **international organisations**

Data-to-Deal Resource

Introduction	Costa Rica – Case Study	Dominican Rep. – Case Study	Chile – Case Study

Supported by

Key Policy Recommendations

- International organisations supporting LMICs to develop **credible investment cases** should structure assistance using the **Data-to-Deal** framework
- Country stakeholders should be **technically equipped** and empowered to determine their own **consensus-based** and **nationally-owned** decarbonisation pathways
- High-level leadership should drive a process of **cross-government collaboration**, with the Ministry of Finance engaging from an early stage with the critical line ministries
- **Capacity-building** efforts in-country should be **sustained** over time, building individual technical skills, as well as strengthening relevant institutions, with the central involvement of local academia

Thank you

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Climate Compatible Growth

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"The views expressed in this material do not necessarily reflect the UK government's official policies."

University Partnership:

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Imperial