

# TECHNICAL WEBINAR

June 4<sup>th</sup>, 2024, 11:00 AM-12:00 PM (CET)

# AMIGDALA



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# SPEAKERS

AMIGDALA



**Judith Kessens**  
Senior Project Manager



**Toon van Harmelen**  
Project Manager



**Alex Zabeo**  
Chief Technology Officer



**Dinh Du Tran**  
Scientific Project Manager



**Joel Neave**  
Senior Manager



**Wouter Nijs**  
Senior Researcher & Project Manager



## 1 AMIGDALA Project Presentation

*TNO*

## 2 Expertise Leads Details

*Decision making Framework – GreenDecision  
Scenarios – VITO  
Data – DECHEMA  
Integrated Modelling – TNO*

## 3 Community of Practice & Next steps

*Deloitte*

## 4 Q&A Session

*Consortium*



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# 1 WHAT IS THE AMIGDALA PROJECT?

Consortium Presentation

AMIGDALA

## What is the AMIGDALA Project?

*AMIGDALA Consortium – Presented by TNO*

*Judith Kessens, Senior Project Manager*



# ABOUT THE AMIGDALA PROJECT

AMIGDALA

Alliance for **M**odeling **I**ndustries towards the **G**reen **D**eal's objective **A**nd circula**LA**rity



**Climate neutral by 2050**  
**Growth without depletion**  
**Just transition**



AMIGDALA aims to **define pathways for Europe's energy-intensive industry** to become climate neutral, remain competitive and build resilience.



We employ **decision analysis** and **integrated modelling** of demand, trade, energy, emissions and industrial production.



04/06/2024

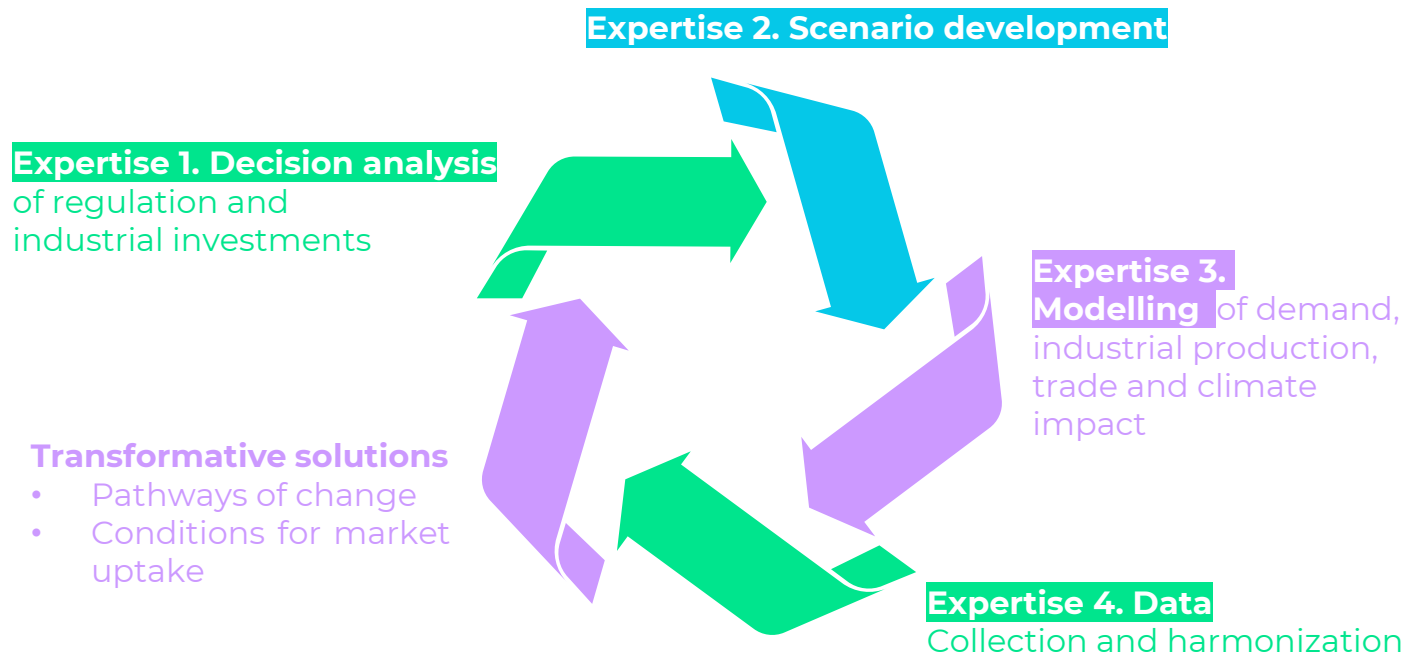
# ABOUT THE AMIGDALA PROJECT

- Call: HORIZON-CL4-2023-TWIN-TRANSITION-01
- Start Date: 1st Jan 2024
- Duration: 48 months
- Requested EU Contribution: €6,913,013

Expertises	Partner
Decision analytics & user interaction	  
Energy- and process- technology	  
Scenario's & modelling	    
Dissemination, exploitation, and communication	
Project management	 



AMIGDALA provides **decisionmakers** on policy and investments with perspectives on the **deployment of transformative solutions** to make industrial production in Europe **climate neutral and competitive**.





## Outcomes:

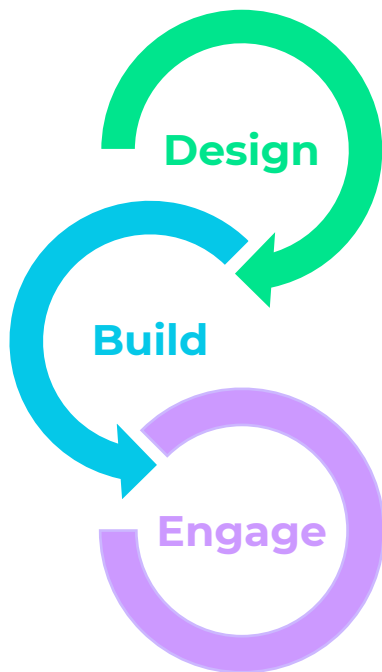
- Development of an **integrated modelling framework** embedded in a decision framework
- **Transparent** and **verifiable pathways** of change towards the GreenDeal objectives
- **Scenarios of public and private decisions** to access the pathways
- **Conditions for transformative solutions** to become investable and be deployed by industry
- **Enhance knowledge** about climate neutral pathways for academia and industry

## Impacts:

- Globally **climate neutral supply chains** for sustainable products
- **Competitive production in Europe** by global industries
- **Resilient value chains** for open strategic autonomy



The AMIGDALA model will present results in actionable terms for users. This way we close the gap between abstract results and actual decisions.



## Design around decisions

Our community of practice advises on the development of the decision framework. This defines the dashboard of control options and performance indicators.

## Build on recognized models

We combine recognized model of trade, production, energy demand and climate impact to generate pathways of change from decision scenarios.

## Engage for impact

Impact is achieved through engaging decisionmakers and their advisors around scenarios of transformation options and pathways of change.





## Presentation of the Expertise Leads

*AMIGDALA Consortium*



# 4 EXPERT LEADS

As **policy-maker, industrial association**, non-governmental association or **process industry company**, you can contribute to the project.

Expert Leads	Partners
Integrated Modelling	
Decisional Framework	
Data	
Scenarios	

## Why contribute?

1. **Contribute** to building a common, cross industry and policy framework
2. **Shape** a conceptual approach and tool.
3. **Exchange** across industry and policy areas
4. **Ensure** that the AMIGDALA model meets the needs of industry and policy-makers
5. **Help** in developing an innovative model

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# 2 EXPERTISE LEADS

GREENDECISION, VITO, TNO, DECHEMA



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# EXPERTISE LEADS – Decisional Framework

GREENDECISION - Alex Zabeo, Chief Technology Officer



## State of Art



Decision-making models rely upon the understanding of **decision-making goals, user preferences, control parameters and decision criteria.**



Decisions toward meeting **Green Deal objectives** in the European process industry depend upon a wide range of actors amongst which industrial C-suites and policy-makers.

## Challenges



**Understanding the difference in decision-making approaches**



**Defining preference profiles** for AMIGDALA dashboard users



**Identifying key control parameters** and output variables (both common and differentiated) for user profiles



Designing an approach which **meet different stakeholder objectives and supports decision-making capability** regarding the Green Deal



## What we have already done

### Current progress

- ✓ The **decisional framework methodology** is under **preparation**.
- ✓ The **different alternatives, assessment criteria** and **preference categories** to be considered in the framework have been **selected**.

### Key answered questions

- ✓ The system will **be based on the assessment of forecasted conditions** of selected indicators given predefined goals and constraints set by the decision maker.
- ✓ The tool allows evaluating different pathways **satisfying the defined goals and constraints** and assessing the expected values of key indicators which are reported graphically with their uncertainty.





## What we have already done

### Results so far

1

Generally, interviewed **policy-maker goals, control levers and output parameters preferences are more variable** than in industrial decision-makers. This can be explained by the difference in perimeters of responsibility.

2

Industrial decision-making control levers and outputs are **largely economically driven:**

- Raw material and energy prices, availability and environmental characteristics (e.g. associated GHG emissions)
- Technology merit order
- Market perspective and competitive position regarding the rest of the world and relative to other companies

3

Economic preferences are often considered in terms of **strategic autonomy/relative position of the EU**



## What we have already done

### Results so far

4

Wider considerations which have economic impacts but are of a **political nature represent significant uncertainty**

- Consumer willingness to pay
- Social license to operate/acceptability of political choices and social ramifications
- Clarity on priority of competing policy objectives and degree on constraint over a given sector

5

These wider considerations, particularly in their social and political dimensions are critical for **policy maker**.

6

**Policy-makers tend to have a broader ranging view** on what the European Green Deal ought to achieve beyond climate neutrality objectives

- Economic coherence
- Impact on the value stream
- Impact on a country level
- Circular economy objectives
- Improving the quality of life (ex: in terms of healthcare via decreased pollution)



## Key remaining questions and how to address them

Several details are still under assessment:

- ❑ Which **indicators** are **meaningful** for the decision maker?
- ❑ Which **constraints** are **useful** to establish proper future scenarios?
- ❑ Which **goals** **best represent sustainable conditions** for profitable business?
- ❑ Which **background** and **foreground scenarios** are the **most realistic** and how the **constraints** and goals relate to them?
- ❑ Which are the **best user interface widgets** for input / output of such **complex information**?

## Added value for the COP



The COP is crucial in

- ✓ The definition of proper indicators and constraints
- ✓ The selection of the best user interface widgets to interact properly with decision makers



## Key next steps

2024

- ❑ The **detailed methodology** will be defined by the end of 2024.

2025 - 2026

- ❑ Next steps include the creation of a **simplified testing environment** and **first ideas on the user interface** in 2025-2026.



## To keep in mind

The decisional framework will be **beneficial** both for

- **Policy makers** and **industrial associations** to understand which actions shall be performed to reach the expected goals in the most effective way.
- **Companies** and **practitioners** to understand which are the foreseen future horizons and their likelihood so to take informed decisions.

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# EXPERTISE LEADS – Scenarios

VITO - Wouter Nijs, Senior Researcher & Project Manager



## State of Art

Current scenario development:



Define a **consistent set** of **background** and **foreground scenarios**



Focus on **energy** and **emissions**



Tailored to a **specific group** of end-users



**Aggregated** pathways for industries



Focus on **internal validation** within each project

## Challenges



AMIGDALA will



**Reflect realistic and actionable control options** for government and industry stakeholders in a changing global context



Cover **all dimensions** (energy, emissions, materials, production and carbon utilization) of making industrial sectors climate neutral.



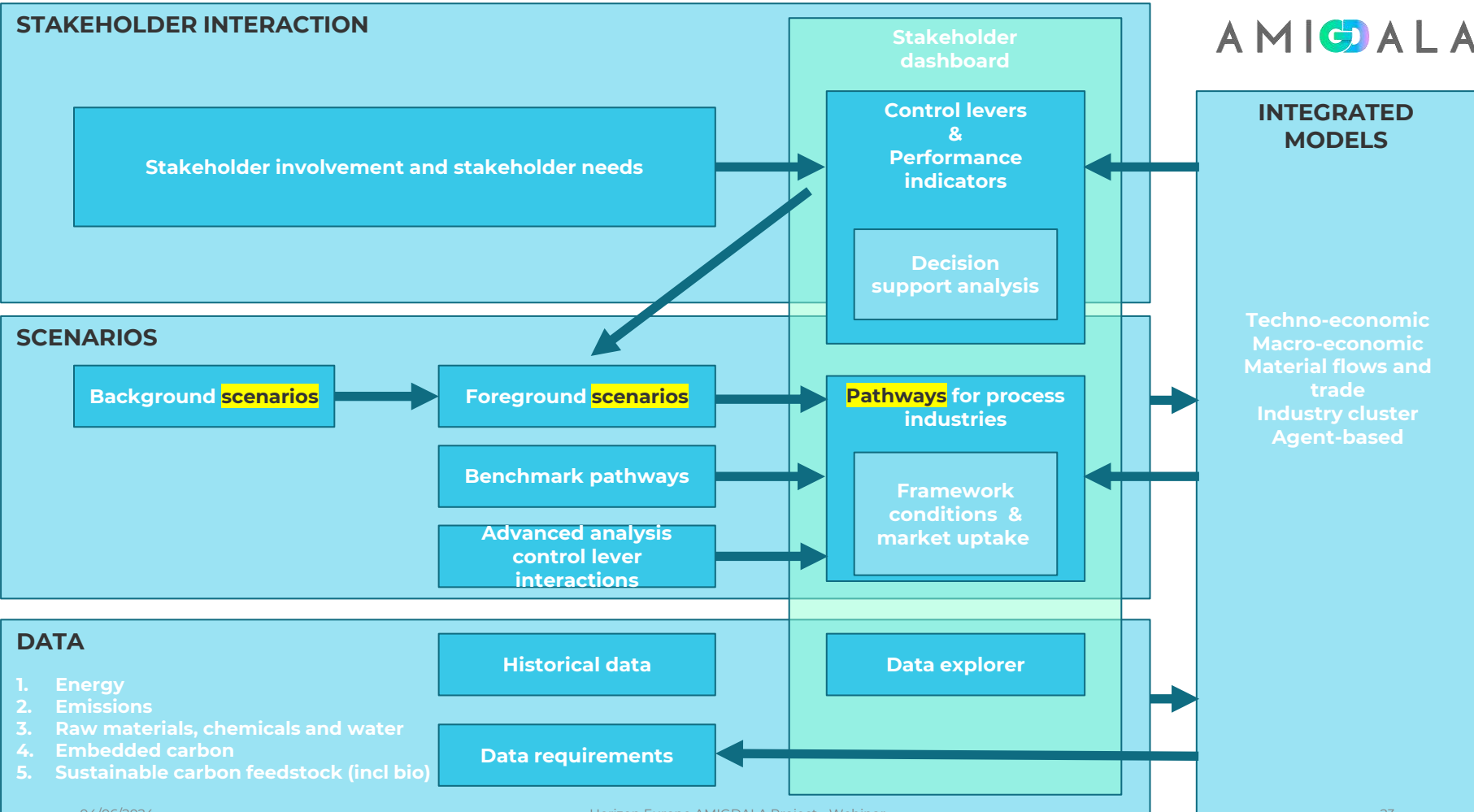
Consider **all stakeholders together**.



Differentiate between **industry subsectors** and end uses



**Benchmark** AMIGDALA's results with external scenarios

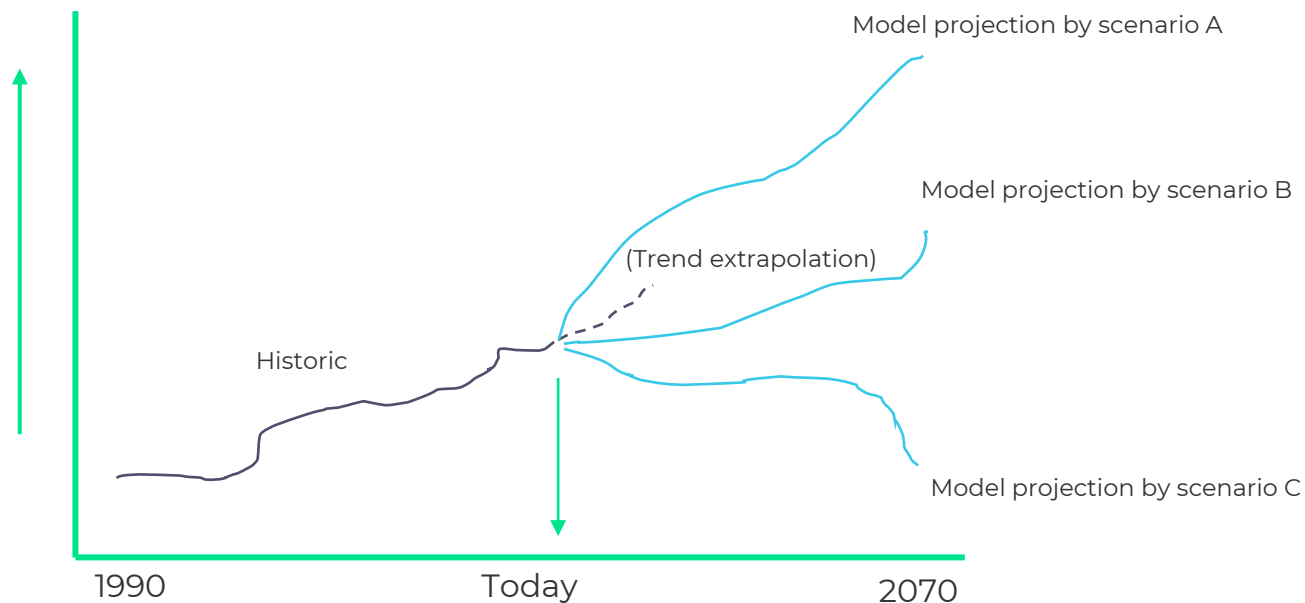


## Scenario and Pathways

A pathway is an outcome of a scenario, characterised by several dimensions

Dimensions:

- Related to the five dimensions
- Decision KPI's
- Control-KPI's







## What we have already done

### Current progress

- ✓ **Establishing sound interfaces** to the other expertise areas
- ✓ **Using bottom-up and top-down background scenario** approaches

### Key answered questions

- ✓ Scenarios can only reflect **realistic use of control options** when designed and/or validated by policymakers and industry stakeholders
- ✓ Scenarios will **have to be explicit** about new opportunities, but also about regrets

## Key remaining questions and how to address them



- ❑ **What do we consider background and foreground? How many?**
- ❑ **What concerns are key ?** *Are industry clusters at risk? Should we import intermediate products? How complex is it to have hydrogen pipelines? At what cost? How much carbon is needed for feedstock? What incentives will be needed for carbon removal?*

## Added value for the COP



You are in the driver's seat to steer our models with open mind solutions for healthy EU industries, constructive and realistic storylines and key factors/data specific for industrial transformation.



## Key next steps

2024

- ❑ **Defining background scenarios:** assess key uncertainties/main drivers, create inventory of Scenario Frameworks (academic and industry), select framework based on criteria like stakeholder relevance. Select one Background Scenario as baseline.
- ❑ **Select and qualitatively define control levers** for Foreground Scenarios. Integration of feedback from the stakeholders.

2025 - 2026

- ❑ **Analysis of the scenario results** of the Proof-of-Concept plastic value chain
- ❑ **Final selection of Foreground Scenarios**
  - Quantitatively define all control levers for Foreground Scenarios
  - Analysis of expected impacts of combining certain control levers
- ❑ **Full description of scenarios** and assumptions



## To keep in mind

### CCC

Please join the AMIGDALA Community to stay at the forefront of Industry Innovation, focusing on the essential **C**onditions for success, **C**ircularity, and **C**arbon flow optimization.



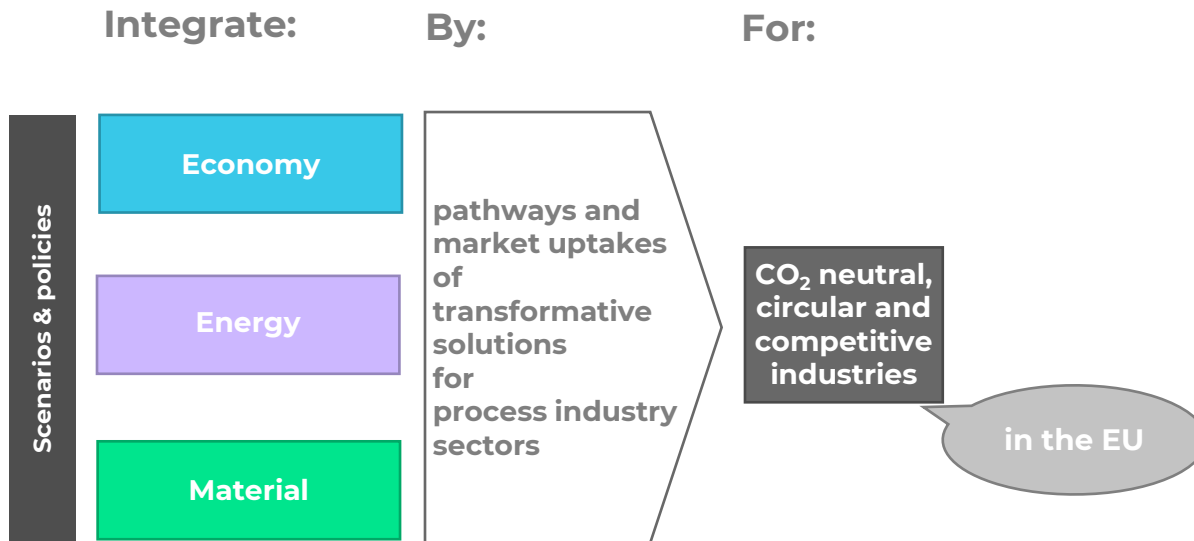
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# EXPERTISE LEADS – Integrated Modelling

TNO - Toon van Harmelen, Senior Researcher

# OUR CHALLENGE

## From a flock of models to an integrated framework





## State of Art

Current CO2 mitigation decision making:



Is **energy focused**, incl. domain / sector prioritization



Materials and product **circularity measures** are **lacking** (these models are lacking)



Is based upon a combination of (dynamic balance) **macroeconomic models** and techno-economic (optimization) energy models



**Competitiveness is simplified** to **technology costs**



**Behaviour** is rather **static** and/or **simplistic** (least-cost)

## Challenges



Include **materials** and **circularity options** (from recycling to refuse);



**Integrate Economy, Energy, Materials & Environment;**



Align **societal** and **business perspective** / different types of models;



**Combine global, EU, MS and local scale;**



**Detail all process industry sectors**



## What we have already done

### Current progress

- ✓ **Workshops & report** (August 2024) to...
- ✓ **Assess first potential set** of decision-making indicators
- ✓ **Develop of a first framework of models:**
  - a) model (input, output) characterization,
  - b) model arrangement & functionality,
  - c) model connections,
  - d) model interactions,
  - e) model framework outline (Tiered approach),
  - f) model implementation & operation

### Key answered questions

- ✓ What is the **scope needed** to investigate CO2 neutral, circular and competitive industries?
- ✓ What **model** is needed in what capacity?
- ✓ Which model receives what **input** to generate what **output** (type, domain, level)



## Key remaining questions and how to address them

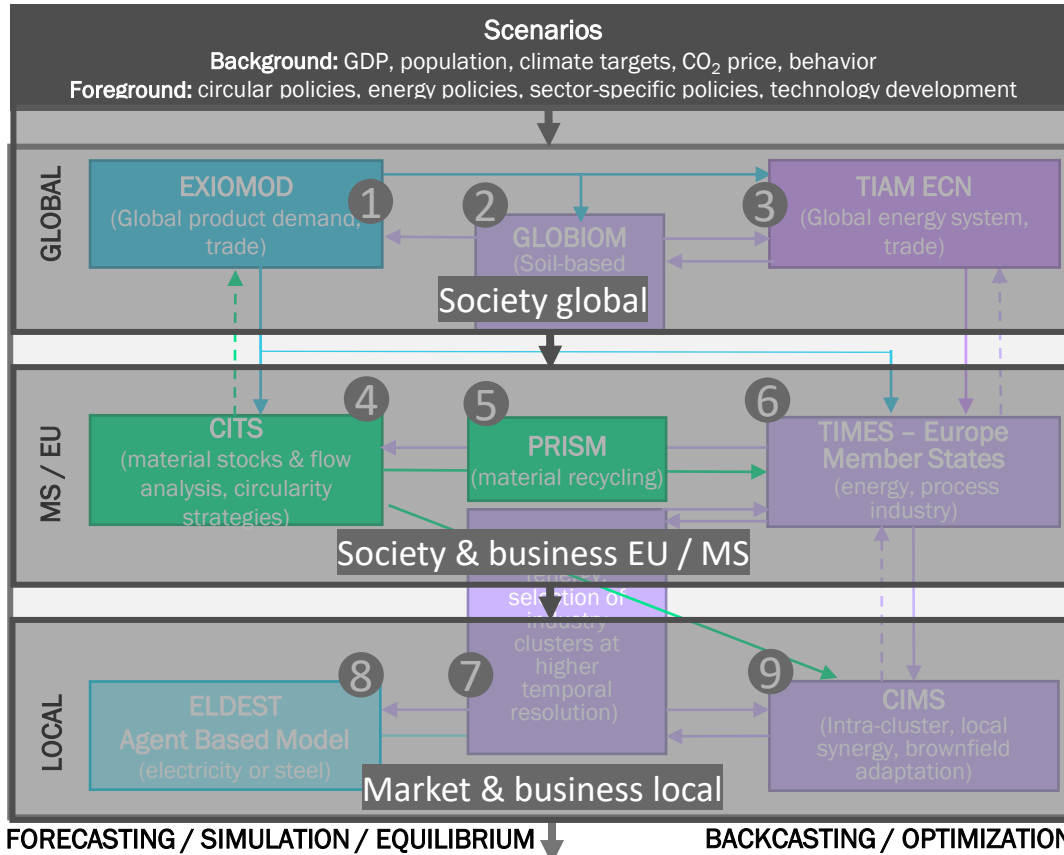
- ❑ **How** and **in** what detail to specify each process industry sector?
- ❑ **How to operationalize** the whole model framework with different experts, IP, software?

## Added value for the COP



Guide us in addressing your stakeholder needs, i.e. the right topics and questions

# First outline of proposed model framework

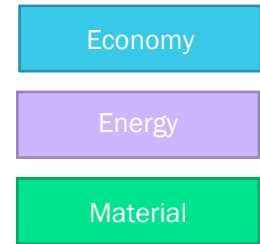


Scale: global, EU / MS, local;  
 Perspective: society, market, business

Order:

1. **Society global** economy, biobased, energy,
2. **Society & business EU/MS** material & energy,
3. **Market & business local** energy, production & market

No upward iteration (as a start)



**Key outputs:** Energy & material flows and stocks, costs, material efficiency, GHG-emissions (& further LCA impact categories), local network needs and output per scenario or policy measure.





## Key next steps

2024

On short term – till end of 2024:

- ❑ **Design** and **report** draft model framework;
- ❑ **Proof of Concept** plastic value chain specification in majority of models within framework;

2025 - 2026

- ❑ **Finalize Proof of Concept study** on plastics, including learnings on methodology and content (mid 2025);
- ❑ **Improve model framework** (e.g. on iterations, operation modes, indicators etc.);
- ❑ Start-up data collection & model specification for **other industrial sectors**.

Stakeholder feedback

Academics, Industrial associations, process industry companies, policy makers



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# EXPERTISE LEADS – Data

DECHEMA - Dinh Du Tran, Scientific Project Manager



## State of Art



Many models will be used to **predict possible transformation** pathways towards climate neutrality



Data sets across the entire modelling and scenario scope **inconsistent**



**Partially inconsistent unit operations**, or indistinctive system-boundaries for the energy-intensive sectors

## Challenges



**Harmonize** the data used in the different models



**Create a library** with respective feedstock demands and emissions.



**FAIR principles** (findable, accessible, interoperable, re-usable) --> **for partners** (and COP) during the project and via the data-explorer at the end of the project



## What we have already done

### Current progress

- ✓ Getting an **overview** on all (9) models used within AMIGDALA
- ✓ **Including: data units, topology, time-span, system boundaries, ...**
- ✓ **Harmonizing data formats** for linking the models
- ✓ **Providing and/or validating (historic) data** used in the models

### Key answered questions

- ✓ **Validation of used data:** how robust are they regarding adjustments and changes?
- ✓ **Interchangeability:** if a different input data set (or other versions of data) is used, do the models still converge?
- ✓ **Linkability** : Can the generated output file be (directly) used by other models?



## Key remaining questions and how to address them

- ❑ Data used by models should be **publicly available**, e.g. from databases with open access (IEA, Eurostat, IDEES, etc.)
- ❑ **Comparison** and **validation** of data with experts from each sector/technology/...
- ❑ **Harmonization** of data for cross-sectoral usage
- ❑ **How to handle data storage** (private vs. public) incl. data security and protocol

## Added value for the COP



- Data provided for the dashboard will be accessible within COP
- COP members will be included for data harmonization and validation



## Key next steps

2024

- ❑ **Validation of data** used in the models, with historic data from various industries or sectors

2025 - 2026

- ❑ **First draft** of the data-explorer will be available internally and for the COP
- ❑ **Harmonization** of data over all models



## To keep in mind

- Early steps of data management is always crucial and "pioneering" for the rest of the project, as it determines the common playground for all involved parties
- Involvement of COP would help AMIGDALA in including lesser known and unnoticed aspects for data harmonization



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3

# NEXT STEPS

Consortium Presentation

**Launch of AMIGDALA's Community of Practice**  
*AMIGDALA Consortium – Presented by Deloitte*  
*Joel Neave, Senior Manager*





# WHAT IS THE COMMUNITY OF PRACTICE?

As part of the project, we are setting up a “Community of Practice” – or COP. This COP will ensure that the AMIGDALA model meets stakeholder needs and expectations.

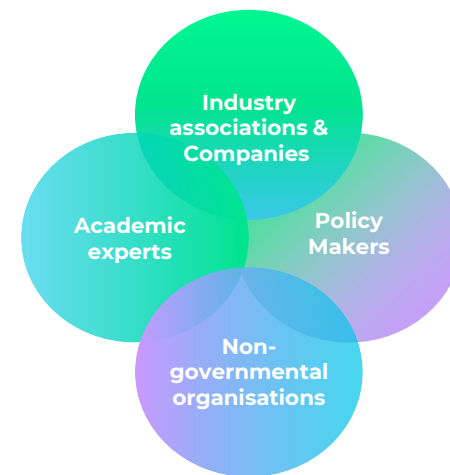
## What?

As part of the project, we are setting up a “**Community of Practice**” – or COP. This COP will ensure that the AMIGDALA model framework meets stakeholder needs and expectations and meets its objectives of enabling practical decision.

## Who?

This COP will bring together leading European industrial associations, European, national and regional policy makers as well as key companies.

## 4 types of stakeholders



# HOW TO CONTRIBUTE?

You can directly join online the Community of Practice.

## How to join the Community of Practice?

Joining is easy!

Simply go on the website page [Community of practice - Amigdala Project](#) and fill in [our registration form](#).

- No cost associated
- No regular meeting – 4 workshops scheduled in 4 years.
- Compliant with GDPR rule





## Key next steps

- ❑ **Workshop in late September (Date TBC) to:**
  - Present progress
  - Present & gather your feedback on the decision making framework
  - Have your insights on different aspects of the project (scenarios, data, models etc.)



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4 Q&A Session



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