

Aviation Zero Emissions 2050 (AZERO) Project

MSCA Fellowship 2024 – 2026



Azero2050.eu



DCU, 2nd September 2026



Prof. Marina **Efthymiou**
Dublin City University



Assoc. Prof. Miguel **Mújica-Mota**
Amsterdam University of Applied Sciences



Research Fellow Luis **Martín-Domingo**
Dublin City University | Ozyegin University



**Funded by
the European Union**

This project has received funding from the European Union's HORIZON-MSCA-2023-PF-01 research programme under the Marie Skłodowska-Curie (MSCA) grant agreement No 101151804

One Tweet in 2022, Network, and Perseverance



Marina Efthymiou
@EfthymiouMarina

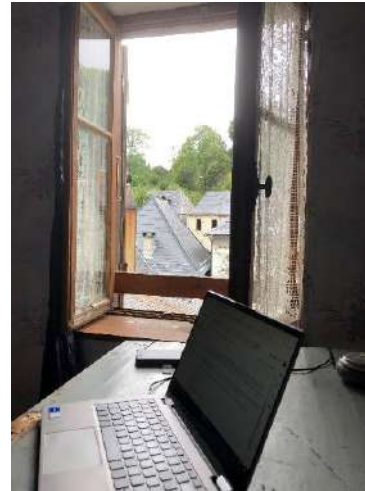
...

If you have a topic in [#Aviation](#) and you feel you fit the [#M5CA](#) Postdoctoral Fellowships call requirements, let me know. More info: lnkd.in/gN-gsBzB
[sPhDaviation](#) [#research](#) [#aviationresearch](#) WDCU



10:55 AM- Jun 14, 2022

Summer 2022



Morning
Writing

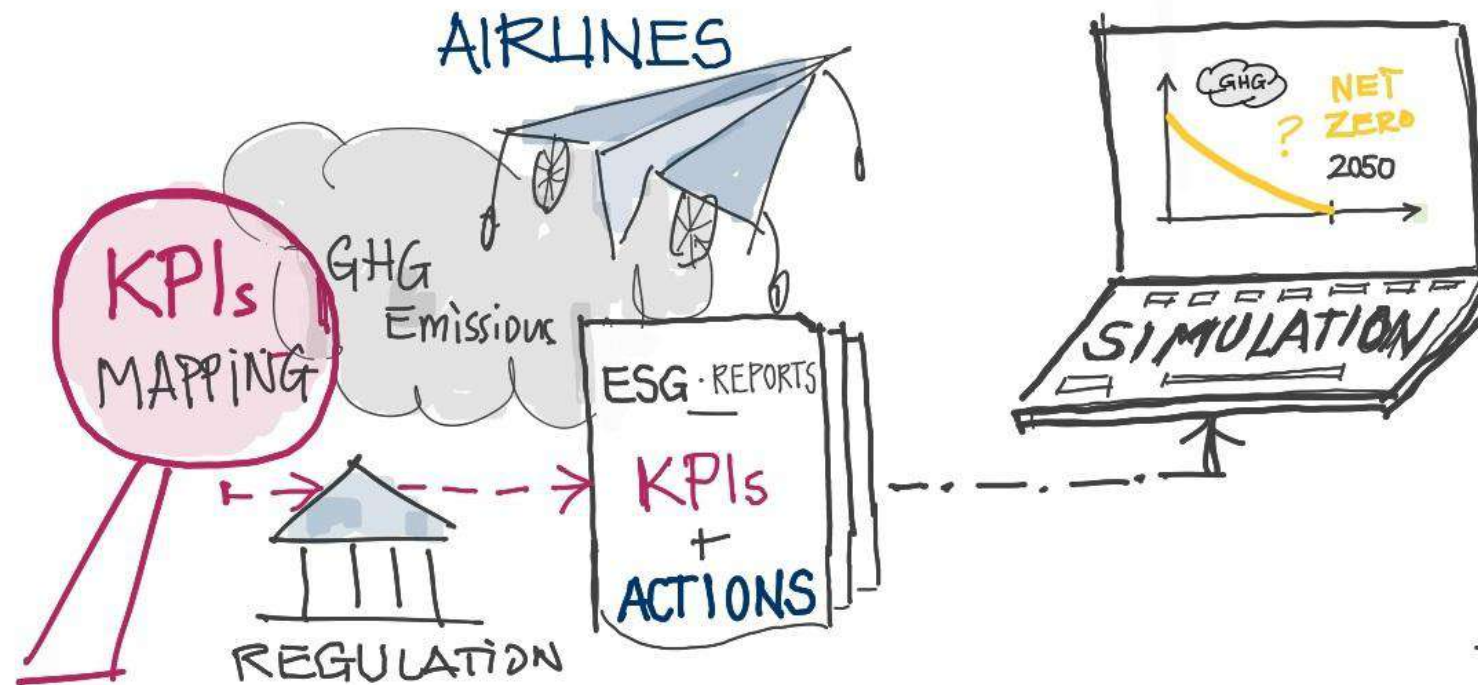


Afternoon: 'Relaxing'

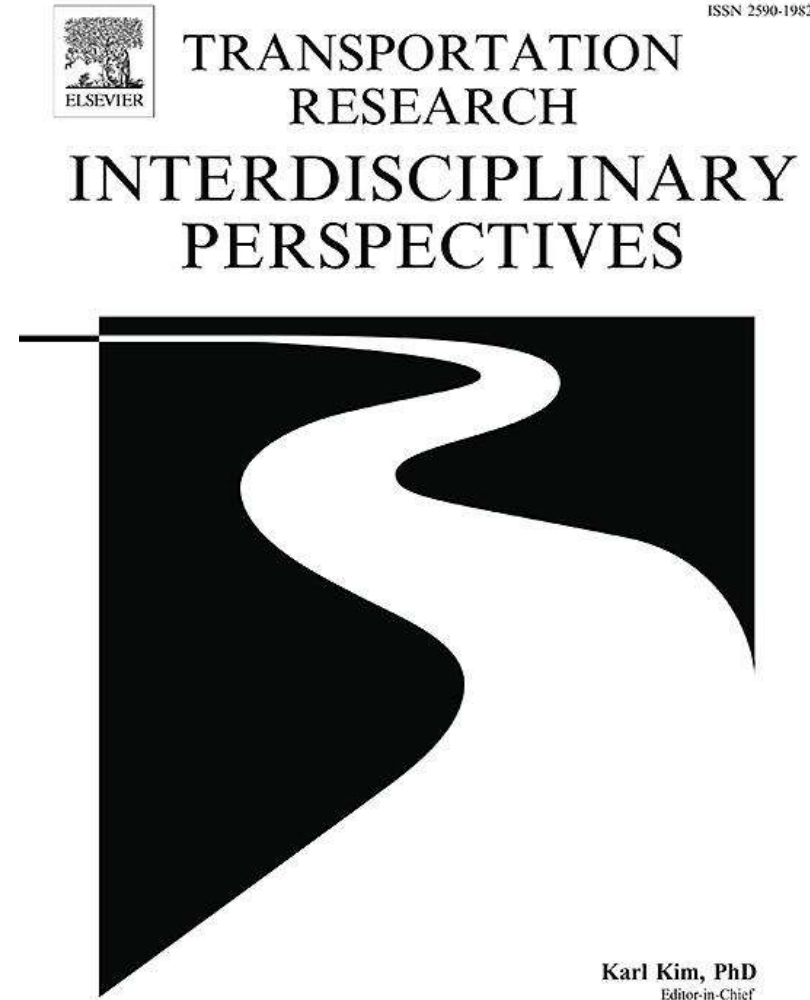
Summer 2026



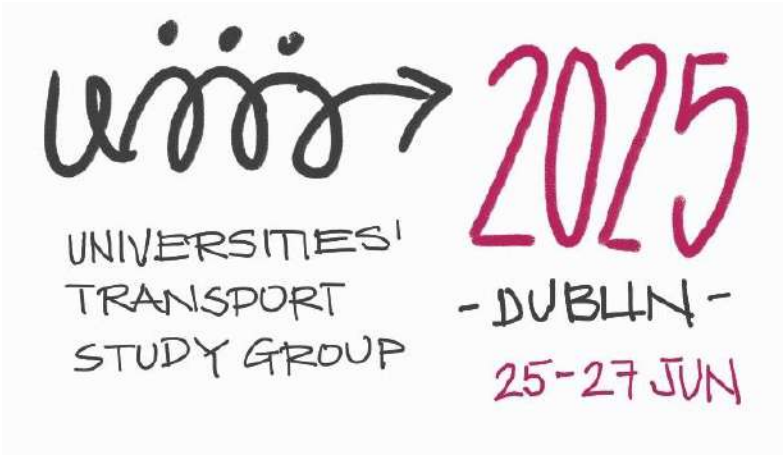
Aviation Zero Emissions 2050 (AZERO) Project



Conferences a good publishing start process



Research Output



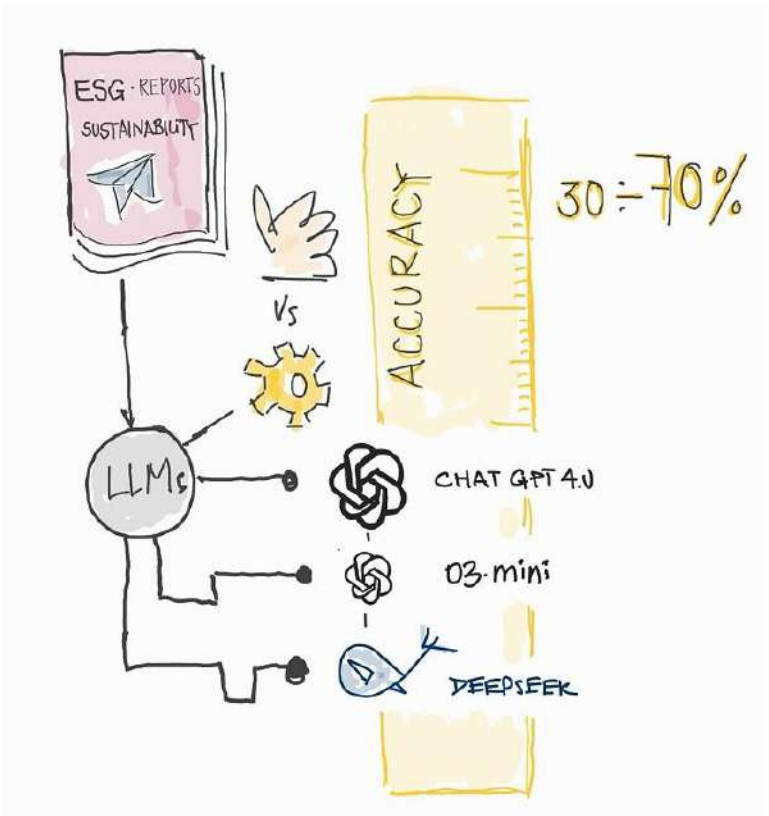
Extracting airline emission KPIs from sustainability reports using large language models (LLMs)

Luis Martín Domingo ^{a,*,}, Jaime B. Fernandez ^{c,}, Marina Efthymiou ^{b,}, Muhammad Intizar Ali ^c

^a Business School, Dublin City University, Dublin 9, Ireland

^b Faculty of Aviation, Ozyegin University, Istanbul, Turkey

^c Insight Research Ireland Centre for Data Analytics, Dublin City University, Dublin 9, Ireland



Aviation Decarbonisation: A Bibliometric Analysis of Productivity, Research Trends, and Gaps

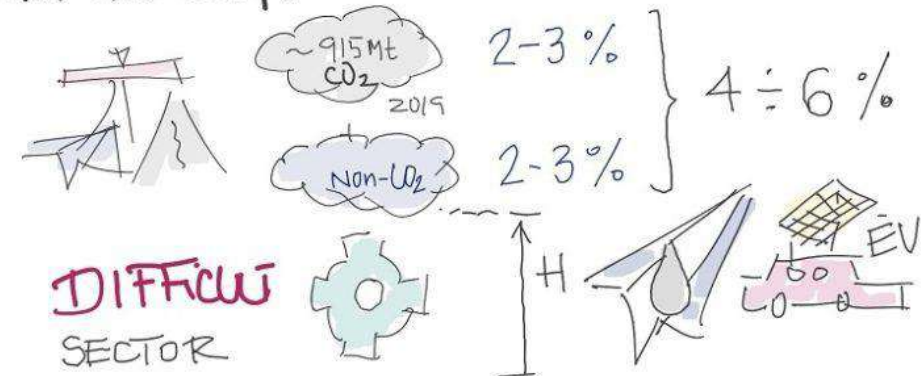
Marina Efthymiou ^a✉, Luis Martín-Domingo ^{a,b}, Miguel Mujica Mota ^c



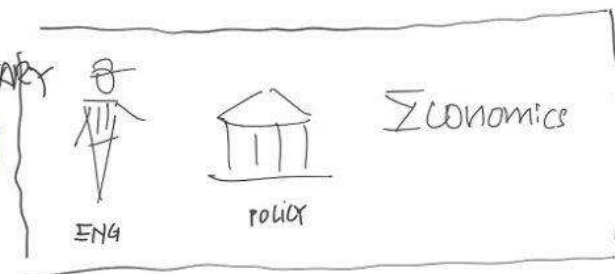
INAIR 2025
14th INTERNATIONAL CONFERENCE
2025年10月28-29日
PAOLA, MALTA

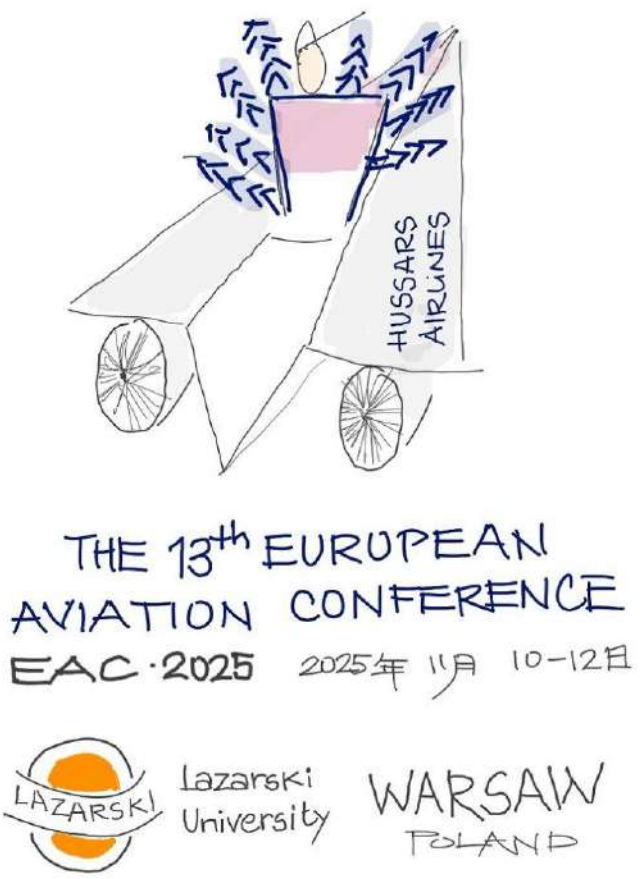
luismartindomingo.com

WHY THIS STUDY?



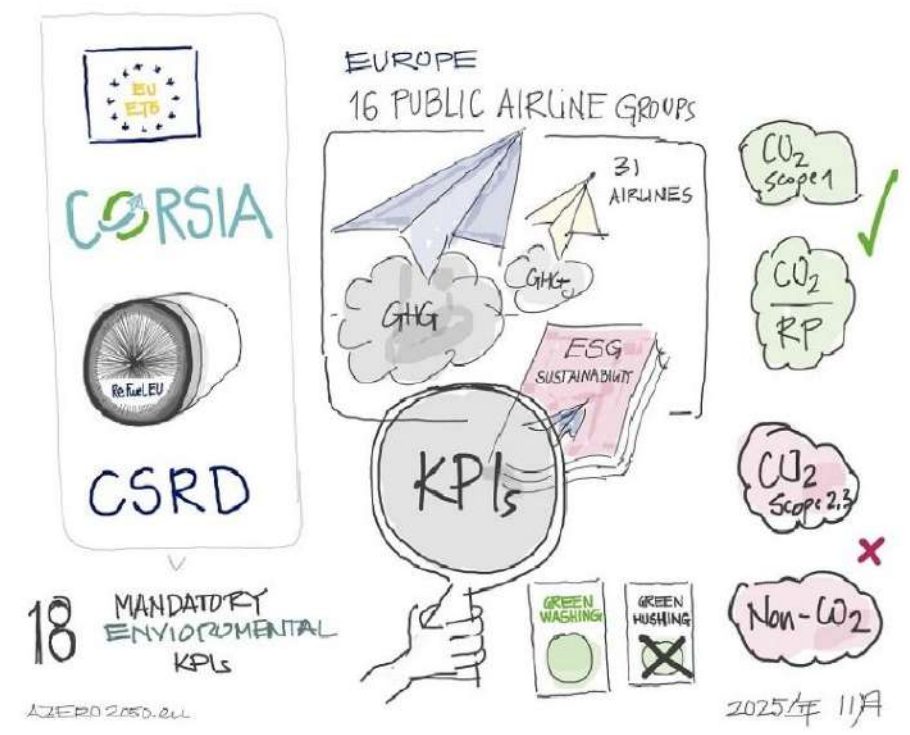
MULTIDISCIPLINARY
RESEARCH

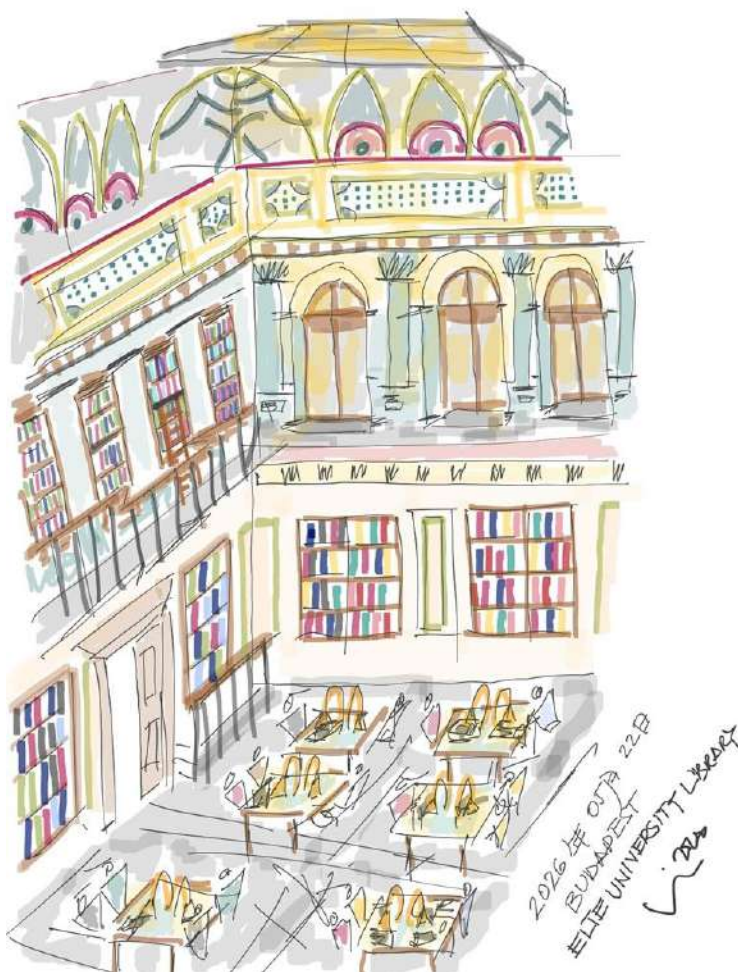




Airline sustainability reporting in Europe: Progress, compliance and challenges

Luis Martín-Domingo ^{a,b}, Marina Efthymiou ^a, Miguel Mujica Mota ^c ✉





Climate Change & Aviation



Literature Review I: Challenges in ESG Reporting

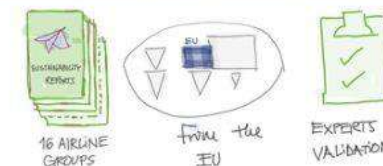


Literature Review II: Schemes



Methodology

Systematic analysis of 2023 sustainability reports of 16 European airline groups
Data validated via independent expert coding (91.2 % initial agreement, resolved to 100%)



Results

Airlines often report on what is flattering or easy, but not what is most impactful

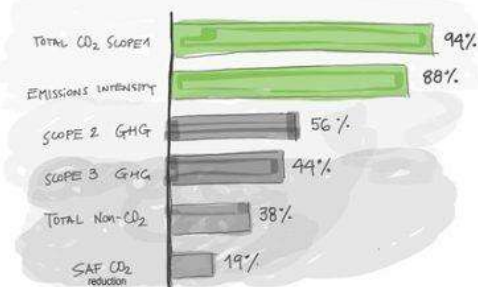


Figure 1: Reporting Rates for Key Mandatory KPIs in 2023 (Authors)

Conclusions



Contact

Luis Martín-Domingo
azero2050.eu

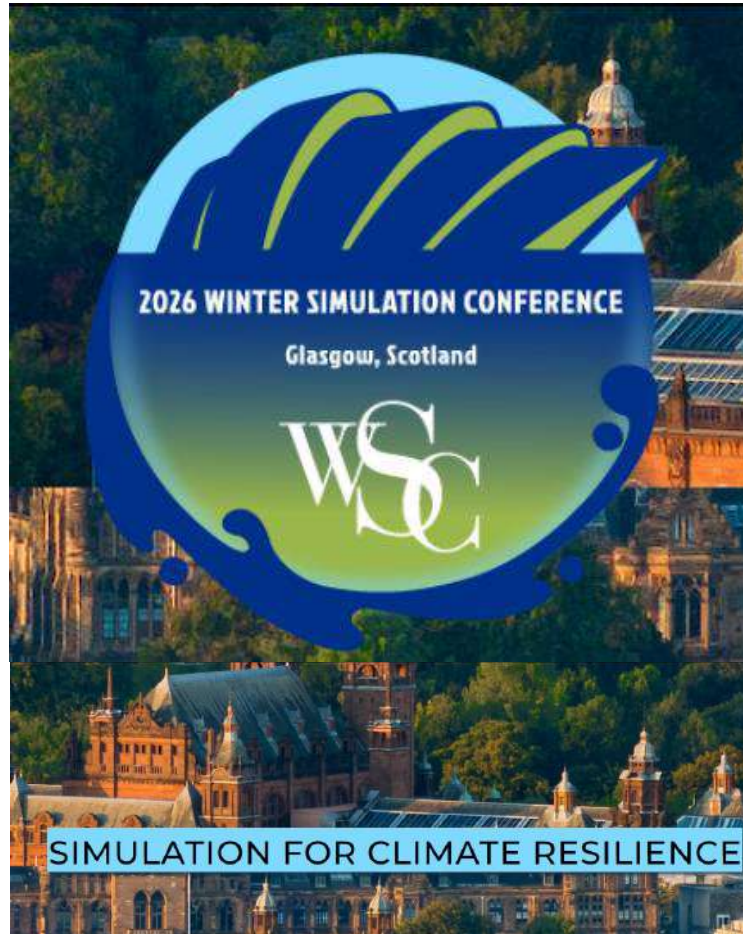


Azero2050.eu

It continuous...

Proceedings of the 2026 Winter Simulation Conference

V. Ramamohan, A. Djanatljev, M. Fakhimi, C. Krejci, C. Ruiz Martin, B. S. Onggo, and N. Mustafee, eds.



AIRLINE DECARBONIZATION PATHWAYS USING SYSTEM DYNAMICS: A CONCEPTUAL SIMULATION FRAMEWORK

Luis Martín-Domingo^{1 2}, Miguel Mujica Mota³, and Marina Efthymiou¹

¹Business School, Dublin City University, Glasnevin, Dublin 9, IRELAND

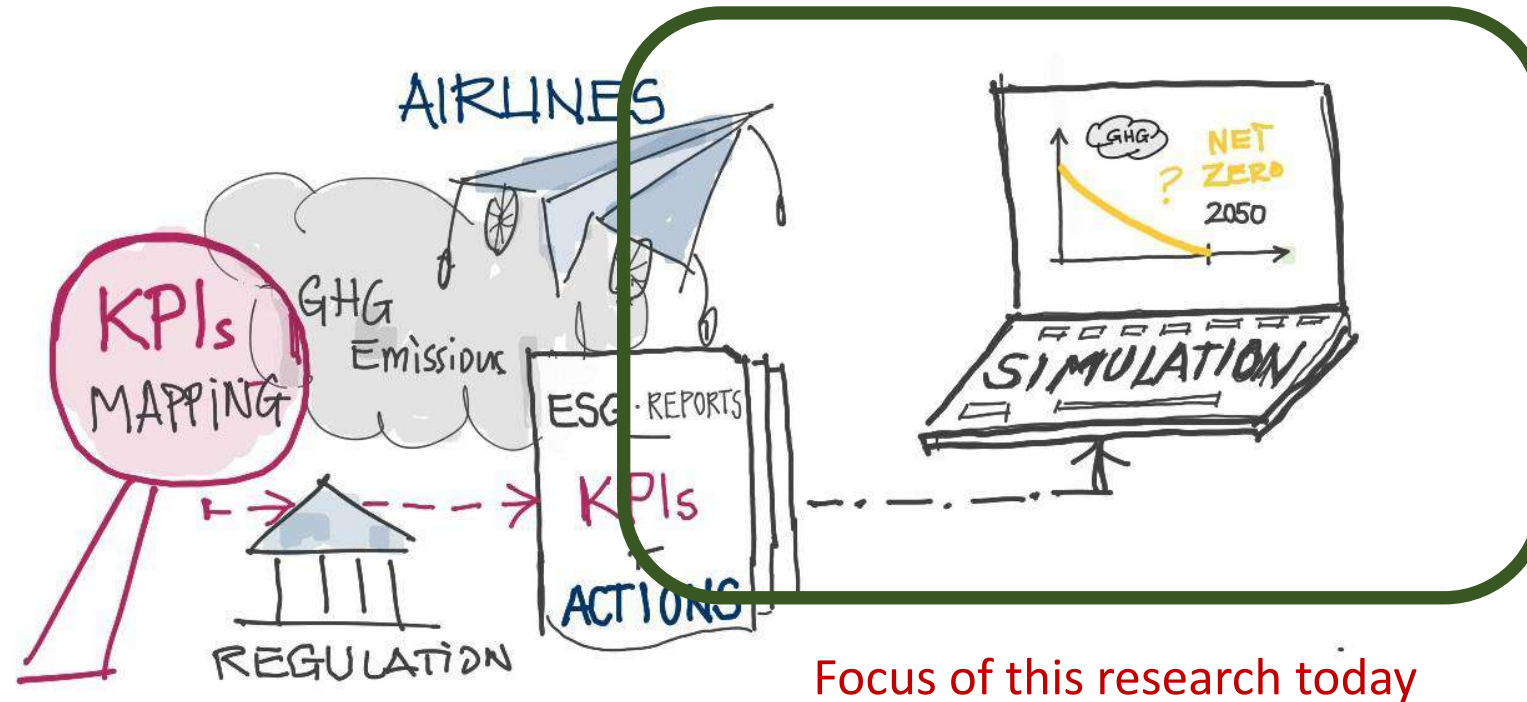
²Faculty of Aviation, Ozyegin University, Istanbul, TÜRKİYE

³Aviation Academy, Amsterdam University of Applied Sciences, Amsterdam, NETHERLANDS

ABSTRACT

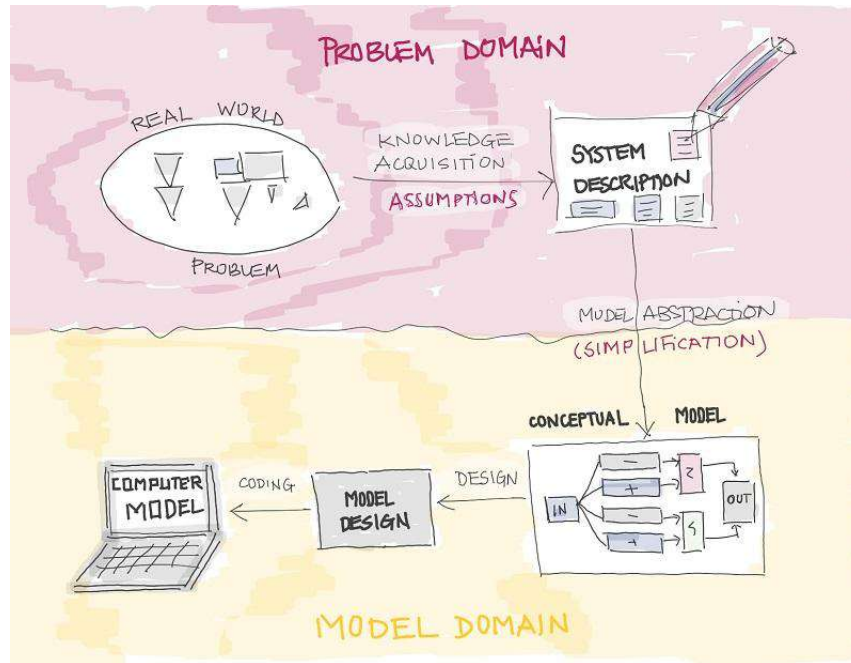
European airlines face increasingly ambitious climate obligations, yet whether their reported Greenhouse Gas (GHG) reduction commitments are consistent with net-zero by 2050 remains unclear. This paper

Objective: Simulation of GHG emissions 2030-40-50



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Airline Decarbonization Pathways Using System Dynamics: A Conceptual Simulation Framework



Luis **Martín-Domingo**^{1, 2}; Miguel **Mújica-Mota**³; and Marina **Efthymiou**¹

马路易

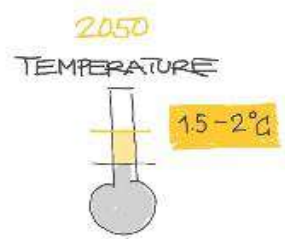
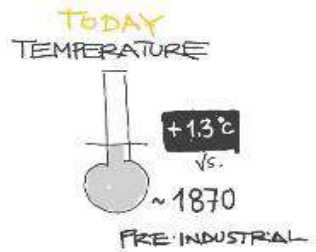
¹ Dublin City University; ² Ozyegin University; ³ Amsterdam University of Applied Sciences



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[Grant Project: 101151804 — AZERO](#)

Context



Temperature increase and suggested ceiling by science



Paris Agreement EU Green Deal leading to **Net Zero 2050**



Air Transport commitment to Net Zero 2050, but **what about researchers?**

Impact of aviation emissions on the climate

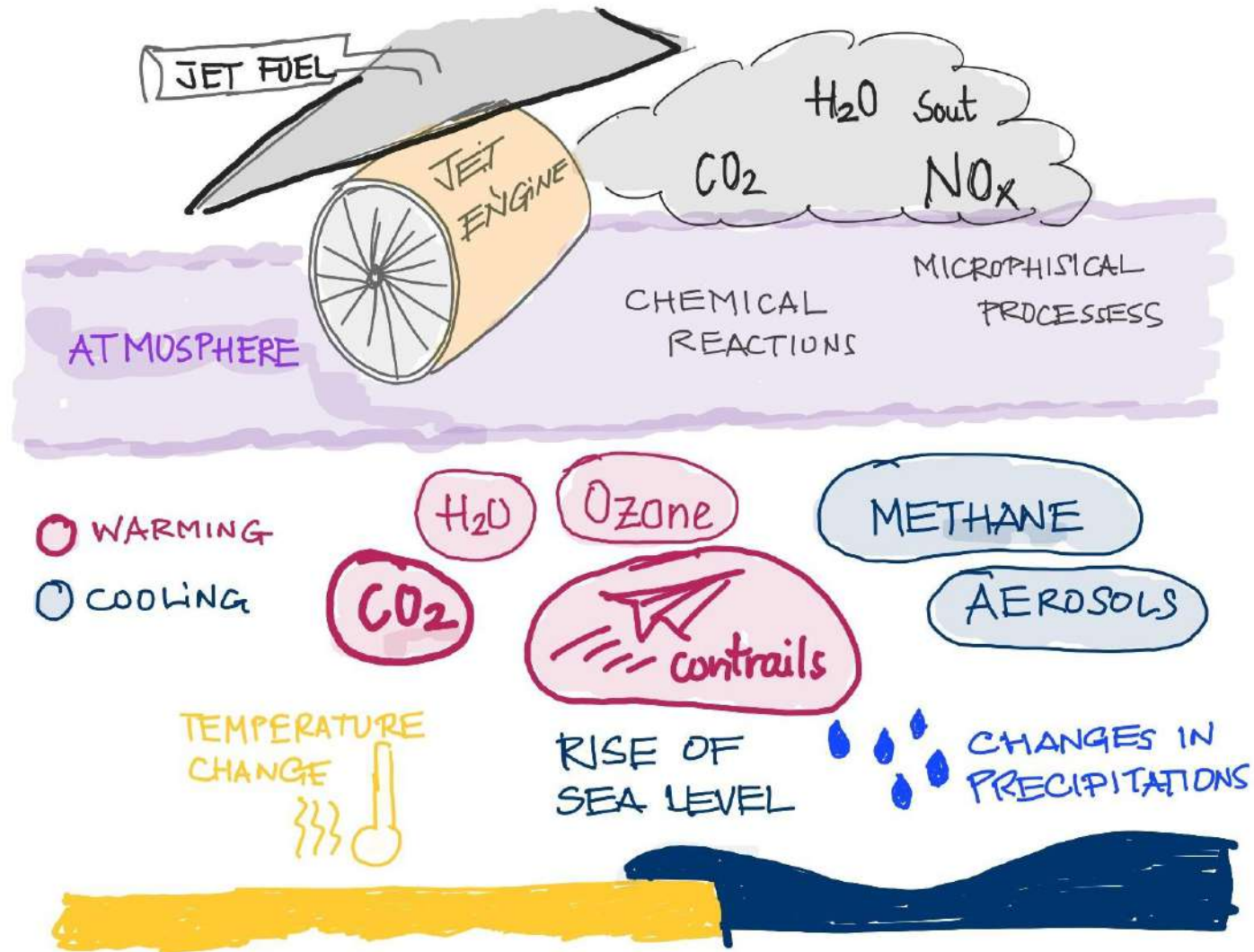


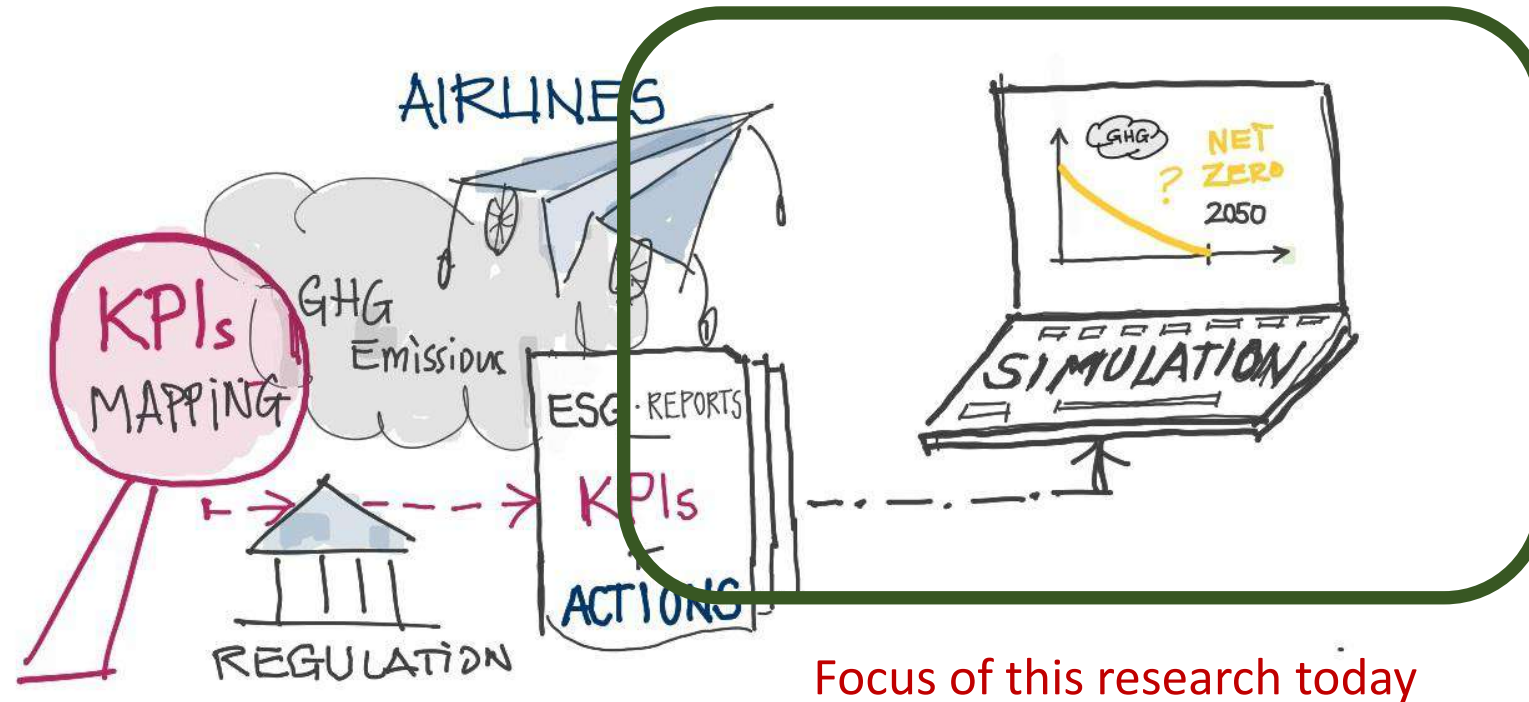
Figure 1: Impact of aviation emissions on the climate (Martín-Domingo, L. 2024 – based on German Environmental Agency (2023))

Global sea level rise

1900

The sea-level rise resulting from 2°C global warming would place 100 airports below sea level
(Yesudian & Dawson 2021)

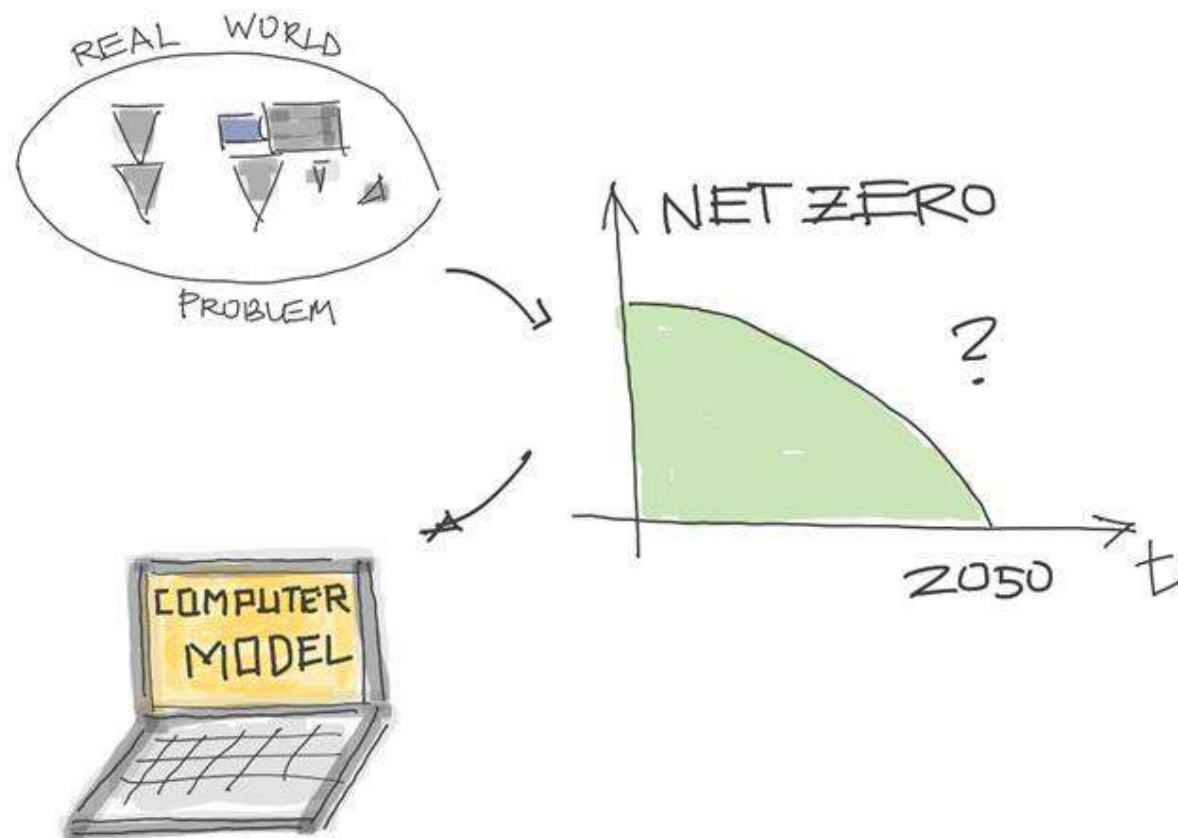
Objective: Simulation of GHG emissions 2030-40-50



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Real World Problem to a Computer Model



Optimal Simulation Technique

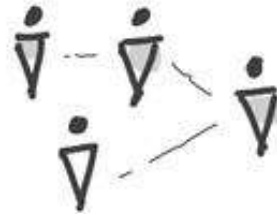
DISCRETE-EVENT
SIMULATION (DES)



MICRO / ~~X~~
OPERATIONAL

NOT
SUITABLE ~~X~~

AGENT-BASED
MODELING (ABM)



AUTONOMOUS
ENTITIES

COMPUTER
POWER
HIGH
| ~~X~~

SYSTEMS
DYNAMICS (SD)



MACRO ✓
AGGREGATED

MULTIYEAR

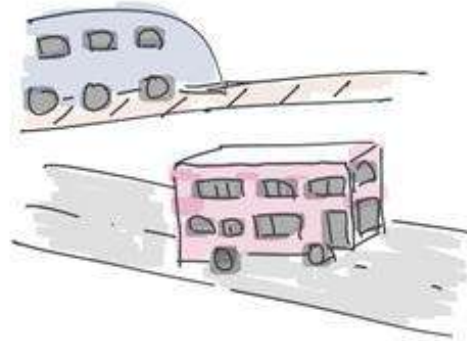
2030 2040 2050



Literature Review: SD applications

SD: PREDICTS COMPLEX SYSTEMS
Trends of data over-time

PUBLIC TRANSPORT



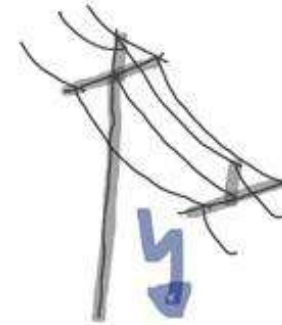
(Ercan et al., 2016)

CEMENT INDUSTRY



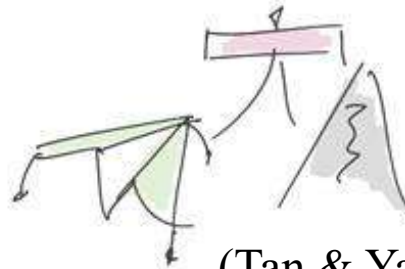
(Jokar & Mokhtar, 2018)

ELECTRICITY
GENERATION



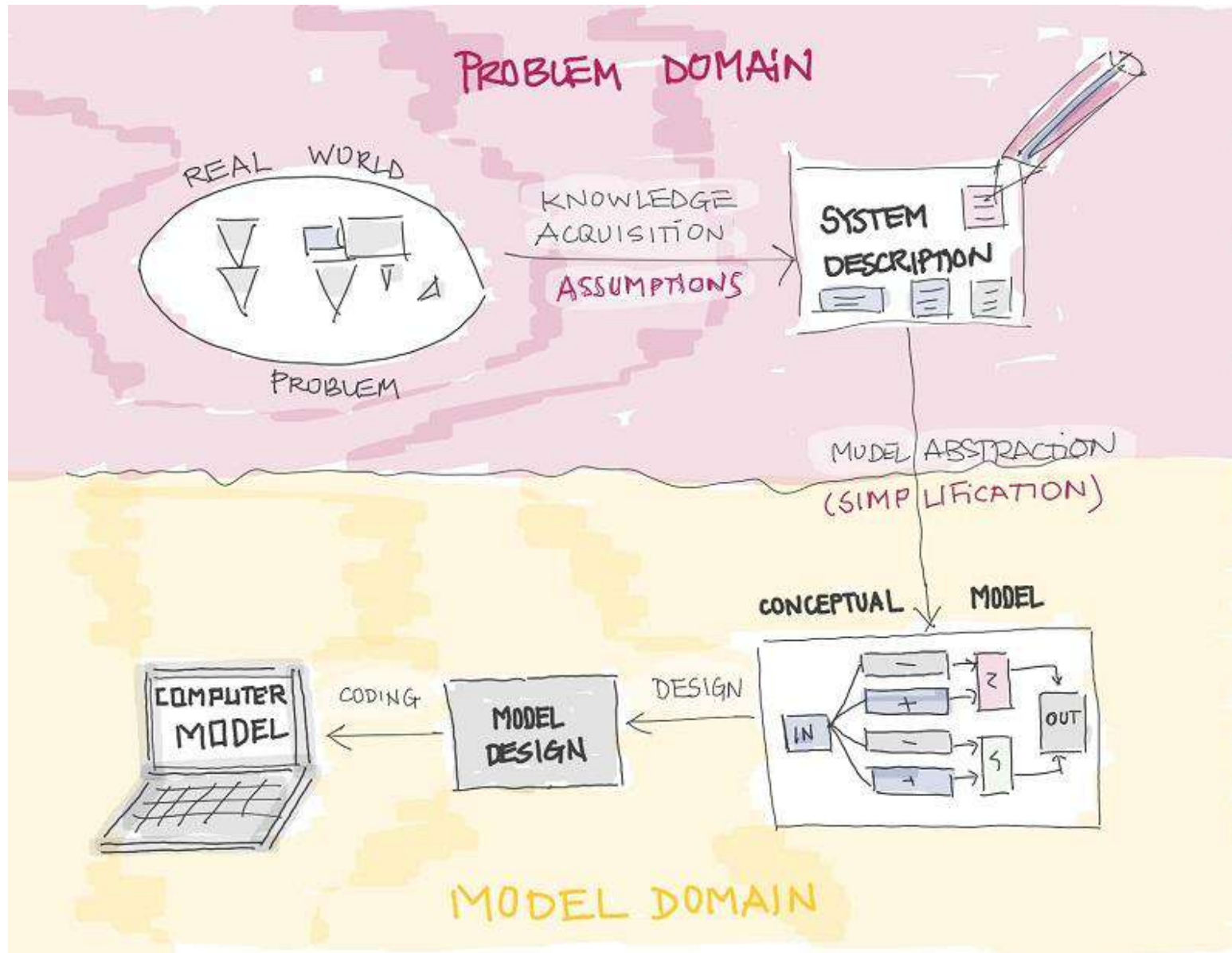
(Saysel & Hekimoğlu, 2013)

AVIATION

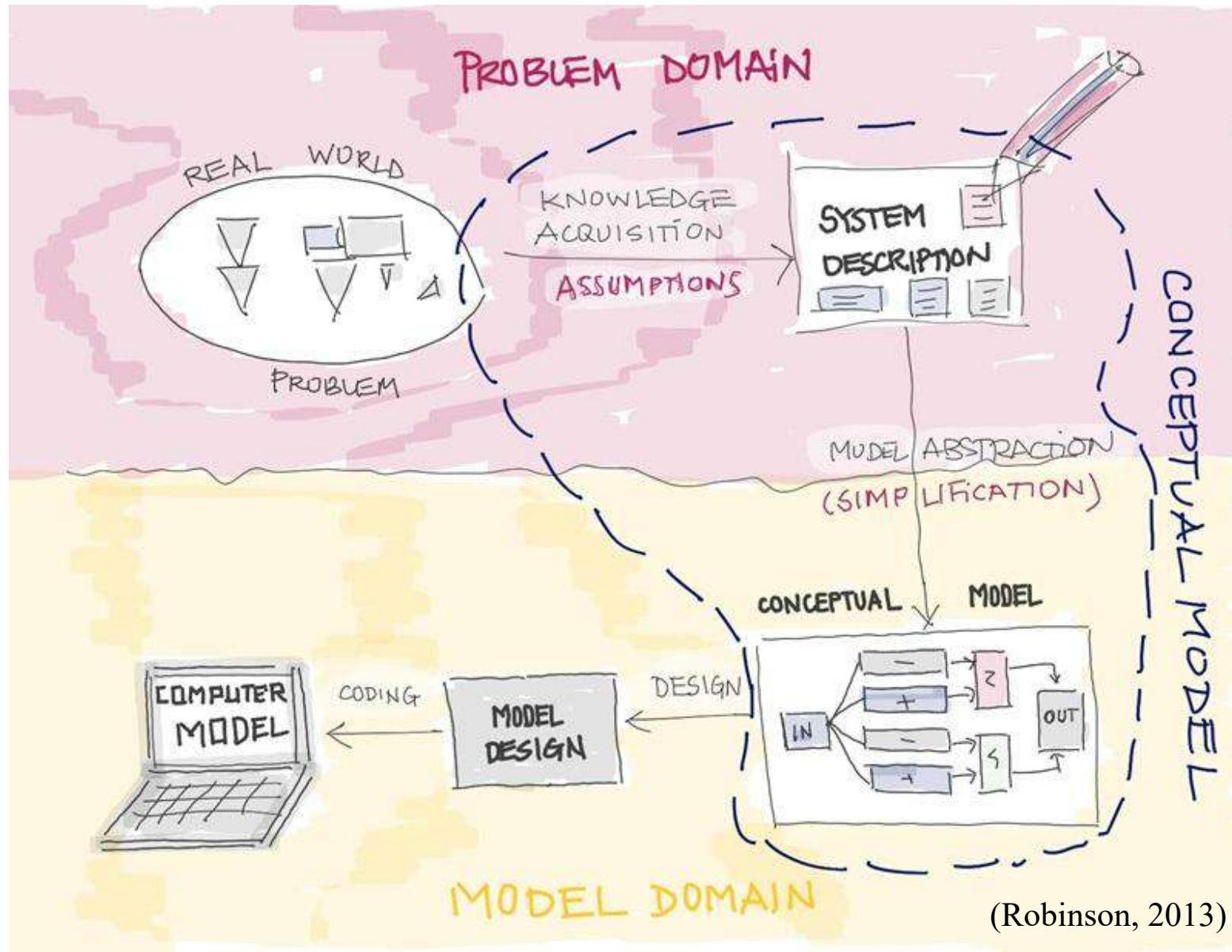


(Tan & Yap, 2015)

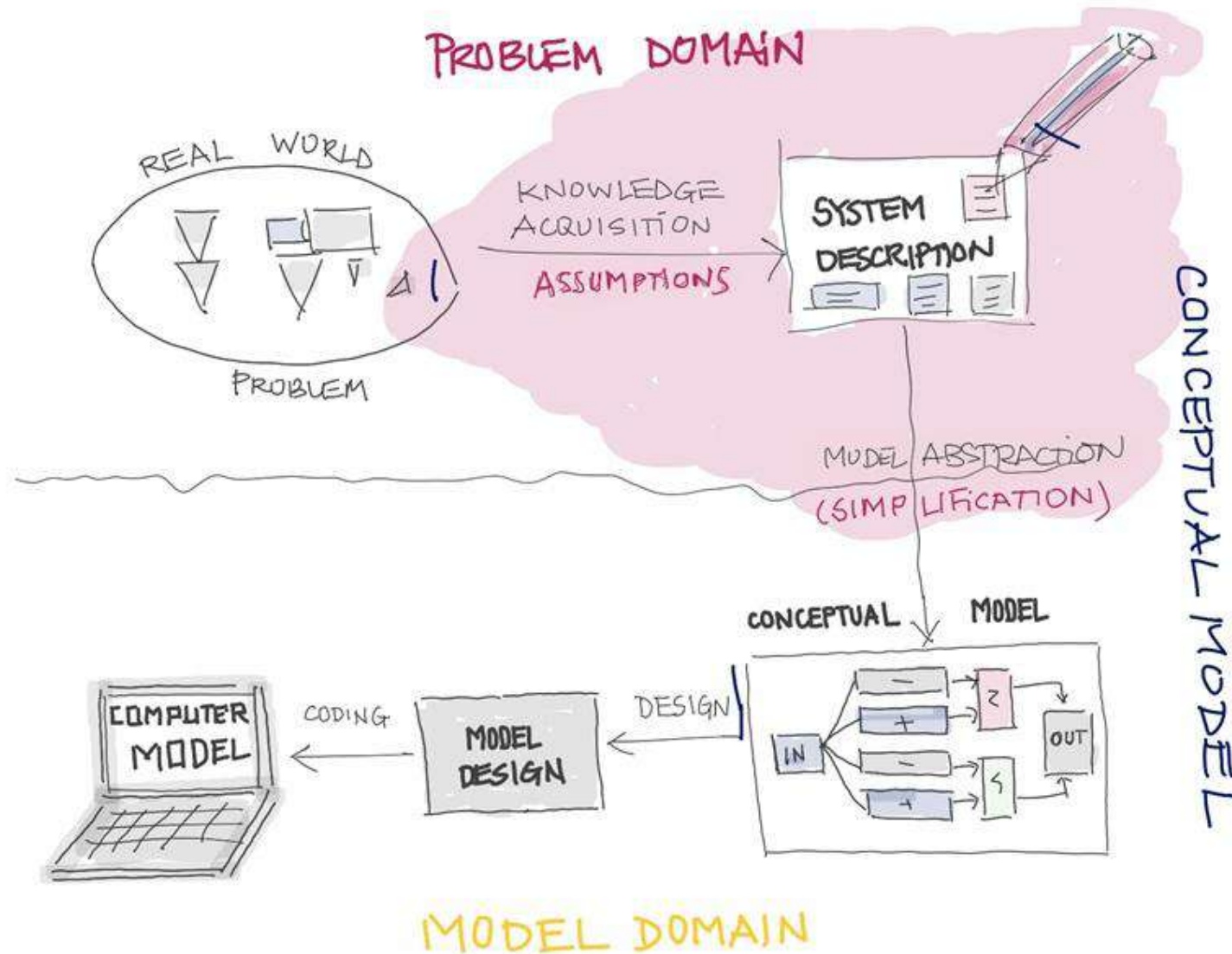
Methodology I: Problem and Model Domain (Robinson, 2013)



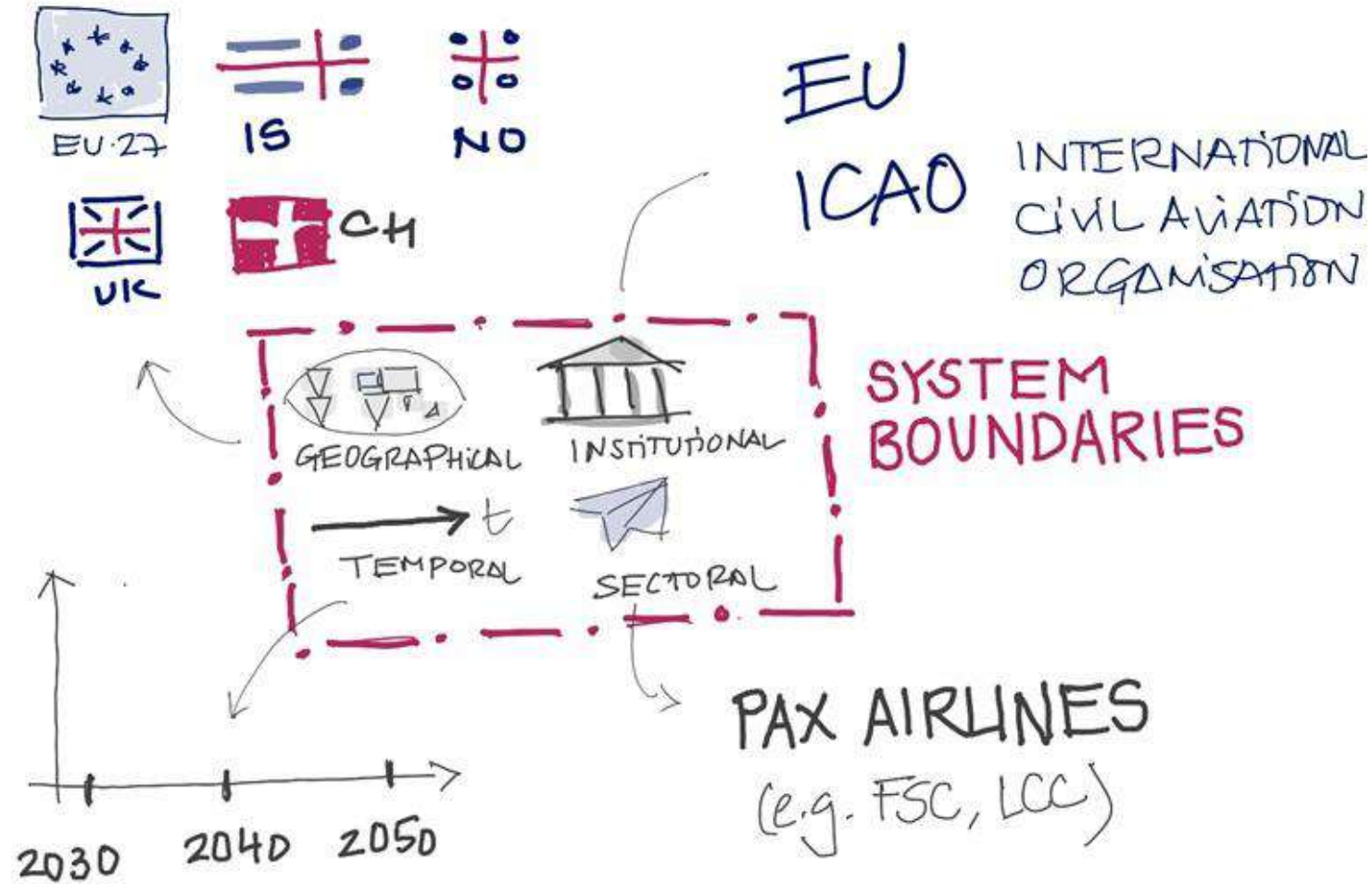
Methodology II: Conceptual modeling for simulation



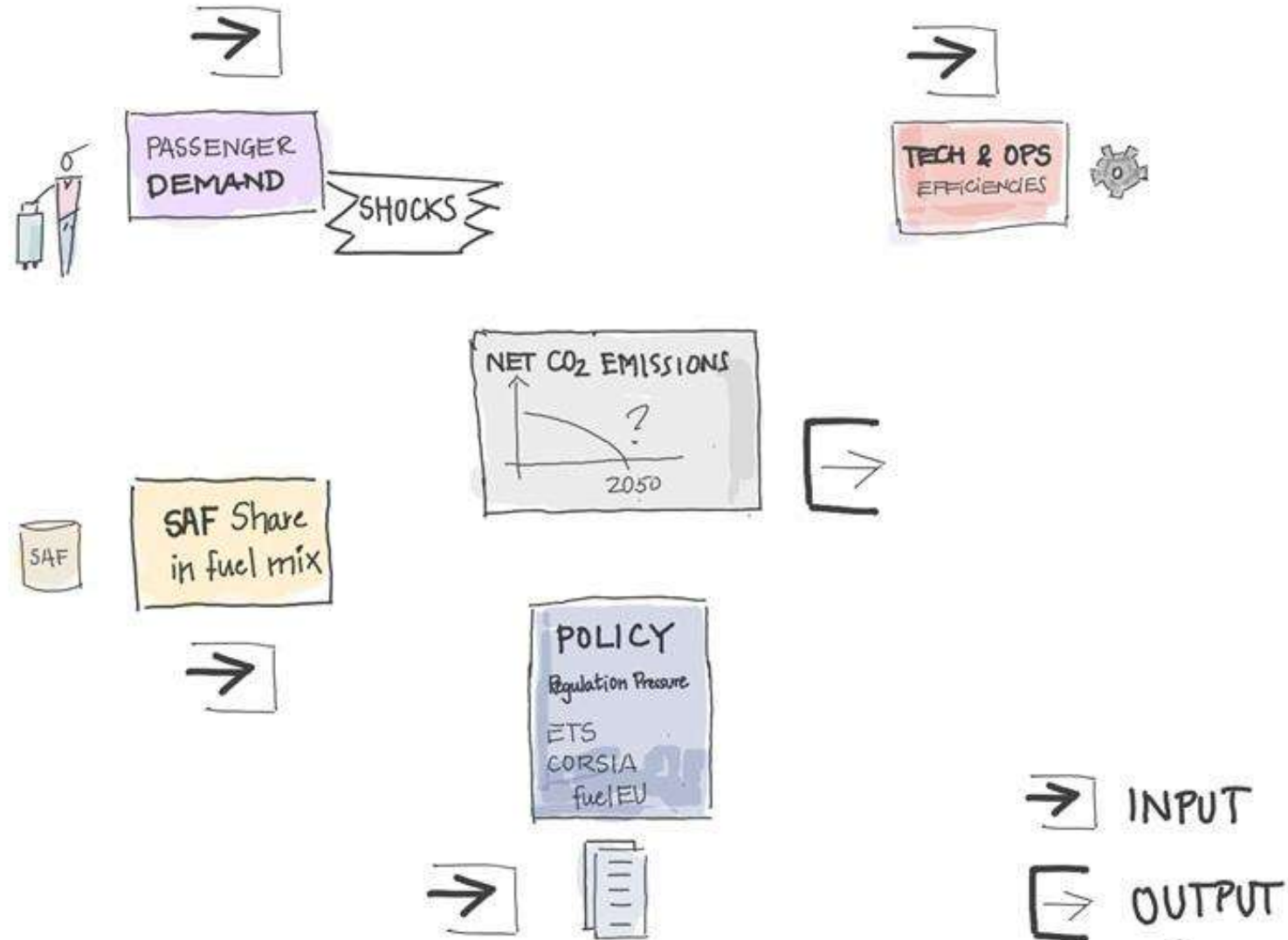
Methodology III: System Description



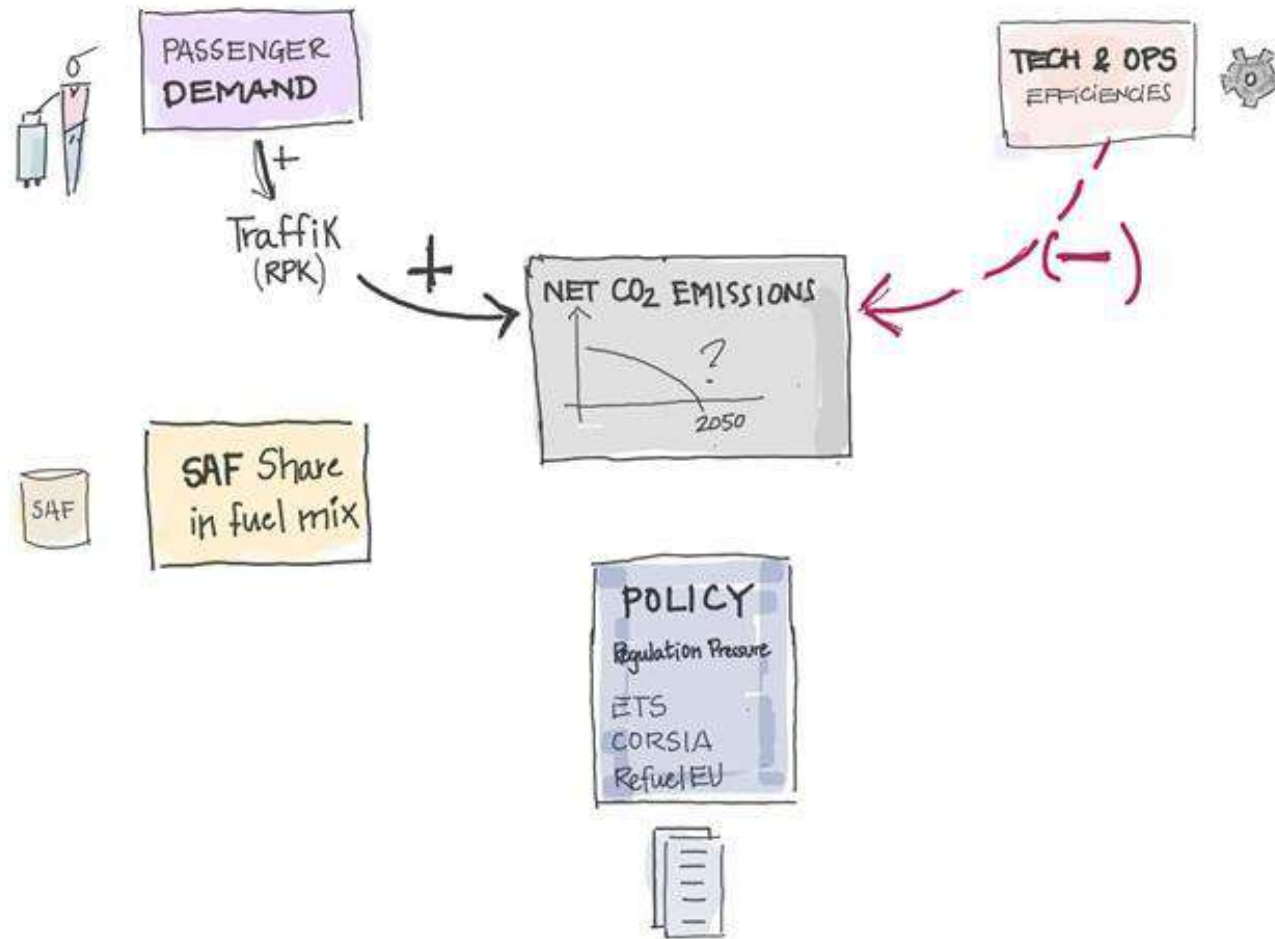
Results I: System Boundaries



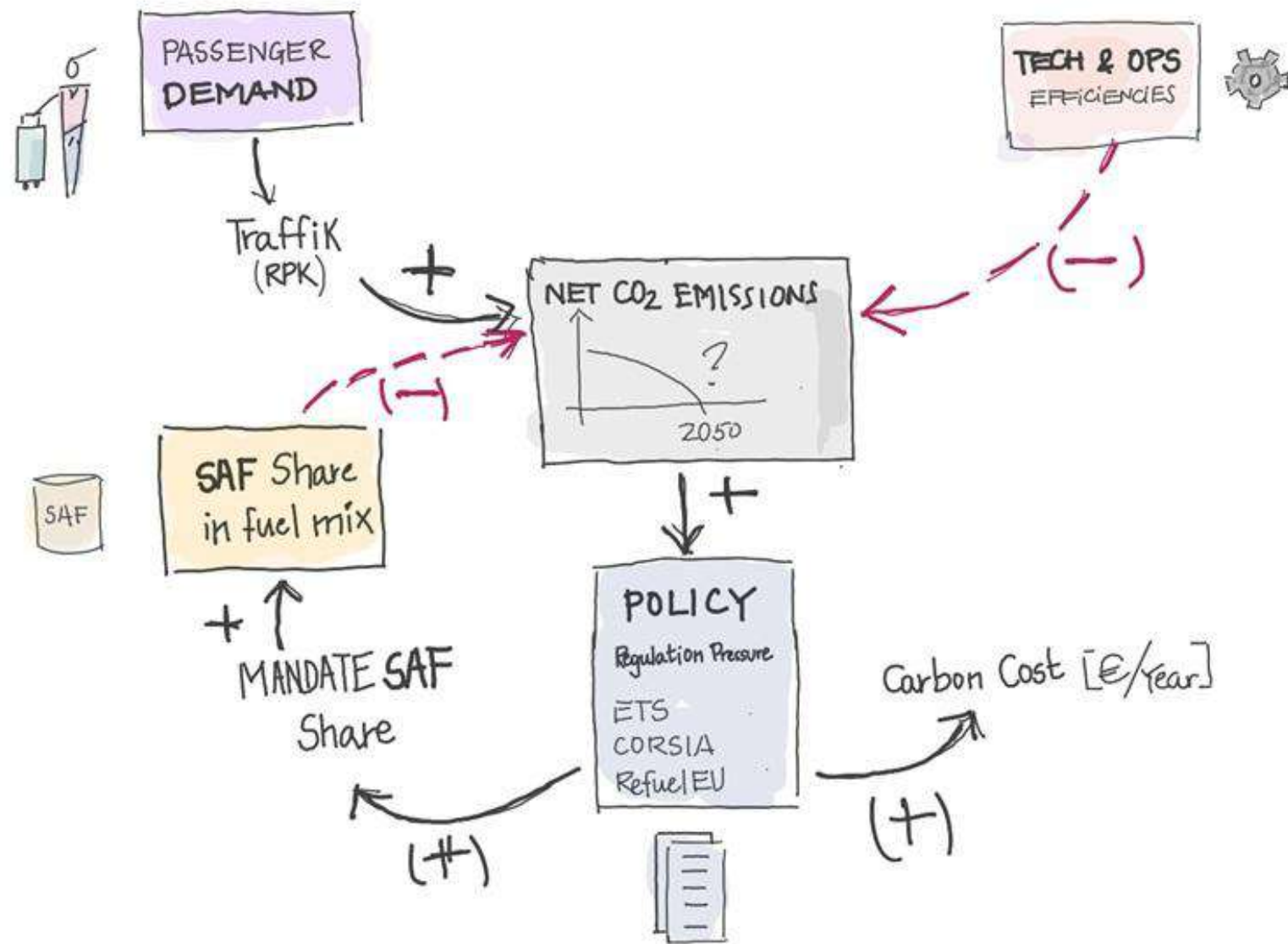
Results II: Core System Entities



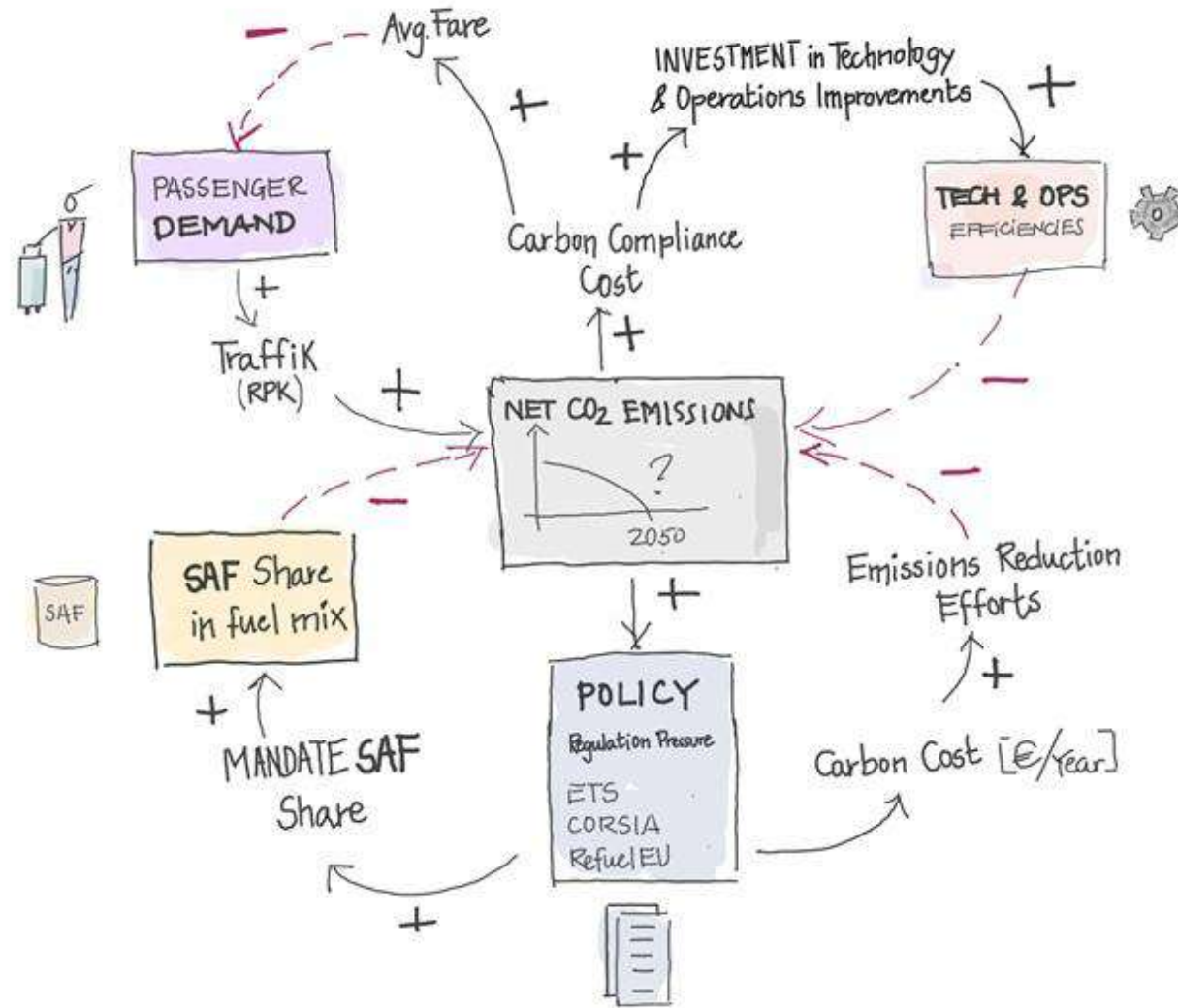
Results III: Casual Diagrams 1 / 3



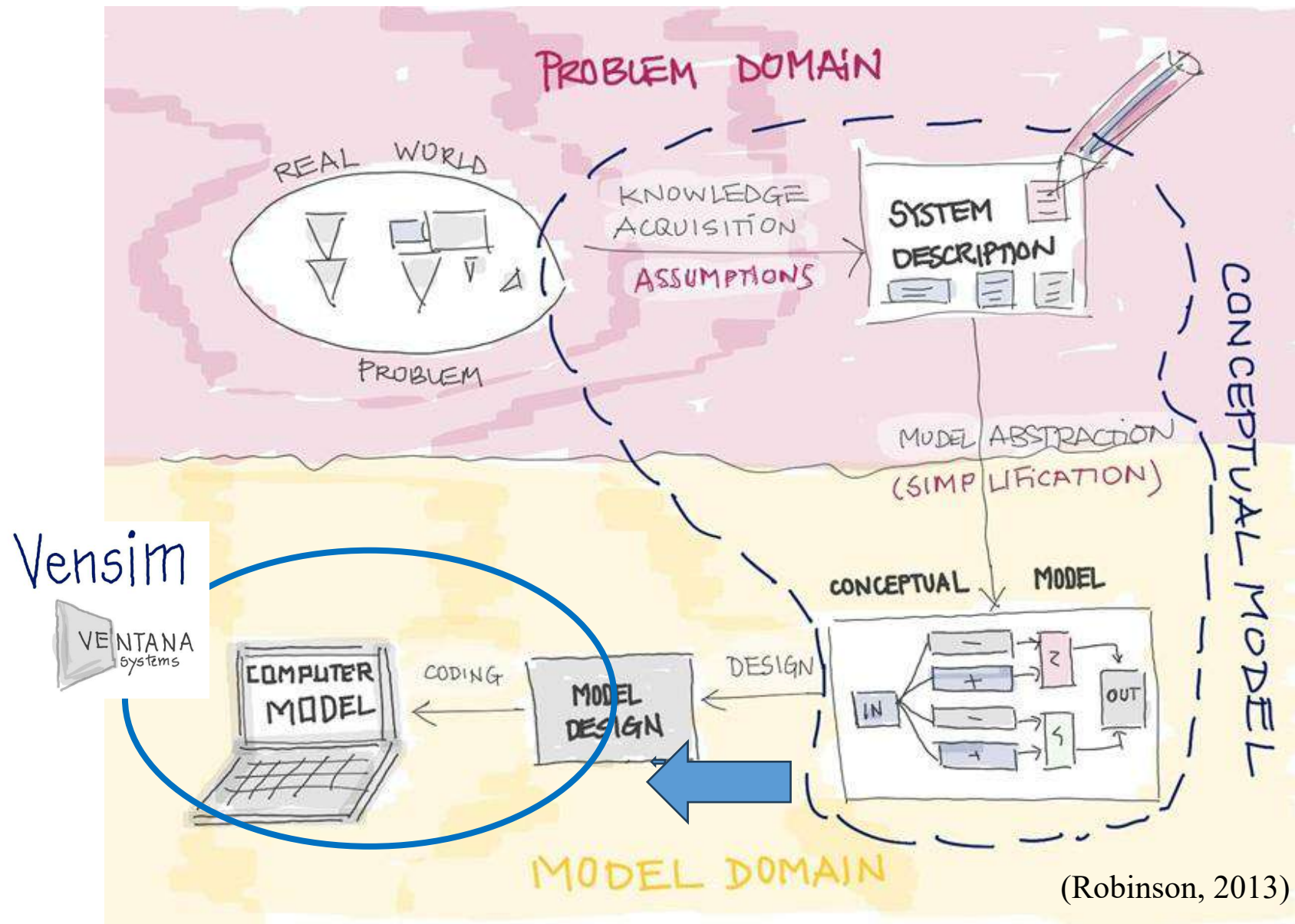
Results III: Casual Diagrams 2 / 3



Results III: Casual Diagrams 3 / 3

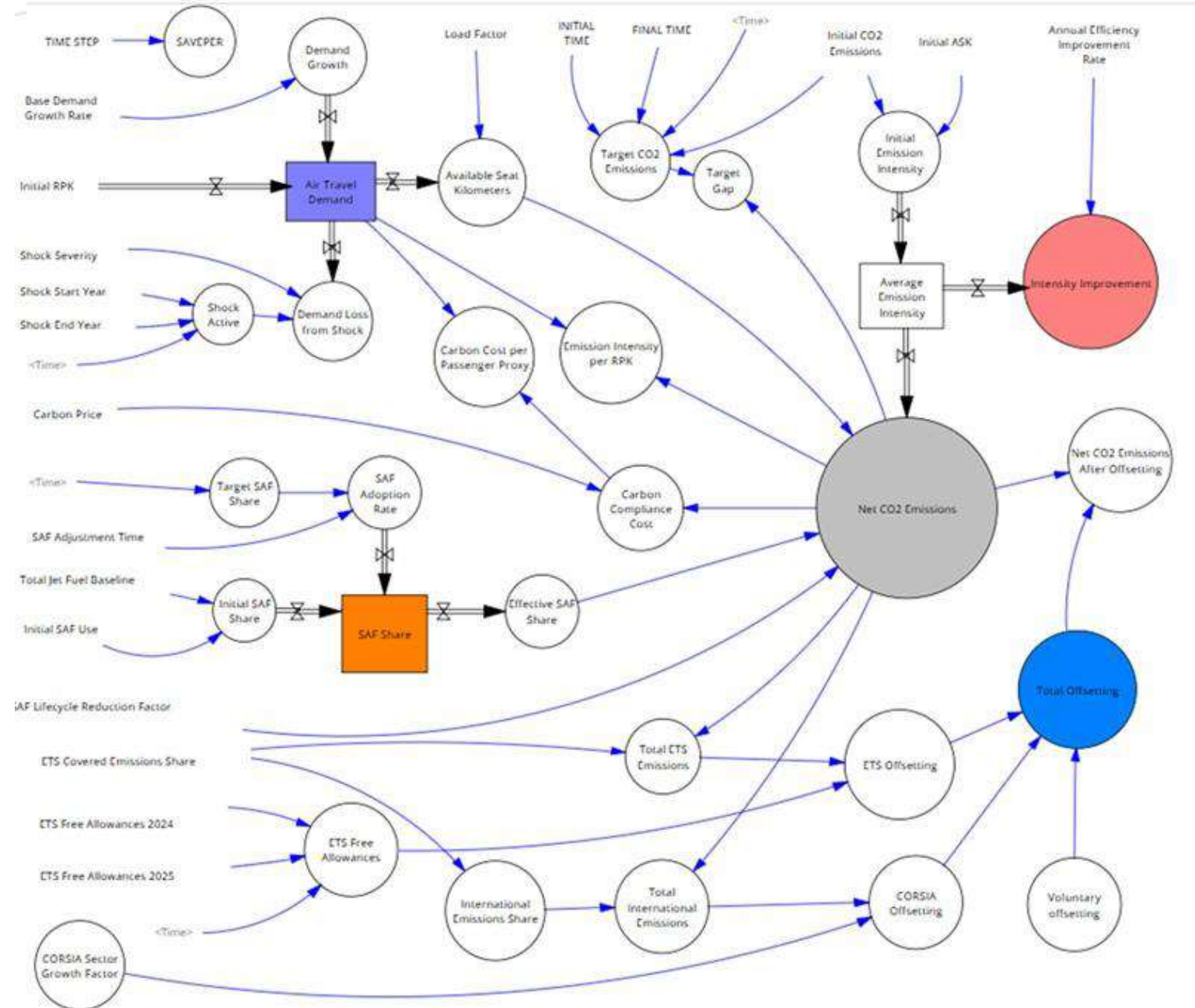


Methodology II: Conceptual modeling for simulation

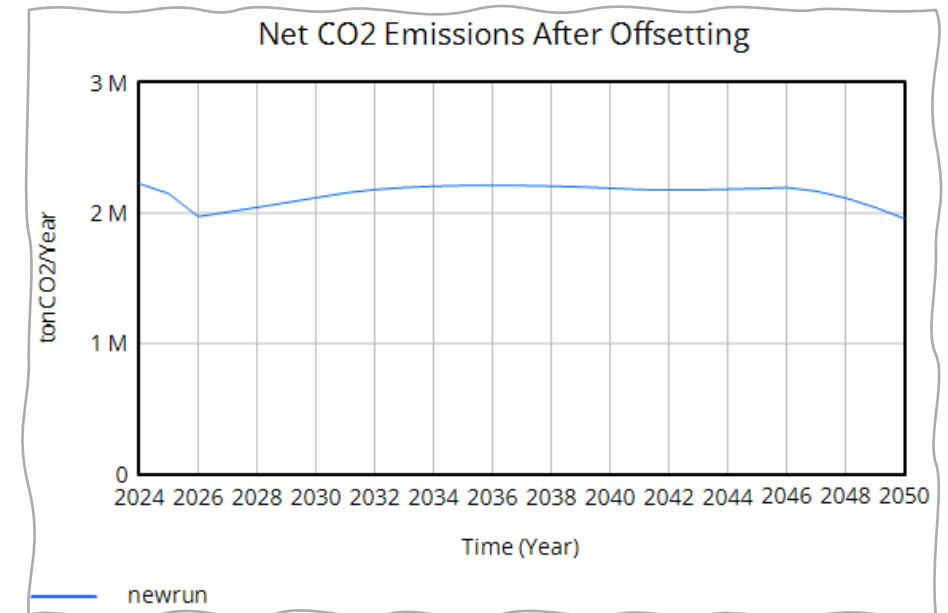
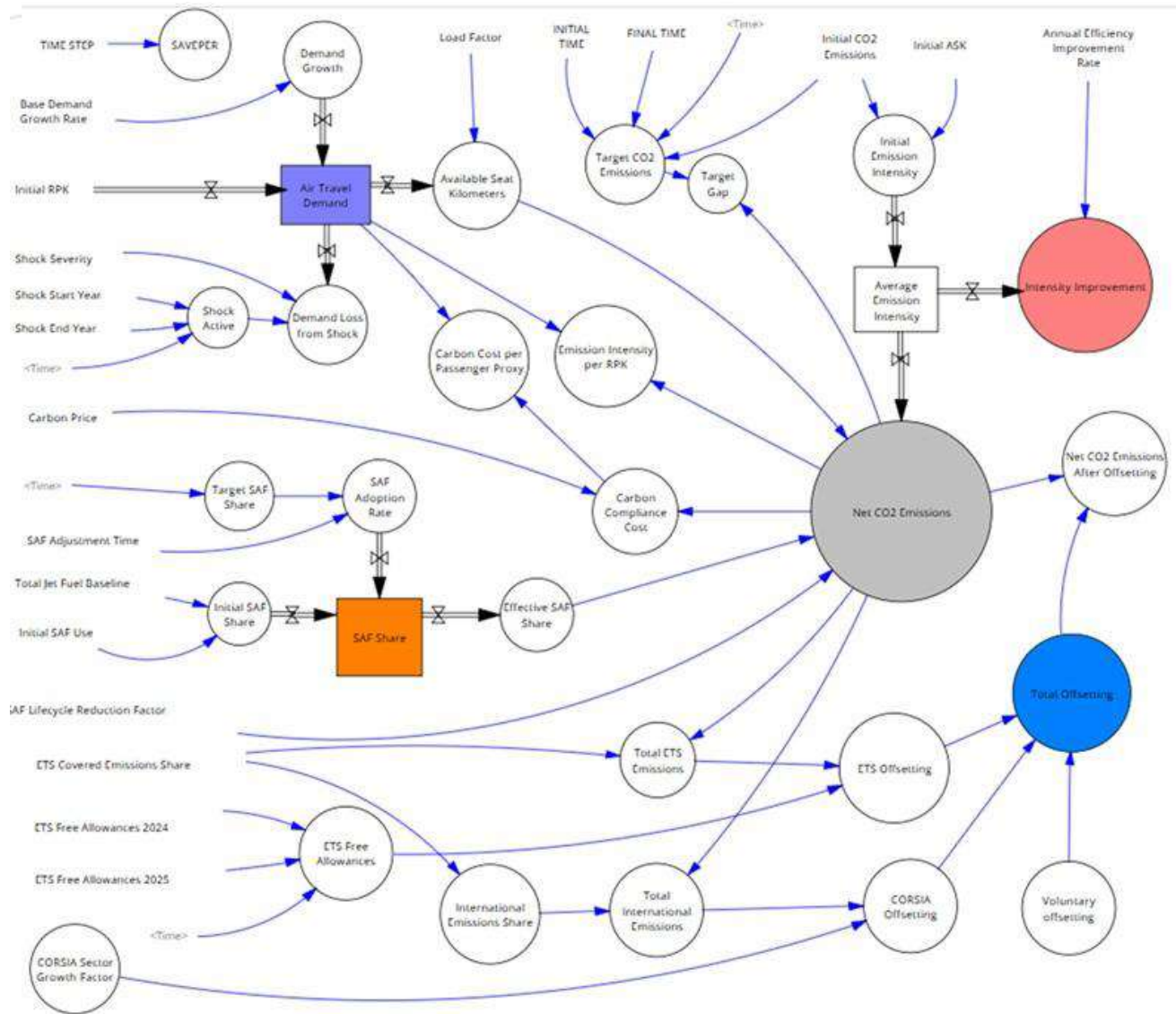


Computer Model

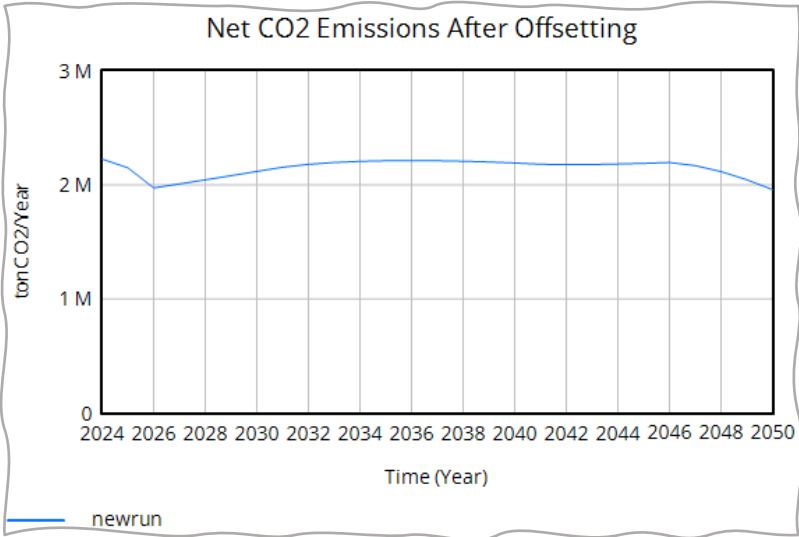
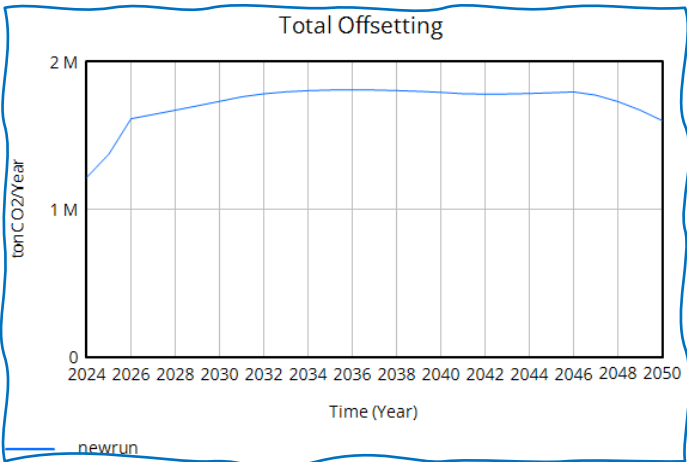
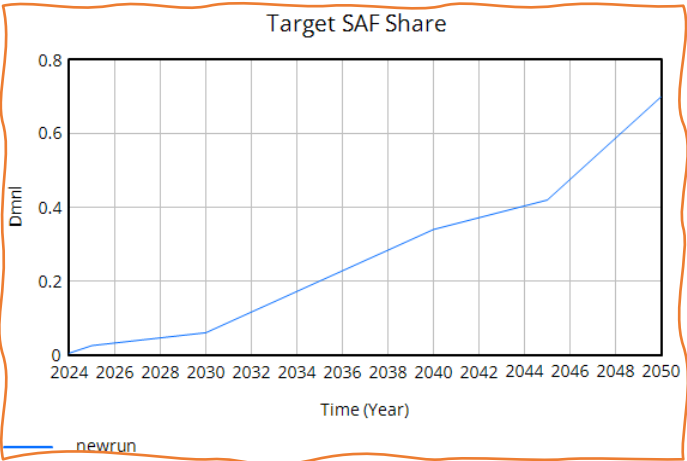
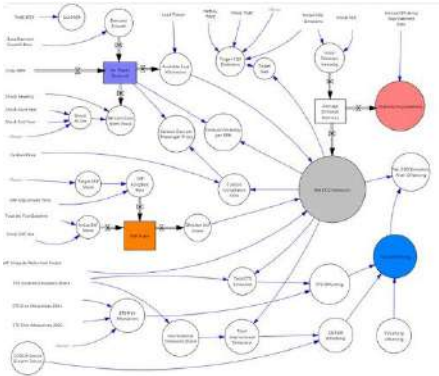
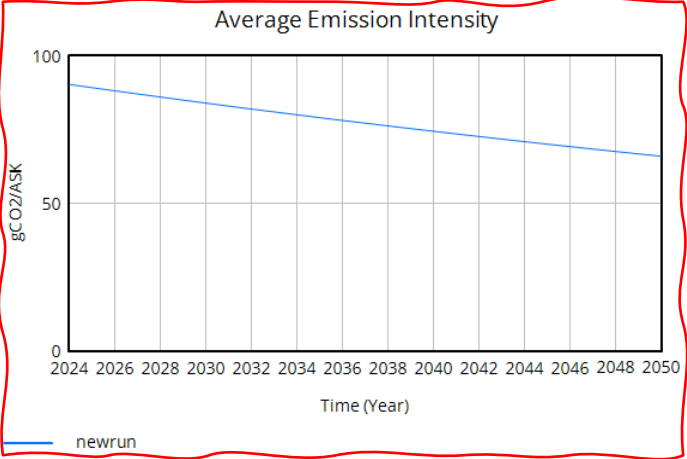
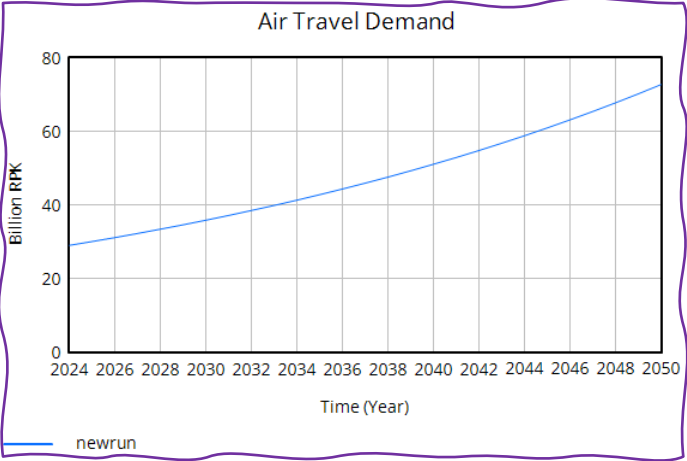
Vensim



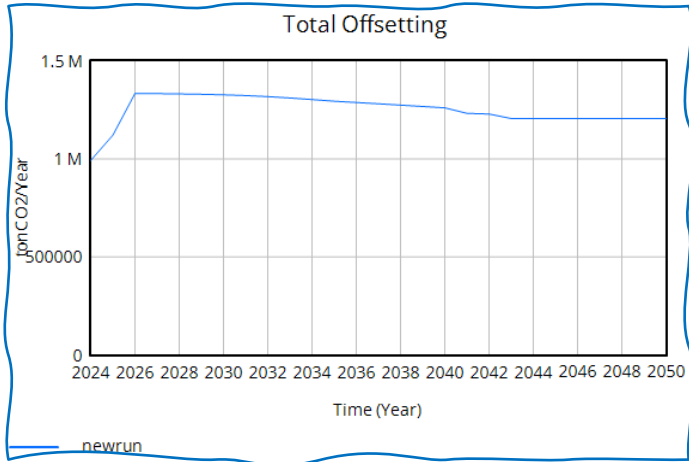
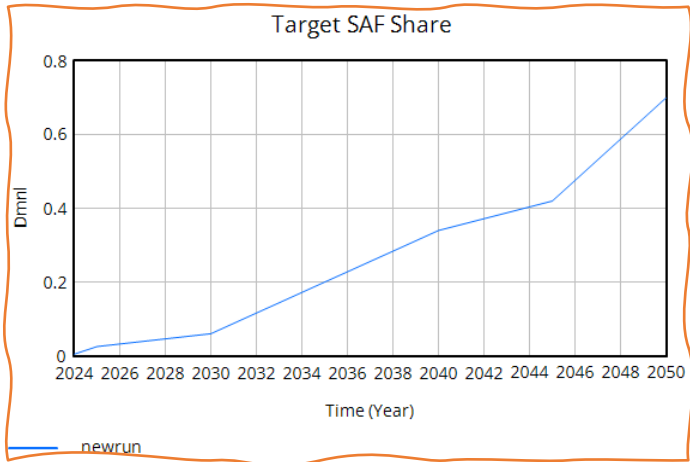
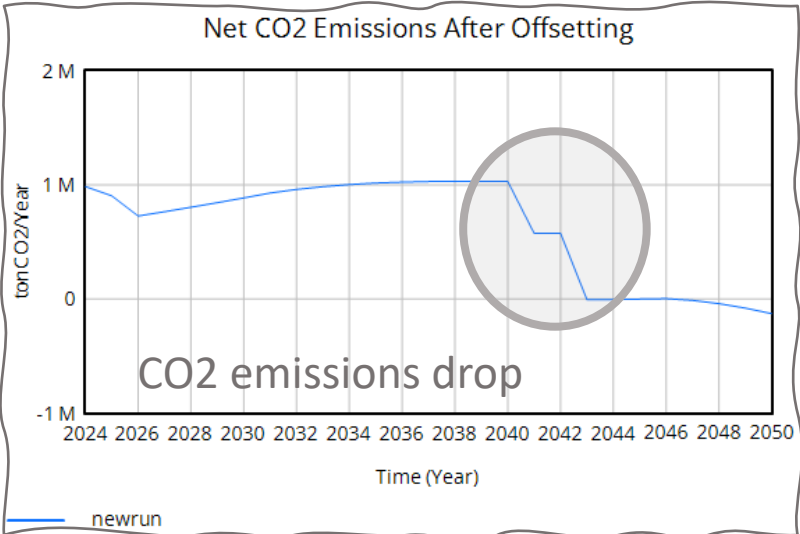
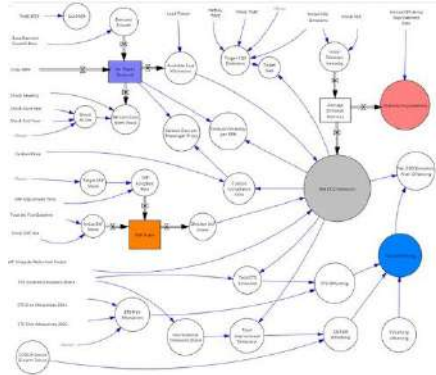
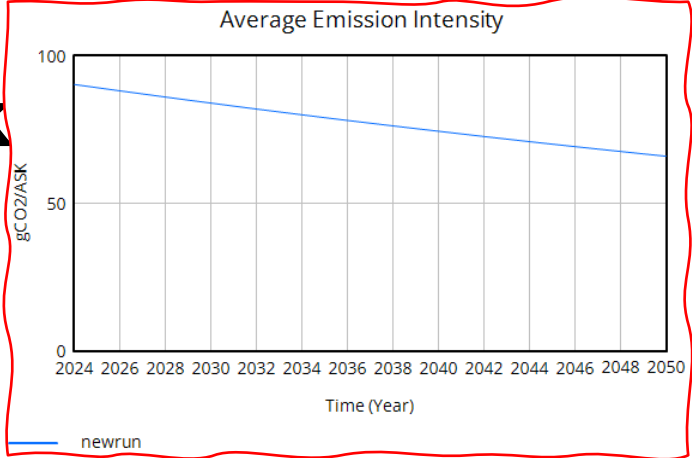
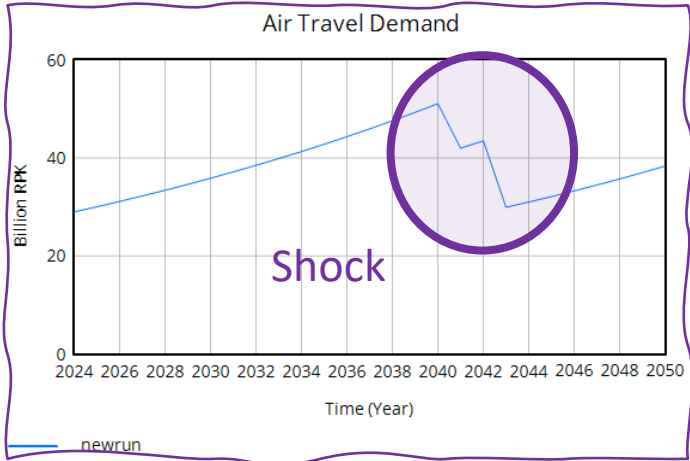
Design of Experiments (DOEs) for one airline



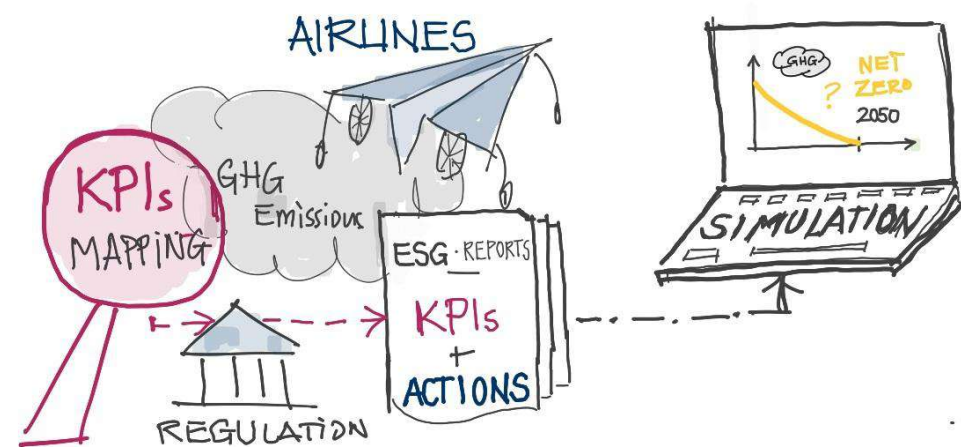
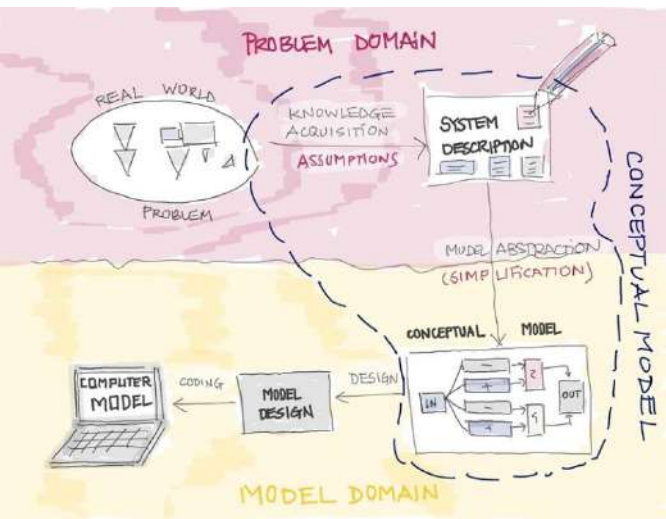
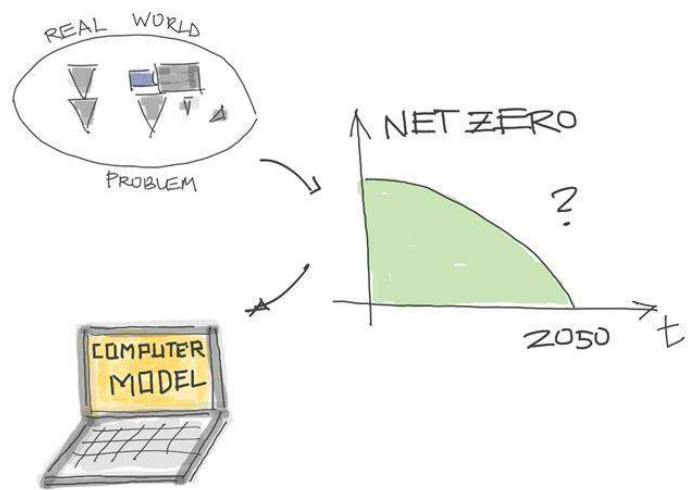
DOE 1/2



DOE 2/2 with Shock



Conclusions & Future Work



AZERO Plus

the platform to be developed in 2027 for airlines, education and policy makers

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Azero2050.eu



DCU, 2nd September 2026



Prof. Marina **Efthymiou**
Dublin City University



Research Fellow Luis **Martín-Domingo**
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Contact: www.LuisMartinDomingo.com



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