

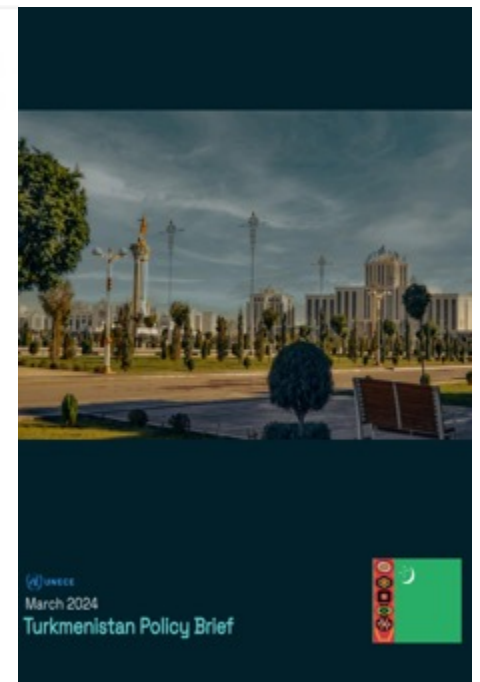
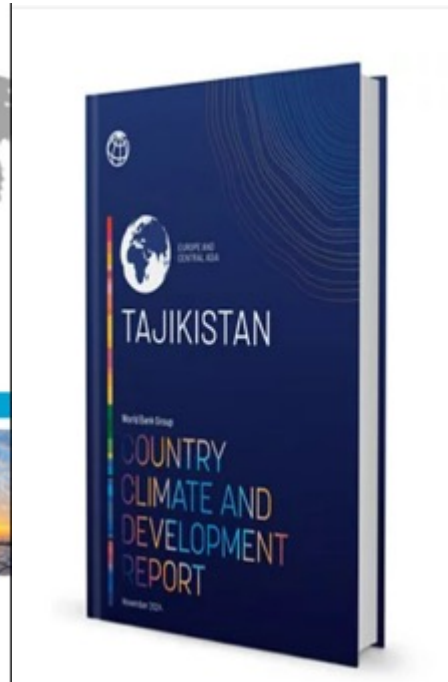
REGIONAL TRAINING ON MODEL-BASED INTEGRATED ENERGY AND CLIMATE ANALYSES

Almaty, 28-31 January 2025

What we have done and where we are heading

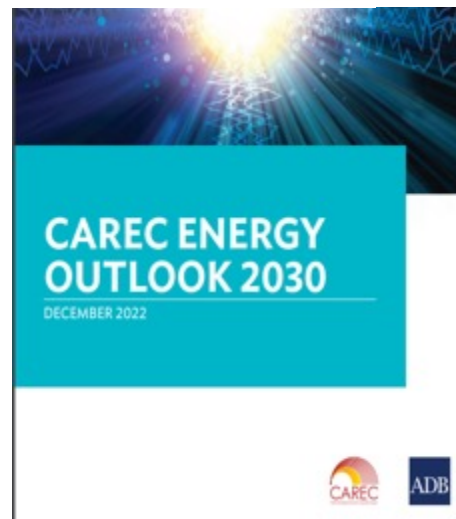
Rocco De Miglio
Expert in energy modelling, SECCA

Energy analyses VS (local) decision-making



And many others...

Analytical instruments



Lack of
understanding

Limited co-creation

Training sessions for country “modelling units”

By the end of the sessions the trainees will have a good understanding of the theoretical background of complex integrated energy and climate analyses, will be able to critically analyse model-based studies and reports and to formulate comments, and will be able to organise data and key factors for simple national and regional modelling exercises

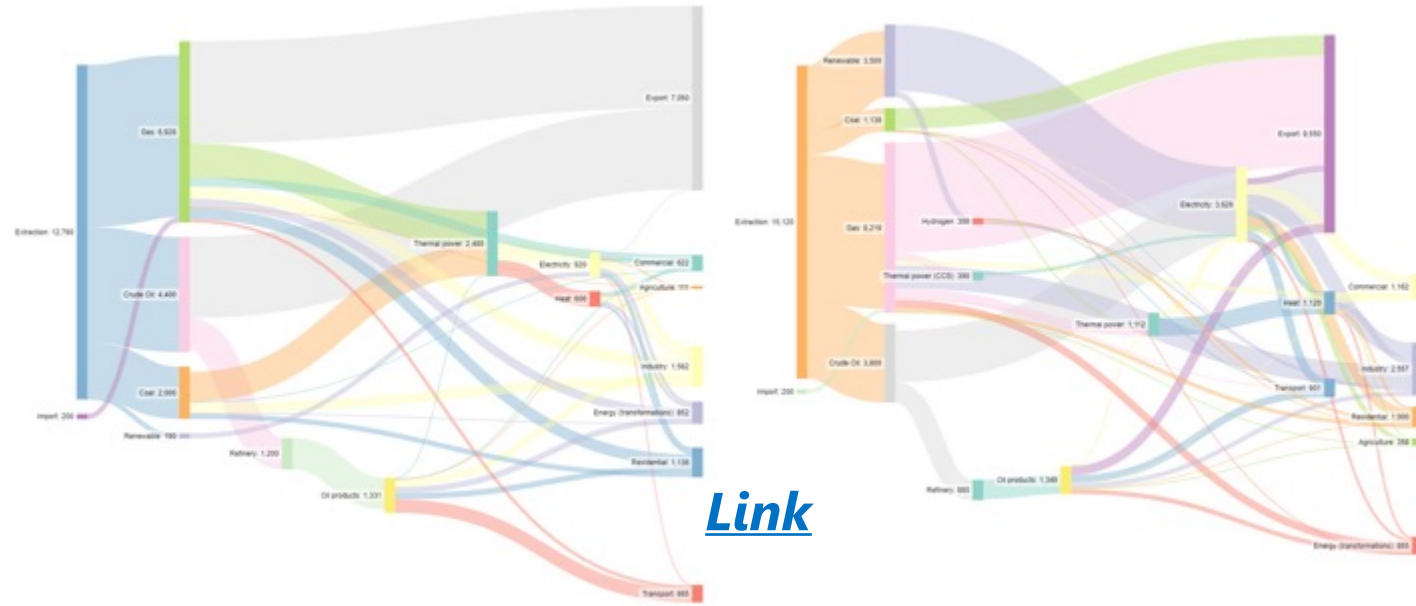
Workstream / Tasks	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Energy systems modelling									
Establishing local "modelling units"									
Introductory meeting (remote)									
Preparation of the training sessions									
Regional seminar/training 1									
Regional seminar/training 2									
Regional seminar/training 3									
Continuous dialogue and co-working									

			PreWorkshop	Workshop1	Homework	Workshop2	Homework	Workshop3	Homework	Total
Name	Position	N. days			up to		up to		up to	
XYZ	Junior country expert - X	Home+Field		4	5	3	5	4	4	25

Session1 (Sept 2024) - recap

Analytical paradigm	Sectoral Coverage	Time horizon	Time resolution
Geographical coverage	Supra-national forces	Technology explicitness	Activity explicitness
Multi-criteria/agents	GHG emissions and environmental impacts	Microeconomic robustness	Capacity to represent macroeconomic feedback
Capacity to represent non-market preferences	Capacity to represent uncertainties	Data requirement	Computing requirements / Tools integration

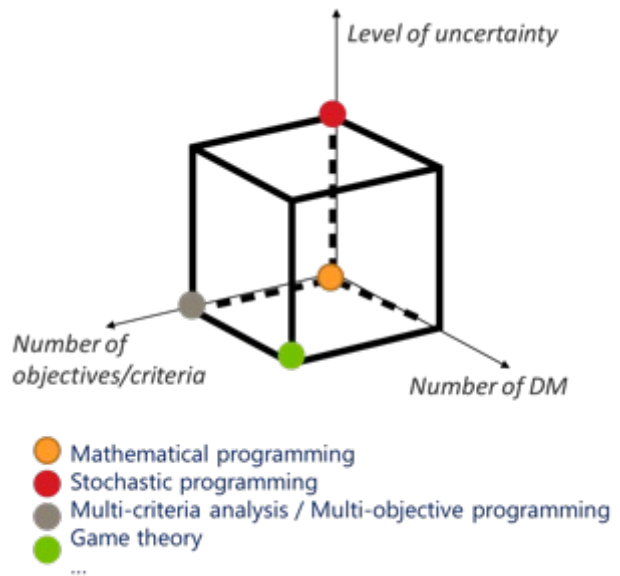
Key driving questions:
 - For what???
 - For whom???



[Link](#)

Techno-economic “key” data
 'International Energy Agency (2023), Global Energy and Climate Model Documentation 2023, IEA, Paris '

Assignment -1 Data collection
 → get familiar with energy&climate data/statistics
 → get familiar with the data gaps
 → understand the challenges/issues of the national system

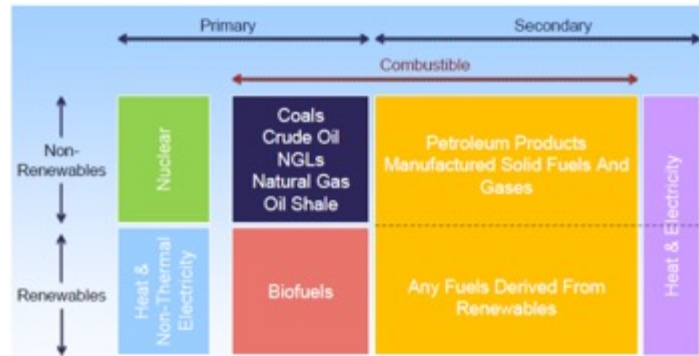


Session2 (Dec 2024) - recap

Presentation of Assignment -1 (country)

- receive comments and suggestions
- share experience with colleagues

Energy statistics – Fundamentals and exercises



Task: Calculate the mass of the one-filled car reservoir of 50 litres or how many kilograms have 50 litres of gasoline and 50 litres of diesel?

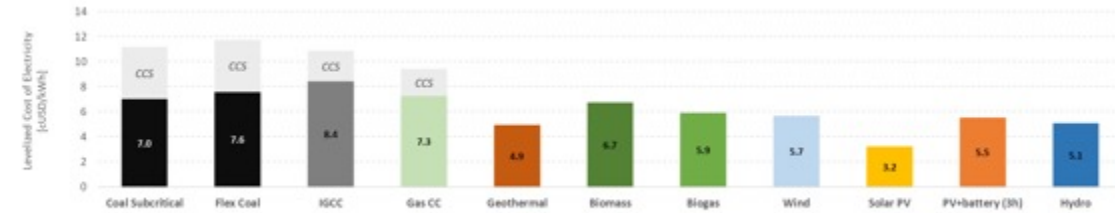
Answer:

50 liters of gasoline = 50 lit * 0,724 kg/lit = 37,1 kg of gasoline
 50 liters of diesel = 50 lit * 0,85 kg/lit = 42,5 kg of diesel

Conclusion
 The same volume of diesel is 14,5 % heavier than gasoline

		COA	GAS	OIL	DSL	KER	LPG	GSL	NAP	HFD	OPP	NUC	BIO	HYD	WIN	SOL	SLU	HET	ELC	TOT
		Solid Fuels	Natural Gas	Crude Oil	Diesel oil	Kerosenes	LPG	Motor spirit	Heavy Fuel Oil	Other Petroleum Products	Nuclear Energy	Biomass	Hydro power	Wind energy	Solar energy	Industrial Wastes	Derived Heat	Electricity	Total	
MIN	PRIMARY																			
	Domestic Supply	8098	7898	5373	0	0	0	0	0	0	9900	3016	1005	754	251	0	0	0	0	36297
	Imports	6463	13232	27649	4410	1210	652	1320	1366	2199	1194	0	113	0	0	0	0	0	0	1168
	Exports	-1947	-2516	-3297	-3366	-591	-389	-3001	-802	-2479	-906	0	-72	0	0	0	0	0	0	-1127
TPC	Total Primary Supply	13414	18675	23724	1044	613	263	-1681	565	-319	286	3900	3057	1005	754	251	0	0	0	41
ESC	CONVERSION																			
	Energy Sector Consumption	-58	-793	-33	0	1058	-329	-1	-412	0	-4	0	0	0	0	-2	0	0	0	-2689
	Electricity Plants	-9588	-5636	-50	0	-48	0	0	-1050	-57	-8900	-703	-1005	-754	-136	-33	1738	11681	0	-15671
	Heat Plants	-161	-301	-15	0	0	0	0	-30	-4	0	0	-140	0	0	-2	659	0	0	5
	Petroleum Refineries	0	0	-31736	11403	1939	2173	6710	1941	4570	2600	0	0	0	0	0	0	0	0	-402
	Total Conversion	-9817	-6730	-31736	11295	1939	1067	6381	1939	3076	2529	-3900	-848	-1005	-754	-136	-36	2396	11681	0
RSD	FINAL																			
	Residential	257	5160	1724	146	380	6	0	31	2	0	1194	0	0	100	0	865	2572	0	12637
	Commercial	57	1752	738	3	63	11	0	39	0	0	52	0	0	15	1	255	2527	0	5514
	Industry	1697	4437	597	73	286	16	88	572	383	0	722	0	0	0	117	634	4088	0	13910
	AGRI	44	201	733	1	32	3	0	27	0	0	63	0	0	0	0	16	19	0	1141
	TRA	1	-21	7713	2095	188	4788	0	66	0	0	161	0	0	0	0	0	266	0	15300
	OTH	1189	0	0	0	0	0	0	0	0	0	0	0	0	0	0	627	650	0	2466
	Non Energy	52	634	153	10	400	8	1788	104	1601	0	0	0	0	0	0	0	0	0	4759
	Losses	0	0	294	0	0	0	0	0	1894	13	0	0	0	0	0	0	0	0	2111
	Total Final Consumption	3597	12205	11952	2328	1350	4831	1887	2644	2000	0	2192	0	0	115	118	2396	10423	0	0

Simple LCOE calculation (.xls)



<https://rezoning.energydata.info/>

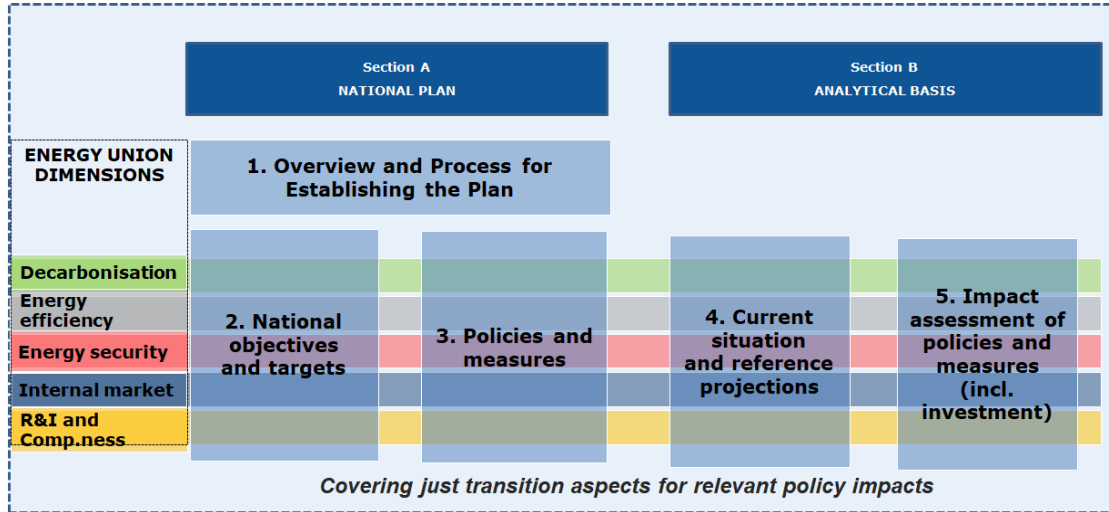


Assignment -2 Country Policies and Measures

- get familiar with the existing energy&climate PaMs
- get familiar with the future plans
- understand the challenges/issues of the national system
- propose hypothetical instruments

Session3 (Jan 2025) - agenda

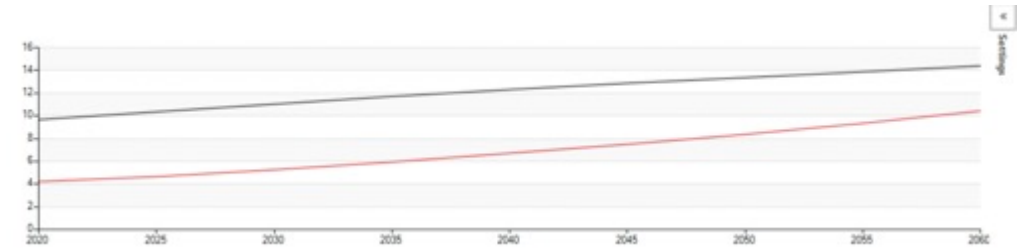
Design and implementation of National Energy and Climate Plan (NECP) in EU Member States (EU MS) in Energy Community Contracting Parties (EnC CP)



Presentation of Assignment - 2 (country)

- compare with the NECP experience
- receive comments and suggestions
- share experience with colleagues
- *discuss the specific "modelling" and "data" requirements to translate/explore the PaM*

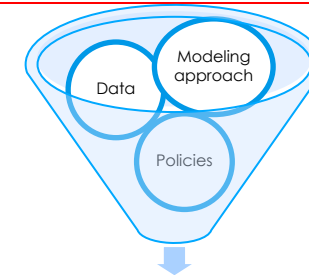
Simple demand projections calculator (.xls)



Timeslices - Fractions (.xls)

Basic settings					0.25	0.25	0.25	0.25			0.17	0.17	0.17	0.17	0.17	0.17
Demand/Timeslice	R	S	F	W					N	L	M	D	A	E		
1 Residential-Water heating	0.25	0.25	0.25	0.25	1.00				0.083	0.250	0.167	0.167	0.167	0.167	1.00	
2 Residential-Space cooling	0.25	0.50	0.25	0	1.00				0.000	0.200	0.200	0.200	0.200	0.200	1.00	
3 Residential-Space heating	0.25	0.00	0.25	0.42	1.00				0.167	0.167	0.167	0.167	0.167	0.167	1.00	
4 Residential-Lighting	0.25	0.17	0.25	0.33	1.00				0.083	0.250	0.167	0.083	0.167	0.250	1.00	
5 Residential-Appliances	0.25	0.25	0.25	0.25	1.00				0.000	0.200	0.200	0.200	0.200	0.200	1.00	
6 Residential-Cooking	0.25	0.25	0.25	0.25	1.00				0.000	0.200	0.200	0.200	0.200	0.200	1.00	
7 Residential-Clothes washing	0.25	0.25	0.25	0.25	1.00				0.000	0.250	0.250	0.250	0.250	0.000	1.00	
8 Residential-Dish washing	0.25	0.25	0.25	0.25	1.00				0.000	0.250	0.250	0.250	0.250	0.000	1.00	
9 Residential-Refrigeration	0.25	0.25	0.25	0.25	1.00				0.167	0.167	0.167	0.167	0.167	0.167	1.00	
10 Tertiary-Public-Water heating	0.25	0.25	0.25	0.25	1.00				0.083	0.250	0.167	0.167	0.167	0.167	1.00	
11 Tertiary-Public-Space cooling	0.25	0.50	0.25	0.00	1.00				0.000	0.200	0.200	0.200	0.200	0.200	1.00	
12 Tertiary-Public-Space heating	0.25	0.00	0.25	0.42	1.00				0.167	0.167	0.167	0.167	0.167	0.167	1.00	
13 Tertiary-Public-Lighting	0.25	0.17	0.25	0.33	1.00				0.083	0.208	0.208	0.208	0.208	0.083	1.00	
14 Tertiary-Public-Appliances	0.25	0.17	0.25	0.33	1.00				0.083	0.208	0.208	0.208	0.208	0.083	1.00	
15 Tertiary-Public-Cooking	0.25	0.25	0.25	0.25	1.00				0.000	0.200	0.200	0.200	0.200	0.200	1.00	
16 Tertiary-Public-Refrigeration	0.25	0.25	0.25	0.25	1.00				0.167	0.167	0.167	0.167	0.167	0.167	1.00	
17 Tertiary-Service-Water heating	0.25	0.25	0.25	0.25	1.00				0.083	0.250	0.167	0.167	0.167	0.167	1.00	
18 Tertiary-Service-Space cooling	0.25	0.50	0.25	0.00	1.00				0.000	0.200	0.200	0.200	0.200	0.200	1.00	
19 Tertiary-Service-Space heating	0.25	0.00	0.25	0.42	1.00				0.167	0.167	0.167	0.167	0.167	0.167	1.00	
20 Tertiary-Service-Lighting	0.25	0.17	0.25	0.33	1.00				0.083	0.208	0.208	0.208	0.208	0.083	1.00	
21 Tertiary-Service-Appliances	0.25	0.17	0.25	0.33	1.00				0.083	0.208	0.208	0.208	0.208	0.083	1.00	
22 Tertiary-Service-Cooking	0.25	0.25	0.25	0.25	1.00				0.000	0.200	0.200	0.200	0.200	0.200	1.00	
23 Tertiary-Service-Refrigeration	0.25	0.25	0.25	0.25	1.00				0.167	0.167	0.167	0.167	0.167	0.167	1.00	
24 Street Lighting	0.25	0.17	0.25	0.33	1.00				0.250	0.187	0.083	0.056	0.167	0.278	1.00	
25 Industry	0.25	0.19	0.25	0.31	1.00				0.167	0.167	0.167	0.167	0.167	0.167	1.00	
26 Agriculture	0.25	0.25	0.25	0.25	1.00				0.042	0.208	0.250	0.250	0.208	0.042	1.00	
27 Transport	0.25	0.25	0.25	0.25	1.00				0.083	0.208	0.208	0.208	0.208	0.083	1.00	

Assignment - 3 Country Energy Note/Brief



Technical note

Session3 - Next steps

Purpose of the final assignment

- To demonstrate the young professional's new knowledge and skills (understanding of the training sessions)
- To apply "theoretical" knowledge to practical problems (country-specific)
- To analyse, interpret, or evaluate information critically
- To present well-reasoned / structures arguments or proposals (deliverable)



Context, problems statement and key issues to investigate, proposed instruments and goals, methodology and data requirements / gaps, role of stakeholders involved, areas for future research or action, etc.

- To provide proposals and ideas for **future** developments of country analyses and tools (next phase)

Weaknesses / Hot topics

Country-specific / Multi-regional CA

***Need for Integrated Analysis
(against stand-alone/sectoral analyses)***

Energy security

Energy efficiency measures

Advanced Technology

“Watergy”
(integration water-energy)

H2 market (I/E)
Promotion of H2 domestic use

Integration with power system analyses (renewables)

Regional integration – cooperation
Trades / Trading schemes

International funds
(eg Belt and Road Initiative)

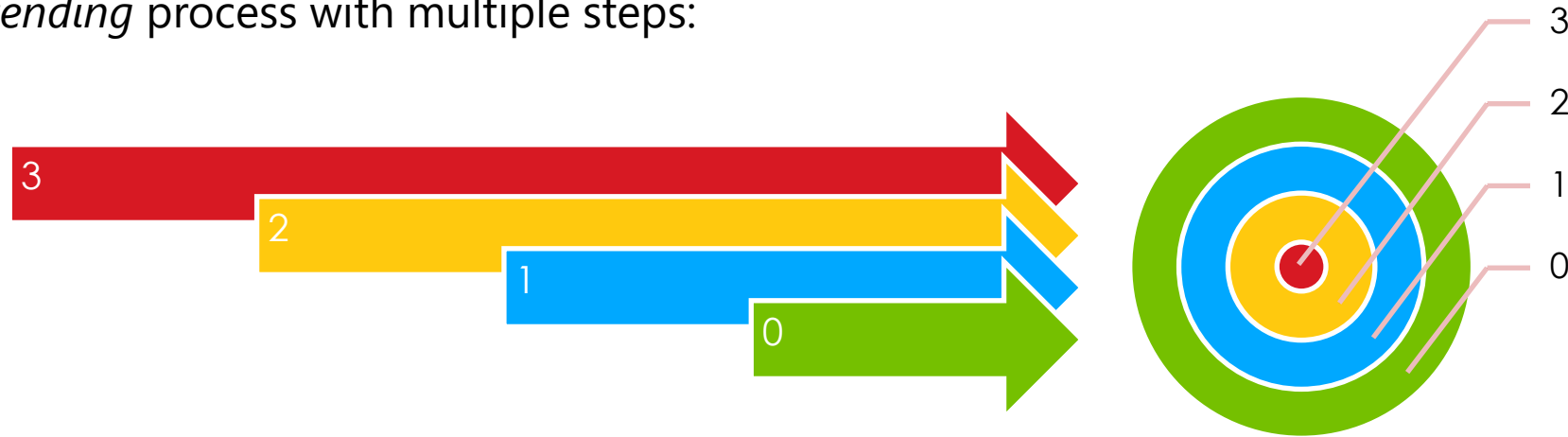
Risks (CBAM)

Tariffs
(energy subsidies)

Variants/Uncertainties
(prices, technologies, targets)

Modelling in energy&climate policy development

A simplified *ascending* process with multiple steps:



0: organise a proper data collection and analysis (at sectoral level)

0 → 1: move towards a system-oriented approach and a more explicit representation of the key factors involved

1 → 2: design scenarios to explore different combinations of factors (eg goals, policies, uncertainties)

2 → 3: integration of non-energy sectors/components to consider multiple dimensions of the sustainability of the strategies.

Training sessions for country “modelling units”

What are your critical strategic questions in the energy&climate domain?
The SECCA project can help you formulating and investigating them

Think “out of
the box”

Evidence-
based decision
making

Environment for
Dialogue /
Cooperation /
Transparency

Inter- and Trans-
disciplinarity

THANK YOU!

Eng. Rocco De Miglio
Energy systems modeller and analyst

