SECCA
Sustainable Energy Connectivity in Central Asia

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THE ONLINE INITIAL TRAINING WORKSHOP ON ENERGY MODELLING

Online, 27 March 2025

SECCA training sessions for country modeling units: what we have done

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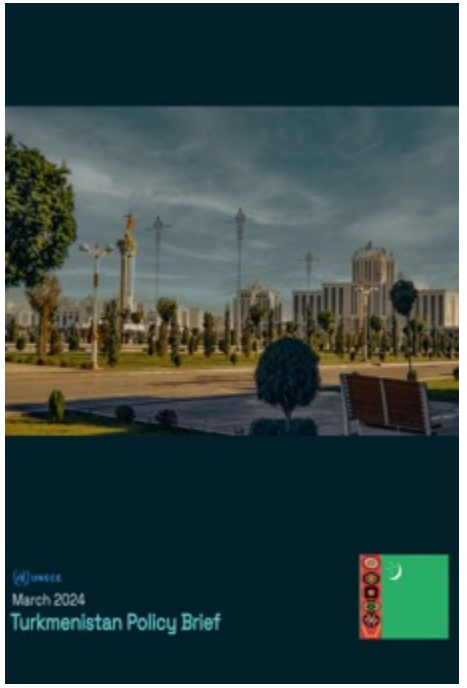
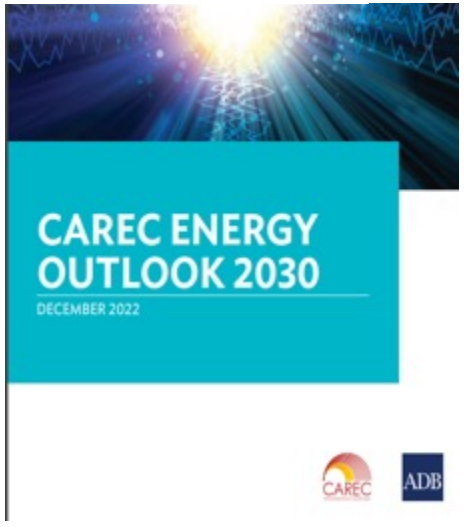
Stantec | intec | ACTED | European University Institute | Robert Schuman Centre for Advanced Studies | FSR ENERGY Florence School of Regulation

Energy analyses VS (local) decision-making



And many others…

Analytical instruments



Lack of understanding

Limited co-creation

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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**

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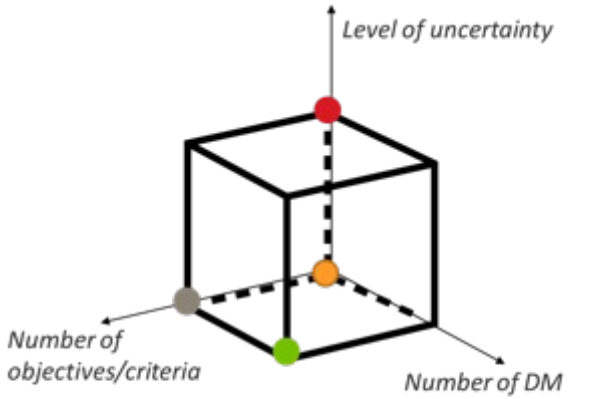
Session1 (Sept 2024) - recap

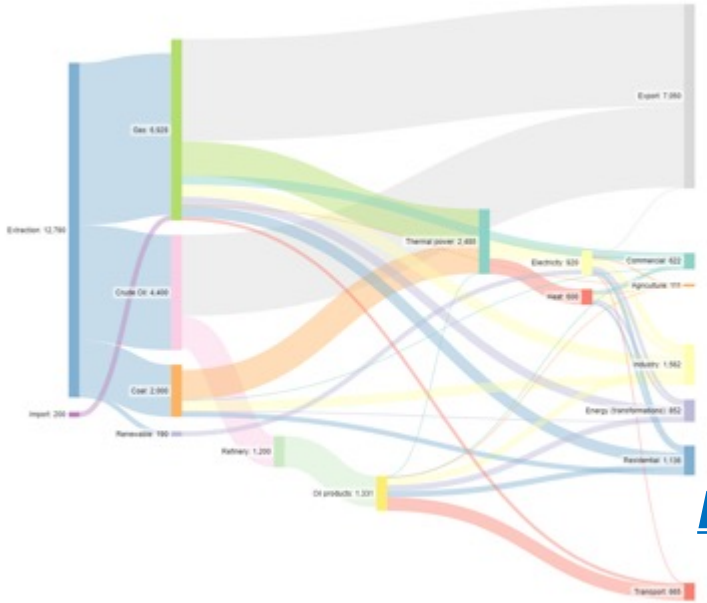
Analytical paradigm	*Sectoral Coverage*	*Time horizon*	*Time resolution*
Geographical coverage	*Supra-national forces*	*Technology explicitness*	*Activity explicitness*
Muti-criteria/agents	*GHG emissions and environmental impacts*	*Microeconomic robustness*	*Capacity to represent macroeconomic feedback*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

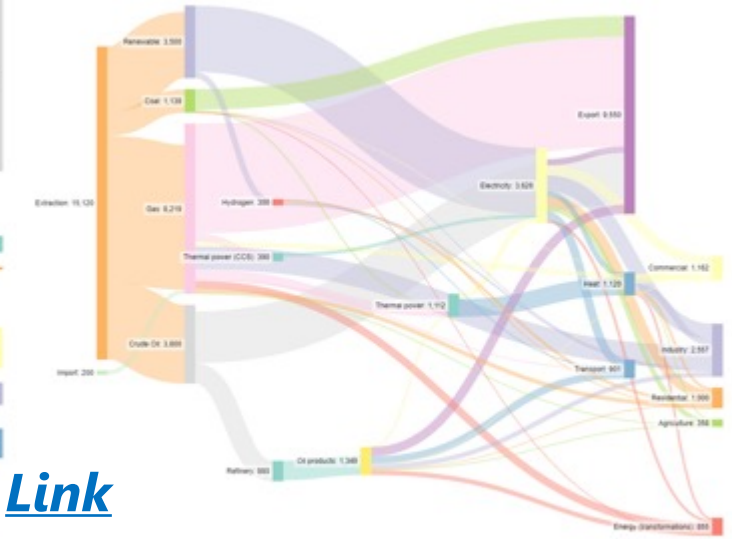


- Mathematical programming
- Stochastic programming
- Multi-criteria analysis / Multi-objective programming
- Game theory
- ...

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

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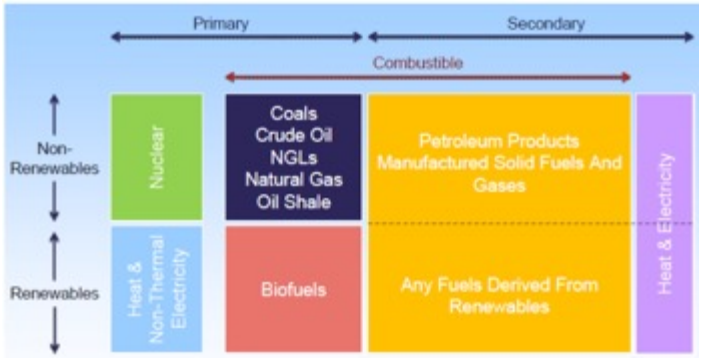
Session2 (Dec 2024) - recap

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?

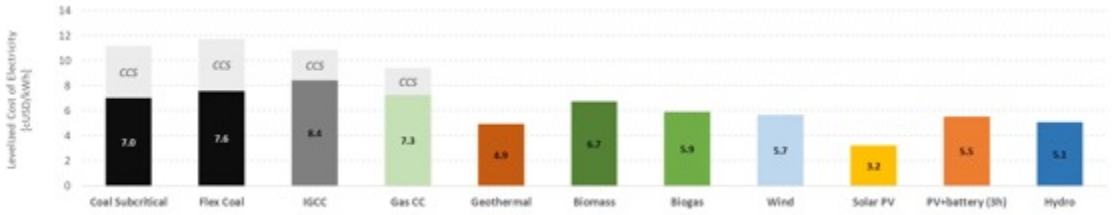
Answer:

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 % havier then gasoline

		COA	GAS	OIL	DSL	KER	LPG	GSL	NAP	HFO	OPP	NUC	BIO	HYD	WIN	SOL	SLU	HET	ELC	TOT
		Solid Fuels	Natural Gas	Crude Oil	Diesel oil	Kerosenes	LPG	Motor spirit	Naphtha	Heavy Fuel Oil	Other Petroleum Products	Nuclear Energy	Biomass	Hydro power	Wind energy	Solar energy	Industrial Wastes	Derived Heat	Electricity	Total
	PRIMARY																			
MIN	Domestic Supply	9098	7899	5373	0	0	0	0	0	0	0	9900	3016	1005	754	251	0	0	0	36297
IMP	Imports	6463	13292	27649	4410	1210	652	1320	1366	2159	1194	0	113	0	0	0	0	0	1168	60995
EXP	Exports	-1147	-2516	-3297	-3366	-591	-389	-3001	-802	-2479	-906	0	-72	0	0	0	0	0	-1127	■■■■
TPS	Total Primary Supply	13414	18675	29724	1044	619	263	-1681	565	-319	288	9900	3057	1005	754	251	0	0	41	■■■■
	CONVERSION																			
ESC	Energy Sector Consumption	-58	-793		-33	0	-1058	-329	-1	-412		0	-4				-2	0	0	-2689
ELC	Electricity Plants	-9598	-5636		-60		-48			-1050	-67	-9900	-703	-1005	-754	-136	-33	1738	11581	-15671
HPL	Heat Plants	-161	-301		-15		0			-30	-4	0	-140				-2	659	0	5
REF	Petroleum Refineries			-31736	11403	1939	2173	6710	1941	4570	2600									-402
	Total Conversion	-9817	-6730	-31736	11295	1939	1067	6381	1939	3078	2529	-9900	-848	-1005	-754	-136	-36	2396	11581	■■■■
	FINAL																			
RSD	Residential	357	5160		1724	146	380	6	0	31	2	0	1194	0	0	100	0	865	2972	12837
COM	Commercial	57	1752		738	3	63	11	0	39	0	0	52	0	0	15	1	255	2527	5514
IND	Industry	1897	4437		597	73	286	16	88	572	383	0	722	0	0	0	117	634	4088	13910
AGR	Agriculture	44	201		733	1	32	3	0	27	0	0	63	0	0	0	0	16	19	1141
TRA	Transport	1	21		7713	2095	188	4788	0	66	0	0	161	0	0	0	0	0	266	15300
OTH	Other	1189	0		0	0	0	0	0	0	0	0	0	0	0	0	0	627	650	2466
NEN	Non Energy	52	634		153	10	400	6	1798	104	1601	0	0	0	0	0	0	0	0	4759
BNK	Bunkers	0	0		294	0	0	0	0	1894	13	0	0	0	0	0	0	0	0	2111
TFC	Total Final Consumption	3597	12205		11952	2328	1350	4831	1887	2644	2000	0	2192	0	0	115	118	2396	10423	■■■■

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

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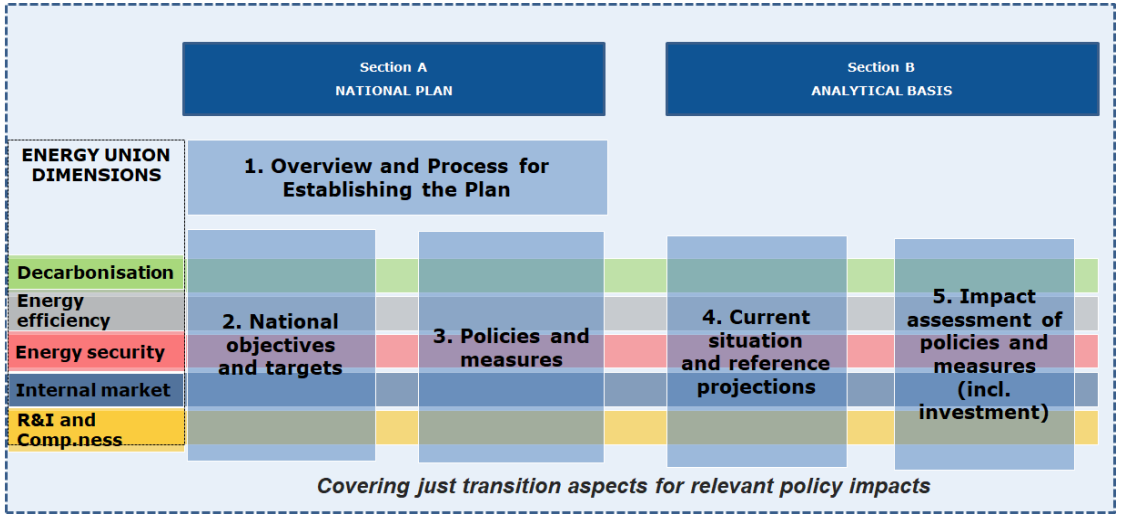
Session3 (Jan 2025) - agenda

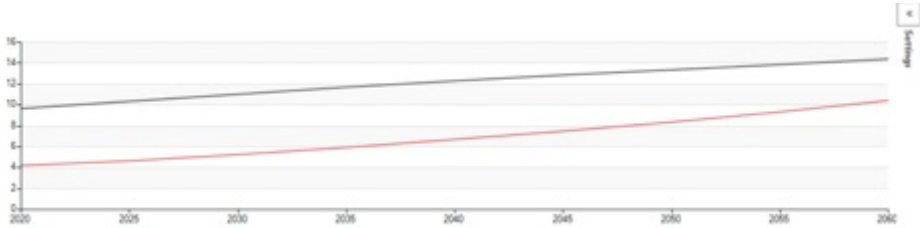
Design and implementation of National Energy and Climate Plan (NECP) in EU Member States (EU MS) in Energy Community Contracting Parties (EnC CP)



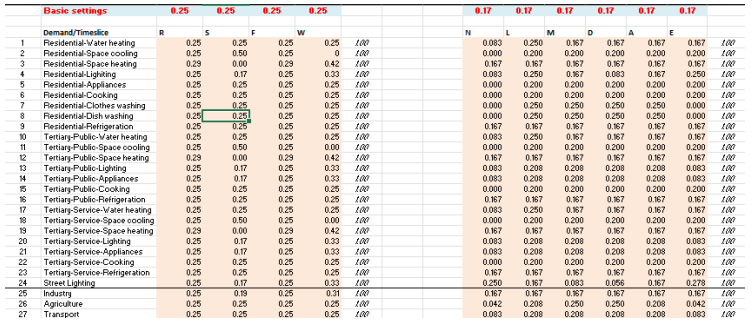
Presentation of Assignment - 2 (country)

→ 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)

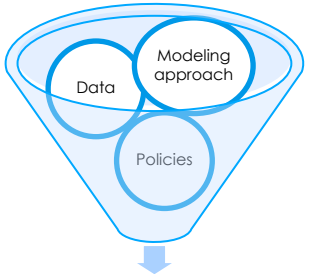


Timeslices - Fractions (.xls)



	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	0.29	0.00	0.29	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	0.29	0.00	0.29	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	0.29	0.00	0.29	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	0.167	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

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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)

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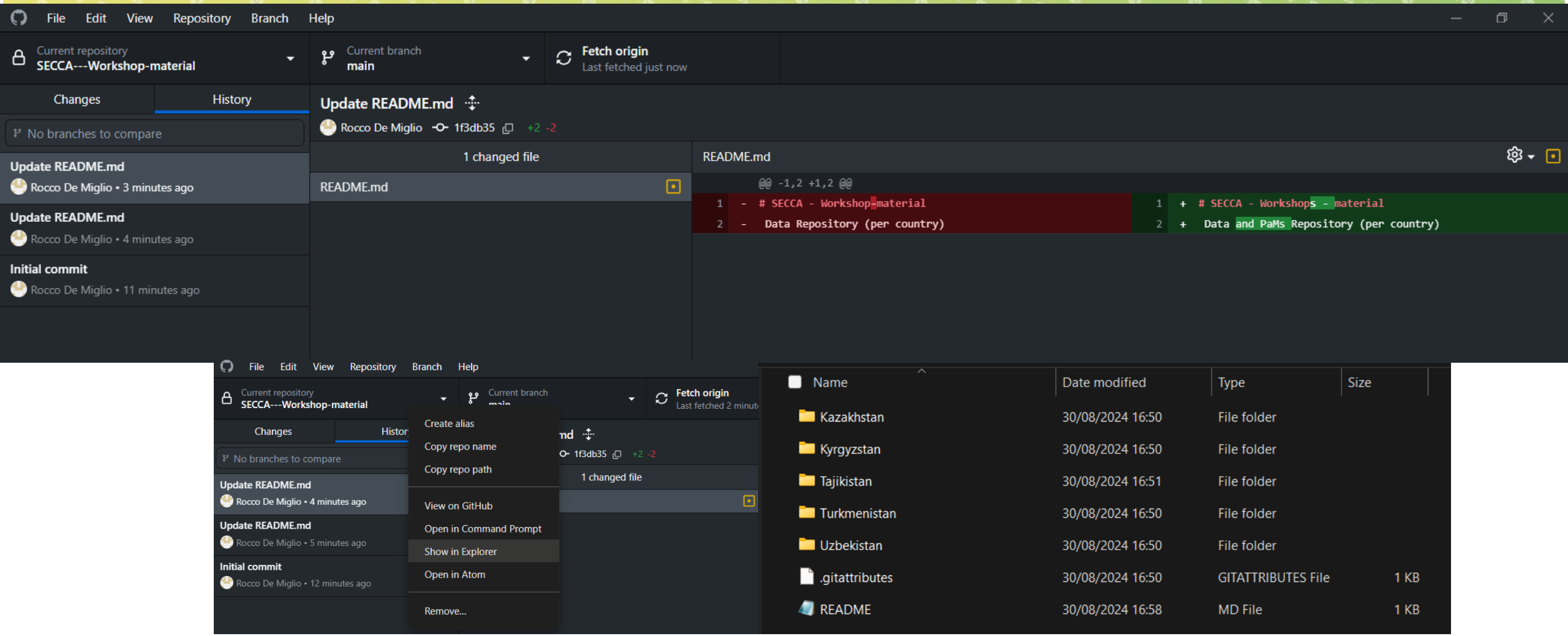
Country repositories (SECCA project) - Create a github account



https://docs.github.com/en/get-started/start-your-journey/creating-an-account-on-github

https://desktop.github.com/download/

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