NECESSITY SCORE

- ***Explanation of all datafields (columns) in the datasets***
- ***Significance of each field***
- ***Formulas for each composite score***
- ***Formula for the collective Necessity Score***
- ***Python code to implement the calculation***
- ***Example visualization for a dashboard***

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1. Explanation of Datafields & Their Significance

Necessity Score 1 Dataset (`necessity_score1_coal.csv`):

Field Name	*Description*	*Significance*
`iso3`	*ISO 3166-1 alpha-3 country code*	*Identifies the country*
`country`	*Country name*	*Human-readable country name*
`year`	*Year of data*	*Ensures temporal accuracy*

`labor_force`	*Total employed people in the country*	*Reference base for employment-related calculations*
`coal_rents_pct`	*Coal rents as % of GDP*	*Proxy for economic importance of coal in the country*
`share_electricity_coal_pct`	*% of electricity generated from coal*	*Proxy for coal's role in powering the country*
`jobs_coal_estimated`	*Estimated number of coal jobs in country (scaled to match IEA global total)*	*Measures direct employment impact of coal*
`A1_jobs_share`	*% of jobs in the country from coal (`jobs_coal_estimated` / `labor_force`)*	*Indicates labor dependence on coal*
`A2_global_jobs_share`	*% of global coal jobs in this country (`jobs_coal_estimated` / global total)*	*Shows the country's share in the global coal workforce*
`A3_share_electricity_coal`	*% of electricity from coal (normalized to 0-1)*	*Directly reflects dependency on coal for energy*

necessity_score1	*Composite score based on A1, A2, A3 (see formula below)*	*Measures total necessity for jobs (labor survival)*

Necessity Score 2–5 Datasets:

All have these columns:

Field Name	Description	Significance
iso3	*ISO country code*	*As above*
country	*Country name*	*As above*
year	*Year*	*As above*
share_electricity_coal_pct	*% electricity from coal*	*Proxy for sectoral coal reliance*
necessity_X_score	*Composite score for necessity type X (see below)*	*See composite score below*

- ***Necessity Score 2:*** *(necessity_energy_fulfillment_score) – Energy dependency*
- ***Necessity Score 3:*** *(necessity_health_score) – Dependency for health, housing, safety*

- ***Necessity Score 4:*** *(`necessity_education_score`) – Dependency for education*

- ***Necessity Score 5:*** *(`necessity_public_private_ratio`) – Proxy for public vs. private consumption*

*All four use the **share of electricity from coal** as their main metric (normalized between 0 and 1).*

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2. Formula to Calculate Each Composite Score

Necessity Score 1 (Job Dependency):

- ***A1:*** *% of jobs in country from coal*
  `A1 = jobs_coal_estimated / labor_force`

- ***A2:*** *% of global coal jobs in this country*
  `A2 = jobs_coal_estimated / global_coal_jobs` *(global_coal_jobs ≈ 6,300,000)*

- ***A3:*** *% of electricity from coal (normalized: divide by 100 to get 0–1)*
  `A3 = share_electricity_coal_pct / 100`

- ***Composite Score:***

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  `necessity_score1 = A1 + (A2 / 2) + A3`
- *(A2 is halved to reduce overweighting global workforce.)*

Necessity Scores 2–5:

Each is just the normalized share of electricity from coal, i.e.

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- `necessity_X_score = share_electricity_coal_pct / 100`

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3. Formula for the Collective Necessity Score

If you want an overall collective score (average of all 5):

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- `collective_necessity_score = (necessity_score1 + necessity_score2 + necessity_score3 + necessity_score4 + necessity_score5) / 5`

Or, you may use a weighted sum depending on your project needs.

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