
Group 17 - Project 1

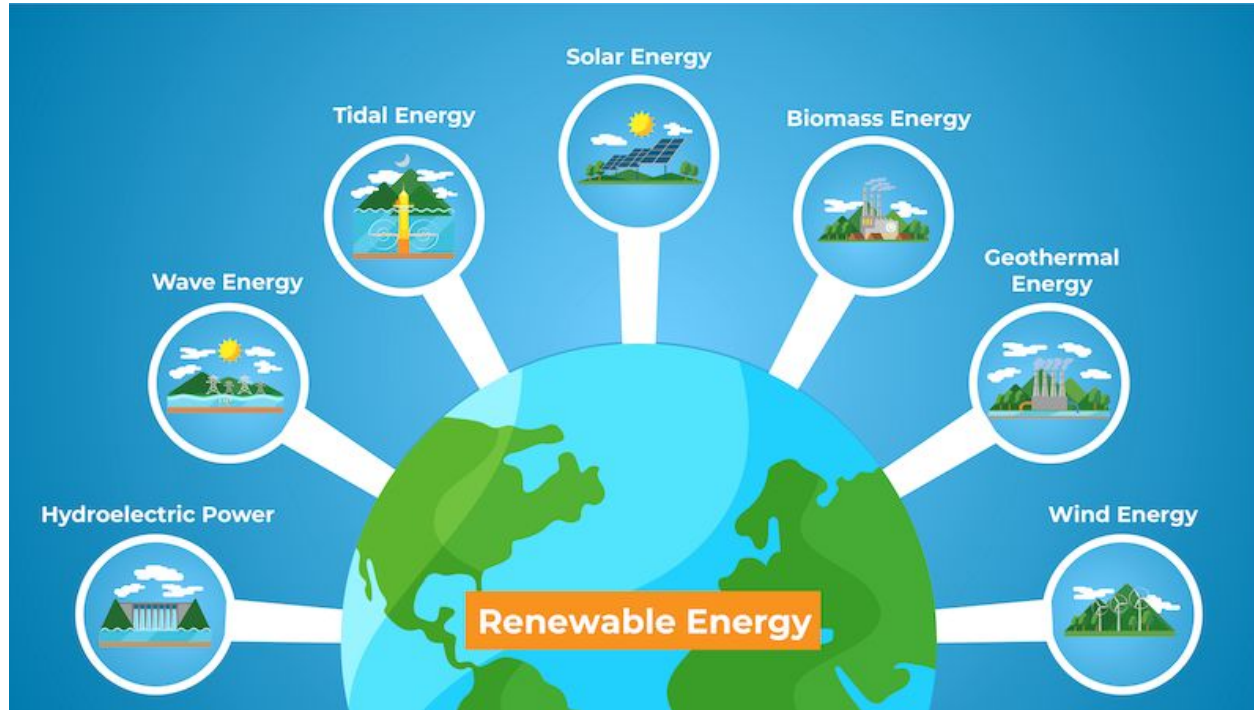
By: Lina Blanco Restrepo, Herbert
Dennis, Amar Patil, Jason Wloszek

Objective

To determine if there is a relationship between countries financial factors and their use/adoption of renewable energies, while considering extenuating factors outside the dataset.

Our Dataset and Why we chose it

Global Data on Sustainable Energy (2000-2020)



Data Engineering

Dropped

Renewables (% equivalent primary energy)

Population - Density\n(P/Km2)

Cleaning

Financial flows to developing countries (US \$)

Renewable-electricity-generating-capacity-per-capita

Feature Engineering

Created new Dataframe to consolidate data on a continent basis.

High Level Questions

1. What impact does foreign aid have in developing countries regarding renewables?
2. Are there any notable factors that promote the adoption in renewable energy year over year?
3. What conclusions can be drawn by examining a countries renewable usage by geographical location?

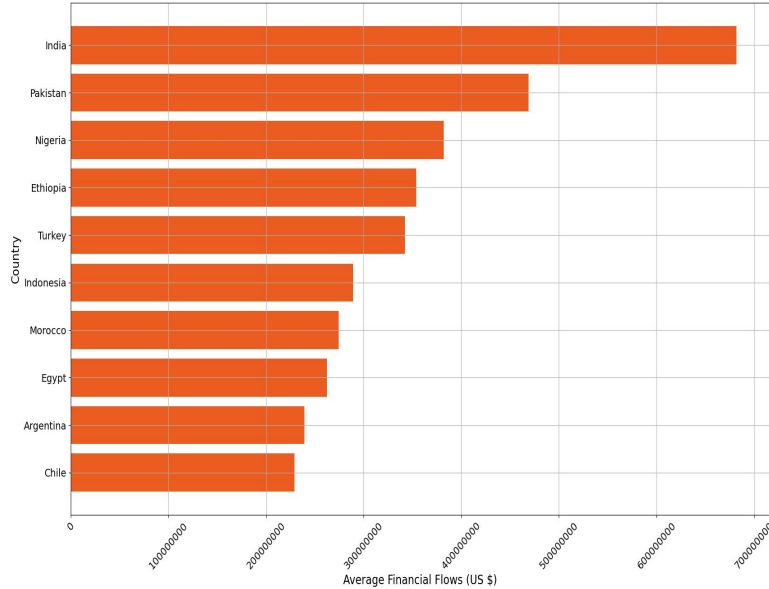
Question 1: What impact does foreign aid have in developing countries regarding renewables?

One of the main drivers in the transition to renewable energies is finance. Often more developed countries financially assist with the implementation of the creation and upkeep of renewable energy in less developed countries. Is this as big of an impact as one may think?

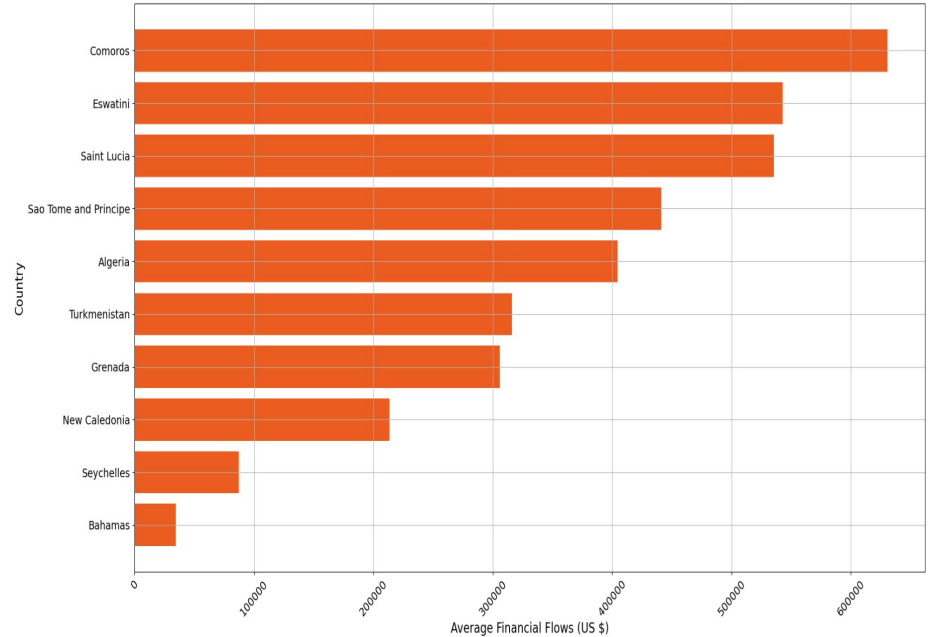
Next we will look at the top 10 countries with the highest and lowest financial flow averages, the top 10 countries with the highest and lowest renewable energy share compared to total energy consumption average, and what is the relationship between the two factors over the course of a 20 year period.

Top 10 Countries with Highest & Lowest Average Financial Flows

Highest

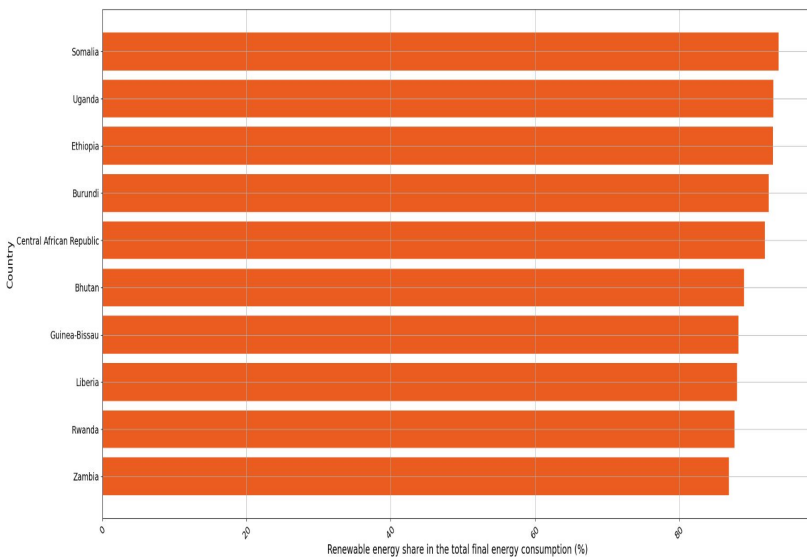


Lowest

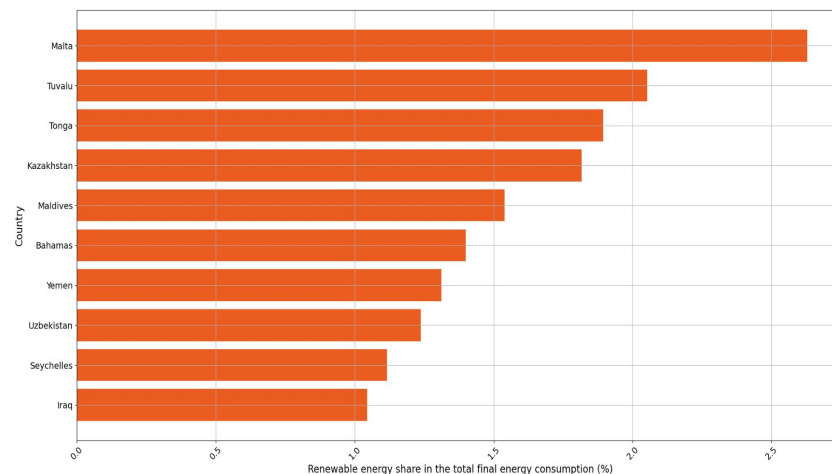


Top 10 Countries with Highest & Lowest Average Renewable Energy Share in the Total Final Energy Consumption %

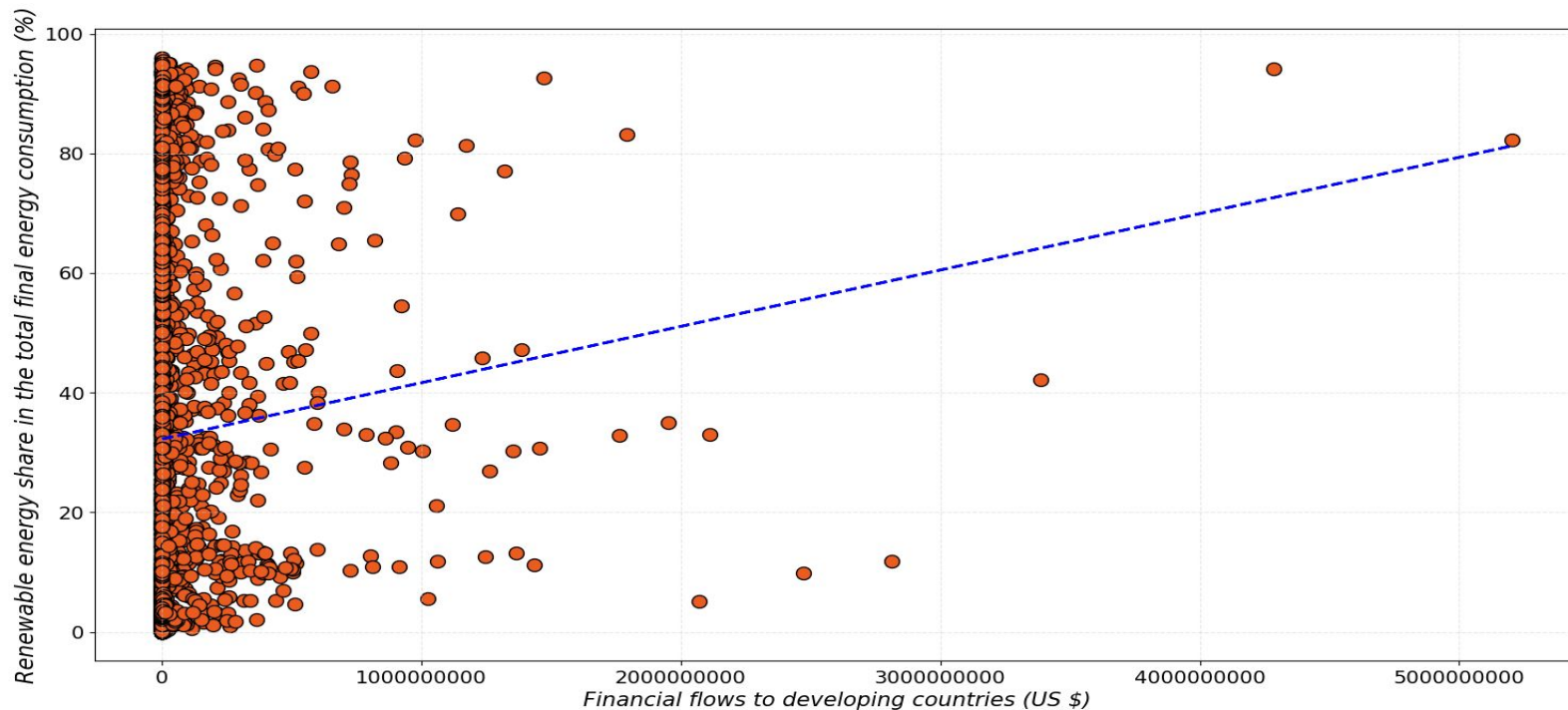
Highest



Lowest

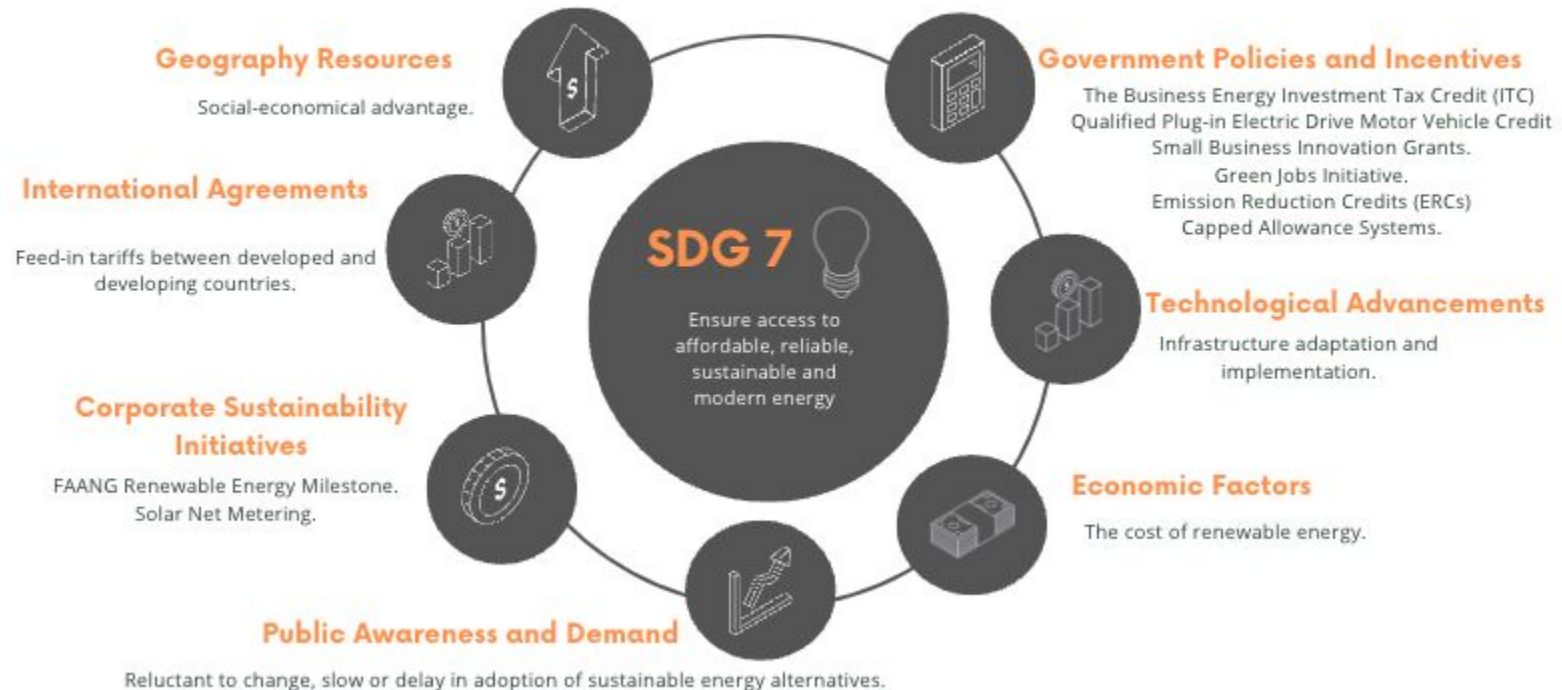


Financial Flows vs Renewable Energy Share % of Total Countries

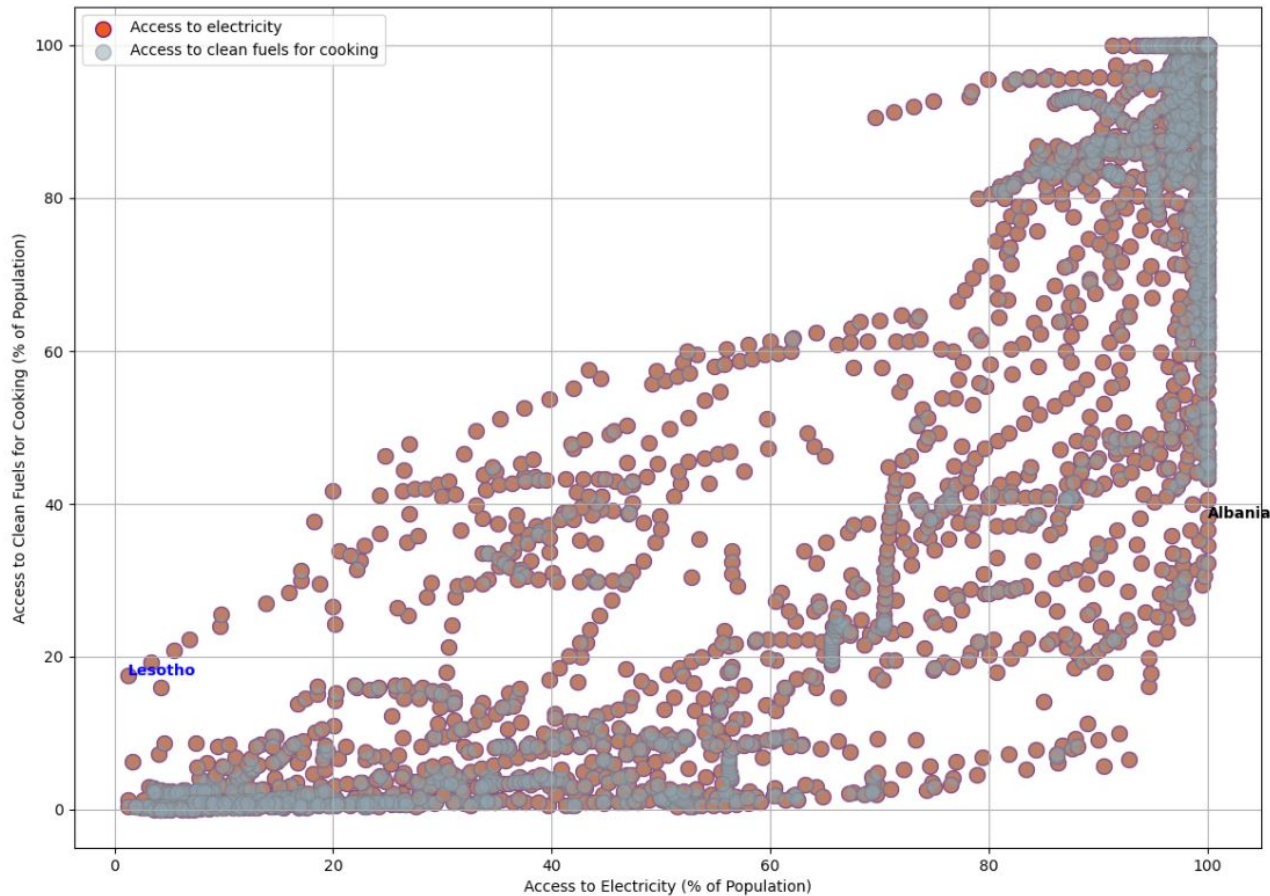


Question 2: Are there any notable factors that promote the adoption in renewable energy year over year?

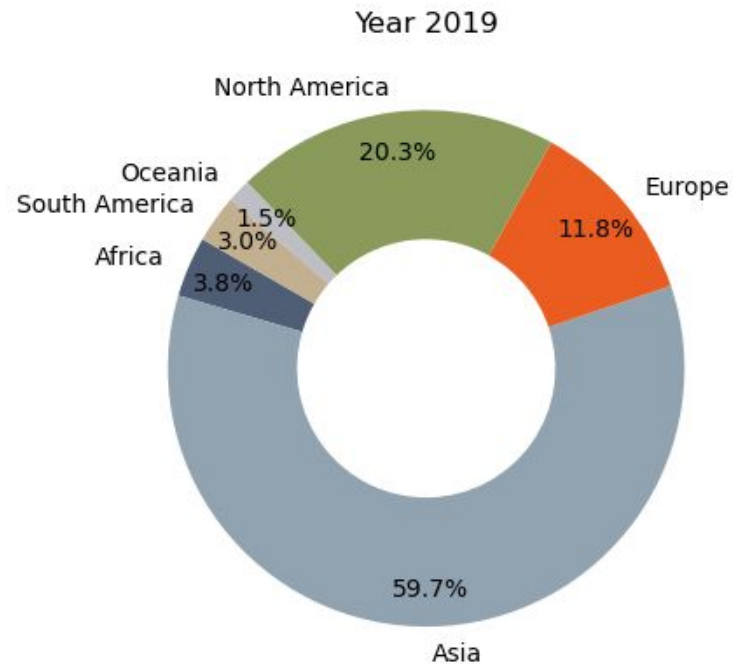
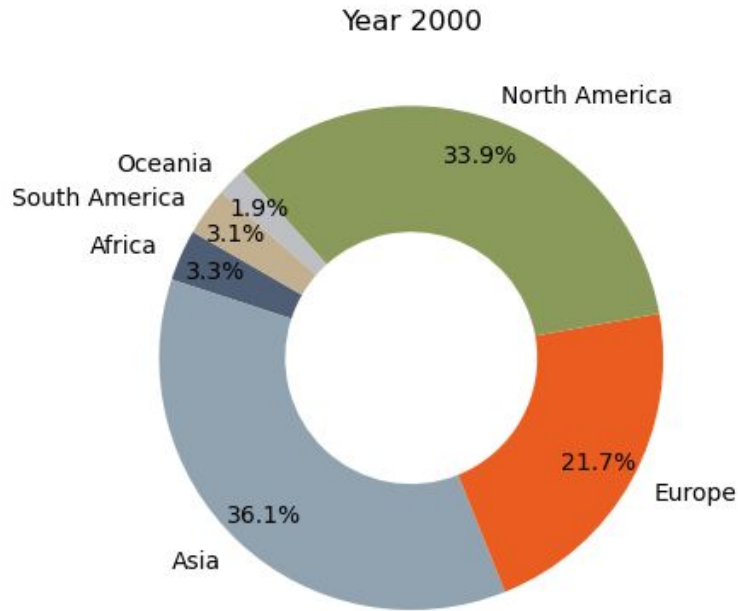
SUSTAINABLE DEVELOPMENT GOALS - 2030 AGENDA



Access to Clean Fuels for Cooking vs. Access to Electricity

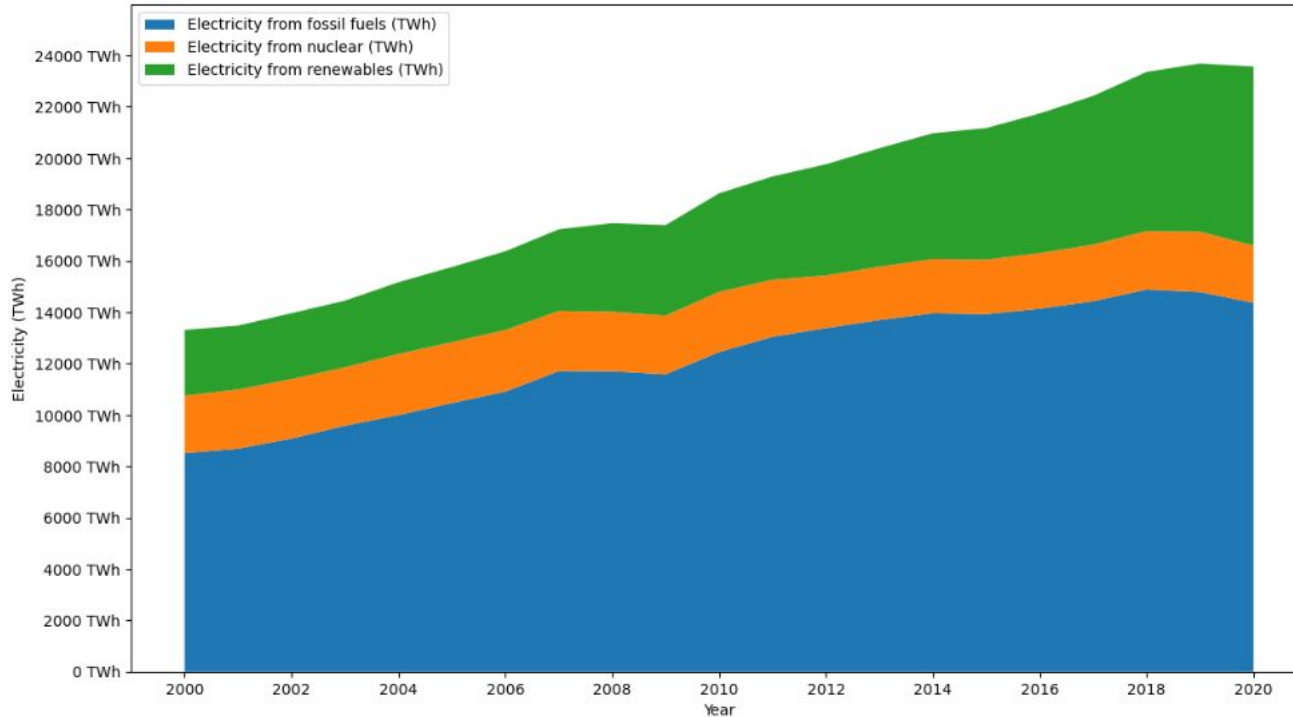


CO2 Emissions Distribution by Continent



CO2 emissions from 2000 to 2019 show a 19.89% increase in emissions.

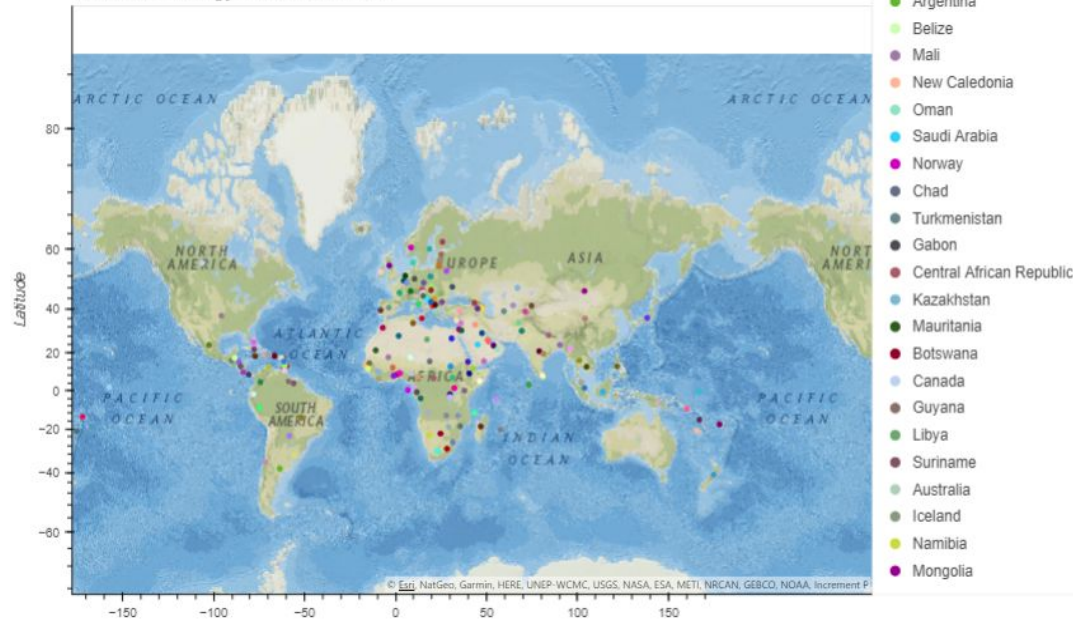
Electricity Generated by Source



Mixed Renewables includes:
Solar
Wind
Hydropower
Others/Bioenergy

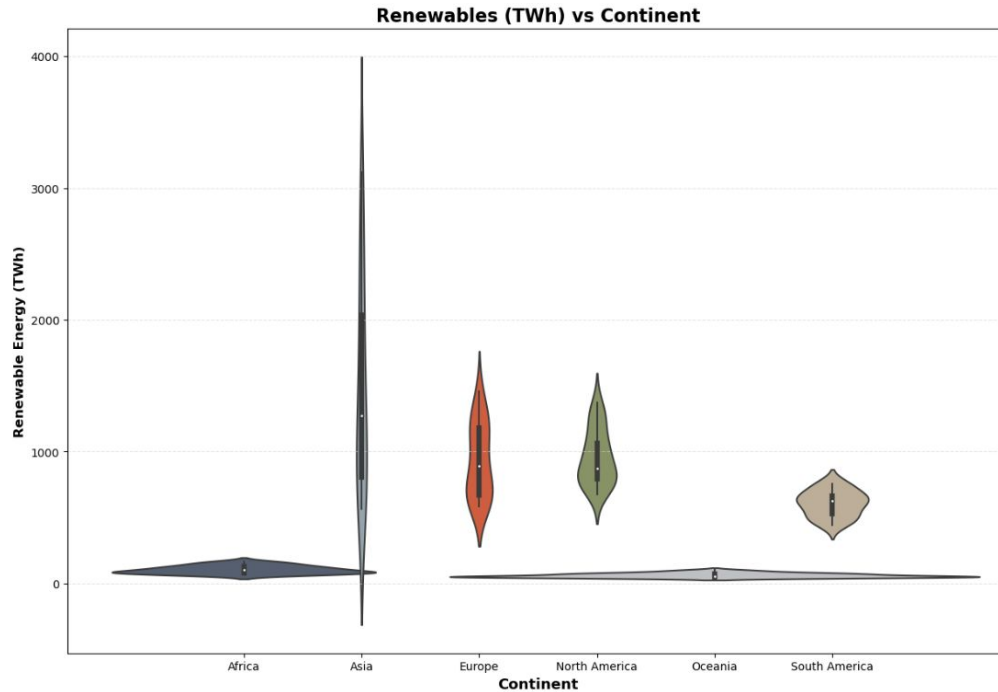
Question 3: What conclusions can be drawn by examining a countries renewable usage by geographical location?

2020 Clean Energy Ratio in the World



The primary intent of the color points on the map was to show increase in renewable energy ratio from 2000 to 2020 by change in color and points size. But it was not conclusive enough. Alternatively, this shows the higher concentration of renewable energy closer to Equator, and countries with installed renewable energy.

Renewable Energy by Continent

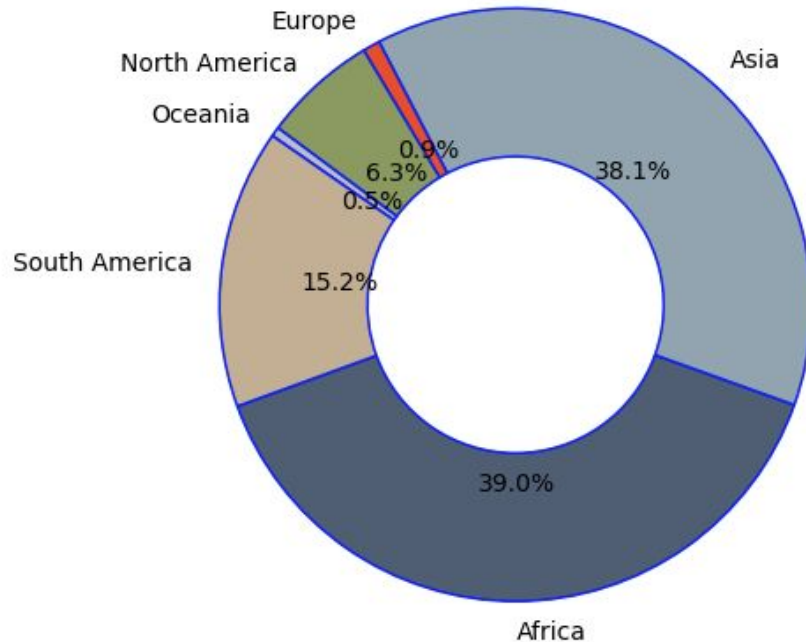


Violin Chart compares median of each region, with Asia having highest median followed by Europe and North America.

	count	mean	std	min	25%	50%	75%	max
Continent								
Africa	21.00	105.49	29.82	66.71	81.65	103.20	126.83	163.94
Asia	21.00	1477.04	805.94	563.65	805.46	1272.50	2039.31	3120.37
Europe	21.00	931.09	279.93	585.72	670.43	893.67	1178.96	1457.31
North America	21.00	956.89	207.39	677.93	791.59	873.01	1064.58	1369.68
Oceania	21.00	62.46	16.35	44.17	49.47	55.66	72.57	101.25
South America	21.00	607.79	98.04	442.70	529.92	626.01	663.80	758.49

Financial Flows by Continent

Financial flows by Continent (2000-2020)



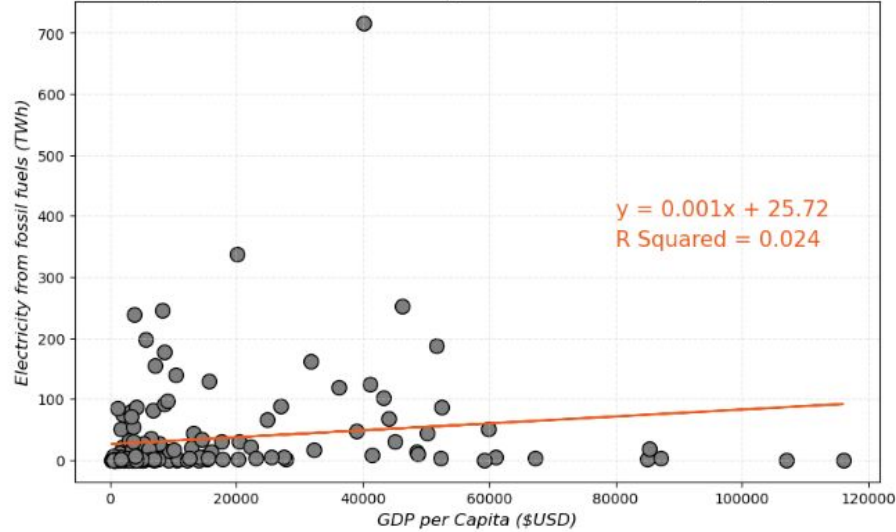
1. Asia and Africa received about 80% of funding.
2. India and Pakistan received maximum funding in Asia. Ethiopia and Nigeria received more funding in Africa.
3. As a result Asia & Africa's installed Renewable energy capacity increased by about 5 and 3 times respectively.
4. Contradicts the micro level analysis.

Overall Energy and Financial Flows by Continent

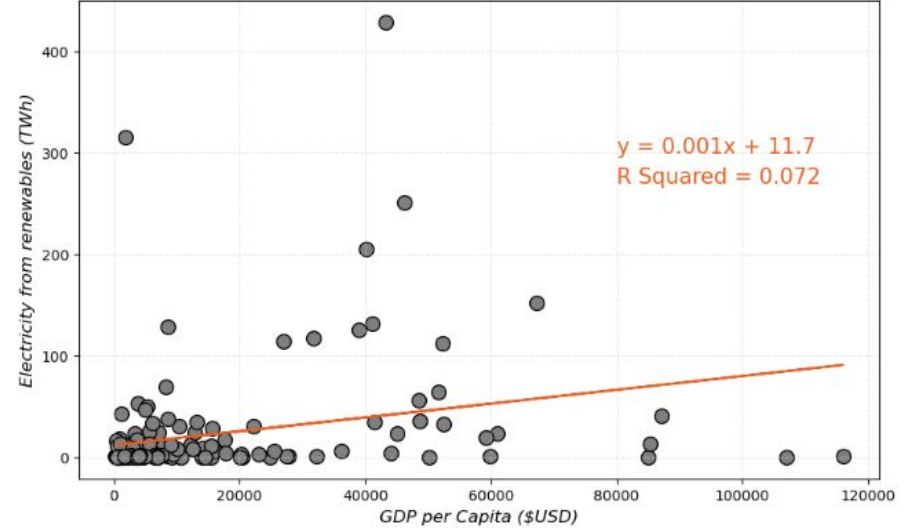
	Continent	Year	Electricity - Fossil Fuels (TWh)	Electricity - Nuclear (TWh)	Electricity - Renewable (TWh)	Access to Electricity (%)	Financial Flow (\$)	CO2 Emission (kiloton)
0	Africa	2000	325.70	13.01	66.71	34.92	66380000.00	660040.00
1	Africa	2010	525.24	12.90	103.20	43.23	3050990000.00	925039.99
2	Africa	2019	625.47	13.60	159.30	54.09	4434190000.00	1118650.02
3	Asia	2000	3026.03	338.84	563.65	79.51	1057110000.00	7221840.00
4	Asia	2010	6260.63	378.74	1272.50	87.55	2177400000.00	13971769.87
5	Asia	2019	9180.31	466.81	2918.13	96.20	3006860000.00	17689289.79
6	Europe	2000	1781.41	1049.31	631.29	99.94	4880000.00	4348177.05
7	Europe	2010	1917.66	1033.25	908.11	99.99	288220000.00	4197558.72
8	Europe	2019	1450.46	931.83	1337.60	100.00	96520000.00	3484720.01
9	North America	2000	3061.36	830.86	779.13	87.11	53230000.00	6774825.71
10	North America	2010	3298.60	898.16	873.01	92.15	225680000.00	6522777.25
11	North America	2019	3035.16	915.76	1286.70	95.88	627620000.00	5996300.23
12	Oceania	2000	194.40	0.00	46.53	69.38	0.00	375483.20
13	Oceania	2010	228.17	0.00	55.66	77.97	8260000.00	429229.00
14	Oceania	2019	210.83	0.00	92.00	90.09	55390000.00	430940.00
15	South America	2000	119.33	10.93	472.45	90.76	130250000.00	619879.88
16	South America	2010	219.86	20.46	626.01	94.88	3048320000.00	798038.22
17	South America	2019	284.50	23.13	757.79	98.50	777450000.00	891050.00

Regressions

GDP per Capita vs Electricity from Fossil Fuels (TWh) - 2020



GDP per Capita vs Electricity from Renewables (TWh) - 2020



Bias and Limitations

- Renewables are impacted by a number of socio-economic factors that this data set would be unable to capture
- Did not include all countries in the world (148 / 195)
- Developed vs Developing Countries
- Outside factors of renewable investments limitations in supply chain and delayed outcomes of financial flows
- Renewable should show breakdown

Conclusions/Final Thoughts

Call to Action

- Cost of Renewables
- Effectiveness of Funding
- Incentivize adoption of Renewables

Thank you
Questions?

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Biography Continuation

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