

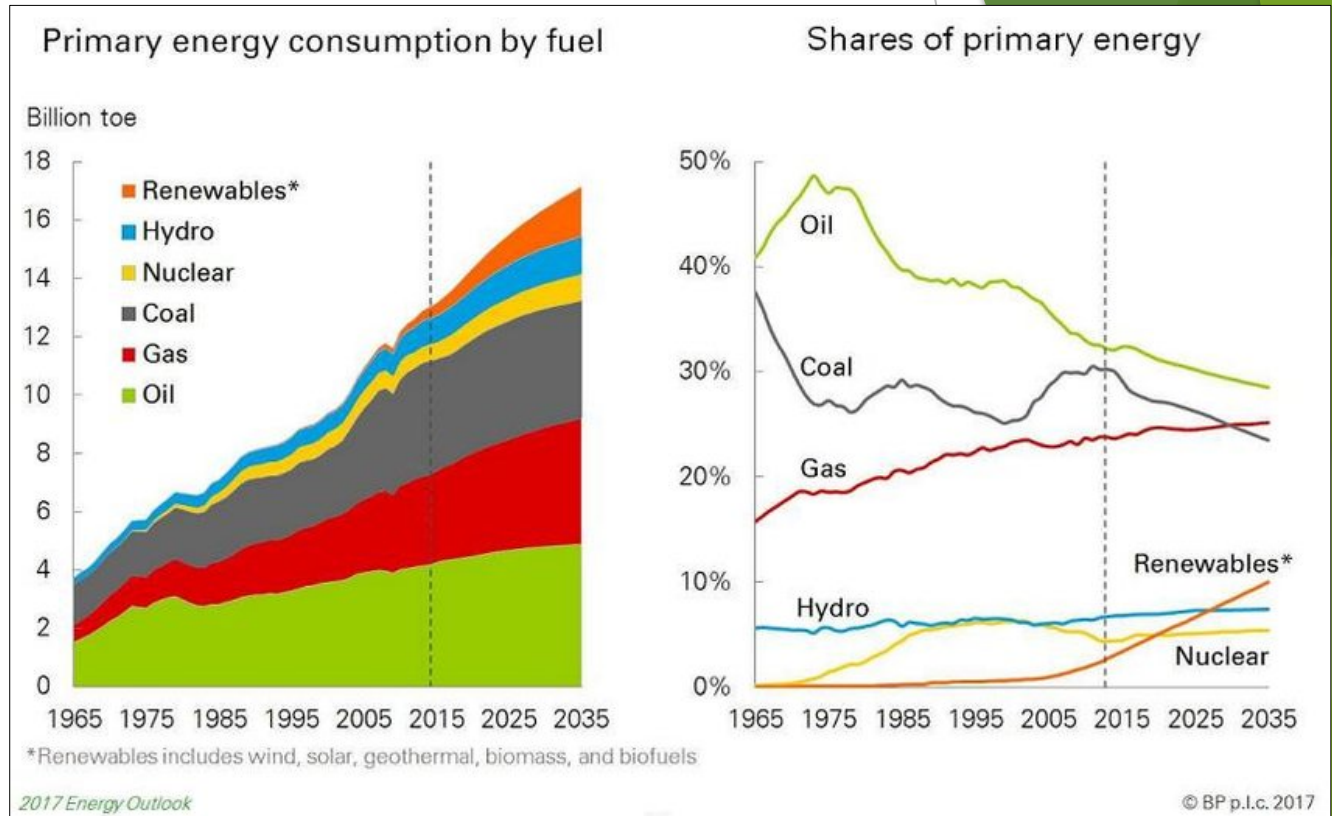
Energy Transition

Trends and Challenges
Athens Triennial Meeting 7-9th October 2024
Factors affecting the Transition
Presented By Adip Mittal

Energy Transition Trends

We all expect and agree to the trend:

- Downward trend for Fossil fuels- especially Coal.
- Coal has long been known to be the most polluting source of energy with highest emissions in the energy-mix.

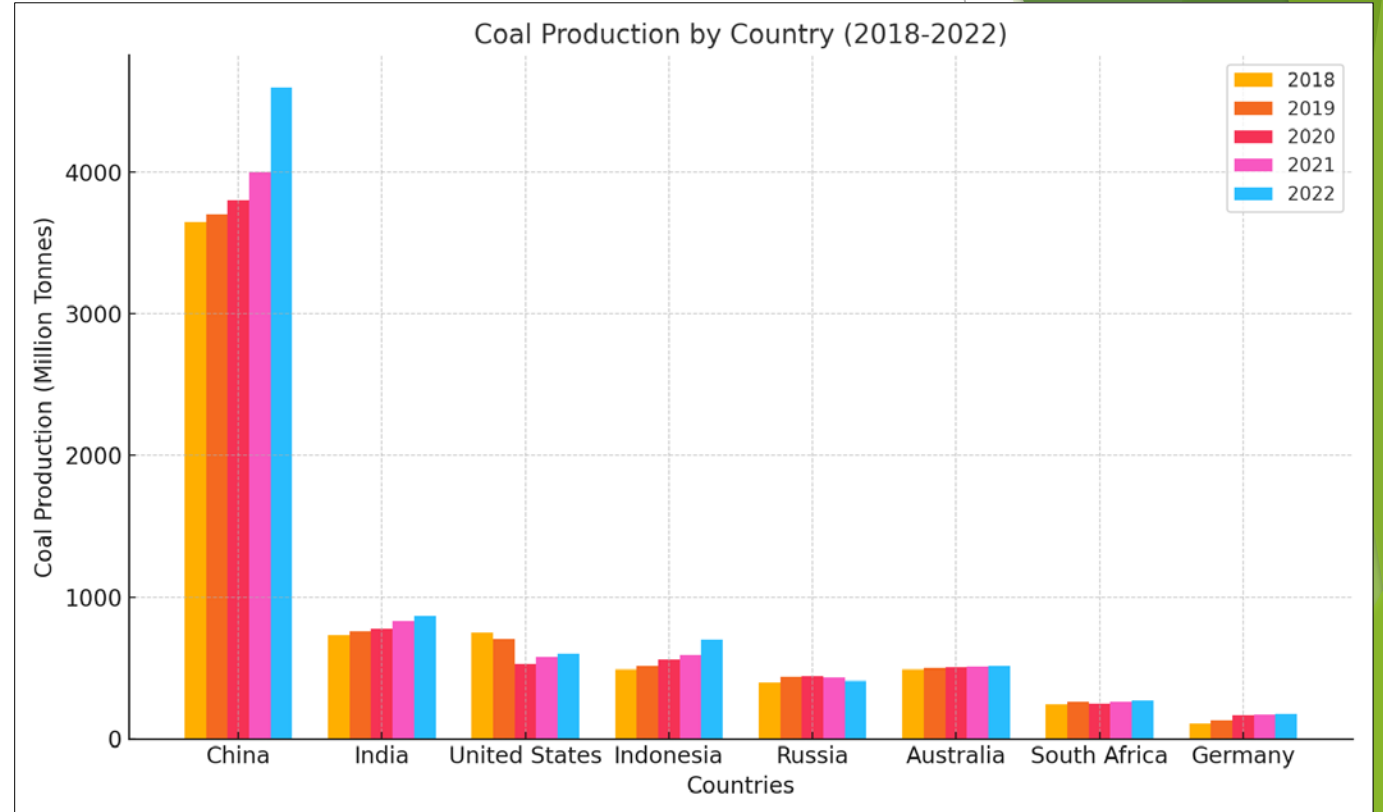


Reality Check

Coal Production: Global coal production hit a record high in 2023.

Coal Consumption: Despite a global shift toward cleaner energy, coal consumption has remained strong, largely due to demand in Asia. Coal Consumption was record high in 2023.

We can see from the graph almost all countries have record production, except USA—with a marginal decline.



What is favoring Coal in spite of being most polluting energy Source?

Economical Factor

Cost of Producing Electricity:

Coal	Natural Gas	Solar	Hydrogen
The levelized cost of electricity (LCOE) from coal ranges between \$50 to \$120 per megawatt-hour (MWh) .	The LCOE for natural gas-fired power plants ranges from \$40 to \$90 per MWh	The LCOE for utility-scale solar ranges from \$20 to \$50 per MWh	The LCOE for hydrogen power can range from \$100 to \$150 per MWh
Source: IEA			

Environmental Factor

Coal	Natural Gas	Petroleum Products
SOx : 1500-3000 g/MWh	SOx: 1-10 g/MWh	SOx: 500-2000* g/MWh
NOx : 1200-1500 g/MWh	NOx: 500-1000 grams/MWh	NOx: 800-1200 g/MWh

HFO	Ultra Low Sulfur Fuel
SOx : 30-80 g/KWh	SOx: 1-2g/KWh
NOx : 10-18 g/KWh	NOx: 10-18 g/KWh



Caused the whole shipping industry to adopt the new fuel or install a scrubber system

Environmental factor: Producing Energy



Open-pit Coal Mining in
Indonesia



Natural Gas Producing Well
Head

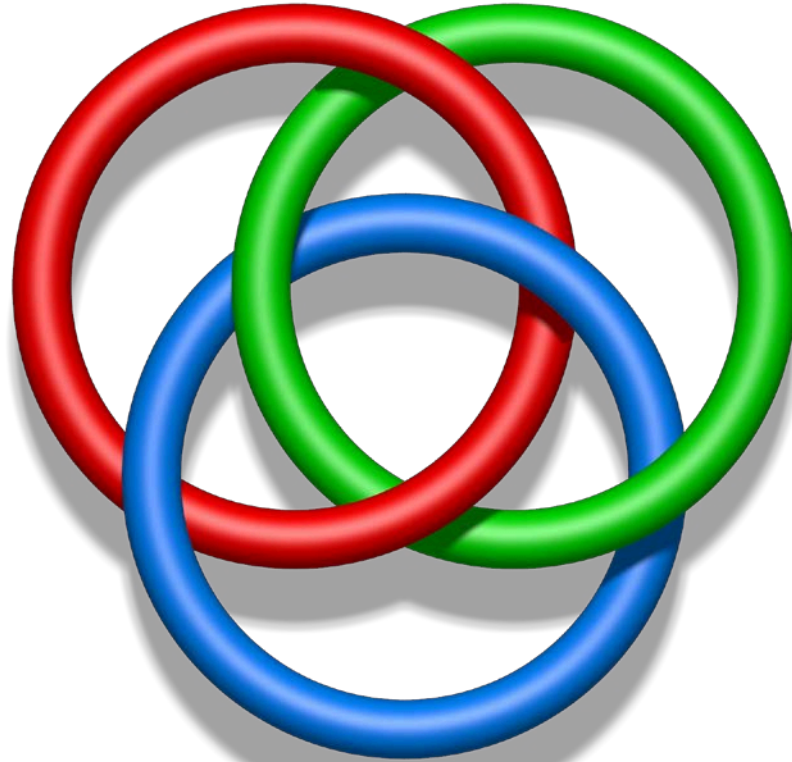


Solar Panel farm for
~1MW of power

Factors for Choosing Energy Source

Economical

Environmental



Political

are 80-90% efficient converting
Electrical Energy Transition energy to motion vs 12-40%

BUT this transition is driven more by political reasons than Environmental.

-China and India can convert domestic coal to electricity and be less dependent on import of petroleum products.

Energy source which meets all three factors-

- It may be different for different regions. One fuel WILL NOT fit all.
- Multiple fuels may find their space-
-energy demand is increasing for everyone to have space.

END!
Thank you!