HIGH EFFICIENCY LOW EMISSIONS TECHNOLOGIES FOR SUSTAINABLE COAL UTILISATION

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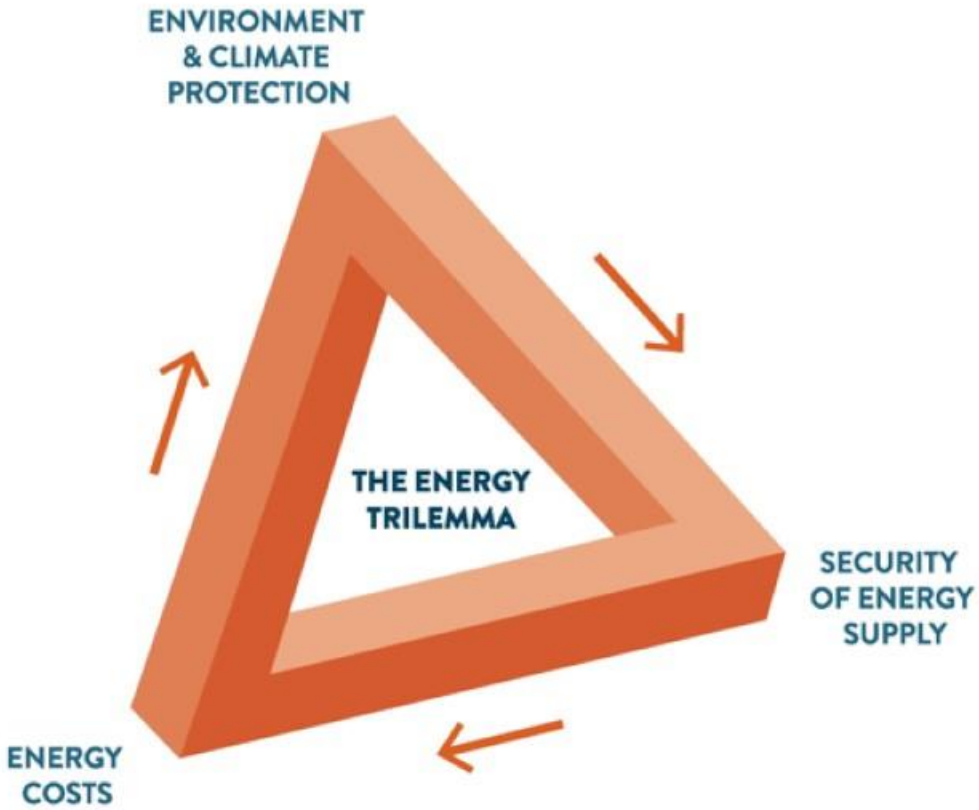
STRATEGIC IMPORTANCE OF THE ENERGY TRILEMMA



This is the basis for every rational energy strategy in the world.

It represents an energy compromise as it is not sustainable to focus on one aspect without consideration of the others

THERE IS NO ONE-SIZE-FITS-ALL SOLUTION TO COUNTERING CLIMATE CHANGE

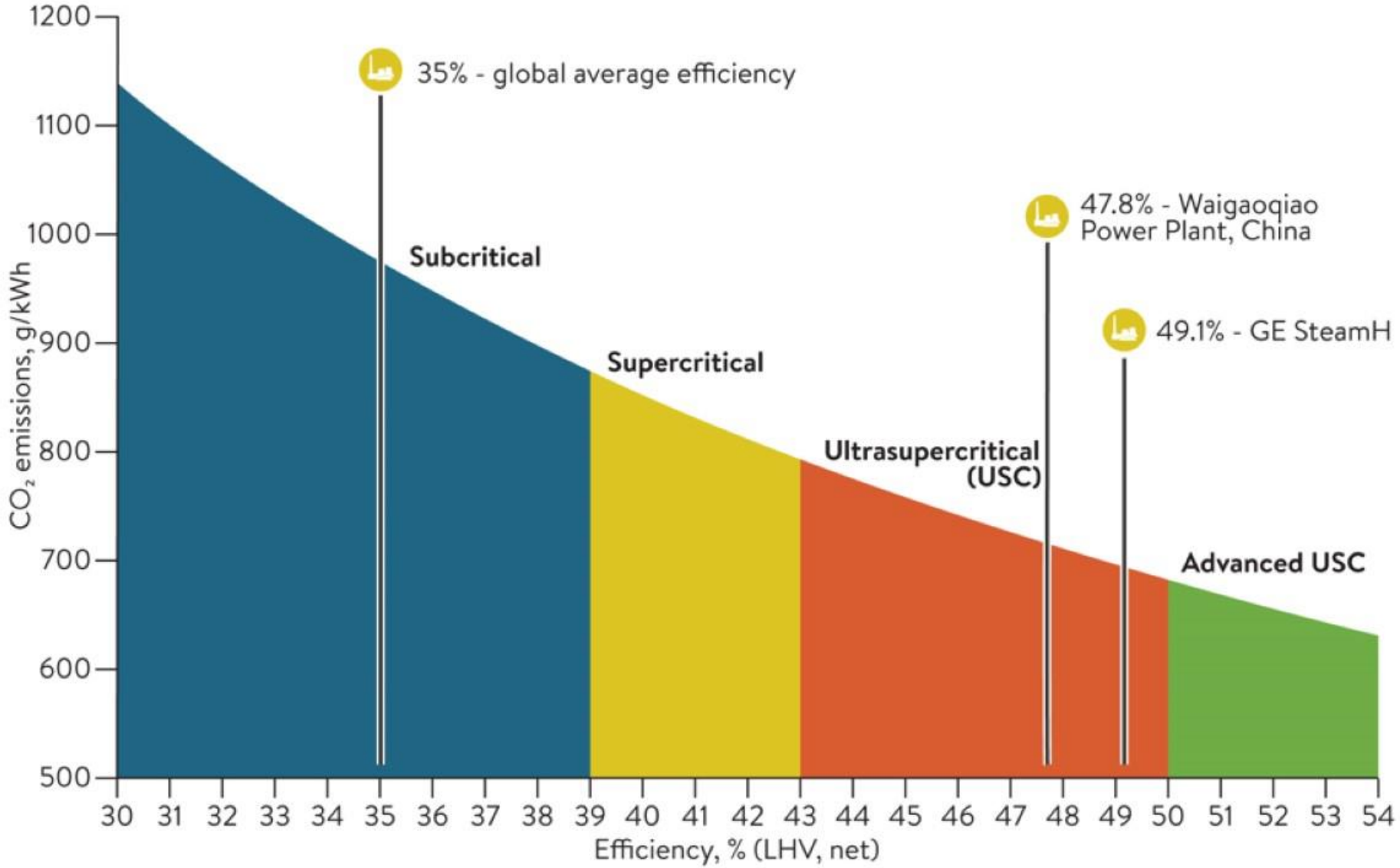
COAL CURRENTLY PROVIDES 41% OF GLOBAL ELECTRICITY AND IS ALSO AN ESSENTIAL RAW MATERIAL IN THE PRODUCTION OF 70% OF THE WORLD'S STEEL AND 90% OF THE WORLD'S CEMENT

IT IS SET TO REMAIN A SIGNIFICANT AND INTEGRAL PART OF THE GLOBAL ENERGY MIX FOR WELL INTO THE FUTURE

HELE EFFICIENCY AND CO_2 EMISSIONS (BARUYA 2018)

Over 30% saving in CO_2 emissions intensity between state-of-the-art and current average

Potential for >3 Gt/y CO_2 saving



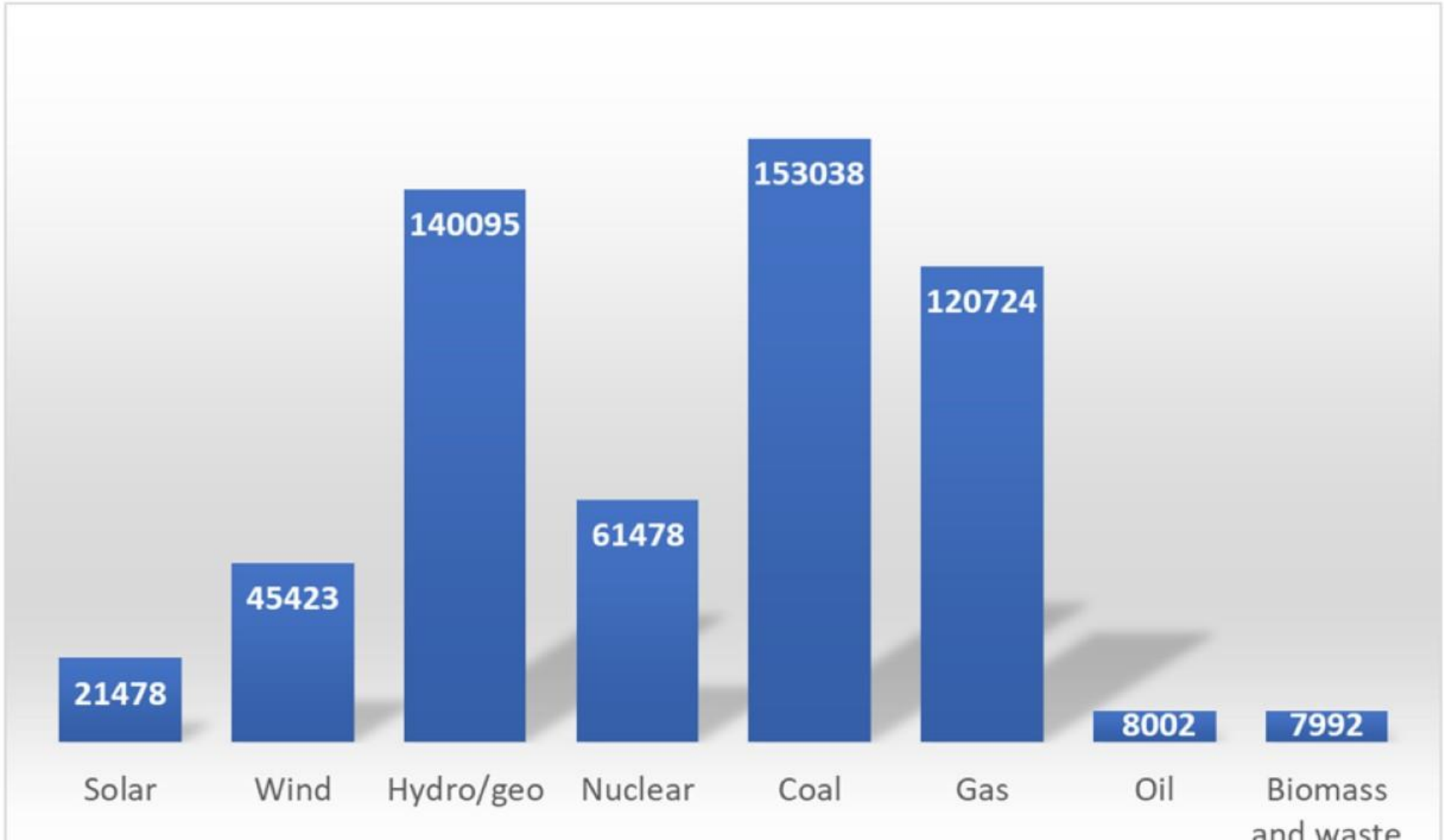
USC COAL POWER CAPACITY WORLDWIDE

(PLATTS, JUNE 2018)

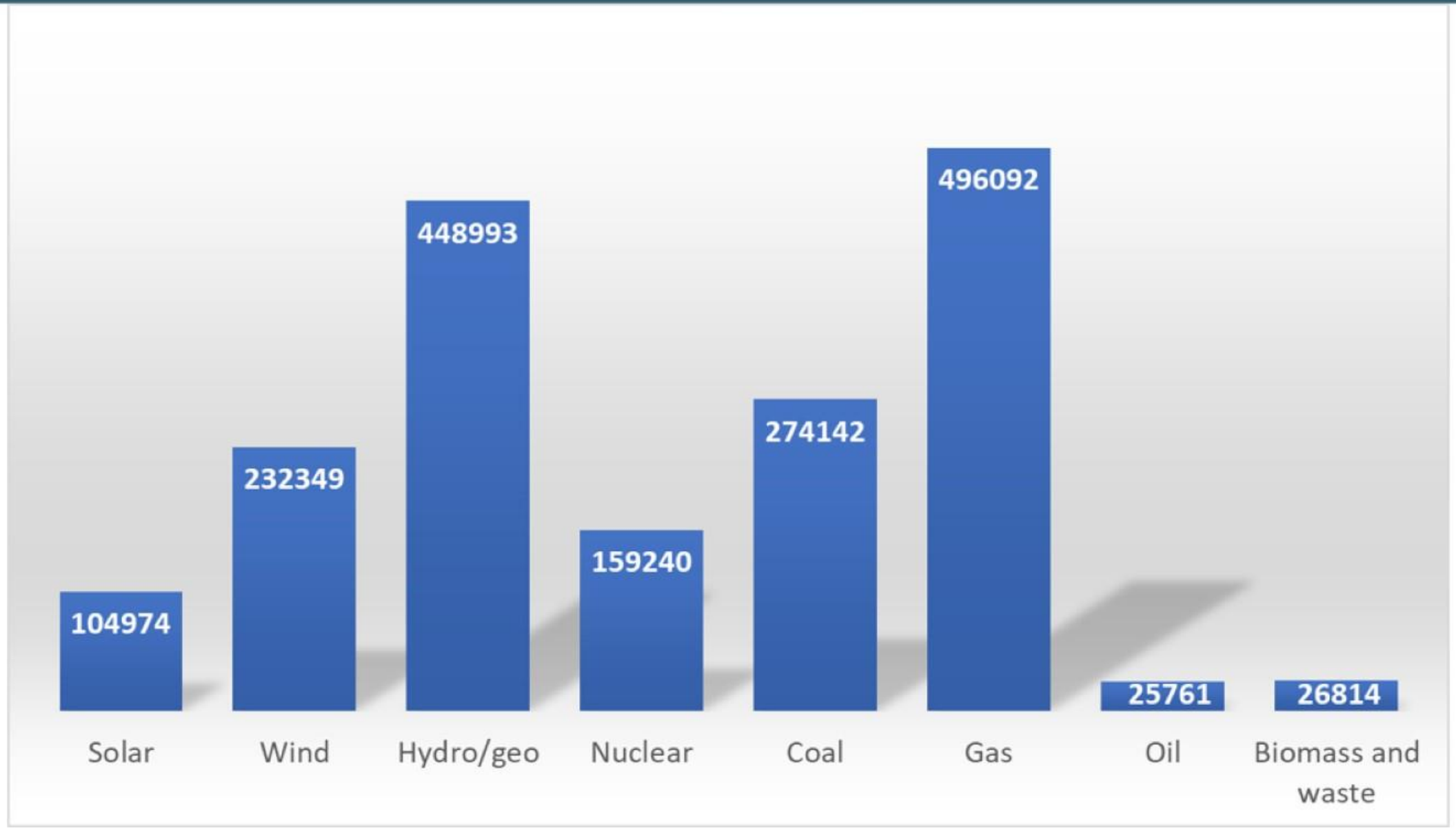
REGION	IN OPERATION (MWe)	UNDER CONSTRUCTON (MWe)
	2018	2018
Asia	224203	88228
Europe	19208	4970
Middle East	0	2400
Eurasia	300	0
North America	665	0

POWER PLANTS UNDER CONSTRUCTION (MW)

(PLATTS, 2019)



PLANNED POWER CAPACITY, MW
(PLATTS, 2019)



TREND TOWARDS USC AND SC COAL POWER

(PLATTS 2019)

- The global coal power fleet is now some 2030 GW, with , some 700 GW of new capacity installed since 2010

- A further 153 GW of new capacity is being built in 32 countries (Africa, Middle East, Asia)
  - 80.4 GW of ultra-supercritical (USC)
  - 53.7 GW of supercritical (SC)
  - 15.4 GW of subcritical (mainly small units)

- Some 274 GW in the planning stage across 60 countries, with 75% in Asia

CHINA BELT AND ROAD INITIATIVE

(BROOKINGS.EDU)

- US$ 1tn programme to boost economic and trade ties in 71 countries
- Equivalent to a quarter of global GDP via investments in energy and infrastructure using Chinese expertise and technology
- China has invested in 67.9 GW of new coal-fired power in BRI countries since 2014
- Between 2014 and 2017, six Chinese banks participated in US$ 25.7 bn worth of syndicated loans for electricity projects in BRI countries - US$ 10.2 bn (40%) was for coal-fired generation

- s.com/article/us-china-power-coal/china-energy-to-expand-ultra-low-emission-coal-fired-power-executive-idUSKCN1UD0J9

TO MOVE TOWARDS NEAR ZERO COAL POWER, NEW PLANT SHOULD BE BASED ON THE DEPLOYMENT OF EVER IMPROVING HELE TECHNOLOGIES, WITH THE SCOPE TO DEPLOY CCUS IN DUE COURSE

TRANSFORMATION IS NOT LIMITED TO POWER PLANTS

- Electrification of transportation and heating
- Digitisation of electricity grids
- Flexibility
- Smart grids and virtual power plants
- Blockchain and distributed generation
- Demand side management to manage VRE
- Battery storage
- Carbon capture, utilisation and storage

COAL HAS BEEN AROUND FOR A LONG TIME AND HAS SUCCESSFULLY FACED MANY CHALLENGES THROUGH INNOVATIVE TECHNOLOGICAL DEVELOPMENTS TO IMPROVE ITS ENERGY & ENVIRONMENTAL PERFORMANCE

THE CHALLENGE NOW IS TO CONTINUE TO MAINTAIN A ROLE IN THE POWER SECTOR AND AT THE SAME TIME SEEK NEW SUSTAINABLE OPPORTUNITIES, SUCH AS THE NEED TO CLOSE THE CARBON CYCLE TO ENSURE INCLUSION WITHIN THE CIRCULAR CARBON ECONOMY

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THANK YOU FOR LISTENING

ANY QUESTIONS?

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