



Expanding the Role of Nuclear Energy

Dr. Joshua Walter

jwalter@terrapower.com

June 9, 2016

TerraPower's Innovation Group continuously evaluates new ideas and approaches them in a graded manner

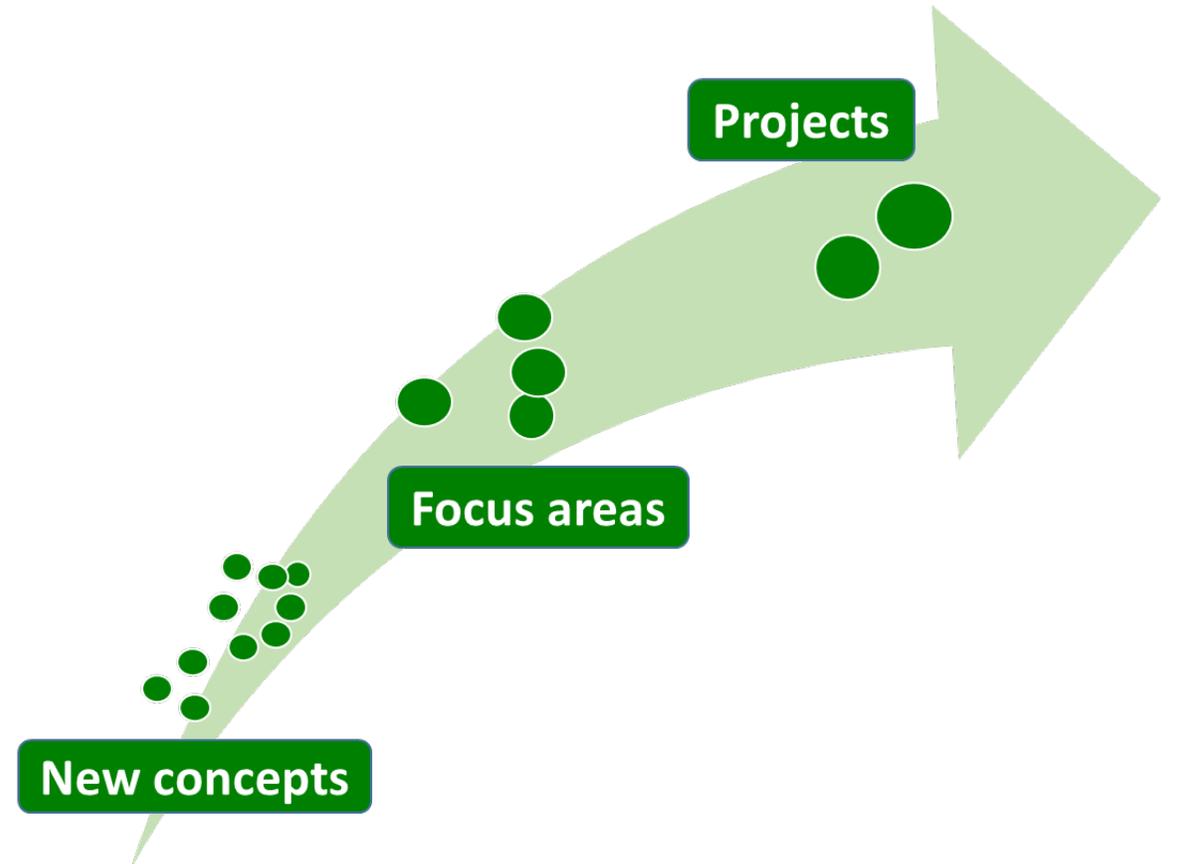
Nuclear Systems

Non-Electric Applications

Isotopes & Chemistry

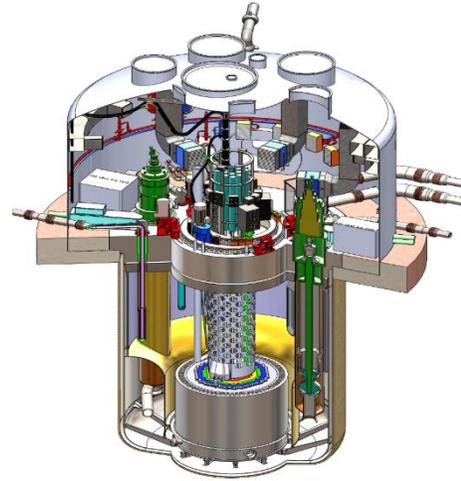
Fuels & Materials

Subsystems & Safety

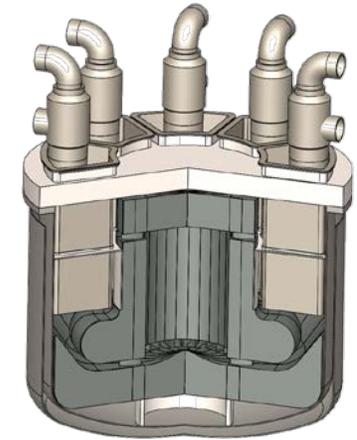


TerraPower is focused on bringing two new reactor technologies to market

- TerraPower was formed to address growing **global** energy needs
 - With climate change, pollution, and rising energy demands, a scalable solution is needed
 - All energy forms were considered
 - Fossil (coal, gas, diesel, etc.), wind, solar, etc.
- Our focus is on next generation nuclear energy systems that excel in economics, safety, resource utilization, waste, and proliferation resistance



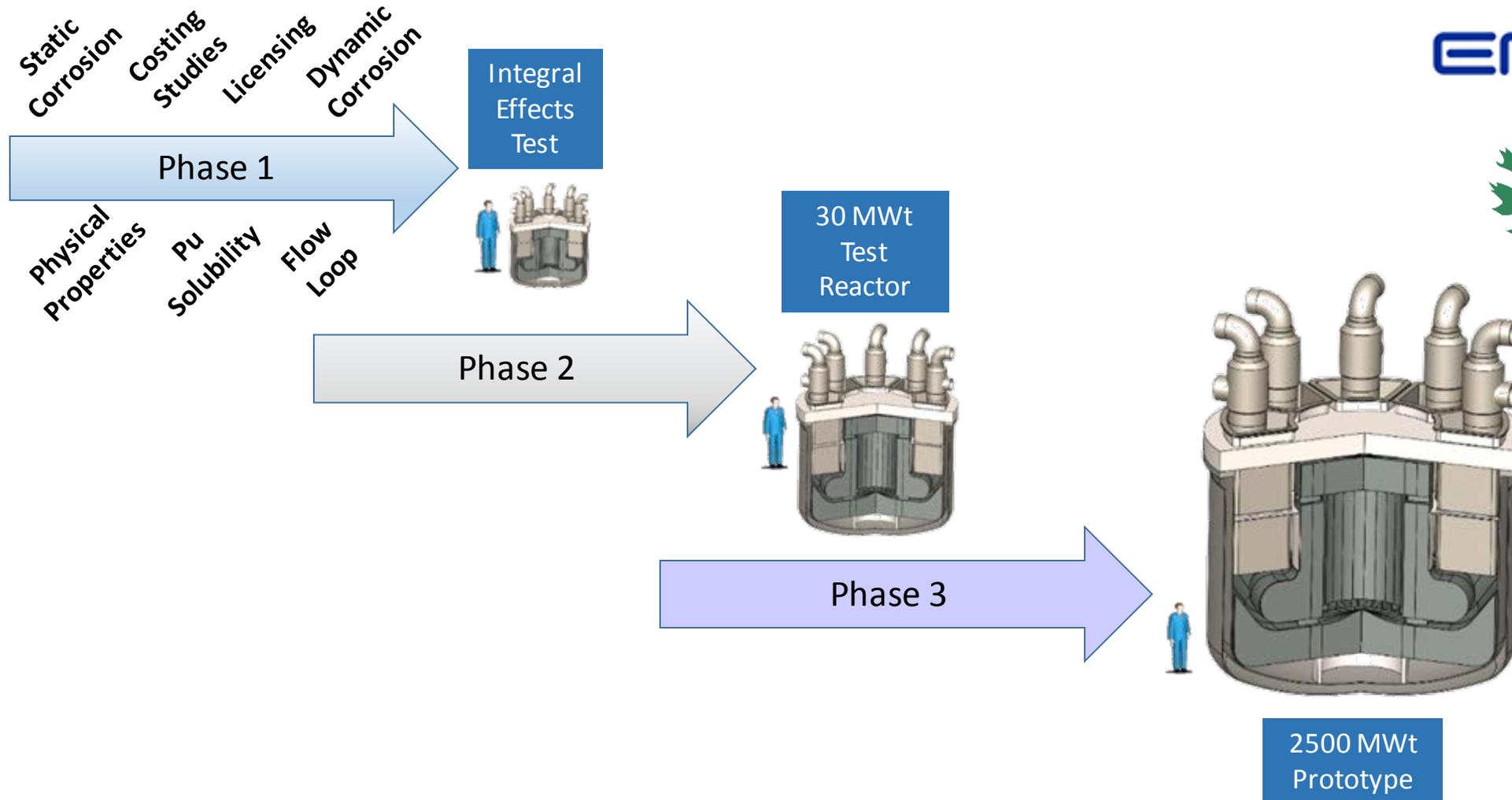
Traveling Wave Reactor



Molten-Chloride Fast Reactor

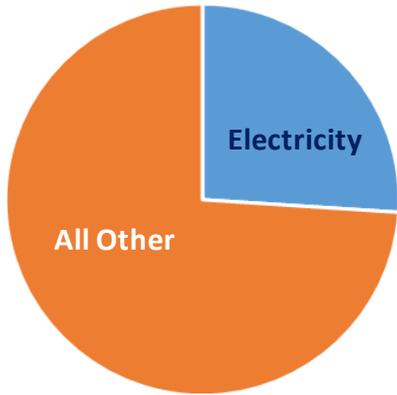
	TWR	MCFR	LWR
Thermal Power (MWth)	3000	2500	3415
Electrical Power (MWe)	1200	1000	1100
Core Outlet Temperature	510°C	740°C	340°C
Fuel Burn-Up (%)	12%	25%	6%
Ability to run on un-enriched fuel	Yes	Yes	No

The MCFR will be developed in phases, with the help of key partners

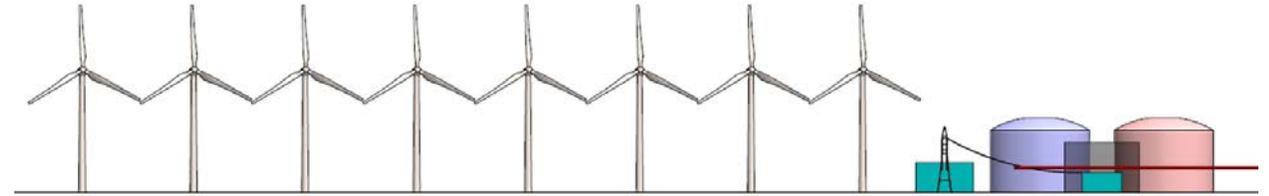


Thermal applications of nuclear energy are worth pursuing and renewables may be a stepping stone

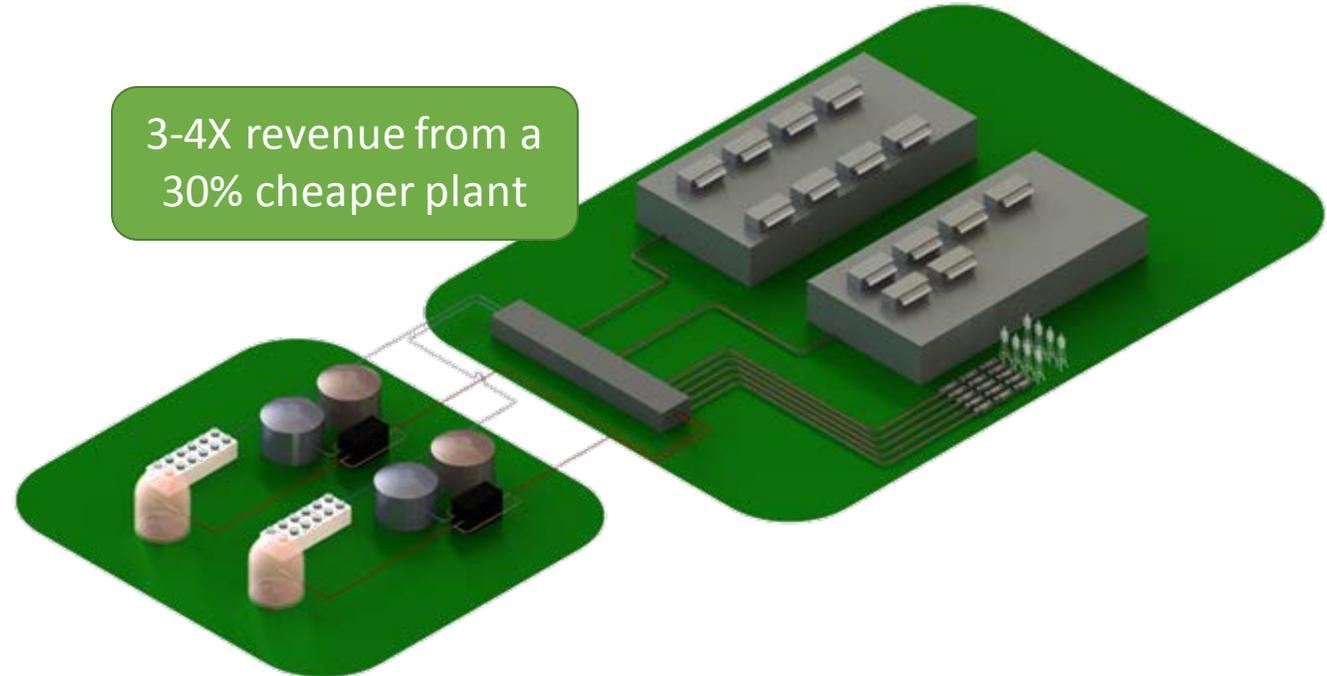
Non-electrical uses of energy are the world's largest source of CO₂ (32 Billion Tons/Year)



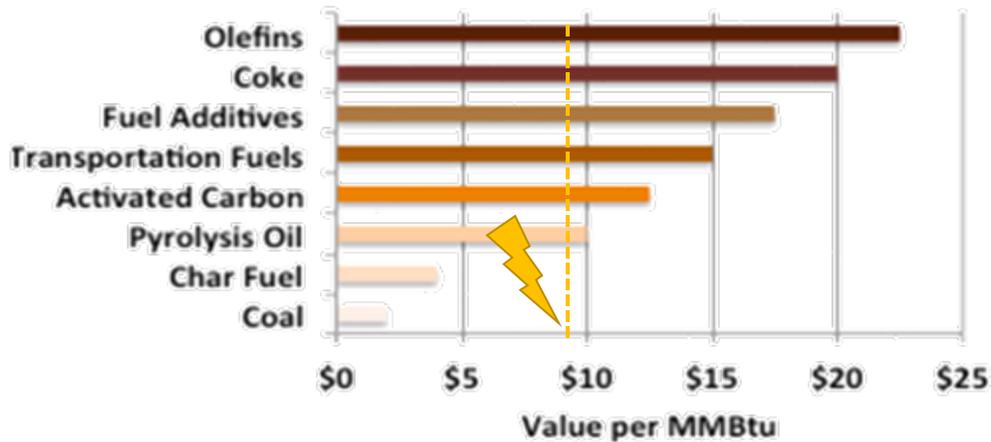
Salt-based thermal storage enhances integration of renewables.



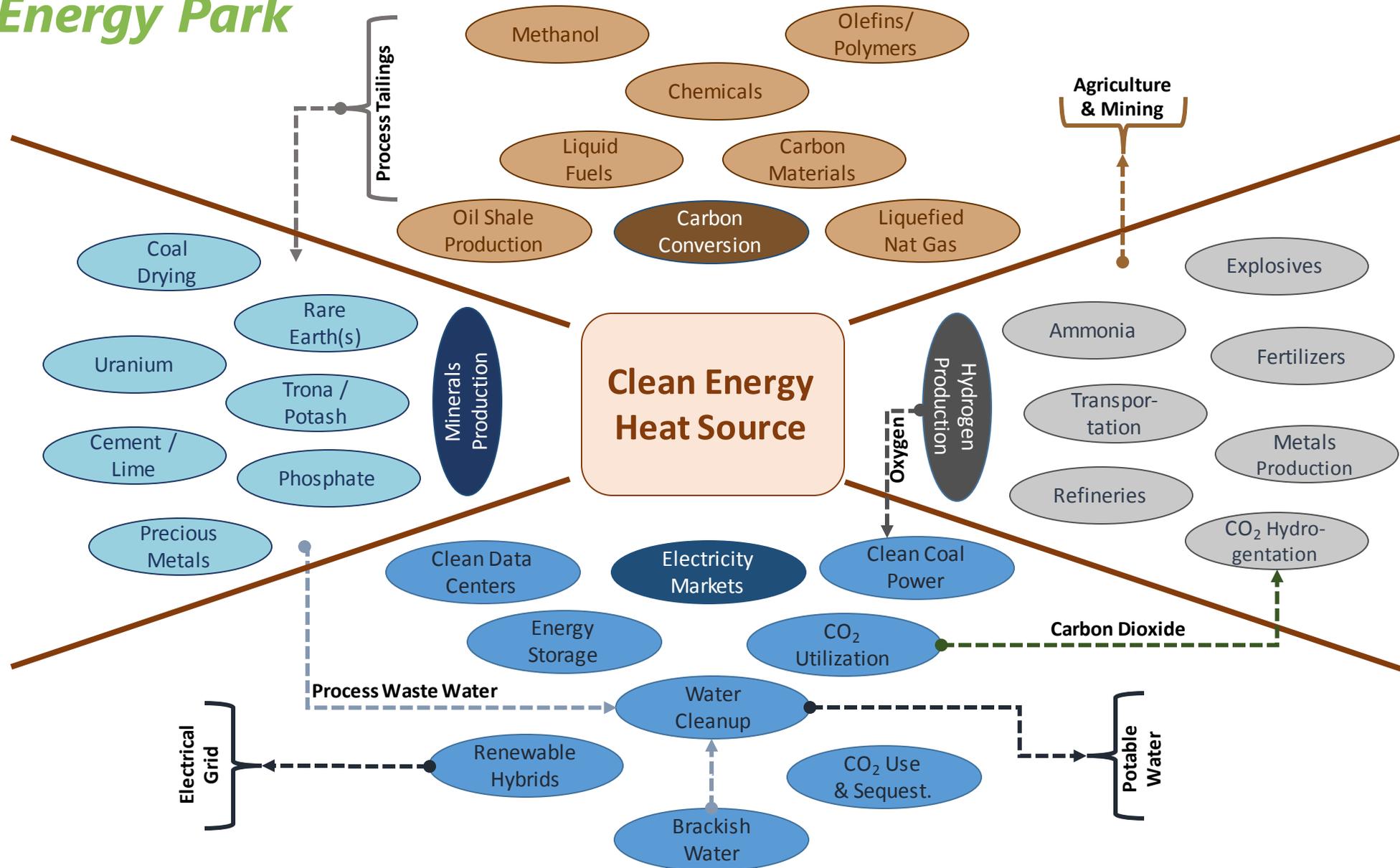
3-4X revenue from a 30% cheaper plant



Coal Products Value Chain

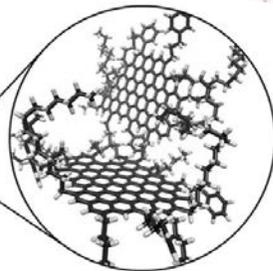
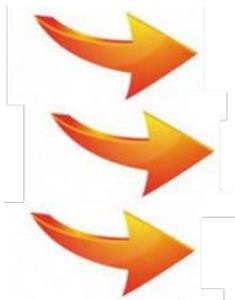


Clean Energy Park



MuSCL (Multistage Supercritical Liquefaction) – Pyrolysis under a reducing solvent for high value product creation.

Nuclear or Renewable Thermal Energy (>460°C)

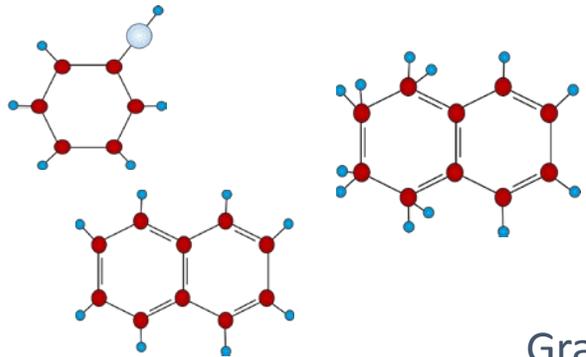


\$14/ton

Stage 1 → Pyrolysis under sCO₂
(Heat transfer fluid and reaction product solvent;
Reducing/non-Oxidizing)



\$1000/ton
"Non-BTU" Chemicals



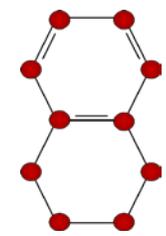
\$200/ton
Pyrolysis Coke



Activated Carbon



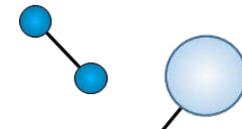
Graphene



Carbon Fibers



Add Steam (>600°C)



Catalytic formation and dehydration



\$500/ton
Fuels

Stage 2 (Optional) → Steam reform to syngas and build specific fuels or intermediate chemicals, i.e. MeOH or DME