

IGCC and Gasification

Cleaner Coal Solutions



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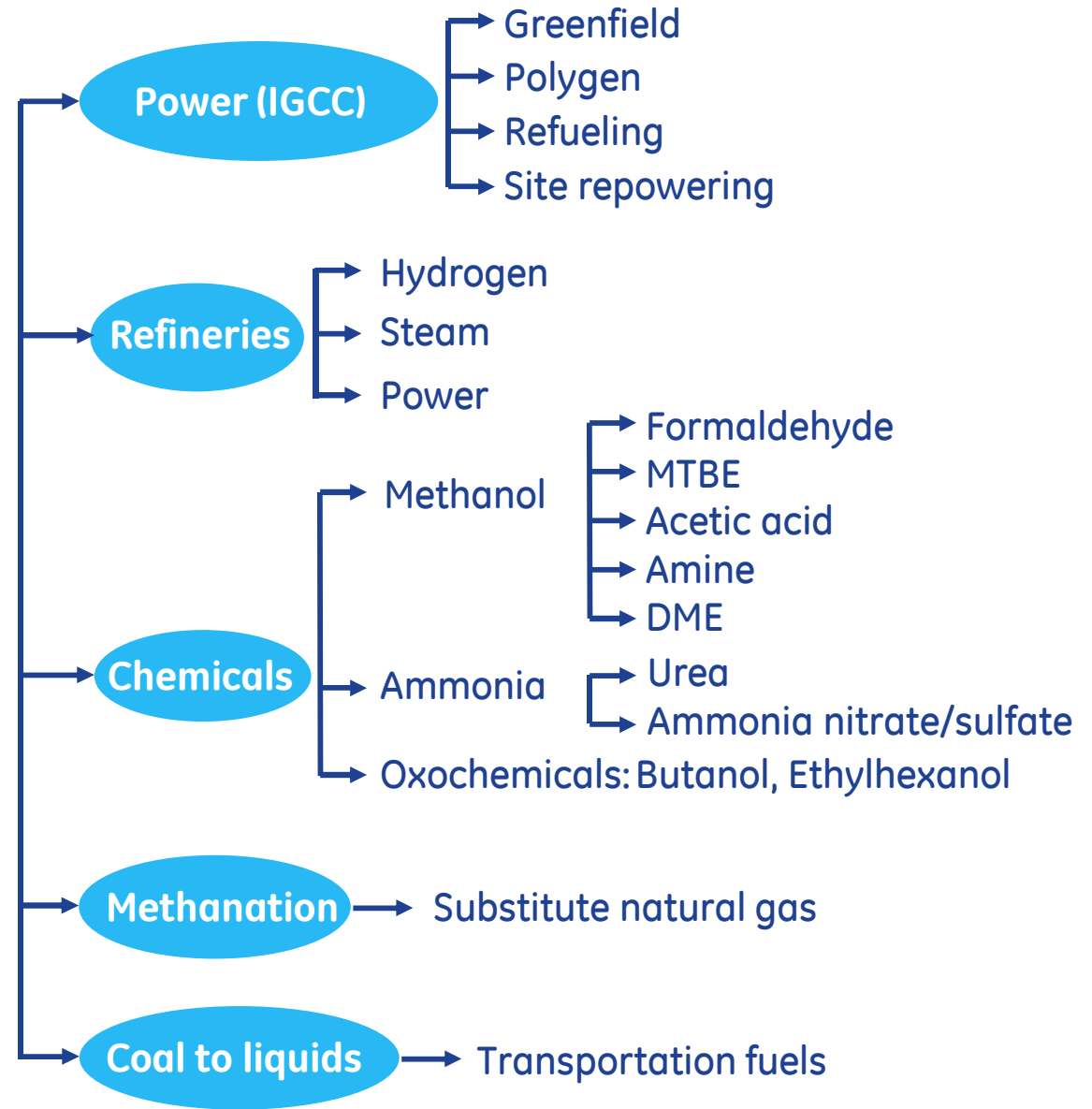
Diverse applications



Syngas
(H_2+CO)

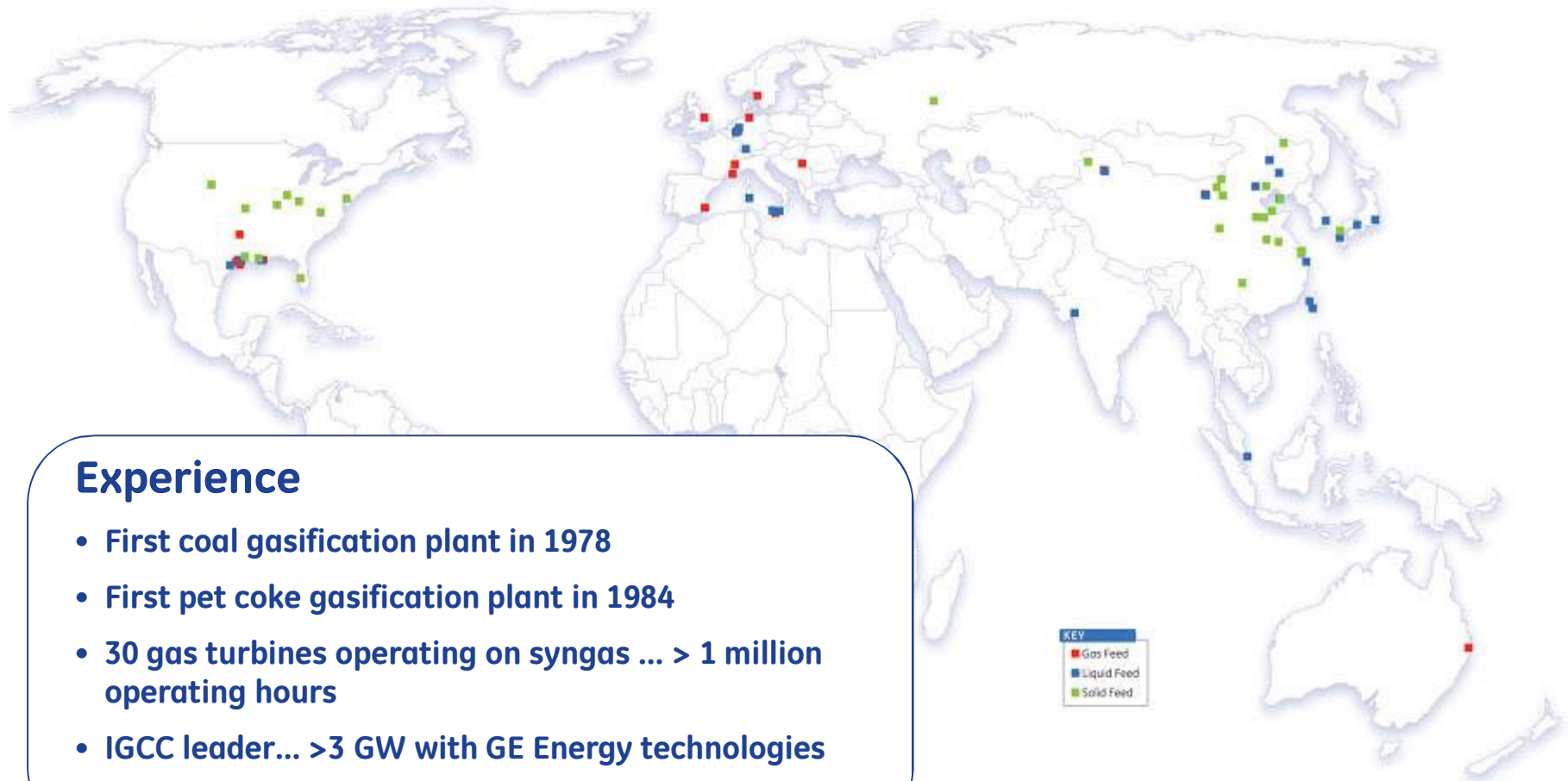
Feedstocks

- Coal
- Pet coke
- Asphalt
- Heavy Oil
- Vacuum Residue
- Natural Gas



Gasification leadership

Over **65** facilities and **145** gasifiers operating worldwide



Experience

- First coal gasification plant in 1978
- First pet coke gasification plant in 1984
- 30 gas turbines operating on syngas ... > 1 million operating hours
- IGCC leader... >3 GW with GE Energy technologies
- 35 projects globally that separate and capture CO₂

Shenhua Baotou: MTO facility



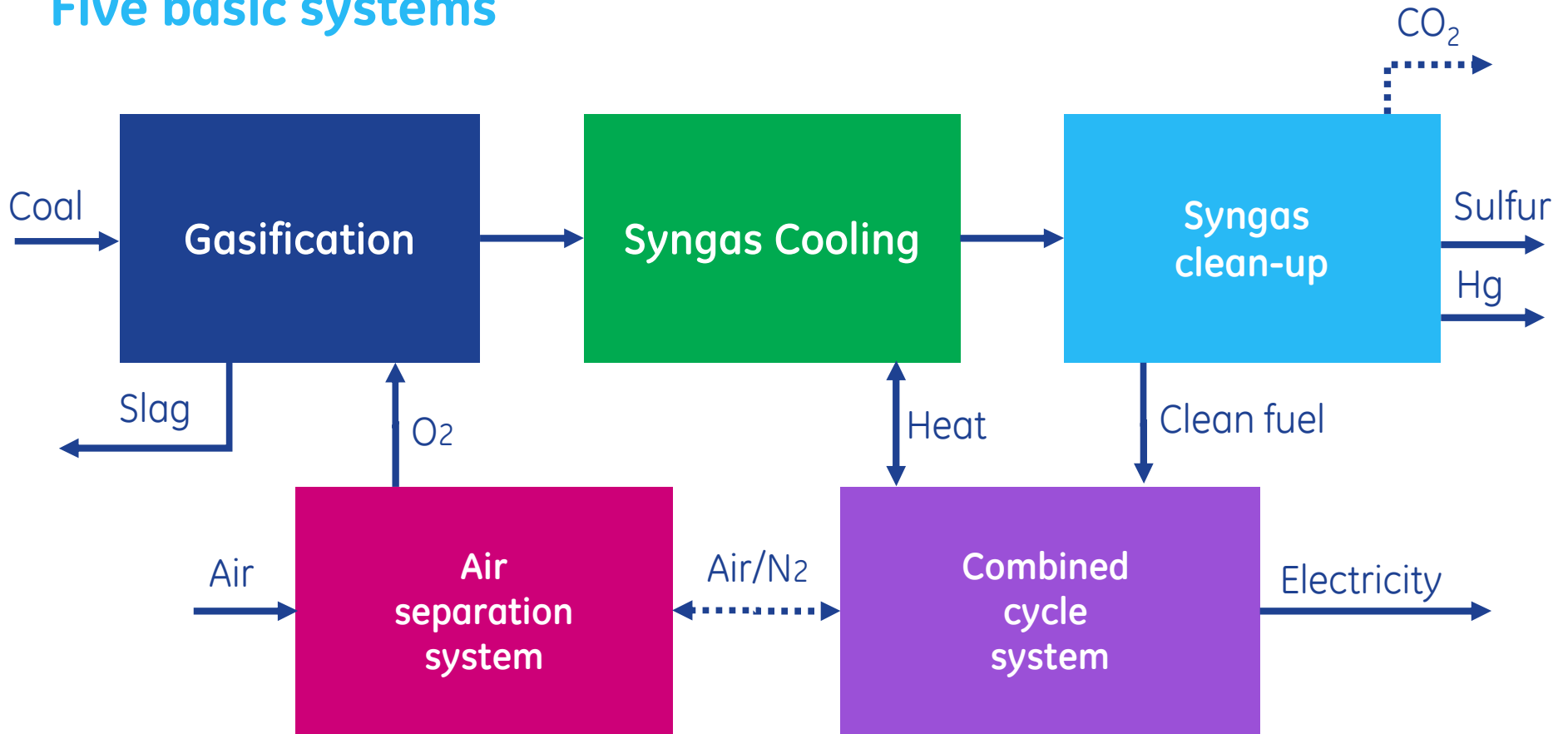
- China Shenhua Coal to Liquid and Chemical Co. Ltd., Baotou, Inner Mongolia
- **5 GE 900 ft³ gasifiers + 2 spares**
- Successful start-up in summer 2010 ...
PDP delivery May '07, large bore inspection Oct. '09
- 1.8MMTPY of methanol per year from syngas (at full production)

Largest coal to olefins plant in the world.



Integrated gasification combined cycle

Five basic systems

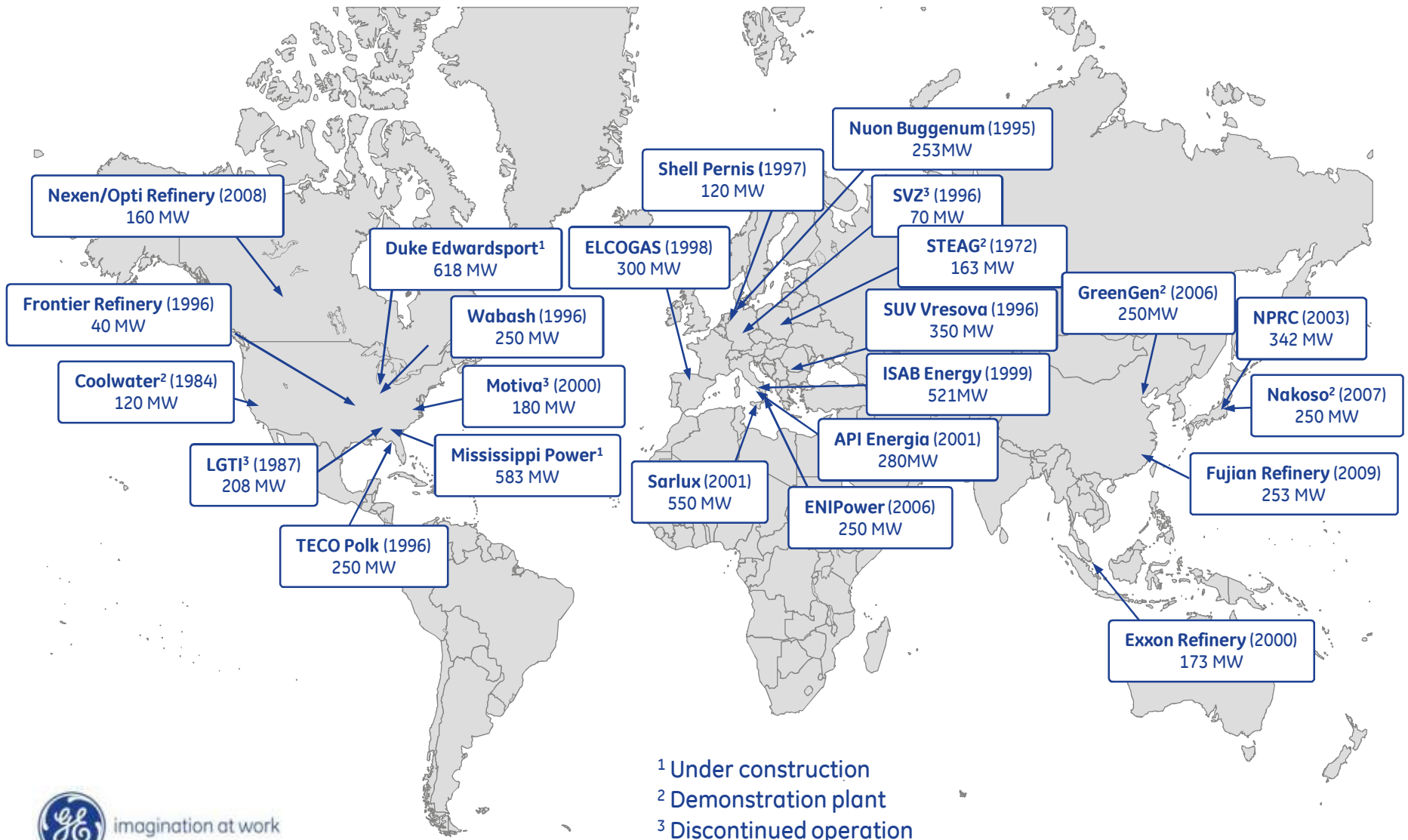


Key IGCC milestones

- **Cool Water Demo Plant 1984**
 - First Large Scale (120MW) IGCC
 - Demonstrated IGCC technical feasibility
- **Polk Tampa Electric 1996**
 - Process heat and ASU/GT N2 integration.
 - 250MW - demonstrated IGCC commercial feasibility
- **Duke Energy Edwardsport**
 - Startup 2012
 - 618MW at 38.4% HHV
 - 3 year construction
 - FOAK IGCC commercial deployment



Global IGCC Deployment



¹ Under construction
² Demonstration plant
³ Discontinued operation



Experience in CO₂ capture

Proven Gasification



H₂
CO

Proven Shift



H₂
CO₂

Proven Capture



CO₂

Proven Turbines



H₂

- 68 GE licensed gasification units operating worldwide
- 21 with solid feedstock

- 35 GE licensed gasification units operating worldwide using shift reaction to produce H₂
- 19 with solid feedstock

- 35 GE licensed units operating worldwide removing CO₂ from shifted syngas
- 19 with solid feedstock

- 30 GE gas turbines operating at 50%+ H₂
- F-class combustion validation up to 90% H₂



Polygeneration

Can provide any combination of:

- Power
- Cleaner CO₂ for EOR or sequestration
- Steam (refinery, district heating, EOR)
- H₂ for hydrocracking
- Chemicals
- Desalination

Broad feedstock capability

- HFO
- Residuals
- Steam cracker bottoms
- Delayed pet coke

Proven in refinery/petrochemical settings

- Sarlux (power, steam, H₂, desalination)
- Exxon Singapore (power, steam, H₂)
- Singapore Syngas (CO for acetic acid, H₂ for refinery, power, steam)



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