

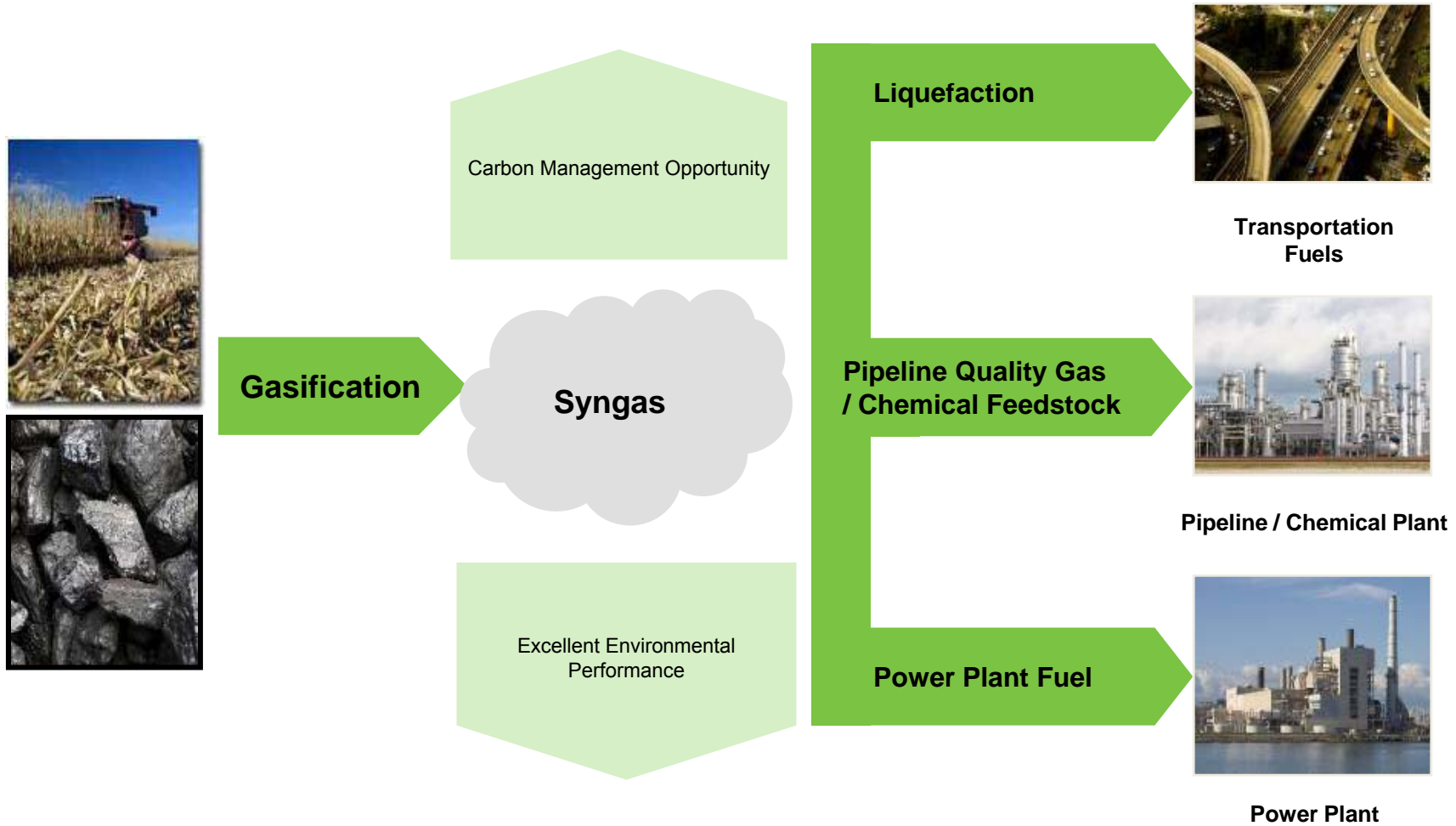


the Energy to Lead

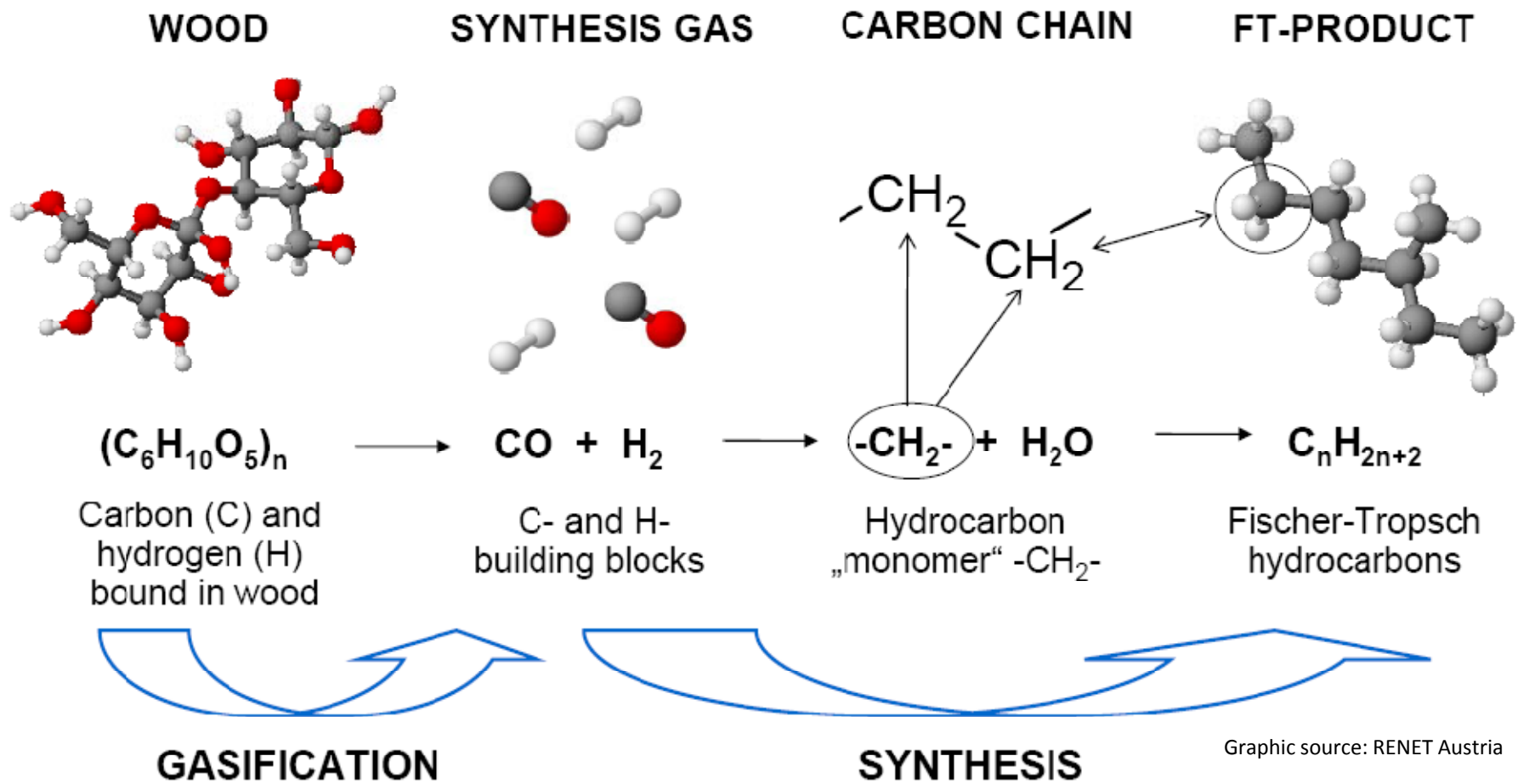
GTI Gasification Overview

-
- > Vann Bush
Managing Director, Supply—Gasification
GTI Energy Technology Forum
June 3, 2009

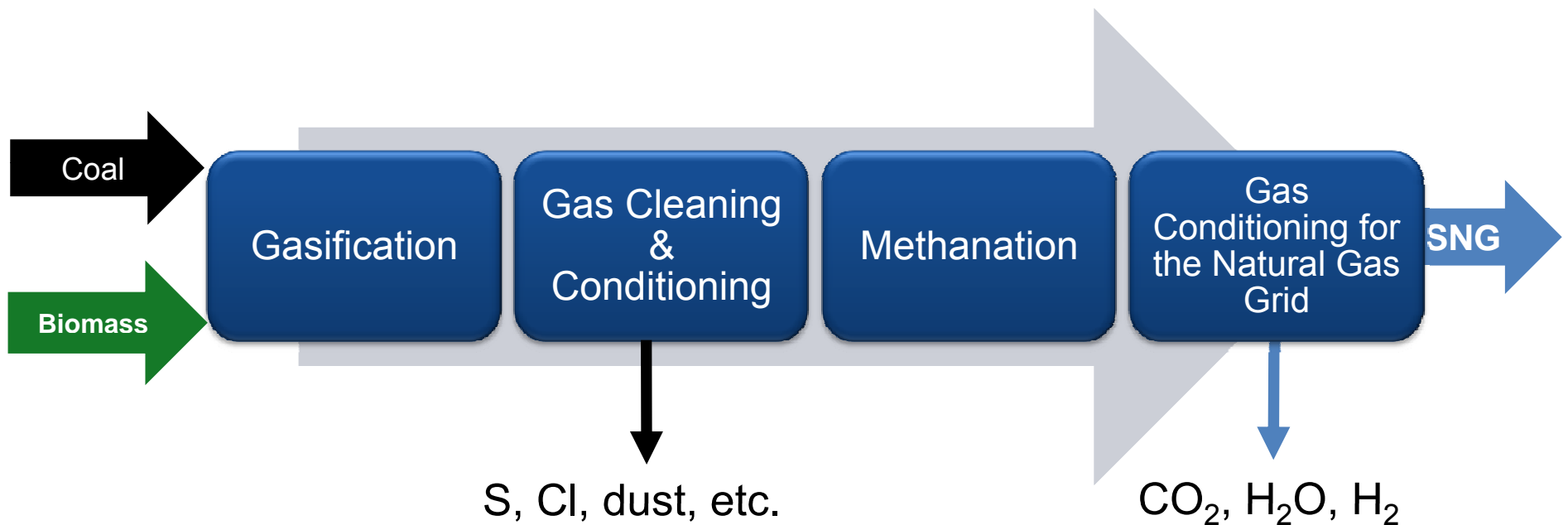
Gasification – A Means to a Secure, Clean Energy Supply



Gasification is a Versatile Tool

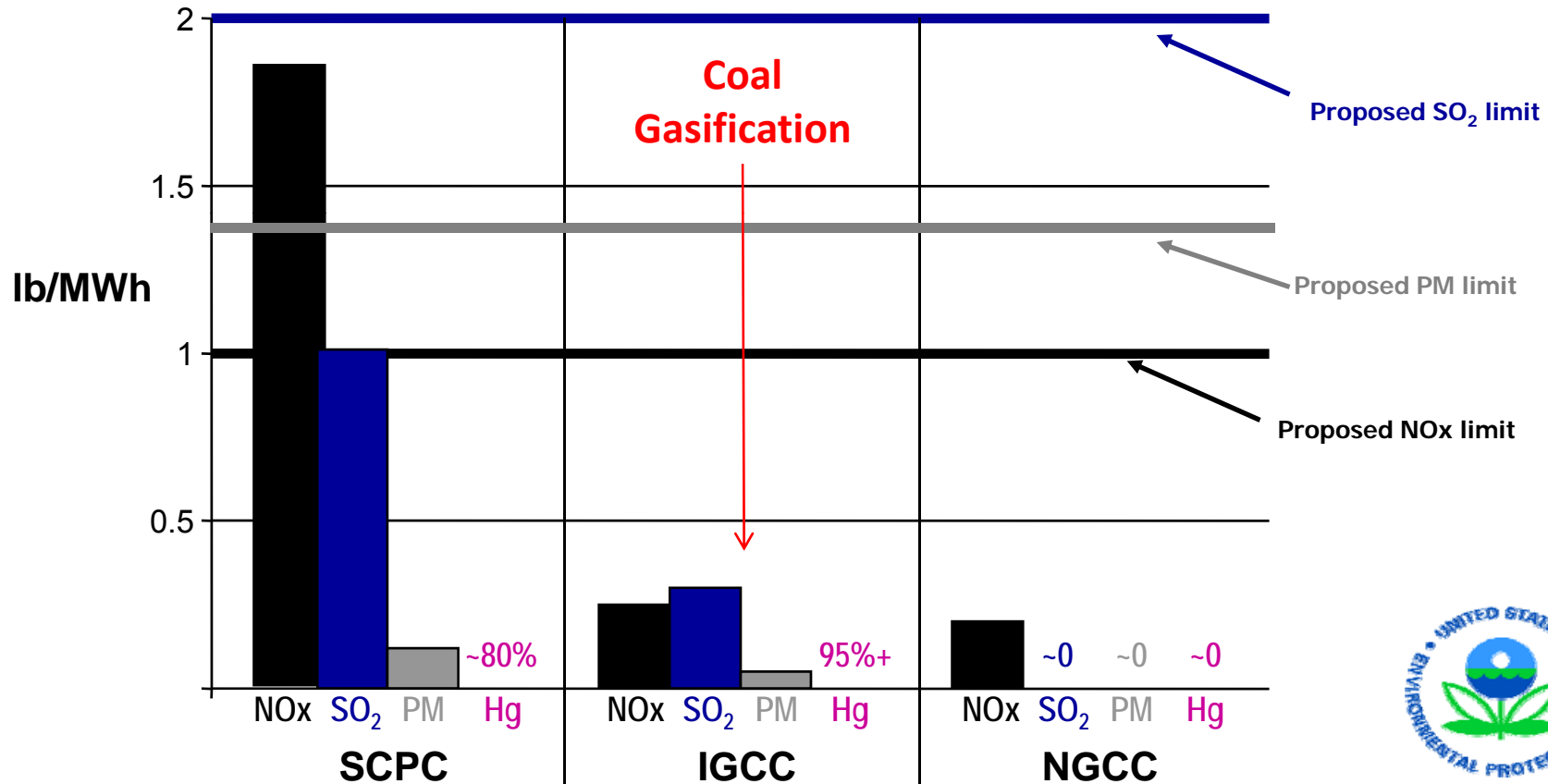


Simplified Substitute Natural Gas Process



Gasification is a Clean Option

Estimated New Plant Emissions Performance



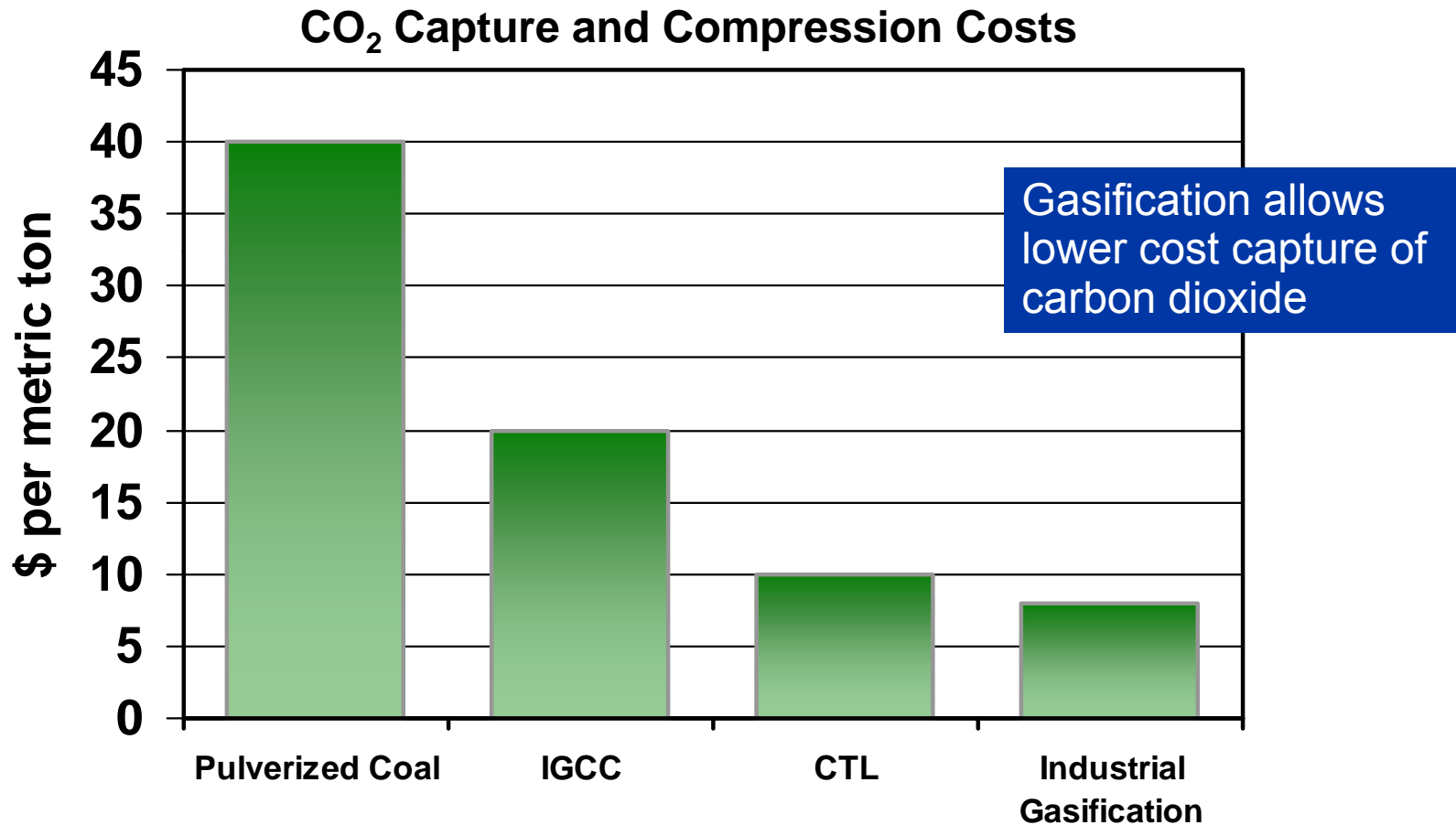
Advanced Coal Combustion



Source: Robert J. Wayland, Ph.D.
 U.S. Environmental Protection Agency
 Office of Air and Radiation, Office of Air Quality
 Planning and Standards



Gasification Delivers a Carbon Management Advantage for Coal



Source: MIT's The Future of Coal, 2007

Projects at GTI

1. Supporting GTI commercialized technologies
 - > e.g.) U-GAS[®] and RENUGAS[®] Gasifiers, CrystaSulf[®], Morphysorb[®]
2. Developing and evaluating technologies for industry
 - > e.g.) GreatPoint Energy, Pratt & Whitney Rocketdyne
3. Developing new solutions
 - > e.g.) advanced solvents, membranes, catalysts, sorbents

Hai Hua Project Zhaozuang City, China



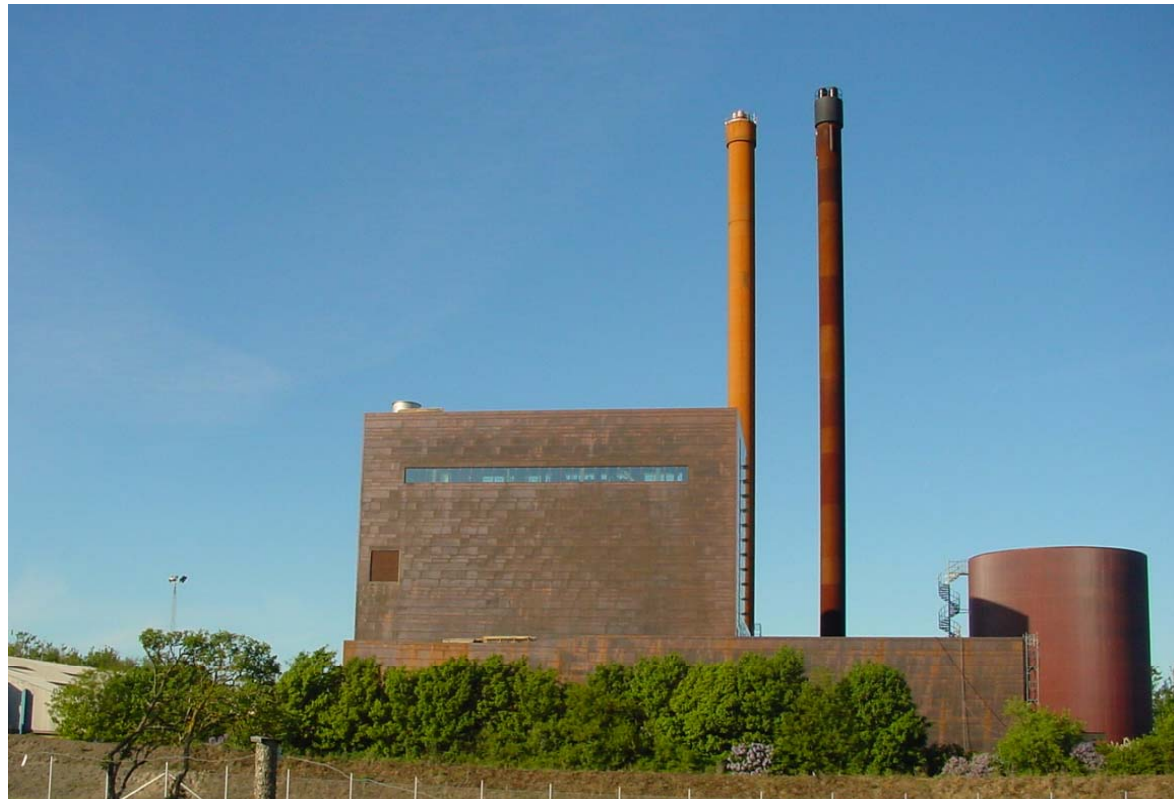
Two U-GAS®
gasifiers to
convert up to
300 TPD
Chinese coal
to clean
syngas for
methanol
production.



Combined Heat & Power Project Skive, Denmark

CARBONA

One gasifier to convert 110 tons/day (20 MW) wood fuel into 6 MW electricity and 12 MW district heat.



World's Largest Acid Gas (CO₂ and H₂S) Injection Facility



Using GTI's Morphysorb[®] to capture acid gases from 45 MM SCFD of raw, sour gas.



Gas Processing Research Laboratory



Gas Processing Laboratory



High-Pressure Absorber/Gas/Liquid Membrane Contactor



High Pressure Vapor-Liquid Equilibrium Test System



High-Pressure Flow Loop

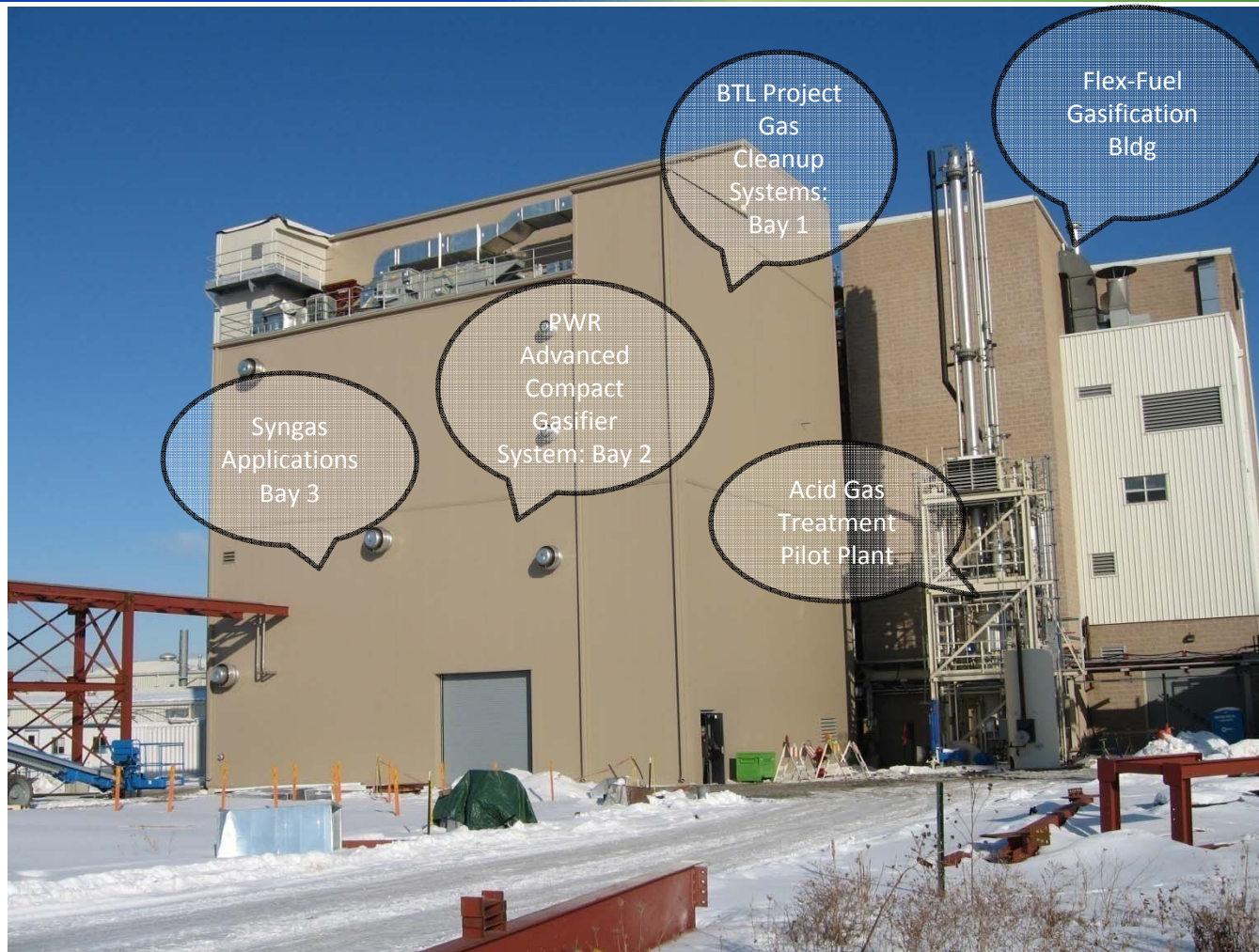
Flex-Fuel Test Facility: A Technology Development and Systems Integration Platform



- > Pilot-scale process R&D
- > 20 tpd coal or 40 tpd biomass
- > Periodic test campaigns
- > ~30 testing staff
- > CO₂ and H₂S capture pilot plant

Commissioned 2004

Flex-Fuel Test Facility and Advanced Gasification Test Facility



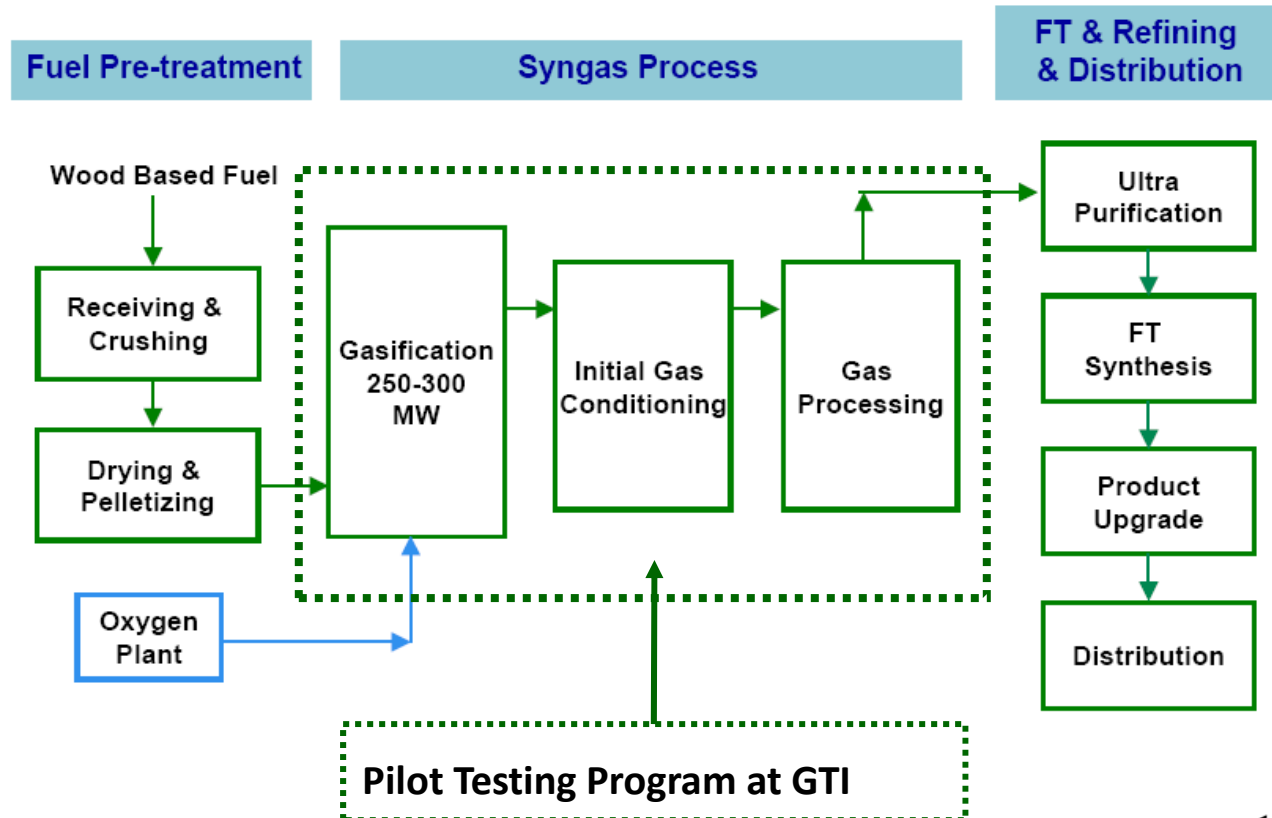
2nd Generation Biofuel Production



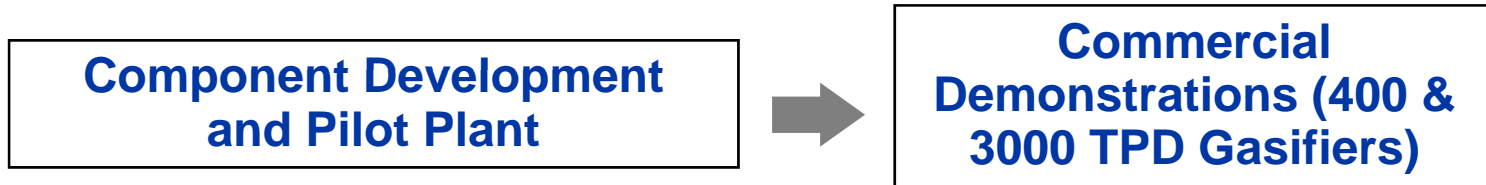
UPM-KYMMENE BIODIESEL PROCESS



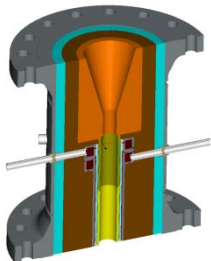
- > Carbon-neutral diesel and jet fuel through gasification of wood and Fischer-Tropsch conversion of cleaned syngas.
- > Design support at GTI. Commercial plant planned for 2012.



Pratt & Whitney Rocketdyne Compact Gasification System



2004 - 2009



Component Development



2007 - 2010



Pilot Plant Gasifier & Test Facility



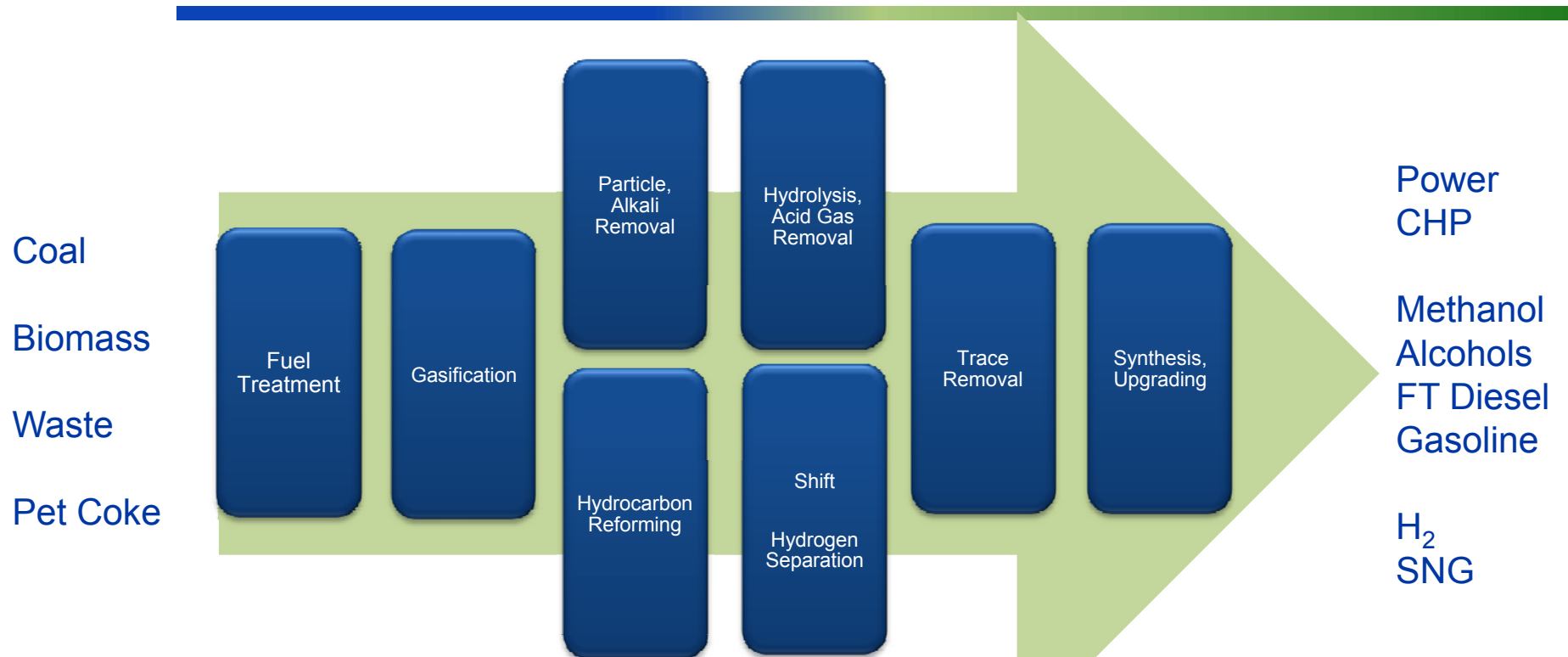
2015



Commercial Gasification Plant

15% to 20% Lower End Product Cost from Improved Efficiency, Cost and Availability

Synthesis Gas Process Work at GTI



GTI R&D
 Coal
 Biomass
 Coal and Biomass

Biomass pretreatment, pyrolysis	GTI U-GAS®, RENUGAS®, GPE bluegas, PWR Compact Gasifier	Ultra-Clean GTI Catalysts, Tar Reforming	Morphysorb®, UCSRP, CrystaSulf® (+DO) Ultra-Clean Membranes	UCSRP, CrystaSulf-DO® Ultra-Clean	Catalyst
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16–18 september 2009
Sheraton Chicago Hotel & Towers

tcbiomass2009
THE INTERNATIONAL CONFERENCE
ON THERMOCHEMICAL CONVERSION SCIENCE

Join us at the cutting edge of thermochemical biomass conversion science!

The banner features a close-up of a person wearing safety goggles on the left, and three circular images of biomass (a tree, algae, and grass) on the right. The background is a light blue sky over a field of grass.

- > Leading researchers and vendors in thermochemical biomass conversion science
- > 3 days of peer-reviewed scientific sessions
 - 25 presentations
 - 50 posters

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Remarks from State of Illinois

- > *Bill Hoback*
Deputy Director,
Office of Coal Development
Department of Commerce
and Economic Opportunity
State of Illinois

