Factors That Affect the Design of Clean Coal Technologies

Synfuel Park Feasibility Study

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The Southern States Energy Board Report

The goal is to determine the feasibility of locating a Fischer Tropsch (FT) plant with **a capacity of 10,000 B/D** at the **Crane Naval Surface Warfare Center**. The specifications for the plant will be taken from one of the case studies published in the Southern States Energy Board report "**The American Energy Security Study**."

The **details of components of the plants are not available** in the report. These details will have to be approximately inferred from the available information to evaluate issues related to transportation and any changes in plant configuration such as location of the gasifiers at the mouth of a nearby coal mine

Source: http://www.sseb.org/

Site Selection Criteria

(1) Coal access

(2) Sequestration access

(3) Land acquisition

(4) Transportation (rail, highway, water way)

How can gasifiers and FT reactors be transported to Crane?

(a) Estimates of size and weight for gasifiers and FT reactors included in the cases will be estimated, and feasibility of shipment from the Ohio River near Mt. Vernon via road or rail will be assessed by enquiring with INDOT and rail companies.

(b) How can finished products (FT liquids, electric power, and byproducts) be delivered for either end use or further processing?

(5) Transmission lines

Site Selection Criteria (cont.)

(6) Gas pipelines

(7) Water Resources

(8) Is sufficient water available?

(a) Potential sources include Lake Greenwood, underground sources, a nearby river such as the East Fork, or a moderately nearby lake such as Lake Monroe.

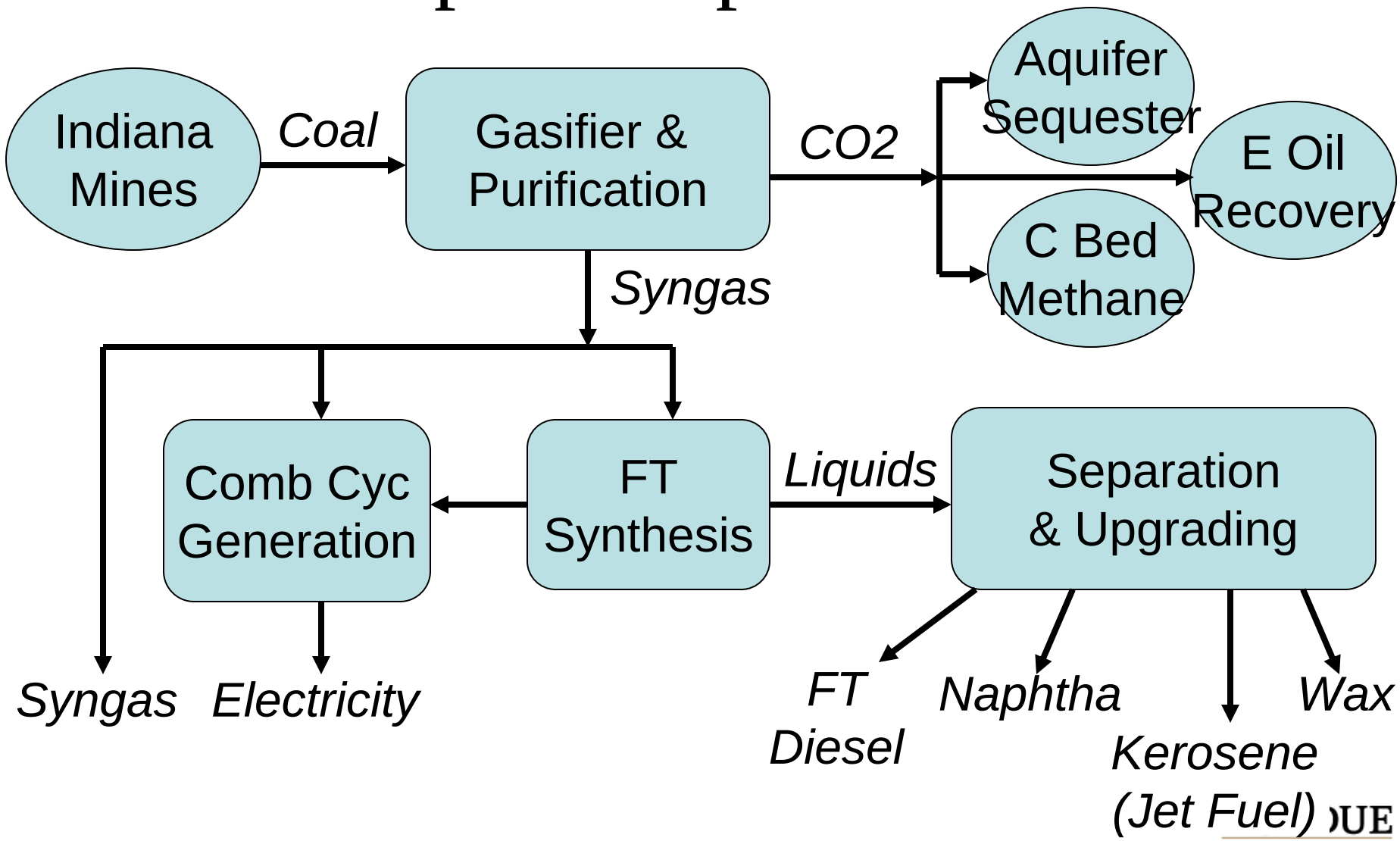
(b) How would used water be released, and what level of water treatment is required for releasing to alternative destinations (e.g., Lake Greenwood, the West/East Fork, others?)

(9) Waste disposal, environment

(10) Labor force

(11) Economic development

Concepts & Options



Data Collection

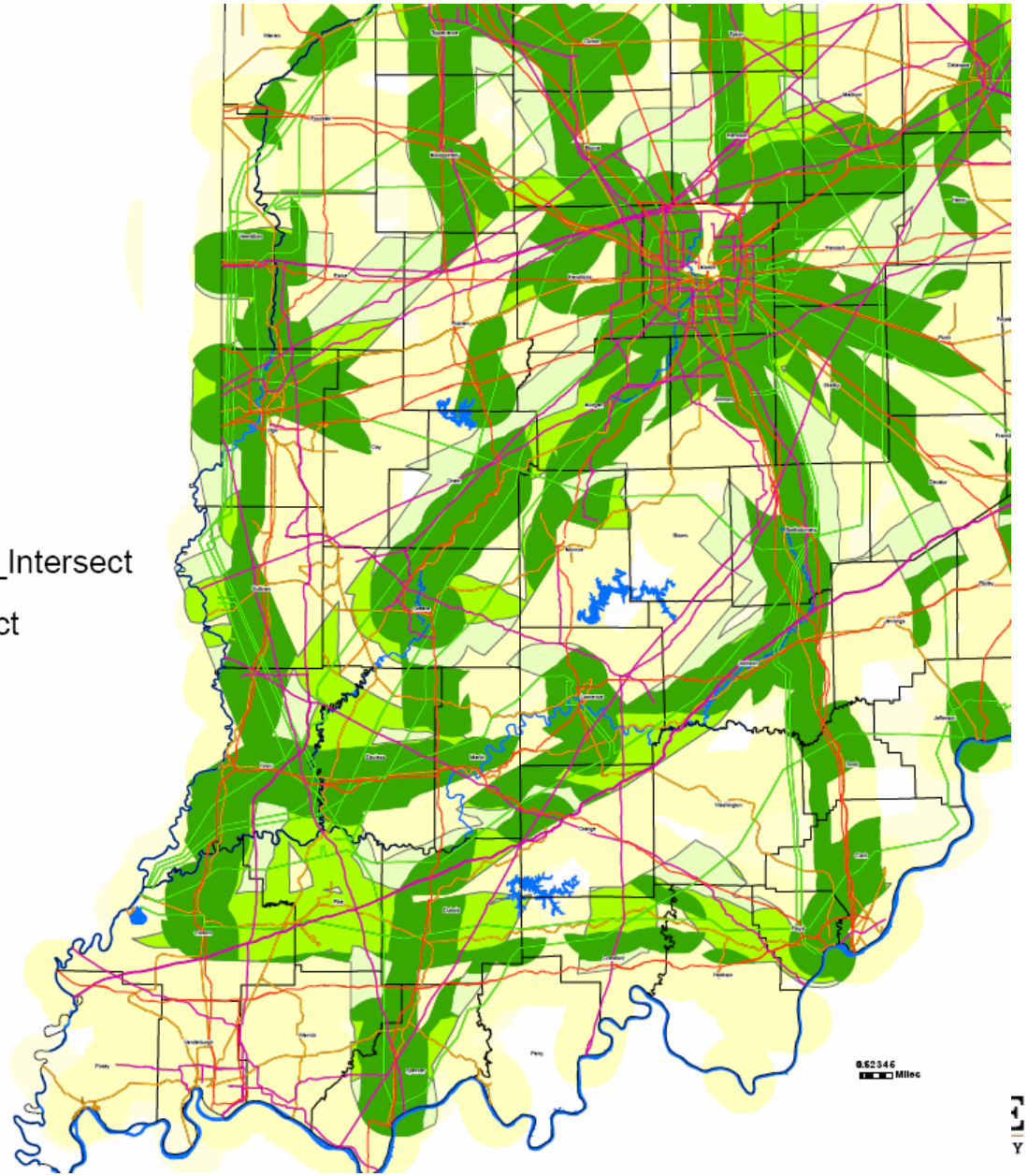
- Gasification (gasifiers, ASU, syngas cleaning)
  - Technologies (data of 7 gasifiers collected…)
  - Cost data (historical and forecast)
- FT process
  - Technologies (once through vs recycled)
  - Cost data (historical and forecast)
- Power islands, etc.
- CO2 sequestration options & potentials

Both historical cost and estimates vary by sources & scaling -- need careful analysis

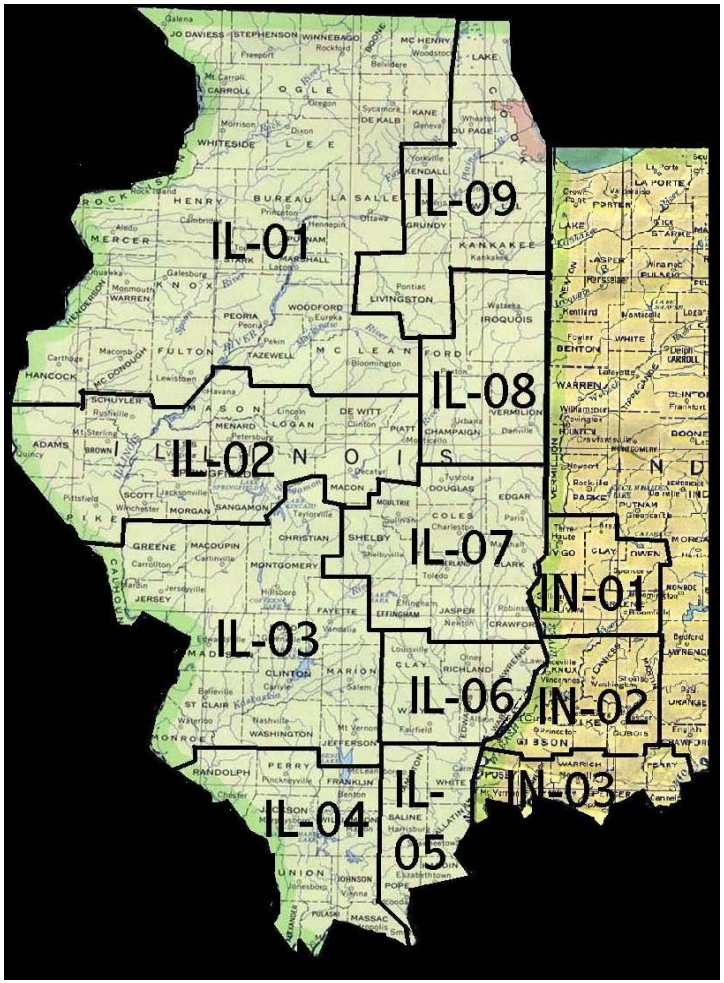
IGS Site Map

Legend

- Major Roads
- Rail System (INDOT)
- Pipelines (>12 inches diameter)
- Electric Power Lines
- Roads_Pipelines_Transmission_Rail_Intersect
- Pipelines_Transmission_Rail_Intersect
- Pipelines_Transmission_Intersect



ECBM & EOR Potential

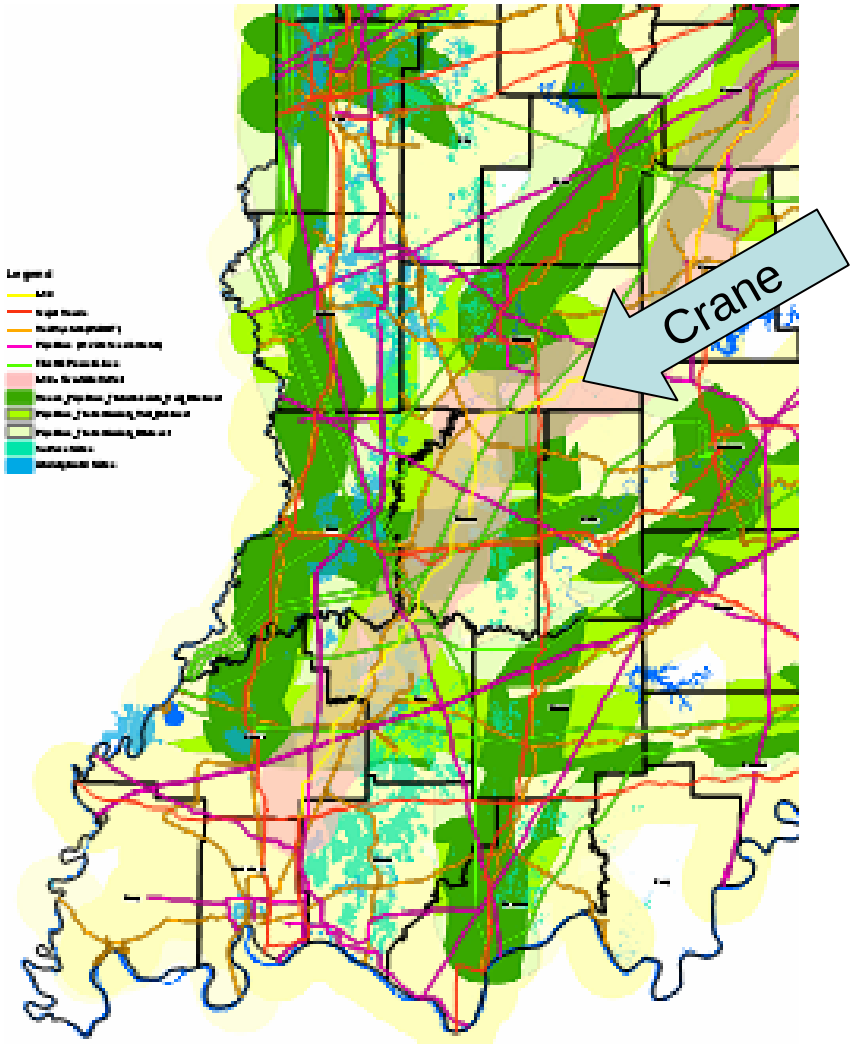


Node	CO2 in (Mtons)	CBM out (Bscf)	EOR out (Mbbls)
IN-01	**44**	**32**	**89 ***
IN-02	**99**	**160**	**67**
IN-03	**91**	**169**	**9**
IL-01	288	545	-
IL-02	191	370	7
IL-03	594	1023	182
IL-04	89	149	25
IL-05	**352**	**495**	**173**
IL-06	**998**	**1436**	**450**
IL-07	**1130**	**1972**	**156**
IL-08	48	43	-
IL-09	-	-	-

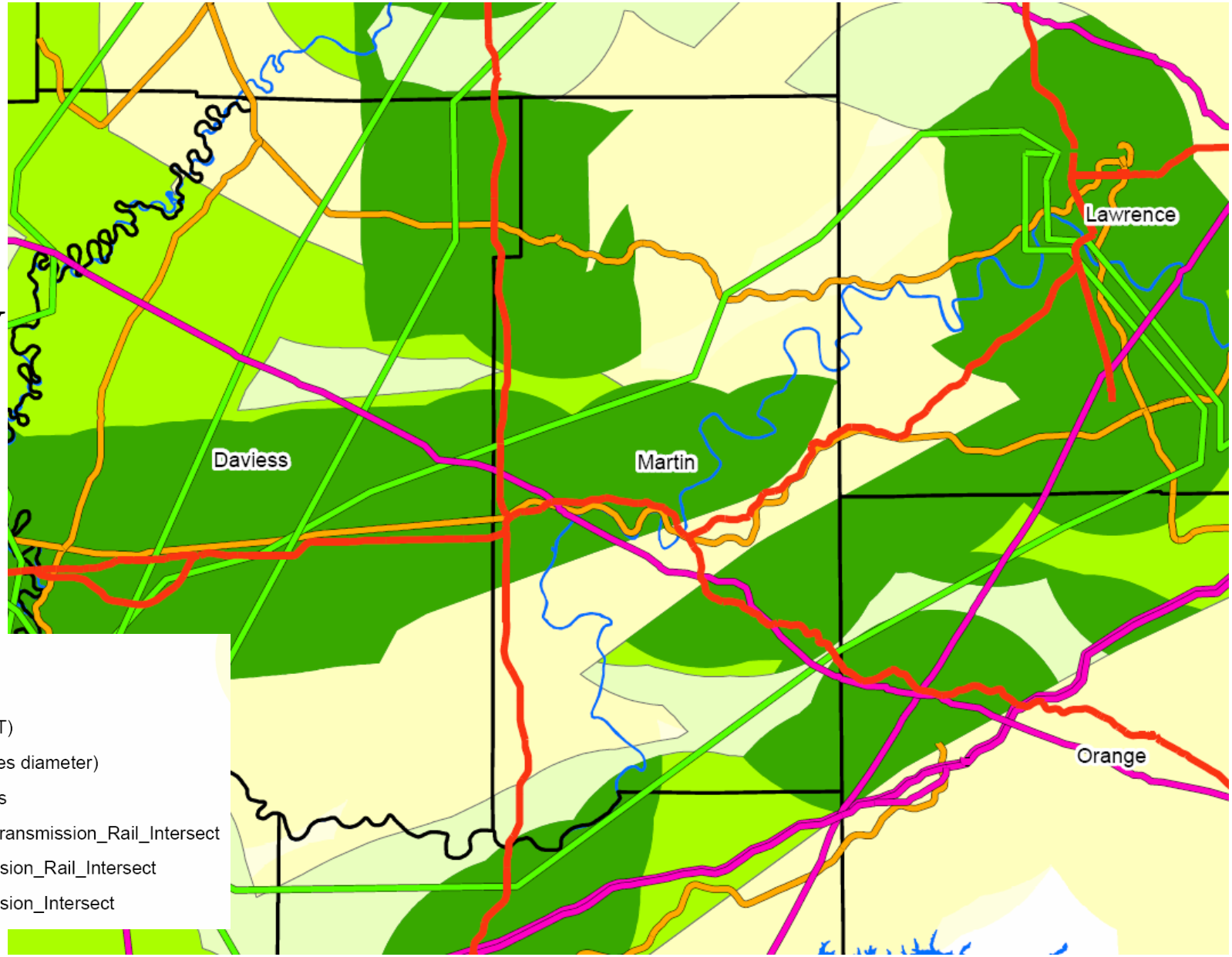
* **IN-01**, Location of Naval Surface Warfare Support Center

Crane Visit

- Crane Naval Weapons site in Martin county
- Major ordinance storage, testing & maintenance
- Special potential example
- Need for development in region
  - Crane may close?



Crane Martin County



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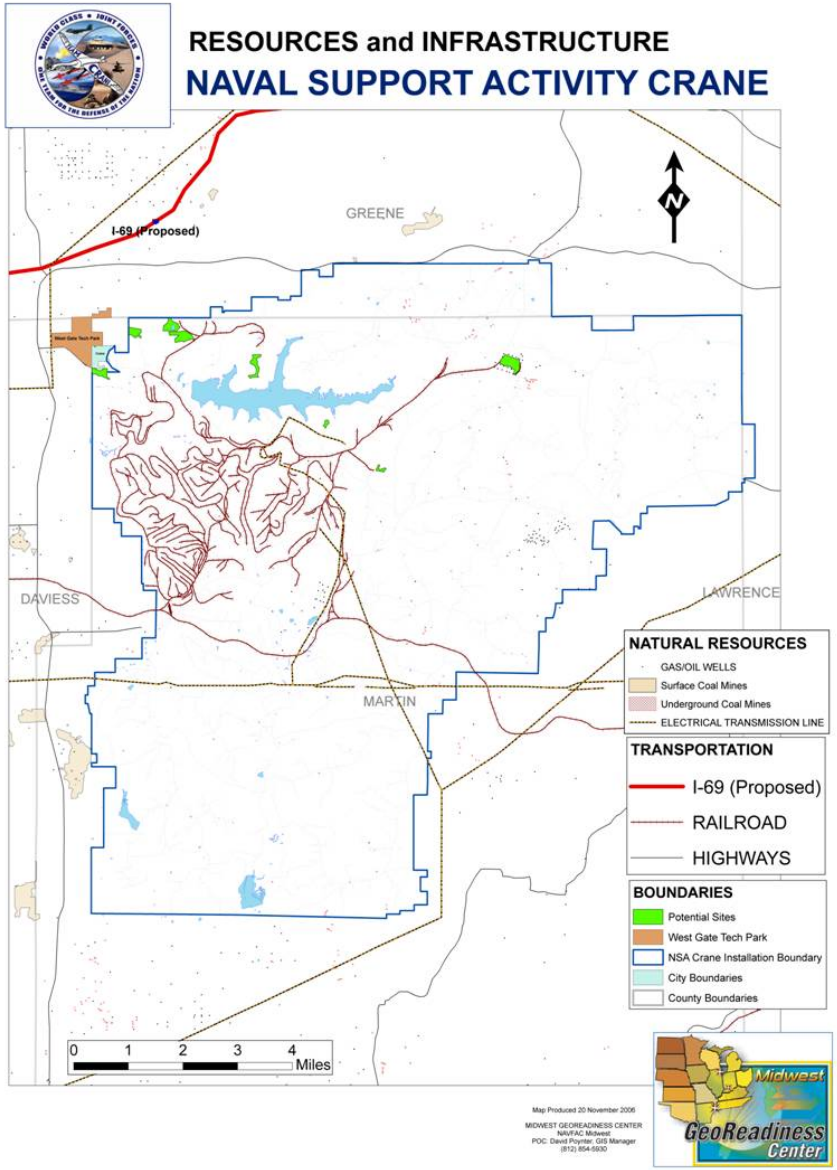
Crane Resources

- 63,000 acres
- Opportunity mostly on periphery
- In kind lease deals



Crane: Analysis

- Very hilly, and the largest flat area is about 80 acres
- Limited water, a small lake is about 800 acres, fed by a very small creek
- Connected to the East-West rail system, with many rail routs within the complex
- No major highway connection, and the situation can be improved if I69 is built along its front gate
- There is a gas citygate, with about 30% capacity loading
- There are two power substations, one from Hoosier Energy, the other, from Duke

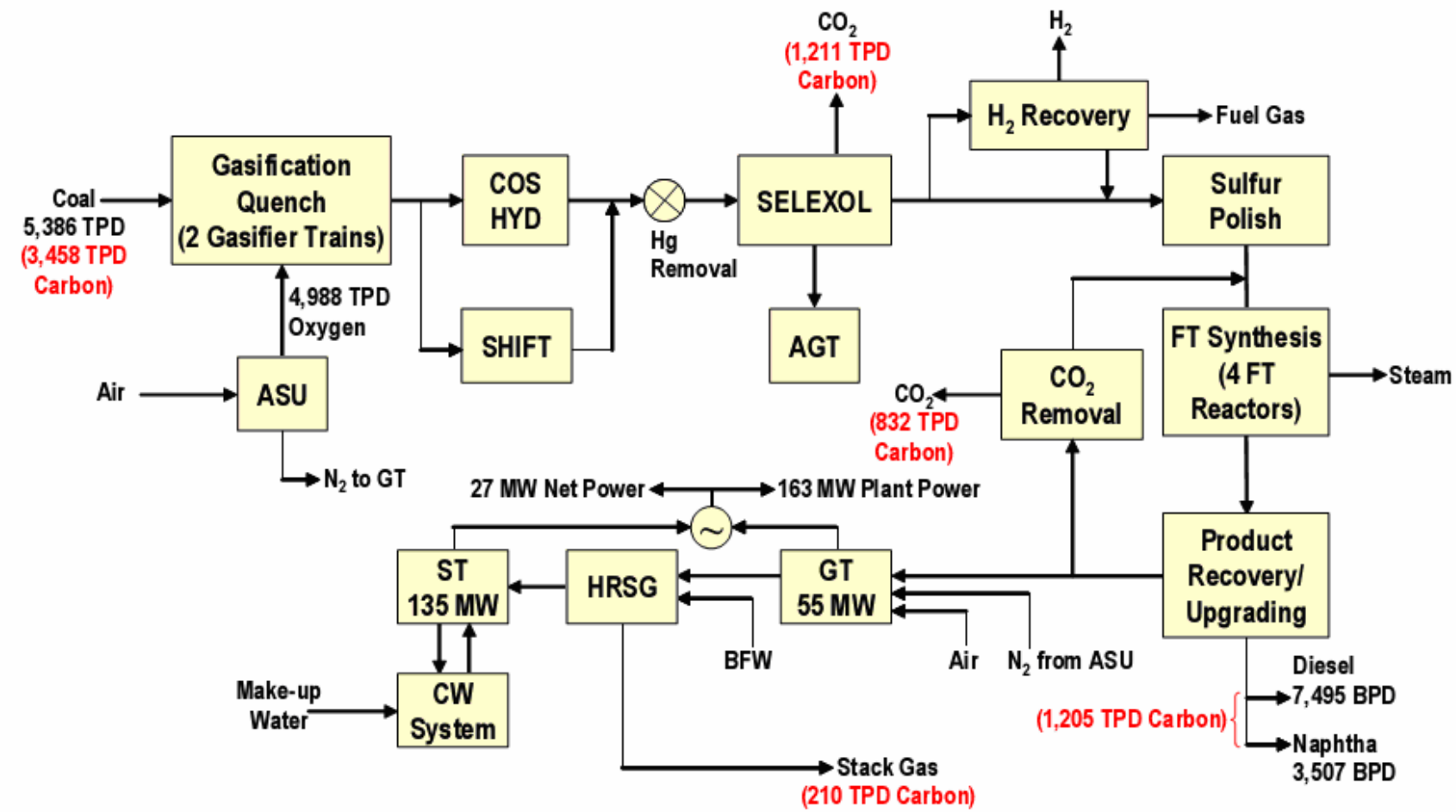
Crane: Analysis (cont.)

- More than 5,000 people are working for the base, some with technology background
- Most of the land is not contaminated
- ESOP Advisors Inc has been hired for planning economic development in 6 counties around Crane. They asked H2 production and biomass fuel as part of the synfuel park
- The site is not far from major coal sources
- People from there are eager to talk development
- There is a technology park at the Northwest side of the base (State certified). Purdue has a small training facility there

Synfuel Park Design Opt

- Maximize the economic returns over
  - Sites
  - Coal supplies
  - Numbers, sizes & types of different facilities
  - Markets for different products (including competitive risks from crude oil & tar sands)
  - Transportation & infrastructure at all stages
  - Management of CO2 & other environmental concerns
  - Government incentives & regulation

SSEB, 10,000 B/D Bituminous Coal with Recycle



Source: http://www.sseb.org/

SSEB, 10,000 B/D Bituminous Coal

Southern States Energy Board (SSEB) figure shows 10,000 barrels per day (B/D) bituminous coal with recycle on an equivalent diesel basis of naptha and diesel. It uses bituminous coal as feed material to two trains of single stage, slurry feed gasifiers and has a simple recycle stream to the four FT synthesis reactor trains (each reactor produces 2,500 B/D of product)

The as-fed coal input to the plant is 5,386 TPD. The products from this plant configuration are 3,507 B/D of FT naptha, 7,495 B/D of FT diesel and 190 MW Of gross power. The total plant parasitic power is estimated to be 163 MW therefore the net power available for sale is only 27 MW. The overall Efficiency of the plant on an HHV basis is calculated to be 47%

Source: http://www.sseb.org/

What Next

How much time?

CCTR lead

Questions

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