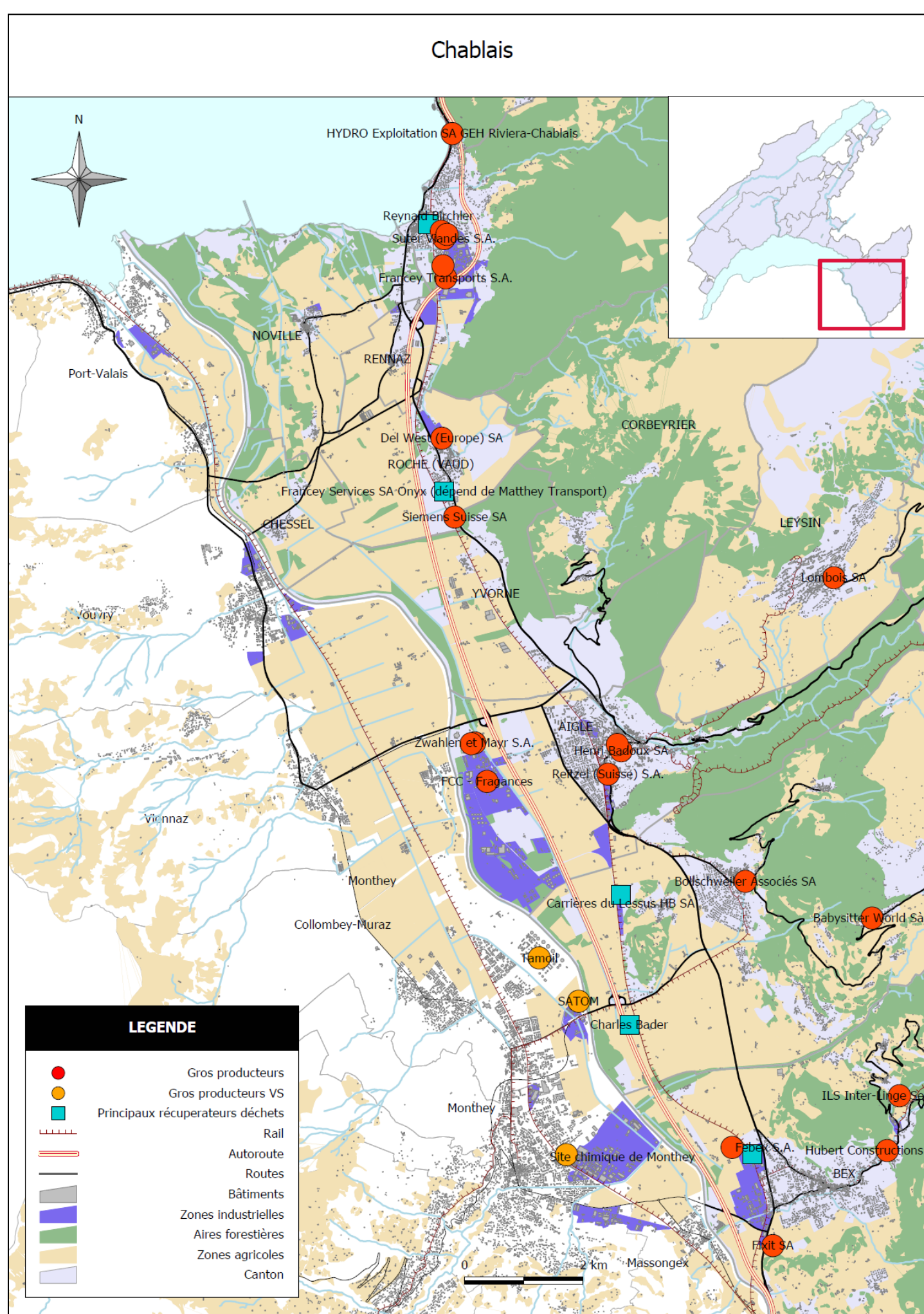


## Analysis of symbiosis potential in Chablais region

Under supervision of Laetitia Carles (SOFIES), Benoît Charrière (SOFIES) and Suren Erkman (EPFL-Unil)



### Objectives

This project is part of AigleRegion's initiative for development of industrial ecology in Chablais. Its objective was to develop an analysis of the potential of industrial symbiosis on the scale of the region Chablais, by giving a comparison with similar international eco-industrial parks, where symbioses already exist.

### Methodology

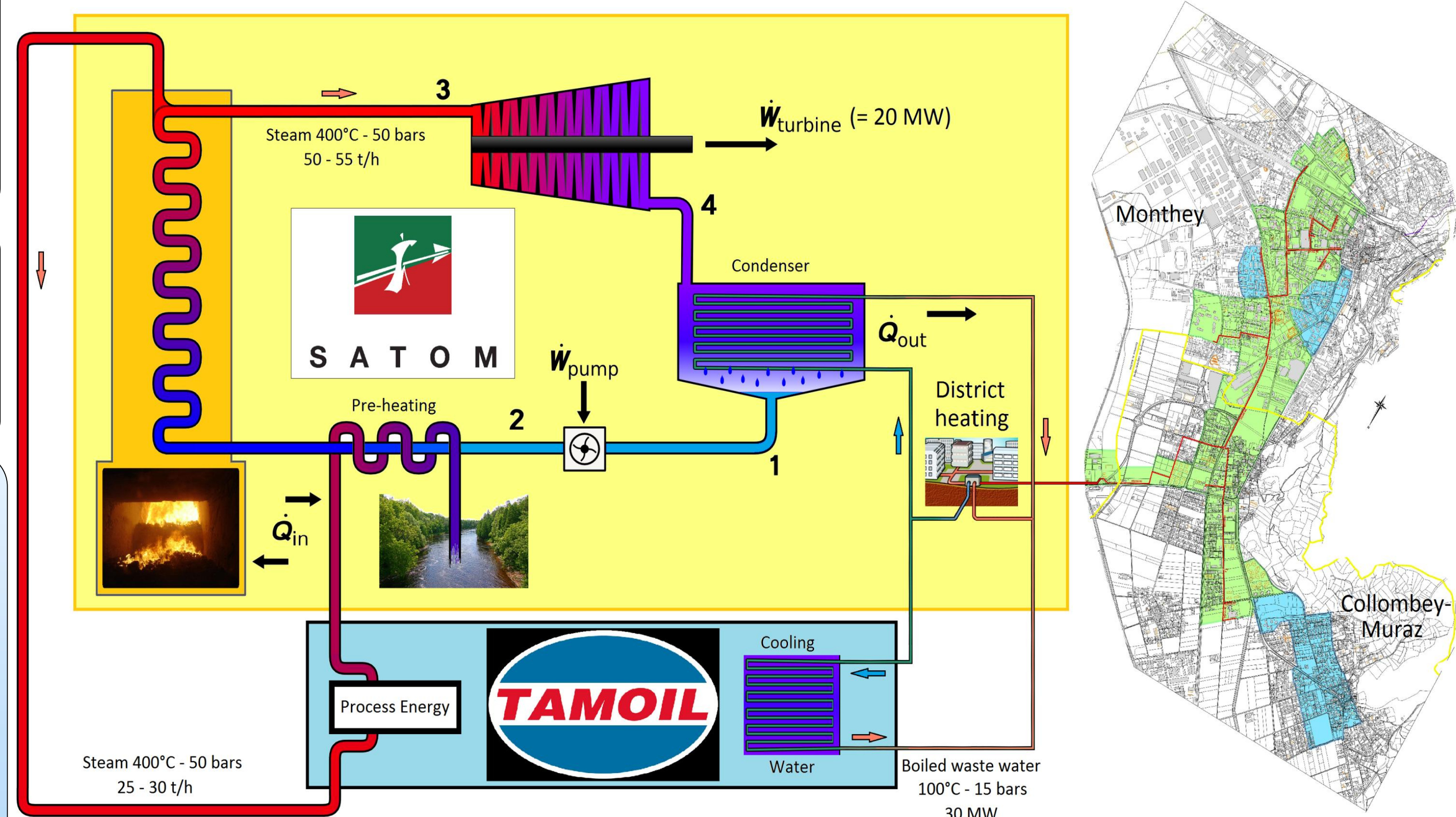
Stage 1. Analysis of present economic sectors in Chablais  
Stage 2. Inventory of international industrial symbiosis  
Stage 3. Critical analysis of SATOM – Tamoil symbiosis

### Economic context

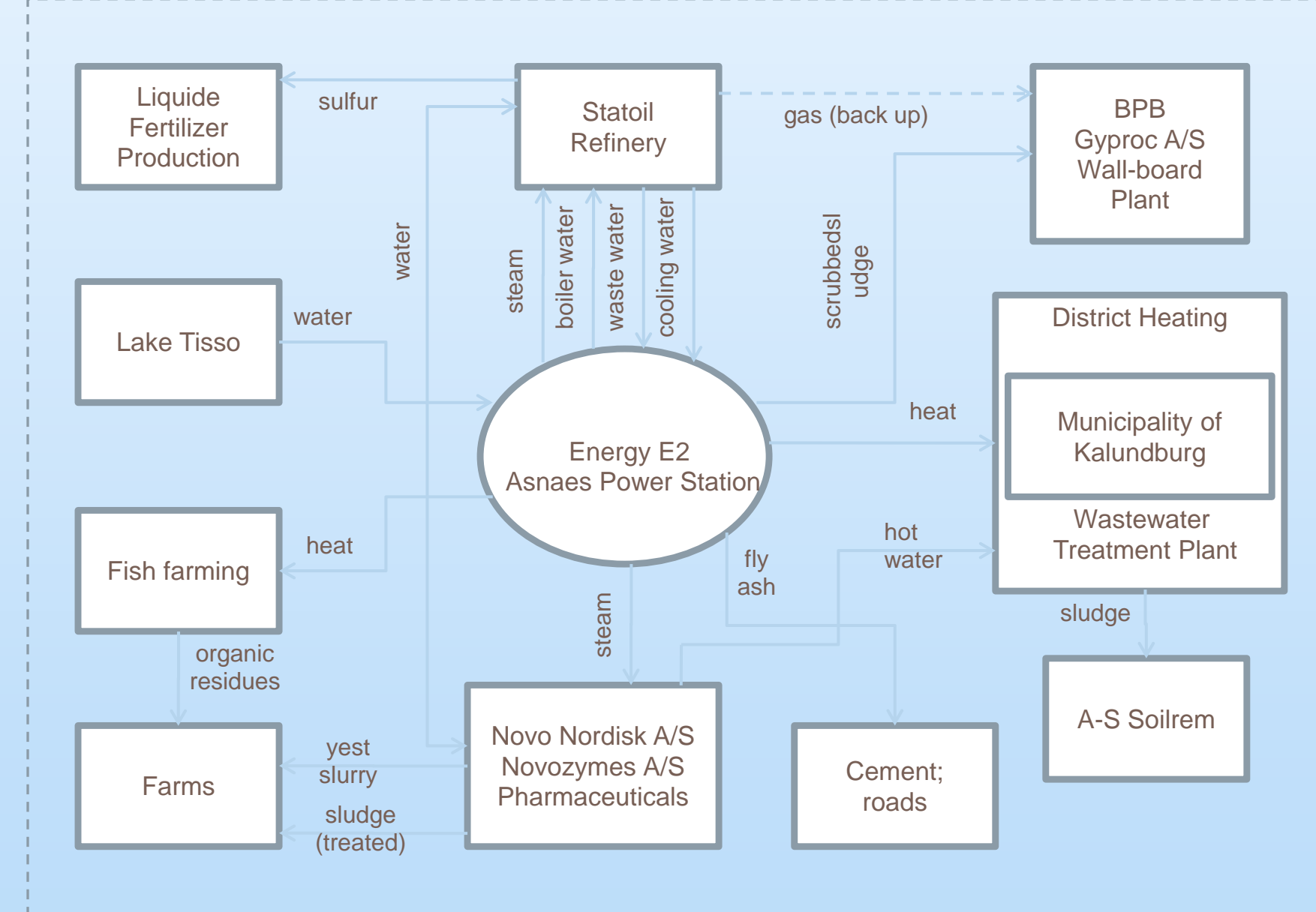
Chablais economic sector: various, mostly industrial. Solid waste management site, oil refinery, water and energy supply site, chemical industry, construction materials sites and a couple representatives of food industry. Most important industrial actors of the scene:

- SATOM incinerator
- Oil refinery Tamoil
- Water and energy supply organization CIMO

## SCHEME OF SATOM-TAMOIL SYMBIOSIS



### Kalundborg (Denmark)



### Identification of relevant international experiences

149 existing or planned eco-industrial parks studied:

- Europe 53
- South-East Asia and Oceania 34
- North America 62

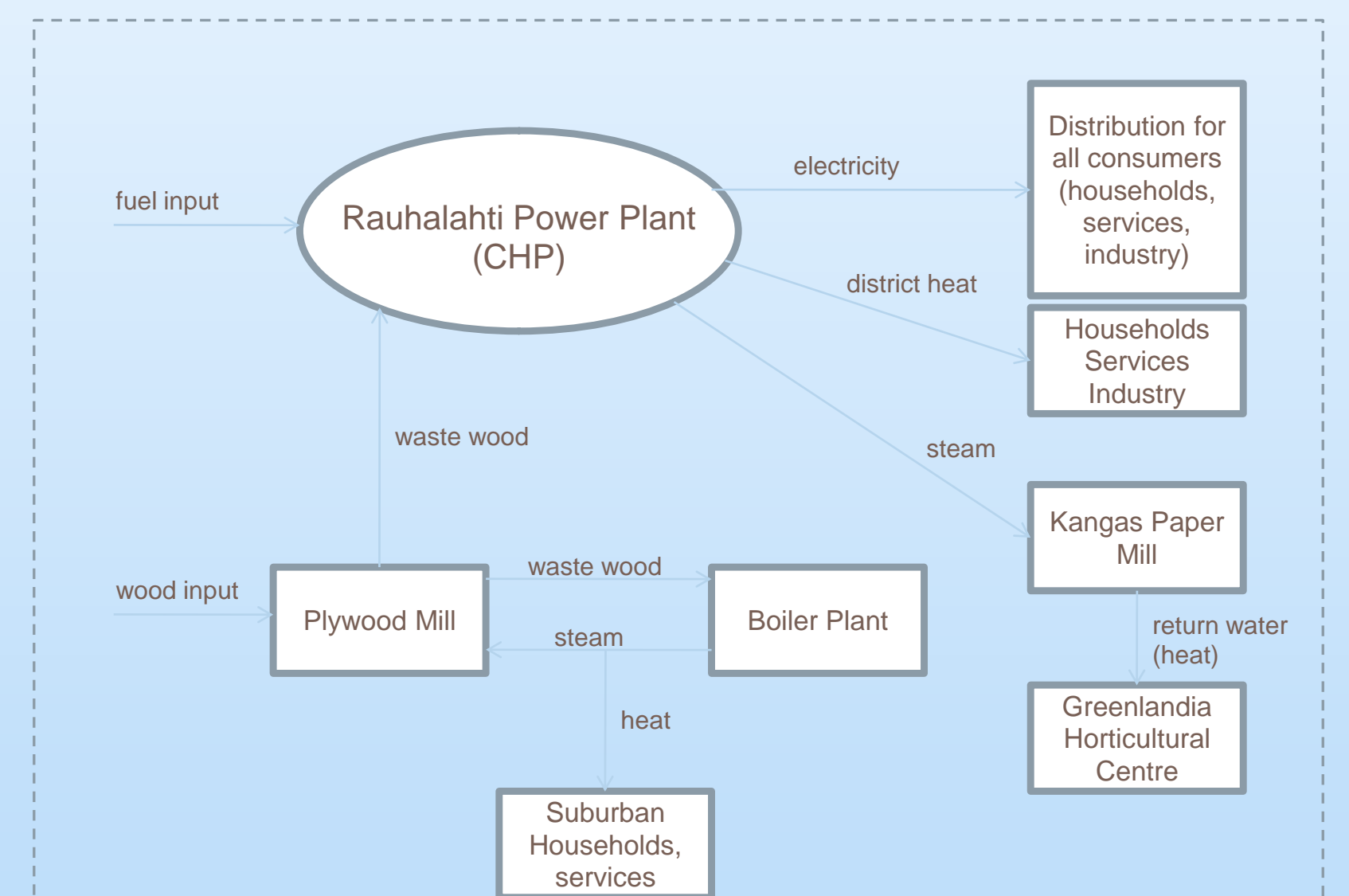
2 questions to determine relevance:

- **Who are the main actors of the park?**
- **Which exchanges of heat and steam flux already exist?**

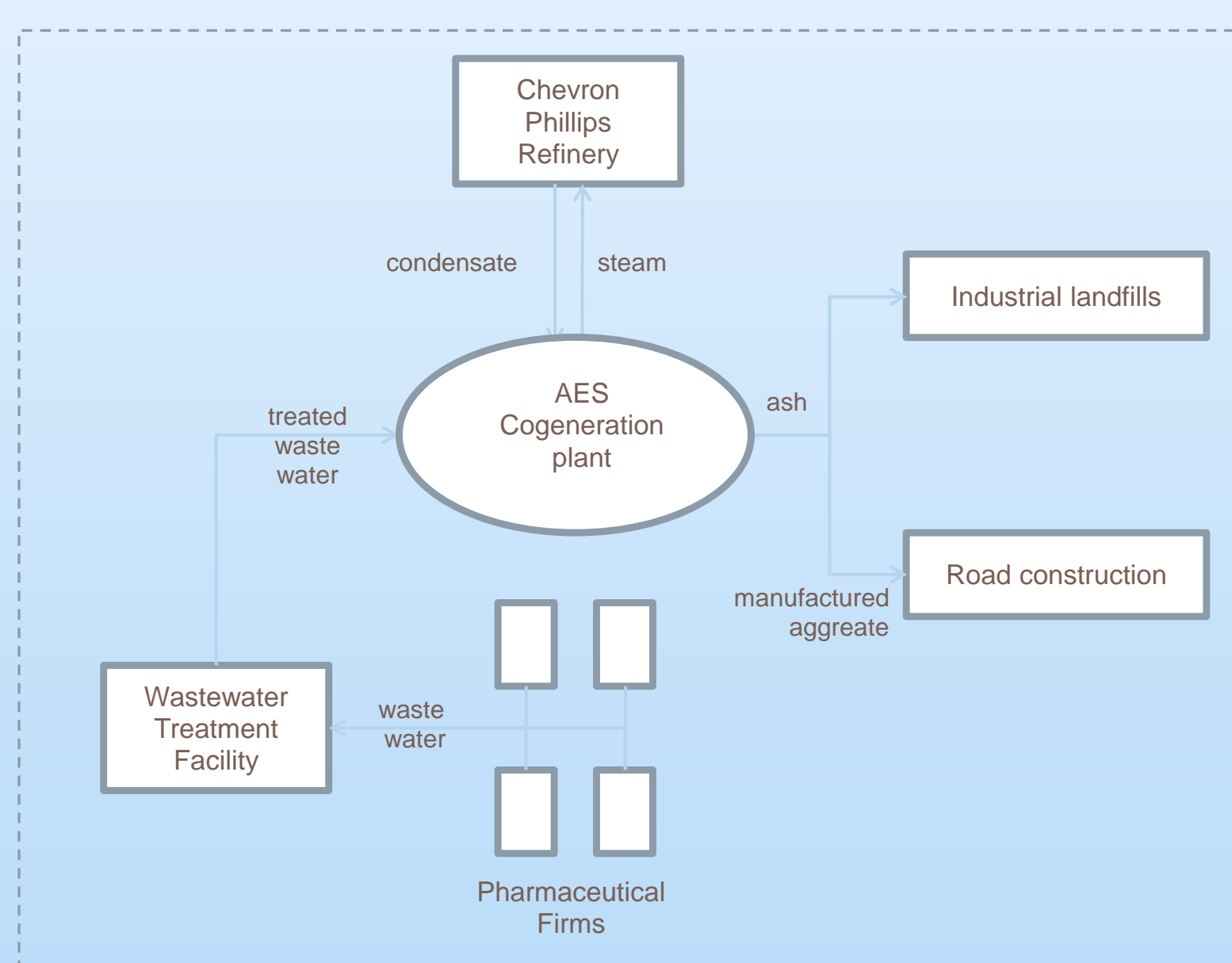
Selection of the 10 parks presenting most similarities with Chablais (red points):

Kalundborg (Denmark), Schkopau (Germany), Rotterdam (Netherlands), Uimaharju (Finland) and Jyväskylä (Finland), Ulsan (South Korea), Guyama (Porto Rico), Kwinana (Australia), Map Ta Phut (Thailand) and Bruce Eco-Ind. Park (Canada).

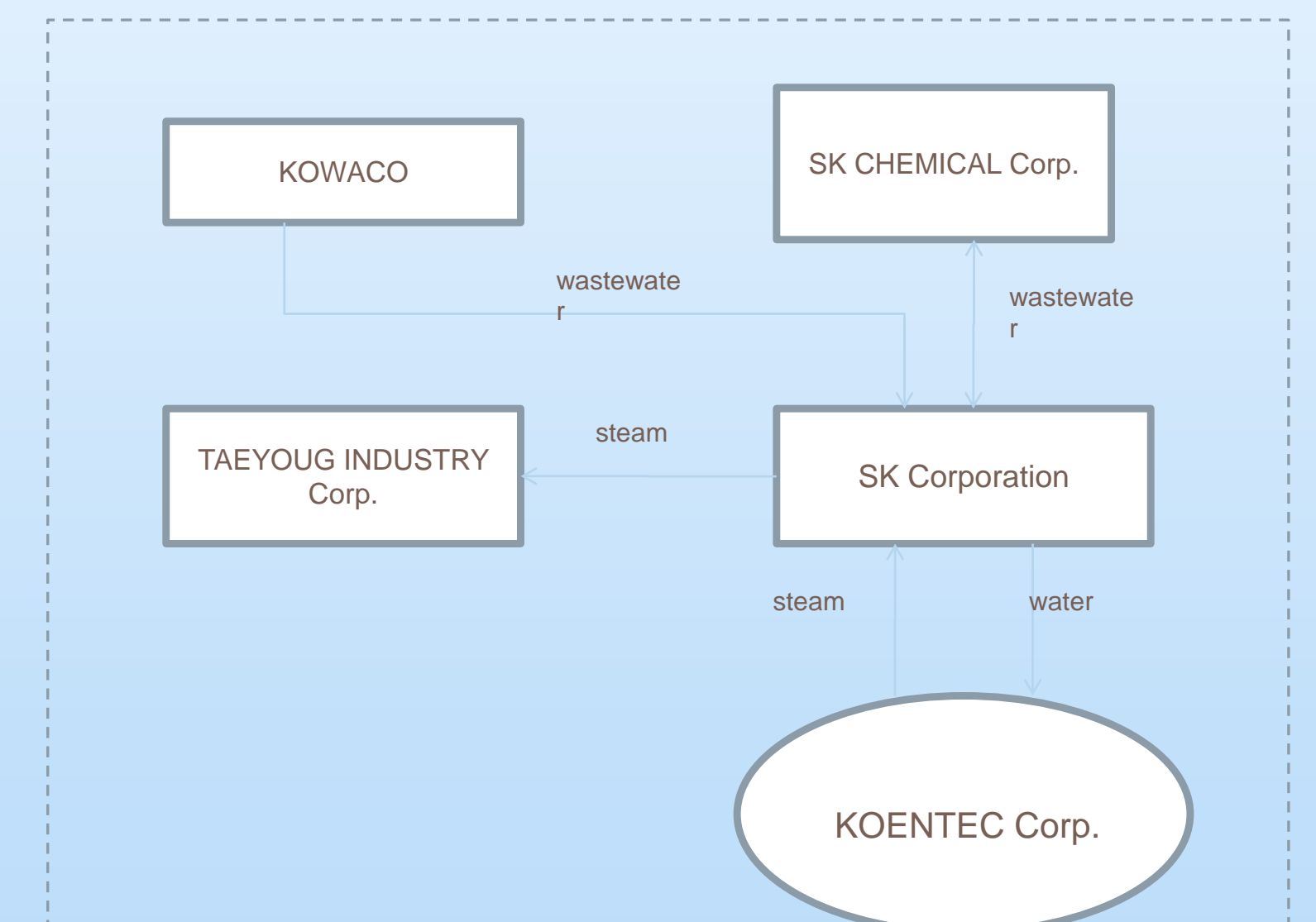
### Jyväskylä (Finland)



### Guayama (Puerto Rico)



### Ulsan (South Korea)



## SWOT ANALYSIS OF SATOM-TAMOIL SYMBIOSIS

### STRENGTHS

#### Ecological gains

- 60.000 t/y fossil resources saved
- 220.000 t/y water saved
- 200.000 t/y less CO<sub>2</sub> – emissions

Increased reliability of steam supply for Tamoil:

- Risk of break-down avoided
- Highly polluting restart avoided

#### Social gains

- Heat generation at lower costs benefits the inhabitants of Monthey and Collombey-Muraz, guaranteeing them low heating prices
- Good relations between the firms thanks to equally shared gains and balanced interdependence

#### Economic gains

- Selling of waste fluxes
- Tamoil's boiled waste water has appropriate properties to feed SATOM's district heating
- Avoids complete break-downs which and money because of production halt during service
- Production costs reduced

Investment for the pipelines construction (> 10 MCHF):

- Equitably shared
- Plants proximity (2 km) avoided to make it too high
- Shorter distance than SATOM – CIMO in Chablais (> 5 km)
- *Shorter distance than Statoil - Asnaes coal-fired power plant in Kalundborg (3,2 km)*
- Lower risk of investment
- Short payback times (few months for both firms)
- Same payback time observed in Ulsan (6 months).

### WEAKNESSES

Tamoil's requirements not met by SATOM's steam:

- Too high pressure (50 bars) for direct process
- Reason why the refinery buys only 20% of its steam from the waste incinerator.
- In Kalundborg Statoil refinery receives 40% of its steam from Asnaes coal-fired power plant.
- Lack of communication around the symbiosis:
  - Advertising opportunities not enough taken in account yet.
  - No public grants allowed because of its little visibility.

### OPPORTUNITIES

- SATOM can use the steam pipeline to choose the amount of steam it wants to keep for power generation, the rest being sent to the refinery
- Allows it to make electricity adjustments for the regional network up to 10 MW power variations in 15 minutes

### THREATS

No potential threats identified.

### Conclusion

The symbiosis between Tamoil's oil-refinery and SATOM's incineration plant is located in a promising dynamic and varied industrial estate for the future establishment of multiple partnerships around them and the chemical site of Monthey.

We identified 10 relevant experiences around the world, which characteristics could inspire the development of the industrial park in Chablais. The famous eco-industrial park of Kalundborg and also the one in Ulsan, South Korea, were noticed as particularly pertinent.

Two main potential improvements were drawn.

1. Find a way to generate steam which properties match better Tamoil's requirements. SATOM is actually planning to change its turbine to make it.
2. Enhance communication about this outstanding partnership, which should encourage the development of industrial ecology in Chablais region.