Biomass to biofuel & beyond

Fortum Bio2X

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Fortum: A Strong Backbone for Bio2X

FORTUM IS THE 3RD LARGEST PRODUCER OF CO2-FREE ENERGY IN EUROPE

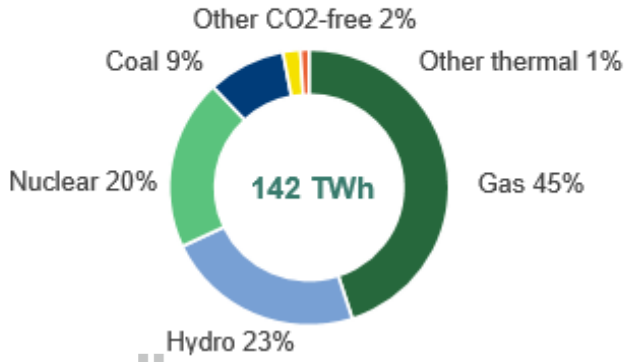
Fortum in brief

Key figures 2020[1]

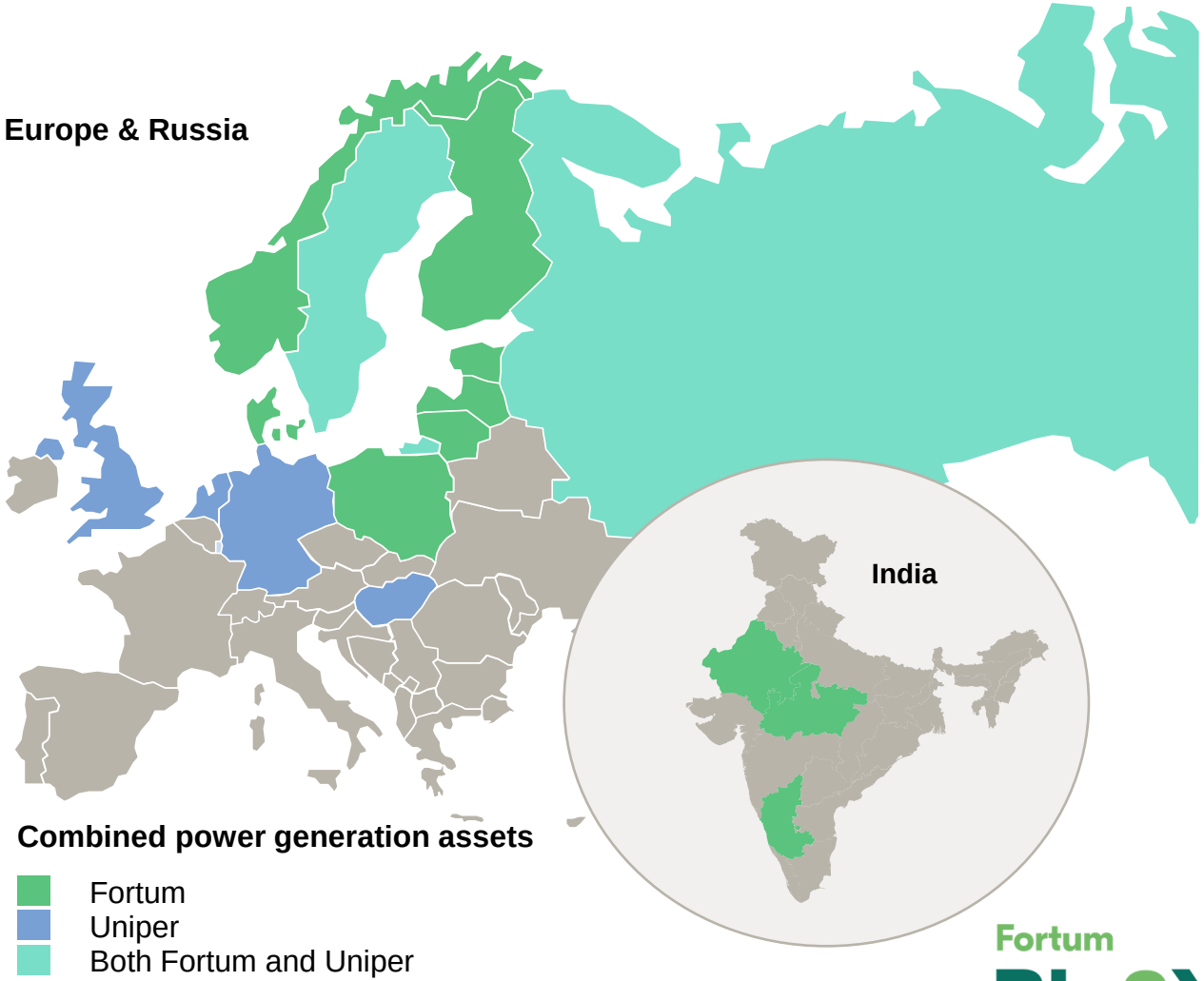
Sales	EUR	49.0 bn
Comparable EBITDA	EUR	2.4 bn
Total assets	EUR	57.8 bn
Personnel		20,000

Main businesses[1]	Volume[2]	Capacity
Power	142 TWh	50.3 GW
Gas	~370 TWh	7.6 bcm[3]
Heat	30 TWh	19.5 GW

Combined power generation (2020)



1) Until 31 ol



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Chempolis at a glance

- Groundbreaking biorefining **formico**® technology
  - **formico**bio™ for the production of cellulosic ethanol and biochemicals
  - **formico**fib™ for the production of (non-)wood fibres
- Our business idea is to deliver **formico**® biorefineries based on technology license and know-how services
- +25 years experience in technology development
- Headquarters and demo plant located at Chempolis Biorefining Park in Oulu, Finland

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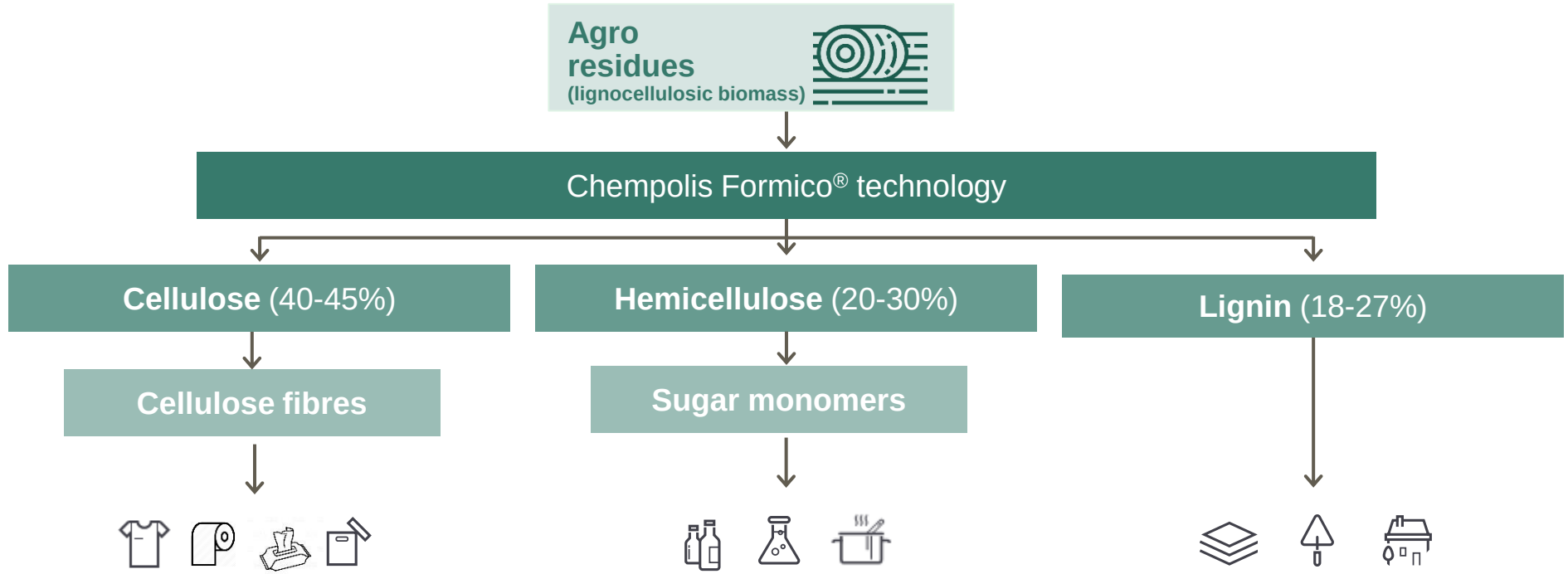
Bio2X is developing highly valuable sustainable products

Paradigm shift: Materials will be treated as scarce resource and energy abundant

Sustainable materials will increase consumption of biomass resources

Developing high value applications working closely with customers

What Chempolis' formico technologies can do



End products:

- Bioethanol
- Dissolving Pulp
- Brown pulp for packaging

- Furfural, acetic acid
- Other chemical intermediates

- Bio-Coal
- Bio-resins
- Concrete plasticizers
- Thermoplastics
- Asphalt additive

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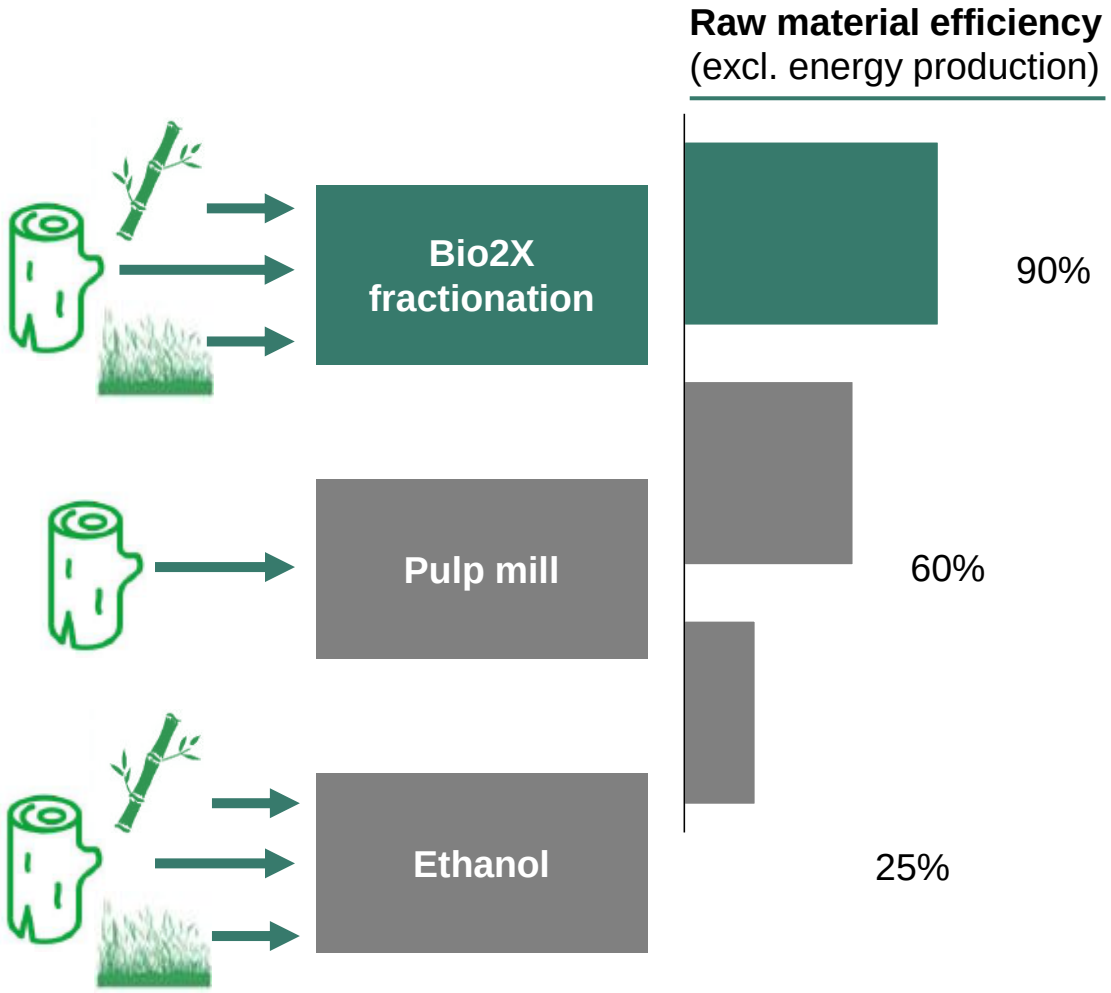
Bio2X delivers high yield, favorable pricing, small unit size & vast environmental benefits



Technical benefits:

- **Purity of all fractions**, enabling cost-effective production of end-products
- **Optimized properties of all fractions** (vs. conventional pulp mills: only pulp is optimized)
- **Smaller unit size** (e.g., 1/5) with at least the same feasibility as large pulp mills
- **Flexibility in raw material,** e.g., possibility to use **waste** (e.g., straw)
- Ability to **combine best parts of different technologies**

Environmental benefits:

- Possibility to **replace fossil raw materials** in huge variety of products (e.g., viscose & plastics)
- **Lower pollution** (i.e., CO_2) **& reduced water consumption**
- **Reduced land degradation & deforestation** (e.g., wheat is used for food & straw to replace fossil and unsustainable products)

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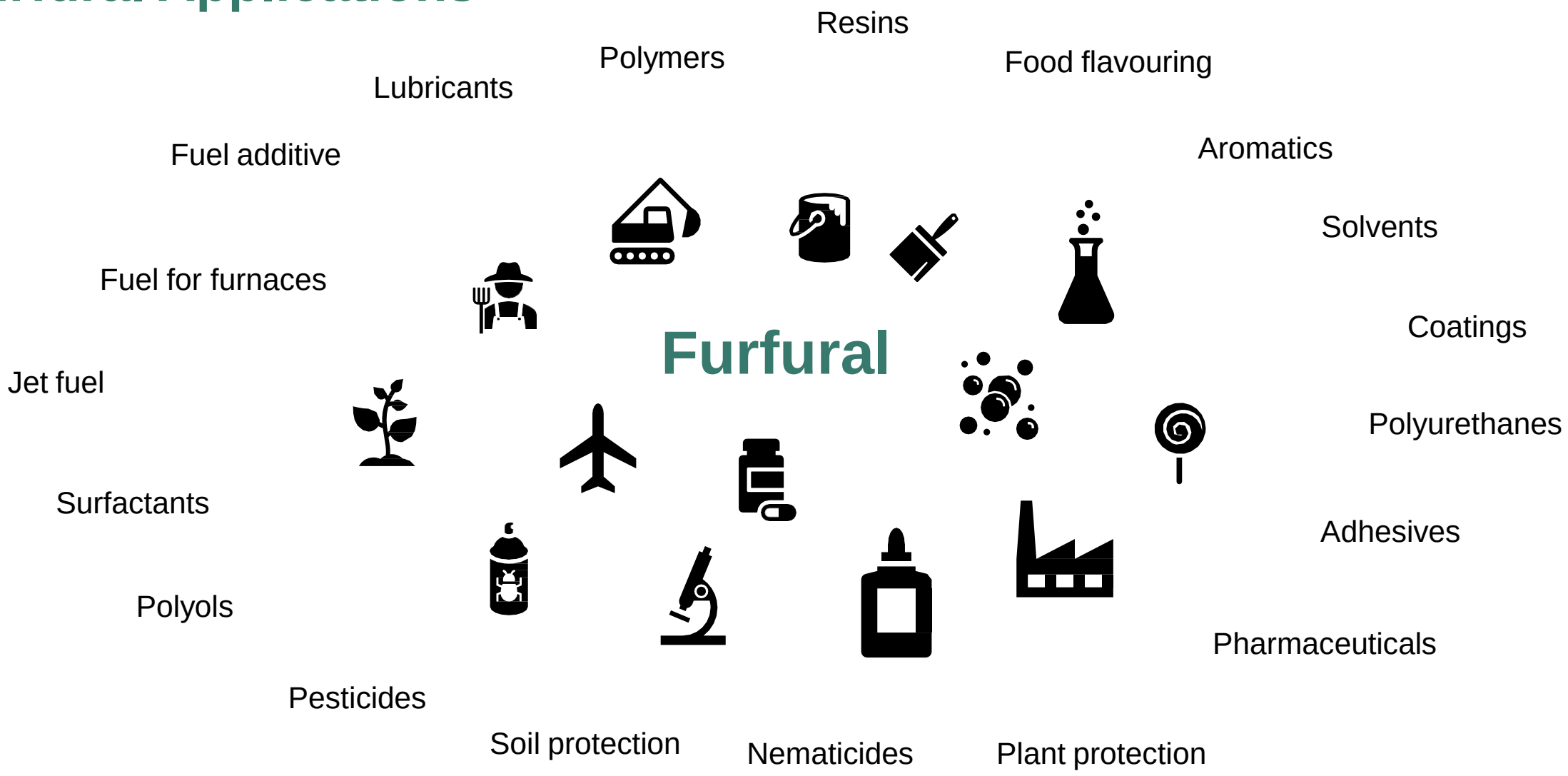
Furfural Applications



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Acetic Acid Applications

Paints

Coatings

Pharmaceticals

textile

Pet Bottles

Adhesives

Acetic Acid

Solvents

Laboratory

Plastic Films & Sheets

Rubber

Agriculture

Food additives

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Lignin Applications

Plywood

Laminates

Automotive

Tyre

Foil Extrusion

Mechanical Rubber Goods

Injection Molding

Lignin

Admixtures

Insulation

Ready Concrete

Mattress

Colorants

Epoxide

Ink printing

Adhesive

adsorbent

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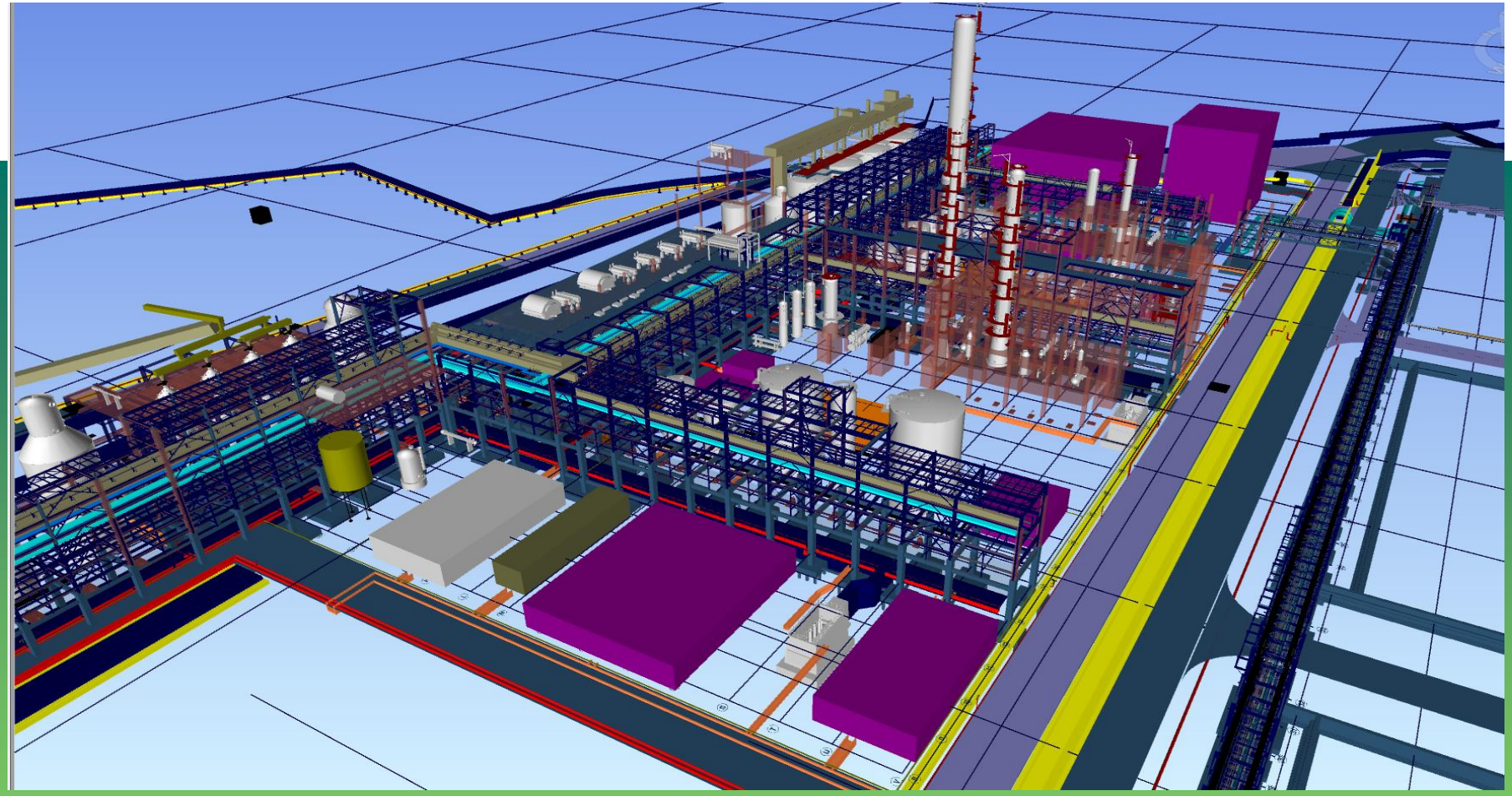
1st Bio Refinery in Assam, India



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Employment Generation: 10,000

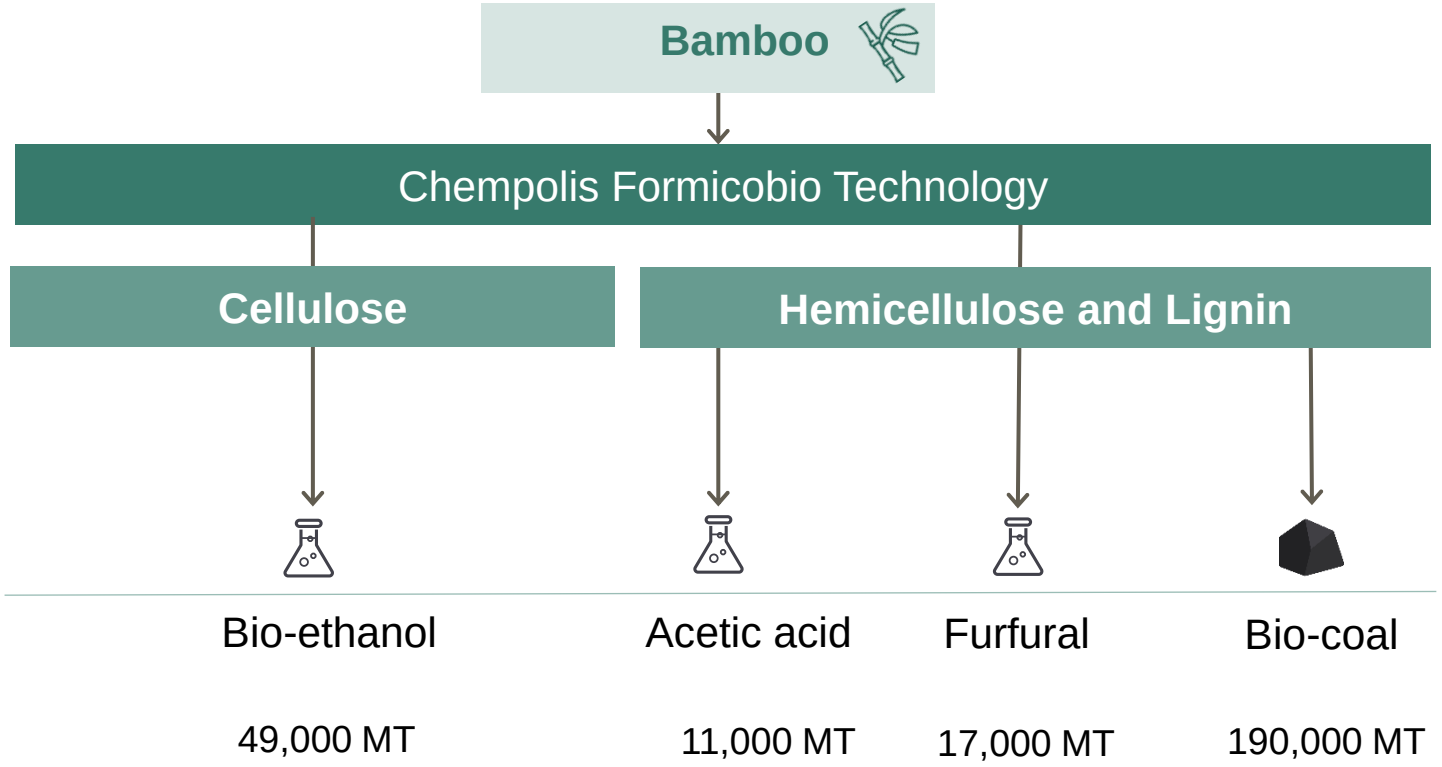
Livelihood Support: 30,000 people

Carbon Emission: 150,000 t Co2 Eq **Reduction**

Local Level Entrepreneurs: 50

1st Bio Refinery in North-East India

- Joint Venture- Assam Bio Refinery Pvt. Ltd. (ABRPL) between NRL, Fortum and Chempolis was formed
- Fortum brought in largest FDI in North East, in last decade or so
- Raw material: Bamboo (feed 300 kt/a dry)



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ABRPL Site Photographs

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Thank You

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