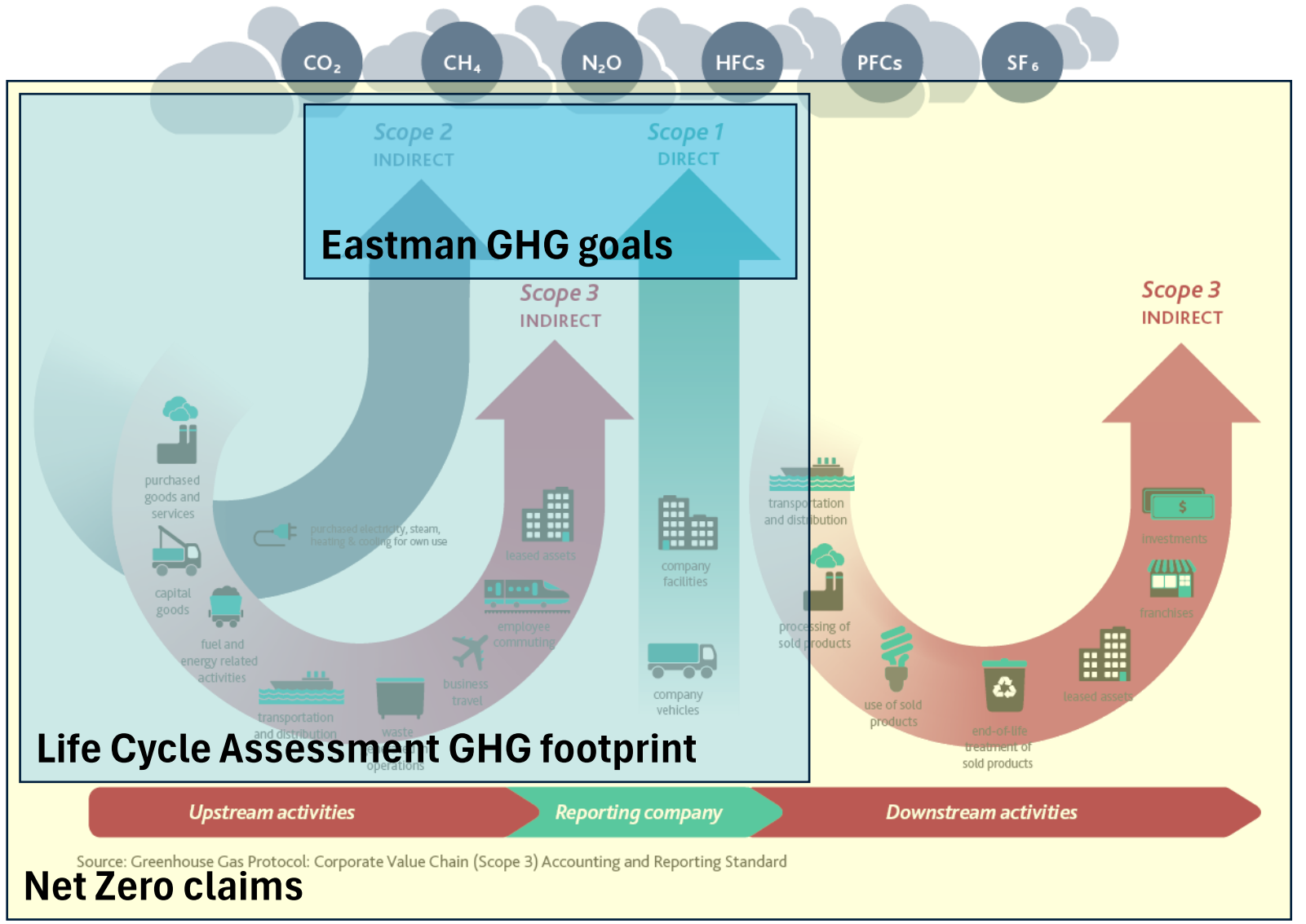
EASTMAN

Technology Perspective:
Scope 1 Greenhouse Gas Emissions Reduction

Council of Industrial Boiler Owners Conference · May 13, 2025

Greg Wellman
Technology Manager,
Decarbonization

Context: Greenhouse gas emissions scopes



EASTMAN

A materials innovation company

Eastman is a materials innovation company that is:

- Dedicated to **enhancing the quality of life** in a material way
- Committed to **mitigating climate change, mainstreaming circularity** and **caring for people and society**
- Celebrating the inclusion of its **diverse global workforce of ~14,000 employees**
- **A Fortune 500 company** with 2024 revenue of ~9.4 billion USD and **more than 100 years of vital innovations**

TOP 100 BARRON'S Most Sustainable Companies 2021

FAST COMPANY BEST WORKPLACES FOR INNOVATORS 2023

FAST COMPANY World Changing Ideas 2023

REFOCUS SUSTAINABILITY & RECYCLING SUMMIT SUSTAINABILITY INNOVATION AWARD

NEW PLASTICS ECONOMY

RESPONSIBLE CARE™ Driving Safety & Sustainability

cefic

PLASTICS EUROPE

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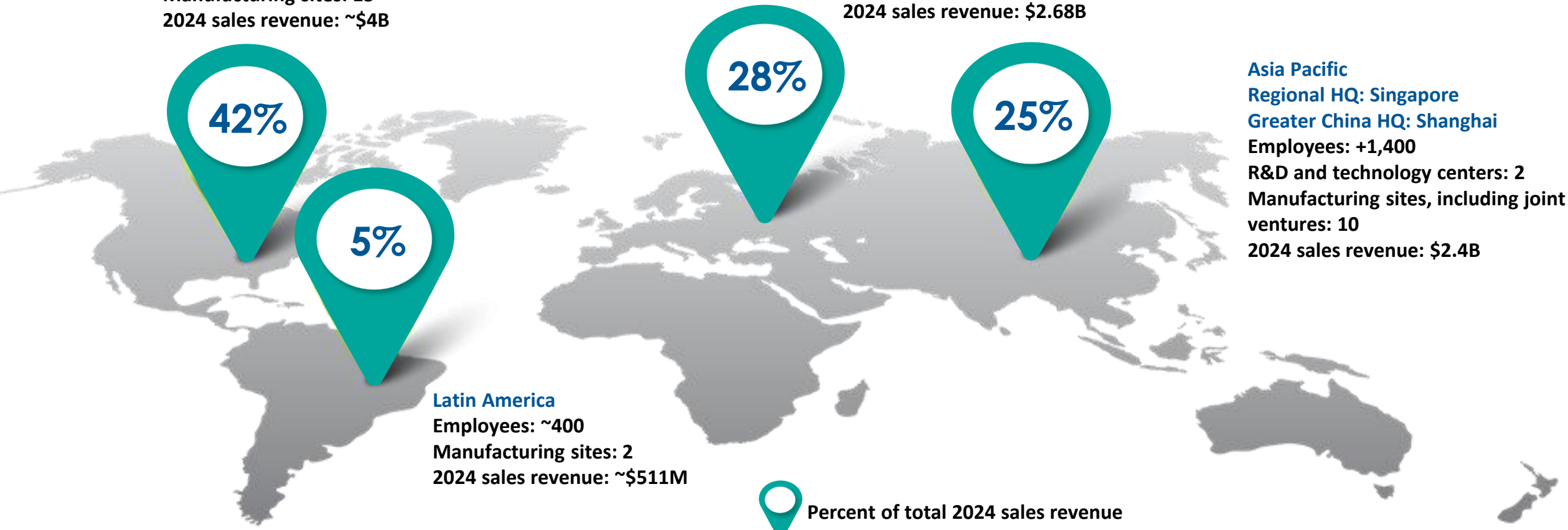
A broad global presence

North America Global HQ: Kingsport, Tenn.
Employees: ~10,000
R&D and technology centers: 5
Manufacturing sites: 13
2024 sales revenue: ~$4B

Europe, Middle East and Africa Regional HQ: Rotterdam, The Netherlands
Employees: ~2,000
R&D and technology centers: 4
Manufacturing sites: 10
2024 sales revenue: $2.68B



Asia Pacific
Regional HQ: Singapore
Greater China HQ: Shanghai
Employees: +1,400
R&D and technology centers: 2
Manufacturing sites, including joint ventures: 10
2024 sales revenue: $2.4B

Latin America
Employees: ~400
Manufacturing sites: 2
2024 sales revenue: ~$511M

Percent of total 2024 sales revenue

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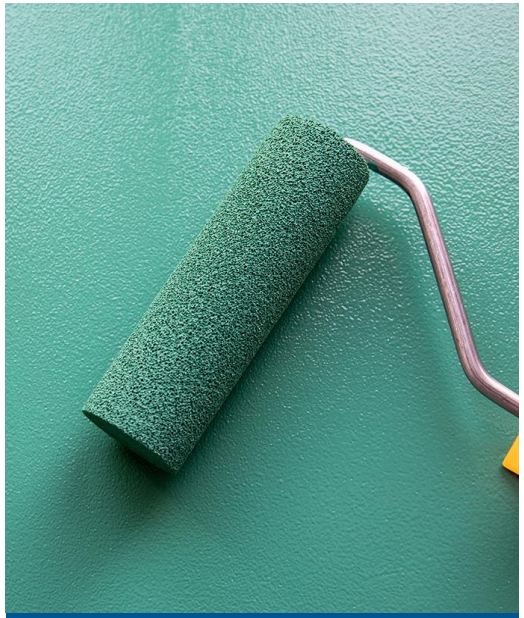
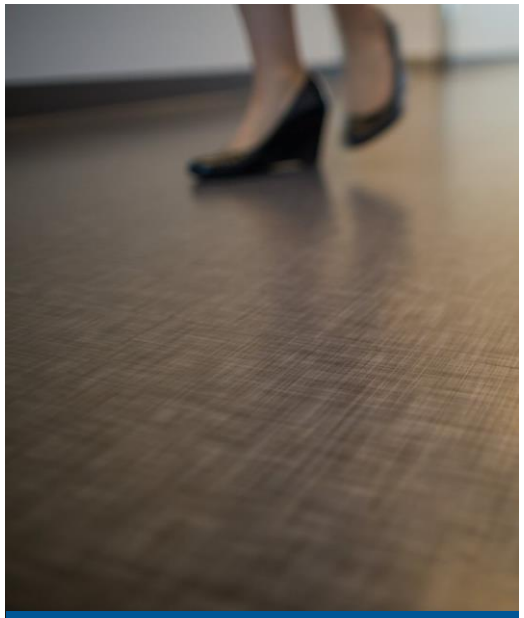
A diverse portfolio of businesses

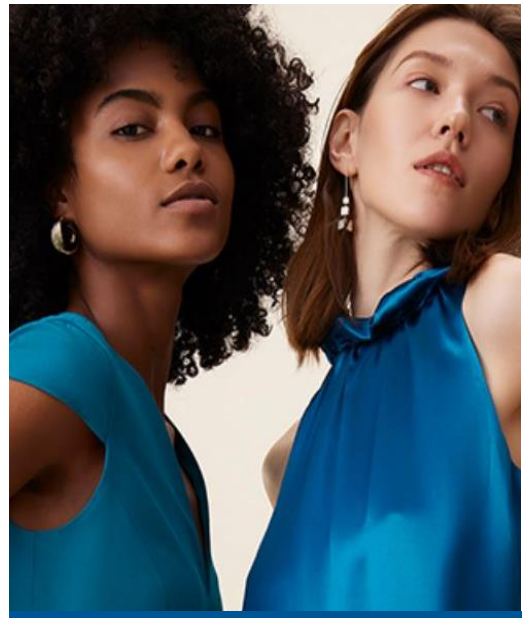
Advanced Materials
2024 sales revenue: $3.0B
32% of total Eastman sales



Additives & Functional Products
2024 sales revenue: $2.9B
31% of total Eastman sales



Chemical Intermediates
2024 sales revenue: $2.1B
23% of total Eastman sales



Fibers
2024 sales revenue: $1.3B
14% of total Eastman sales

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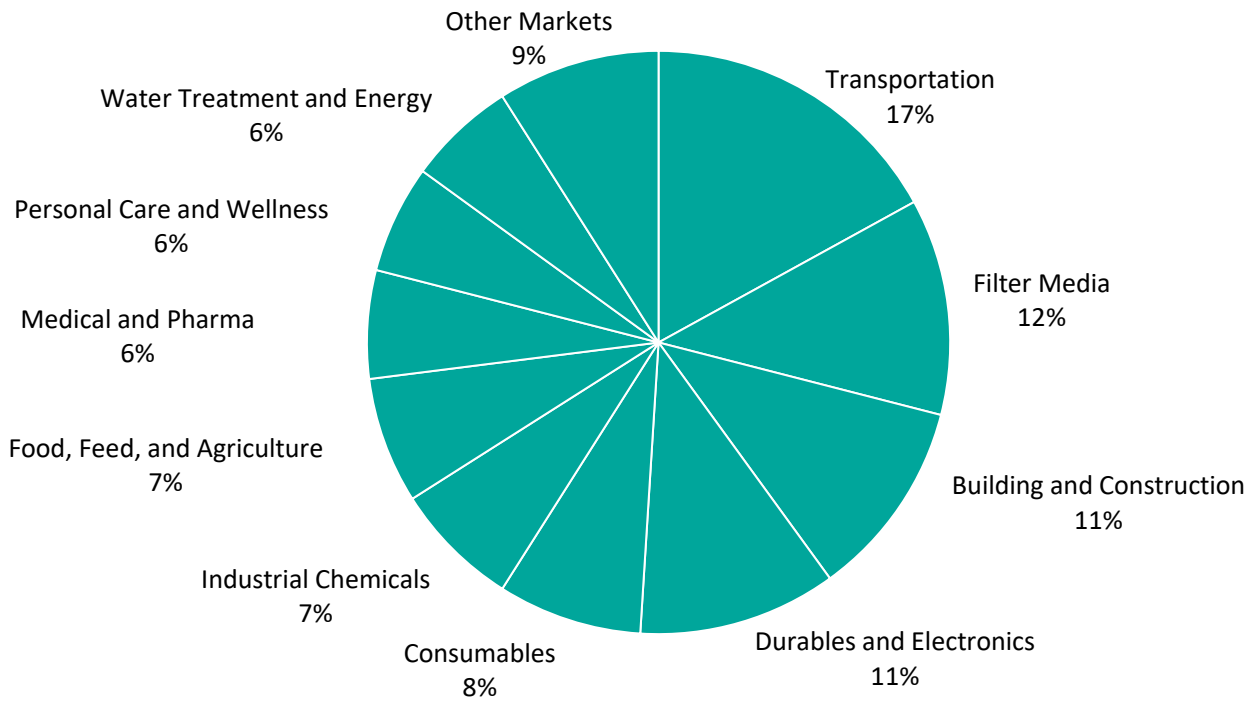
Serving diverse markets and customers

The diversity of the geographies, markets and customers that we serve provides a source of strength and the ability to deliver consistent growth.

2024 revenue by end-use market



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Our innovation pillars help address three complex global challenges

CHALLENGES		INNOVATION PILLARS	
	Climate change	**Mitigating climate change** • Leading expertise in energy efficiency • Molecular recycling that reduces GHGs • Increasing use of renewable energy • Materials to help reduce carbon footprint	
	Material waste crisis	**Mainstreaming circularity** • Molecular recycling for infinite recycling of hard-to-recycle waste • Eastman Renew recycled materials with no performance loss • Biodegradable, compostable biopolymers	
	Growing population	**Caring for society** • Plastics to preserve food and enable health care • Window films for skin safety and road safety • Can coatings that are durable and BPA non-intent • Additives to bolster the world food supply	

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STRATEGY

Sustainable innovation is the future of Eastman

- We feel a responsibility to deliver products needed for society and are better for the planet.
  - Aventa™ Renew provides a sustainable, high-performance option for food packaging and quick-service restaurants.
  - Saflex™ Evoca™ is a new interlayers platform that will support EV growth.
  - Saflex™ LiteCarbon Clear helps reduce carbon footprint in buildings.

"Because sustainable innovation is the future for Eastman, we thought it important that we have a metric to keep us accountable. By 2030, we will align all growth R&D spend with sustainability macro trends. That's the goal we set, and our progress makes me confident we'll achieve it. "

Chris Killian

Senior Vice President and Chief Technology and Sustainability Officer
(he/him/his)

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Our innovation pillars help address three complex global challenges

CHALLENGES

Climate change

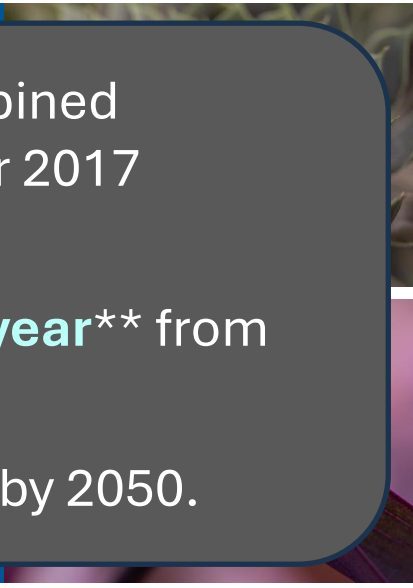
Material waste crisis

Growing population

INNOVATION PILLARS

Mitigating climate change

- Leading expertise in energy efficiency
- Molecular recycling that reduces GHGs
- Increasing use of renewable energy
- Materials to help reduce carbon footprint



- As of 2023, Eastman has reduced it's combined Scope 1&2 GHG emissions **22.3%** from our 2017 baseline of ~8 million tCO_2e per year.
- We have removed **~1.8 million tCO_2e per year**** from our operations.
- Our goals: **↓32%** by 2030; **Carbon neutral** by 2050.

**1.8 MtCO2e/yr ≈ 220k US homes or 2.1M acres of forest

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Our path toward carbon neutrality

Step 1: Play to your strengths

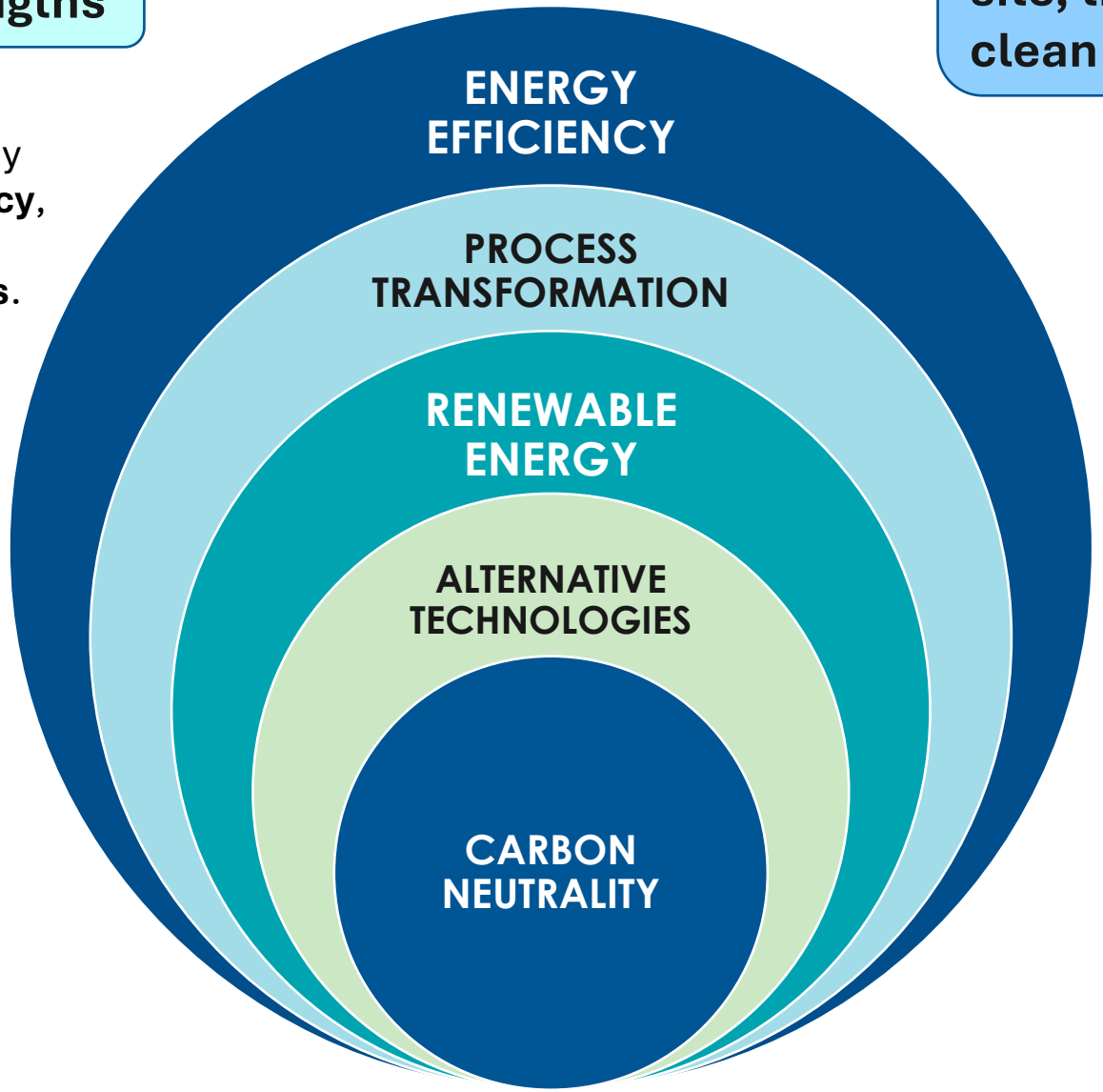
ENERGY EFFICIENCY

Eastman's climate progress today leans heavily on **energy efficiency**, where we have received multiple **DOE and ENERGY STAR® awards**.

PROCESS TRANSFORMATION

Our **molecular recycling technologies** produce new materials at a substantially reduced carbon footprint.

- Polyester renewal technology produces virgin-quality intermediates for plastic production with **20-30% fewer greenhouse gas emissions** than traditional processes.
- Carbon renewal technology produces syngas with **20-50% fewer greenhouse gas emissions** than traditional processes.



Step 2: Find the right technology, site, timing, and value fits for clean firm CHP.

RENEWABLE ENERGY

By 2030, 100% of our purchased electricity in North America and Europe will be renewable.

ALTERNATIVE TECHNOLOGIES

We are exploring **alternative energy technologies** that have the potential to accelerate our progress toward decarbonization.

Charting a path to Eastman's low-GHG future… How do we get there?

For every complex problem there is an answer that is clear, simple, and wrong.

– H. L. Mencken

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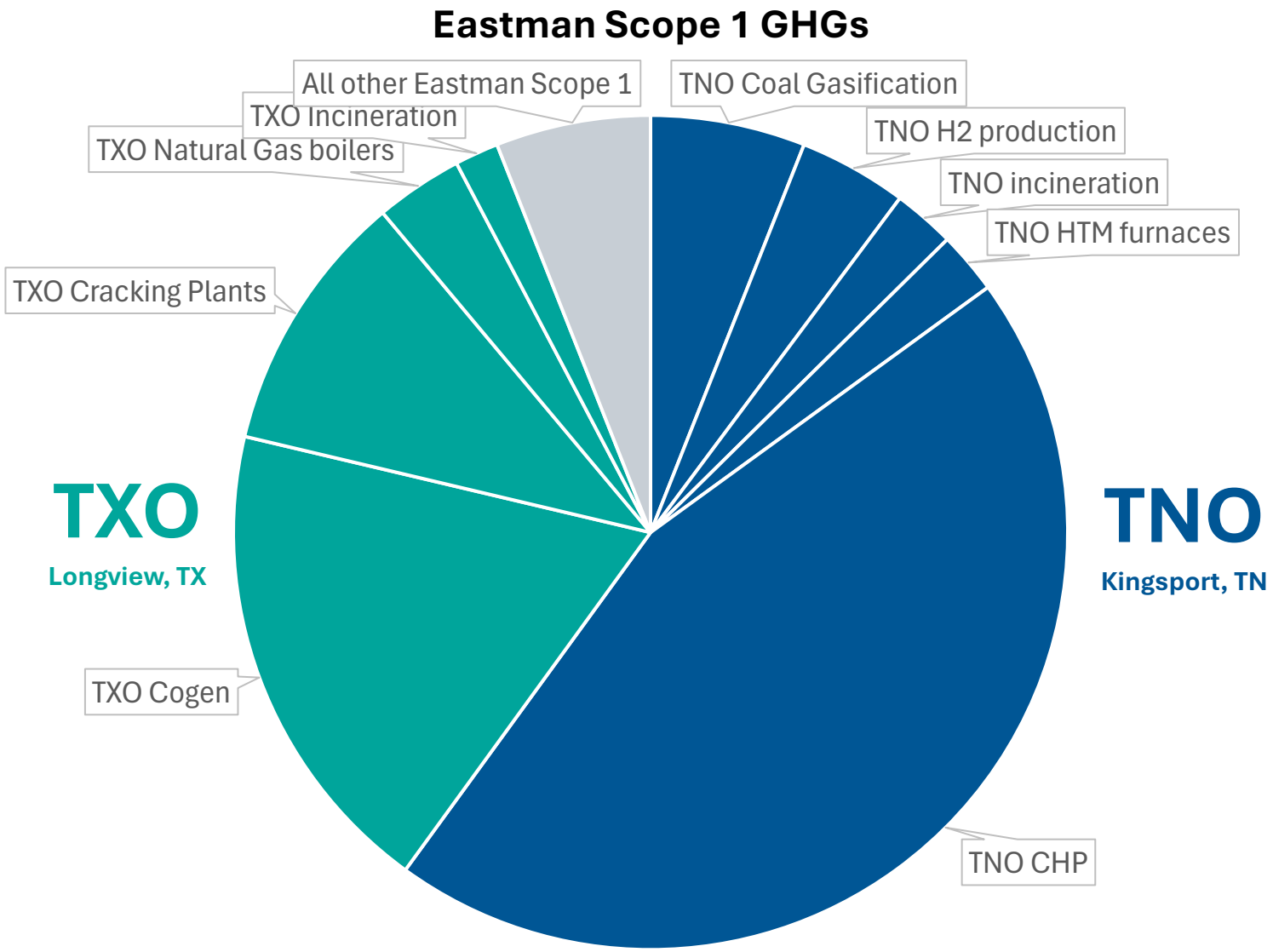
Eastman Scope 1 GHG emissions



Tennessee and Texas Operations represent >90% of Eastman's Scope 1 GHGs.

Source-specific solutions are needed for this diverse emissions portfolio.

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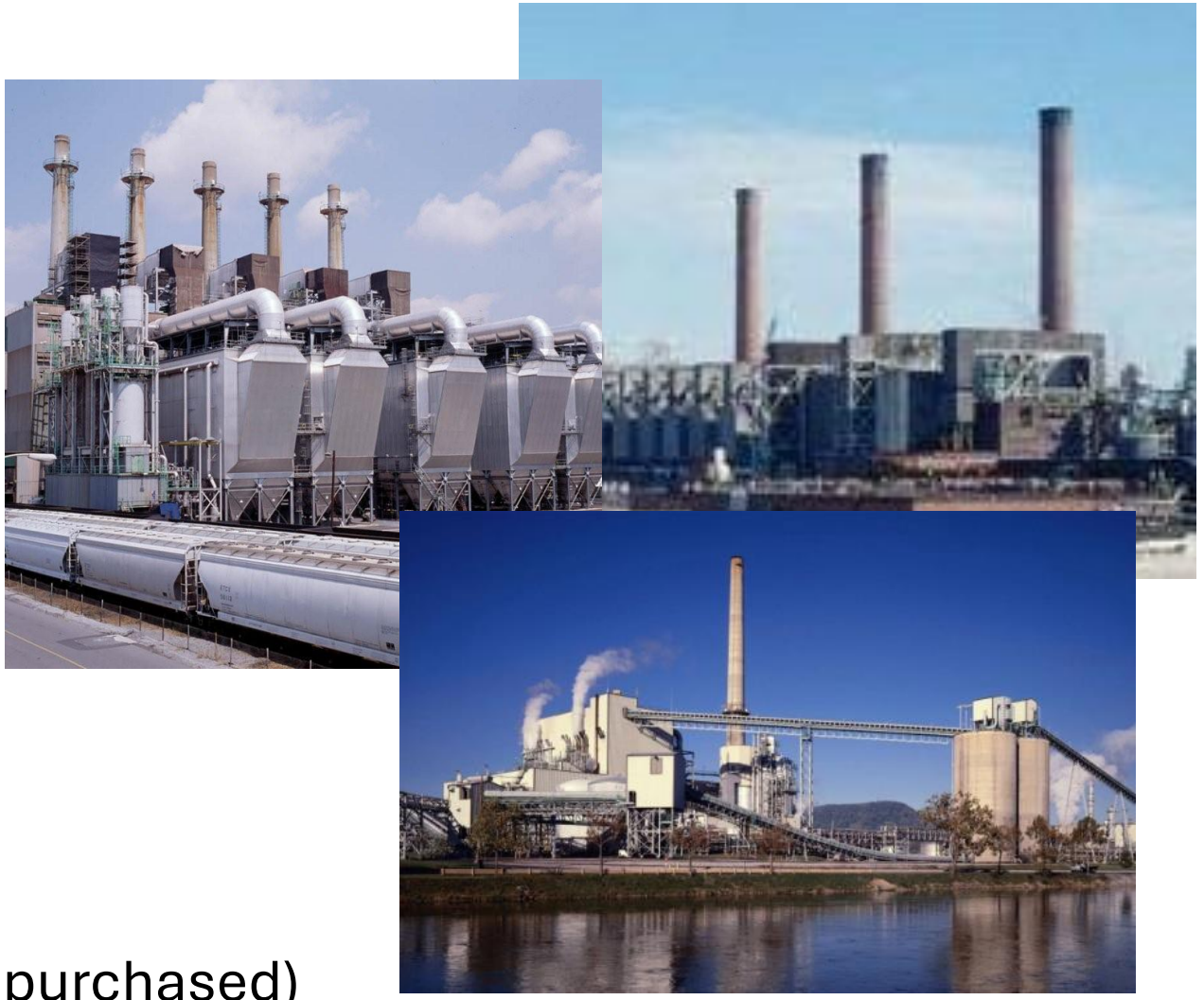
Context: Combined Heat and Power at TNO

- **Four Powerhouses**
  - 17 Boilers
  - 19 Turbine-Generators
  - 13.8 kV Electric distribution

- **Combined Heat & Power**
  - **Cogenerating** steam & electricity
    - **1,500 psig / 510°C (950°F)**
    - **600 psig / 400°C (750°F)**
    - 100 psig / 190°C (375°F)
    - 15 psig / 127°C (260°F)

    Cascade
  - **~3.6 Mlb/hr steam**
  - **~170 MW electricity** (plus ~15 MW purchased)



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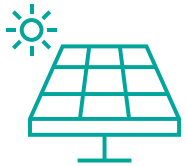
The menu of GHG-reducing assets and services is diverse, and we are working to understand the optimal portfolio of technologies, projects, and timing.



Electrification

- Substitute fossil-based energy and materials with low-GHG electricity

Alternative Fuels

- Generate low-GHG heat and power

CCUS

- Capture and manage CO2 via sequestration or conversion to useful materials

Low-GHG natural gas

- Low-GHG sources or alternate processing of natural gas

Process Innovation

- Design low-GHG new processes
- Reduce GHGs and energy use in existing processes

GHG Compensation

- Indirect emissions reduction

Partnerships

- Foster discovery and identification of decarbonization solutions

Examples under consideration

- Thermal batteries
- Heat pumps
- Green hydrogen
- Electric boilers

- Geologic hydrogen
- Advanced nuclear
- Deep geothermal
- Biomass

- Conventional and next-gen solvents
- Membranes
- CO2 to feedstocks
- CO2 to products

- Renewable natural gas
- Methane pyrolysis to hydrogen

- Polymer Renewal Technology
- Carbon Renewal Technology
- New process development

- Green tariffs
- RECs & PPAs
- High quality carbon offsets

Executed

- DOE
- National Labs
- C2ES[1]
- Renewable Thermal Collaborative
- EPIXC[2]

ENERGY EFFICIENCY: foundational pillar for decarbonization

ENERGY earthshots U.S. DEPARTMENT OF ENERGY

Industrial Decarbonization Roadmap

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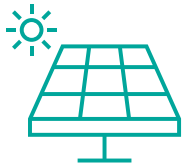
1: Center for Climate & Energy Solutions **2:** Electrified Processes for Industry without Carbon, DOE Mfg Innov Inst @ Arizona State University

Step 1: Play to your strengths.
Step 2: Find the right technology, site, timing, and value fits for clean firm CHP.



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Decarbonization Strategy Model ("DSM")

Scopes 1 & 2 emissions

Eastman today

Assets

- Boilers
- Turbine Generators
- Refrigeration Machines
- HTM Furnaces
- Air Compressors
- Gasification
- H2 Plants
- Hydrocarbon Crackers
- Etc.

Eastman 2050

Assets & Services

- Subset of today's assets
- New assets & services needed to become carbon neutral

Process Needs

- Steam / Process Heat
- Electricity
- Refrigeration
- Compressed Gas
- Syngas
- CO
- Hydrogen
- Olefins
- Etc.

What is the optimal path to become carbon neutral while continuing to meet process needs?

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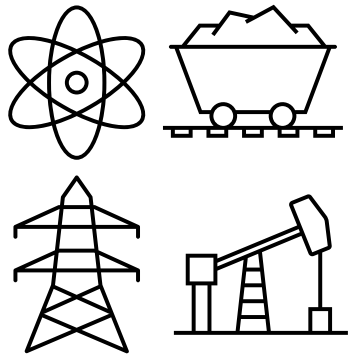
DSM: Inputs required



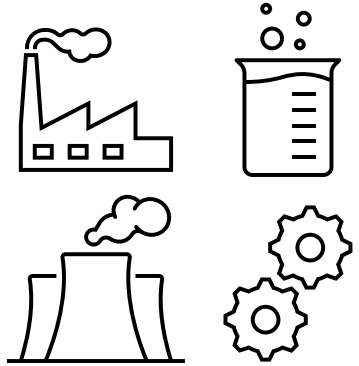
Materials

Supply (bought) – cost, limits, learning rates

Demand (sold) – value, quantity

Internal (e.g. steam)

Disposal (excess) – cost, limits



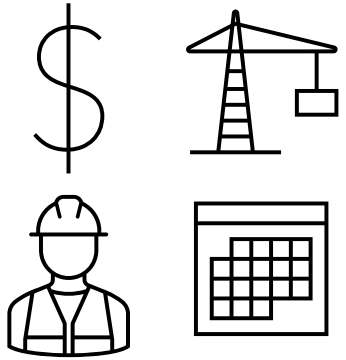
Equipment

Availability – dismantle dates, commercially available estimates, lifetime

Limits – min/max output

Bill of materials – input or byproduct relationships

Costs – maintenance, conversion, etc.



Projects

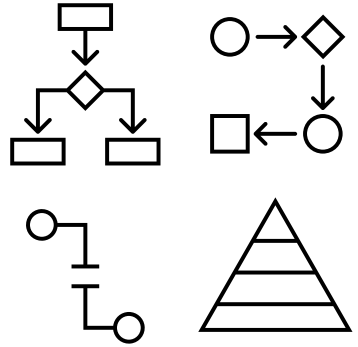
Technology options

Potential sizes & configurations

Capital costs

Depreciation schedules

Learning rates



Constraints

Energy demands by manufacturing

Equipment reserve requirements (ensure adequate available capacity)

Capital constraints

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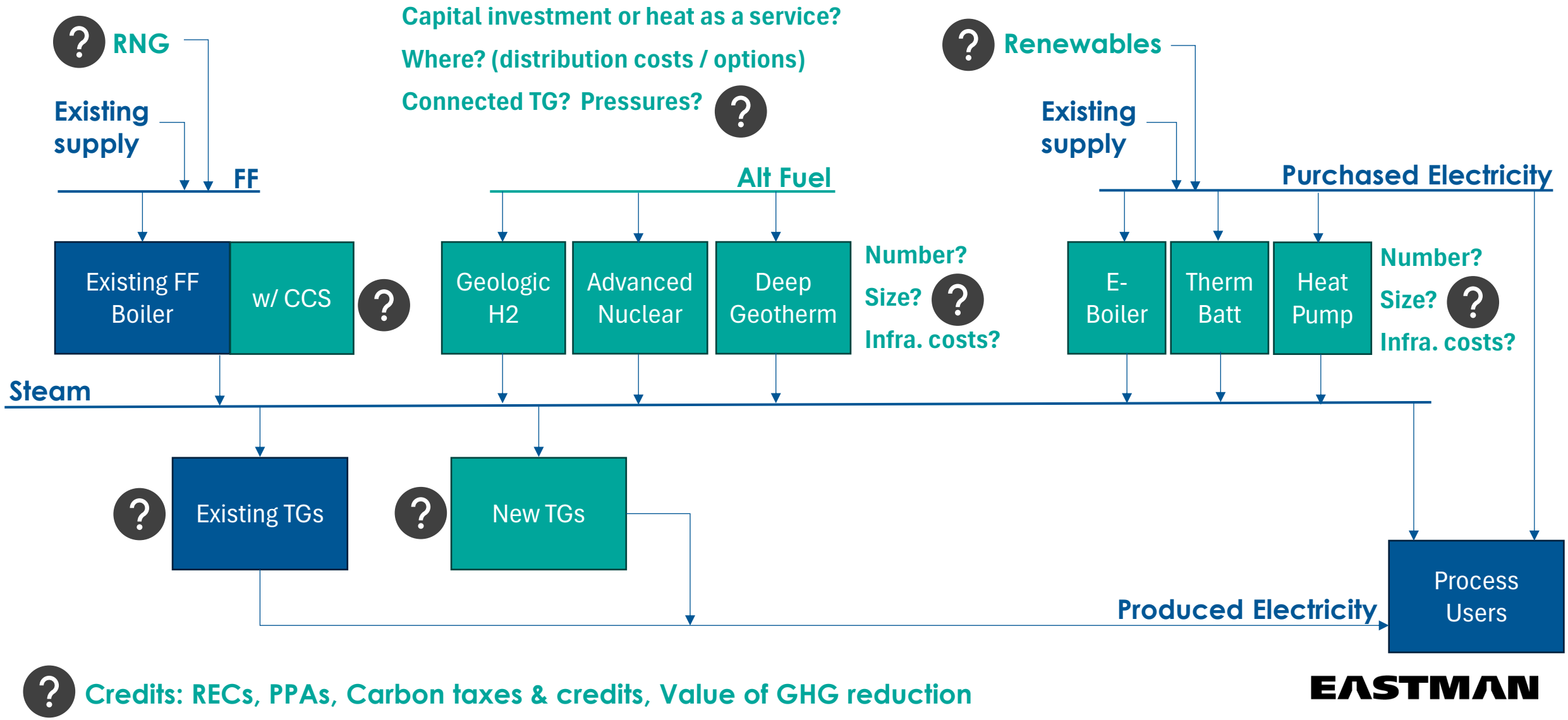
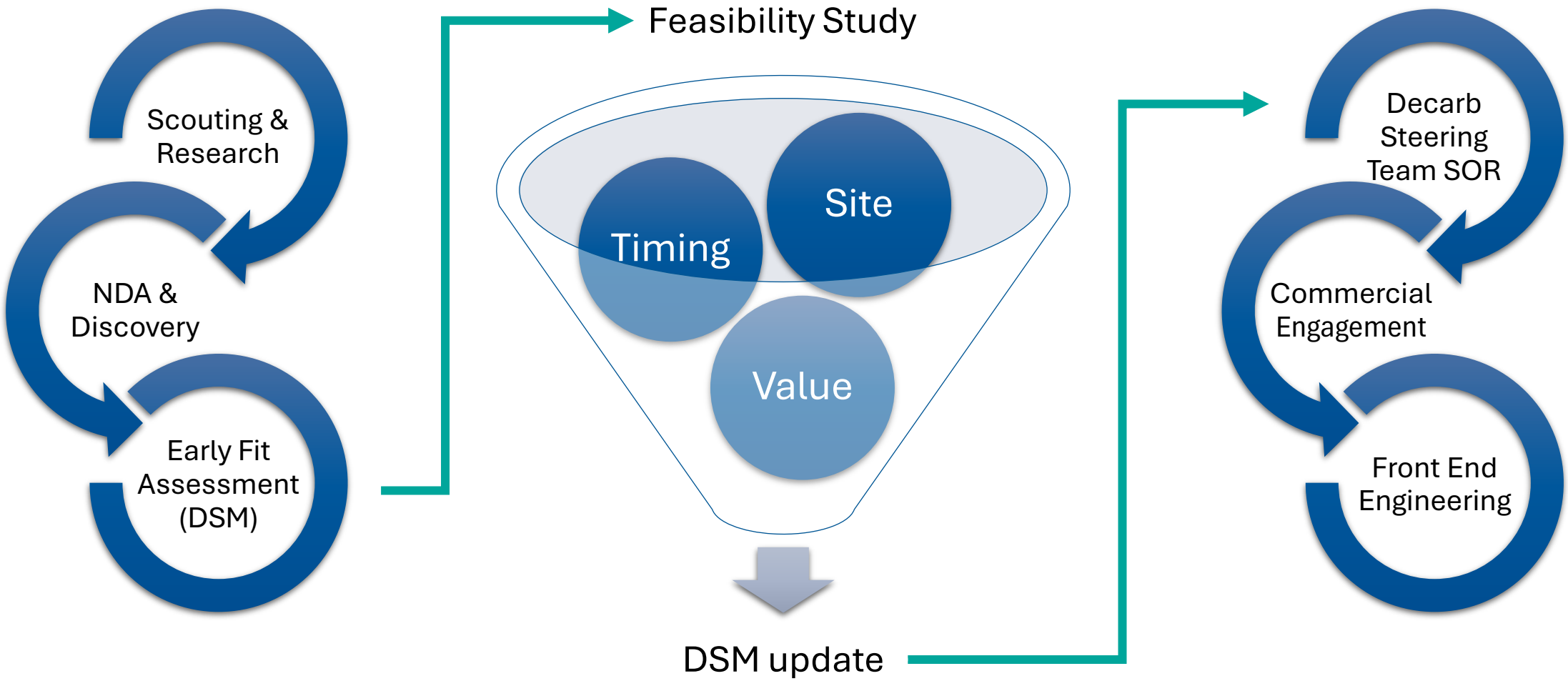
Simplified DSM structure



Stages of concept evaluation



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Scope 1 GHG reduction efforts

Decarbonization Platform

Mission: Identify and execute value-added pathways for Eastman's decarbonization.

Path forward:

- Continue technology scouting & discovery
- Use DSM scenario analysis to inform recommendations.
- Launch feasibility studies & FEEDs.

TXO Thermal Battery

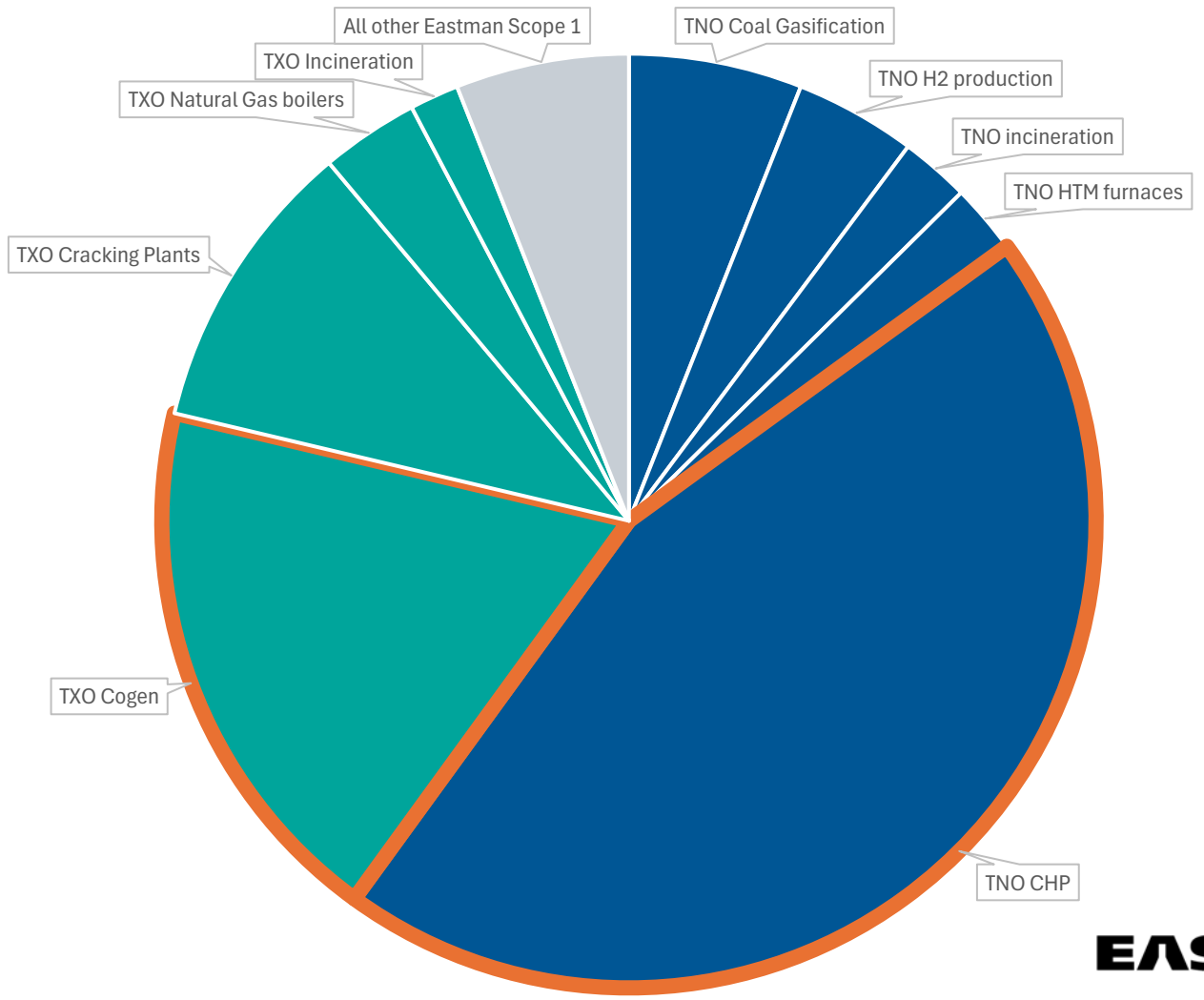
- Enabled DOE award for 2nd US PRT facility

TXO CCS

TNO CCS

TNO & TXO Clean CHP

Eastman Scope 1 GHGs



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