

CLIMATE TRACE

Data Science and Decarbonization

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Product Manager

November 16th, 2022

The Climate TRACE coalition

Climate TRACE is a joint initiative founded by collaborating universities, environmental nonprofits, tech startups, and environmental leaders; plus dozens of other institutions that have contributed additional data and analysis.

The purpose of the coalition is to pool the collective technical resources and domain knowledge of all of these organizations to bring transparency, recency, and actionability to global greenhouse gas (GHG) emissions inventories.

Climate TRACE founding members

Johns Hopkins
University Applied
Physics Lab

EARTHRISE
ALLIANCE



Former
VP AI
Gore

 TransitionZero



Hypervine.io



 Blue Sky Analytics



Emissions Data for Decision-Making

Independent



- Direct measurements of emissions-causing activities from remote sensing data and multiple other datasets

Timely



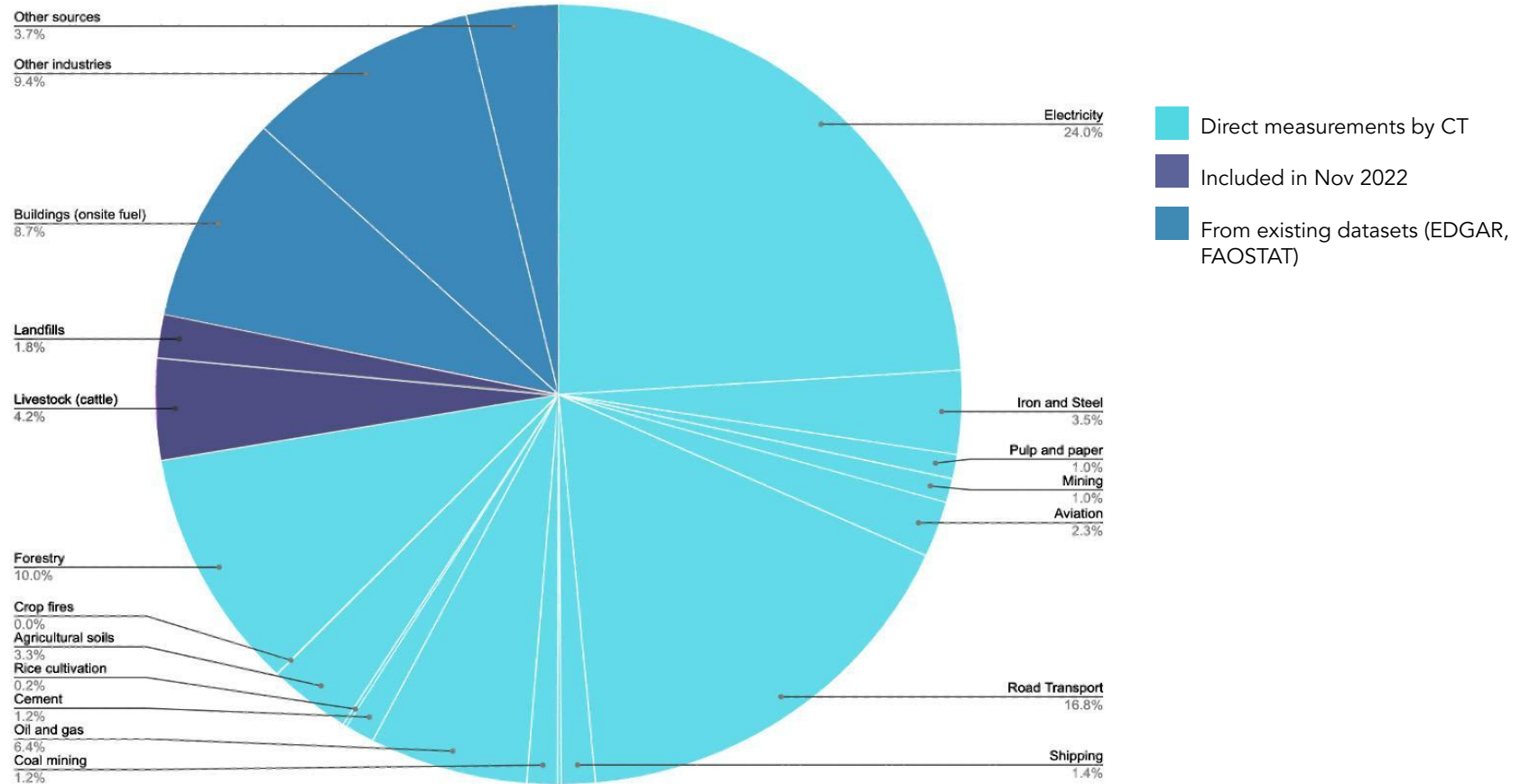
- Annual data for every country 2015-2020 and more than 70k assets

Comprehensive



- All major emissions sectors
- All countries
- Coming soon: Facility-level emissions estimates for the largest plants across all sectors

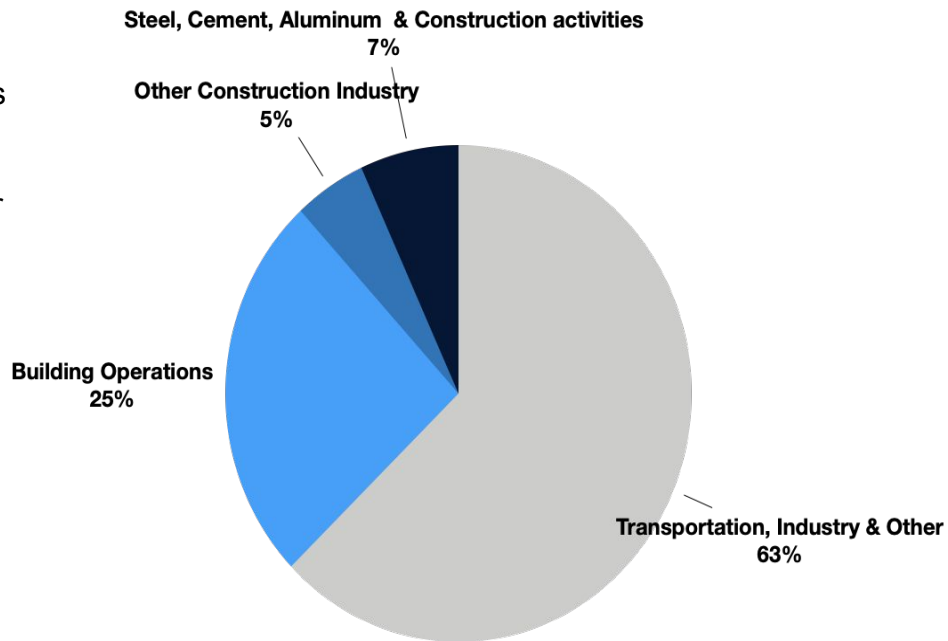
Emissions sectors covered



Built Environment generated around 37% of annual global CO2 emissions in 2021

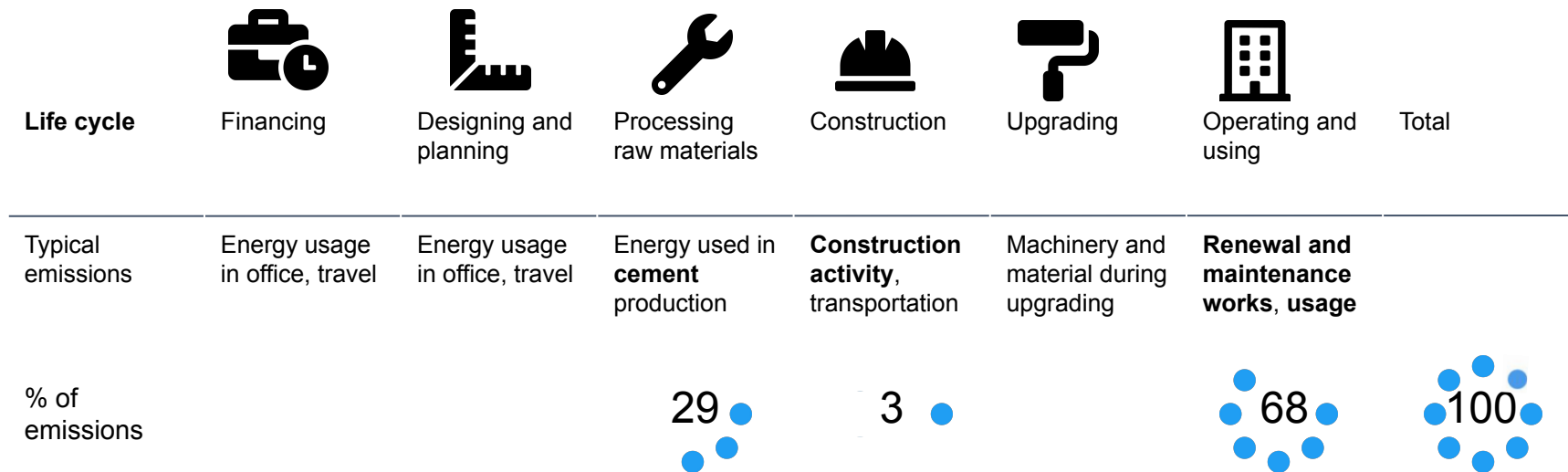
Building operations are responsible for 25% emissions globally annually

Building materials and construction are responsible for an additional 12% annually;



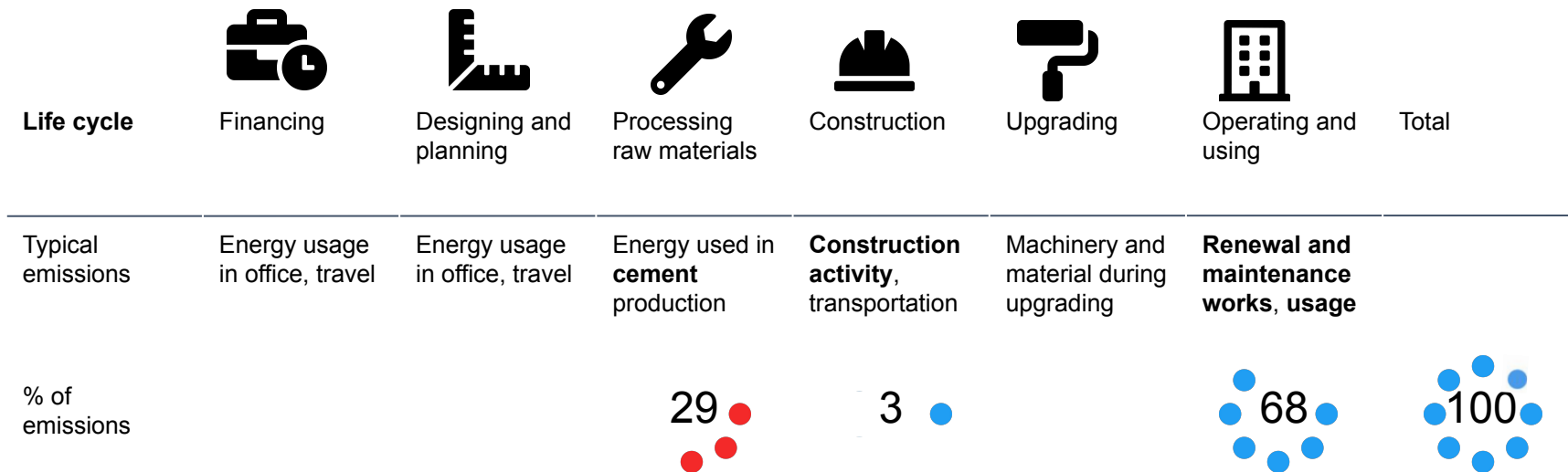


The construction ecosystem & carbon emissions

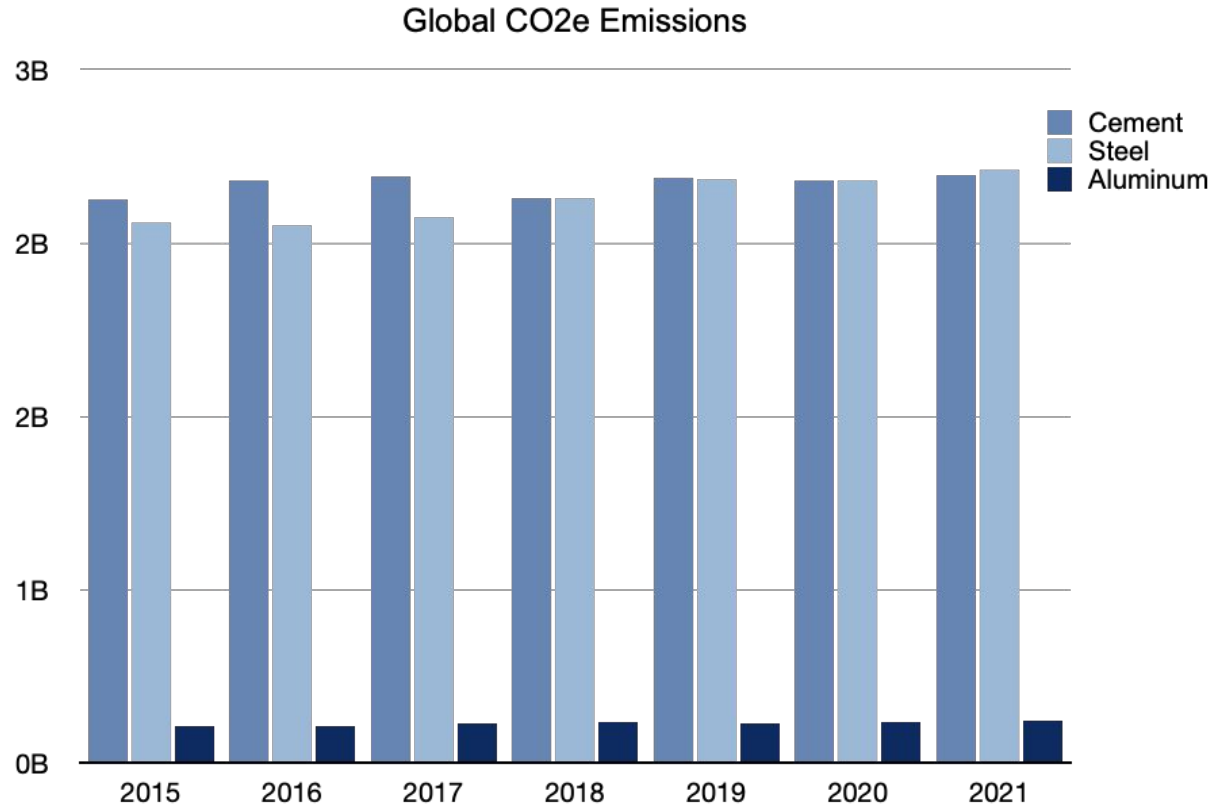




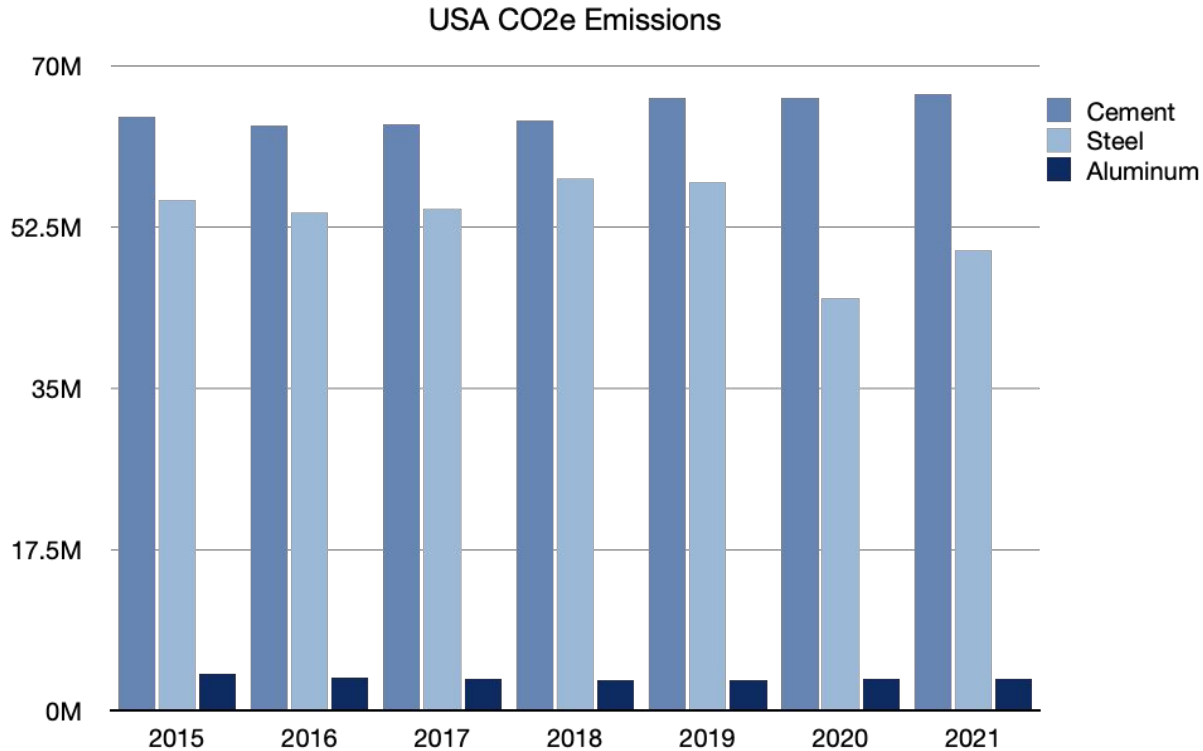
The construction ecosystem & carbon emissions



Global Manufacturing emissions of Materials Commonly used in construction



USA Manufacturing emission of Materials Commonly used in construction



Reducing emissions impacts of new builds

Material decarbonization

- **Choosing materials from manufacturers that have lower carbon emissions during its production process**
by:
 - Increasing production efficiency
 - Electrification of process equipment
 - Technology advancements

Demand reduction and circularity

- Lowering demand for primary resource (e.g aluminum, steel through design);
- Using generative design to create outcome-based designs that help frame and clarify how different materials choices can lower GHG emissions

Optimizing construction and material

- Shift materials and equipment to alternatives that are more energy efficient;
- Include substitution by low-carbon materials, higher performing materials;

How Climate Trace data can help with:

Material decarbonization

- **Choosing materials from manufacturers that have lower carbon emissions during its production process**
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 - Increasing production efficiency
 - Electrification of process equipment
 - Technology advancements

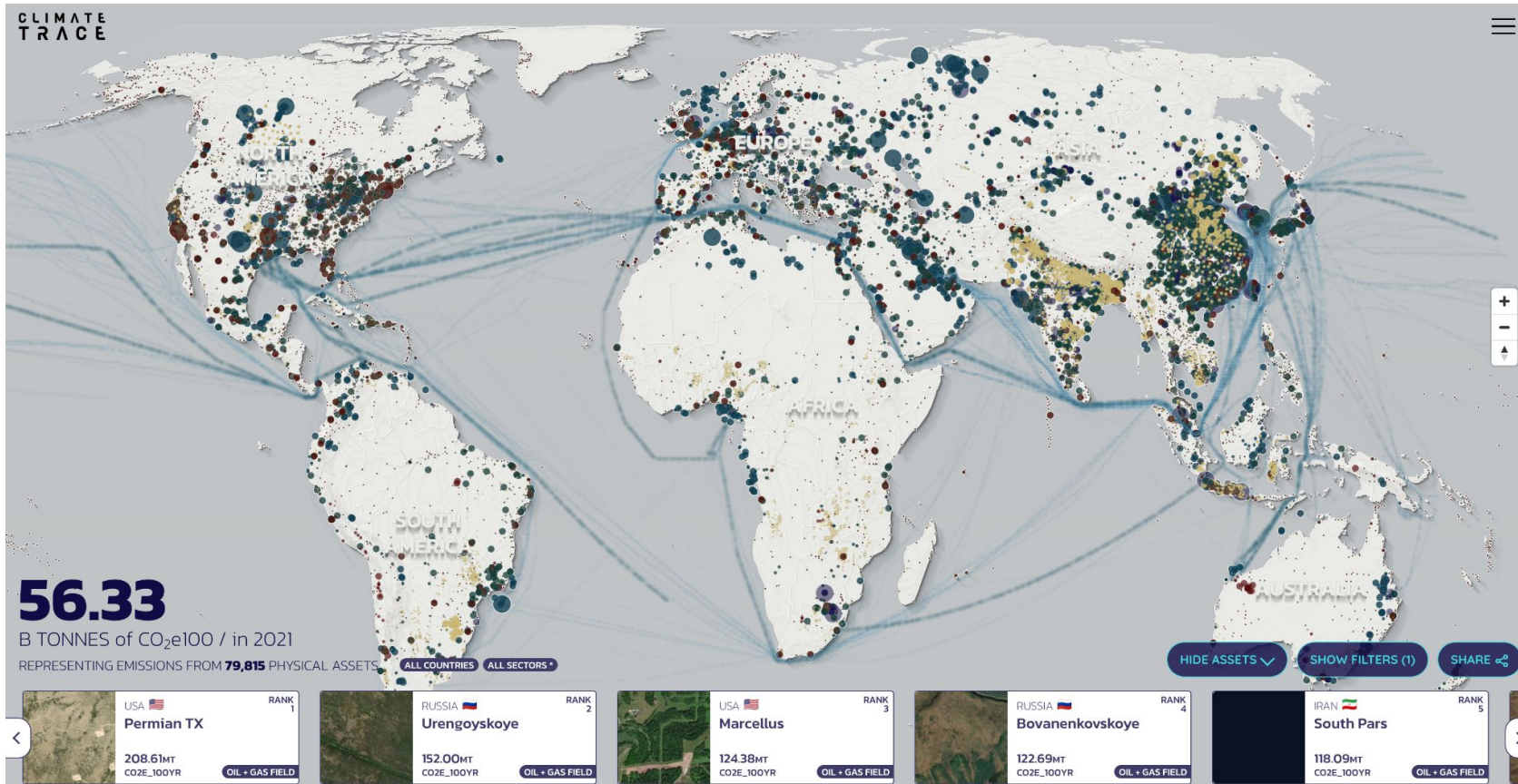
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Climate TRACE Asset level emissions inventory

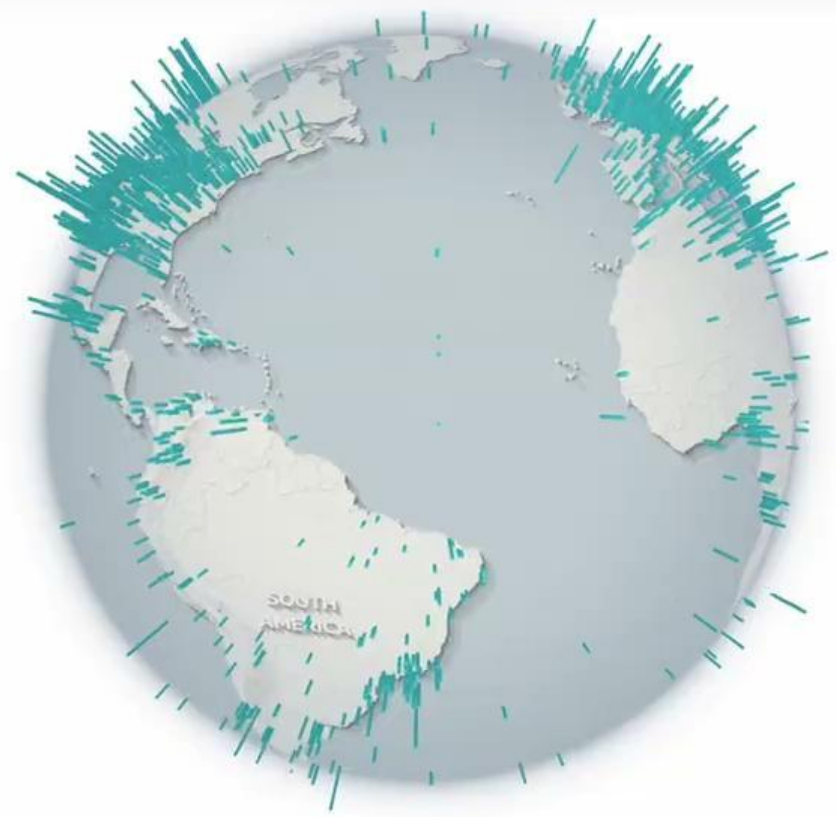


CLIMATE TRACE

INDEPENDENT GREENHOUSE GAS EMISSIONS TRACKING

EXPLORE THE MAP >>

DOWNLOAD THE DATA >>





120
MLN TONNES of CO₂e100 / in 2021
REPRESENTING EMISSIONS FROM 170 PHYSICAL ASSETS

UNITED STATES OF AMERICA | ALUMINUM | CEMENT | ...

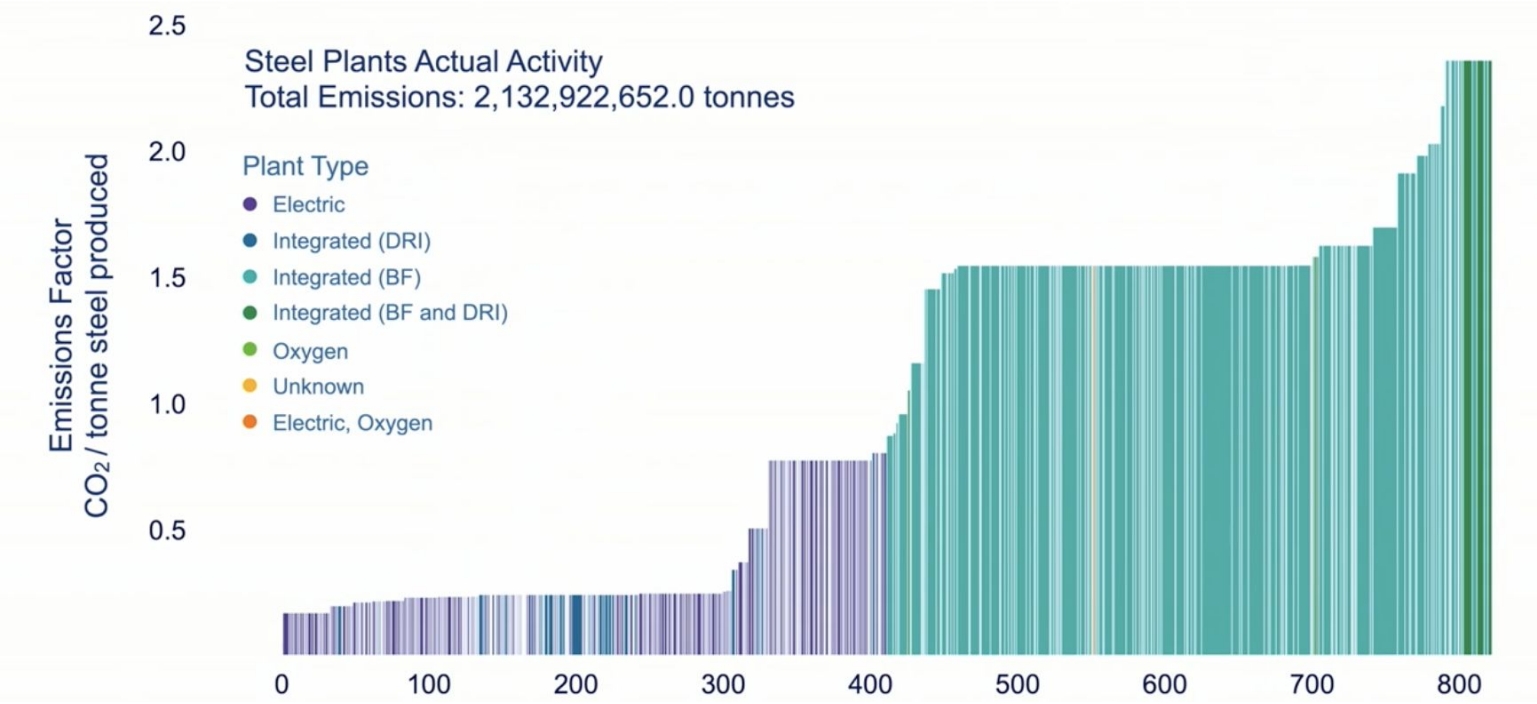
HIDE ASSETS | SHOW FILTERS (5) | SHARE

Rank	Asset Name	CO ₂ e (100YR)	Plant Type
1	U.S. Steel Gary Works	7.10MT	STEEL PLANT
2	Cleveland-Cliffs Indiana Harbor steel plant	6.60MT	STEEL PLANT
3	Cleveland-Cliffs Burns Harbor steel plant	5.82MT	STEEL PLANT
4	Cleveland-Cliffs Cleveland steel plant	3.46MT	STEEL PLANT
5	U.S. Steel Edgar Thomson Plant	2.91MT	STEEL PLANT

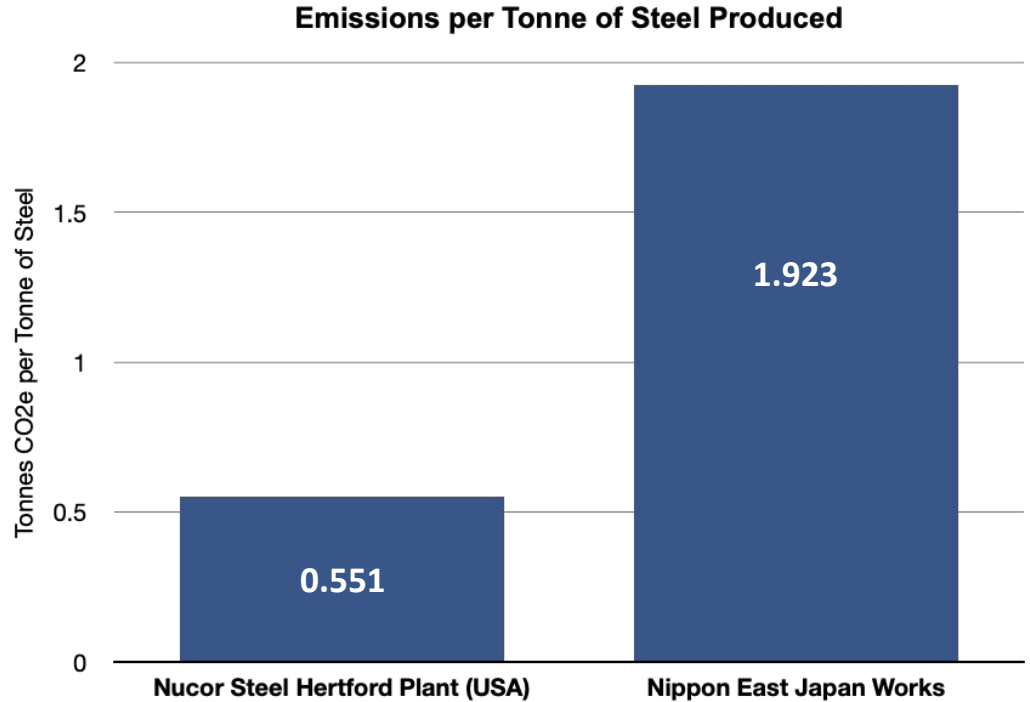
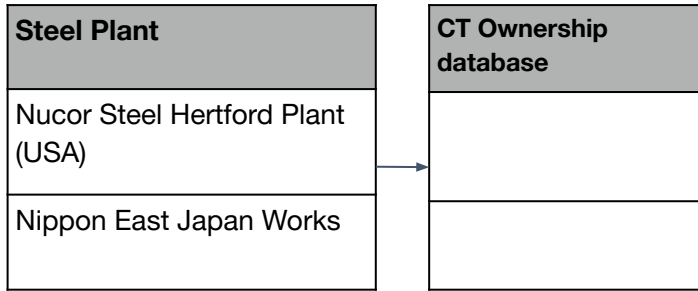


Selecting Steel Manufacturers by using Climate TRACE data

Global Steel Plants, Ordered by Emissions Factors



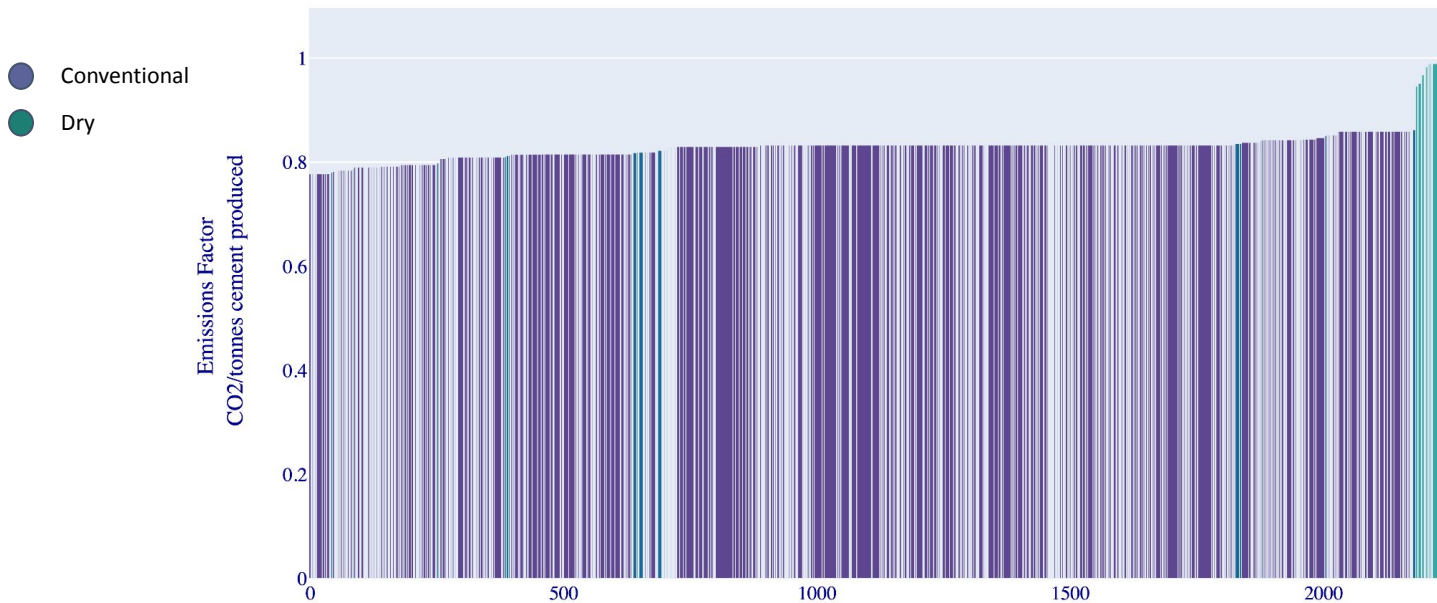
Selecting Steel Vendors by using Climate TRACE data





Selecting Cement Manufacturers by using Climate TRACE data

Global Cement Plants, Ordered by Emissions Factors

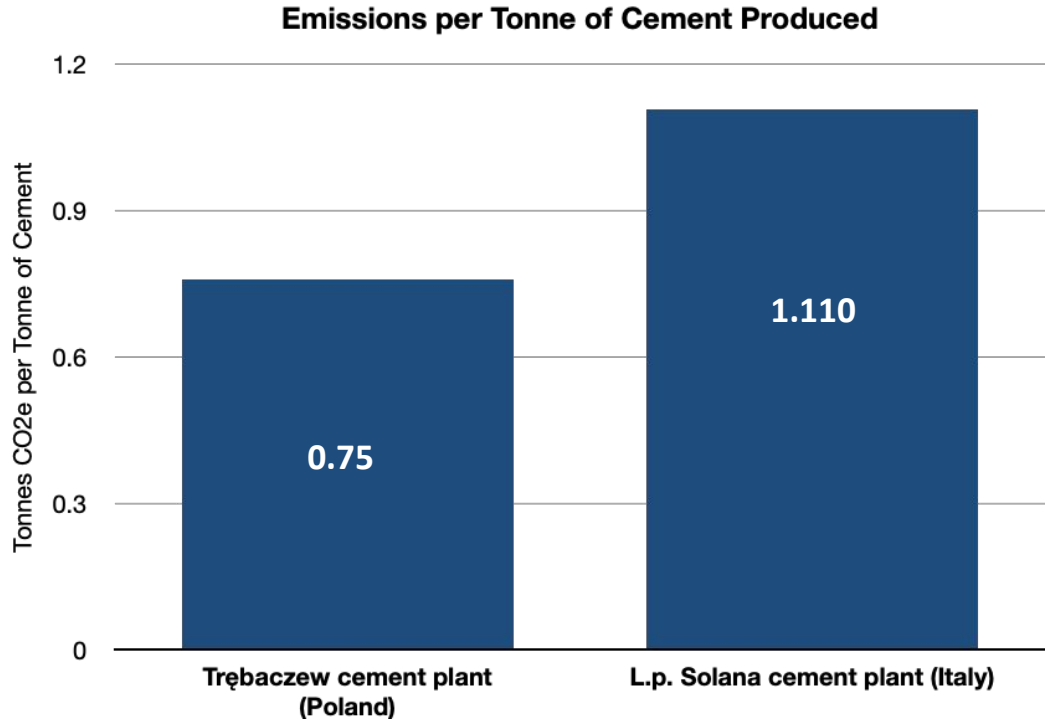


Selecting Cement Vendors by using Climate TRACE data

Cement Plant
Trębaczew cement plant (POL)
L.p. Solana cement plant (ITA)

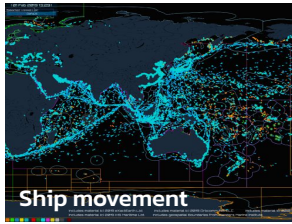


CT Ownership database



How Climate TRACE monitors emissions:

OBSERVE ACTIVITY: satellite imagery identifies emissions-causing activities



ESTIMATE ACTIVITY:
AI, ML, and statistical models estimate activity data

TRAIN THE MODELS: training data (e.g., CEMS, sensors, reported emissions) complements activity observations

COMPLEMENT ACTIVITY DATA:
Other datasets to estimate facility size, technology, and emissions factors

EMISSIONS ESTIMATES



Monitoring Steel plants data:

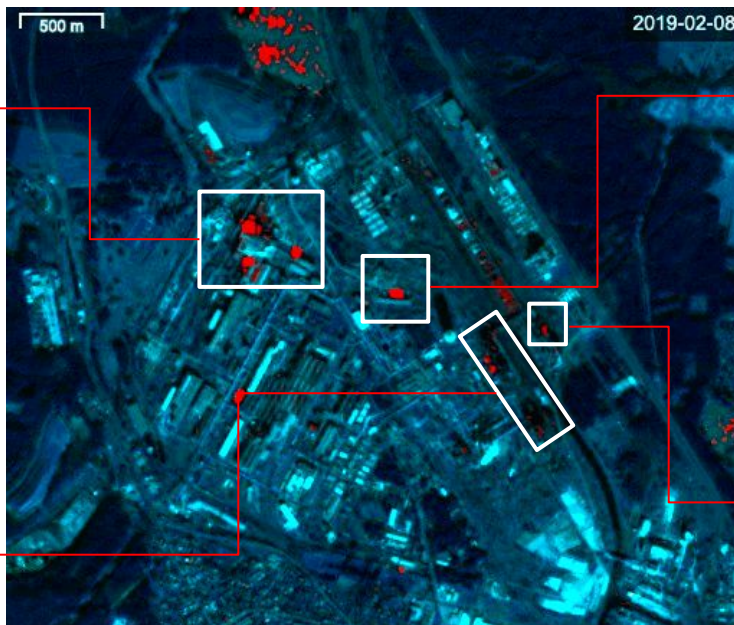
Modified Sentinel-2 imagery of Eisenhuettenstadt mill

Basic Oxygen Furnace

Off-gas emerges from the reaction at about 1650°C.

Blast Furnaces Row

A mixture of sinter and coke is heated to create pig iron at up to 1300°C.



Slag pit

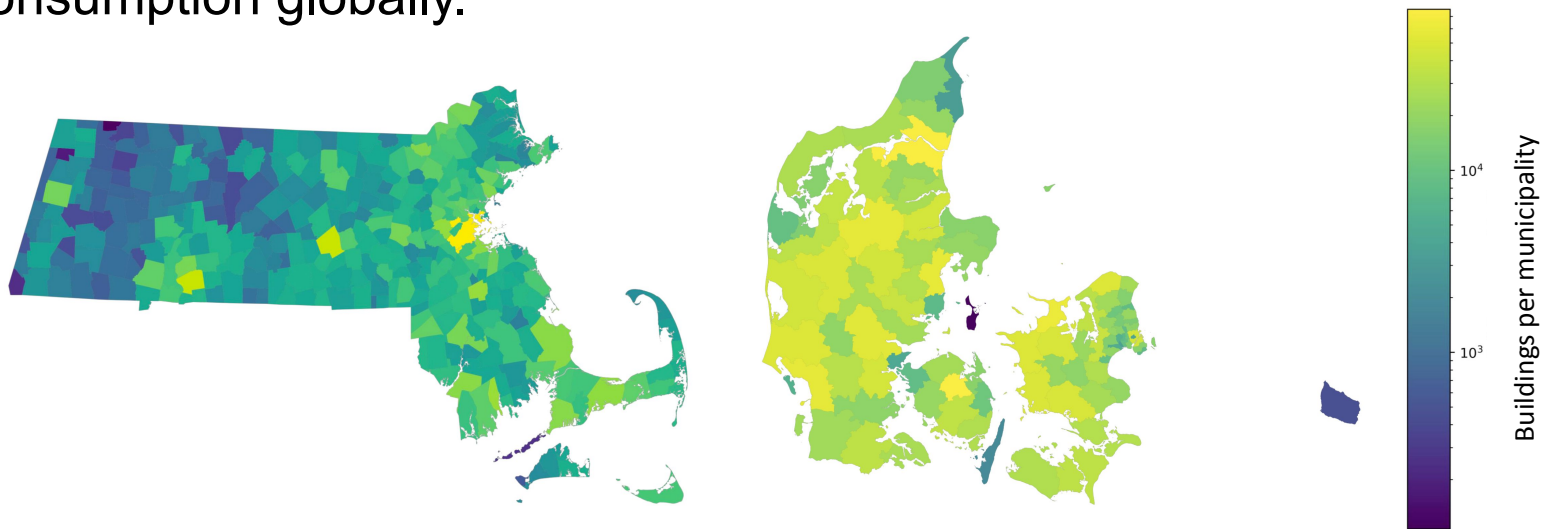
Hot process impurities are dumped into a slag pot then transported back to large pits dug into the ground to be allowed to cool.

Sinter Plant

The temperature maintained between 1150 - 1250°C.

Future work: Pilot on Buildings Energy Consumption

Working towards generating higher resolution estimates (spatially and temporally) of **building energy consumption for residential and commercial buildings**, with a focus on non-electricity energy consumption globally.



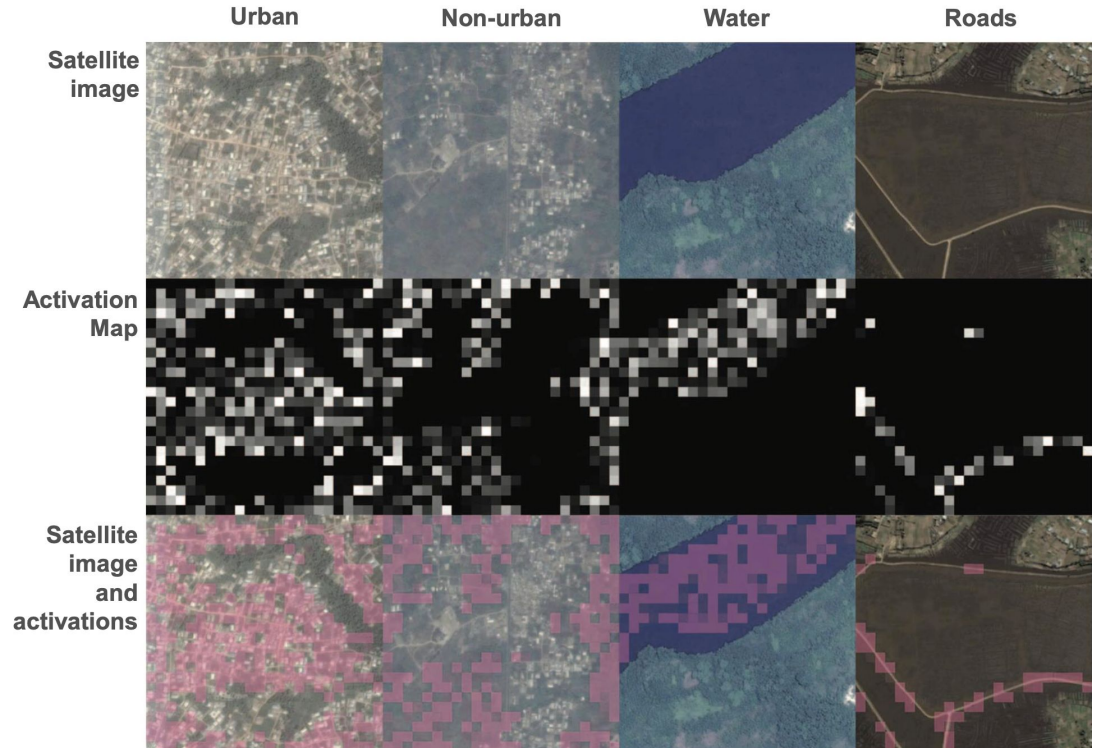


Future work: Pilot on Buildings Energy Consumption

Inputs for the AI model:

- Temperature Data
- Population Data
- Building Size Distribution
- Economic Data
 - GDP
 - Human Development Index

- CO₂ regional estimates
- Satellite derived features



N. Jean, M. Burke, M. Xie, W. M. Davis, D. B. Lobell, and S. Ermon, "Combining satellite imagery and machine learning to predict poverty," *Science*, vol. 353, no. 6301, pp. 790–794, Aug. 2016, doi: 10.1126/science.aaf7894.



Climate TRACE data can help Building Industries experts choose the less carbon intensive manufacturer for commonly used materials in this industry.

 climatetrace.org

 **Contact us**
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