Microsoft

PIDX
EMISSIONS TRANSPARENCY

Transforming supply chain platforms in transitioning to net-zero

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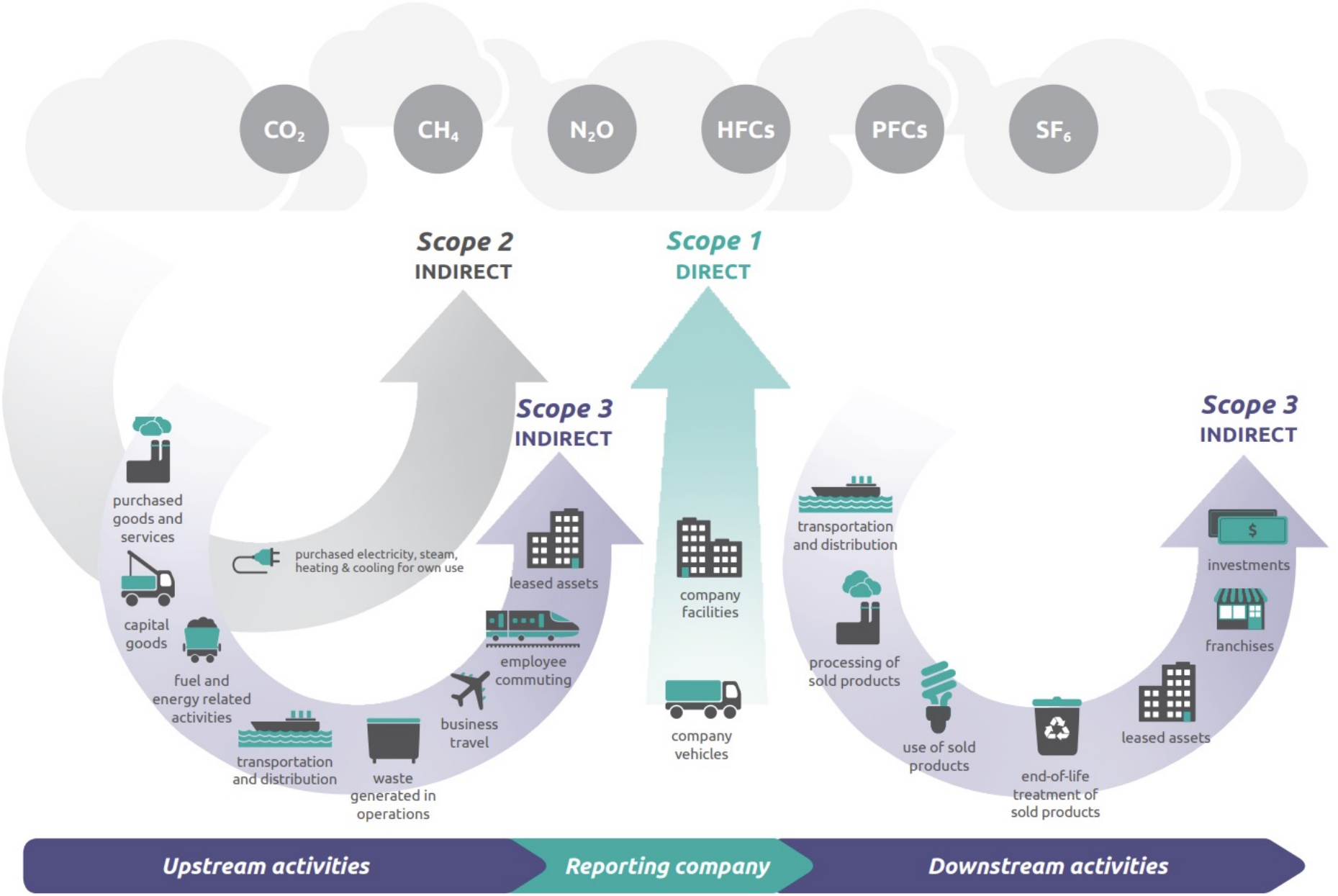
Agenda

- Why is Scope 3 Emissions Important
- Why is Scope 3 Emissions Complex
- Brief Intro to PIDX ETDX
- Achieving Net Zero Supply Chains
  - Business Use Cases
  - Technology Proposal

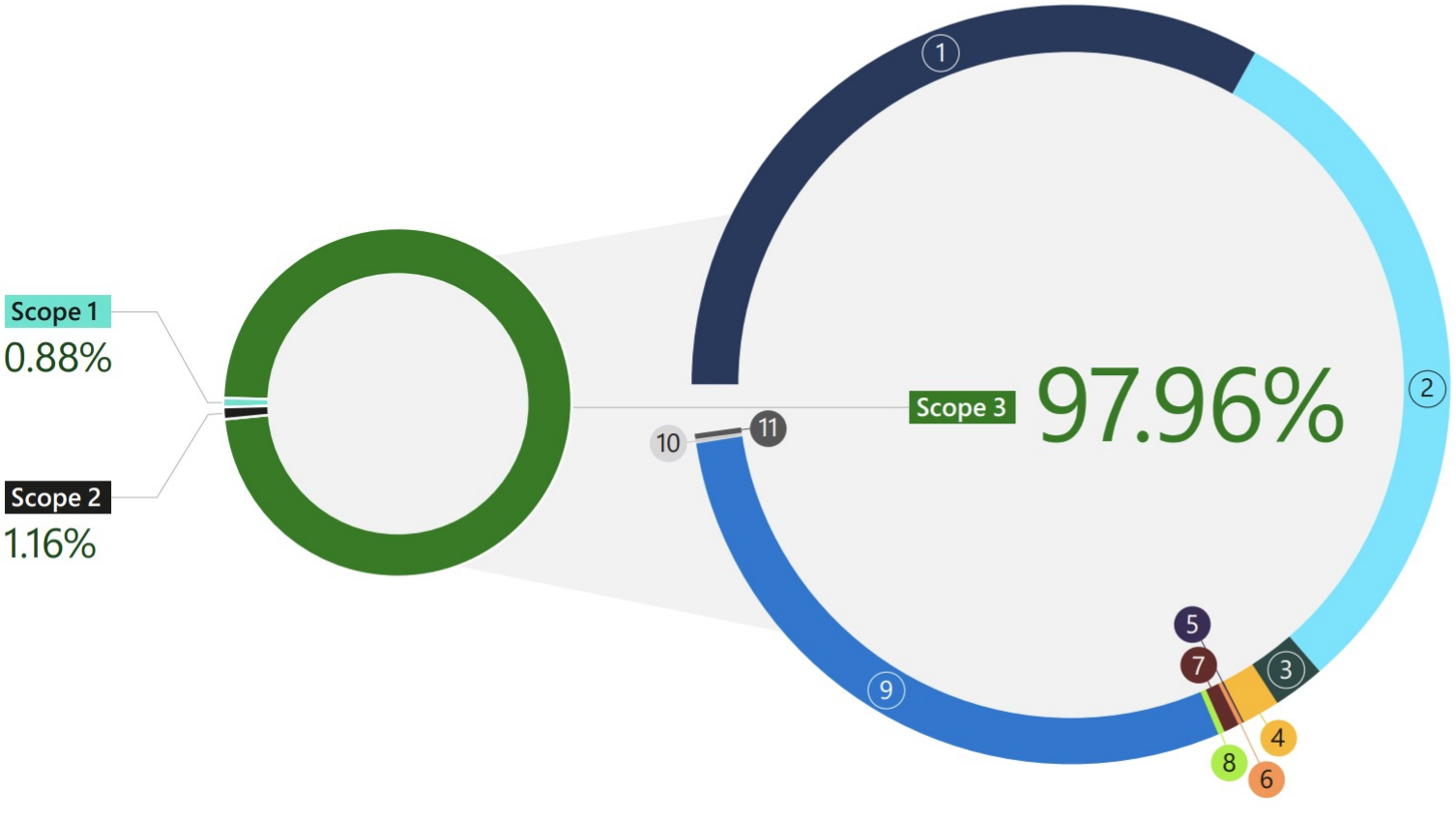


https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf

#1 Scope 3 Emissions are Huge

Breaking down of our FY21 Scope 3 emissions by source

Scope 3 represents the majority of Microsoft's emissions, and we are committed to reducing these emissions by more than 50 percent by 2030. Tracking and reporting against this category of emissions is critical for net zero progress.

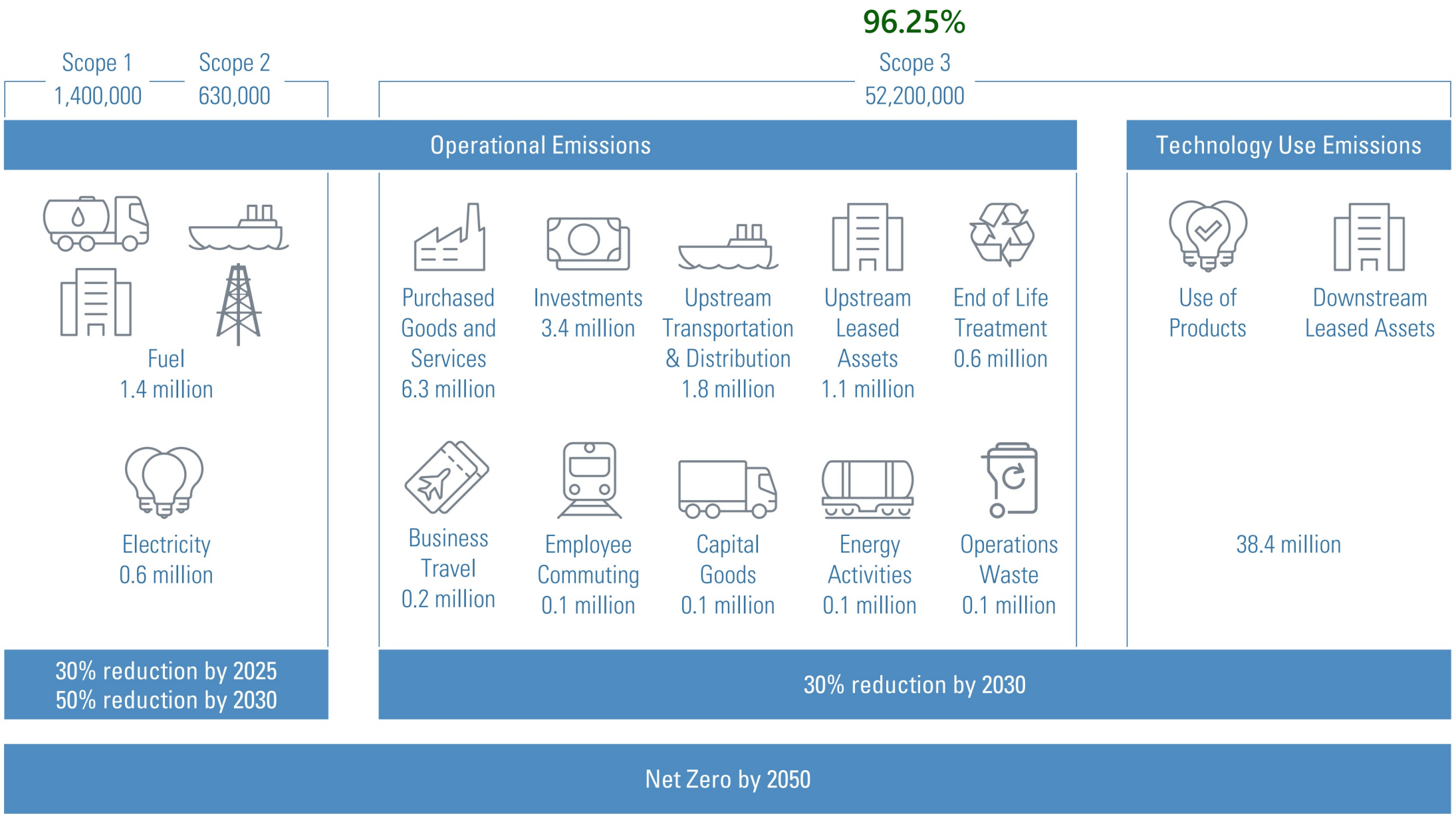


Scope 3 Categories

1	Purchased Goods & Services	35.03%
2	Capital Goods	29.70%
3	Fuel- and Energy-Related Activities (Market-Based)	2.20%
4	Upstream Transportation	1.60%
5	Waste	0.04%
6	Business Travel	0.16%
7	Employee Commuting	0.57%
8	Downstream Transportation	0.32%
9	Use of Sold Products	28.07%
10	End of Life of Sold Products	0.14%
11	Downstream Leased Assets	0.13%

See appendix for more data on our carbon emissions

https://www.microsoft.com/en-us/corporate-responsibility/sustainability/report

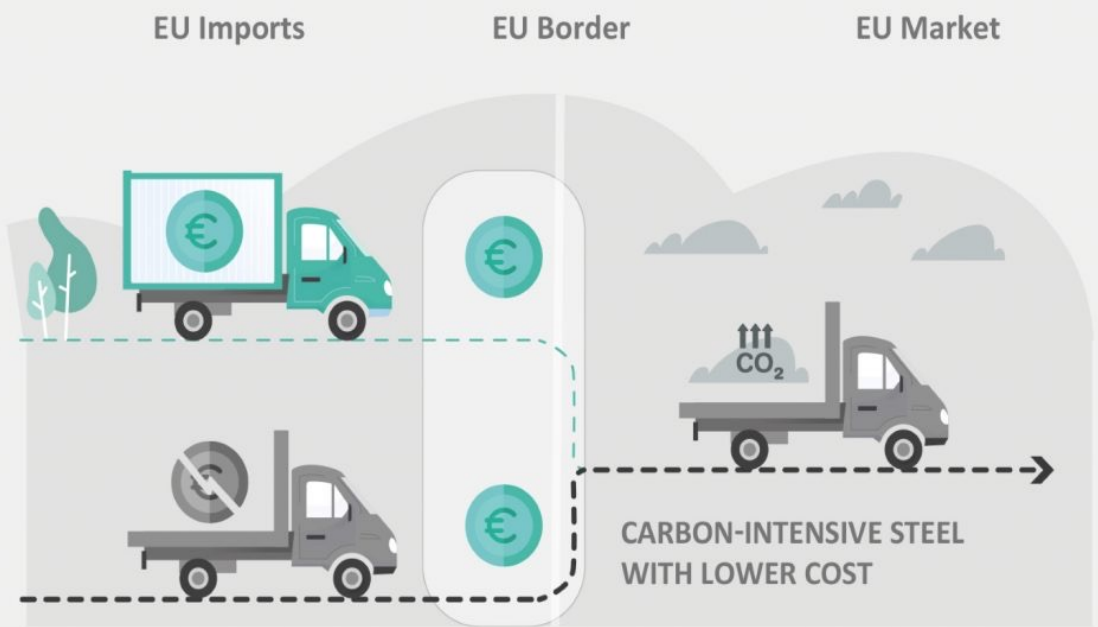


https://www.slb.com/sustainability/pdf/SLB_2020_Sustainability_Report.pdf

#2 Border Carbon Adjustment Regulations are coming

THE EU CARBON BORDER ADJUSTMENT MECHANISM: CHOOSING A MODEL FOR FAIRNESS

OPTION I
'ONE SIZE FITS ALL' FLAT MECHANISM



WHAT THIS MEANS FOR THE CBAM

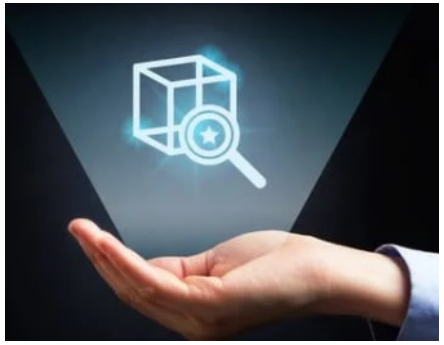
OPTION II
'INDIVIDUAL ADJUSTMENT MECHANISM'

WHAT THIS MEANS FOR THE CBAM

https://www.imf.org/en/Publications/WP/Issues/2021/09/24/Border-Carbon-Adjustments-Rationale-Design-and-Impact-466176

#3 Scope 3 emissions are very hard to calculate (your suppliers' scope 1 - 2 are your scope 3, and they are already reporting it)

Challenges with calculation and reporting of GHG emissions



Lack of standards

Or abundance

Slow, manual processes

Value Chain

Scope 3 emissions

"Today, carbon accounting suffers from data quality issues, measurement and reporting inconsistencies, siloed platforms, and infrastructure challenges. This makes it difficult to compare, combine and share reliable data, particularly for companies."

The Carbon Call – Feb 10, 2022

Demo – Automated Calculation of Scope 3, Microsoft Cloud for Sustainability

Kadri Umay

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Record, report, and reduce

Integrate and accelerate your sustainability journey with Microsoft Cloud for Sustainability

Getting started

Easily connect to your data and generate powerful calculations

Using the power of the Common Data Model, you'll aggregate your operational data, and holistically record the impact of your operations and value chain. Start by linking to an emissions source, then choose a calculation model or define your own.

Play video → Connect to your data

Make sound decisions by viewing reliable analytics and reports

Visualize your impact and generate actionable reports that meet strict public reporting requirements. Analytics tell the story of where your company is today, and give your leaders the insight they need to decide on next steps.

Play video → View analytics

Take action and reduce your environmental impact with meaningful scorecards

Using your detailed reports and analytics, you can set goals and review progress going forward. Design the scorecards you need to help your stakeholders understand trends, progress, and opportunities for improvement.

Play video → Design a scorecard

Manage data

Your trial comes with preinstalled sample data to help you learn how to use the product and to explore its capabilities. You can remove this data if you like, but adding it back would require a full reset to factory settings.
learn more

Remove data

Learn more

Product overview
Learn more about how Cloud for Sustainability can accelerate your sustainability journey

Help articles
Learn how to connect data, create calculations, design scorecards, and more

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Dashboard

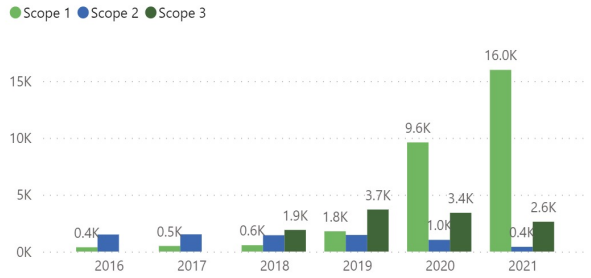
Reporting year: 2021
Accounting method: Location Based
Scope: All

Total emissions (mtCO2e)
19,015.11
▲ 35% compared to previous year

Percentage of renewable energy (%)
92.05 %
▲ 12% points compared to previous year

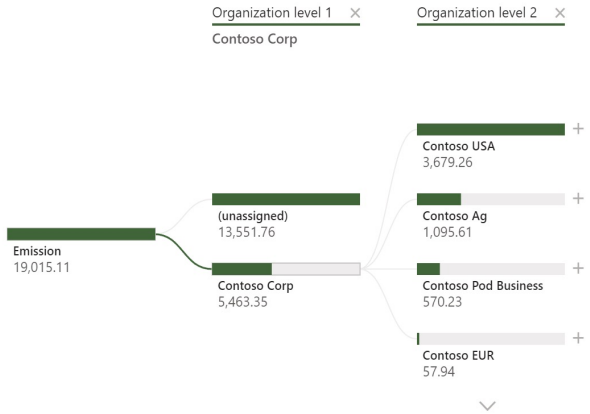
Revenue intensity score (mtCO2e/M$)
83.36
▲ 64% compared to previous year

Total emissions (mtCO2e)



Emissions by country (mtCO2e)

Total emissions (mtCO2e) by organizational unit



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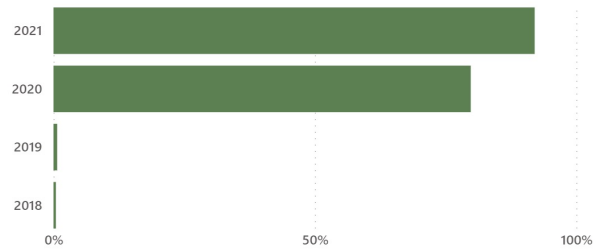
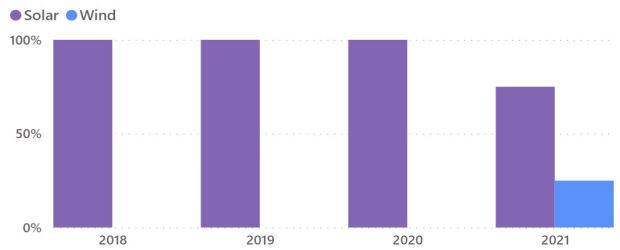
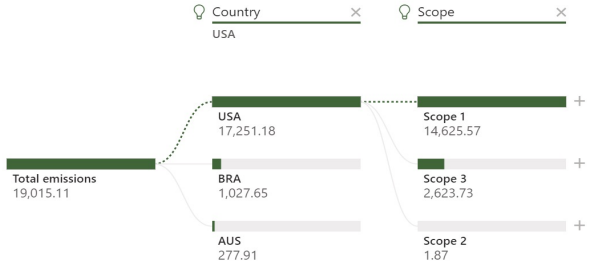
Percentage of renewable energy (%)



Distribution of renewable energy (%)



Data exploration



Key influencers | Top segments

What influences Emissions to Increase ?

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Activity Data

Scope 1

Scope 2

Scope 3

Source	Data	Connections	Numbers of connections
Business Travel	View	Manage	0
Capital Goods	View	Manage	0
Downstream Leased Assets	View	Manage	0
Downstream Other	View	Manage	0
Downstream Transportation and Distribution	View	Manage	0
Employee Commuting	View	Manage	0
End-of-life Treatment of Sold Products	View	Manage	0
Franchises	View	Manage	0
Fuel and Energy Related Activities	View	Manage	0
Investments	View	Manage	0
Processing of Sold Products	View	Manage	0
Purchased Goods and Services	View	Manage	0
Upstream Leased Assets	View	Manage	0
Upstream Other	View	Manage	0
Upstream Transportation and Distribution	View	Manage	0
Use of Sold Products	View	Manage	0
Waste Generated in Operations	View	Manage	0

Data Connections

New data connection

- Choose connector
- Create connection
- Map data fields
- Schedule data refresh
- Summary

Connectors

Select data type

- (•) Activity data
- ( ) Pre-calculated emissions
- ( ) Reference data

Activity data

Industrial Process

Choose how you'd like to connect your data

CSV | Excel | OData | More connectors

Data Connections

New data connection

- Choose connector
- Create connection
- Map data fields
- Schedule data refresh
- Summary

Choose data source

Select a connector or directly drag a file from your computer.

All categories | File | Database | Power Platform | Azure | Online services | Other

Search

Excel workbook File	Folder File	JSON File	PDF File
Parquet File	SharePoint folder File	Text/CSV File	XML File
Access Database	Amazon Redshift Database	Google BigQuery Database	IBM Db2 database Database
Impala Database	MySQL database Database	Oracle database Database	PostgreSQL database Database
SAP BW Application Server Database	SAP BW Message Server Database	SAP HANA database Database	SQL Server Analysis Services Database
SQL Server database Database	Snowflake Database	Teradata database Database	Azure Analysis Services Azure
Azure Blobs Azure	Azure Data Explorer (Kusto) Azure	Azure Data Lake Storage Gen2 Azure	Azure HDInsight Spark Azure
Azure SQL database Azure	Azure Synapse Analytics (SQL ... Azure	Azure Tables Azure	Adobe Analytics Online services
Google Analytics Online services	Microsoft Exchange Online Online services	Salesforce objects Online services	Salesforce reports Online services
SharePoint Online list Online services	FHIR Other	OData Other	Odbc Other
SharePoint list Other	Spark Other	Web API Other	Web page Other
Dataflows Power Platform	Dataverse Power Platform	Blank table Other	Blank query Other

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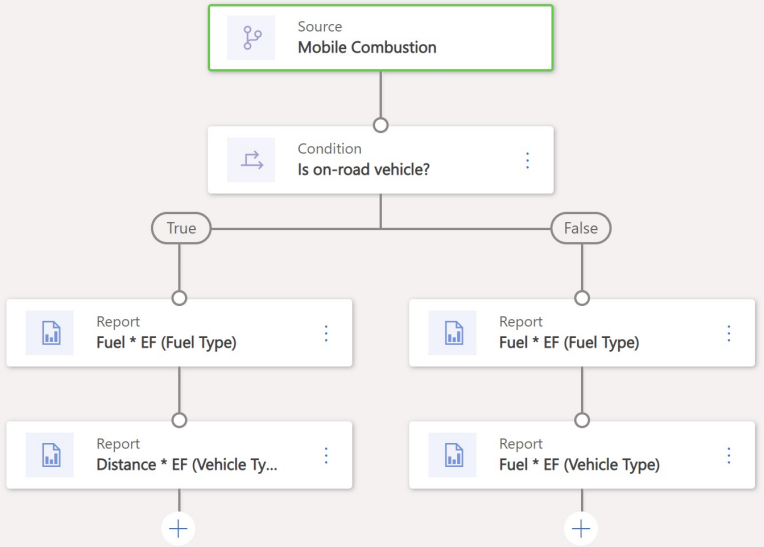
Name ↑	Emissions Sources
Fugitive Emissions	Fugitive Emissions
Mobile Combustion	Mobile Combustion
Purchased Cooling	Purchased Cooling
Purchased Electricity: L...	Purchased Electricity
Purchased Electricity: R...	Purchased Electricity
Purchased Heat	Purchased Heat
Stationary Combustion	Stationary Combustion



Source Details

Last updated: 4/2/2022, 7:27:26 AM

Name *
Mobile Combustion

Activity data *
Mobile Combustion

Calculation Method *
EPA Equation 1,4,5

Documentation Reference *
https://www.epa.gov/sites/default/files/202...

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Show Chart | New | Delete | Refresh | Email a Link | Flow | Run Report | Excel Templates | Export to Excel | Import from Excel | Create view

Emission Factor Libraries

Search this view

Name	Version	Year	Description
EPA	1	2021	EPA Factors
Demo Energy Emission Factor Library			Fictitious energy factors to be used only with ...

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Save | Save & Close | New | Deactivate | Delete | Refresh | Check Access | Email a Link | Flow | Word Templates | Run Report

EPA - Saved

Emission Factor Library

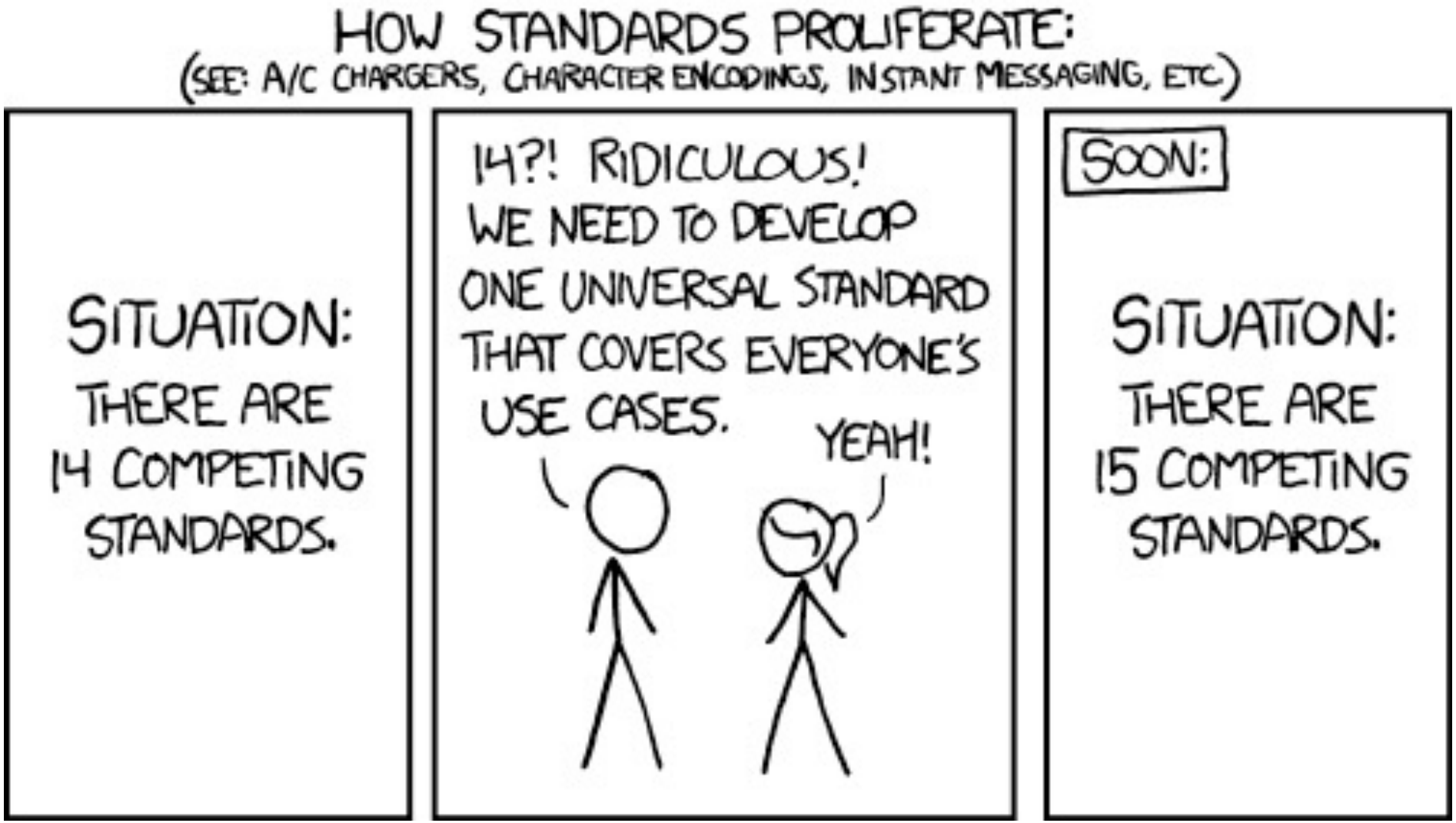
General | Emission Factors | Factors Mapping | Related

New Emission Factor | Refresh | Flow | Run Report

Calculatio...	Emissions...	Name	Description	Unit	Type	Sub Type	Documen...	CH4	CH4 Unit	CO2	CO2 Unit	N2O	N2O Unit	HFCs	HFCs Unit
EPA	Purchase...	SRMW (SERC Midwest)		MWh	eGRID	Total Out...	EPA eGRI...	0.169000...	lb	1,584.400...	lb	0.025000...	lb		
EPA	Mobile C...	Light-Duty Cars-Biodiesel		mile	Vehicle	On-Road ...	EPA (202...	0.030000...	g			0.019000...	g		
EPA	Mobile C...	Gasoline Light-Duty Trucks 2012		mile	Vehicle	On-Road ...	EPA (202...	0.009600...	g			0.003300...	g		
EPA	Mobile C...	Gasoline Heavy-Duty Vehicles 1990-1995		mile	Vehicle	On-Road ...	EPA (202...	0.324600...	g			0.114200...	g		
EPA	Purchase...	RFCW (RFC West)		MWh	eGRID	Non-Base...	EPA eGRI...	0.178000...	lb	1,831.600...	lb	0.026000...	lb		
EPA	Mobile C...	Gasoline Passenger Cars 1980		mile	Vehicle	On-Road ...	EPA (202...	0.132600...	g			0.049900...	g		
EPA	Mobile C...	Gasoline Passenger Cars 2017		mile	Vehicle	On-Road ...	EPA (202...	0.005400...	g			0.001800...	g		
EPA	Mobile C...	Gasoline Passenger Cars 2000		mile	Vehicle	On-Road ...	EPA (202...	0.017500...	g			0.030400...	g		
EPA	Stationar...	Isobutylene		Gallon	Fuel	Petroleu...	Federal R...	0.310000...	g	7.090000...	kg	0.060000...	g		
EPA	Stationar...	Pentanes Plus		Gallon	Fuel	Petroleu...	Federal R...	0.330000...	g	7.700000...	kg	0.070000...	g		
EPA	Mobile C...	Light-Duty Cars-CNG		mile	Vehicle	On-Road ...	EPA (202...	0.082000...	g			0.006000...	g		
EPA	Stationar...	Bituminous Coal		shortton	Fuel	Coal and ...	Federal R...	274.0000...	g	2,325.000...	kg	40.00000...	g		
EPA	Purchase...	SRVC (SERC Virginia/Carolina)		MWh	eGRID	Total Out...	EPA eGRI...	0.058000...	lb	675.4000...	lb	0.008000...	lb		
EPA	Purchase...	MROW (MRO West)		MWh	eGRID	Total Out...	EPA eGRI...	0.119000...	lb	1,098.400...	lb	0.017000...	lb		
EPA	Stationar...	Distillate Fuel Oil No. 2		Gallon	Fuel	Petroleu...	Federal R...	0.410000...	g	10.21000...	kg	0.080000...	g		
EPA	Mobile C...	Logging Equipment-Gasoline (4 stroke)		Gallon	Vehicle	Non-Roa...	EPA (202...	6.710000...	g			0.180000...	g		
EPA	Purchase...	PRMS (Puerto Rico Miscellaneous)		MWh	eGRID	Non-Base...	EPA eGRI...	0.055000...	lb	1,587.900...	lb	0.010000...	lb		
EPA	Mobile C...	Gasoline Passenger Cars 1995		mile	Vehicle	On-Road ...	EPA (202...	0.053100...	g			0.056000...	g		
EPA	Mobile C...	Heavy-Duty Trucks-CNG		mile	Vehicle	On-Road ...	EPA (202...	3.700000...	g			0.001000...	g		
EPA	Stationar...	Used Oil		Gallon	Fuel	Petroleu...	Federal R...	0.410000...	g	10.21000...	kg	0.080000...	g		
EPA	Mobile C...	Heavy-Duty Trucks-Ethanol		mile	Vehicle	On-Road ...	EPA (202...	0.075000...	g			0.028000...	g		
EPA	Mobile C...	Industrial/Commercial Equipment-Gasoline...		Gallon	Vehicle	Non-Roa...	EPA (202...	5.480000...	g			0.200000...	g		

PIDX ETDX Group has spent the last 2 years looking into this problem and partnering with others

What we are not doing



https://xkcd.com/927/

EMISSIONS TRANSPARENCY DATA EXCHANGE (ETDX)(SPT02b)

PARTICIPANTS

- Baker Hughes
- Schlumberger
- BP
- Chevron
- ConocoPhillips
- Global Carbon ESG
- Global Value Web
- Halliburton
- Independent Data Services
- Microsoft
- OFS Portal
- Shell
- Sphera
- Sullexis
- Engage Mobilize

BENEFITS

Clarity on energy standards by region, regulation, etc.
Transparency of reporting
Alignment between operators, suppliers and network on data needed to meet requirements.
Technical integrations (APIs, etc) for reuse and sustainability
Potential savings of 1-2FTE in resource savings by participant working collaboratively in the PIDX framework

GOALS/ DELIVERABLES

Develop the energy transition standards for data exchange regarding carbon emissions and other energy transition-type needs that are designed to be harmonized/normalized across industry participants.

- Perform Collaborative Discovery (gather requirements from participating members and including industry best practices and other bodies [UN, CDP])
- Develop scope, metrics and standards for data exchange normalized across industry participants.
- Provide a proposal on standards for data exchange as well as how data would be collected - via data models and data definitions for carbon footprint as well as a recommendation for pilots, POCs. Need to have an agile mindset and, via iterations, solve for specific needs to show progress on a “minimum viable product” in two phases: 1) harmonization of a specific energy transition-type need (data) across industry participants and 2) develop a prototype of collecting, normalizing the data.

ETDX MISSION

PIDX ETDX is developing use cases for data exchange along the value chain, exploring how the existing PIDX schemas could be extended to support the transfer of emissions data from supplier to operator, and vice versa.

The PIDX ETDX team is also looking at leveraging the reference data that PIDX manages, including Downstream Master Codes for Products, Companies, and Terminals—as well as references in the Petroleum Industry Data Dictionary (PIDD)—an open, royalty-free dictionary that classifies products and services with more than 4,100 templates mapped to UNSPSC.

PIDX™
EMISSIONS TRANSPARENCY

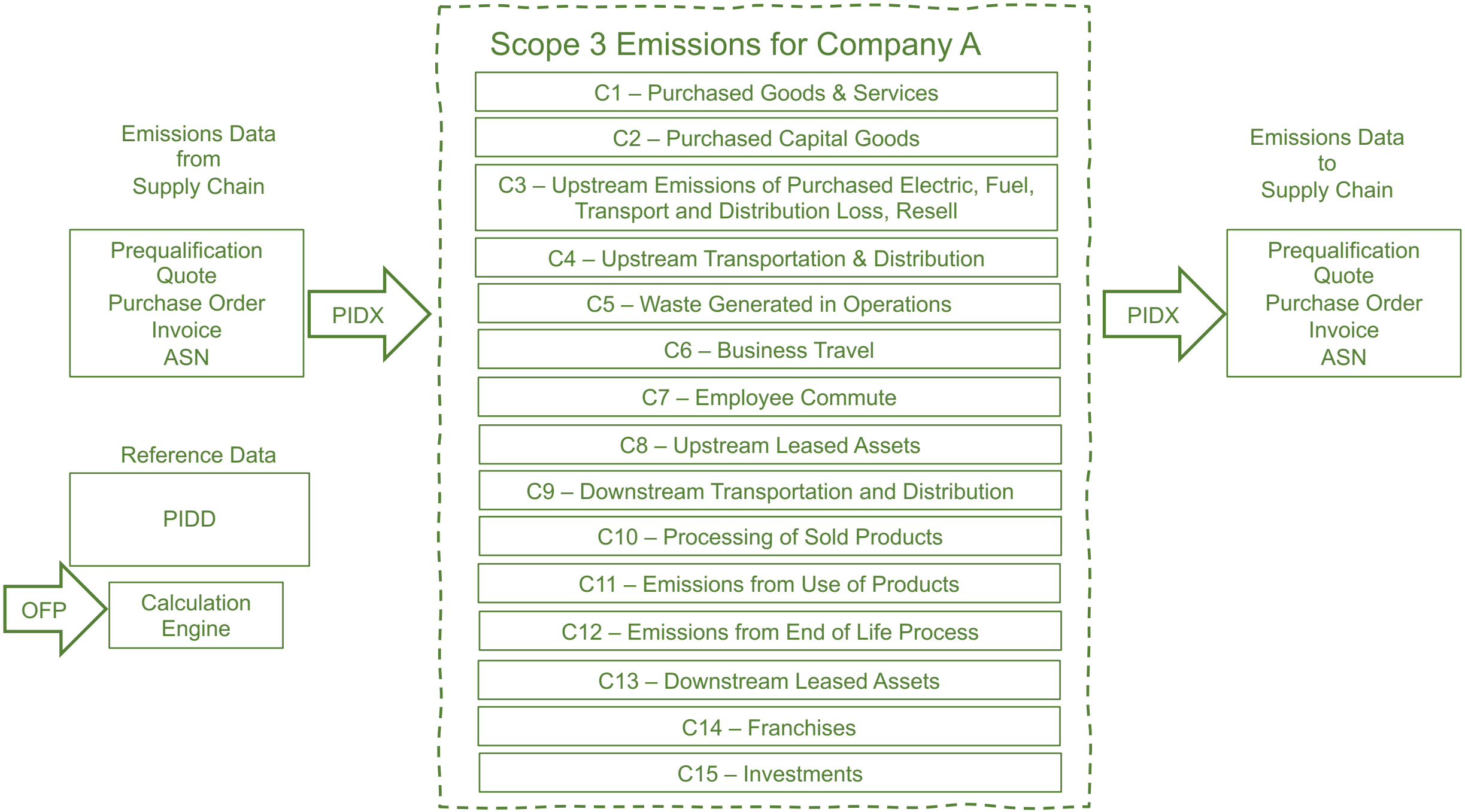
PIDX INTERNATIONAL + OPEN GROUP

PIDX ETDX is collaborating with The Open Group Open Footprint™ Forum. The Open Group Open Footprint™ Forum's mission is to create a definitive platform for emissions data (e.g., water, land, energy) and base calculations to standardize and compile data.

The Open Group Open Footprint Forum is an industry consortium that enables businesses to solve problems together in order to help drive objectives that benefit the industry as a whole.

PIDX™
EMISSIONS TRANSPARENCY

Using the standards such as PIDX, which you already use; one can make emissions data a first-class citizen in supply chain transactions


Emissions Data
from
Supply Chain
Prequalification
Quote
Purchase Order
Invoice
ASN
PIDX
Reference Data
PIDD
OFP
Calculation
Engine
Scope 3 Emissions for Company A
C1 – Purchased Goods & Services
C2 – Purchased Capital Goods
C3 – Upstream Emissions of Purchased Electric, Fuel, Transport and Distribution Loss, Resell
C4 – Upstream Transportation & Distribution
C5 – Waste Generated in Operations
C6 – Business Travel
C7 – Employee Commute
C8 – Upstream Leased Assets
C9 – Downstream Transportation and Distribution
C10 – Processing of Sold Products
C11 – Emissions from Use of Products
C12 – Emissions from End of Life Process
C13 – Downstream Leased Assets
C14 – Franchises
C15 – Investments
PIDX
Emissions Data
to
Supply Chain
Prequalification
Quote
Purchase Order
Invoice
ASN

PIDX ETDX Use Cases Scope 3

Proposed

Use Case 1	Exchange scope 3 emissions footprint across the SC
Description	I would like to exchange scope 3 emissions footprint with my upstream providers and downstream consumers across the supply chain. I would like the emissions footprint to be included in the business transactions thru PIDX messages for PO, invoice, quote, etc. at the aggregated or line item level.
Actors	Emissions inventory managers, emissions disclosure teams
Basic Flow	· Company A releases a Quote Request providing a range of emissions · Supplier provides quote with the emissions footprint · Company A releases Purchase Order with the committed emissions footprints · Supplier releases invoice with the emissions footprints · Company A logs the emissions resulting from this transaction as scope 3 and discloses to regulatory authorities with a linkage to PIDX transaction codes
MVP parameters	Company A as the buyer Company B as the supplier Sample PIDX business messages for the transactions with test data and sample products

Use Case 1.1	Cradle-to-Gate Asset Tracking: Provide emissions footprint data in sale of serialized equipment
Description	Extension of Use Case 1 to reflect how supplier data would be transmitted through an ERP system. If a company transferred a piece of serialized equipment, the operational emissions data (i.e., service time/effort) would need to be transferred as part of the asset sale.
Actors	Suppliers reporting emissions disclosures related to received purchase orders. Buyers reporting scope 3 emissions.
Basic flow	· Company wants to sell a piece of serialized equipment with operational emissions data associated with it. · Emission footprint generated during operation is provided · Operational data associated with the service of serialized equipment is put into buyer data repository · Asset transfer/maintenance
MVP parameters	Company A as the buyer Company B as the supplier

Use Case 1.2	Cradle-to-Gate Asset Tracking: Operational data in buyer data repository
Description	Operational data associated with service of serialized equipment (i.e., service time/maintenance) is put into buyer data repository
Actors	Suppliers reporting emissions disclosures related to received purchase orders. Buyers reporting scope 3 emissions.
Basic flow	Operational data associated with the service of serialized equipment is put into buyer data repository
MVP parameters	

PIDX ETDX Use Cases Scope 3

Proposed

Use Case 1.3	Cradle-to-Gate Asset Tracking: Operational data asset transfer/maintenance
Description	Operational data associated with service of serialized equipment (i.e., service time/maintenance) is transferred and maintained
Actors	Suppliers reporting emissions disclosures related to received purchase orders. Buyers reporting scope 3 emissions.
Basic Flow	· Operational data associated with service of serialized equipment (i.e., service time/maintenance) is transferred and maintained
MVP parameters	Company A as the buyer Company B as the supplier Sample PIDX business messages for the transactions with test data and sample products

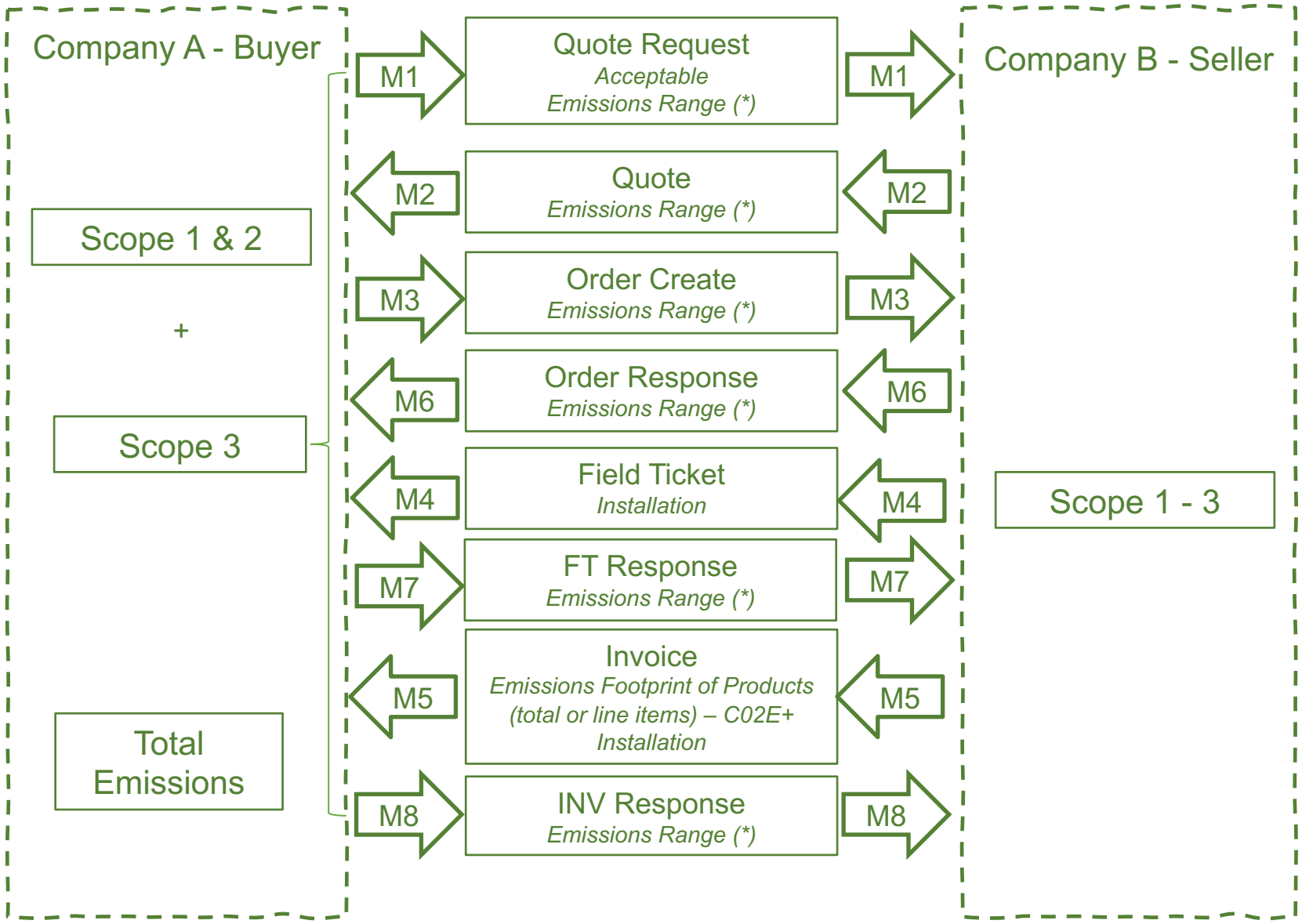
Use Case 2	Provide emissions footprint data in catalog (PIDD)
Description	I would like to calculate the emissions footprint of the products in the PPID catalog. For each product I would like to have reference either to the actual emissions or to models & parameters to calculate the emissions if these are determined dynamically for instance by country, location, facility and other parameters.
Actors	Emissions inventory managers, emissions disclosure teams, external standards bodies such as Open Footprint to calculate actual emissions
Basic flow	· Company A want to order a product and searched PIDD catalog · Emission footprint generated during production is provided if it is a static value (for instance a certain type of pump, etc…) or a pointer to a model is provided if it is dynamic · Emission footprint calculation model and parameters are provided for carbon generated from the usage of the product · PIDX hosted or external service called to calculate the emissions. · Emissions level as an indicator (high, low, medium) if the actual calculation could be done at business transaction
MVP parameters	Company A as the buyer Test cases to calculate emissions for 1-2 products from Open Footprint

Use Case 3	Onboarding measurement data via smart ledgers
Description	I would like to use measured data that closely conforms to PIDX schema v1.7 to simulate supplier reporting data that will act as an input to a PIDX
Actors	Suppliers reporting emissions disclosures related to received purchase orders. Buyers reporting scope 3 emissions.
Basic flow	· Measured field data generated for input into calculation engine (automates collection of ESG data from the seller's operation) · Calculation engine output stored on blockchain with units converted to CO2e to match PIDX v1.7 schema · Blockchain API is called when quote request received · Quote response populated with supplier generated data
MVP parameters	Incoming field data can trigger a ledger entry Ledger entry can act as input to calculation engine in the smart contract Data is output in CO2e and is callable via API to populate the seller's quote response to buyer

USE CASE 1
BUSINESS PROCESS
OVERVIEW

By extending the existing procurement processes and data schemas, one can make emissions data a first-class citizen in supply chain transactions

Use Case 1



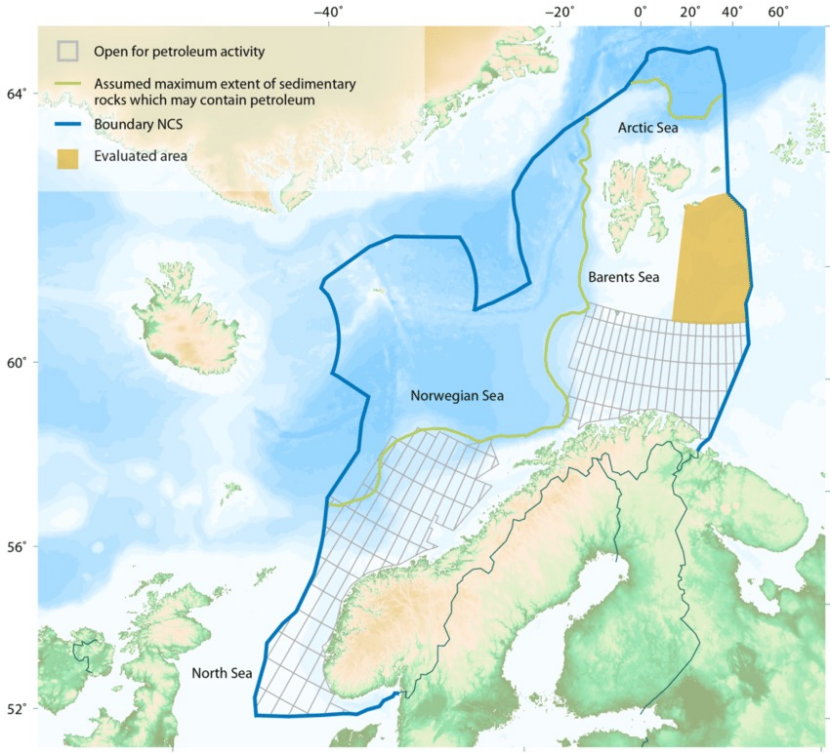
* Today the emissions data is provided in free text field by some buyers and providers.

Business Process Overview

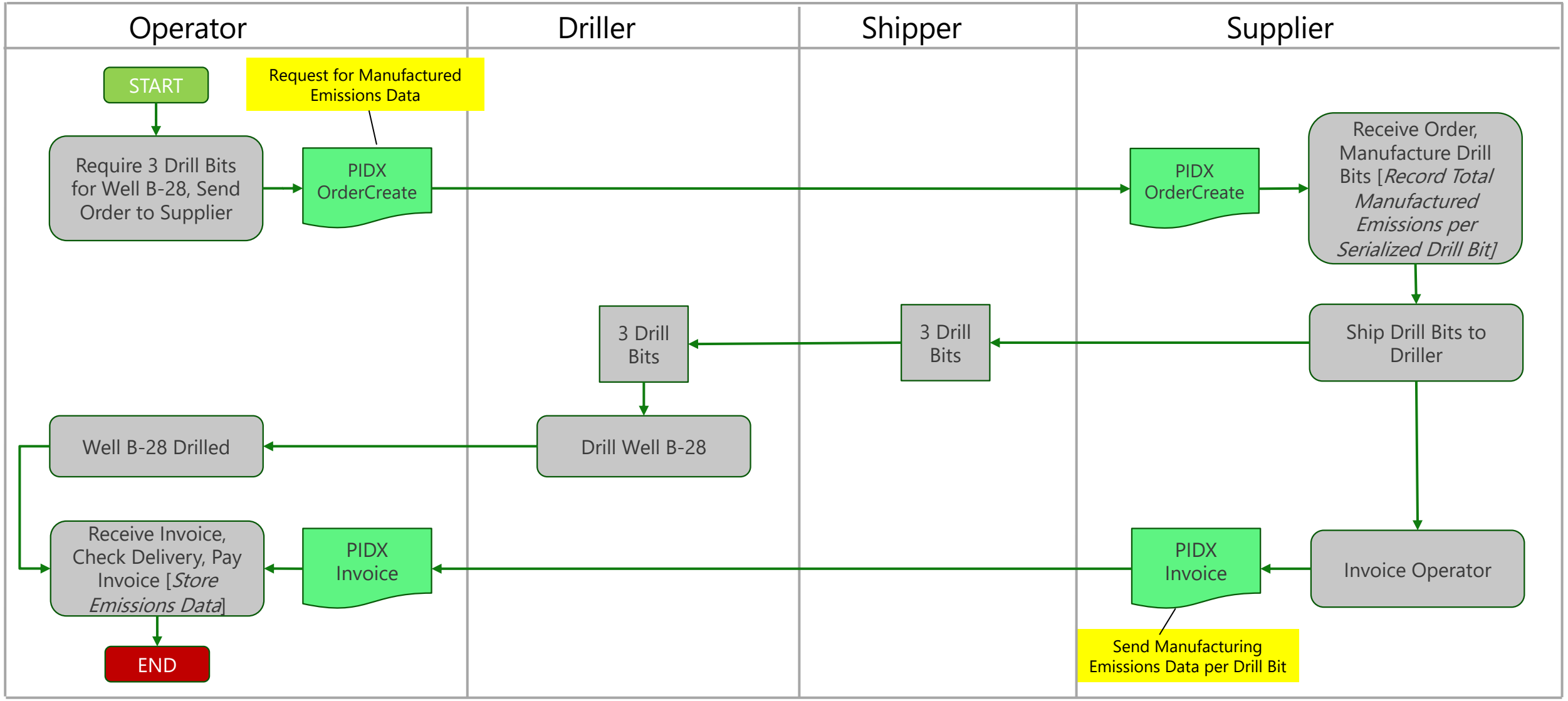
- Contractual Relationships
  - Operator is in contract with a Supplier for drill bits
  - Operator has a freight contract with Shipper
  - Operator has a drilling contract with Driller

- Business Need
  - Operator needs 3 drill bits from Supplier to be delivered by Shipper to the Driller
  - Driller uses 3 drill bits to drill a well in the NCS, well identifier is B-28

- ETDX Scope 3 Use Case 1
  - Supplier to provide Manufactured Emissions for the drill bits at the point of shipment (leaving Supplier's manufacturing plant)
  - Supplier to identify emissions by serial number for each drill bit supplied and pass that data to Operator on the Invoice at the line-item level
  - Identify any further emissions that the Operator needs to complete Scope 3 reporting



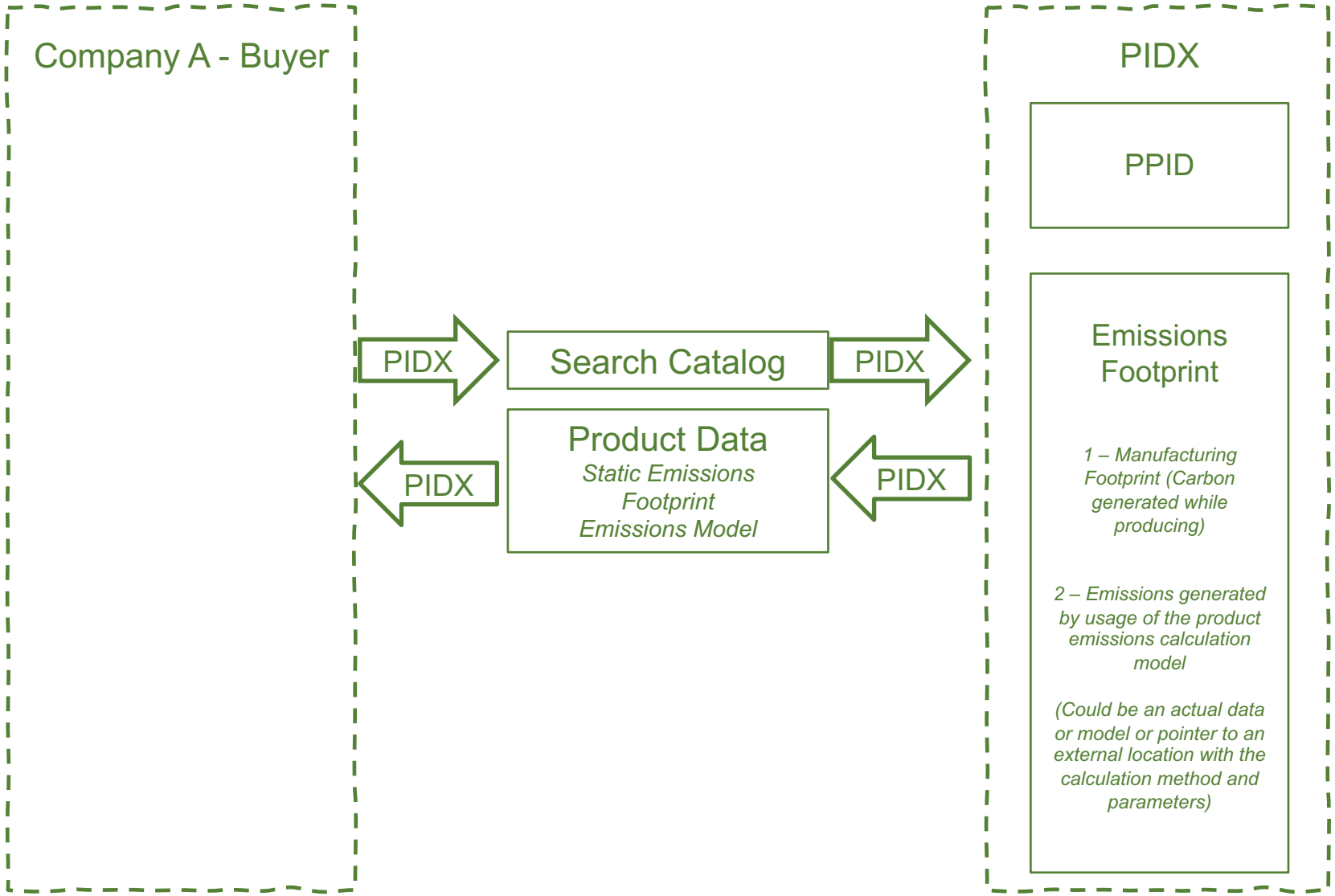
Business Process Dataflow Diagram



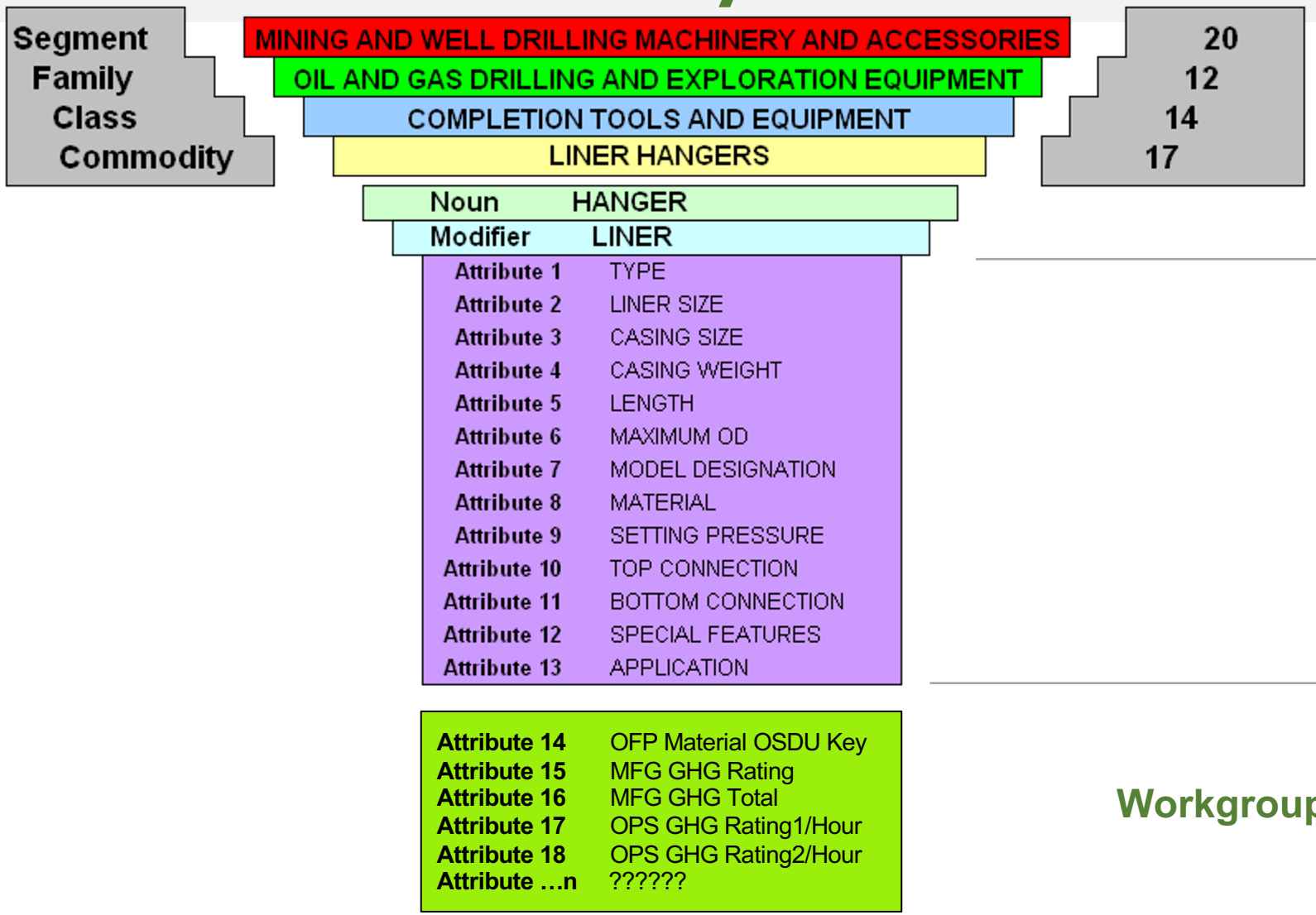
USE CASE 2
BUSINESS PROCESS
OVERVIEW

Using the industry data dictionaries in your supply chain services, one can query and select products based on emissions footprint

Use Case 2


Company A - Buyer
PIDX
Search Catalog
PIDX
PIDX
Product Data
Static Emissions Footprint
Emissions Model
PIDX
PIDX
PPID
Emissions Footprint
1 – Manufacturing Footprint (Carbon generated while producing)
2 – Emissions generated by usage of the product emissions calculation model
(Could be an actual data or model or pointer to an external location with the calculation method and parameters)

Petroleum Industry Data Dictionary



UNSPSC Code 20 12 14 17

PIDX PIDD HANGER:LINER

PIDX PIDD Detailed Attributes

Workgroup to extend PIDX PIDD for GHG

Supply Chain Schema Additions for Scope 3 Use Case 2

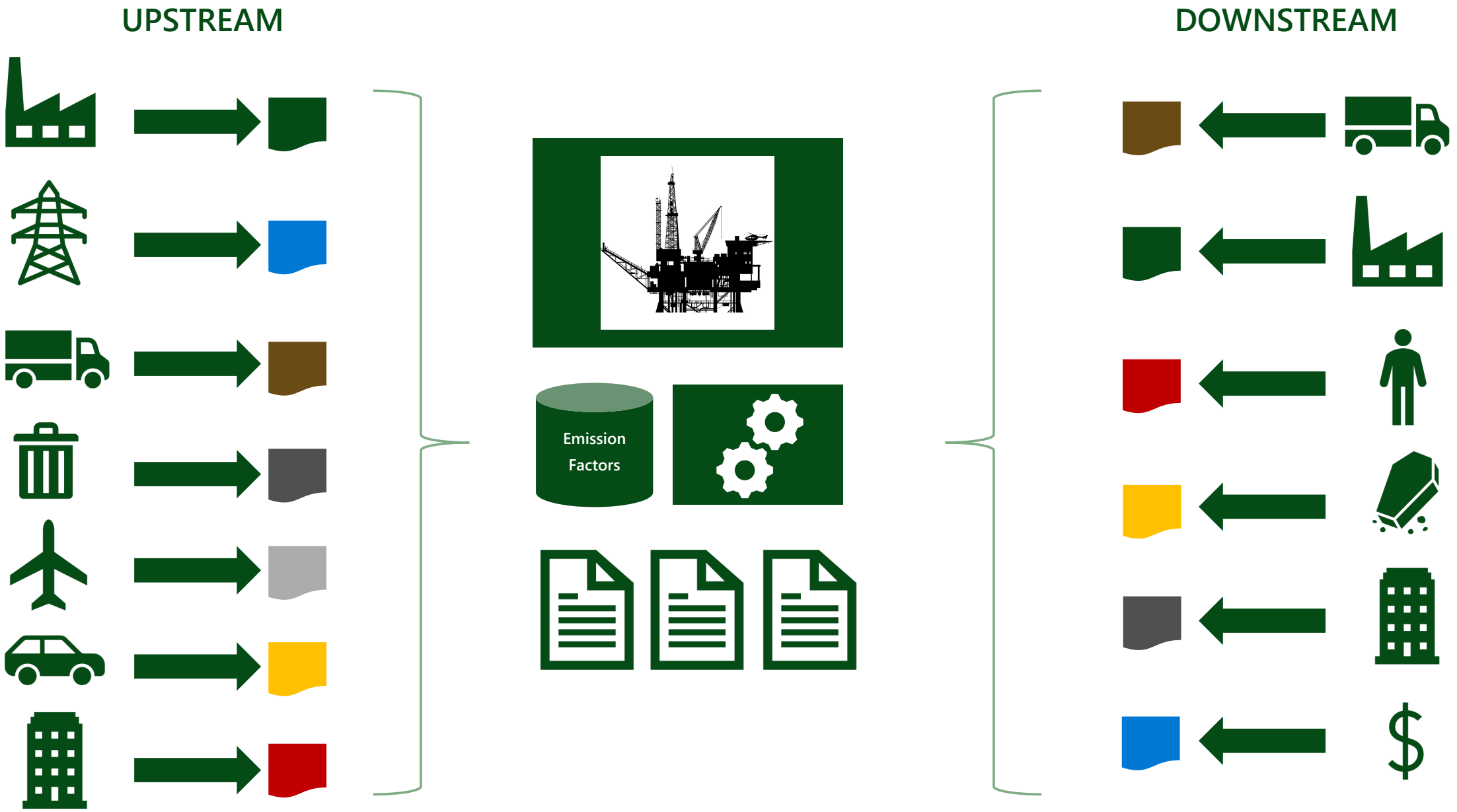
PIDX™ EMISSIONS TRANSPARENCY

Emissions Data for Products and Services (Scope 3 Category 1)

A#	Attribute	Unit	Notes / References
14	Product GHG Emission (cradle-to-gate)	kg CO_2e	Upon purchase of the product, this attribute is expected to become part of the purchasing company's upstream scope 3 emissions.
15	Operational GHG Emission	kg CO_2e / [time]	This attribute is a guide to the expected emissions in the use of the product. This could be a URL, provided for reference – detail of ranges, real case studies, etc.
16	Service GHG Emission	e.g., kg CO_2e / hour	This attribute expected for services. What are emissions for this service? Per day, per hour, per whatever unit the service is provided.
17	Emission Uncertainly	%	An estimate of how certain the company is of the value in Attribute #14 / #16
18	Emission Methodology	(unitless)	A description of/reference to the methodologies used to quantify emissions in Attribute #14 / #16, and a description of the data sources used (including emission factors and GWP values), e.g., AR5[1].

Where to go next – technology view

Scope 3 Emissions Data Flows



Demo – How Microsoft Calculates Scope 3 for Cloud Customers

Kadri Umay

Emissions Impact Dashboard

Microsoft Corporation

Power BI apps

★ 2.0 (16 AppSource ratings)

Pricing Free Get it now

Contoso (Demo)

Microsoft carbon emissions from my company cloud usage

Reflects activity through Jan 2021

Subscription name
All

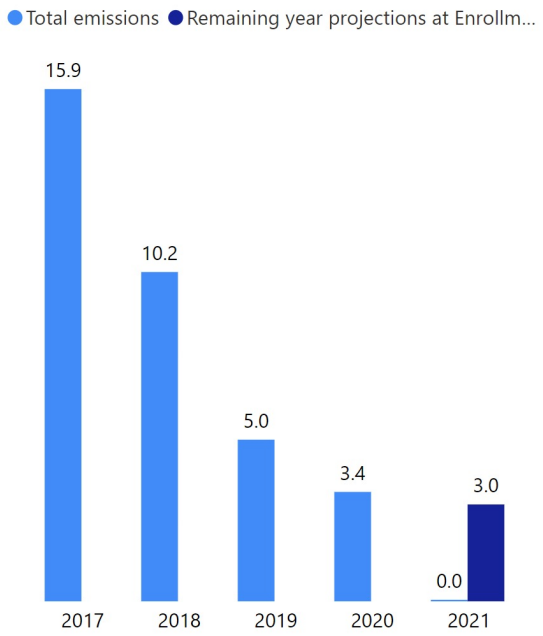
Azure service
All

Region
All

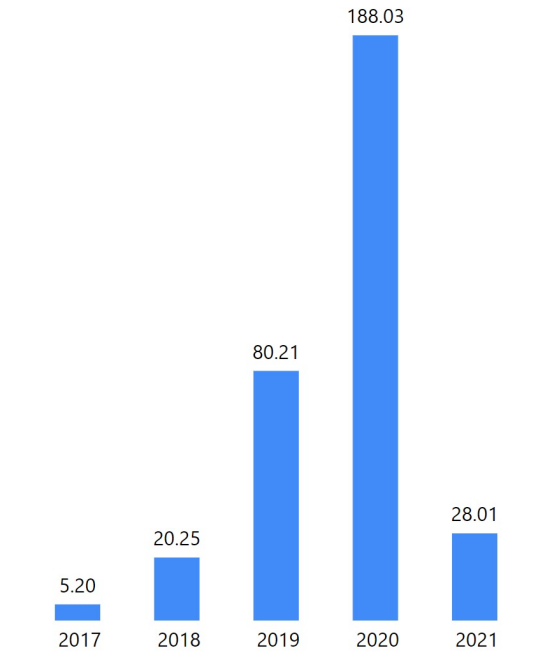
Year
All

Month
All

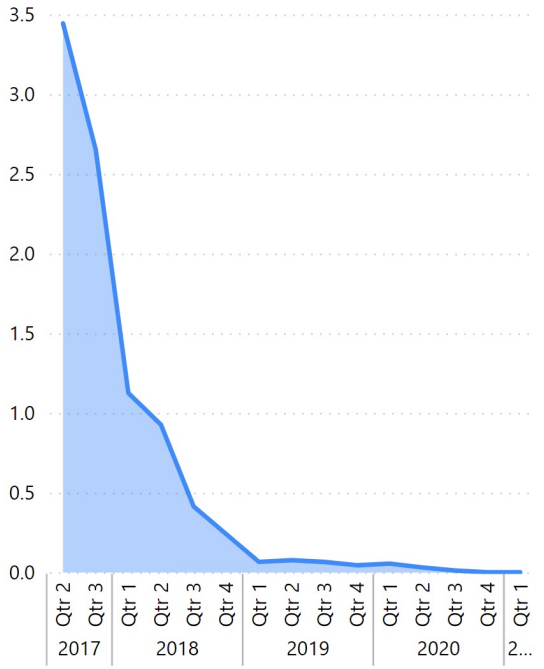
Microsoft carbon emissions from my company cloud usage : scope 1, 2 and 3 (MTCO2e)



My company Microsoft cloud usage



My company carbon intensity (MTCO2e/usage)



Carbon emissions (MTCO2e) for scopes 1, 2 and 3
34.48

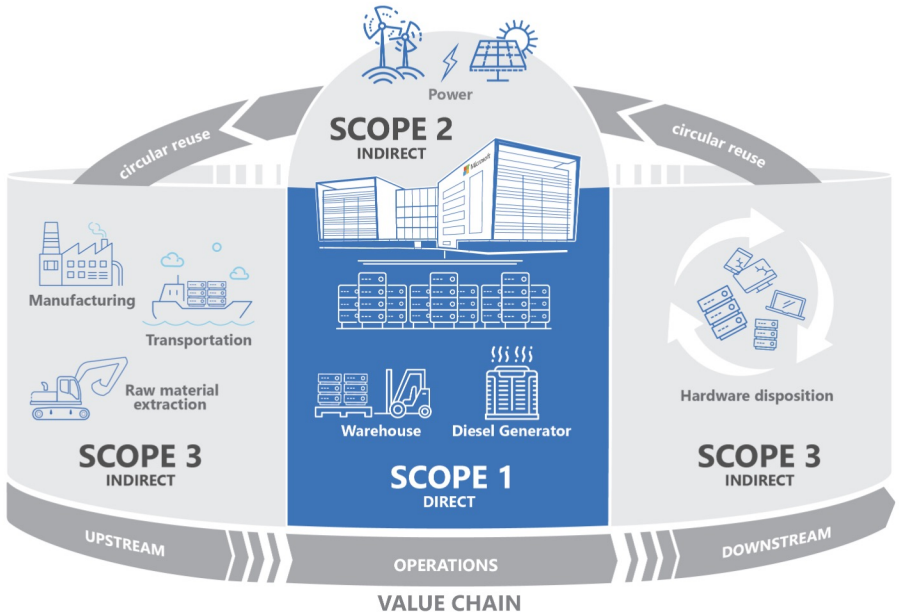
Carbon emissions (MTCO2e) for scopes 1 and 2
22.50

Projected end-of-year carbon emissions (MTCO2e)
3.04
▼ 100% compared to previous year

Carbon intensity (MTCO2e/usage)
0.1071701

Microsoft's cloud-carbon accounting practices

Basis for the calculation



Application:

This methodology is designed to calculate the carbon emissions associated with the use of Microsoft's Azure cloud computing resources. It covers Scope 1, 2, and 3 carbon emissions as calculated from manufacture, packaging, transportation, use, and end of life phases of data center hardware in all Microsoft owned and leased data centers. The emissions and usage measured by this methodology are for Microsoft's Azure cloud only.

Standards used for calculation:

1. At Microsoft, we segment our greenhouse gas (GHG) emissions into three categories consistent with the Greenhouse Gas Protocol, a globally recognized standard for the calculation methodology and reporting of Greenhouse Gas (GHG) emissions:
   a. Scope 1: Direct emissions – Emissions from stationary and mobile combustion, as well as process and fugitive emissions.
   b. Scope 2: Indirect emissions - Emissions from the consumption of electricity, heat, or steam.
   c. Scope 3: Other indirect emissions – Manufacturing phase and end-of-life emissions (supply chain related). The scope of this tool is scope 3 categories 1, 2, 4, 5, 9, and 12.
2. Material related carbon emissions are based on ISO 14067:2018. Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification.
3. Operational emissions are based on ISO 14064-1:2006. Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.
4. Verification and validation are based on ISO 14064-3:2006. Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions.

Scope 3

The calculation of scope 3 emissions is best summarized by Figure 3. We start with the Life Cycle evaluation of materials used in our data center infrastructure and calculate carbon emissions by data center. We then can segment this sum based on customer usage of each data center.

This methodology for Scope 3 emissions calculates the energy and carbon impacts for each data center over time, using the following:

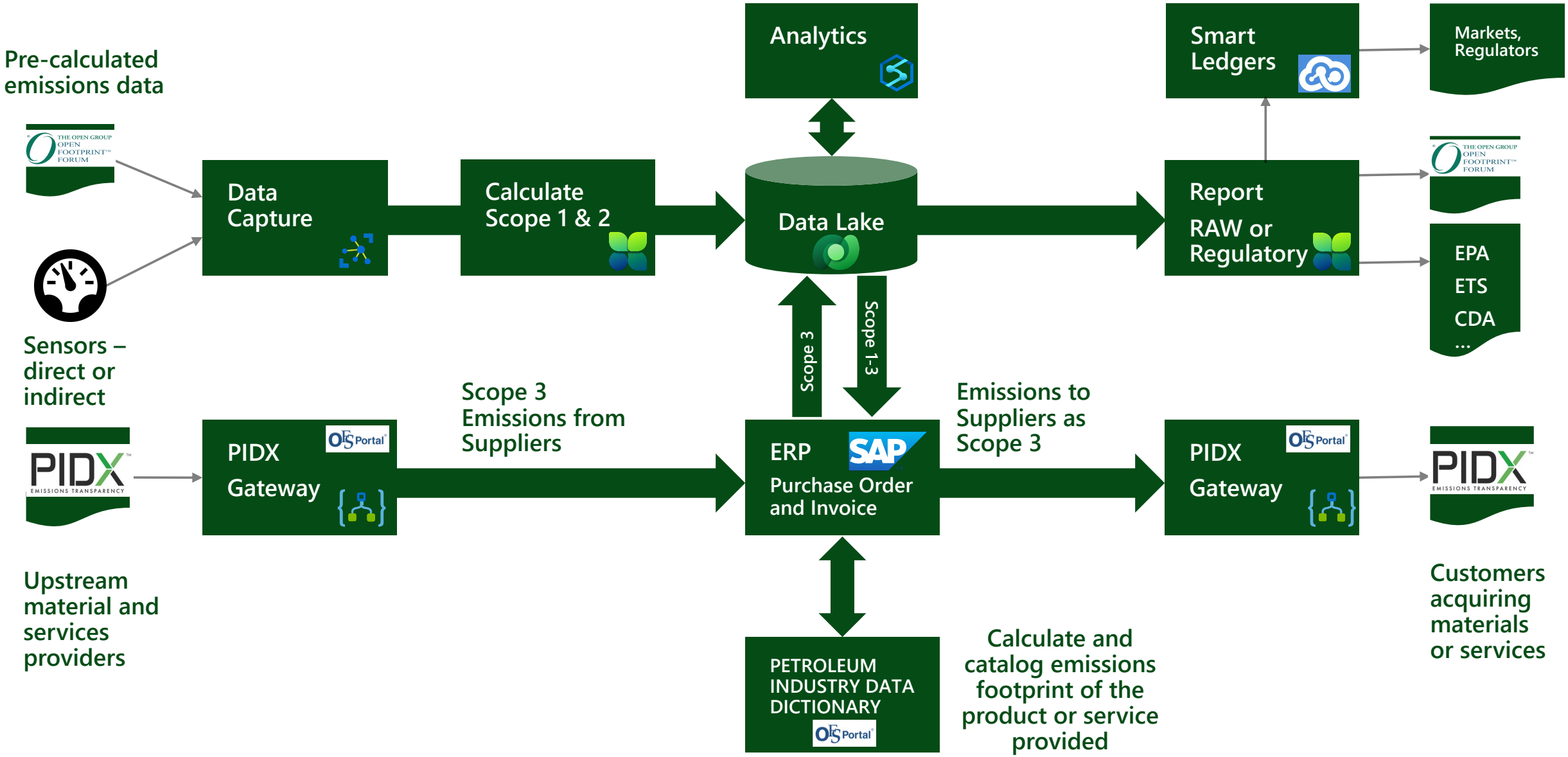
- Most common materials used to manufacture the IT infrastructure used in our data centers.
- Most common parts that make up cloud infrastructure (hard disks, FPGA, steel racks).
- Complete inventory of all the assets (as categorized by Microsoft Bill of Materials) in our data centers by region.
- Carbon factors for cloud infrastructure across life stages (raw material extraction, component aggregation, usage, and end-of-life disposal).

Calculation variables:

- Lifetime of equipment defaults to 6 years but users may change this variable based on end-of-life management options.
- Critical infrastructure, such as the data center facility, is not included in the methodology at this time but may be added as data becomes available.

Validation of our methodology is included in Azure's Scope 3 Methodology White Paper, published in 2021.

Technology Components for Emissions Management in Supply Chains



PIDX Sample Invoice Line Item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</pidx:InvoiceLineItem>
```

Join PIDX ETDX and let's make it happen together

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