…like barcodes for product CO2e declarations

Carbon-ML

CARBON REPORTING MARKUP LANGUAGE

Carbon-ML About Us

The Carbon-ML project is developing an open-source ecosystem to provide declarations of measurements for embodied carbon in any product or service.

Carbon-ML is incubated by Carbon Finance Labs in partnership with Oxy Low Carbon Ventures with a goal to evolve into an independently governed project.

Carbon Finance Labs

- A finance and technology incubator creating climate change solutions. Our impact comes from a global network of resources and knowledge built over decades spent in the carbon, finance and technology sectors.

OXY LOW CARBON VENTURES

- Oxy Low Carbon Ventures, LLC (OLCV), a subsidiary of Occidental, Petroleum

CARBON ML

The Problem: Measuring, Reporting, Tracking Embodied Carbon in Products is a mess.

Numerous measurements, policies, mandates, systems, etc. all designed to measure carbon emissions – but lack consistency between them

Carbon focus today is mainly at the Company, not the individual Product level

Currently, carbon embodied in making products remains hidden across supply chains

Problem: embodied CO2e Data = No Context

What you said:
"<Chips> have 20g of CO2e/Kg"

<Chips?>

What they heard:
"<Chips> have 20g of CO2e/Kg."

Which chips?
How Calculated?
How verified?
Who said that?
When was it said?

Telephone game problem:

Message intent & context is lost at each hand-off

- Manufacturer
- Distributor
- Customs Agent
- Retailer

CARBON ML

Today Context gets re-mapped at each handoff: structured data w/context could help

- Manufacturer
- Distributor
- Customs Agent
- Retailer

<Key, Value> pair can provide context for what is being tagged

<Foodchips,potato5667>
<Producer,Frito Lay>
<CO2e/KG,20 g>
<LCA Method,Cradle:gate *5074*>
<Verified by,Auditco llc>
<….,….>

CARBON ML

The Vision

Carbon data flowing between all product related system interactions while maintaining context.

Solution: an open-source global ecosystem:
An extensible schema using existing product taxonomies, enabling trusted and visible declarations of embodied carbon in every product at all points & actors across supply chains.

CARBON ML

The Goal: Make Embodied Carbon Data Sharing Easy

- An evolving ecosystem using an extensible schema to reference existing product taxonomies to declare measured embodied carbon (CO_2e) that is trusted and visible, open-source, adaptable for easy implementation, and technology agnostic.
- Empowered private and public sector actors producing and/or consuming trackable declarations of the embodied carbon for any product across supply chains.
- Embodied carbon information shown on product labels so that companies, consumers, suppliers, governments, etc. make better choices.

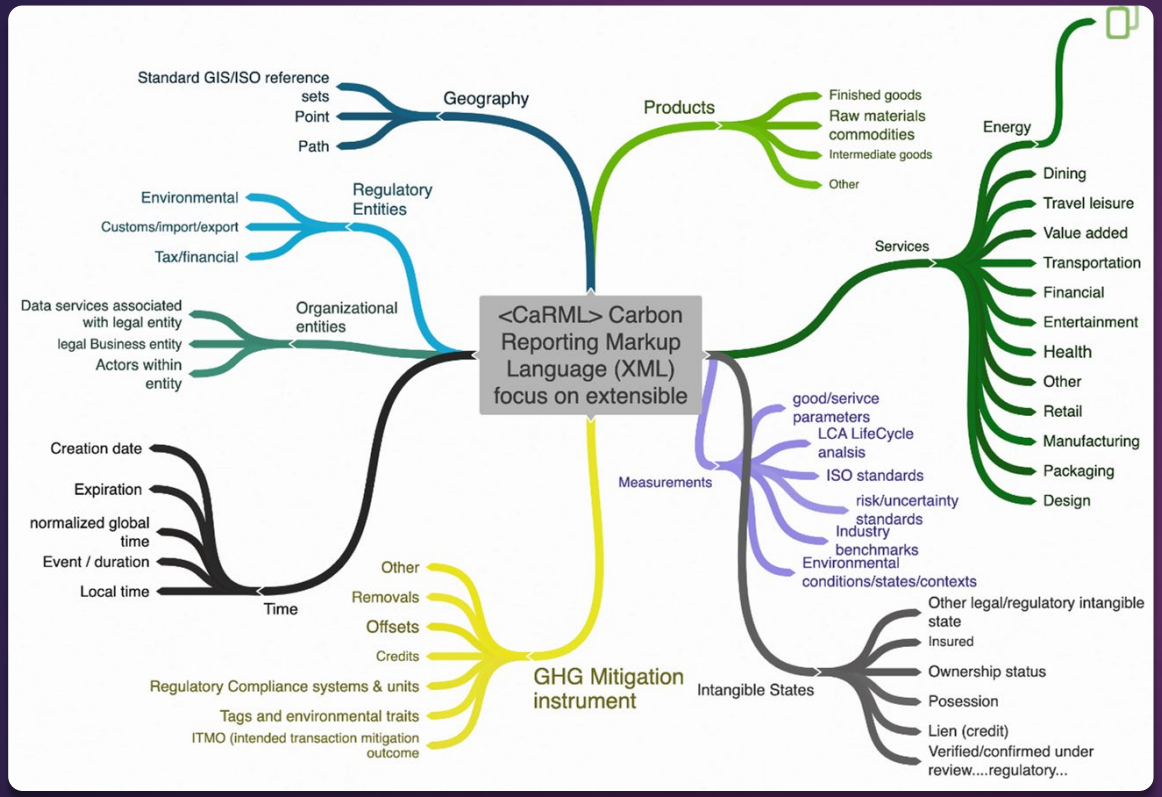
The Outcomes

Major Actor changes:	Products & Economic impact:	New behaviors:
• Corporate purchasing • Customer pressure • Government policy	• New goods & services • Growth in voluntary carbon market	• Better Understanding of embodied carbon • Conversations & trust • New Choices made

Carbon-ML Guiding Principles

- Carbon-ML combines declaring, measuring, tracking and tracing embodied carbon within any product with the development of an ecosystem using
  - an extensible schema and
  - underlying related taxonomies
  - open-source technical code;
  - Using principles from climate, product, sustainability, and technology taxonomies.
- A primary principle is ecosystem adaptability for local, regional, and country based norms.
  - And, for the evolving ecosystem's schema and taxonomies, as related ecosystems, products, supply chains evolve. Basically tracking and tracing embodied carbon at each branching point….for each tree as each branch changes.
- Other principles include non-proprietary (technology agnostic), language commonality, active collaboration with corporate / govts, standardized measure and metric use, and open and robust governance.

CARBON ML



Carbon-ML <CarML>

Ecosystem: Schema & Taxonomies

Schema = intelligent context

- Re-use data from other systems leading to faster integrations
- Repurpose existing schemas and data contexts
- Data retains value/context and is exchangeable between systems
- CO2e Data objects with context are shared and utilized to automat forms submissions & reporting
- Continual machine learning about changes in CO2e flows with contextual inference

CARBON ML

Context = tag & taxonomy

- XML **TAG** (eXtensible Markup Language)
  - Machine readible <Key, Value> pair associated with an attribute.
  - <GS1_food, twix_candy_bar123123987908>
- **Taxonomy** (structure, context)
  - Meta data tags to define things
  - Approved / recognized formally or informally. example GS1* =100m FMCG barcodes
  - Provides external context for "what" is being tagged.
  - <GS1_food, xxxx>, <GS1_soap, xxxx>, <GS1_beer, xxxx>

*GS1 is non-profit industry group maintaining product codes for 100 million FMCG (fast moving consumer goods)

CARBON ML

What is Carbon Reporting Markup Language <CarML>

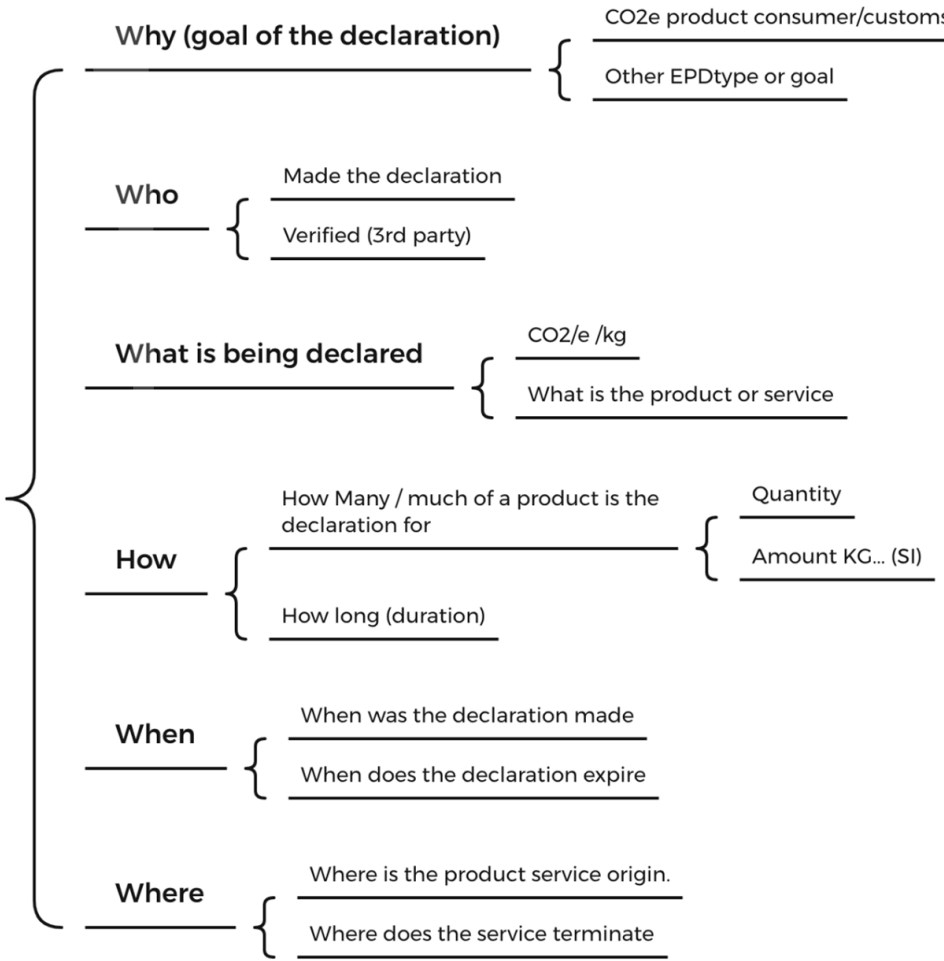
- CarML enables shared context for reporting embodied carbon data objects.
- CarML is open-source XML: standard for how product / service information about CO2e is created, processed, distributed, declared and shared.
- Useful for many product / service handoffs

	Business	Government	Machine	Consumer	Other
Business	B to B	B to G	B to M	B to C	B to Other
Government	G to B	G to G	G to M	G to C	G to Other
Machine	M to B	M to G	M to M	M to C	M to Other
Consumer	C to B	C to G	C to M	C to C	C to Other
Other	Other to B	Other to G	Other to M	Other to C	Other to Other

- <CarML> creates interactive / intelligent CO2e data
- Essentially a “Bar Code” for Embodied Carbon information for products/services

CARBON ML

Carbon-ML Ecosystem: Root Schema points to/uses Unique Taxonomies



Carbon-ML Ecosystem - Why declaration or state is made/updated

- Why the event (change in CO2e) happened (process description)
- Why carbon was added / altered
- Why a good or service was updated or changed
- Can include non-carbon add events:
  - Legal state changes/assignments
  - Logical changes/assignements
  - Examples: Duty paid, package certified, audit completed, auditor verified etc.

CARBON ML

Carbon-ML Ecosystem - Who (entity said / did a thing)

Declaring Carbon Related Fact(s)

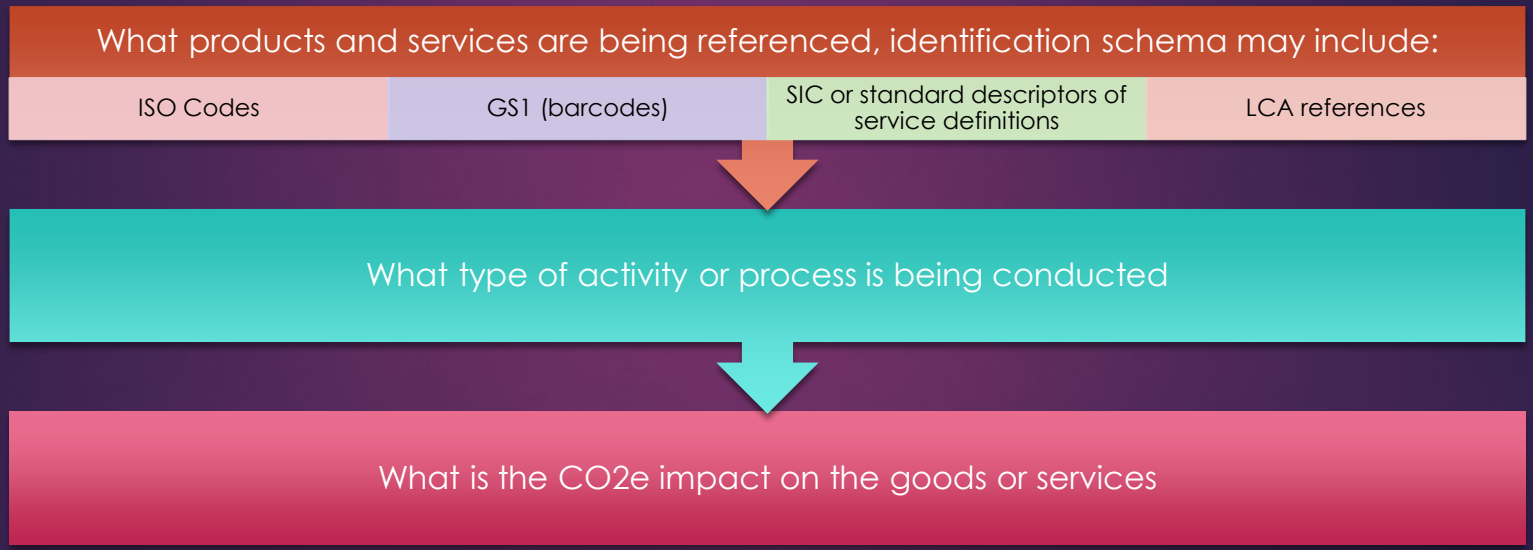
- Corporations
- Commodity producers
- Governments
- Regulators
- NGO's IGO
- Researchers
- Verifiers such as auditors

Ecosystem Roles

- Owners of a product or service
- Consumer of a product or service
- Procurement agents
- Carbon registrar or issuer
- Verifier or reviewer (entity)
- Product innovators
- Individual viewer or observer

CARBON ML

Carbon-ML Ecosystem - What impacts a CO2e declaration



Carbon-ML Ecosystem - How was this fact about CO2e assessed / derived

HOW DID A CARBON FACTOR CHANGE

WHAT WAS THE CO2e AMOUNT & LCA TYPE METHODOLOGY USED

MAY INCLUDE ASSIGNMENT OF OFFSETS/REMOVAL INSTRUMENTS TO PRODUCTS

CARBON ML

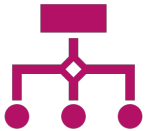
Carbon-ML Ecosystem - When a CO2e fact occurs or is declared

Point in Time event: ISO standard time convention

Relative elapsed time:

Relative to the location where something occurred,

As an absolute reference to an event.



Examples:

1. Process start, end, completion
2. Product event
3. Time of system and data entry update
4. Service initiation, completion
5. Product or process expiration
6. Credit remediation expiration

CARBON ML

Carbon-ML Ecosystem - Where did the activity occur

- Point or Service Route
- A point along the supply chain
- GIS/ISO standards for maps / geo locations

CARBON ML

<CarML>

Examples and Use Cases

Barcodes for product CO2e declarations

What we are talking about.

Product GS1 100m FMCG

How we measured CO2e.

LCA data taxonomy

Who declared /verified etc.

Reuters entity library

<CaRML> reference XSD w/ schema/Taxonomy pointers

Xml.1.0 <carml 0.1>

Key,Value

<Product GS1>,<12312319879087>
<LCA method>,<CandyBar>
<Corporate entity>,<12312Mars.inc>
<CO2e/ kg >,<540g/kg>

Manufacturer

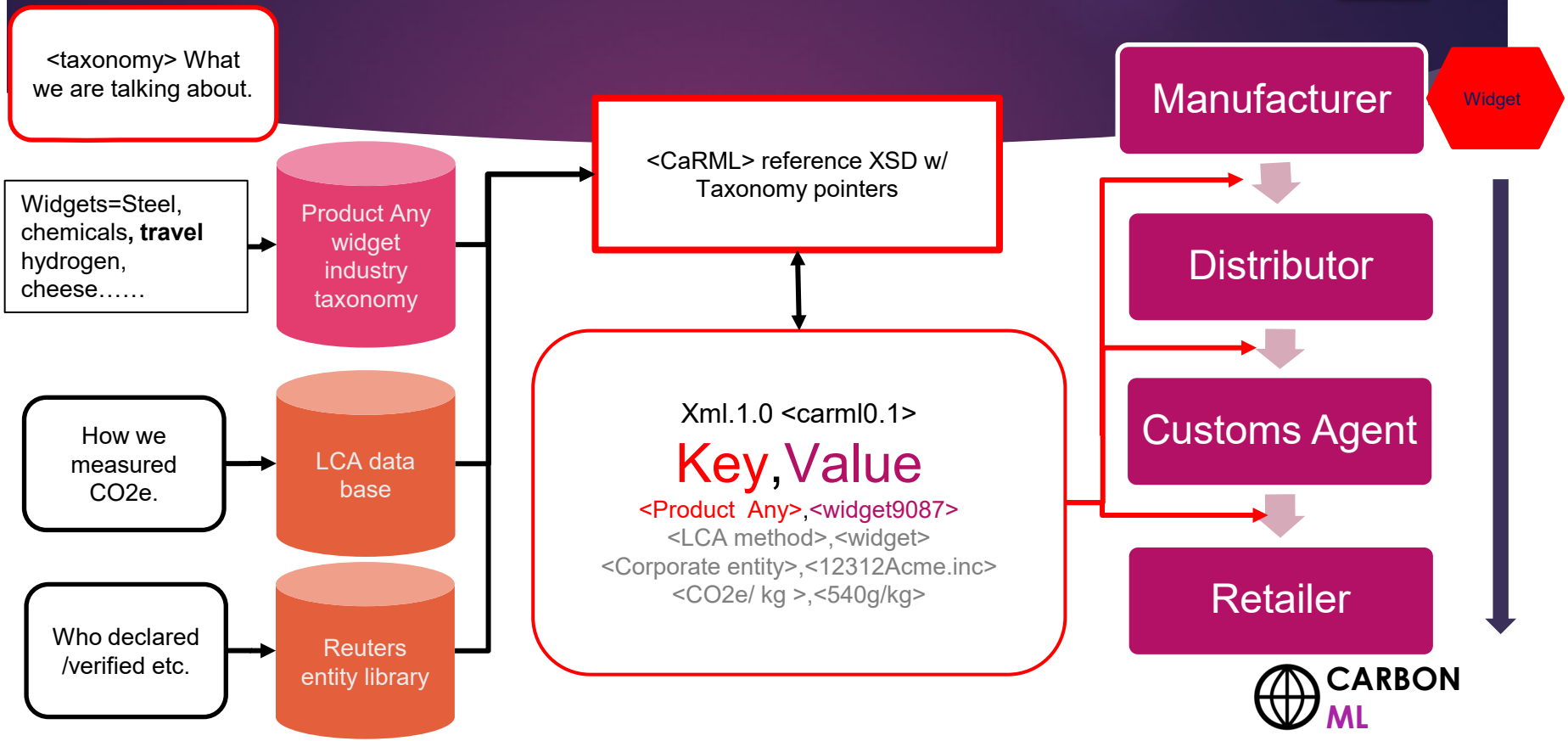
Distributor

Customs Agent

Retailer

CARBON ML

XML = Open Extensible Schema: any taxonomy



CARBON ML

Declared/Shared CO2e content needs Context(s) <Root_Schema,Taxonomy,Key,Value>

Root declaration	Schema(s) context	Key	Value data
What we are talking about	<GS1_FMCG_database>, <Fuels_industry_schema>, <plastics_industry>,<Metals_association>	<GS1_Food_item>	<Twix_bar_1023>
Who made the declaration, verification, attestation	<Reuters_entity>,<govt_XYX_lookup>, <insert_favorite>	<UK entity>	<Mars co. 502934>
How was CO2e measured LCA, LCI method	<Open_LCA>,<EU_regulatory_LCI>, <new_schama_metric_tool>	<food 10244 method>	<Cradle 2 gate>
How much CO2e was reports	<CaRML>,<other_reporting_EPC>, <ISO_schema>	<CO2e KG>	<0.015>
When did this occur	<ISO_Time_conventions>	<GMT>	<15:02:32>
Where did this occur	<ISO_GPS_location_convention>	<long,Lat>	<34.092,-118.328>
????	<Extensible_open_schema>		

Carbon-ML Use Cases

FMCG Labeling with GS1	International Trade / Customs & Border Agents	Materials / Supplies Purchasing Decisions	Financial Markets / Investment Decisions	Government and State Regulators
Carbon-ML supporting GS1 would allow for the "labelling" of approximately 100 million consumer products out of the box and be integrated w/ many inventory/supply chain systems.	Carbon-ML supporting international trade/customs and border agents, policies such as the EU Carbon Border Adjustment Mechanism (CBAM)	Carbon-ML supporting measurement & labeling of embodied carbon within a product or service at every point along the supply chain	Carbon-ML supporting financial markets investment decision making by providing more accurate tracing and tracking, and comparable representations of embodied carbon within products and services by companies.	Carbon-ML supporting Government and State regulators understanding of carbon related data, standardized data allows for better comparability and tracking of embodied carbon within products and services.
Processing managers can compare based on Carbon quality Consumers can make more informed decisions	More accurate and standardized assessment of reporting of embodied carbon in products in line with customs carbon border policies	Purchasing managers can make more informed procurement decisions Goods and services can be compared based on embodied carbon	Asset managers can make more informed decisions relating to portfolio carbon footprint Shareholders have greater understanding of corporate impact profile	Better assessment of procurement processes and service provider selections Better assessment of legislation, regulations, and enforcement

CARBON ML

Get Involved!

- To learn more about the Carbon-ML project, contact us at info@carbon-ml.org, and share:
  - Your interest:
    - Participate as Industry advisor
    - Participate from standards/taxonomy organization
    - Participate providing governance oversight
    - Participate providing technology expertise
    - Mailing list only
  - If you would like to participate, how would you like to contribute to Carbon-ML, what areas of expertise do you have, have you worked on a standards or taxonomy project before
  - What carbon data problem you would like to see solved

CARBON ML

Carbon-ML Core Team

Nick.Gogerty@carbonfinancelab.com

Jonathan.Hollander@carbonfinancelab.com

Lynn.Connolly@carbon-ml.org

info@carbon-ml.org

www.carbon-ml.org

Thank you!

Carbon-ML <CarML> Schema & Ecosystem Summary

- <CarML>: An open extensible markup language supporting a collection of new or **ideally existing schema** to ease structured machine communications and declarations about the carbon CO2e associated with all economic activities at the individual product and/or service level.
- The <CarML> extensible schema evolves by **using existing product taxonomies**, not being fully proscriptive of any one solution or interpretation.
- **<CarML> is transparent** providing machine readable CO2e data. This accelerates reporting across supply chains, creating awareness of carbon and enables efforts to reduce CO2e to create new higher valued products and services.
- There is no <CarML> schema terminal solution. <CarML> is extensible and designed for usability and extension such that **only part of the tool or tags needs implemention to get benefits.**
- Early <CarML> schemas will **be shaped from key industry and policy stakeholders** building on schemas and taxonomies in use by other industries and software solutions.
- **Non-proprietary.** No one should own a language.