



VIRTUAL DESIGN & CARBON

AN OPEN TOOL BUILDERS FORUM
WASHINGTON DC 2023

Quebec Government Office in New York joins the Quebec Wood Export Bureau

NAHB, September 28th, 2023



Sebastien Lanthier

Director of Economic Affairs

Québec

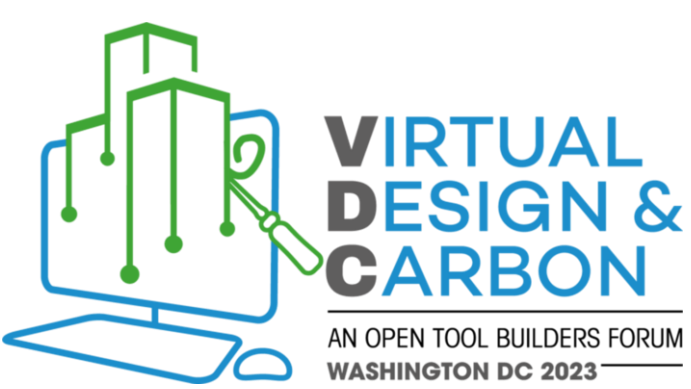
successful

Québec 

A GLOBAL NETWORK



34 government offices in 19 countries



Virtual Design and Carbon: Open Tool Builders Luncheon

Eli Gould

Product Manager: Offsite Wood Initiative

A Wood Construction Industry Initiative funded by the members of the regional nonprofit associations QWEB and BC Wood, along with support from Forestry Innovation Investment, Natural Resources Canada, MEI, MRNF, CNRC, and SHQ.

Custom presentation for Virtual Design & Carbon luncheon
Washington, DC

Objectives and Themes



Policy leadership examples

Big problems and disconnects

Open-sourced technologies with potential to connect

Can we begin to unify the 50 calculator tools being built?

What's the cutting edge tech now on transportation calculation, traceability of wood supplies, and an EPD generator for wood industries?

Can manufacturers host their own collaboration tools to work in multiplayer mode?

Advanced practice case studies in housing, industrial buildings, and a net zero workspace.

Networking coffee for offsite wood system fabricators, studio teams, and open tool builders.

A policy push example from California, (into infrastructure first, then buildings)



Buy Clean California Act

**BUY CLEAN
CALIFORNIA
PUBLISHES
EMBODIED
CARBON
LIMITS**

Eligible Material	Maximum Acceptable GWP Limit (unfabricated)
Hot-rolled structural steel sections	1.01 Metric Ton (MT) CO ₂ eq./MT
Hollow structural sections	1.71 MT CO ₂ eq./MT
Steel plate	1.49 MT CO ₂ eq./MT
Concrete reinforcing steel	0.89 MT CO ₂ eq./MT
Flat glass	1.43 MT CO ₂ eq./MT
Light-density mineral wool board insulation	3.33 kg CO ₂ eq./1 m ²
Heavy-density mineral wool board insulation	8.16 kg CO ₂ eq./1 m ²

The push of policy may start as a voluntary stretch and move to mandatory

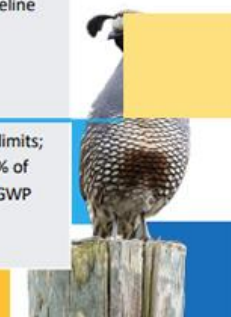


CARBON REDUCTION NONRESIDENTIAL PROPOSED MANDATORY MEASURES

The proposed mandatory measures are specific to nonresidential buildings > 100,000 sf commercial or > 50,000 sf schools.

1. REUSE- When reusing a building, maintain 45% of the existing structure and enclosure.
2. WBLCA Performance Path- For new buildings, conduct a cradle-to-grave whole building life cycle assessment demonstrating at 10% reduction in global warming potential (GWP).
3. Prescriptive Path - For new buildings, products shall comply with GWP values and environmental product declaration (EPD) shall be included on the construction documents. Based on 175% of IW-EPD GWP values (Buy Clean California Act) and 130% of ready-mixed concrete GWP values.

	Existing Voluntary	Mandatory 50,000 sf (project aggregate)	Tier 1 50,000 sf (project aggregate)	Tier 2 50,000 sf (project aggregate)
Building Reuse	75% of the structure and enclosure to be reused.	45% of structure and enclosure to be reused.	75% of the structure and enclosure to be reused.	75% of the structure and enclosure to be reused, AND 30% of interior non-structural elements to be reused.
WB LCA	10% reduction from baseline	10% reduction from baseline	15% reduction from baseline	20% from baseline
Prescriptive Approach	--	175% of IW-EPD GWP limits; concrete 130% of ready-mixed GWP values	150% of IW-EPD GWP limits; concrete 130% of ready-mixed GWP values	IW-EPD GWP limits; concrete 130% of ready-mixed GWP values



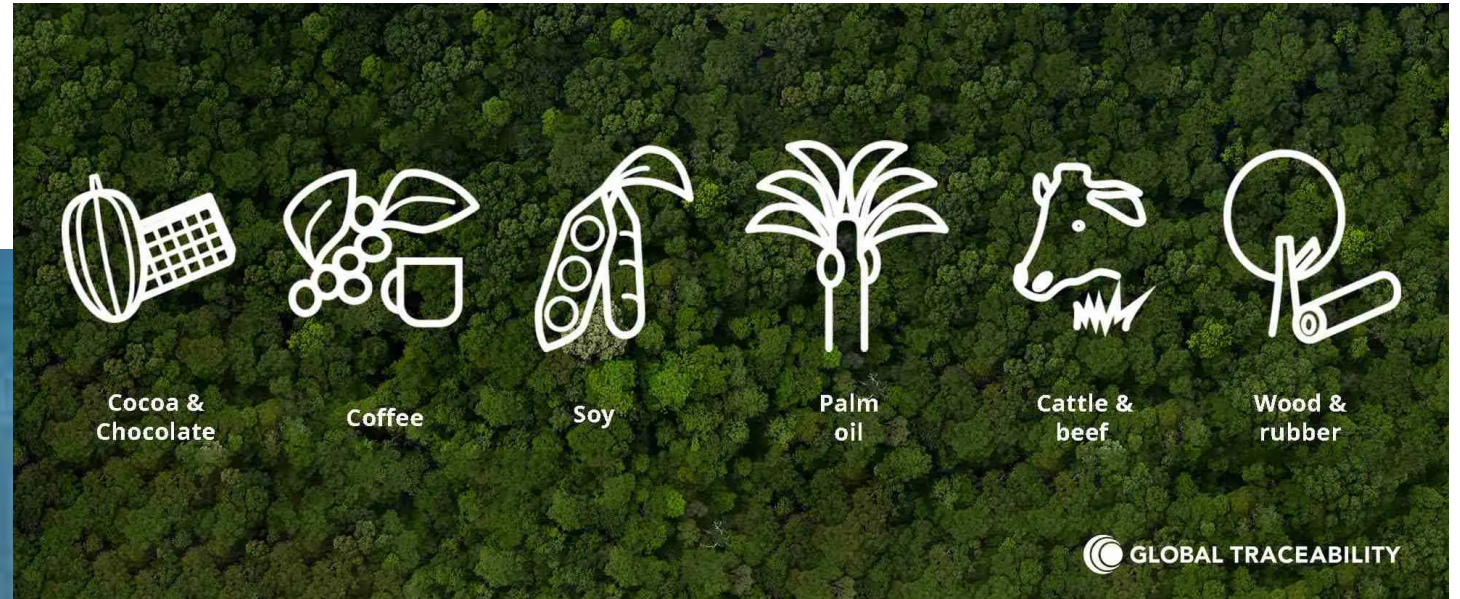
We also have a policy pull from Europe, into forest supply chain traceability. Copycat laws without clear means to report may follow....NY?



ESG Practice

INSIGHTS

THE EU DEFORESTATION REGULATION IS COMING SOON — WILL YOUR PRODUCTS BE DEFORESTATION-FREE?



...and a sobering context for active forestry in both Canada and the mountain west US



A sobering context for ethical forest products



Forest area

- Global: 3.9bn ha (30% of land area).
- Planted forests*: 271m ha (7% of forest area).

*Plantations plus the planted components of semi-natural forest.

Europe inc. Scandinavia

- Increasing forest resources.
- Removals below increment.
- Environmental/leisure issues a constraint.
- Wood fuel demand could improve economics for small forest owners.

Russia

- Holds 21% of world's growing stock inc. nearly 50% of world's softwood.
- Removals well below increment, but large areas are economically inaccessible.

Asia

- Highest rate of reforestation, led by China.
- Nearly 50% of world's planted forests. But huge and growing wood fibre deficit.
- Land and water constraints could limit future plantings.
- Scope to improve yield from existing plantations.

North America

- Stable forest resources.
- 18% of world's growing stock.
- Some scope to increase harvesting levels.
- Insect infestations in West will reduce future supply.

Southern Cone

- Highly productive plantations - nearly 10m ha.
- Highly competitive wood costs.
- Planted area could expand by up to 50% by 2020.

Amazon Basin & Congo Basin

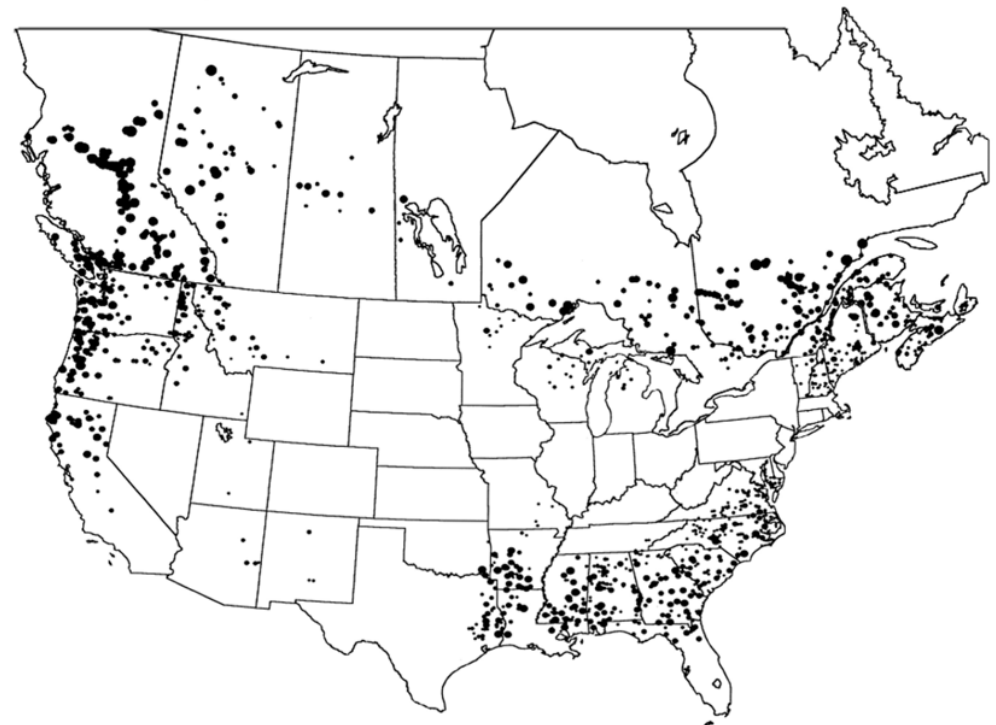
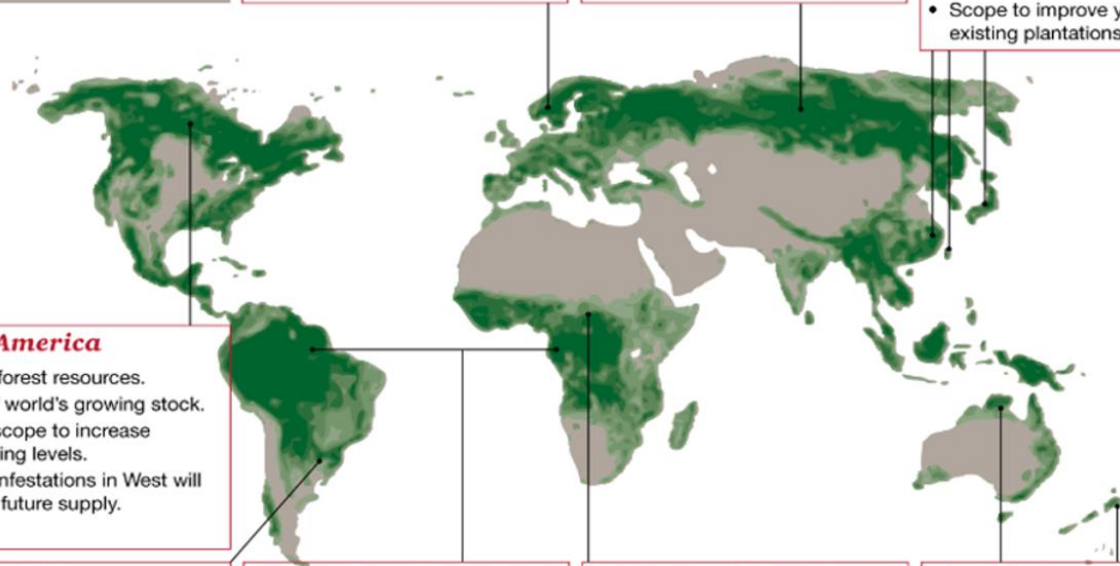
- Two largest areas of contiguous tropical forest.
- Over 30% of world's growing stock. Huge biodiversity.
- Sustainable removals are limited.

Africa (outside Congo Basin)

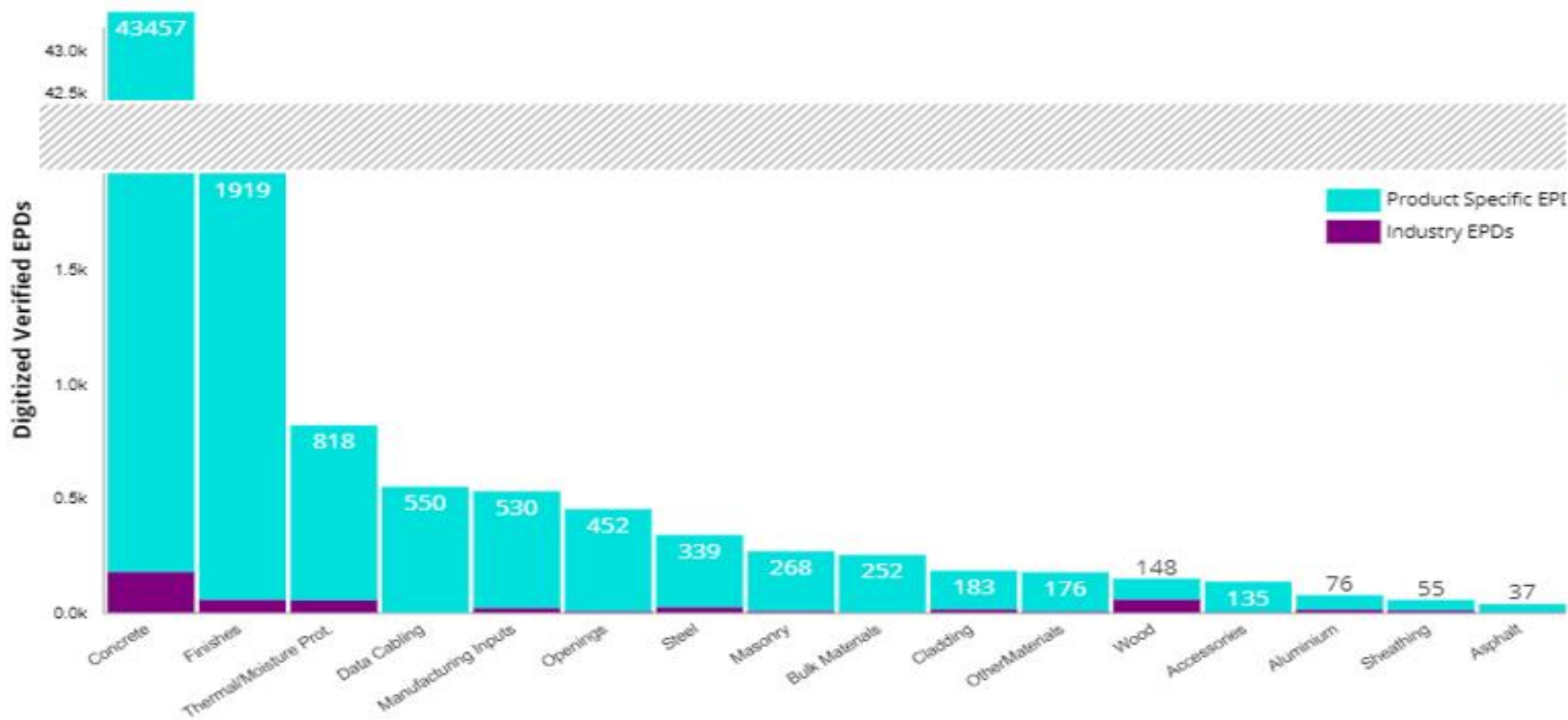
- Home to about 5% of world's growing stock.
- Deforestation continues.
- Outside South Africa, plantations are limited.
- Large land areas suitable for afforestation/reforestation but real potential is uncertain.

Australasia

- Some potential to expand supply from plantations - currently about 4m ha.



Meanwhile the creation of EPDs for wood transformation industries is far behind

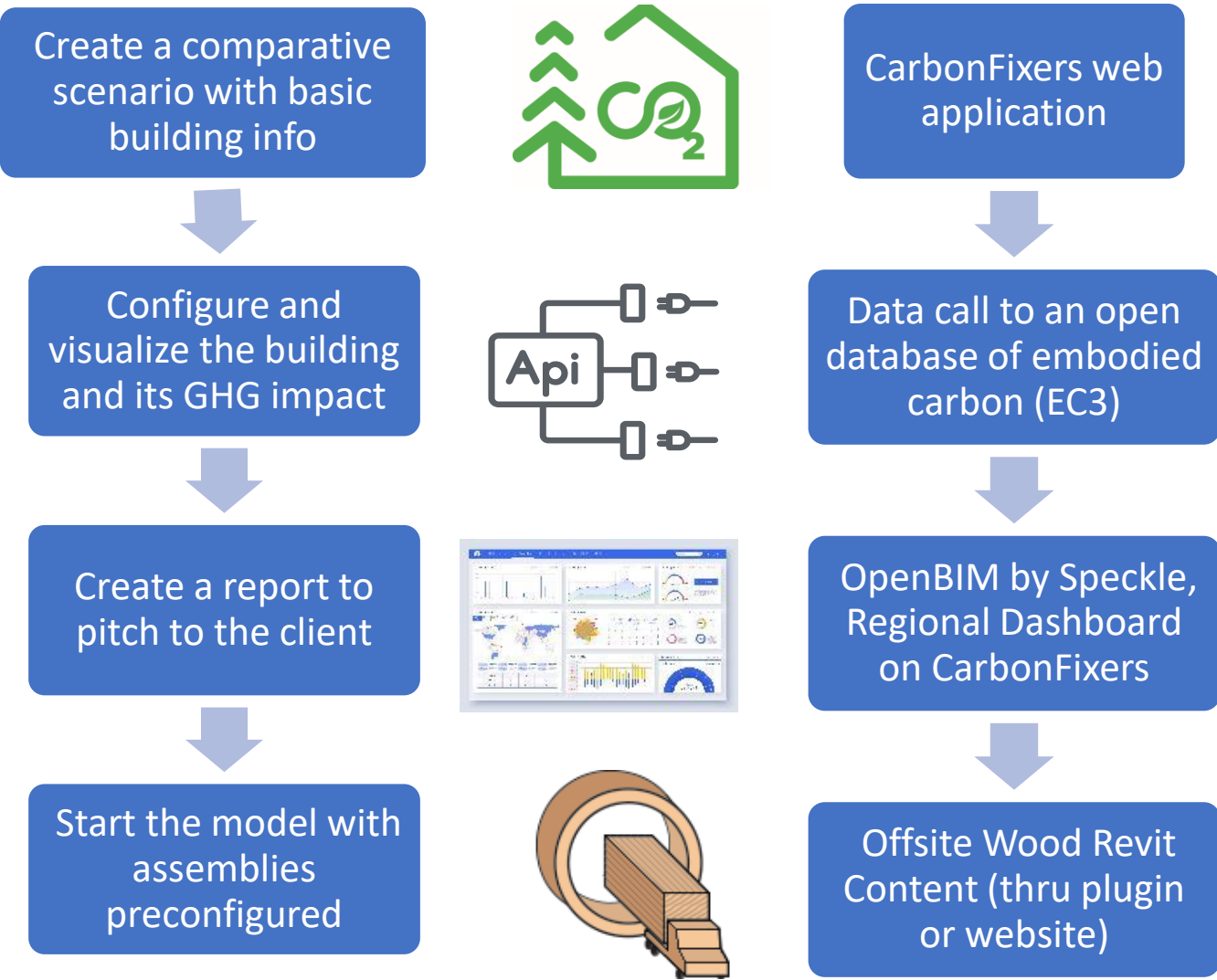


And behind the creation of EPDs lies the process of Product Category Rules (PCRs)

Intro by Anna Lasso

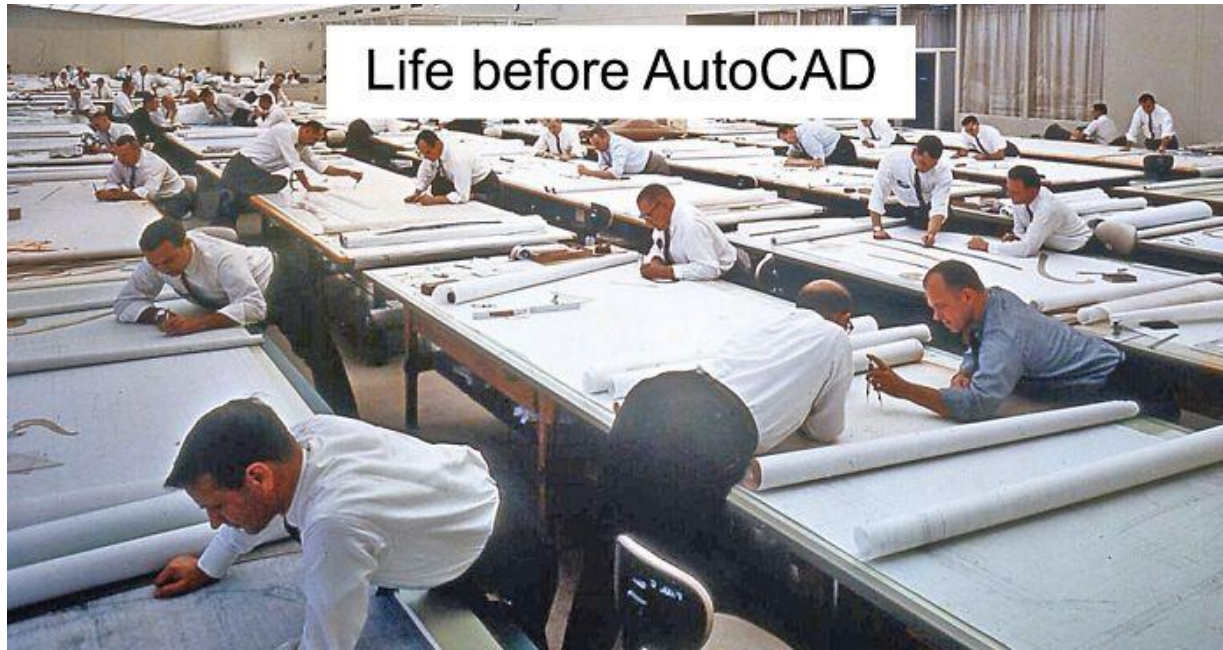


Canadian wood industry and public sectors sponsor suites of open-source tools designed to deliver in early phases



Product Manager: Eli Gould dba STIX .
BIM Content Creation Supervisor: RevitPure's Nicolas Catellier (Quebec City)
Family building teams in Quebec, BC, & USA.
Data science tools & OpenBIM server built by Brainpool, AI (Ontario, BC, & UK offices)
Structural Data Verification & Engineering: Mass Timber Consultants, Montreal.
Sustainability Data and Life Cycle Review: Groupe Ageco, Montreal & QC
EPD Generator project for wood industry with Canadian Wood Council & NRCAN
Traceability Platform Development
Forest-facing side by Incos
Client-facing diligence tools by Indufor

What is BIM (Building Information Modeling), and what isn't.



Life before AutoCAD



Life before BIM? Or are we still sketching?

Linked data for coordinated drawings is mostly what we ask of our BIM model.



The screenshot displays the Autodesk Revit 2021 interface. The top ribbon is set to 'Modify | Doors'. The Properties panel on the left shows the selected door's details:

- RP_DOOR_Simple (750mm x 2134mm)
- Level: LEVEL 1
- Sill Height: 0.0
- Door-Height: 2134.0
- Mark: 102
- Head Height: 2134.0

The central workspace shows a 2D elevation of the door with a vertical dimension line indicating a height of 2134. Below this, a 'DOOR SCHEDULE' table is visible:

<DOOR SCHEDULE>	
A	B
Mark	Height
102	2134

The right side of the interface shows a 3D perspective view of the door installed in a wall. Dimension lines in the 3D view indicate a width of 700.C and a height of 2134.C.

The art of making a fair comparison begins with the architect

Intro by Eric Ross



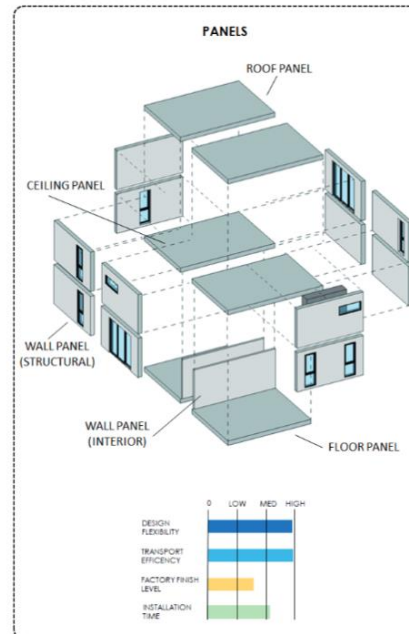
A regional leadership project, McDonough & Partners workspace for HITT, and the research behind it



The HITT leadership team has made material health a top priority for the design of the coLAB. As a team we have targeted all of the LEED v4 Materials and Resources Credits as well as Living Building Challenge Materials Petal certification. Through the project specifications we made Cradle to Cradle, Health Product Declarations, Forest Stewardship Council, and Declare products the basis of design. Products that do not meet any of these certification standards are evaluated against the LEED and LBC credit criteria before being accepted. The bidding and negotiation process benefitted from the advocacy of the HITT leadership in their dual roles of owner and contractor.

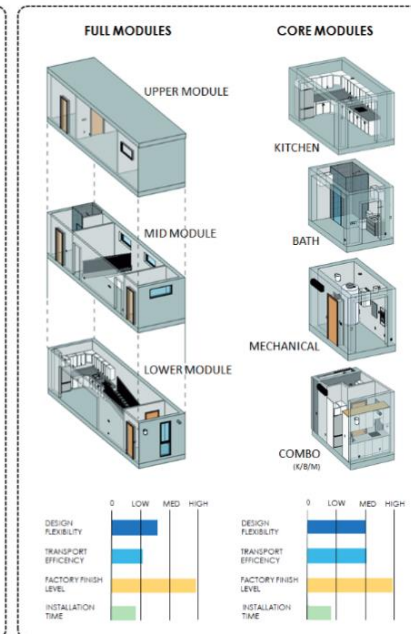
MATERIAL HEALTH

PLANT PANELS



© 2020 PlantFab, Inc.

PLANT MODULES



Note: Ceilings have been removed from Plant Modules for illustrative purposes only.

Adding to the cart of the architect, along four main shopping aisles



Mass Timber Columns/Beams
(Loadable Components)

Floor System Families
(Mass timber and EWP Framed)

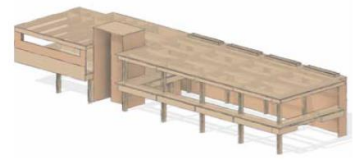
Custom Enclosure Families
(Wall and Roof Systems)

Volumetric Nested Families
(coming soon, previews today)

The screenshot displays a software interface with four distinct sections, each featuring an icon and a text description:

- Mass Timber Post and Beam**: Loads gluelam post and beam families based on user criteria within manufacturers' catalogs, with filters for material qualities, sustainability, fire resistance, and exact dimensions of laminations. The icon shows a T-shaped post and beam connection.
- Mass Timber Floors**: Creates Floor System families and materials based on user criteria within manufacturers' catalogs with filters for material qualities, sustainability, fire resistance, and exact dimensions of laminated assemblies. The icon shows a cross-section of a floor assembly.
- Light Wood Framed Enclosures**: Select Light Wood Frame Enclosure families based on user defined criteria with details, expertise, and specifications from available fabricators of offsite panelized structures. Data is built in to provide calculations of carbon benefits, sustainability metrics, and continuously improved content to optimize for offsite production. The icon shows a simple wooden frame enclosure.
- Volumetric Modular Assemblies**: This future stream will download open-source Modular and Volumetric Assembly example projects from a 2020 nonprofit initiative to prefabricate school and elder care additions in response to pandemic conditions. In the future we will offer a new stream to provide guidance to architects on how to optimize for modular design considerations. The icon shows three stacked modular units.

The art of making a fair comparison is becoming more nuanced with hybrid systems (Ross & Nordic example)



ALL HOLZ BUILD

'Cradle to Gate'
Global Warming
potential from Tally *

Wood Mass = 177 t
Total Mass = 177 t

184.5 mtCO₂eq

*Carbon uptake during
growth of wood -764.65
kgCO₂eq per 1 m³

+ 275.97 mtCO₂eq = +91.47 mtCO₂eq



HYBRID HOLZ AND STEEL

Wood Mass = 114 t
Steel Mass = 57 t
Total Mass = 171 t

178.7 mtCO₂eq

+ 177.74 mtCO₂eq = +0.95 mtCO₂eq



STEEL AND CONCRETE OPTION

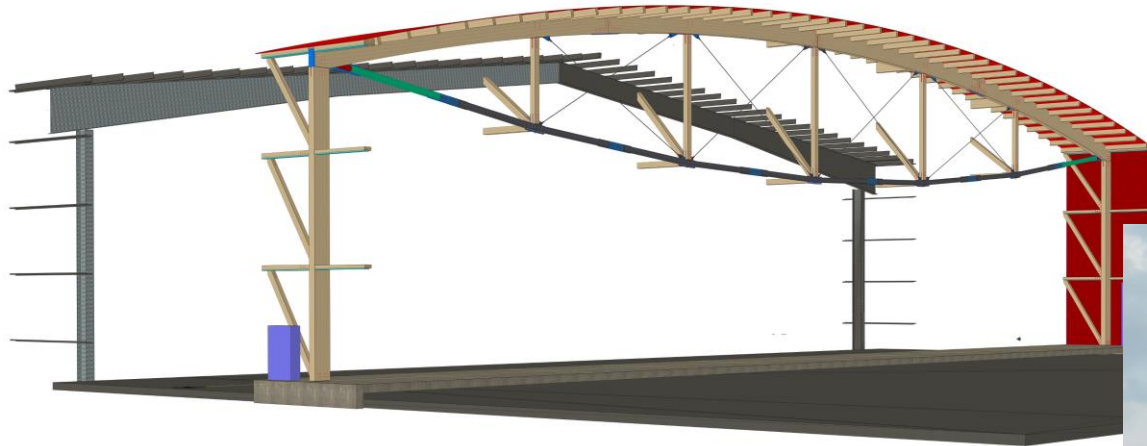
Wood Mass = 0 t
Steel Mass = 65.9 t
Conc. Mass = 419.2 t
Total Mass = 488 t

184.5 mtCO₂eq

+ 4.5 mtCO₂eq = -179.5 mtCO₂eq



The art of making a fair comparison with hybrid systems (Art Massif & Silver Maple example)



Results

Materials	Quantity	GHG emissions
Glued-laminated timber (Glulam) (QC)	28.7 m ³	3,413 kg CO ₂ eq.
Screw, nuts and bolts (QC)	432 kg	1,343 kg CO ₂ eq.
Steel plates (QC)	5,363 kg	12,710 kg CO ₂ eq.
Steel Tubular Section (HSS) (QC)	4.9 metric ton	9,962 kg CO ₂ eq.



www.offsitewood.org source of advanced families & support files: wood textures, details, and carbon integration pilots



Offsite Wood

Home

Get Help +

Download Content

Revit Plugin

Bring Life To Your Early-Phase Building Designs

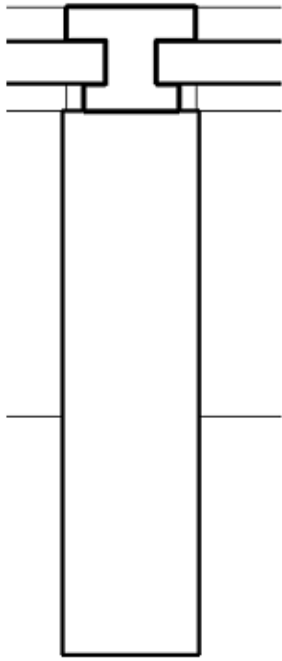
Offsite Wood is the cornerstone of a nonprofit BIM initiative to provide high quality, lean, and efficient content to designers and specifiers worldwide.

Get the plugin

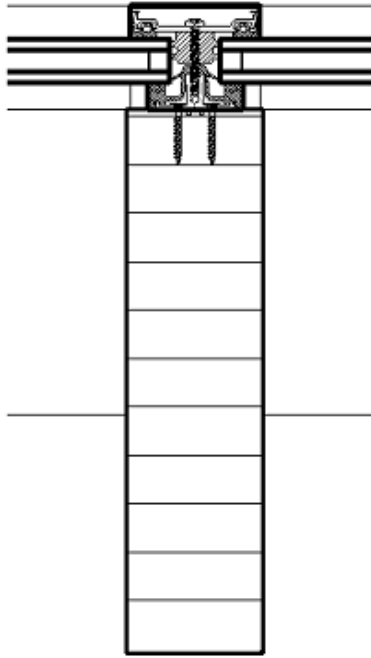
Download BIM Content



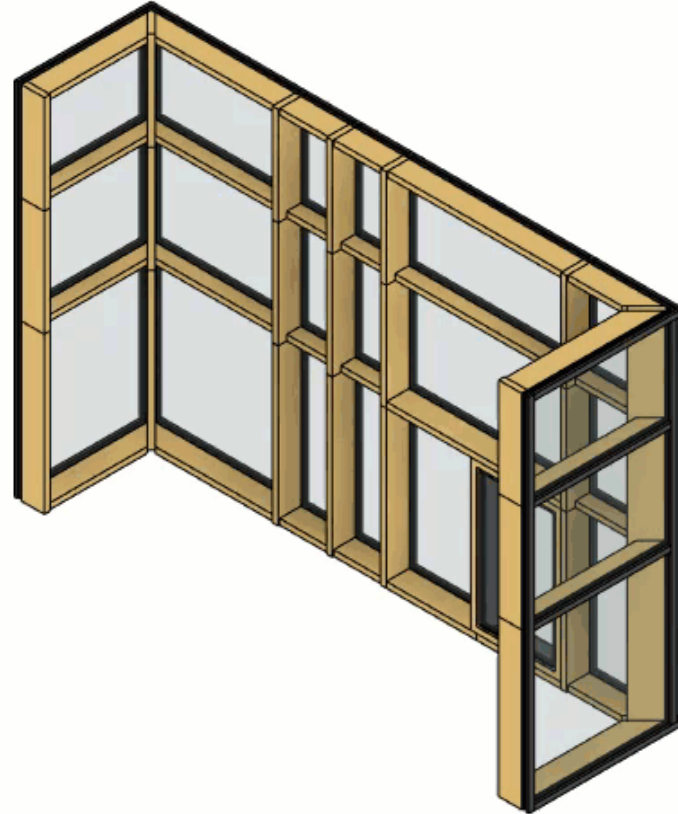
www.offsitewood.org example of sophisticated systems like timber curtainwall in a container file



LEVEL OF DETAIL: 










LEVEL OF DETAIL: 



Global Parameters

Search parameters

Parameter	Value	Formula
60D-Vertical Wood Depth	280.0	=
60T-Bottom Wood Depth	260.0	=
60T-Cap Depth	20.0	=
60T-Intermediate Wood De	200.0	=
60T-Top Wood Depth	260.0	=
60T-Vertical Wood Depth	280.0	=
80D-Bottom Wood Depth	280.0	=
80D-Cap Depth	20.0	=
80D-Intermediate Wood De	240.0	=
80D-Top Wood Depth	280.0	=
80D-Vertical Wood Depth	280.0	=
80T-Bottom Wood Depth	300.0	=
80T-Cap Depth	38.0	=
80T-Intermediate Wood De	200.0	=
80T-Top Wood Depth	300.0	=
80T-Vertical Wood Depth	320.0	=

[How do I manage global parameters?](#)

Can we simultaneously educate about a young industry, and ask for help to guide our R&D?

A screenshot of a 3D architectural software interface. The top toolbar contains icons for file operations, view manipulation, and settings. On the left, a 'Model structure' panel lists components: 'Mass Timber_Pliteq_Sand Bed1a', '3/8 Genie Mat FF', 'CLT Slab', 'Sand bed', 'Sleepers', 'Strapping', and 'Subfloor', each with a checkmark. The main view shows a 3D cutaway of a floor assembly with a thick CLT slab on top, a sand bed, sleepers, and a subfloor. A compass rose is in the top right of the view area.

Model structure

Search in model structure...

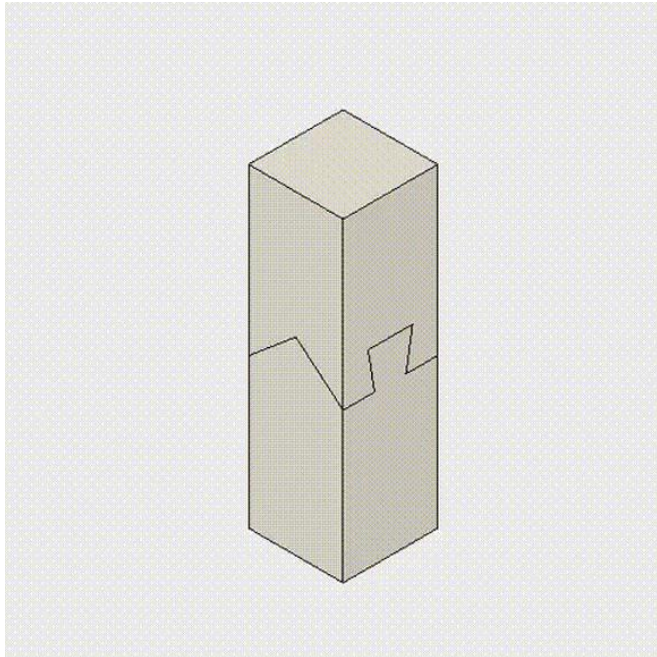
- ✓ Mass Timber_Pliteq_Sand Bed1a
- > 3/8 Genie Mat FF
- > CLT Slab
- > Sand bed
- > Sleepers
- > Strapping
- > Subfloor



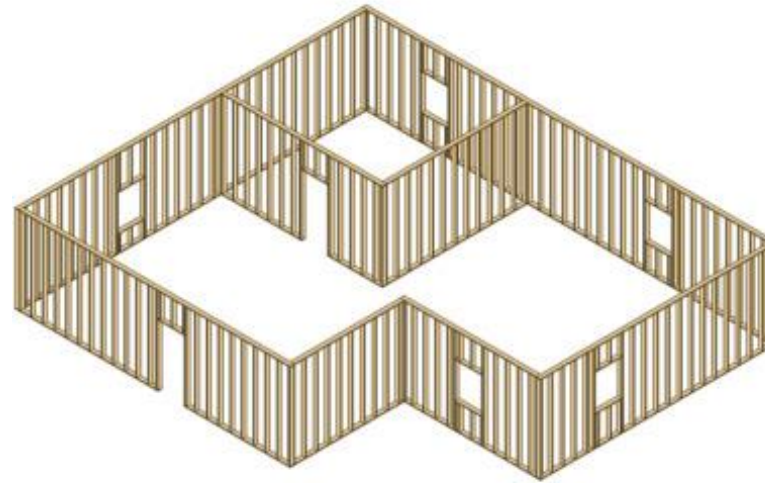
Downstream community #1: wood joinery and framing applications used by fabricators



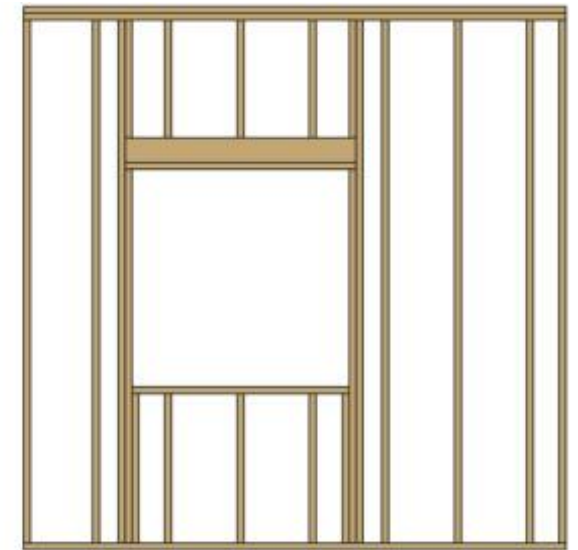
(Note on DfMA & DfMAD)



Credit: @the_JoineryJP



(a)



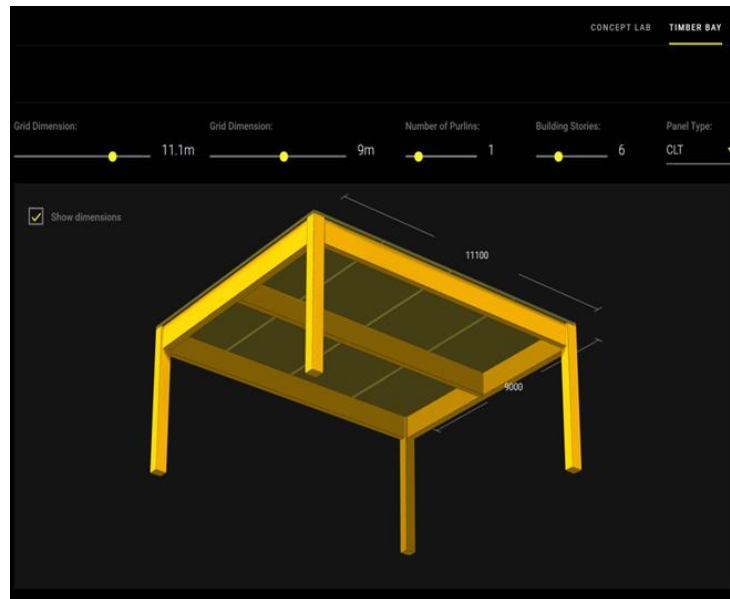
(b)

Credit: ScienceDirect.com

Downstream expert community #2: Engineers (especially builders of open sourced parametric modellers).

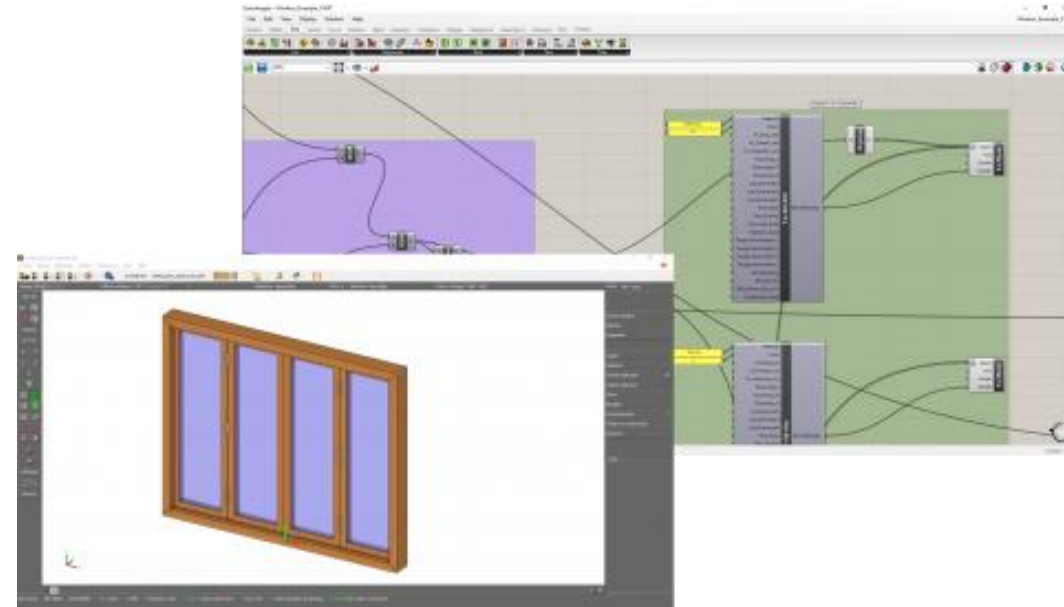


Graphical scripting with
Grasshopper & Rhino



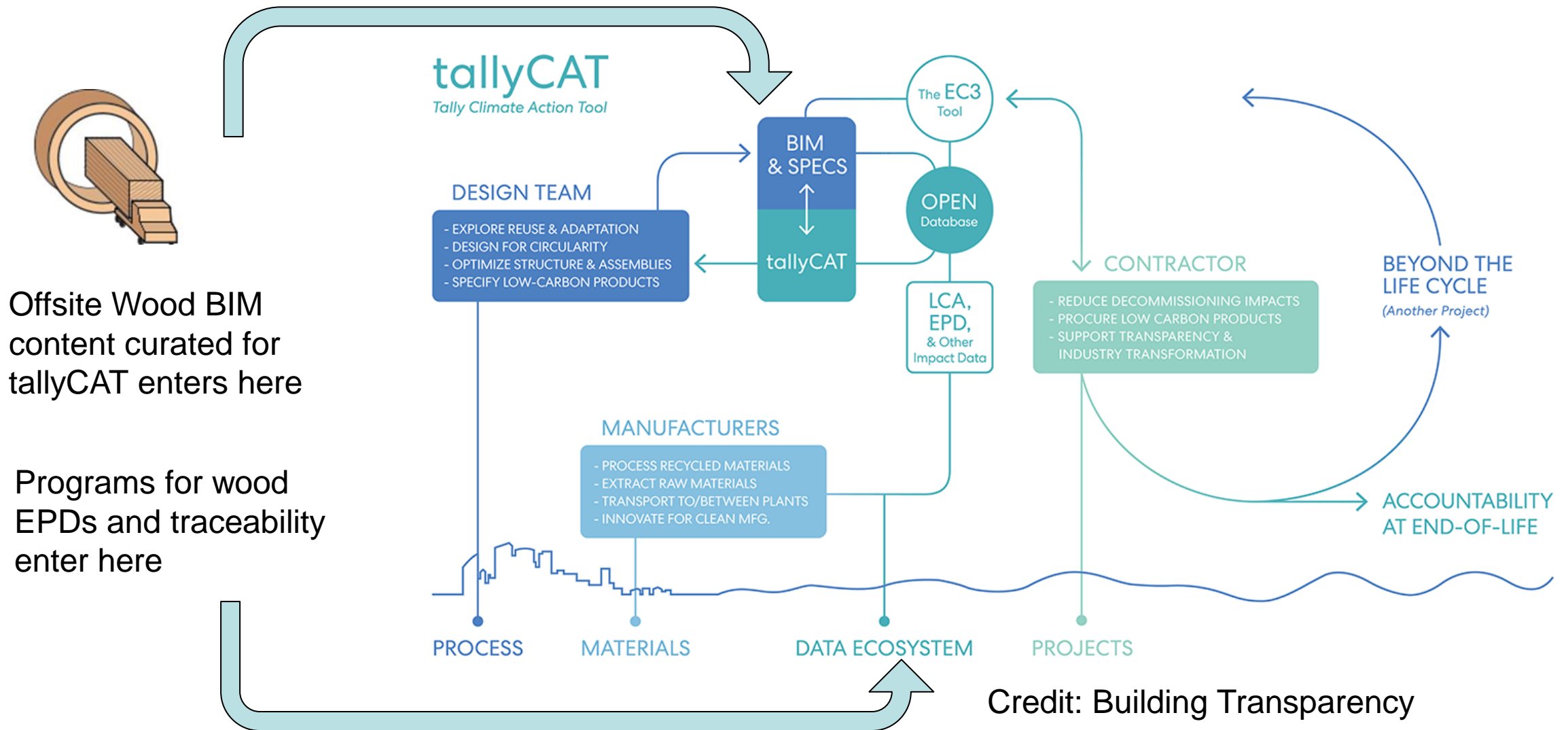
Credit: Fast & Epp
"Timber Bay Design Tool"

Rhino can now run
inside of CAD/CAM too

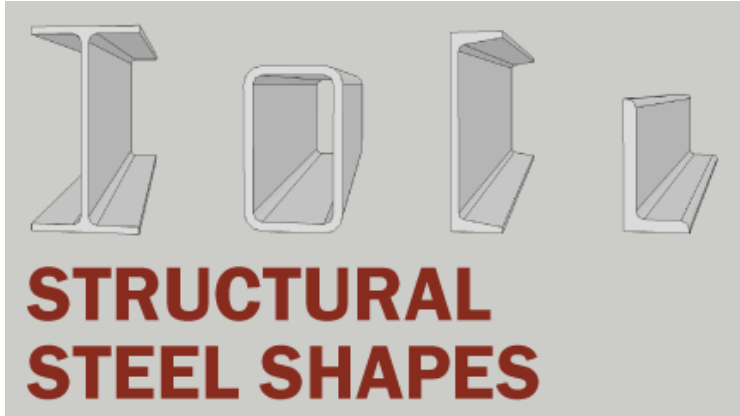


Credit: Food4Rhino

Downstream expert community #3: Life Cycle Analysis plugins (eg TallyCAT)

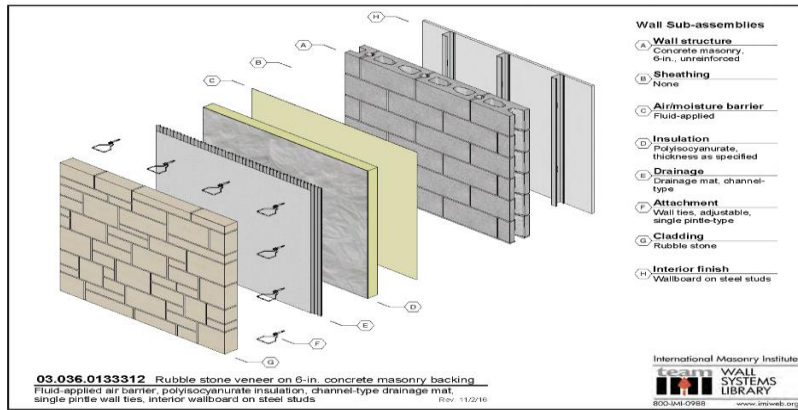


Are catalogs obsolete? Not yet!

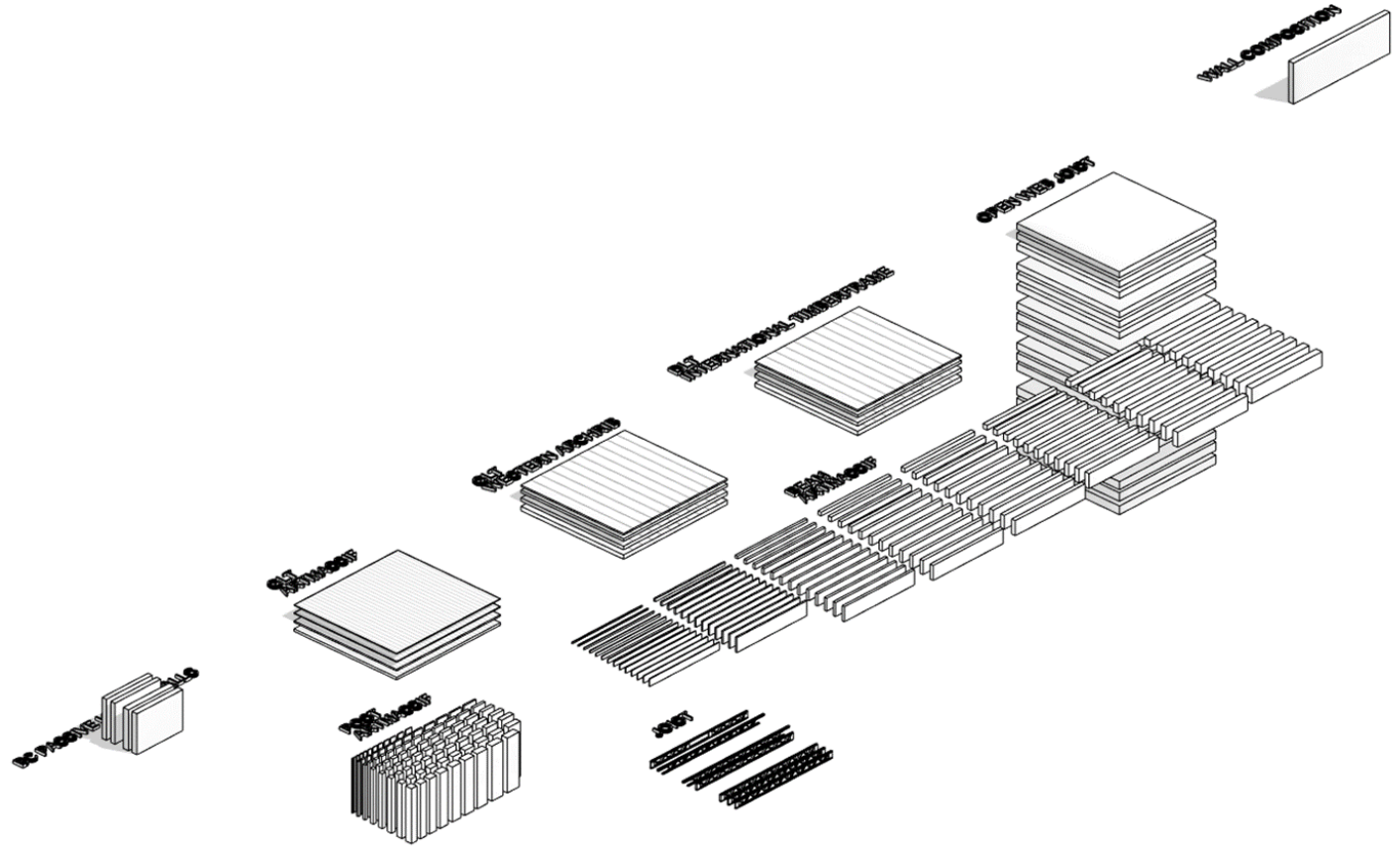


STRUCTURAL STEEL SHAPES

Credit: ArchToolBox



Credit: International Masonry Institute



Wood System Families by
Offsite Wood initiative

Example 1 of industry consent vs the limits of digital technology

(CLT slab limits)



Credit: Nordic Structures

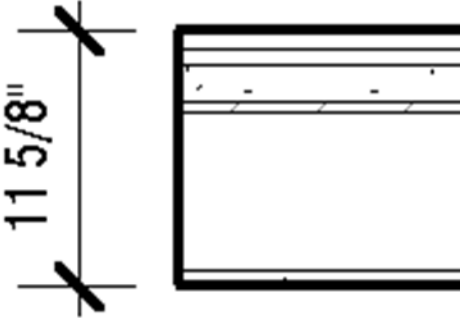
Example 2 of industry consent vs the limits of digital technology

(Building physics)



Analytical Properties	
Heat Transfer Coefficient (U)	0.1790 W/(m ² ·K)
Thermal Resistance (R)	31.7293 (h·ft ² ·°F)/BTU
Thermal Mass	8.79 kJ/K

BC PASSIVE HOUSE
WALL COMP 2



Credit: BC housing.org

Wood Fiber Insulation

Information

Properties

Transmits Light

Behavior: Isotropic

Thermal Conductivity: 0.0231 btu/(hr·ft·°F)

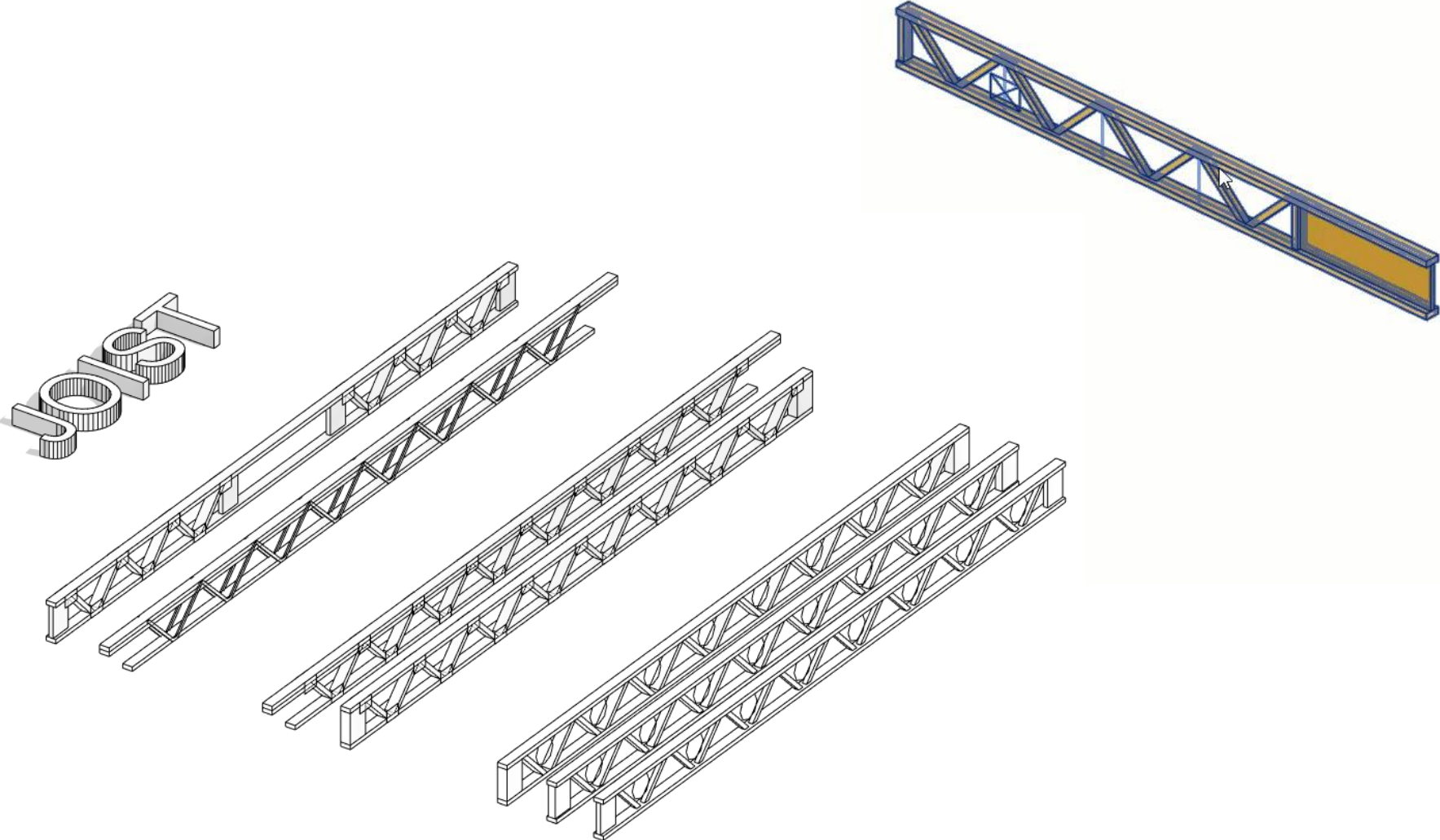
Specific Heat: 0.2388 btu/(lb·°F)

Density: 31.21 pound per cubic foot

Emissivity: 0.90

Example 2 of industry consent vs the limits of digital technology

(EWP Joists and EPDs)



Credit: Triforce by Structures Barrette

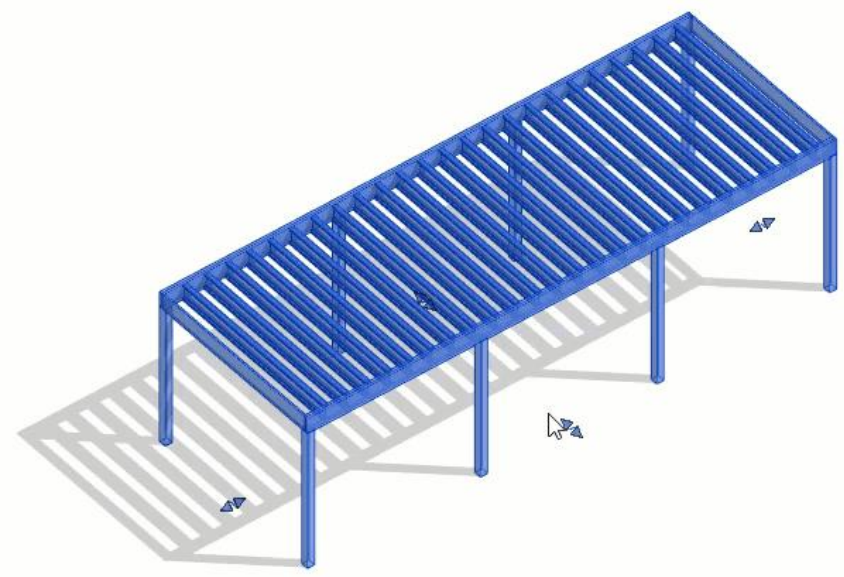
Increasing sophistication: nested families with both eastern and western regional variation: joist, rim, girders, & columns.



< Generic Model Material Takeoff >			
A	B	C	D
Material: Name	Material: Area	Material: Volume	Mark
RP-Wood	346 SF	13.21 CF	MOD1
Oriented Strand Board	322 SF	4.83 CF	MOD1
LSL	59 SF	2.77 CF	MOD1
Laminated Veneer Lumber	183 SF	11.55 CF	MOD1

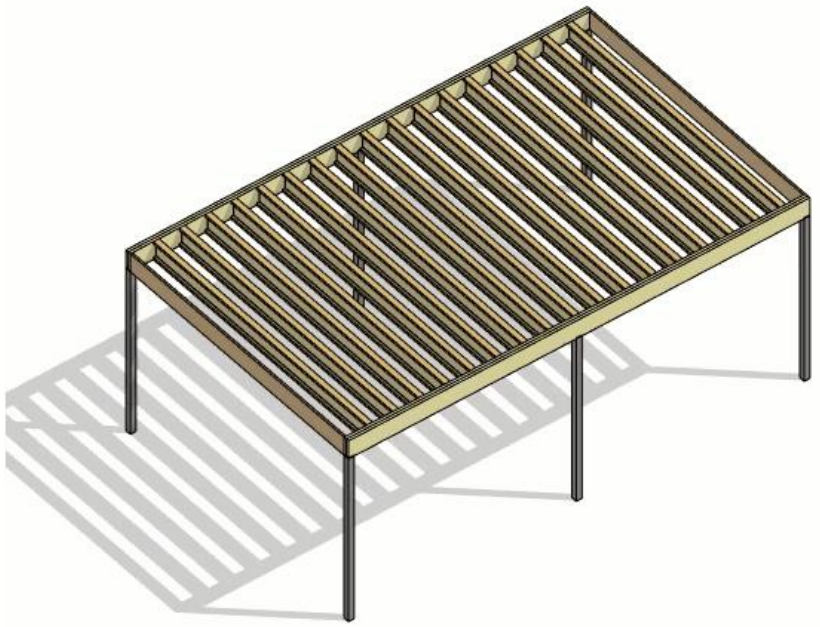
Credit: Nicholas Catellier
dba BIMPure

Increasing sophistication: starting to guide post spacing, warn about governing spans



Credit: Nicholas Catellier
dba BIMPure

Letting the architect output to an EPD database, then toggle the detail back off

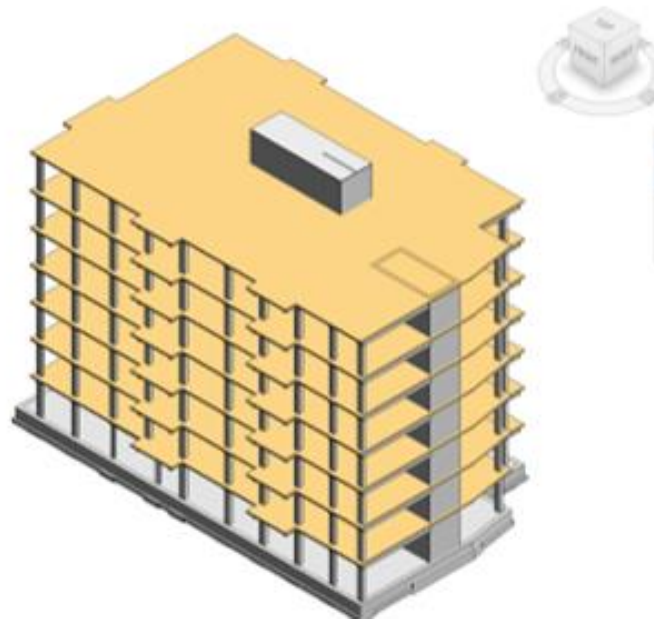


Structural Columns					
COLUMN TYPE	WIDTH	DEPTH	HEIGHT	VOLUME	QTY
GLULAM 5 1/2"	5 1/2"	5 1/2"	9'-1 3/4"	1.92 CF	4

Structural Framing				
LENGTH	DEPTH	WIDTH	VOLUME	QTY
Nordic Beam				
9'-8 1/4"	9 1/2"	1 3/4"	4.48 CF	4
15'-1 3/8"	9 1/2"	1 3/4"	1.75 CF	1
			6.22 CF	5
Triforce Joist				
15'-1 3/8"	9 1/2"	3 1/2"	11.03 CF	7
			11.03 CF	7
Grand total: 13			18.50 CF	13

Credit: Nicholas Catellier
dba BIMPure

While we build more BIM content, we build beta testing relationships & buildings!



Boston 7 story, at 70' with no concrete podium, wood walls (non-load bearing), and only minimal steel. A competitive, Passivehaus, urban infill precedent for mass timber housing.

Credit: Nordic, Haycon, MFDS, H&O, & QWEB



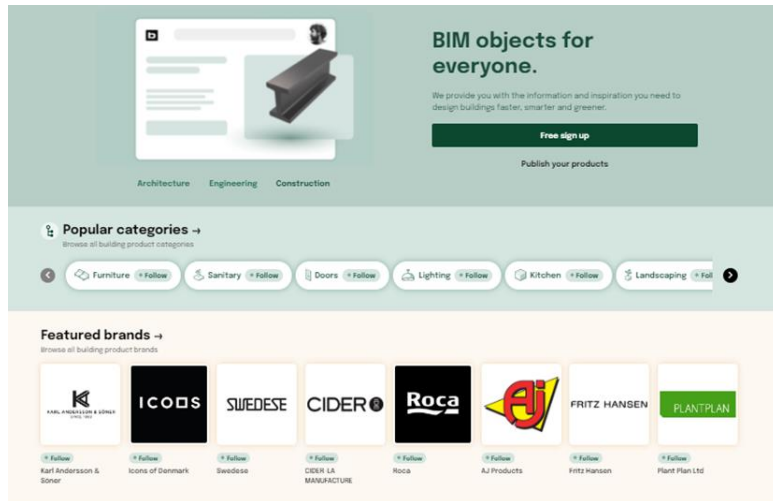
Housewarming tour, born as a beta tester



Web access within BIM creates new markets for content delivery. All of the below...or a fourth?

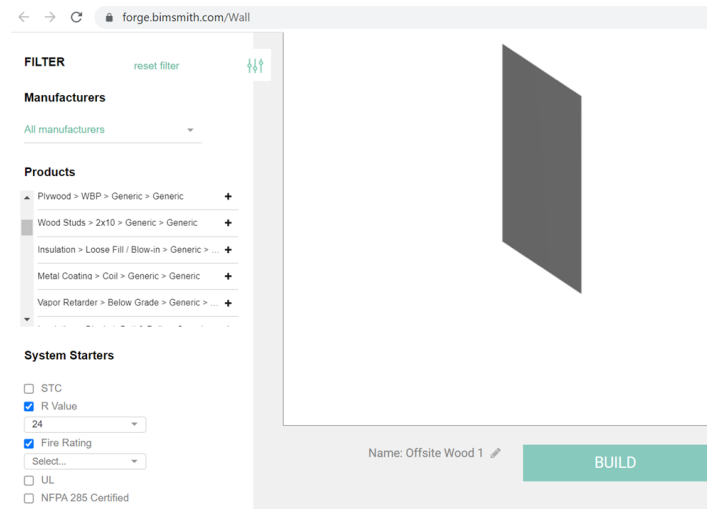


Object marketplace model



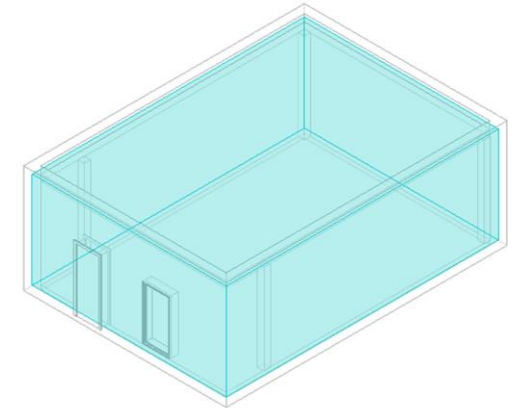
Credit: BIM Object

Online configurator model



Credit: BIM Smith

Calculation as cloud service model

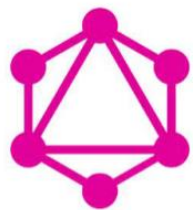


Credit: Insight

A purpose-built bridge between open tools



Carbon Fixers API



GraphQL



Building
Transparency

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"materialProportions": [
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    "fraction": 0.23044296830357142,
    "material": {
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      "bestPracticesGap": 93.4053281025,
      "conservativeGap": 136.07705472499998,
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      "density": 570.125,
      "name": "Timber",
      "mass": "570 kg"
    }
  },
  {
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      "conservativeGap": 7424.332314759458,
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    }
  },
  {
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      "id": "6201086e57f27e1124f2f212",
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      "conservativeGap": 2861.4579027500004,
      "id": "62ea048c6b7ee407035ac63",
      "density": 2650.0,
      "name": "Glue",
      "mass": "1 kg"
    }
  }
]
```

Credit: Andrew Norris of



A web app to bring our BIM and carbon-conscious assembly building data back upstream



- ✓ **Aggregate** Carbon Data from **EPDs**
- ✓ Create **Carbon Estimates** from Expert Approved **Pre-Fabricated Assemblies**
- ✓ Compare Components, Materials, and Transportation **GHG**

- ✓ Cloud Based **Version Control**
- ✓ **Interoperability** for 3D Models
- ✓ Modern **Collaboration** Tools
- ✓ **Automated** Pipelines

Why we need version control of transparency data, (from our young developer's perspective)



Version Control Local Chaos



Messy

Local

Lame

Hard to Collaborate

It's Never Really 'Final' is it?

Name	Date modified	Type	Size
1-firstdraft.ifc	07.02.2023 14:35	IFC File	0 KB
2-seconddraft.ifc	07.02.2023 14:35	IFC File	0 KB
3-thirddraft.ifc	07.02.2023 14:35	IFC File	0 KB
4-thirdkasiaedits.ifc	07.02.2023 14:35	IFC File	0 KB
5-fourtheliedits.ifc	07.02.2023 14:35	IFC File	0 KB
6-fifthdraft-rc.ifc	07.02.2023 14:35	IFC File	0 KB
7-FINAL.ifc	07.02.2023 14:35	IFC File	0 KB
8-FINAL-withedits.ifc	07.02.2023 14:35	IFC File	0 KB
9-FINALFINAL.ifc	07.02.2023 14:35	IFC File	0 KB
10-THEONEYOUSEENOW.ifc	07.02.2023 14:35	IFC File	0 KB

One of the first online collaboration portals being built by the prefabricator (that we know of)



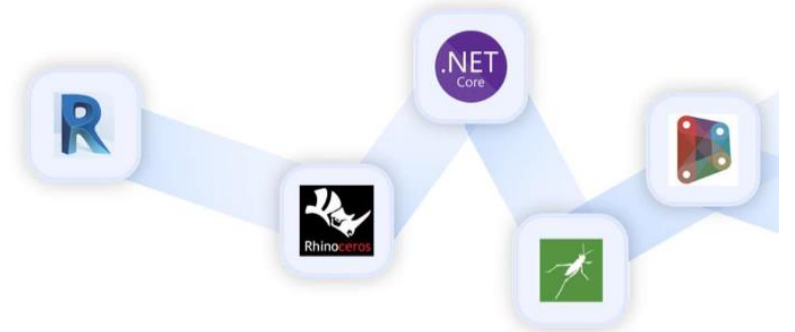
Speckle Interoperability

Speckle Connectors

Extract and exchange data in real time between the most popular AEC applications using our tailored connectors.

Send **Revit** to **Excel** X

- Revit**
Extract BIM data for further processing and visualisation, or dynamically create models from other CAD applications using Speckle for Revit!
- Excel**
Create geometry, schedules and analyse your geometry's metadata. Available on the Microsoft Office Store.



Credit: AmeriCan Structures

The whole assembly can be published, refined, ingredients added, and validated.



Filter assemblies to the requirements that you set.

Filter Assemblies

[REQUEST NEW ASSEMBLY](#)

Acoustic Resistance: [Slider: No Filter, None, Low, Med, High]

Fire Resistance: [Slider: No Filter]

Thermal Resi: [Slider: No Filter]

Source Region: **Central Canada**

Included Jurisdictions: CA-ON, CA-QC

Minimum Span: [Slider]

Select an Assembly that meets your requirements.

CARBON FIXERS.ORG

View Change History for this Assembly

CARBON FIXERS.ORG

20'x20' Light Wood Frame

Nicolas Coutillier

Material Breakdown
Last Updated: 2023-01-26, 1:47:18 p.m

Name
Laminated Veneer Lumber
Laminated Strand Lumber
Oriented Strand Board
Wood
Steel
Plywood
Parallel Strand Lumber

20'x20' Light Wood Frame

Created by: Nicolas Coutillier

Version History

- Change Joist Spacing (2023-01-26, 1:47:18 p.m)
- Update Floor Depth (2023-01-25, 9:12:34 p.m)
- Add Structural Columns and Subfloor (2023-01-25, 3:42:53 p.m)
- Create Structural Framing (2023-01-22, 2:21:12 p.m)
- Initial Commit (2023-01-20, 6:01:30 a.m)

The web user drives their own large form generator with the assemblies offered



Carbon Fixers

Demo
Brainpool

Scenarios
Create, View, and Compare Scenarios

CREATE NEW SCENARIO

Wood
Total Carbon: Not Configured

Wood and Steel
Total Carbon: Not Configured

1

EDIT SCENARIO VIEW SCENARIO COMPARE SCENARIOS

Schematic Building Form
EDIT SCHEMATIC BUILDING FORM

Building Type	Floor Area	5120	sqft	Building Length	160	ft	
Building Width	32	ft	Number of Storeys	2	Story Height	10	ft

OpenBIM Model Generator & Estimator

Powered by Spackle

An experts dashboard drives performance equivalence, ingredients, and EPD data.



The screenshot shows the Carbon Fixers dashboard interface. The left sidebar contains navigation options: Dashboard, EPD DATA (Assemblies, Datasources, Units), GEOGRAPHIC DATA (Regions, Map), and ORGANIZATIONAL DATA (Groups). The main content area is titled 'Heavy Wood Frame' and shows a GHG value of 594 kgCO2e. It features three sliders for Acoustic Resistance, Thermal Resistance, and Fire Resistance, all currently set to 'None'. Below these is a comparison slider for industry average EPD data. The 'Assembly Definition' section includes a table of dimensions for a 'Frame System'.

Dashboard Assemblies Sub-assemblies Materials Regions

Home / Dashboard / Assemblies / Edit Assembly

Heavy Wood Frame GHG 594 kgCO2e Select jurisdiction Regional

Acoustic Resistance: None Thermal Resistance: None Fire Resistance: None

Enter metadata here. Enter metadata here. Enter metadata here.

How do the components in this assembly compare to their industry's average EPD data, from a regional and product-focused life cycle analysis perspective?

±0% Enter metadata here.

1

Assembly Definition Frame System

Dimensions

Governing Span	16	ft	Enter metadata here.
Deflection Criteria	L/360		Enter metadata here.
Framing Depth	14	in	Enter metadata here.
Joist Spacing	12	in	Enter metadata here.
Blocking Depth	6	in	Enter metadata here.
Blocking Spacing	48	in	Enter metadata here.
Sub-floor Thickness	7/8	in	Enter metadata here.

The building assemblies align with BIM families.



The screenshot displays the Carbon Fixers web application interface. The top navigation bar includes 'Dashboard', 'Assemblies', 'Sub-assemblies', 'Materials', and 'Regions'. The left sidebar is organized into three sections: 'EPD DATA' with 'Assemblies' (NEW), 'Datasources', and 'Units'; 'GEOGRAPHIC DATA' with 'Regions' and 'Map' (SOON); and 'ORGANIZATIONAL DATA' with 'Groups' (SOON). The main content area features three panels: 'Building Assemblies' with a 'Floor Systems' dropdown; 'Material Units' with a list of 'Timber', 'Gypsum', 'Steel', and 'Glue'; and 'EC3 Categories' with a search bar and a list of categories such as 'AccessFlooring', 'AcousticalCeilings', 'Aggregates', 'AirBarriers', 'Aluminium', 'AluminiumBillets', 'AluminiumExtrusions', 'AluminiumSheetGoods', 'AluminiumSuspensionAssembly', 'AppliedFireproofing', 'Asphalt', 'BackingAndUnderlay', 'BituminousRoofing', 'BlanketInsulation', 'BlownInsulation', 'BoardInsulation', and 'CMI'. A large number '1' is centered in the main area. The footer contains the text 'Built through collaboration between Brainpool & QWEB © 2022' and the Carbon Fixers logo.

Fabrication plant EPDs are used to aggregate regional materials and calculate transport out.



The screenshot shows the Carbon Fixers web application interface. The top navigation bar includes 'Dashboard', 'Assemblies', 'Sub-assemblies', 'Materials', and 'Regions'. The breadcrumb trail is 'Home / Dashboard / Assemblies / Edit Assembly'. The main content area is for editing the 'Heavy Wood Frame' assembly, which has a GHG value of 594 kgCO₂e. The interface features several sliders for performance metrics: 'Acoustic Resistance: Low', 'Thermal Resistance: Medium', and 'Fire Resistance: High'. Below these is a comparison slider for industry average EPD data. The 'Assembly Definition' section shows 'Frame System' as the selected type. The 'Sub-assemblies' list includes 'Rim Joist (All)', 'Nail (All)', 'Open Web Joist (All)', and 'Oriented Strand Board (CA-OC)'. The 'Materials' list includes 'Timber', 'Steel', 'Gypsum', 'Glue', and 'Air'. The 'Sub-assembly Proportions' section shows 'Rim Joist' at 13% and 'Nail' at <0%.

We do know that real transport calculations tend to soften border lines.



Export to EC3 (BETA) Save

Report Information

Title: Full building summary
Date: 2020-07-23
Author: nicolas.catellier@a21.ca
Company: Autodesk
Project: Sample House
Location: 1A Avenue Jeanne-Mance Québec
Cover: - set image -

Gross Building Area: 1000 ft²
Expected Building Life: 60 years

Transportation Impacts ⓘ
Edit transportation distances

Biogenic Carbon ⓘ
 Include biogenic carbon (default)
 Exclude biogenic carbon

Include Construction Impacts ⓘ

	On-site Construction	Source
Electricity	10000 kWh	
...

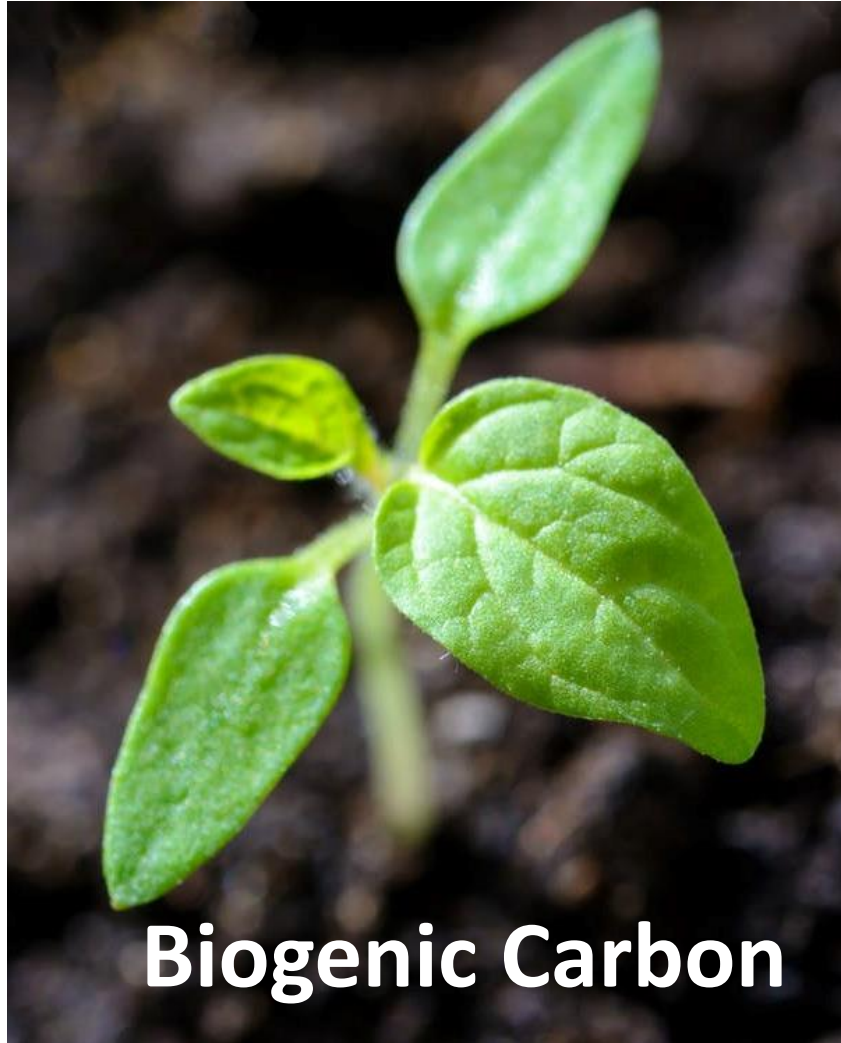
Output Summaries

- Bill of Materials (Excel)
- Contribution Assessments
- Life Cycle Stage
- Division
- Revit Category
- Building Element

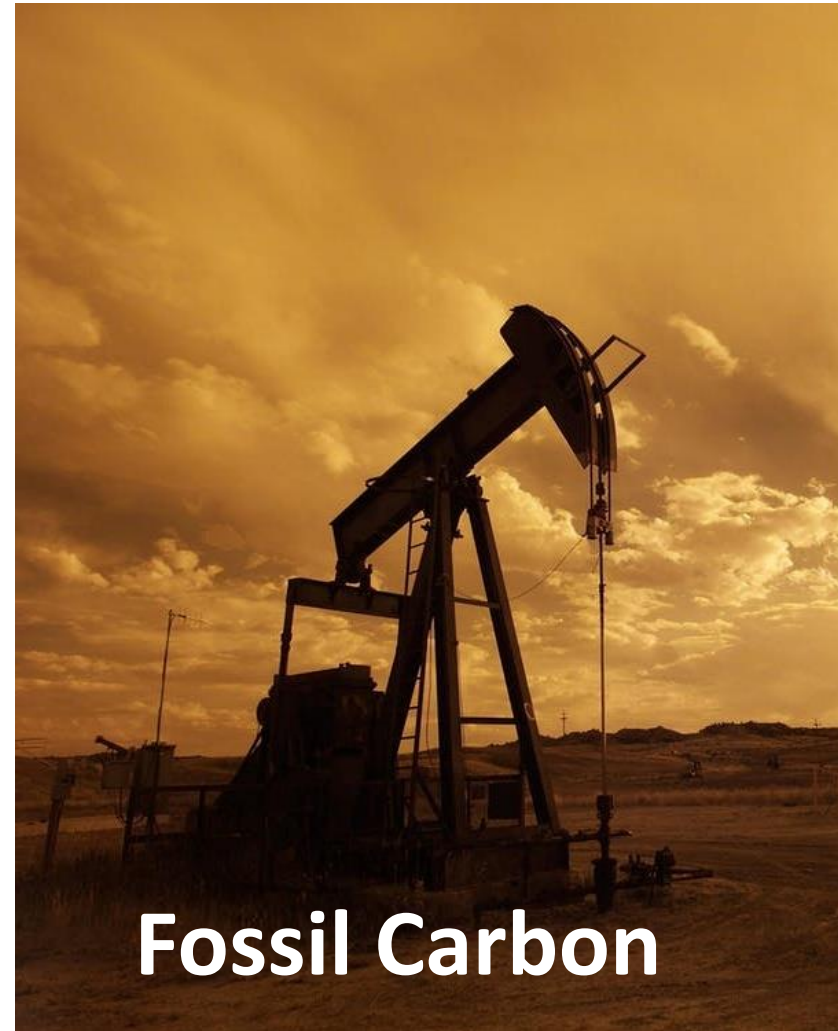


Transportation Distances				
Material	Truck (km)	Rail (km)	Barge (km)	Container Ship (km)

Our mission in 2024 is to educate and include defensible biogenic methodologies.

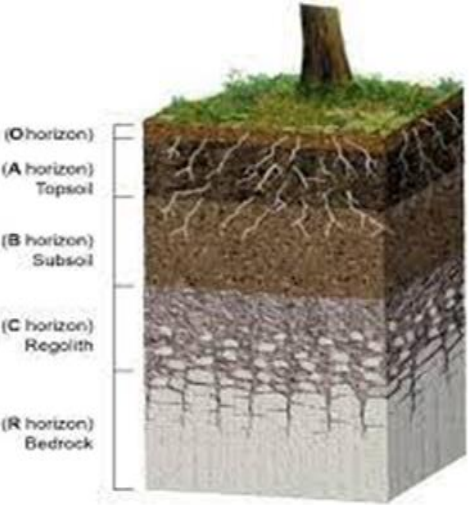
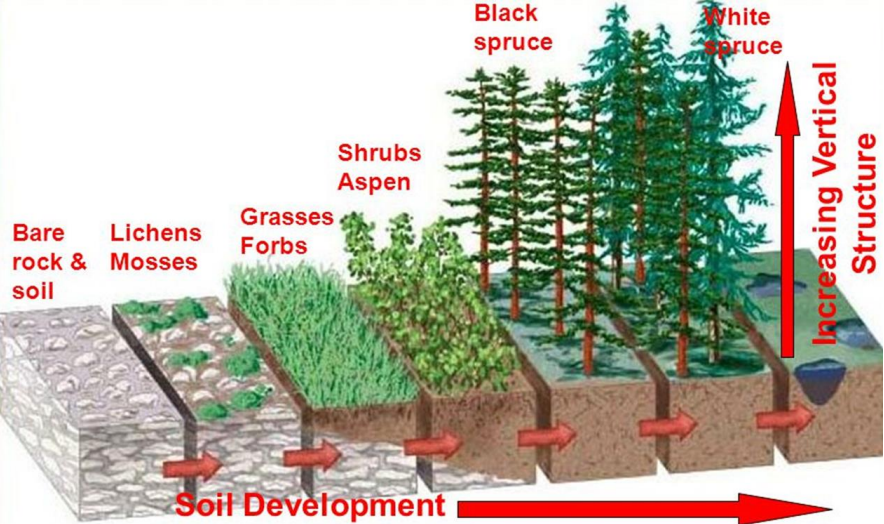
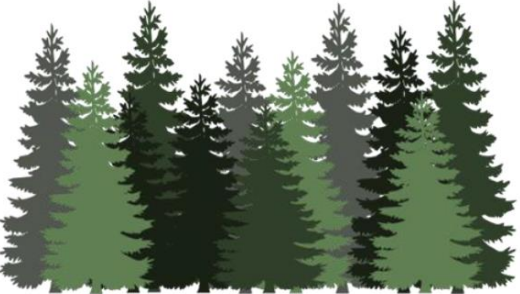


Biogenic Carbon



Fossil Carbon

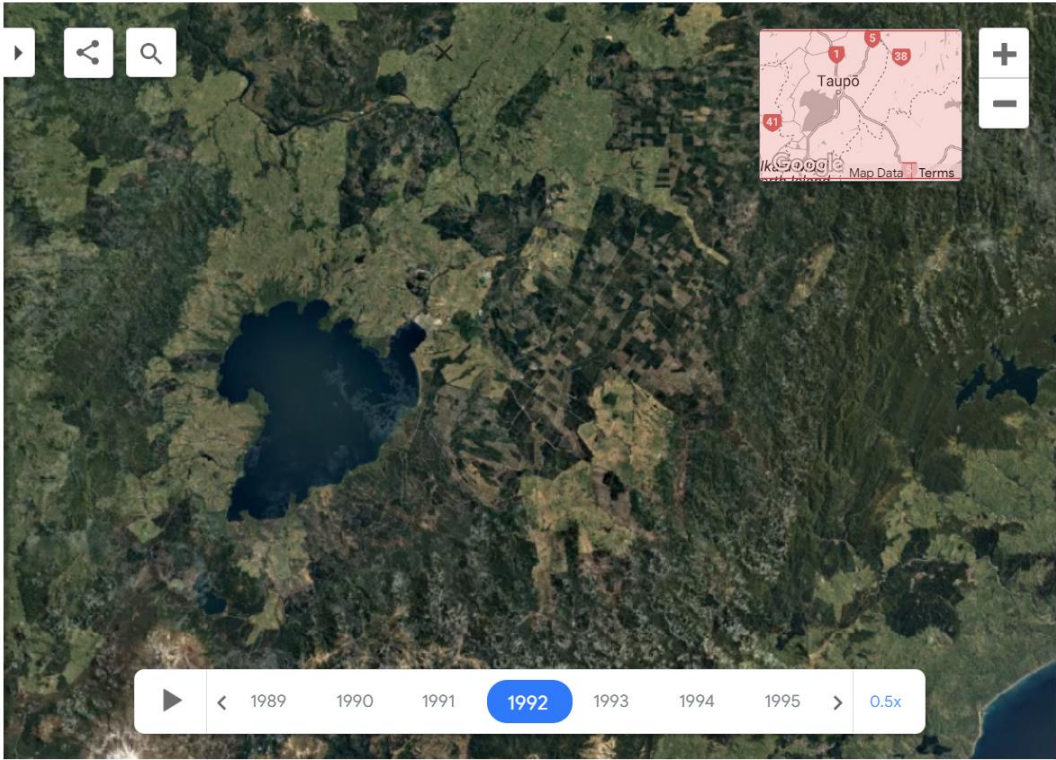
We also need to remind that even beyond biogenic calculation there are carbon benefits outside current frameworks.



Traceability is already being practiced by landscape managers (New Zealand wildfire example from Indufor)



Resource Monitoring



- Investment Advisory
- Industry
- Resource Monitoring
- Landscapes and Sustainable Value Chains
- Sustainable Development
- Climate Change

Traceability is already being practiced by landscape managers (Quebec example from woodsupplychain.com)



woodsupplychain.com



Wood Supply Chain - Origines du bois

Homepage

Accueil

More

Forest Certification Solutions de certification forestière
Map Wood Supply - Cartographie de chaînes d'approvisionnement



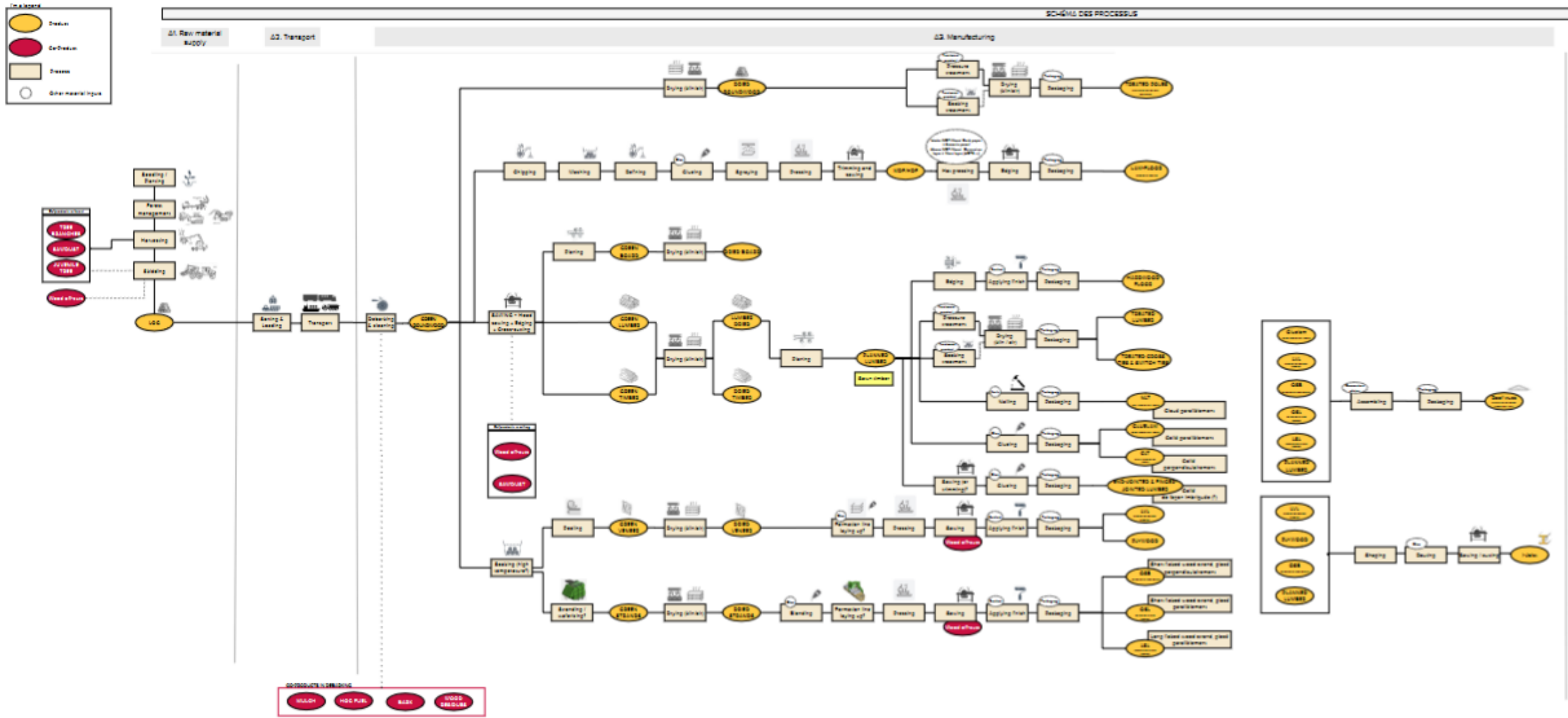
Why

Root of the matter

How it works

For U & all

An EPD generator for wood may never be able to integrate a knowledge map this complex. Reporting framework?



If we can succeed, tomorrow's metrics may be able to get simpler. In the meantime, thanks to all open-sourced tool builders!

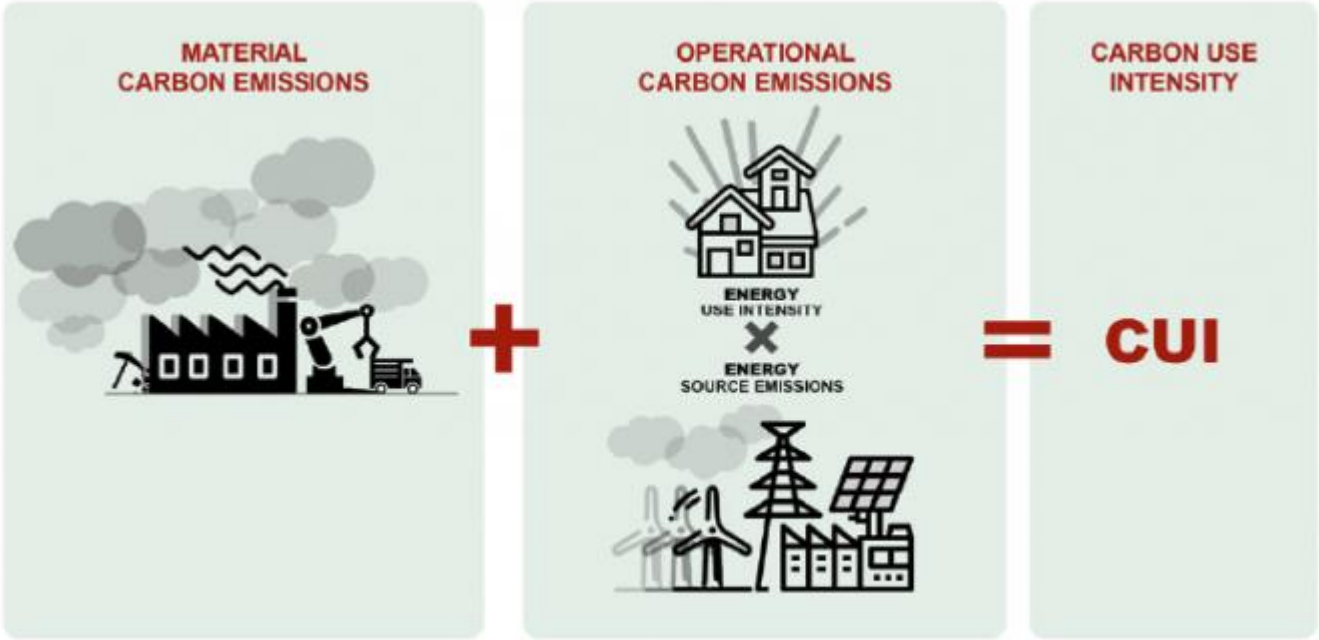
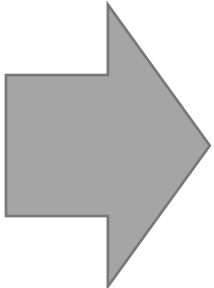
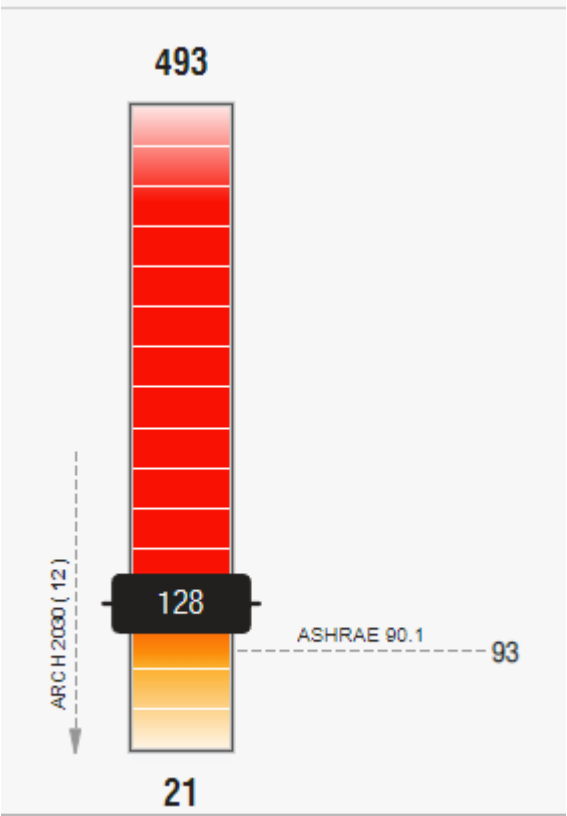


Figure 15 Carbon Use Intensity (CUI) a combined metric of upfront MCE plus OCE

Thank you!

Qu bec.ca/international



A suite of tools designed to deliver in early phases



Functionality

Create a comparative scenario with basic building info



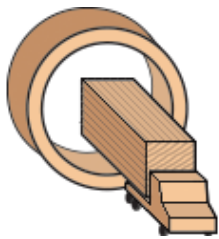
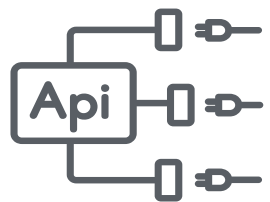
Configure and visualize the building and its GHG impact



Create a report to pitch to the client



Start the model with assemblies preconfigured



Program

CarbonFixers web application



Data call to an open database of embodied carbon (EC3)



OpenBIM by Speckle, Regional Dashboard on CarbonFixers



Offsite Wood Revit Content (thru plugin or website)

People

- Product Manager: Eli Gould dba STIX .**
- BIM Content Creation Supervisor: RevitPure's Nicolas Catellier (Quebec City)**
- Family building teams in Quebec, BC, & USA.**
- Data science tools & OpenBIM server built by Brainpool, AI (Ontario, BC, & UK offices)**
- Structural Data Verification & Engineering: Mass Timber Consultants, Montreal.**
- Sustainability Data and Life Cycle Review: Groupe Ageco, Montreal & QC**
- EPD Generator project for wood industry with Canadian Wood Council**
- Traceability Platform Development**
 - Forest-facing side by Incos**
 - Client-facing diligence tools by Indufor**