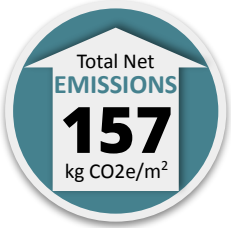
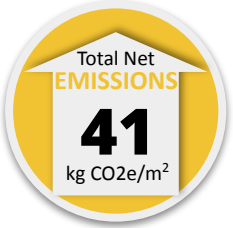
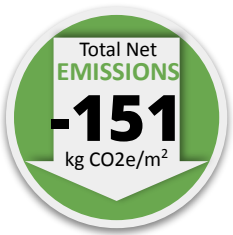
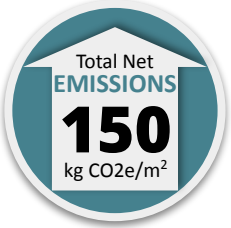
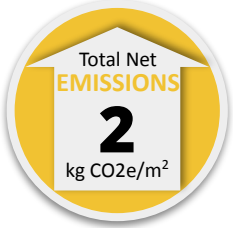
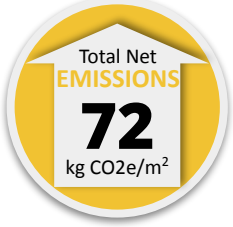
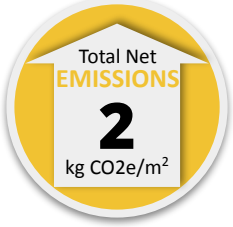
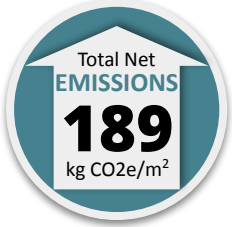
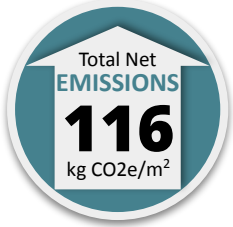
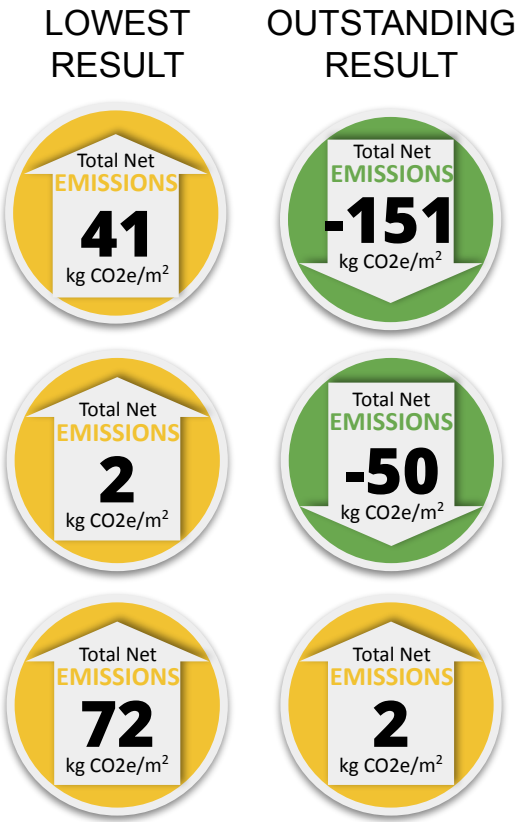
Building with Biomass

Turning Buildings into Carbon Sinks

Chris Magwood - Builders for Climate Action
Ontario Biomass Producers Cooperative
March 17, 2022

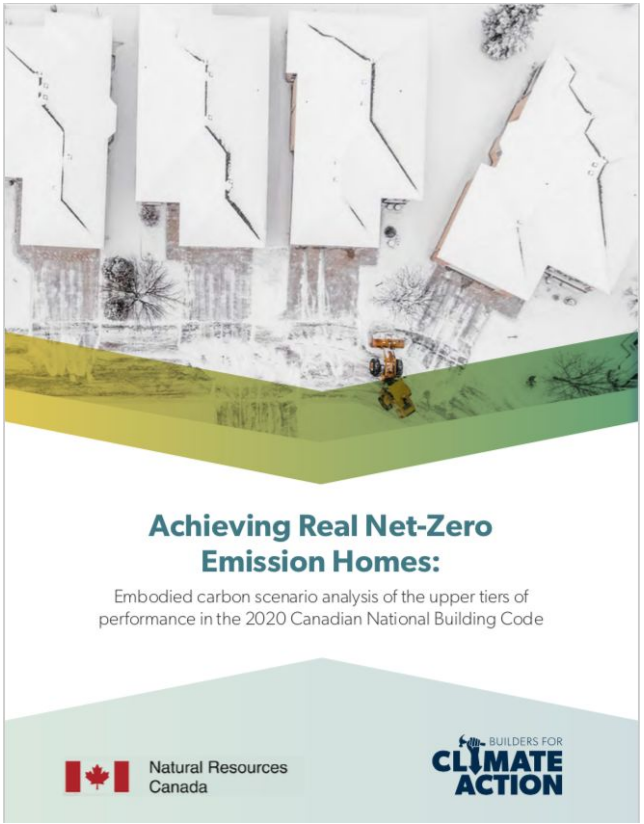
	WORST RESULT	AVERAGE RESULT	LOWEST RESULT	OUTSTANDING RESULT
Builders for Climate Action white paper				
NRCan study (190 model homes)				
Nelson & Castlegar, BC 34 as-built homes				
Toronto region study 503 as-built homes				

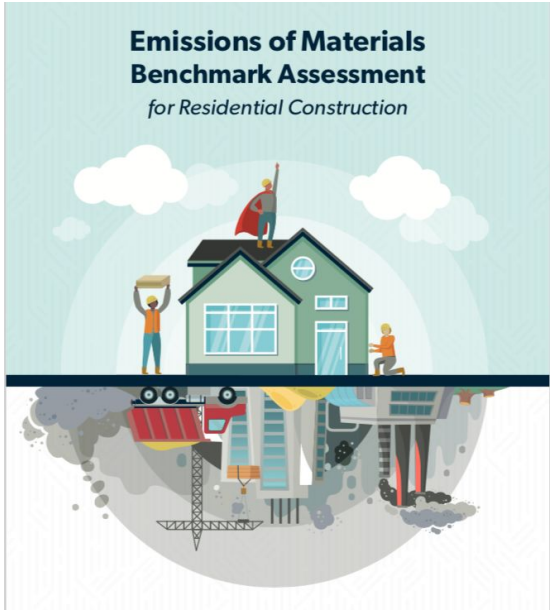
The biggest factor in these results is …



… carbon storage from biomass materials

This study makes it clear that carbon storage in building materials can have a drastic impact on net emissions from the homebuilding sector.





Using the "best possible materials" would result in the reduction of roughly 1,065,000 t CO_2e. In this hypothetical scenario, new Part 9 homes built in the GTHA would pass beyond net zero carbon to store around 225,000 tonnes of carbon from the atmosphere during a single construction year.

Valuing Biomass as Meaningful Storage — Residue & “Waste”

CO_2 absorption

CO_2 will return, soon

Valuing Biomass as Meaningful Storage — Residue & “Waste”

CO_2 absorption

CO_2 will return, but not for 60-200 years

We know how to put this biomass to use in buildings

Trent University
Forensic Crime Scene Building

Trent University Forensic Building Material Carbon Emissions (MCE)

Part of building	Base Case kg CO2e	As-Built kg CO2e	As-Built, including timber storage kg CO2e
Footings & Slabs	29,516	13,503	13,503
Foundation walls	13,108	9,866	1,128
Exterior walls	123,900	-6,967	-18,043
Exterior cladding	11,327	6,263	2,861
Windows & doors	3,378	3,378	3,378
Interior walls	6,968	-4,900	-3,580
Floors	858	-15	-679
Ceilings	963	227	227
Roof system	21,138	4,130	-5,624
NET TOTAL	**211,156**	**25,484**	**-6,829**
MCE Reduction		**88%**	**103%**
Net Carbon Intensity, kg CO2e/m2	**498**	**60**	**-16.1**

BEAM
BUILDING EMISSIONS ACCOUNTING FOR MATERIALS

Results from BEAM material carbon estimator

Zero carbon operations + Zero carbon materials

=

Real zero carbon building!

Louise Michel School, Issy-les-Moulineaux, France

CONTRACTOR: SEMADS
ARCHITECT (S): SONIA CORTESSE / BERNARD DUFOURNET
CHARPENTIER: ARBONIS / FARGEOT
TOTAL AMOUNT: Works budget: € 12,211,000 excl.
SURFACE: SHON: 5,238 m2 (school group only)
CONDITION: Completed in 2013

Prefabricated straw bale panels

http://bet-gaujard.com/wp/wp-content/uploads/2014/01/proc7_corrAMD3.pdf

De Roomley Sports-Hall, Tilburg, The Netherlands

Identity card

PROJECT TYPE :
Renovation & extension

BUILDING TYPE :
Sports facility

CONTRACTING AUTHORITY :
The Municipality of Tilburg

BUILDING MANAGEMENT :
Real estate department Tilb

STAKEHOLDERS :
- Design : Spacetranslators
- Installation advice : W-inst
- Main contractor : Van Der We
- Prefab wood constructions : Ba

DELIVERY YEAR :
2020

NET USABLE AREA :
2.568 m²

COST (total & €/m²) :
2.850.000 € - 1.100 €/

STRAW CONSTRUCTION TECHNIQUE :
Prefab sections with 32cm t

VOLUME OF STRAW USED IN THE PRO
260 m³

DISTANCE BETWEEN STRAW SUPPLY A
250 km

https://www.nweurope.eu/projects/project-search/up-straw-urban-and-public-buildings-in-straw/

Inspire Bradford Business Park, Bradford, UK

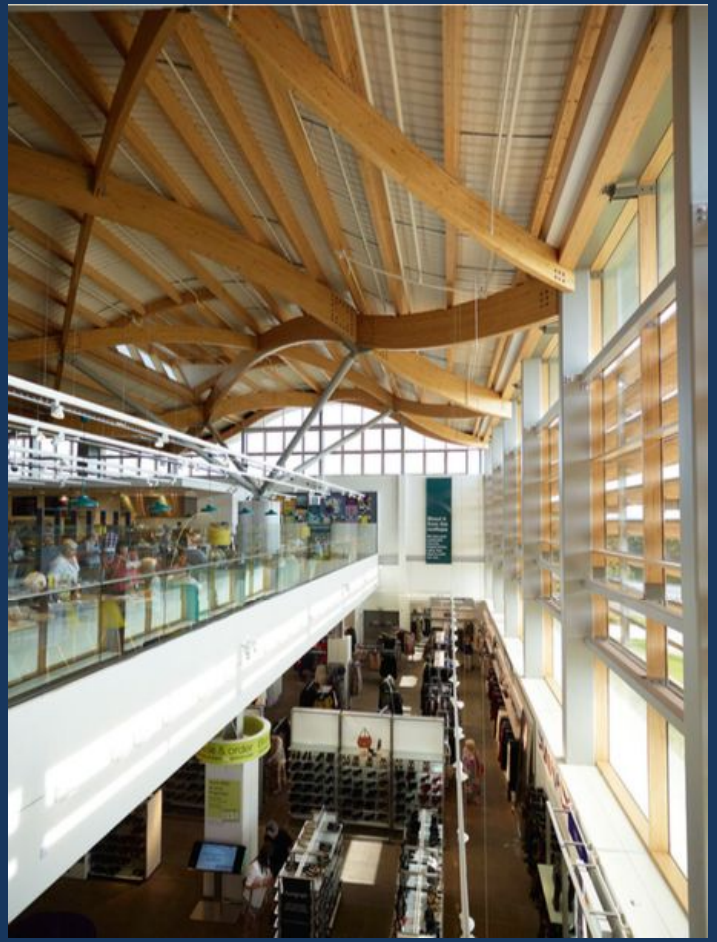
Prefabricated straw bale panels

https://modcell.com/projects/inspire-bradford-business-park/

Marks & Spencer Cheshire Oaks, UK

Prefabricated hempcrete panels

http://www.aukettswanke.com/projects/Marks



Gateway Building, University of Nottingham, UK

Prefabricated straw bale panels

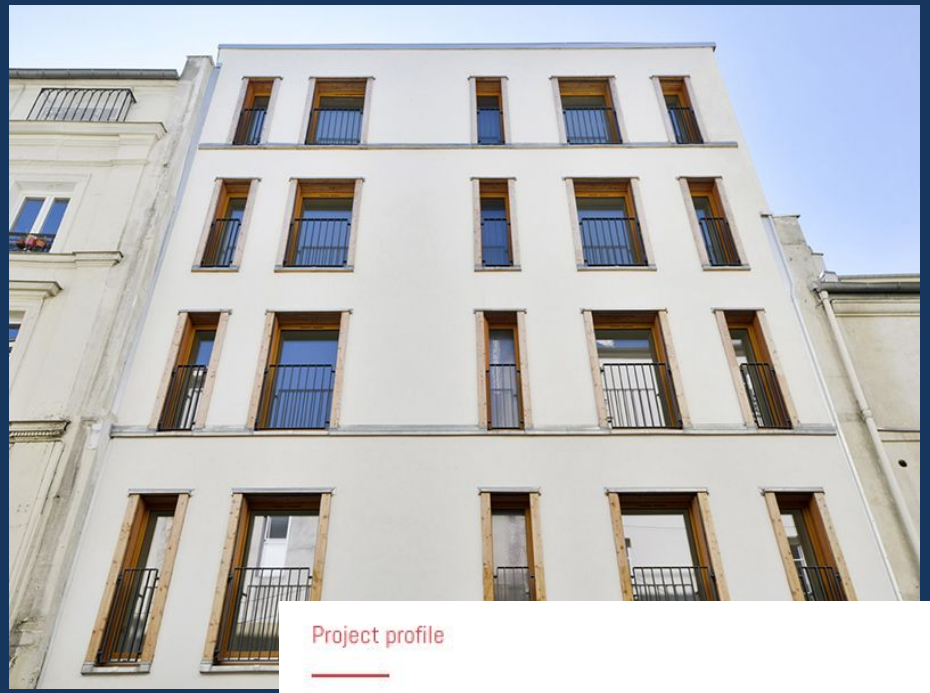
https://www.makearchitects.com/projects/the-gateway-building/

Gateway Building, University of Nottingham, UK

Prefabricated straw bale panels

Eco-Construction Apartment Block, Paris

Prefabricated hempcrete panels



https://www.bcb-tradical.com/en/portfolio_categories/eco-construction-apartment-blocks/

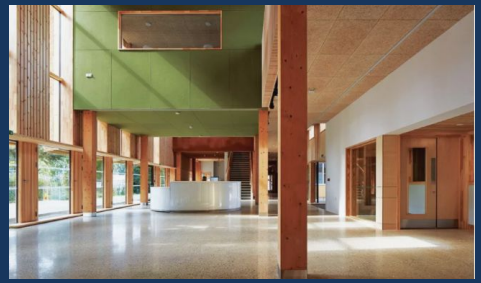
Project profile

- Floor area of the building: 570 m^2 of net floor area (SHON)
- Total floor area of apartments: 345.78 m^2
- Height of the building: Ground floor + 5 floors (with setback)

Enterprise Centre, University of East Anglia, UK

Timber, thatch & straw panels

credit: Architype

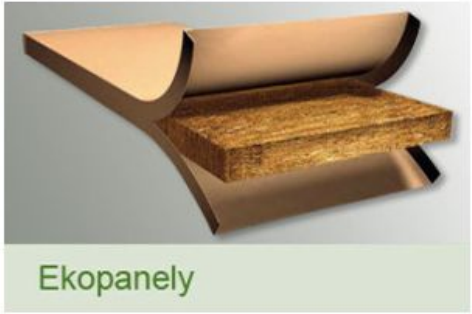


https://sites.uea.ac.uk/adapt/the-enterprise-centre

Globally, biomass materials are on the rise

CalPlant Launches Eureka™, The World's First Rice Straw-Based MDF

November 19, 2020



Sorghum's eco-friendy building material

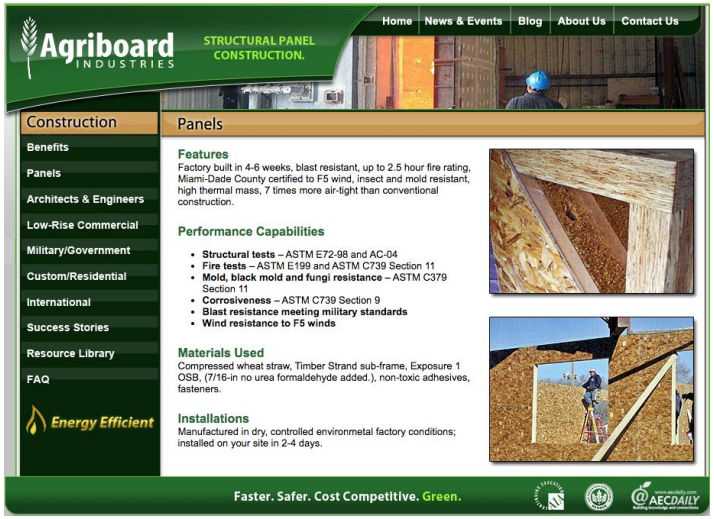
US HEMPCRETE BLOCK

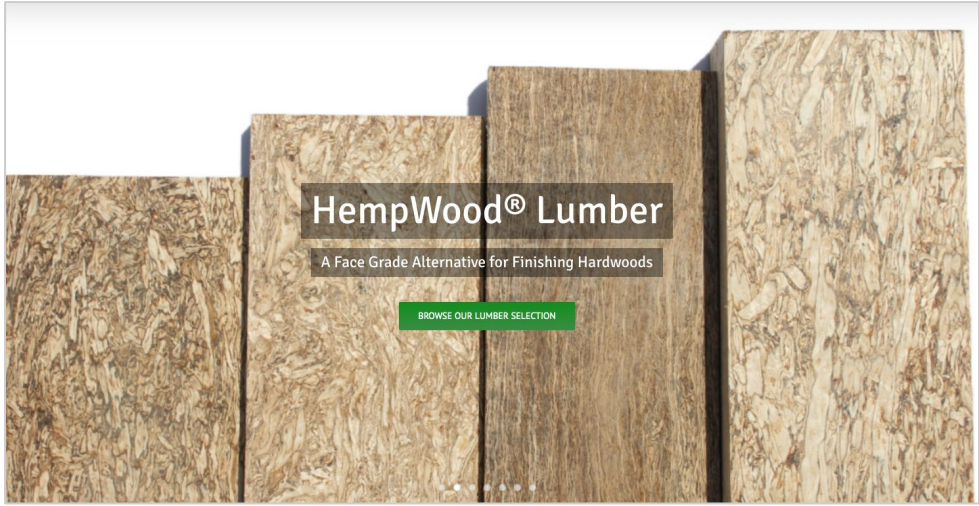
PREFAB HEMP BLOCK MANUFACTURING AND SUPPLY

Best Thermal Mass And Inertia
Moisture Regulation
Carbon Sequestering
Negative Co2 Footprint
Allergy Free Organic Homes

Prevents Dry Rot
Breathable Walls
Maintains A Steady Temperature
Doesn't Shrink, Will Not Get Crack Lines
Lasts For Hundreds Of Years

Gains In Strength Over Time
Termite Proof
Pest Resistant
Mold / Mildew Resistant
Flexible For Hurricanes

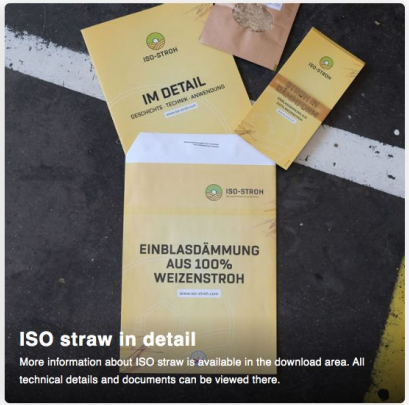




ISO STRAW
CURRENT

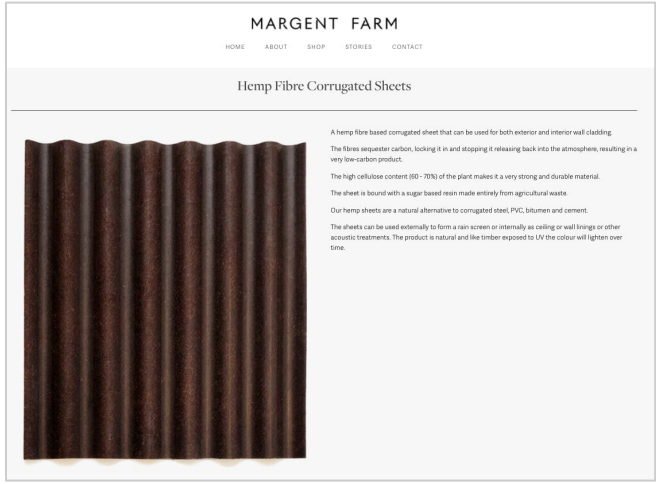
ISO straw in local shops

A big step towards a sustainably insulated future for do-it-yourselfers. If you are interested in including our product in your range, please contact us at any time.



ISO straw in detail

More information about ISO straw is available in the download area. All technical details and documents can be viewed there.



Investment is happening everywhere… except here

U.S. Department of Energy Announces $45 Million in Carbon Storage Technologies for Building Materials

Funding Will Help Remove Carbon Dioxide from the Atmosphere During Production and Development of Building Materials

11/08/2021

We have the raw materials

We have the manufacturing know-how

We have the building know-how

Answering the call, globally…

> Zero-carbon-ready building energy codes should also target net-zero emissions from material use in buildings. Material efficiency strategies can cut cement and steel demand in the buildings sector by more than a third relative to baseline trends, and embodied emissions can be further reduced by more robust uptake of bio-sourced and innovative construction materials (Global ABC Roadmap for Buildings and Construction 2020-2050).

And in Canada…

Achieving net-zero emissions in the Canadian housing sector is possible, but as this study makes clear it will require seriously addressing MCE by embracing low-carbon and carbon-storing materials and designs, while recalibrating efforts on the operational side by concentrating on total GHG metrics rather than energy use metrics. Together, these efforts could predictably lead to a zero-emission housing sector in Canada.