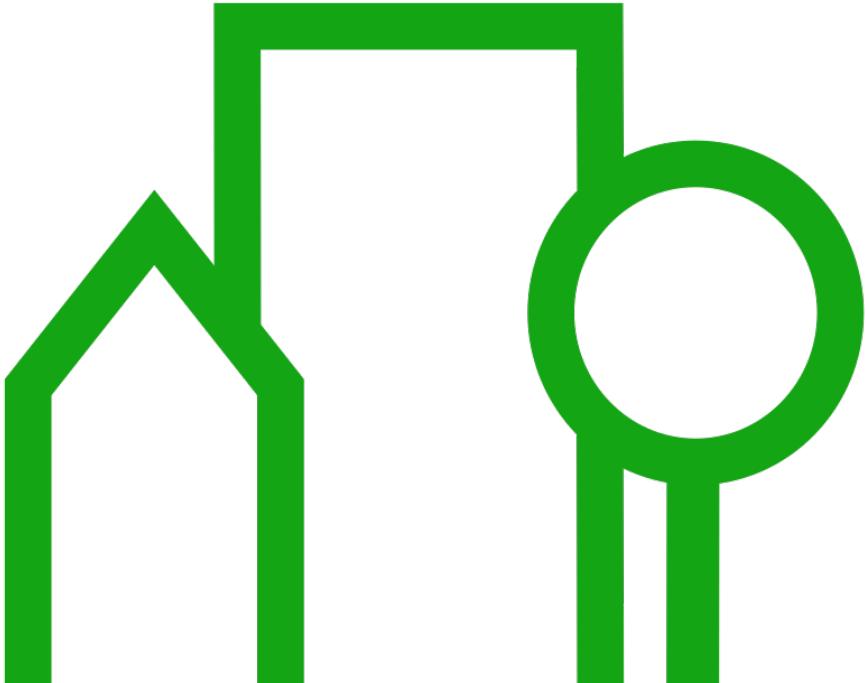


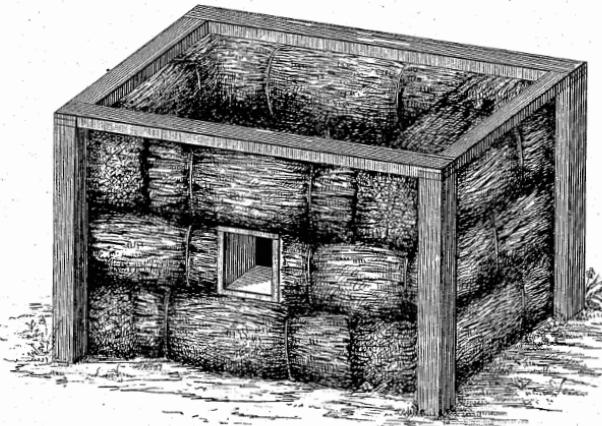
Straw City? State of Play in 2024

05.09..24 Michael Burchert @ <https://bauwende.de>
Rebumat / Nordbau Neumünster



Straw City?





Witnesses:

Silas T. Stout
Henry Davis

Inventor:

Josiah M. Leeds

1st Straw building Patent by J. M. LEEDS." Building Houses, Barns, Fences, 82:0. " No. 225,065. Patented Mar. 2, 1880.<https://patents.google.com/patent/US225065>

UNITED STATES PATENT OFFICE.

JOSIAH M. LEEDS, OF KOKOMO, INDIANA.

BUILDING HOUSES, BARNS, FENCES, &c.

SPECIFICATION forming part of Letters Patent No. 225,065, dated March 2, 1880.

Application filed November 5, 1878.

To all whom it may concern:

Be it known that I, JOSIAH M. LEEDS, of Kokomo, in the county of Howard and State of Indiana, have invented a new and useful Improvement in Buildings, of which the following is a specification.

The object of this invention is to furnish a cheap and useful method of building barns, stables, houses, and fences, of material easily obtained and at a nominal cost. Said buildings can be rapidly constructed, and they are convenient and durable.

The improvement consists in the manner of using the material now considered of little value, and generally thrown away or allowed to go to waste, and is this:

I cut hay, or take straw or corn-stalks, sorgo-stalks, hemp-straw, flax-straw, willow-brush, cedar-brush, or any kind of material that can be pressed into bales, of any convenient size as regards length, breadth, or thickness, banding them with wire or hoop-iron, or any other bandages, then laying them up into buildings, breaking the joints, the same as in laying up brick. I use a mortar or not, as I deem it best.

In constructing my buildings, I set up corner posts made of two-inch planks or studding,

fasten the feet firmly, and at the top put rods through to hold them firmly together. I then lay the bales of hay, straw, stalks, or brush up one upon another until I have attained the desired height. I then lay a plate or joist on the top of my walls. On this I place the foot of the rafters or lay my joist. I roof with shingles or thatch with straw.

When the building has settled thoroughly the corner posts may be taken off or allowed to remain, as one may deem it best.

I make door-frames of wood, and readily attach them to the walls by means of billets of wood in the bales.

I claim—

1. The structure described, consisting of bales of hay, straw, or equivalent material, bound and laid in the manner described.

2. The combination of the bales with the corner posts and joists, substantially as described.

JOSIAH M. LEEDS.

Witnesses:

SILAS T. STOUT,
HENRY DAVIS,
WM. A. STUART,
WILLIAM STYER.

FRAICHES EN ÉTÉ, CHAUDES EN HIVER, LES MAISONS DE PAILLE SONT AVANT TOUT ÉCONOMIQUES

Par Gustave LAMACHE

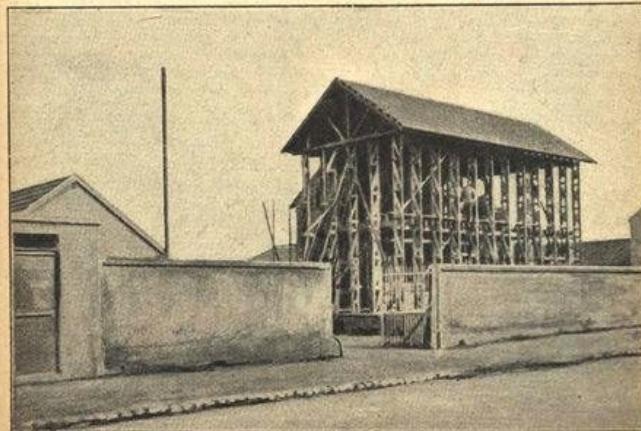
La maison de paille ! L'association de ces deux mots est bien de nature à provoquer de l'étonnement, même chez les personnes les mieux préparées aux hardiesse de la conception dans l'art de construire. Et cependant, il n'en est pas moins acquis, à l'heure actuelle, que la maison de paille est une réalité visible et palpable, déjà reproduite en France à plusieurs exemplaires et dont la ville de Montargis a eu la primeur au cours du dernier automne.

Je note tout de suite qu'il ne s'agit ni d'une « paillette » comme ceux qui sont allés aux Indes en ont pu voir, ni d'une de ces maisonsnettes entourées et recouvertes de glu et baptisées chalet normand ou suisse, sans

doute parce que nulle part, en Suisse, on ne voit de maisons aux toitures de chaume.

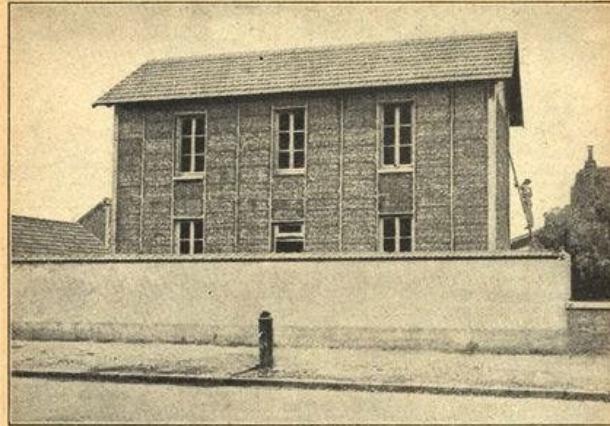
Les visiteurs qui viennent se rendre compte eux-mêmes, à pied-d'œuvre, remportent l'impression qu'un chapitre nouveau s'est ouvert au livre de la construction et qu'une activité féconde ne tardera pas à sortir de l'idée originale que vient de réaliser M. Feuillette, inventeur de la grenade à fusil et créateur de la maison de paille.

La reconstruction des fermes et des habitations paysannes dans les régions dévastées par l'ennemi peut se trouver accélérée par l'utilisation de matériaux abondants et peu coûteux, et le problème des maisons ouvrières peut être résolu par la même méthode.

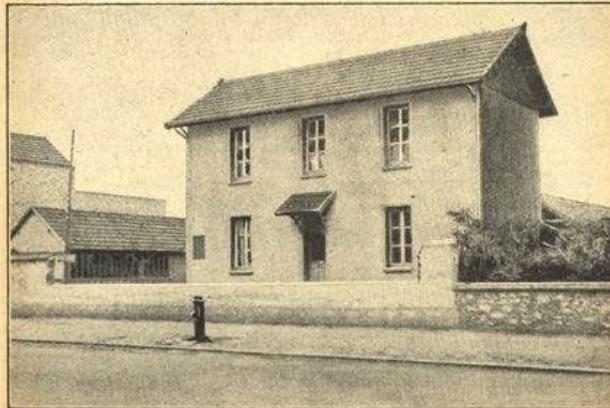


OSSATURE DE LA MAISON DE PAILLE DITE ISOTHERMIQUE
La toiture est complètement achevée, alors que les murs, les portes et les fenêtres n'existent pas encore.

LA SCIENCE ET LA VIE



LA MAISON ISOTHERMIQUE EST COMPLÈTEMENT CLOSE ET COUVERTE
Les murs attendent leur enduit; mais telle qu'elle est, la construction est déjà suffisamment engageante.



VOICI MAINTENANT LA MAISON TERMINÉE; TOUTE TRACE DE PAILLE A DISPARU
Non seulement la maison est totalement achevée, mais les habitants en ont déjà pris possession.



Young Architects on the roof of the North German Centre for Sustainable Construction,
Verden, Deutschland



NZNB, Norddeutsches Zentrum für Nachhaltiges Bauen <http://nznb.de> Highest direct-plastered strawbuilding in europe, World?.
Entwurfsverfasser: Architekten für Nachhaltiges Bauen, Dirk Scharmer, Thomas Isselhard, Frido Elbers





NZNB, Norddeutsches Zentrum für Nachhaltiges Bauen <http://nznb.de> Construction phase.



Right height and density?

NZNB, Baudokumentation: <https://www.youtube.com/watch?v=ZHl8n42AJzE>

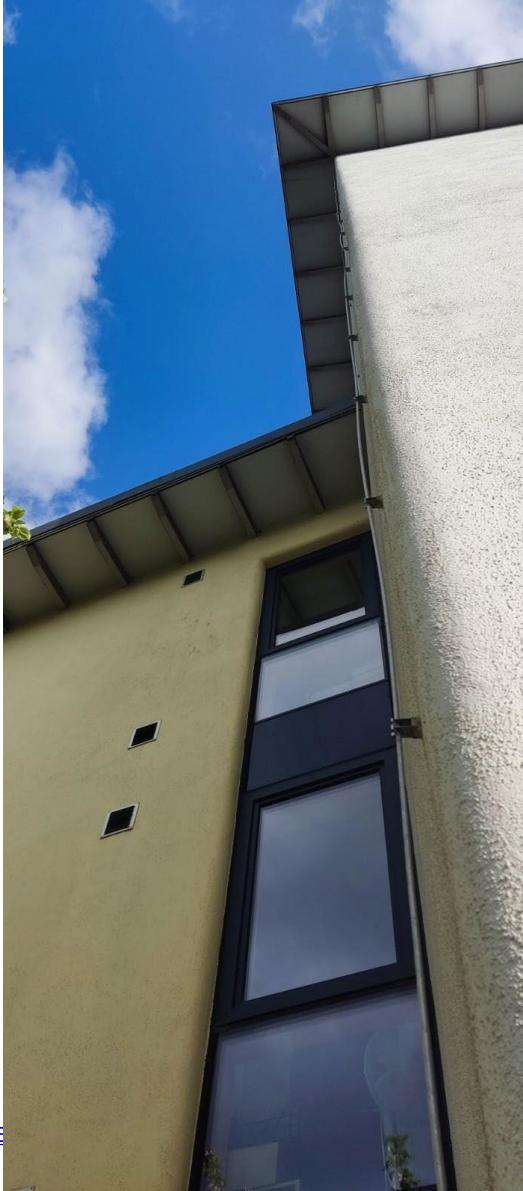


NORDDEUTSCHES ZENTRUM
nachhaltig
bauen



NZNB, Prefabrication of the elements took place directly in the adjacent Workshop by <https://Baustroh.de> GmbH Baudokumentation:
<https://www.youtube.com/watch?v=zHl8n42AJzE>

NZNB, Baudokumentation: <https://www.youtube.com/watch?v=ZHI8n42AJzE>





NZNB, Norddeutsches Zentrum für Nachhaltiges Bauen <http://nznb.de> Aufbau. Entwurfsverfasser: Architekten für Nachhaltiges Bauen,
Dirk Scharmer, Thomas Isselhard, Frido Elbers

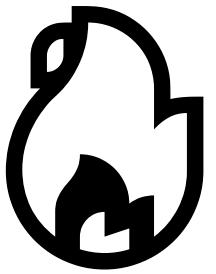
Build Video: <https://www.youtube.com/watch?v=ZHI8c13AEE>





Workshops

<https://www.biwena.de>



?

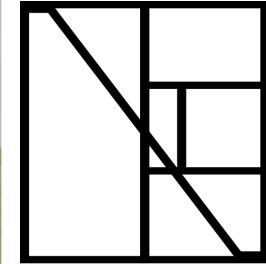




NZNB, multiplied fire strategy

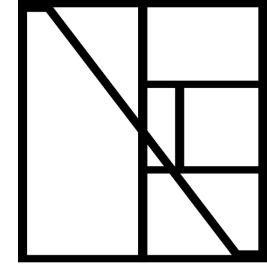


The density from the straw building guideline is what matters: Simple prefab technique for modules suitable for passive houses, install the last 4 straw bales at



Bildungswerkstatt

Straw building was approved in Germany 2014, Fachkraft Strohbau, Lehmbau Workshops Nachhaltiges Bauen in der Halle 57/ NZNB | <https://biwena.de>



Bildungswerkstatt

Prefabricated modular straw elements from Fachkraft Strohbau, Lehmbau Workshops Nachhaltiges Bauen in der Halle 57/
N7NB | <https://hiwena.de>



ESF funded Workshops, Berufsbildung für Nachhaltige Entwicklung: @
<https://ziel13.pznh.de>



Directly from the field, Construction site hands on workshop in Schleswig Holstein

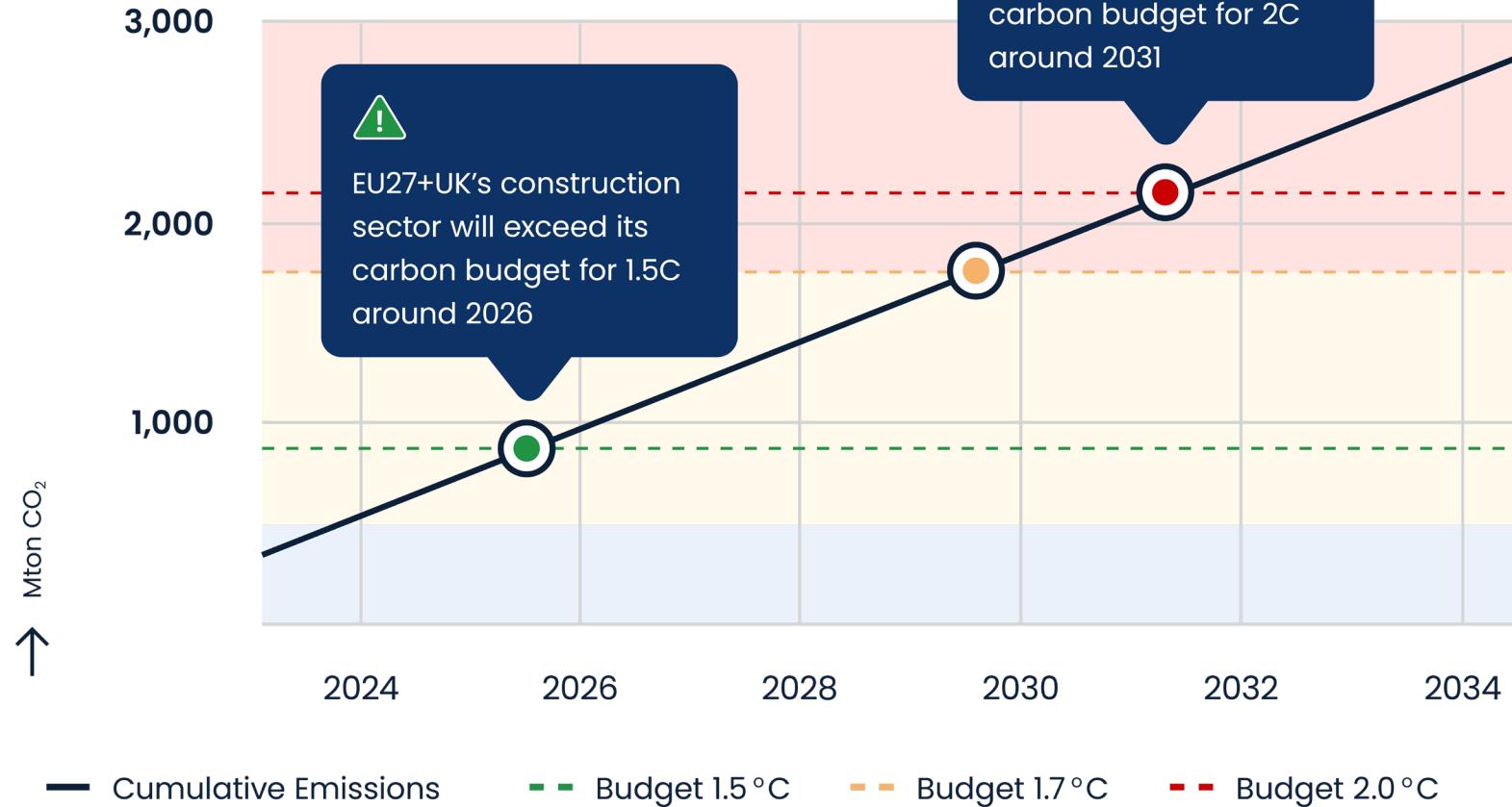


Directly from the field, Construction site hands on workshop in Schleswig Holstein



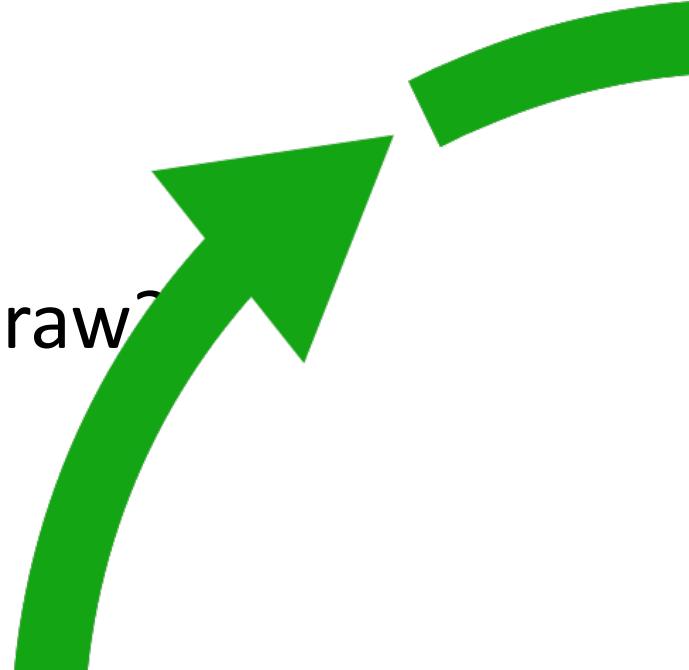
Occupy Parking Space: Prefabrication in Berlin on the street.

Why?





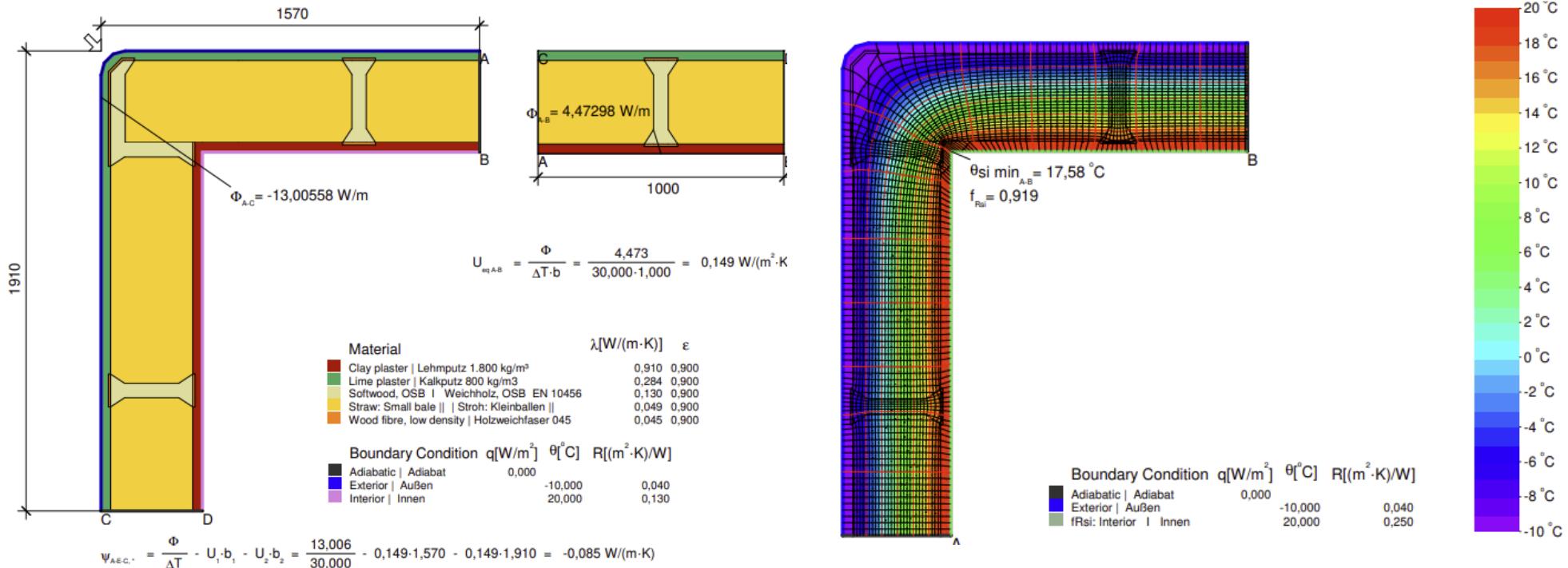
Still, why straw?

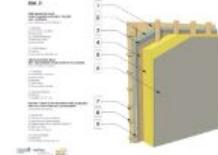
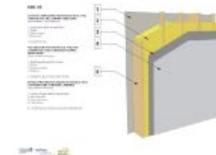
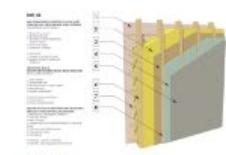
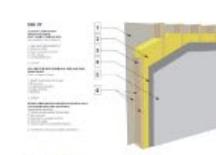




The best building material does not have to be produced, it is already available

Passivhaus-ready



SBR10 - Straw Bale
Infill Roof 10Archicad Model /
Sketchup Model
other models on
bimobject.comSBW01 - Straw Bale
Infill Wall 01Archicad Model /
Sketchup Model
other models on
bimobject.comSBW06 - Straw Bale
Infill Wall 06Archicad Model /
Sketchup Model
other models on
bimobject.comSBW02 - Straw Bale
Infill Wall 02SBW03 - Straw Bale
Infill Wall 03SBW07 - Straw Bale
Infill Wall 07

#THERMAL INSULATION

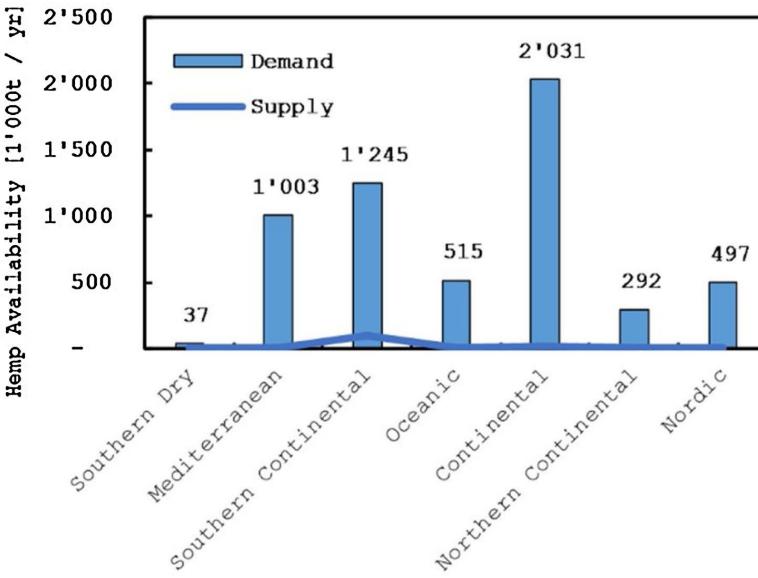
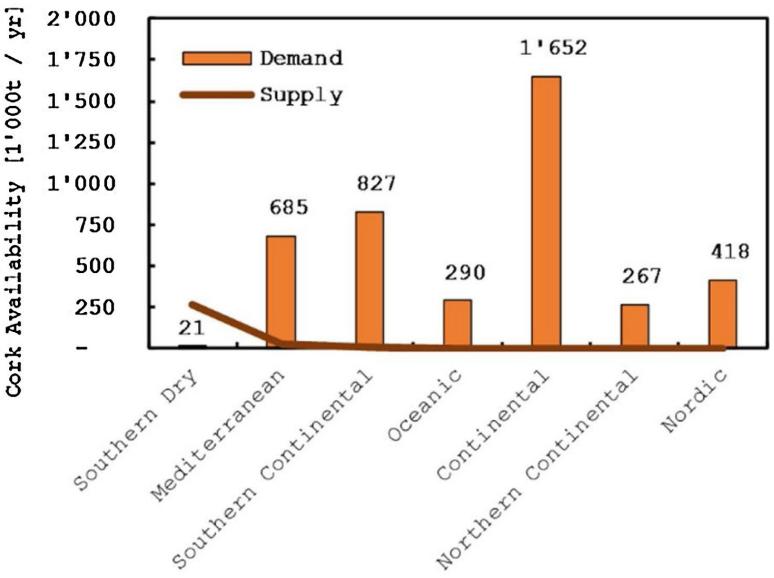
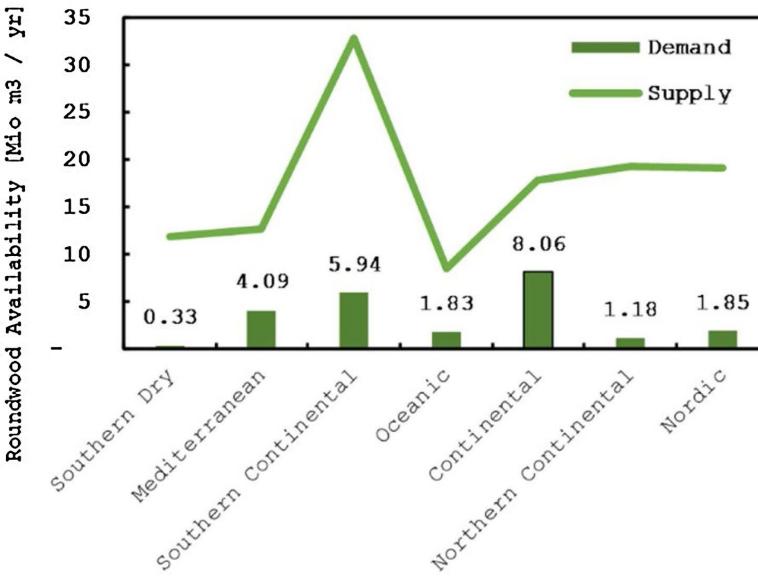
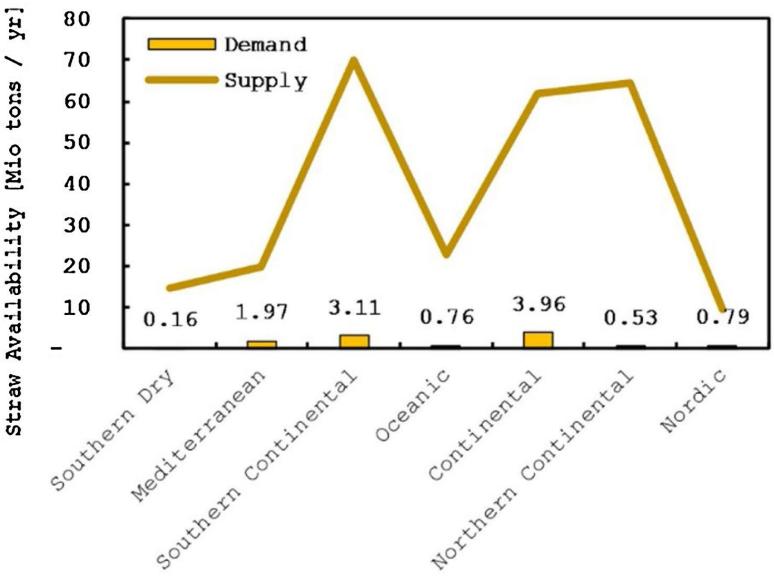
#trainer

#UP STRAW Project

#WRAPPING & RENOVATION

But, do
we have
enough
...

Yes,
but...

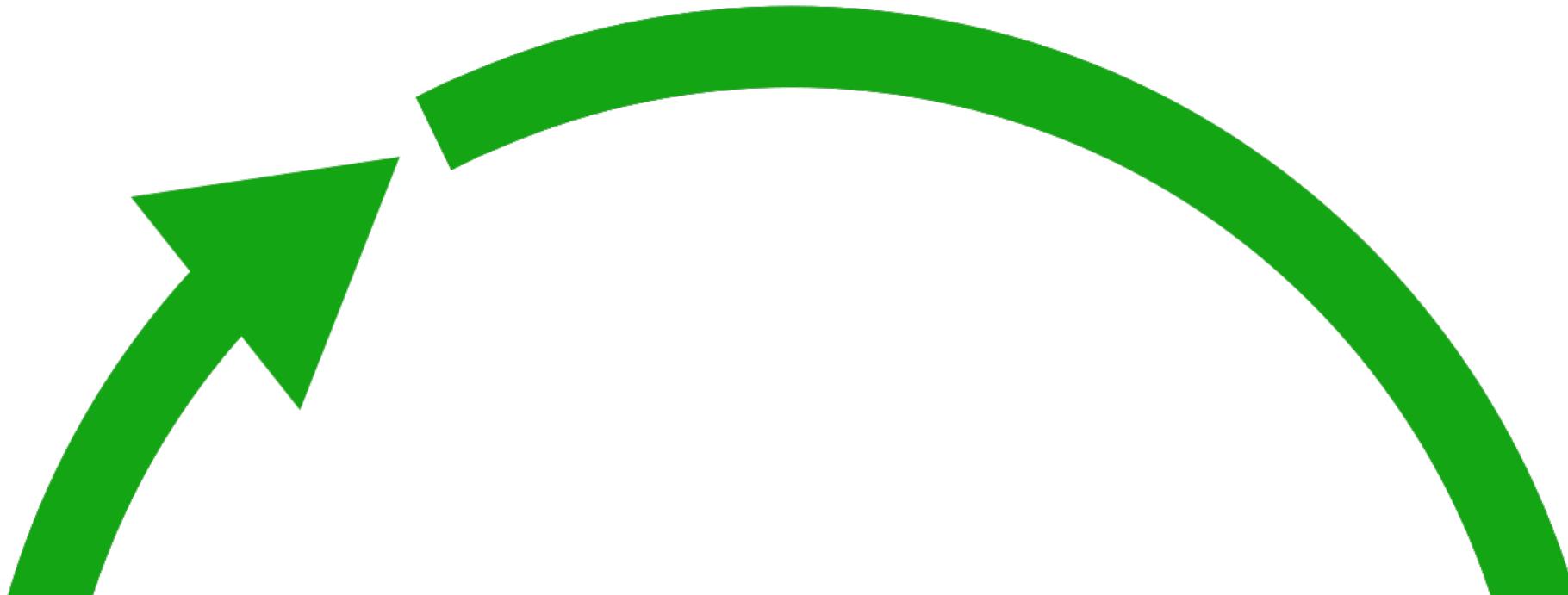


Göswein, 2021, Land availability in Europe for a radical shift toward bio-based construction p.8

<https://www.sciencedirect.com/science/article/pii/S2210670721002158?via%3Dihub>

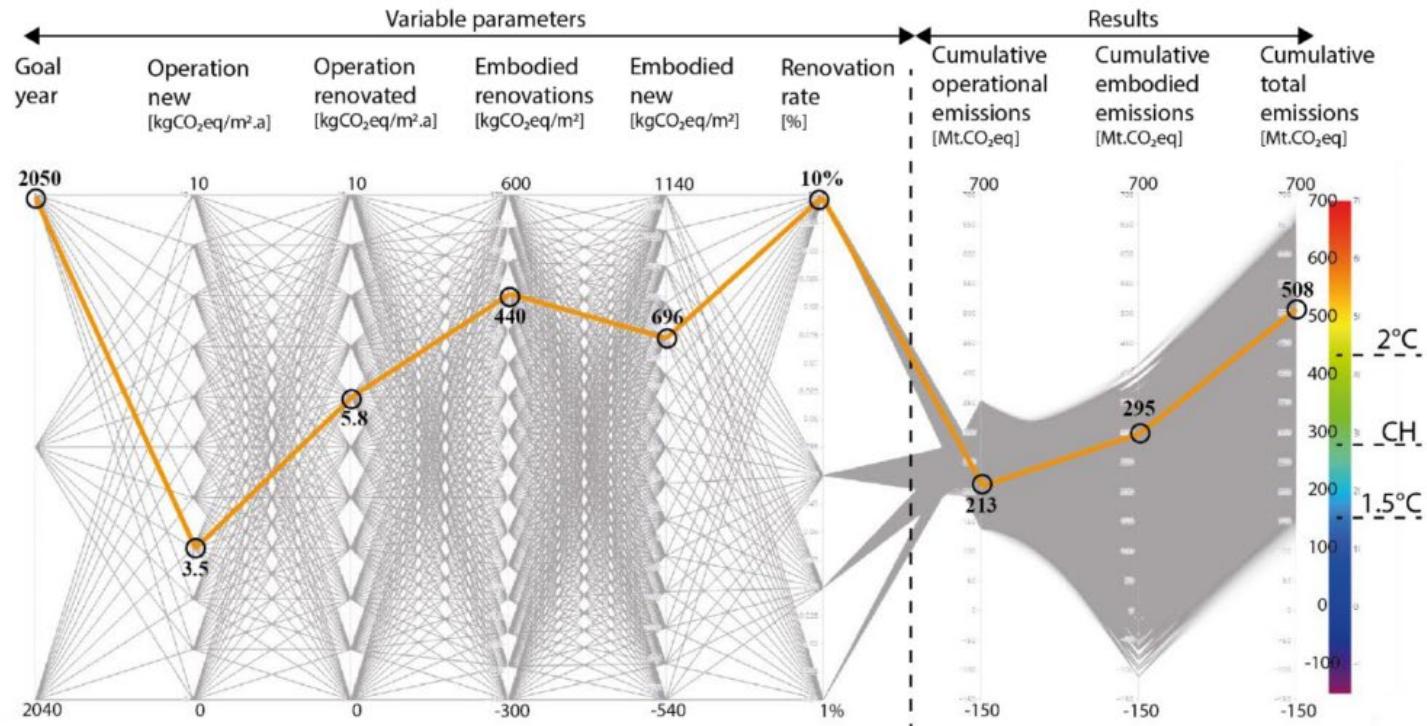
Exkurs: Straw potential

<https://docs.google.com/spreadsheets/d/1WGmCwrm3Kk0INmJ8VkyIPAPMy-rGjJYrodSSQIRqTRQ/edit?usp=sharing>



What is the best renovation scenario?

If we increase renovation rate
(which is currently the EU and Swiss green deal strategy)



We don't change anything compared to business as usual

The only strong constraint to stay below 1.5°C is to control embodied emission

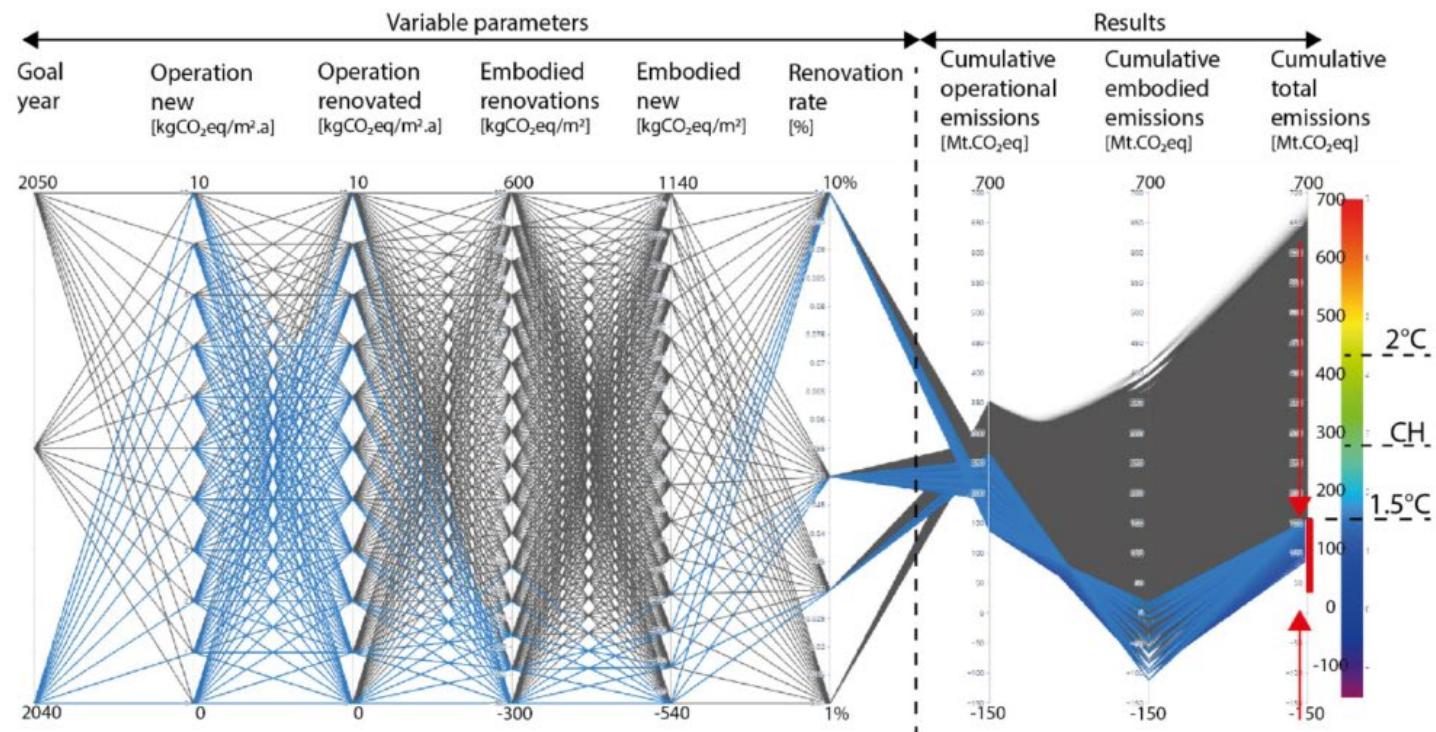
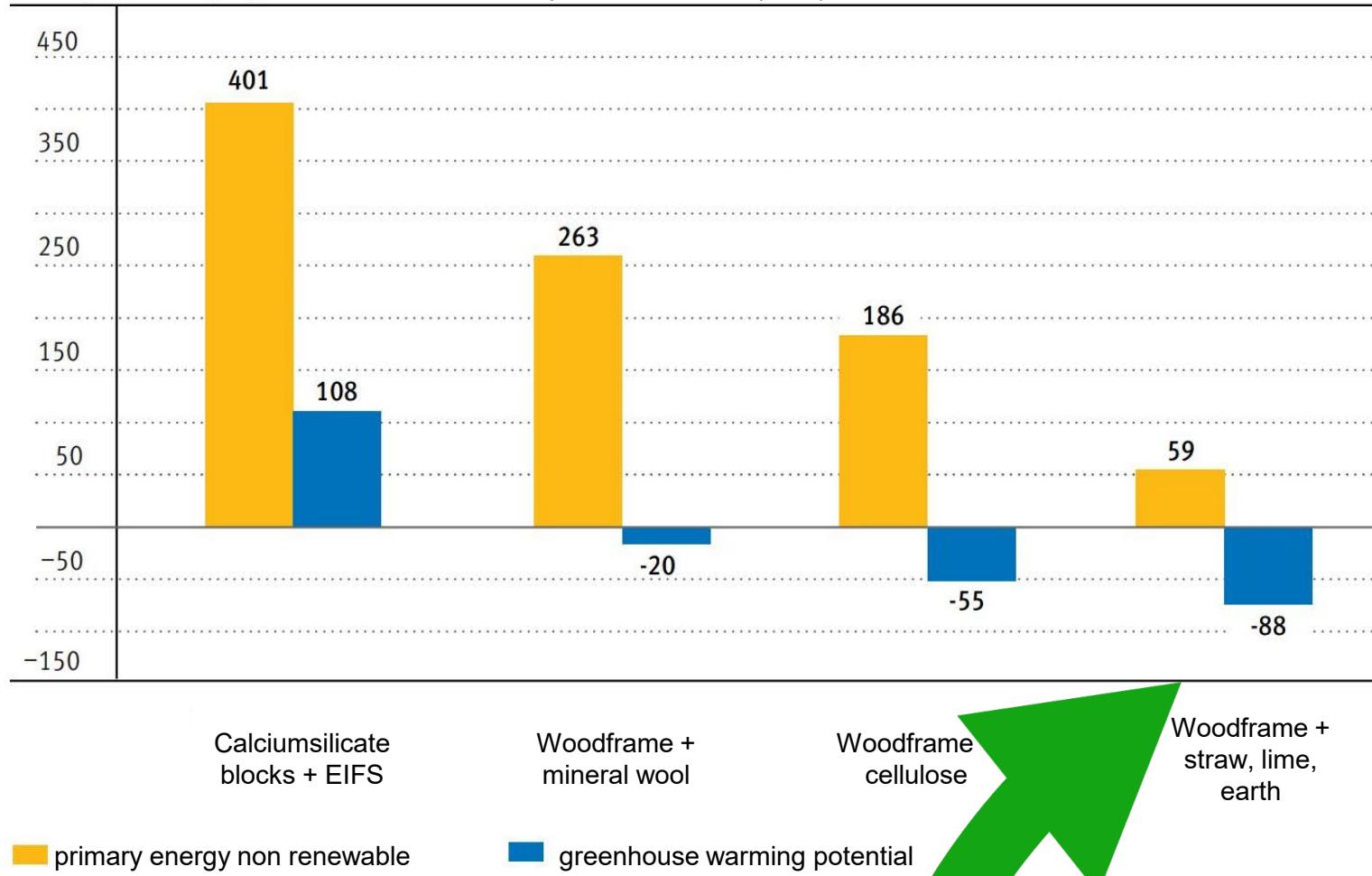


Table 4. Range of possible values for a 1.5°C goal.

	Goal year	Operation new	Operation ren	Embodied ren	Embodied new	Renovation rate
Max	2040	10	10	-120	-180	10%
Min	2040	0	0	-300	-540	3%

ÖKOBILANZVERGLEICH

in kwh/m² bzw. CO₂-Äq/m² passive house quality walls U=0,10W/(m²·K)



Strohgedämmte Gebäude, FNR 2014

<https://docplayer.org/56257792-Strohgedämmte-gebaeude.html>

It's possible to build climate neutral buildings

We just have to change our material diet

Less carbon intensive material, more vegetables..

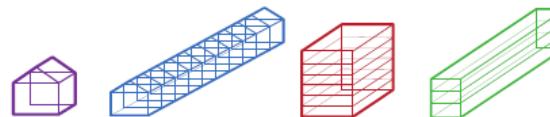


optimised
Reinforced concrete



+ 50 - 100 cm
Straw walls

= Climate neutral building

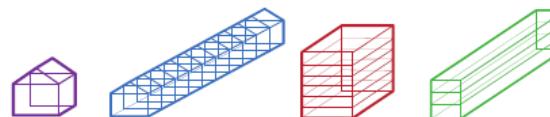


Timber
structure



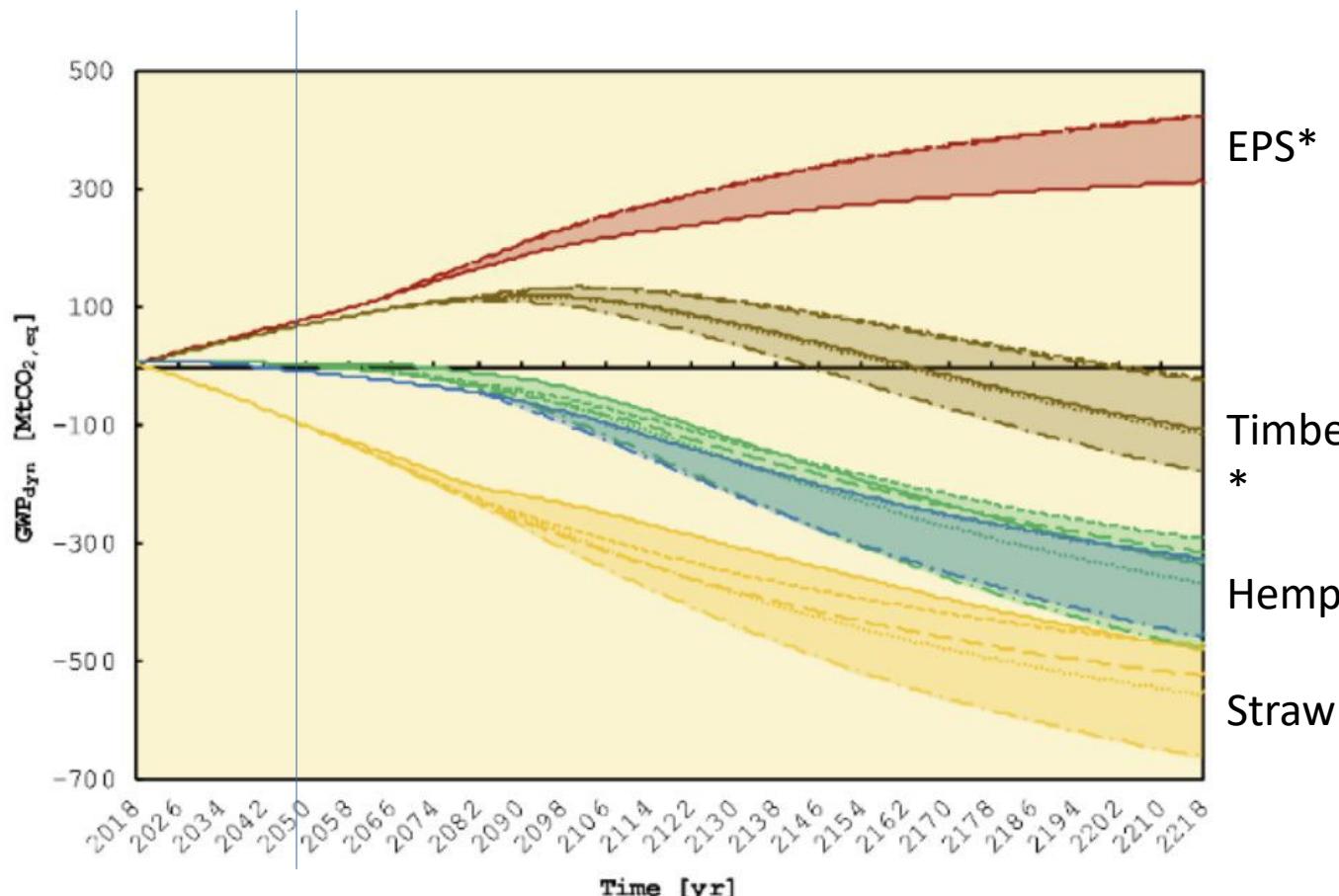
+ 30 - 60 cm
Straw walls

= Climate neutral building



Adapted from: Carcassi et al., 2022. Material diets for Climate-Neutral construction. *Environmental Science and technology*

What if...



„[Straw*] showed the most promising potential, being the only Hempcrete* one able to remove by 2050 3% of the CO₂-eq emitted from all sector in 2015“

*Functional Units, see article

Figure 4. Dynamic GWP for all scenarios

Pittau 2019, A Life-Cycle Approach to Building Energy Retrofitting: Bio-Based Technologies for Sustainable Urban Regeneration
<https://iopscience.iop.org/article/10.1088/1755-1315/290/1/012057/pdf>



baubüro insitu ag, circular straw insulated addition <https://www.insitu.ch/projekte/196-k118-kopfbau-halle-118>



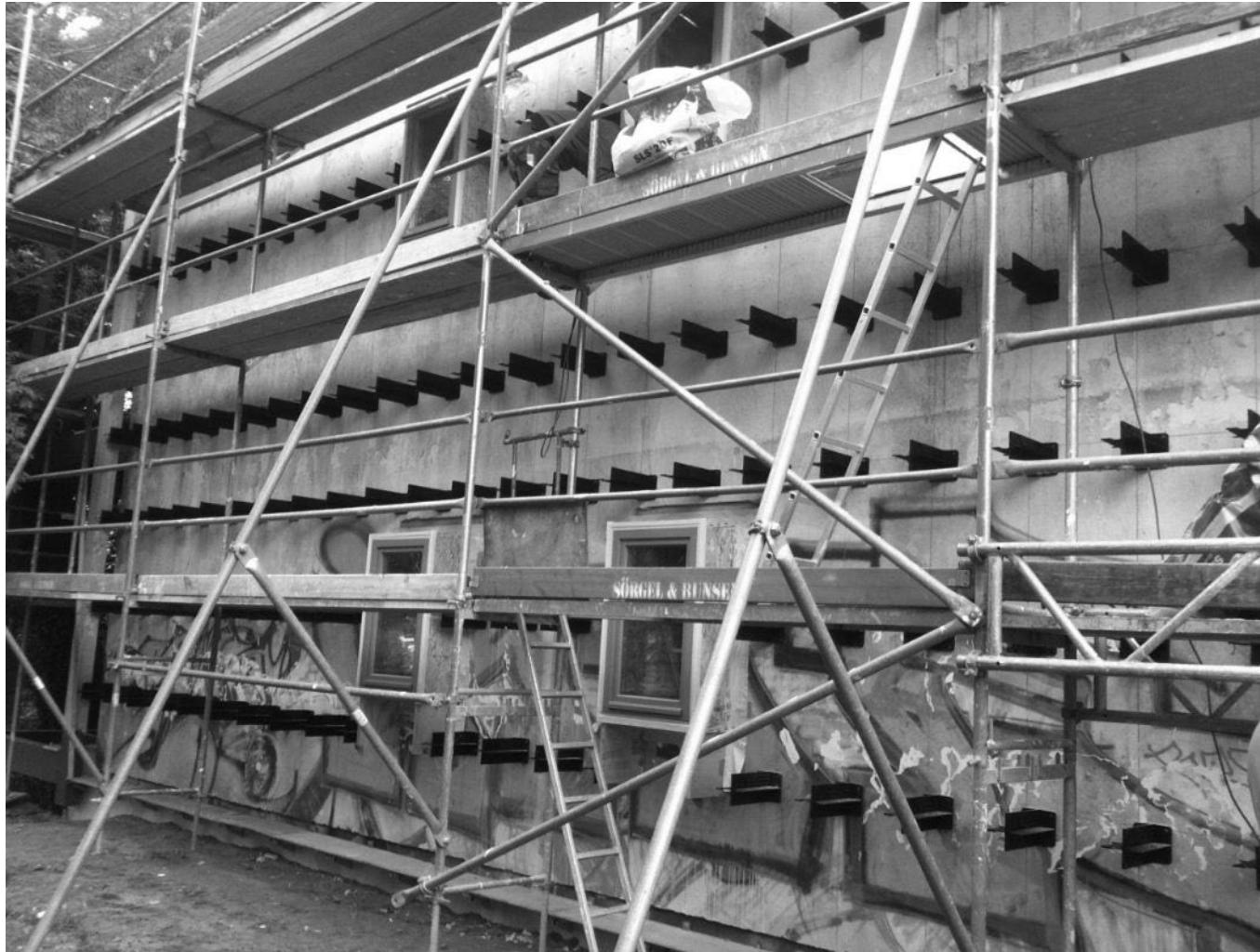
CRCLR HOUSE Berlin, ZRS Architekten Ingenieure <https://www.zrs.berlin/en/project/crclr-house-2/>



CRCLR HOUSE Berlin, ZRS Architekten Ingenieure <https://www.zrs.berlin/en/project/crclr-house-2/>



Schwerin <https://Schelfbauhuette.de>



Building Stock Challenge. Strohbauanker <https://Schelfbauhuette.de>



Building Stock Challenge, Strohbaulunker <https://Schelfbauhuette.de>



Building Stock Challenge, Strohbauanker <https://Schelfbauhuette.de>



Building Stock Challenge, Strohbauanker <https://Schelfbauhuette.de>



300m³ Straw Photo:Benediktinerabtei Plankstetten

<https://www.fnr.de/presse/pressemitteilungen/aktuelle-mitteilungen/aktuelle-nachricht/groesster-strohballenbau-sueddeutschlands-wird-eingeweiht>



Résidence Jules Ferry · ASP architecture ·
crédit Arthur Janin



Photo: Laetitia van Eeckhout in Le Monde:
https://www.lemonde.fr/planete/article/2014/05/19/dans-les-de-huit-etages-en-paille_4421393_3244.html



Photo: ASBN Herbert Gruber <https://baubiologie.at/strohballenbau/7-stckiges-modulbau-in-den-vogesen-3/>

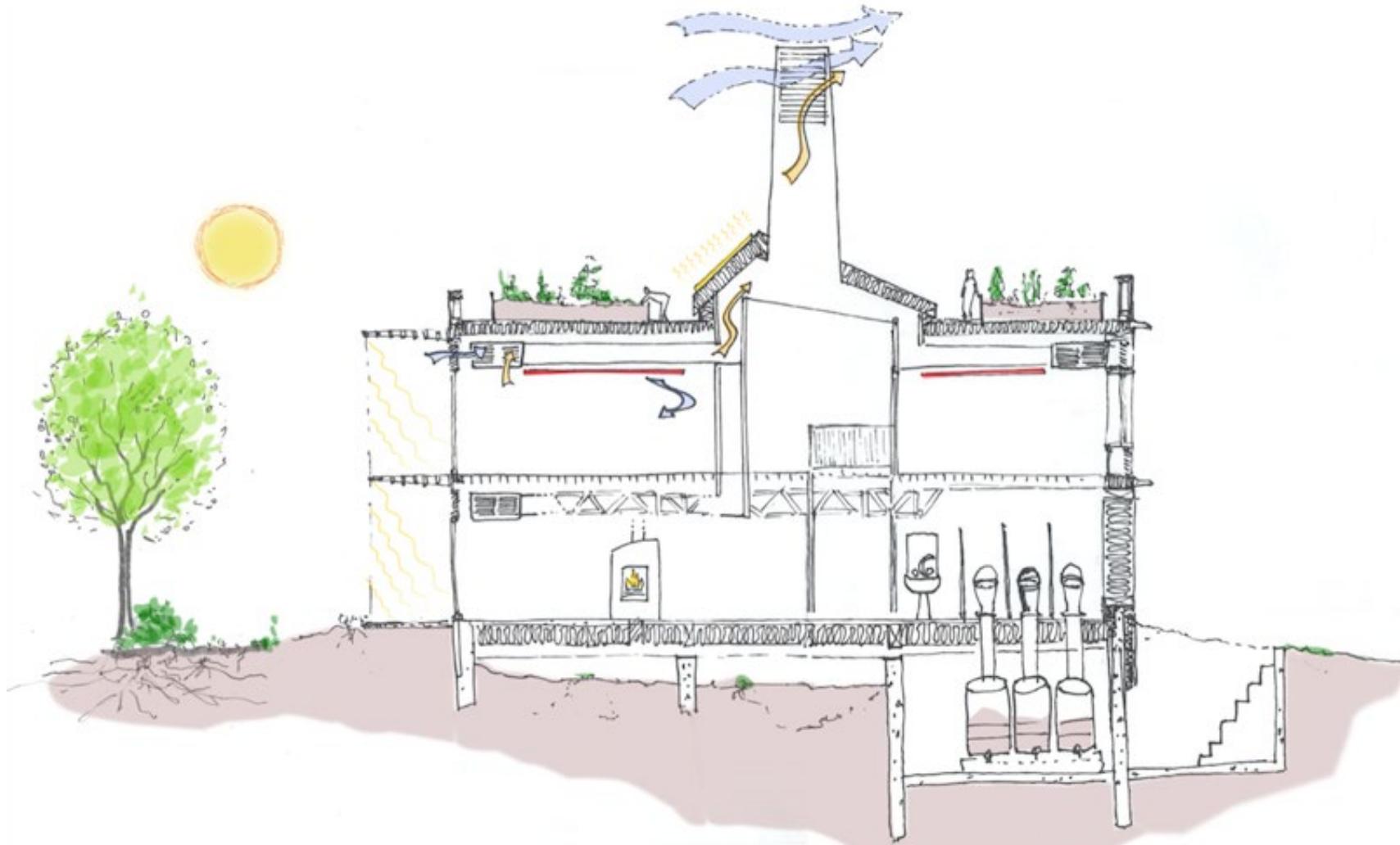
Résidence Jules Ferry · ASP architecture ·



Ferme du Rail · Grand Huit · crédit Grand Huit
Paris



Leisure center - Jacques Chirac - Rosny-sous-Bois

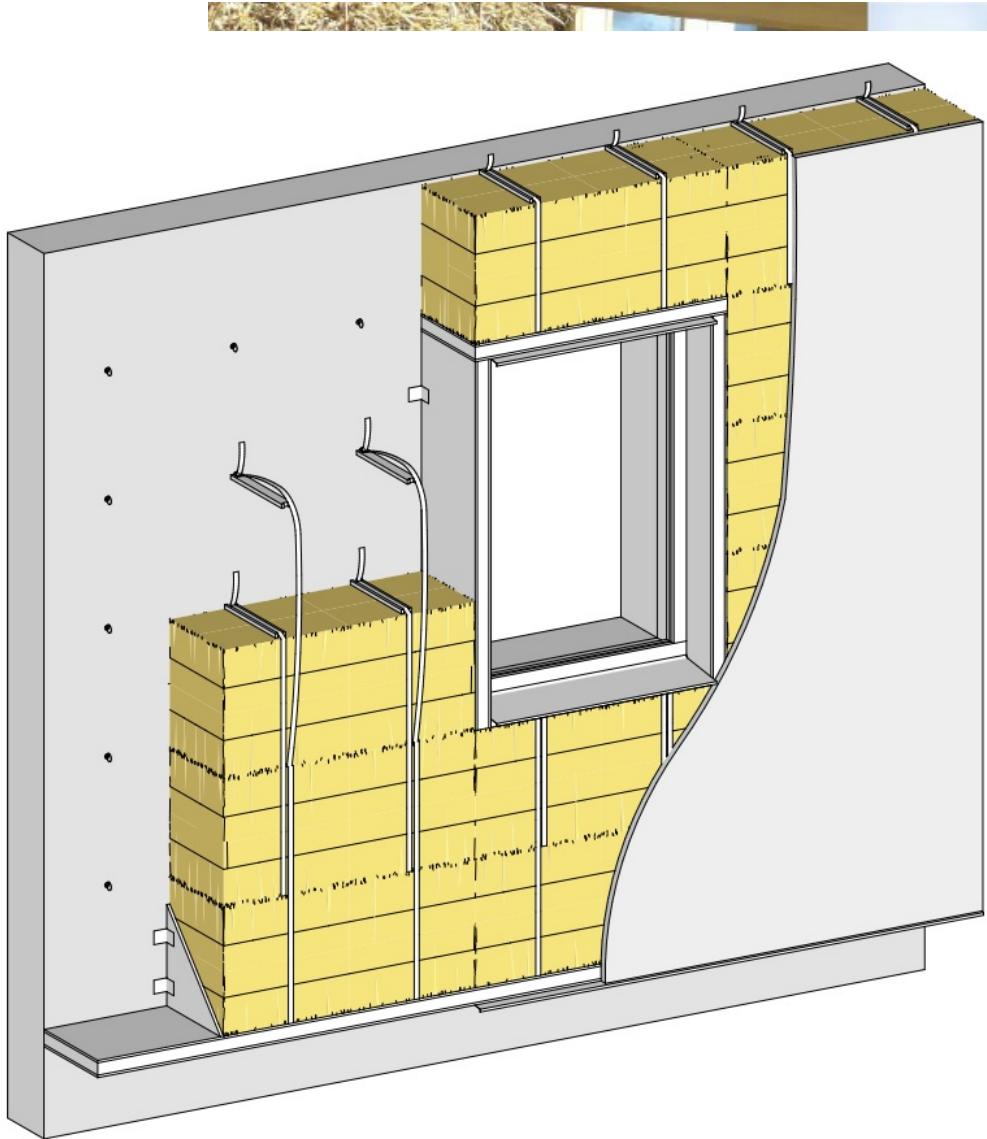


Low tech wind tower

Leisure center - Jacques Chirac - Rosny-sous-Bois



<https://www.batirama.com/article/34010-de-la-paille-pour-l-isolation-par-l-exterieur-d-un-immeuble-existant-en-plein-paris.html> and
<https://iledefrance.constructionpaille.fr/blog/e-chantier-dite-paille-fait-sa-rent%C3%A9e/>



<https://www.batirama.com/article/34010-de-la-paille-pour-l-isolation-par-l-exterieur-d-un-immeuble-existant-en-plein-paris.html> and
<https://iledefrance.constructionpaille.fr/blog/e-chantier-dite-paille-fait-sa-rent%C3%A9e/>



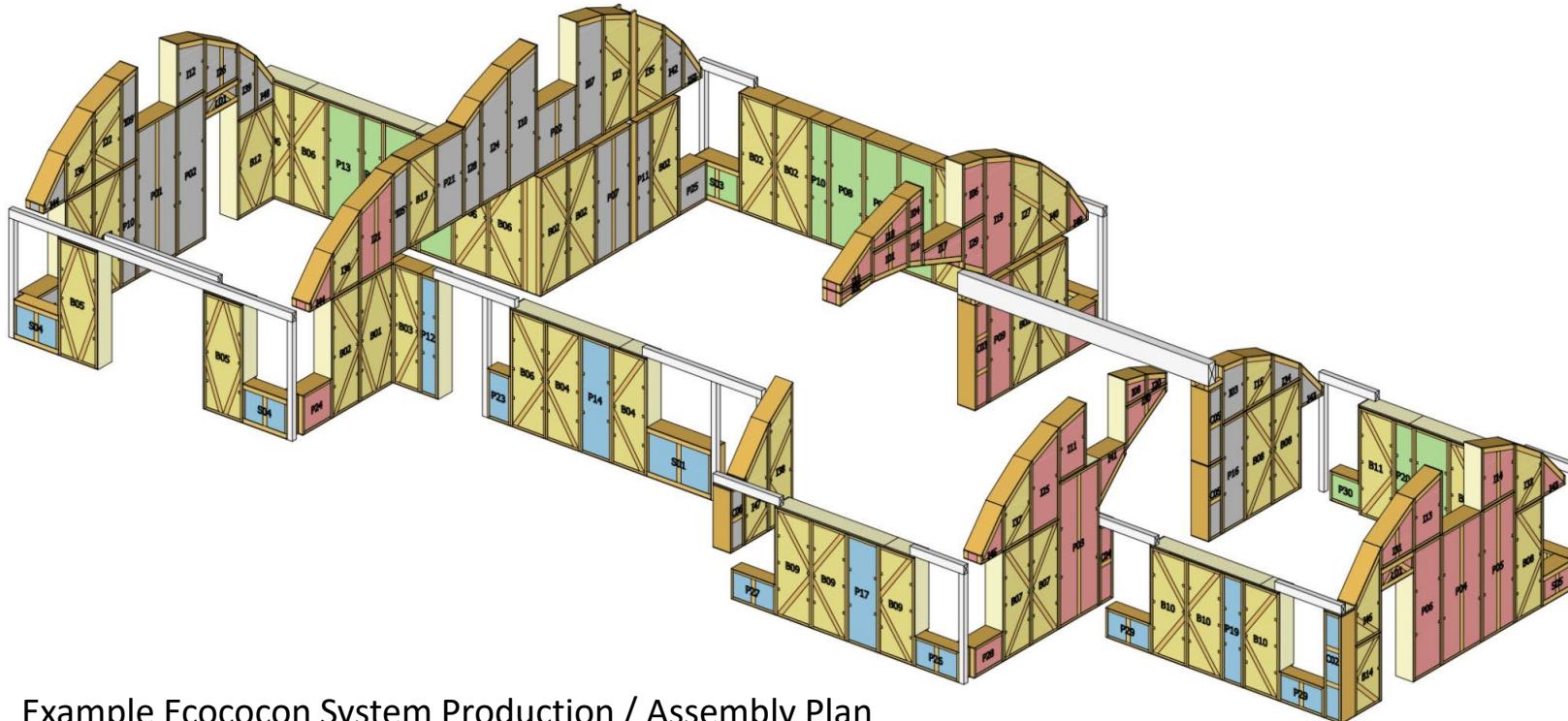
<https://www.batirama.com/article/34010-de-la-paille-pour-l-isolation-par-l-exterieur-d-un-immeuble-existant-en-plein-paris.html> and
<https://iledefrance.constructionpaille.fr/blog/e-chantier-dite-paille-fait-sa-rent%C3%A9e/>



Trait Vivante Architectes



ECOCOCON prefabrication



Example Ecococon System Production / Assembly Plan (Designed by Strombro Building Workshop)



ECOCOCON's new building for automated straw panel production. Photo: Milan Hутera



Lokalzeit
RUHR

Retrofit of several swimming pools Oberhausen, Lorenz Systeme



Retrofit of several swimming pools Oberhausen, Lorenz Systeme



Retrofit of several swimming pools Oberhausen, Lorenz Systeme



Atelier Werner Schmidt, Photos: Lucia Degonda / AWS <https://www.atelierschmidt.ch/sanierung-susch>



Atelier Werner Schmidt, Photos: Lucia Degonda / AWS <https://www.atelierschmidt.ch/sanierung-susch>



Atelier Werner Schmidt, Photos: Lucia Degonda / AWS <https://www.atelierschmidt.ch/sanierung-susch>



Deep Retrofit Complemedis GmbH <https://www.atelierschmidt.ch/>



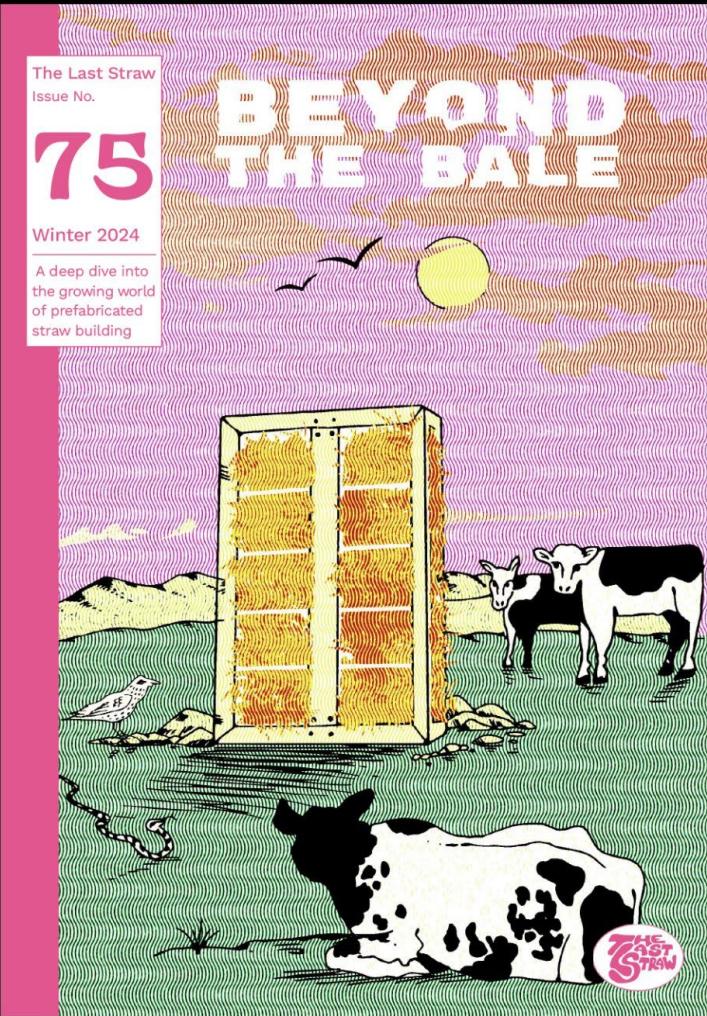
Deep Retrofit Complemedis GmbH <https://www.atelierschmidt.ch/>



Deep Retrofit Complemedis GmbH <https://www.atelierschmidt.ch/>



Strawbale-Wrapping



<https://www.thelaststraw.org/>



Mock up: mostly paludi culture products by Hudson Architects <https://hudsonarchitects.co.uk/>



External Wall Insulation System
<https://www.maxit-strohpanel.de/>



External Wall Insulation System
<https://www.maxit-strohpanel.de/>



External Wall Insulation System <https://www.maxit-strohpanel.de/>

maxit® REFERENZ

Strohdämmung | Altbausanierung





Edge East Side Tower „Amazon Tower“
Straw drywall panels





Other recommendations for your business



Straw mat weaving
machine/Reed mattress...

**US\$8,000.00 -
US\$10,000.00**

Min. order: 1 set



Straw mat sewing/reed
mat knitting straw braiding...

**US\$1,500.00 -
US\$1,690.00**

Min. order: 1 set



High efficiency agricultural
recycling bamboo reed...

**US\$1,800.00 -
US\$2,500.00**

Min. order: 1 set



Super quality rice straw mat
weaving machine/reed ma...

**US\$9,500.00 -
US\$12,000.00**

Min. order: 1 piece

Total options: 1 Model Number.

[Select now](#)

1. Model Number(1)

WT-1000

Shipping

Shipping solutions for the selected quantity are currently unavailable

[Start order request](#)

[Contact supplier](#)



Protections for this product



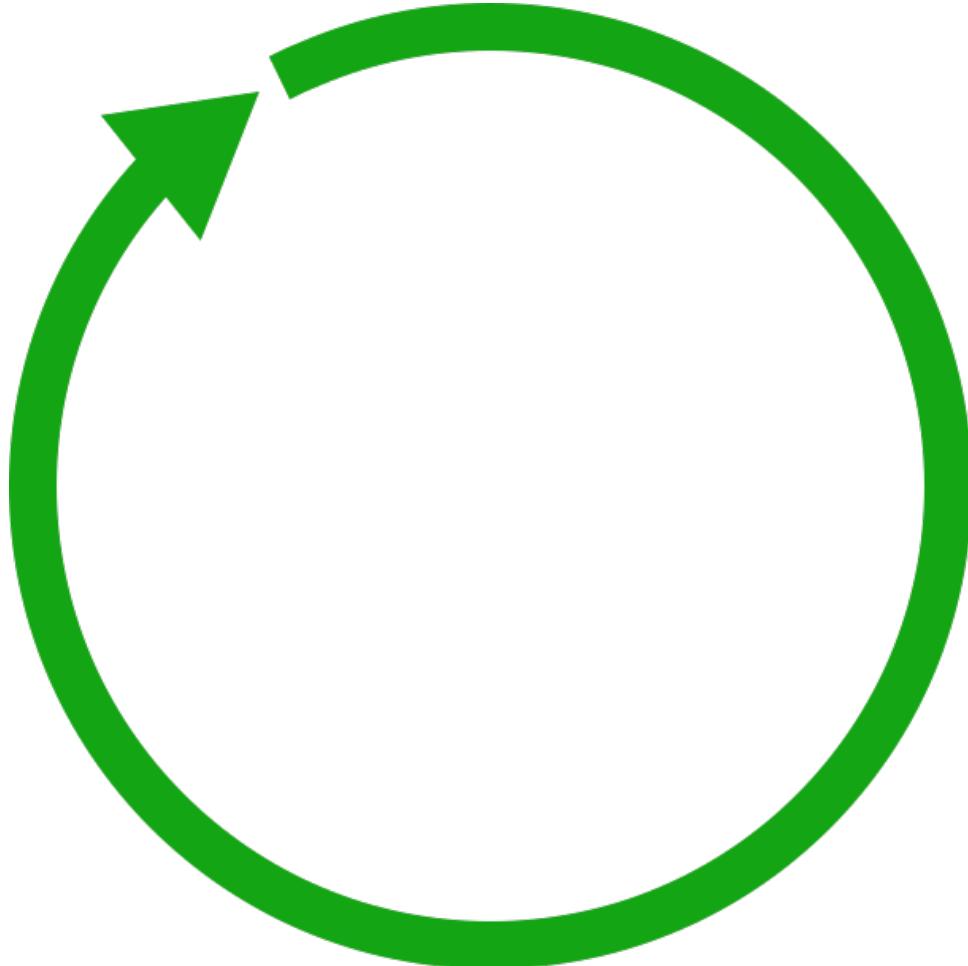
Secure payments

Every payment you make on Alibaba.com is secured with strict SSL encryption and PCI DSS data protection protocols

Easy Return & Refund

Claim a refund if your order is missing or arrives with product issues, plus free local returns for defects on qualifying purchases

Alibaba.com protects all your orders placed and paid on the platform with Trade Assurance





- Michael Burchert | burchert@bauwende.de | let's connect
<https://linktr.ee/michaelburchert>

Bonus

STEP Training and practical workshops
and further technical information:

STEP Training: <https://baubiologie.at/strohballenbau/step-straw-bale-training>

Practical-Workshops: <https://www.strohnatur.at/next-workshops-how-you-can-build-a-strawbale-house>

Registration-Form in general: <https://baubiologie.at/strohballenbau/step-straw-bale-training>

Registration-Form in Detail: <https://forms.gle/xp8e4v8RqBq4GyT6>

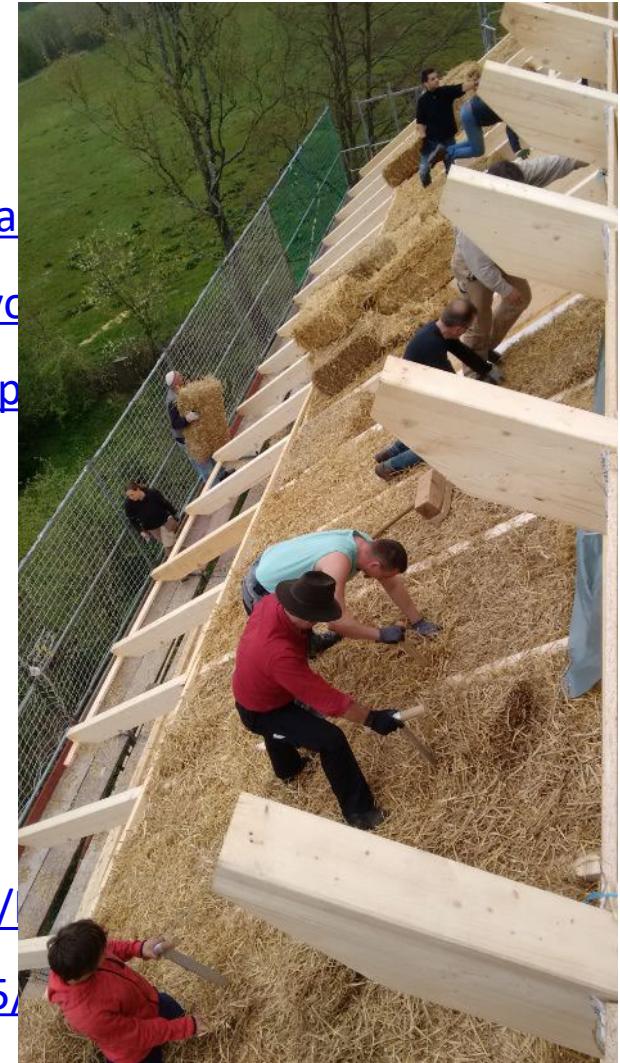
YouTube-Info about STEP: <https://youtu.be/ciKRw5vFcXM>

Workshops in Germany: <https://biwena.de> | <https://nznb.de>

German Strawbale Building Association: <https://fasba.de>

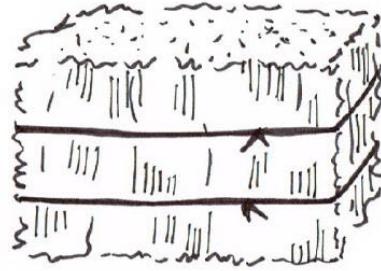
Construction Material authorization for Strawbales in Germany: <https://www.bauaufsichtsamt.de/strawbale>

Further Technical Information: <https://www.zotero.org/groups/2187655>

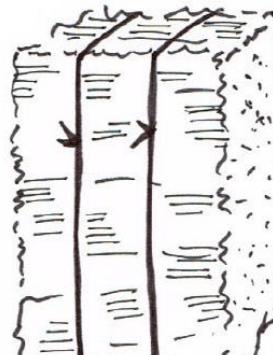


key takeaways, you can do it:

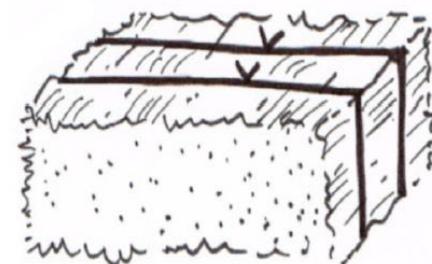
- >85kg /m³ Strawbale = class E
- >8mm **clay** plaster on both sides = B, s1, d0 in timber stud wall, more with lime (up to F90-B)
- λ_R , Germany = **0.049 W/(m·K)** with Stalk orientation predominantly vertical to the heat flow. So Bale vertically or horizontally on Edge (...not flat)
 - wheat and rye are particularly well-suited, whereas oat must be viewed as unsuitable
- Stud width <1m
- +10% compression in frame
- Gapless, settlement proof
- Airtight, windtight
- Smells good
- Clean site, happy site



vertical on edge



horizontal on edge



flat

Resilience, classic timber construction rules:

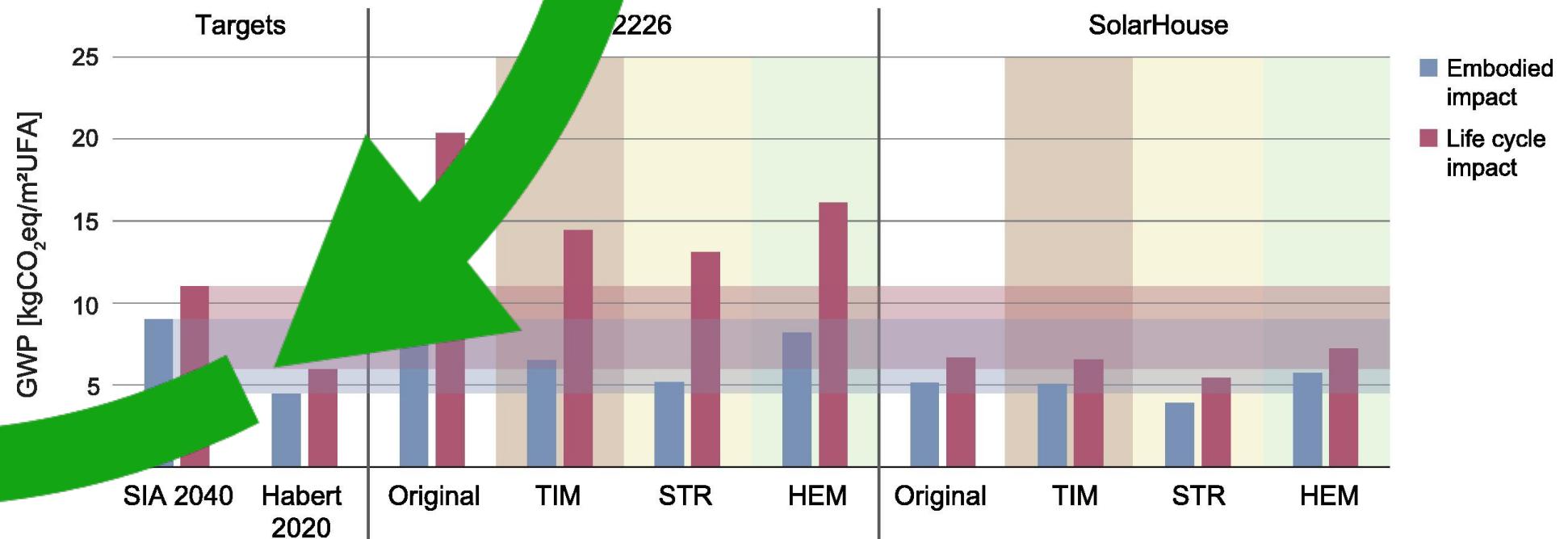
- Large Hat
- High Boots
- new:
- Warm Coat
- Plan with future water damage



Biogenic construction materials Architecture tectonics, Cinark, Royal Danish Academy 2023

https://issuu.com/cinark/docs/til_issuu_23.03.2023_biogenic_construction_bg_fina/1?ff&experiment=last-page

Contextualisation of embodied and life cycle GWP results with climate targets for buildings from literature



Luise Mouton, Damien Trigaux, Karen Allacker, Martin Röck,

Low-tech passive solar design concepts and bio-based material solutions for reducing life cycle GHG emissions of buildings – Life cycle assessment of regenerative design strategies (2/2), Energy and Buildings, Volume 282, 2023, 112678, ISSN 0378-7788, <https://doi.org/10.1016/j.enbuild.2022.112678>.