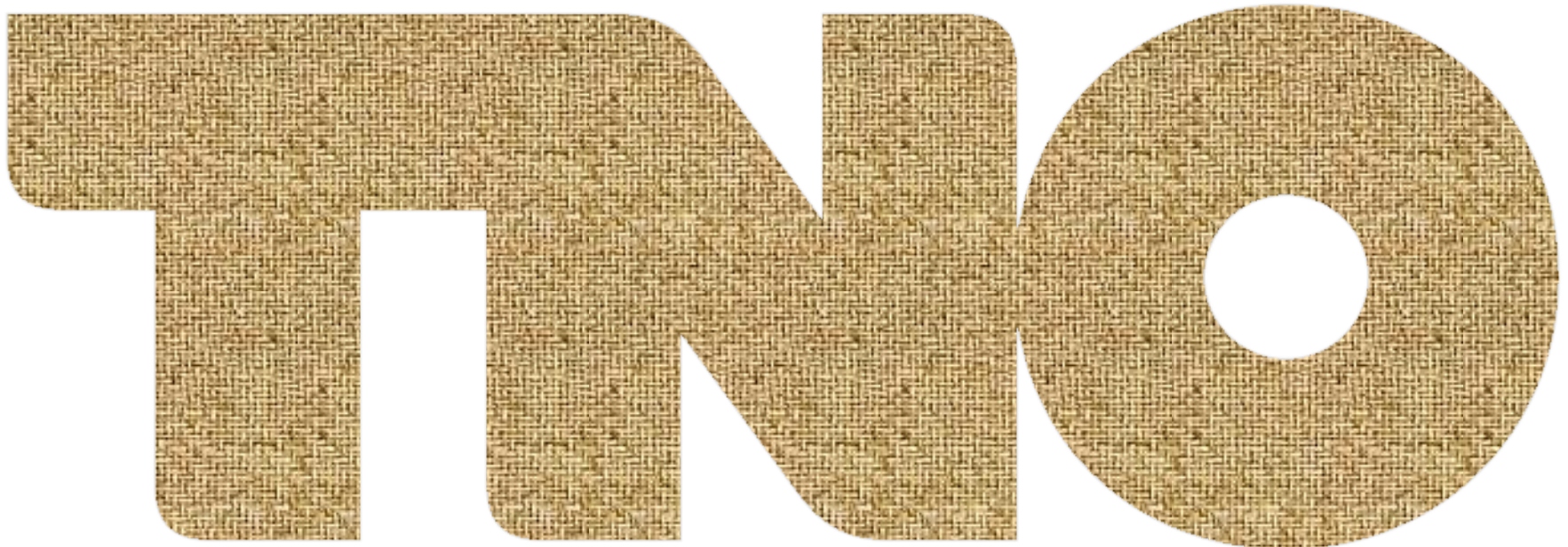


Environmental quickscan

as a decision support tool

Presentation version March 2014

René van Gijlswijk



TNO



TNO in BioBuild

- ▶ Leader of environmental and economic analysis
 - ▶ Establishing a benchmark: traditional building products
 - ▶ Quick scan environmental impact and costs during development
 - ▶ Final assessment: do the BioBuild products meet embodied energy & costs targets?

Contents

1. Environmental assessment in BioBuild
2. Approach
3. Example of results: how do BioBuild products perform?

Environmental assessment in BioBuild

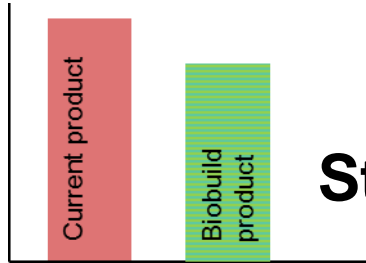
Use biocomposite materials
to reduce embodied energy in:

- building facade
- internal partition wall
- external wall panel
- suspended ceiling

by at least 50% over current materials with no increase in cost.

Approach: three steps

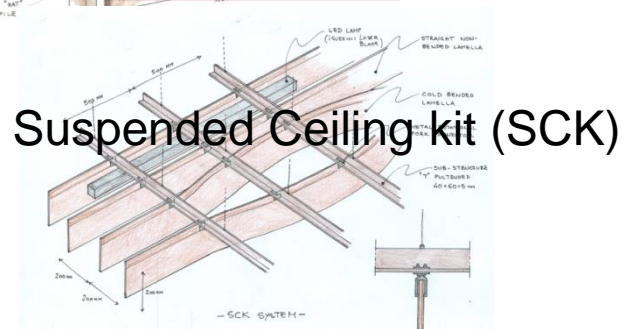
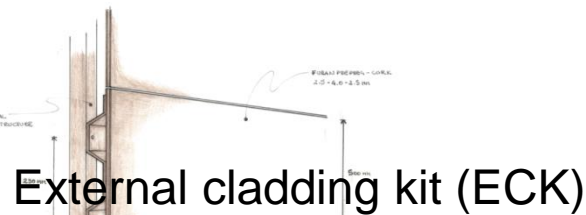
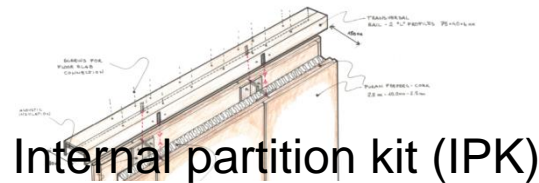
1. Benchmark = setting the reference point
2. Quickscan = to support decisions during development
3. Final assessment = evaluating the developed product



Step 1 – benchmark

What is the environmental performance of current building products?

Biobuild product



Current product

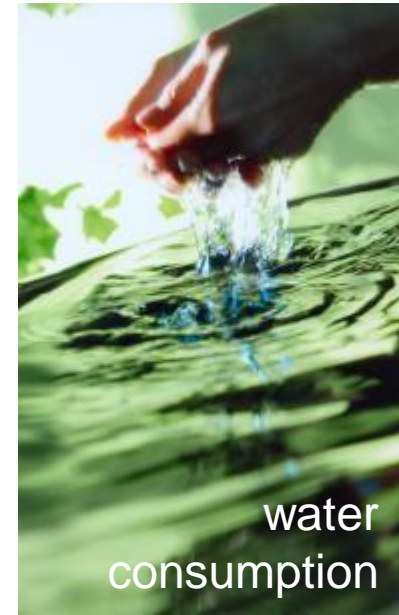
Knauf gypsum/steel

Fibreline GFRP
Alucobond (alu + LDPE)

Fibre gypsum lamella
Aluminium lamella

Step 2 – quickscan

- ▶ Aim is to provide environmentally relevant information:
 1. To support decision making
 2. To generate recommendations for development
 3. To monitor progress towards final goals



Quickscan in practice: feedback from engineers and finetuning

- › Results have been presented to the engineers and designers every 3 months; just ahead of the decision making schedule in the project
- › Results have been presented with meta-information: choices and assumptions with large influence, in particular with high uncertainty
>> show the effect; feedback from the engineers

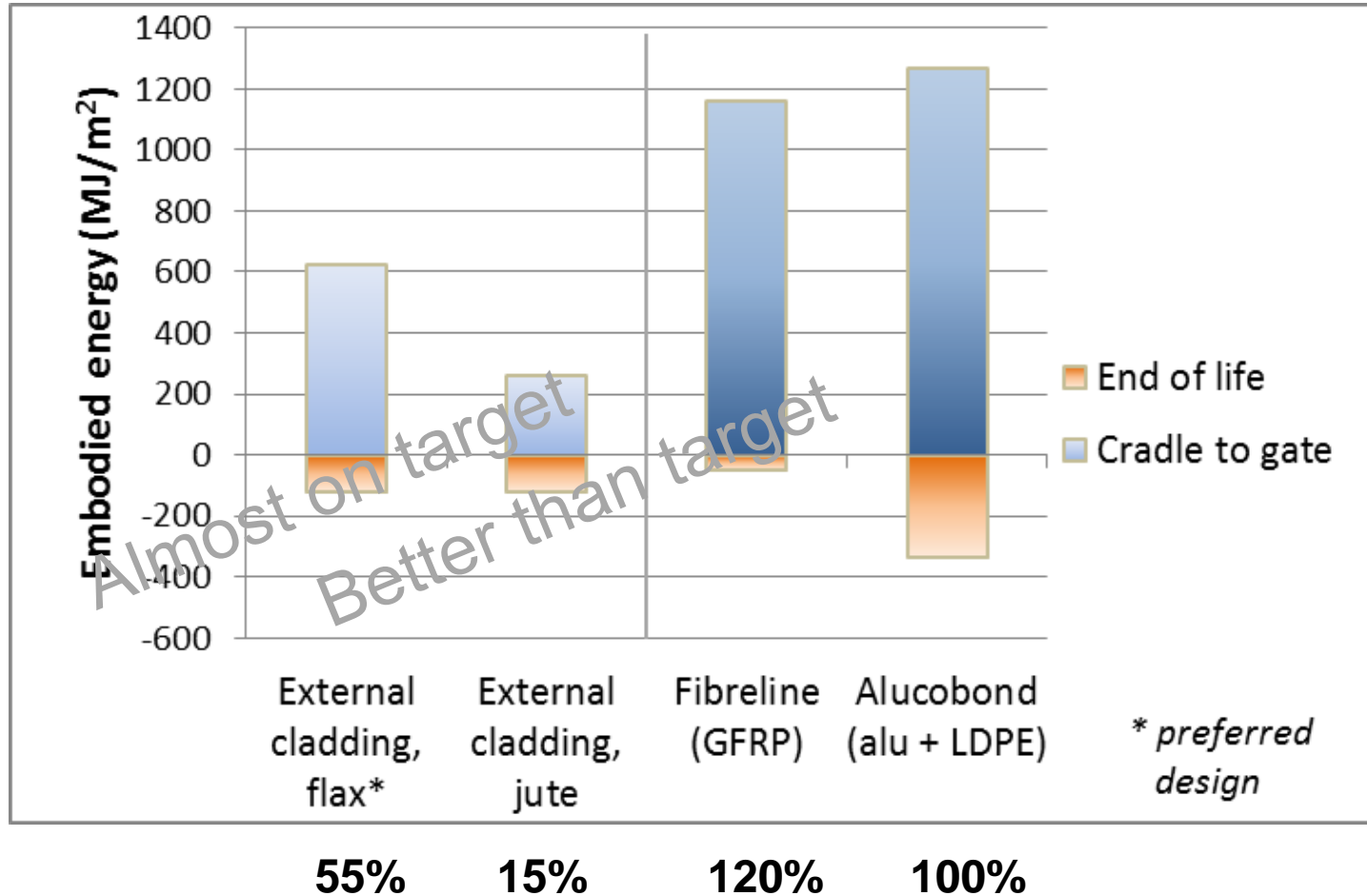
Step 3 – final assessment

- › Goal: final ‘verdict’ of BioBuild products: how do they measure up against benchmarks for costs and environment? Can we meet 50% embodied energy reduction at no additional cost?
 - › Complete life-cycle assessment and life-cycle cost assessment
 - Life span
 - Maintenance
 - Demolition and recycling or disposal
 - › Best estimate of impact of full scale manufacturing by extrapolation
 - › Effects of large scale application

Example of results

Embodied energy

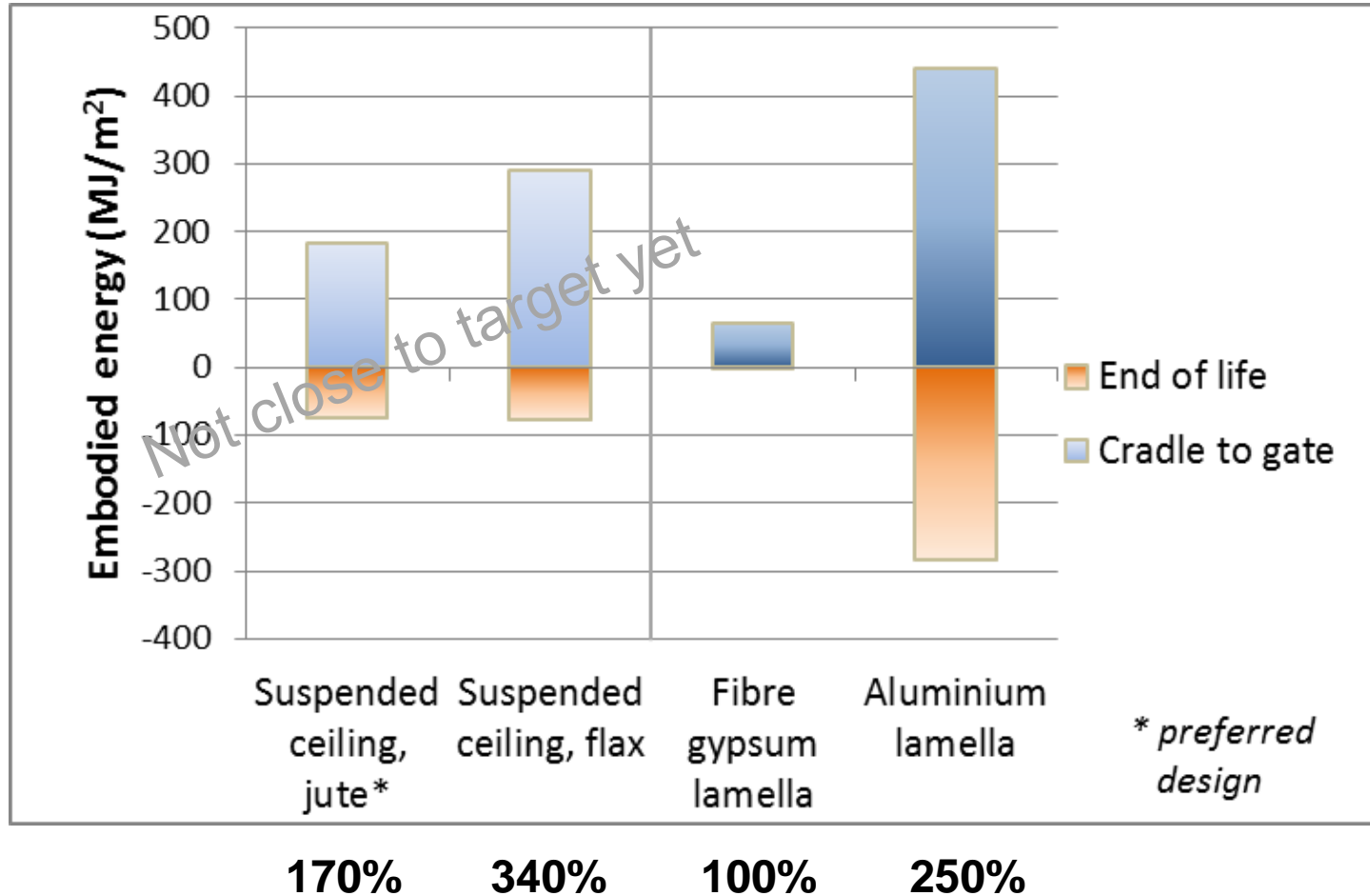
First results external cladding kit



Note: design, composition and manufacturing is still under development

Embodied energy

First results suspended ceiling kit



Note: design, composition and manufacturing is still under development

Summary

- › In BioBuild, we monitor the environmental performance of our products during development.
- › Main target: reduction of 50% of embodied energy compared to non-biobased products.
- › For some cases we are already on target, for some we are not yet.
- › Results have an uncertainty. We continuously work on improving the reliability during the project to clearly indicate BioBuild advantages at the end of the project.

Thank you for your attention!

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Scope of embodied energy in this study

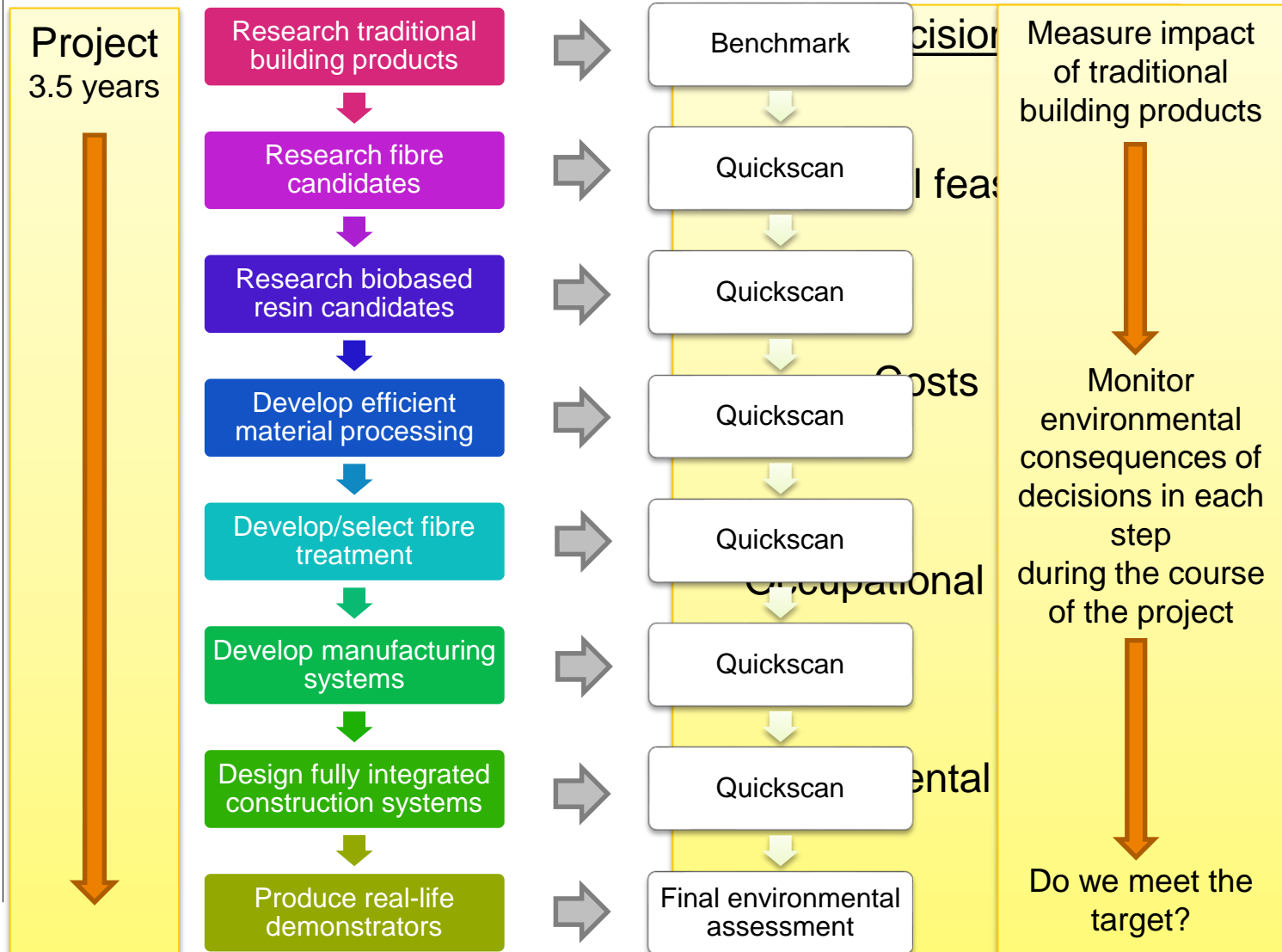
Included:

- › *Non-renewable* energy consumption in production phase (in e.g. agriculture, mining, materials processing, panel manufacturing)
- › *Non-renewable* energy consumption (and benefits) of end-of-life treatment
- › Chemical energy in non-biobased materials and compounds

Excluded:

- › The use of renewable energy (biofuels, wind, sun, hydro)
- › Chemical energy in biobased materials

BioBuild: environmental quickscan



Quickscan methodology step 3: design

A tool has been developed to feed the panel design process with environmental information.

It consists of:

1. Environmental data for processes
 - › BioBuild (BioBuild materials, processing, panel manufacturing, maintenance, end-of-life)
 - › Traditional (materials, processing, panel manufacturing, maintenance, end-of-life)
 2. Data link with 3D design tool
 - › Materials
 - › Volumes
 - › Surface areas
 3. Definition of cases
 4. Calculation for life cycle
- › Once the design has been adapted, it takes 5 minutes to recalculate the environmental performance.

