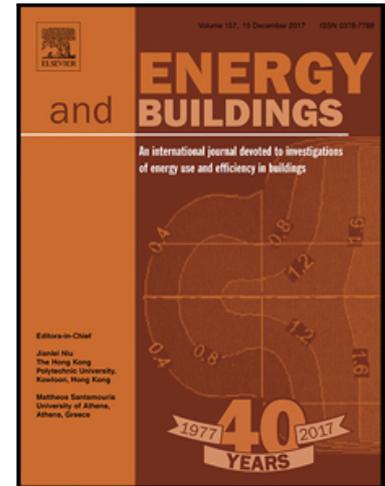


Accepted Manuscript

Is a net life cycle balance for energy and materials achievable for a zero emission single-family building in Norway?

Torhildur Fjola Kristjansdottir, Aoife Houlihan Wiberg,
Inger Andresen, Laurent Georges, Niko Heeren, Clara Stina Good,
Helge Brattebø

PII: S0378-7788(17)32529-X
DOI: [10.1016/j.enbuild.2018.02.046](https://doi.org/10.1016/j.enbuild.2018.02.046)
Reference: ENB 8376



To appear in: *Energy & Buildings*

Received date: 26 July 2017
Revised date: 16 February 2018
Accepted date: 19 February 2018

Please cite this article as: Torhildur Fjola Kristjansdottir, Aoife Houlihan Wiberg, Inger Andresen, Laurent Georges, Niko Heeren, Clara Stina Good, Helge Brattebø, Is a net life cycle balance for energy and materials achievable for a zero emission single-family building in Norway?, *Energy & Buildings* (2018), doi: [10.1016/j.enbuild.2018.02.046](https://doi.org/10.1016/j.enbuild.2018.02.046)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Is a net life cycle balance for energy and materials achievable for a zero emission single-family building in Norway?

Torhildur Fjola Kristjansdottir^a, Aoife Houlihan Wiberg^a, Inger Andresen^a, Laurent Georges^b, Niko Heeren^c, Clara Stina Good^d and Helge Brattebø^b

^a*Institute for Architecture and Technology, Norwegian University of Science and Technology, Alfred Getz vei 3, 7491 Trondheim, Norway,*

^b*Department of Energy and Process Engineering, Norwegian University of Science and Technology, Kolbjørns Hejes vei 1B, 7491 Trondheim, Norway*

^c*Department of Civil, Environmental and Geomatic Engineering, ETH Zurich, Switzerland*

^d*Institute for Physics and Technology, The Arctic University of Norway, Tromsø, Norway*

Abstract

In this study, the objective is to redesign a previous concept for a single-family Zero greenhouse gas Emission Building (ZEB). The concept is redesigned based on comparing greenhouse gas (GHG) emission loads and compensation from different design solutions applied in Norwegian single-family ZEB pilot buildings and selected sensitivity studies. The objective is to see if a previously developed ZEB model (2011) can be redesigned to achieve a life cycle energy and material emission balance (ZEB-OM), which previously was not achieved. Five different design parameters are evaluated: area efficiency, embodied emissions in the envelope, insulation thickness, heating systems and different roof forms with respect to the photovoltaic area. Embodied emissions reductions were possible in the ground foundation, from around 1 kg CO₂/m² to 0.6 kg CO₂/m² per year. Both models are able to compensate for all operational emissions. The new model is in addition able to compensate for 60% of embodied emissions, whereas the previous model only could compensate for 5%. The new model does not reach the life cycle energy and material balance. The paper presents and discusses different approaches for achieving the ZEB-OM balance. Further concept model optimization is needed.

Keywords: Embodied emissions, life cycle, residential, single-family, zero

Download English Version:

<https://daneshyari.com/en/article/6728231>

Download Persian Version:

<https://daneshyari.com/article/6728231>

[Daneshyari.com](https://daneshyari.com)