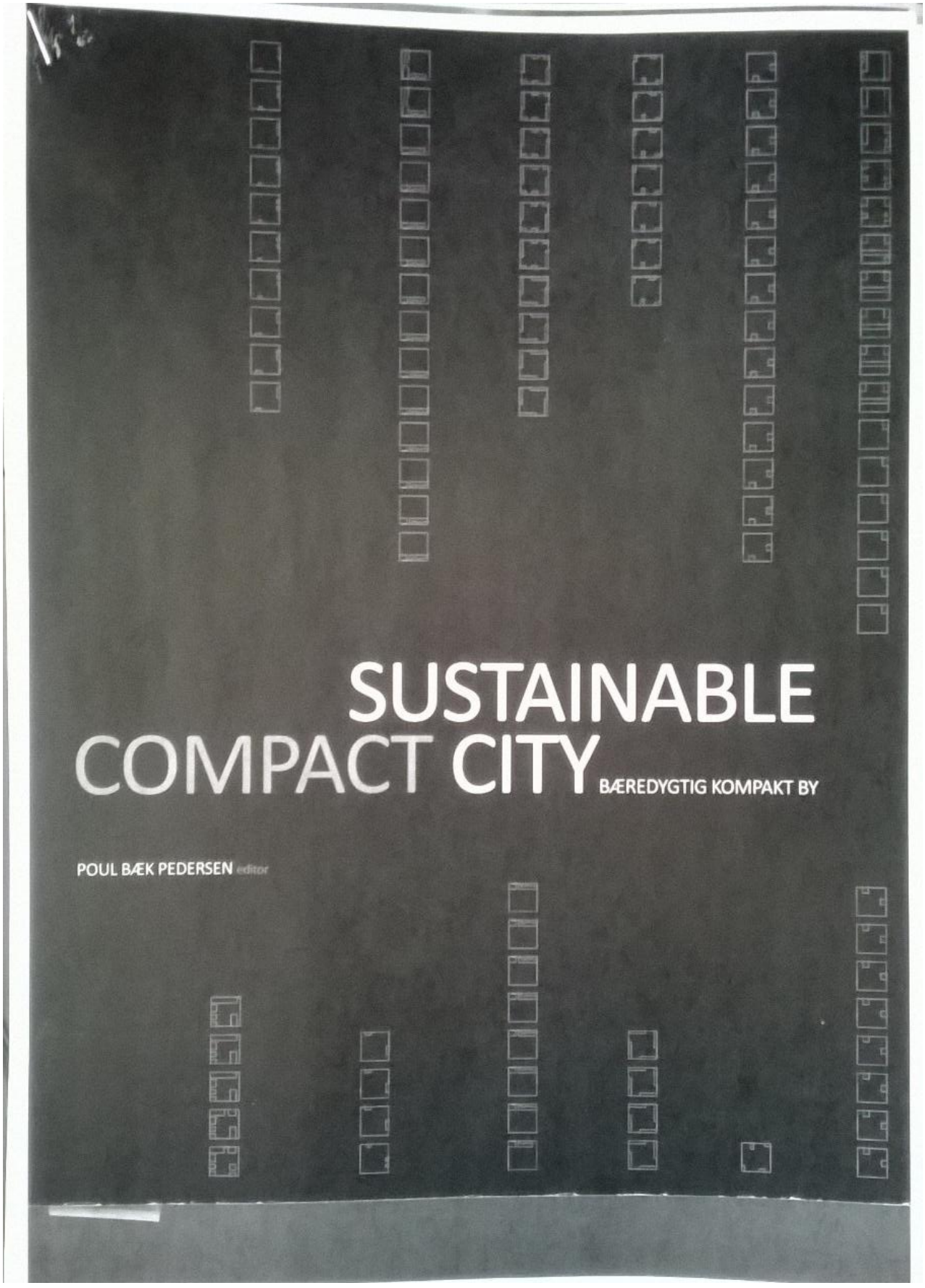

SUSTAINABLE COMPACT CITY

BÆREDYGTIG KOMPAKT BY

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ENERGY ENERGI

Experience has shown that in addition to current evaluations of degree of thermal insulation and thermal mass, the building's 'relative compactness', and therefore the design and geometry, as well as the orientation of the building and the distribution of windows on the façade, are some of the parameters that contribute to the building's collective energy consumption.
The tougher the requirements made to the total energy consumption of the buildings, the more focus there needs to be on not only optimising the individual building elements or the technical systems, but on a collective evaluation of all the components making up the building design, interior and operation.
The goal of this is to evaluate how the building's design, FAR and compactness influence energy consumption.

Method

For the evaluation of the building's energy consumption IES - Virtual Environment (IESve) is utilised and not Be06, which is the programme utilised in Denmark for energy classification of buildings.
There are several reasons for choosing IESve rather than Be06.

1. Several building types with varying complexity in relationship to each other have been evaluated. The buildings are seen in an overview and the energy consumption of individual dwellings is not reviewed.
2. An evaluation via Be06 would entail a very detailed investigation for some of the building types due to the geometrical limitations of the Be06 programme.
3. IESvE is a 3D building model where a part of the plotting work is reduced. In addition, the geometrical building model has been able to be utilised in a number of the analyses in the project, among others, regarding wind, solar and daylight conditions.
4. Since neither the level of space nor individual apartments has been addressed, but instead the building level, the IESve model is organised so that the inputs to the model and the calculations are as close to Be06 as possible. However, since the method of calculation and the degree of detail are quite different from each other, it will not be possible to attain complete correlation between the outputs of the 2 programmes.

Electrical consumption for ventilation and circulation, and for the heating of warm domestic water, is not compared as it is accepted to be the same for the 8 buildings. The air supply is included as a calculation since it has a bearing on the heating and cooling needs.

Addition of building variations

In order to analyse the results in more detail, we have found it advantageous to introduce some supplemental building variations. An adjustment to 3 of the models has been made to a more compact version where voids and projections have been removed. This is included in order to evaluate to what degree compactness has an influence on energy consumption.

The following models have been adjusted:

- Urban Block Compact
- High Rise Compact
- Super Block Compact

To show the importance of the building's orientation, calculations have been made for the individual building types where the buildings are rotated 90 degrees, in order to achieve a north/south orientation.

The following types have been analysed:

- Super Block Rotated 90°
- Super Block Compact Rotated 90°

Parameters evaluated

For the comparison of the building's relation to energy usage, the following parameters have been evaluated:

- Relative surface-volume relation [the total surface / surface of cube with the same volume]
- The building's relational energy consumption

Compactness

The relative surface/volume relation is fixed according to size by calculating the surface of a cube with the same volume. Compactness is thereby expressed as a parameter that will always be larger than 1. Refer to the appendix for a more detailed description.