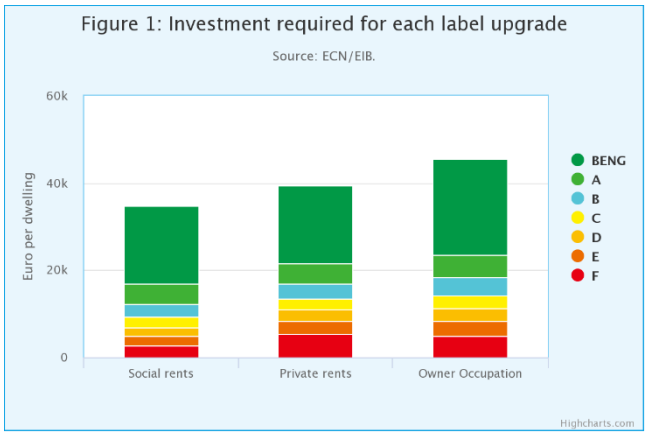
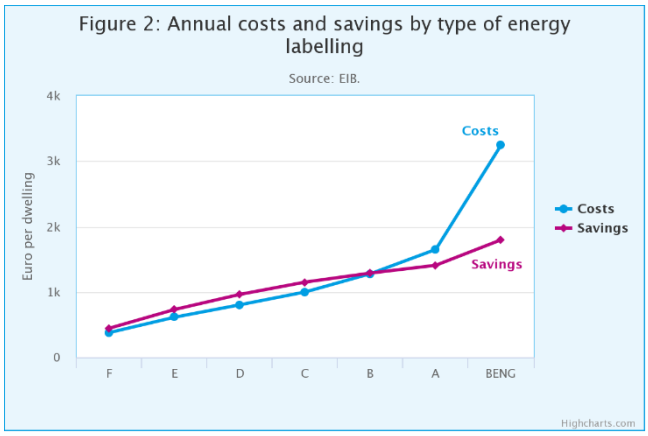
Insights on increasing the energy efficiency of the Dutch housing stock

Most European governments have picked up on the ambition to drastically reduce CO2 emissions in the fight against climate change. There are many ways to tackle the CO2 problem. Several of these opportunities stem from the climate policy concerning the built environment. One of the possibilities that is being contemplated by the Dutch government is converting the entire housing stock to energy neutral buildings by 2050. In the context of this ambitious intention, EIB researched the costs and gains of this proposed measure. Our research estimates that upgrading the entire existing Dutch housing stock to an energy neutral status requires an investment of € 235 billion. However, this investment is haunted by what we have called 'The Efficiency Gap'.

The energy efficiency of buildings in the Netherlands is rated by labels ranging from A to G. Buildings with label A are considered energy efficient, while buildings with the (lowest) G label are least energy efficient. In addition to this, buildings with an energy neutral status are characterised as BENG. Buildings can upgrade to higher labels when certain investments are undertaken that improve the energy efficiency of these buildings. The investment required differs for each label upgrade. Figure 1 shows the investments needed for each label upgrade. The graph shows that the costs increase with every label step.



A part of these investments can be offset by the reduction in energy costs as a result of the increase in energy efficiency. There are even cases where the energy savings exceed the investment costs, making a label upgrade profitable. However, research shows that while the investment costs increase with every label upgrade, the energy savings per label upgrade decrease. The first couple of label upgrades (until label C) are quite profitable financially speaking, whereas the later upgrades (to A and BENG) suffer from a sharp decrease in profitability. This phenomenon, where the most ambitious label upgrades suffer from a decrease in profitability, is what we call the efficiency gap. The efficiency gap is visualized in figure 2, which shows the annual costs and savings per label upgrade.



It should be noted that the above savings are calculated based upon theoretical assumptions of energy usage. In reality there is a great diversity in buildings, situations and other factors that can affect actual savings. The scenario presented in figure 2 can be regarded as a best case scenario, which means that in reality the profitability of upgrading to a higher label will probably be lower. This increases the intensity and relevancy of the efficiency gap.

Despite the efficiency gap, there is still potential in the effort to upgrade the housing stock to higher labels if we abandon the ambition to reach an overall energy neutral status (for now). Figure 2 shows that upgrades up until label B are quite profitable or at least have minimal costs associated with them. Table 1 shows that in the Netherlands approximately 5.6 million dwellings are characterised by label C or lower. This means that for a large share of the housing stock there is a potential for large gains in terms of energy efficiency at relatively low costs.

Table 1: Housing stock by energy label in 2015
(in 1,000 dwellings)

Energy Label	Social Rents	Private Rents	Owner Occupation	Total
BENG	9	47	53	109
A	208	129	633	970
B	394	92	452	938
C	764	185	1,310	2.259
D	532	148	678	1.358
E	255	102	452	808
F	116	83	407	606
G	46	157	407	610
Total	2,324	944	4,391	7,658

Source: EIB

Lowering the ambition of the measure to label B does not make that much of a difference in terms of energy efficiency. If half of the Dutch housing stock would be converted to label B, total energy savings by 2050 will be 210 petajoule (PJ). This is not significantly less than the 260 PJ that will be saved by 2050 the total housing stock is upgraded to an energy neutral status. However, the costs are much lower. Getting 100% of the existing housing stock to energy neutral by 2050 will cost € 163 billion. Upgrading 50% of the housing stock to label B instead, only costs € 96 billion. In addition, such a label upgrade also lowers the efficiency gap (investments minus financial savings) from € 114 billion to € 48 billion. In the end, a relatively small amount of energy savings will be conceded by lowering the ambition to label B. Moreover, significantly less investments are required and the efficiency gap is narrowed.

Phasing the process also has two other important benefits. First of all, by spreading the label upgrades over time it becomes possible to benefit from forthcoming technological innovations. These innovations could mean that less investment is needed in the future to initiate label upgrades. A second benefit that comes with phasing the effort is that it puts less tension on the construction sector. The labour input required to convert the entire housing stock to an energy neutral status amounts to 63,000 fulltime jobs by 2050, while phasing the effort would not essentially require more labour input than is available now.

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For now, the ambition to upgrade the complete Dutch housing stock to an energy neutral status seems a bit too ambitious. The required investments and the savings resulting from a decrease in energy usage are too far apart, especially for the last two label upgrades (label A and BENG). This efficiency gap has to be financed by other means. However, the gap can be reduced by taking more time and phasing the steps towards energy neutrality. For example, reducing the goal to label B will decrease the efficiency gap, but will still result in significant energy savings. Factors such as the technological innovations of tomorrow and required labour input also weigh in on the argument to take a stepwise approach in order to increase the energy efficiency of the Dutch housing stock.