# Top 15% energy-efficient buildings under the EU taxonomy

Jyske Realkredit, August 2024

# Analysis of top 15% most energy-efficient buildings in Denmark

## Top 15% most energy-efficient buildings under the EU taxonomy

The EU Taxonomy Regulation serves to define guidelines for what may be classified as climate and environmentally sustainable activities. The Taxonomy Regulation defines six climate and environment objectives, of which an economic activity must meet at least one, to qualify as climate and environmentally sustainable. Each of the six objectives are supplemented by technical screening criteria identifying minimum requirements as to when an activity will be considered to contribute to the individual objective.

According to the EU Taxonomy Regulation, existing buildings can contribute to the environmental objective "climate change mitigation" and thus be classified as a sustainable activity, provided the building meets the requirements in the technical screening criteria. According to these technical screening criteria, buildings built before 2021 must have at least an Energy Performance Certificate (EPC) rating of A or, as an alternative, be within the top 15% most energy-efficient buildings (7.7 Acquisition of buildings) expressed as operational Primary Energy Demand (PED).

According to the technical screening criteria, the calculation of top 15% must be demonstrated by evidence which at least compares the energy performance of the relevant assets to the performance of the national or regional stock and distinguishes between residential and non-residential buildings. This calculation is made for the whole of Denmark since the national Danish building regulations applies for the entire country and not only for individual regions.

This analysis briefly describes the criteria for selecting buildings built before 1 January 2021 in Denmark which qualify for being within the top 15% of the most energy-efficient buildings. The selection is based on the EPC and year constructed of all buildings in Denmark, except buildings built after 1 January 2021 as these all should have an EPC of A.

The calculation is based on building information as of mid-2024. The calculation will henceforth be updated annually.

## Assessment of energy consumption for buildings

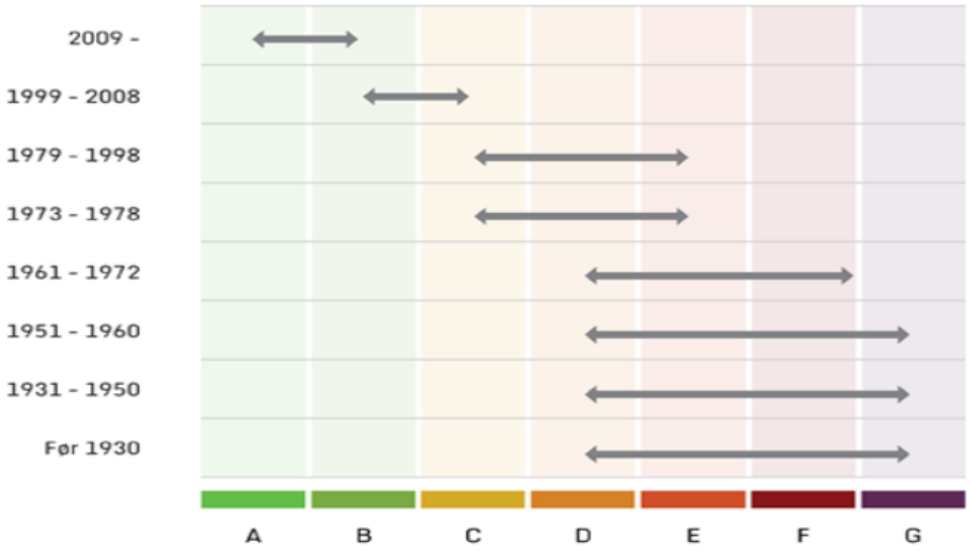
The best indicator of a building's energy consumption is its Energy Performance Certificate (EPC), which shows the expected energy consumption of the building.

In Denmark it is a requirement in the Danish building regulation, that all new buildings must have a valid EPC. Furthermore, it is mandatory to have a valid EPC if the building is to be sold or rented out, or if there is public access to it. An EPC will typically be valid for ten years from the date of issue. The challenge of identifying the top 15% most energy-efficient buildings is therefore that some buildings will not have a valid EPC.

The Danish building regulations specify the minimum requirements as to which EPC a new building must have. The building regulation has changed a lot over time and especially within the last 20 years has the standards increased. The building regulations that entered into force on 1 April 2009 (BR08) include a requirement that new buildings must have a minimum EPC rating of B. This was later replaced by new building regulations at the end of 2010, which changed the minimum requirement for new buildings to an EPC rating of A.

For buildings without a valid EPC, the year constructed may be used as an indicator of its energy consumption as, by virtue of the Danish building regulations, there is a strong correlation between EPC and year constructed for buildings in Denmark (this will be further documented below).

*Figure 1: Statistical breakdown of EPCs based on year constructed*




Source: The Danish Energy Agency (sparenergi.dk)

As shown by the above statistics from the Danish Energy Agency, there is a correlation between the year a building is constructed and the energy consumption. For buildings that no longer have a valid EPC, the top 15% will be calculated based on the year of construction instead of the EPC.

## Identification of top 15%

When identifying the top 15% of Danish buildings, this analysis will initially assess how large a share of buildings with valid EPCs to include in the top 15% and then whether to include buildings without valid EPCs based on the construction year.

As required by the EU taxonomy, the calculation will distinguish between residential and non-residential buildings.

All calculations have been made on the total area of the buildings built before 2021.

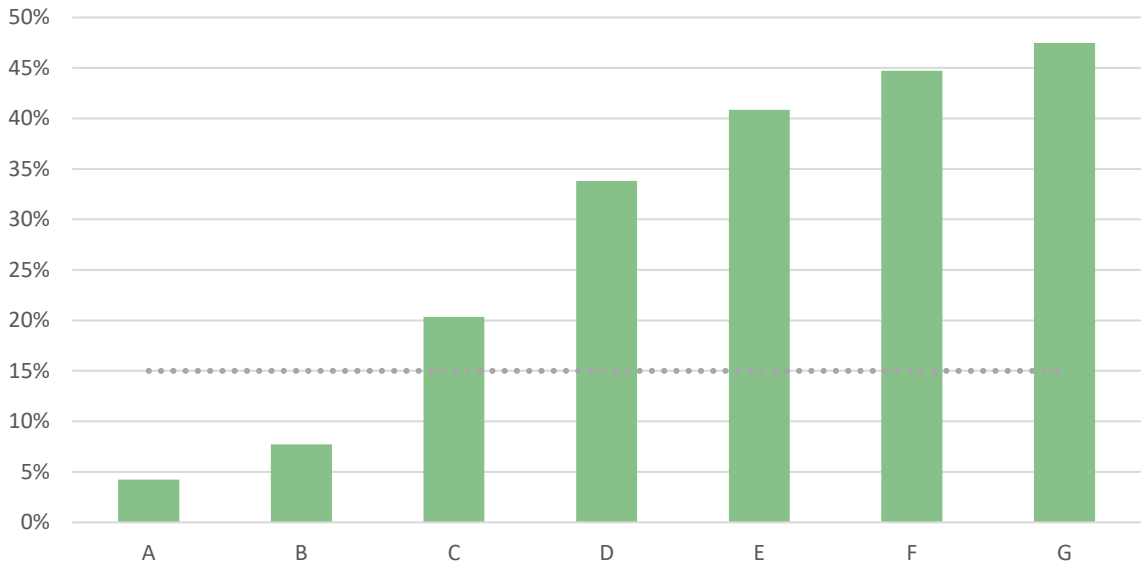
EPCs have been sourced from the Danish Energy Agency, while buildings area and age are based on the Public Information Server (OIS). The general age distributions for danish building are based on data from Statistics Denmark.

## Residential buildings

This category includes private single-family and terraced houses, owner-occupied flats, multi-family housing and co-operative housing units.

First it is examined how large the share of buildings with valid EPCs is out of the total building stock in Denmark. This is done to determine which buildings built before 2021 with a valid EPC qualify for the top 15%.

*Figure 2: Accumulated distribution of EPCs [1], total heated housing areas*

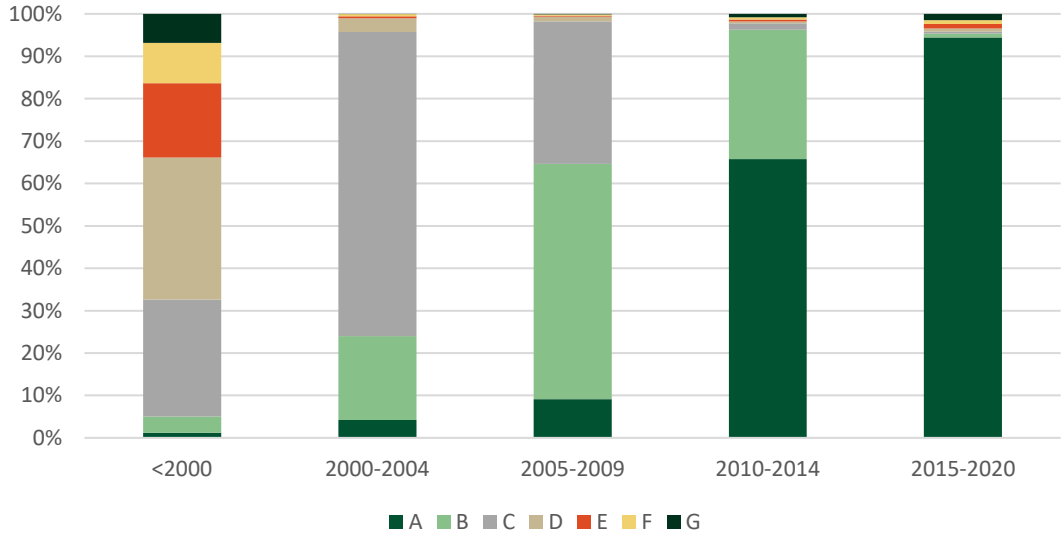



Source: The Danish Energy Agency (sparenergi.dk)

Residential buildings with a valid EPC of A account for 4.2% of the total built-up area, buildings with an EPC of B account for 3.5%, while buildings with an EPC rating of C account for 12.6%. Buildings with an EPC of C will therefore not automatically qualify for the top 15% based on EPC.

The figure below comprises residential buildings in Denmark with a valid EPC. It shows a strong correlation between the age of the buildings and the EPC, especially from 1980 onwards. This development is only natural given the growing regulatory requirements for energy consumption in buildings over time.

*Figure 3: Distribution of EPCs for residential buildings based on the year the building was constructed*



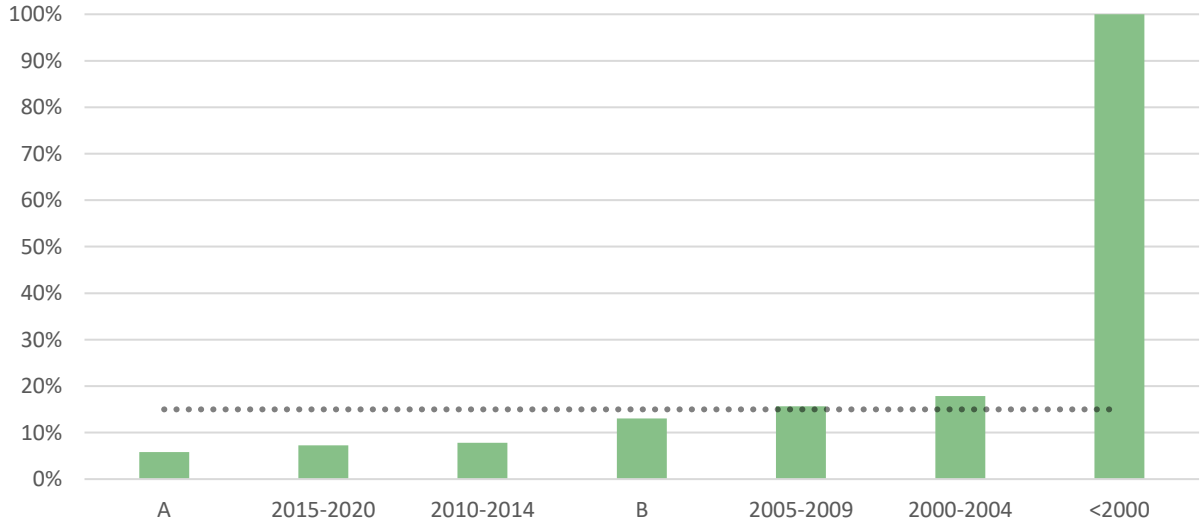

Source: The Danish Energy Agency

[1] EPCs have been sourced from the Danish Energy Agency, while building areas are based on the Public Information Server (OIS).

Largely all residential buildings constructed from 2010 onwards will have an EPC rating of A or B, which is consistent with the requirement of the Danish building regulations where buildings constructed from April 2009 onwards must as a minimum have an EPC rating of B to be approved for residential purposes.

As shown above, buildings with an EPC rating of A and/or B will rank within the top 15% of the most energy-efficient buildings. However, as the EPCs expire, it will also be relevant to include year constructed as a factor when determining the top 15%, which is what we have done in the figure below.

*Figure 4: Accumulated share of building stock by EPC and year of construction*




Source: The Danish Energy Agency and Statistics Denmark

Buildings without an EPC built from 2010 onwards qualify for the top 15% when looking at construction year. It appears from figure 1 that buildings constructed all the way back to 1973 can achieve an EPC rating of C through energy upgrades. The threshold value for the expected energy consumption for the top 15% is currently placed in the EPC rating C range. As buildings built from 2005 to 2009 generally have an EPC rating of C, it is based on the EPC not possible to draw any clear conclusion as to whether they are included in the top 15% or not.

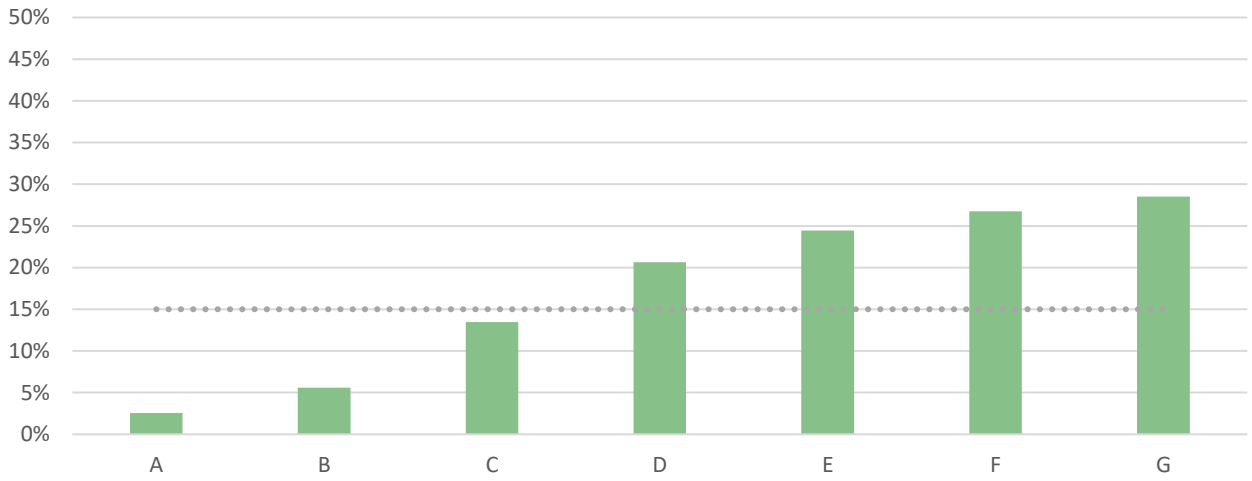
Buildings in the top 15% are expected regularly to reposition as new buildings are constructed, which means older buildings will drop out of the top 15% on a regular basis.

Jyske Realkredit has opted to include all residential buildings with an EPC rating of A and/or B and buildings built after 2009. While this is a conservative approach, it ensures that the top 15% selected will stand for a few years.

## Commercial buildings

This category includes office and retail buildings, buildings used for public institutions and buildings used for cultural purposes. Agricultural buildings and buildings which are assessed to have no heat consumption are not included.

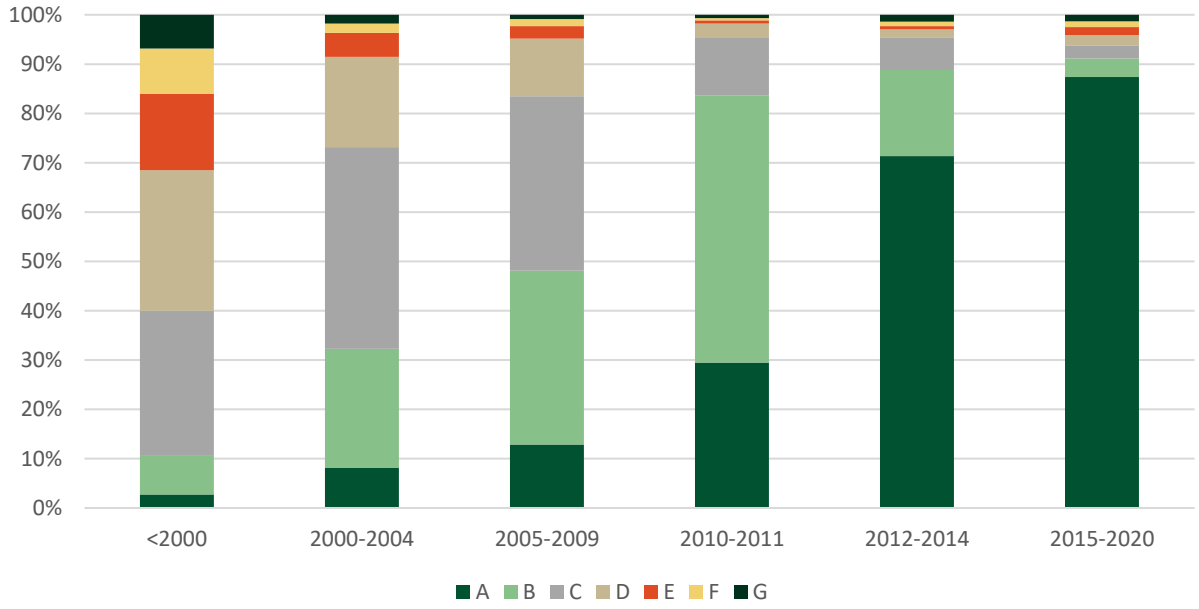
*Figure 5: Accumulated distribution of EPCs for commercial buildings, total commercial building stock*




Source: The Danish Energy Agency (sparenergi.dk)

As with the residential buildings, we start by looking at the proportion of the total commercial building stock with a valid EPC. Buildings with an EPC rating of A, B and C will rank within the top 15% of the most energy-efficient buildings, when only looking at buildings with a valid EPC. For the commercial building stock, there is also a strong correlation between the EPC (energy consumption in the building) and the year the building was constructed. According to figure 1, buildings with an EPC rating of C could be built from 1973 onwards. Newer buildings would be expected to have a more effective energy consumption, why construction year is taken into consideration when deciding on to include EPC of C or not.

*Figure 6: Distribution of EPCs for commercial buildings based on the year the building was constructed*

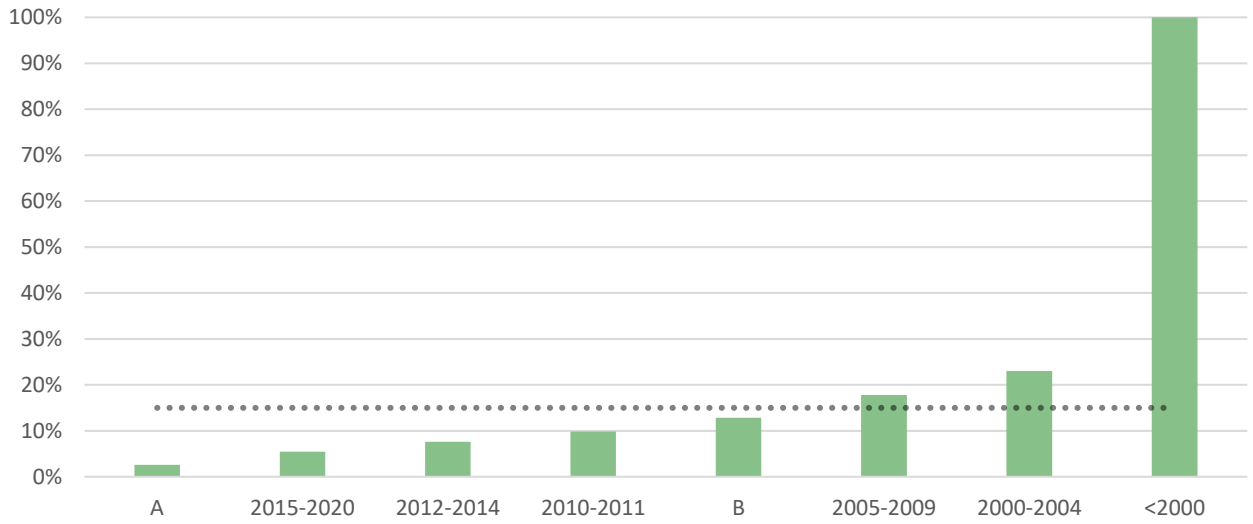



Source: The Danish Energy Agency

The distribution of EPCs is more or less the same for commercial buildings. Especially buildings built from 2010 onwards have an EPC rating of A or B.

Since there is a strong correlation between the EPC and year constructed, the latter may also be used to determine the top 15% for commercial buildings without a valid EPC.

*Figure 7: Accumulated share of building stock by EPC and year of construction*




Source: The Danish Energy Agency and Statistics Denmark

When identifying the top 15% most energy-efficient buildings, other than those with a valid EPC rating of A or B, based on year constructed, buildings built from 2010 onwards may be included.

Based on the above, commercial buildings with an EPC rating of A and B or buildings built after 2009 may be categorised as belonging to the top 15% most energy-efficient commercial buildings. Within relatively few years, the top 15% is expected to only include buildings with a valid EPC.

For non-residential commercial buildings it is also a requirement in the technical screening criteria, that buildings must be operated through energy performance monitoring and assessment. This means, that commercial buildings in the top-15% do not necessarily qualify for being aligned with the taxonomy.

## Conclusion

For both residential buildings and commercial buildings in Denmark, buildings with an EPC rating of A or B and buildings without an EPC built after 2009 will rank within the 15% most energy efficient buildings. This means these buildings can live up to the technical screening criteria for the environmental objective "climate change mitigation" defined by the EU Taxonomy Regulation.

## For questions and comments please contact

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