

Avoiding Greenhouse Gas Emissions The Essential Role of Chemicals



Double-glazed windows in buildings and contribution of sodium carbonate in avoiding greenhouse gas emissions

A Solvay and AGC Glass Europe case study

GHG emissions can be avoided by replacing existing single glazing with double glazing windows in houses in Europe. Overall estimated avoided emissions resulting from such replacement amount to 3,400 kg CO₂ eq. per m² of glazing over a 30 year service lifetime.

Extrapolation to the real European market gives a figure of 360 million tonnes CO₂ emissions that will be avoided for every single year of replacement of windows in Europe. The contribution of sodium carbonate, a key raw material for glass, is essential to avoid these emissions. Its quantification relies on specific assumptions.

The contribution of sodium carbonate is "extensive" according to the ICCA/WBCSD guidance, because this chemical is an indispensable raw material to make glass.

For every m² of double glazing, sodium carbonate can be estimated to be responsible for 19% (441 kgCO₂) of the total avoided emissions thanks to double glazing (2,322 kgCO₂), assuming a mass allocation, and excluding the effect of the low e-coating (1,092 kg CO₂). On the basis of the selected assumptions (presented in the full study), sodium carbonate can be estimated to contribute 90 kg CO₂ avoided for every kg emitted during its manufacturing for this market.

Overall calculated avoided emissions would of course be affected if the ratio of renewable low carbon energy in the European mix would significantly increase in the coming 30 years.

Full study available at: www.icca-chem.org/energy-climate

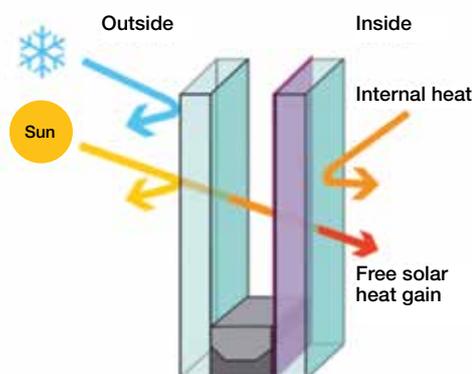
Double glazing unit with a low-e coating

The computation of energy consumption for house heating is based on hypotheses representative of the 6 European representative zones considered: (North (Helsinki), Central Maritime (Brussels), Central Continental (Frankfurt), Central (Prague), South Central (Sofia), South (Roma).

It takes into account:

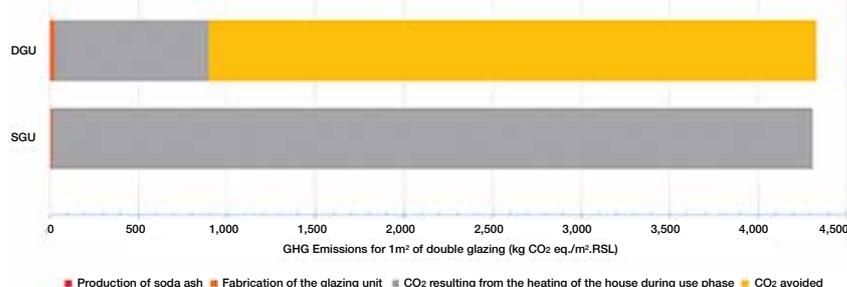
- Distribution of outside temperatures (meteorological data),
- Energy mix for heating housing buildings.

Source: Glass for Europe



GHG emissions during the entire life cycle of glazing (DGU = double glazing / SGU = single glazing)

The figure highlights the emissions avoided during 30 years when substituting 1m² of single-glazed windows by 1m² of low-e coated double-glazed windows in European houses.



This case study illustrates how the reduction of greenhouse gas (GHG) emissions can be enabled by chemical products, as part of a series of case studies brought to you by ICCA. Chemical industry members offered Life Cycle Assessment [LCA] case studies for the purpose of showing illustrative examples on how to calculate avoided greenhouse gas emissions. The avoided emission calculations were based on the guidelines developed by ICCA and WBSCD (World Business Council for Sustainable Development) - Chemical Sector, with the support of Arthur D. Little and Ecofys. Other life cycle environmental impacts such as water and land use change were outside the scope and usually not considered.

