



Carbon footprint of typical dwellings in Cyprus



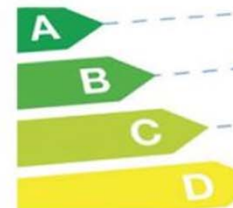
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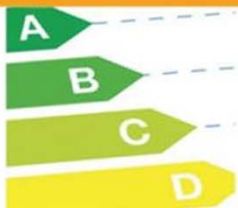
Cyprus Union of Communities

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Nicosia, Cyprus



Presentation Outline

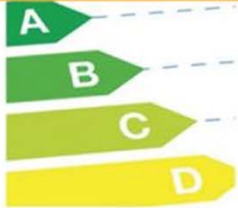


- Introduction
- Characteristics of the sample
- Methodology
- Results & Discussion
- Conclusions





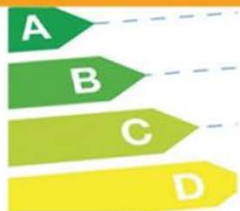
Introduction



- Around 40% of the final energy consumption in the EU is consumed by buildings.
- There are 204 millions of dwellings in the EU which will increase by 2.5 times in 2060, compared to 2000 levels.
- According to the Annual European Community greenhouse inventory 1990-2002 and inventory report 2004 the emissions of CO₂ from residential buildings account for 8.9% of the total GHG emissions in 2011.
- In this study the definition of the carbon footprint of several typical types of dwellings in Cyprus is attempted through a sample of 42 dwellings located all over Cyprus.



Characteristics of the sample

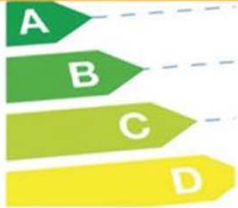


- 42 dwellings located all over Cyprus
- The data used were collected from two on-going projects, namely ElihMED and “Countdown to low carbon homes, Eracobuild”, through a formulated questionnaire and a series of onsite visits.





Characteristics of the sample



- The **ElihMED project** aims to identify and implement innovative technical solutions to improve energy efficiency in low-income housings in the Mediterranean area and its sample included 25 dwellings in Cyprus.



- The main aim of the “**Countdown to low carbon homes, Eracobuild**” project is to develop a commonly acceptable methodology in order to facilitate the sustainable energy retrofit of dwellings in Cyprus and its sample included 21 dwellings.

••• **Eracobuild**

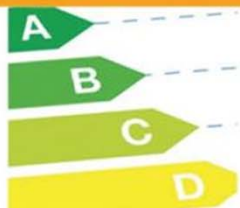


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Characteristics of the sample



The sample selection process was different for each project.

- In **“Countdown to low carbon homes, Eracobuild”** project the selection procedure was based on an open expression of interest by any individual who wanted to participate and was willing to undertake an energy retrofit of his/hers dwelling. Thus, this sample was randomly selected and contains dwellings of all possible categories such as type of dwelling, year built, location and gross annual income of the occupants.
- In **ElihMED** project the selection procedure for the definition of the sample was initiated by a public call for interest released on 2nd April 2012 and carried on through a series of publicity actions. The selection criteria were the gross annual salary of the household depending on the number of occupants, the location of the household (eligible municipalities), the total area of the house (apartments below 100 m², and single houses below 150 m²), the year of construction of the house (1970-1995) and the ownership of the house.

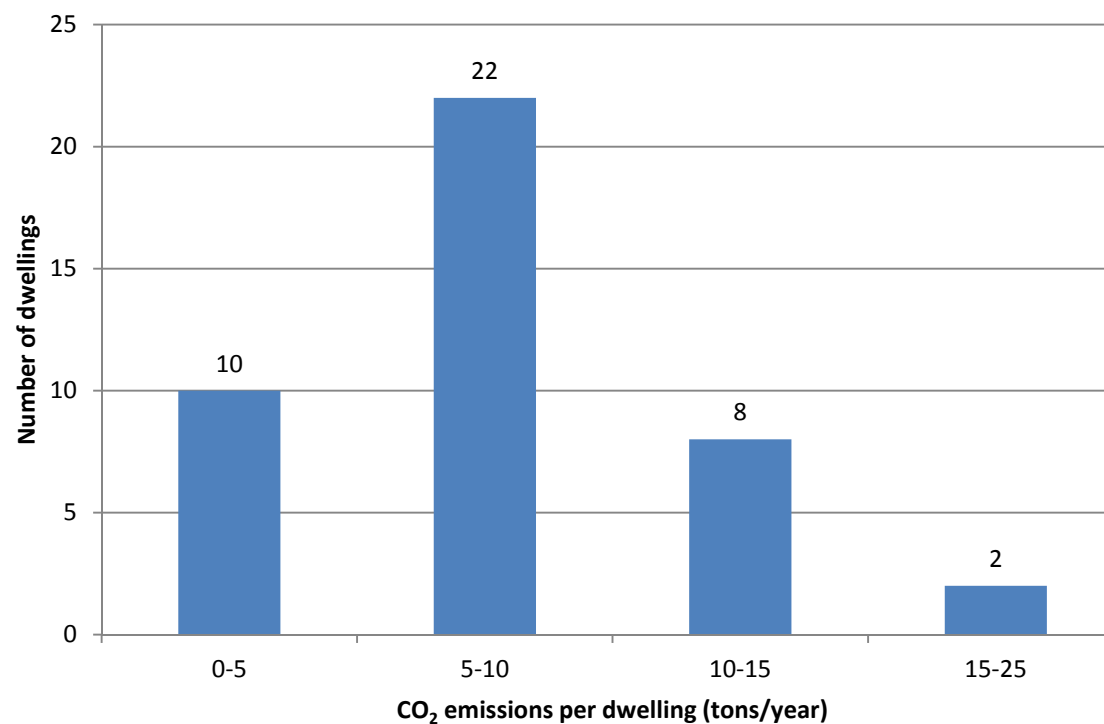
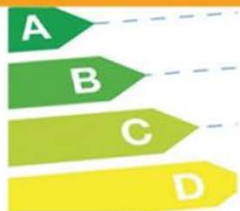
Methodology



- An energy visit was performed in each dwelling and the data were obtained from the owner of the house through an interview using a questionnaire specially formulated for this project while also an infrared thermography of the house was performed.
- The data collected included the type of fuel used for heating, the type of house and the type of lighting, DHW, etc.
- Accordingly, the CO₂ emissions were calculated for each dwelling.
- The energy consumption was calculated for each dwelling, such as grid supplied electricity, grid displaced electricity, waste heat, petroleum gas, etc. used for heating.
- The calculations of the CO₂ emissions were carried using the conversion factors given by the Cyprus Energy Service of the Ministry of Energy, Commerce and Industry in the Methodology for Assessing the Energy Performance of Buildings.

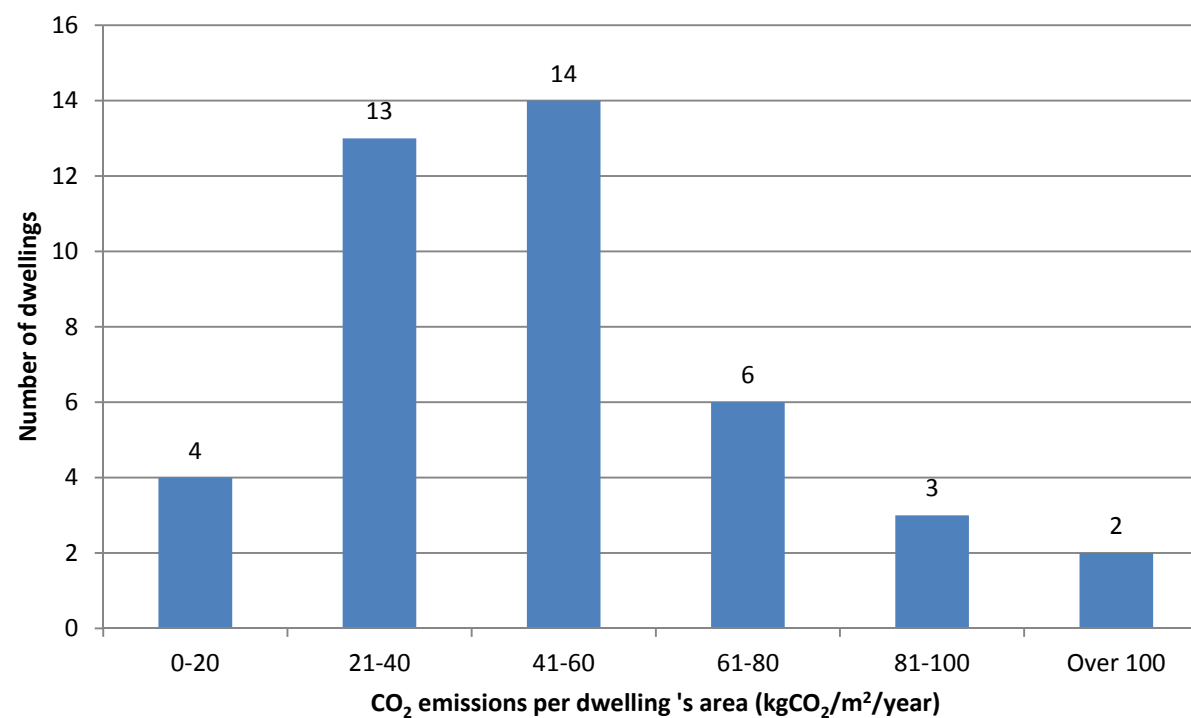
Type of fuel	CO ₂ (kgCO ₂ /kWh _{delivered})
Natural Gas	0,194
LPG	0,249
Biogas	0,025
Diesel Oil	0,266
Coal	0,291
Anthracite	0,317
Biomass	0,025
Grid Supplied Electricity	0,794
Grid Displaced Electricity	0,794
Waste Heat	0,018
Kerosene	0,258

Results and Discussion



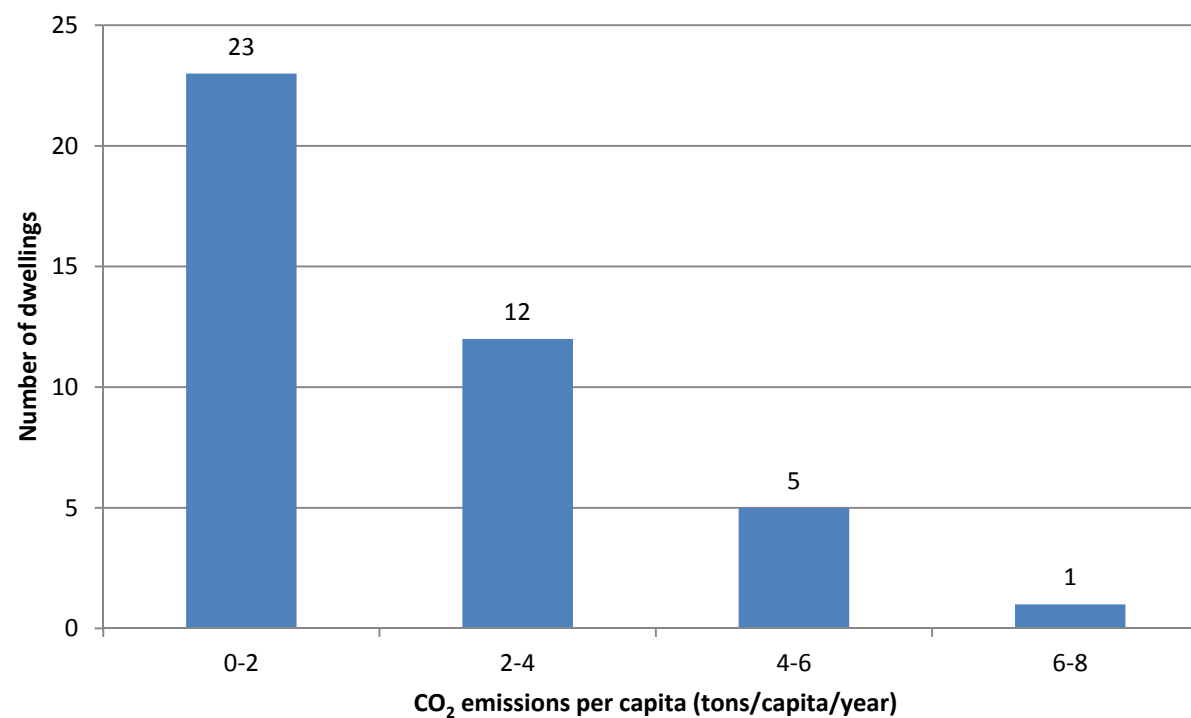
CO₂ emissions per dwelling (tons/year) in Cyprus

Results and Discussion



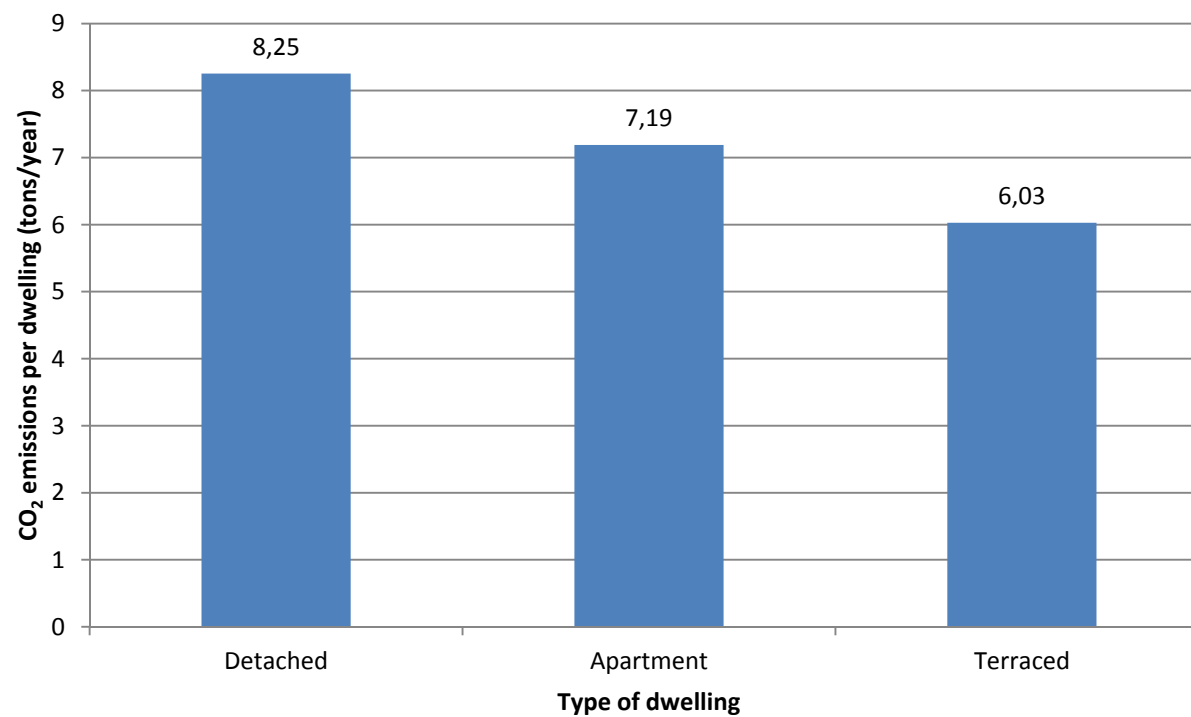
CO₂ emissions per dwelling's area (kgCO₂/m₂/year) in Cyprus

Results and Discussion



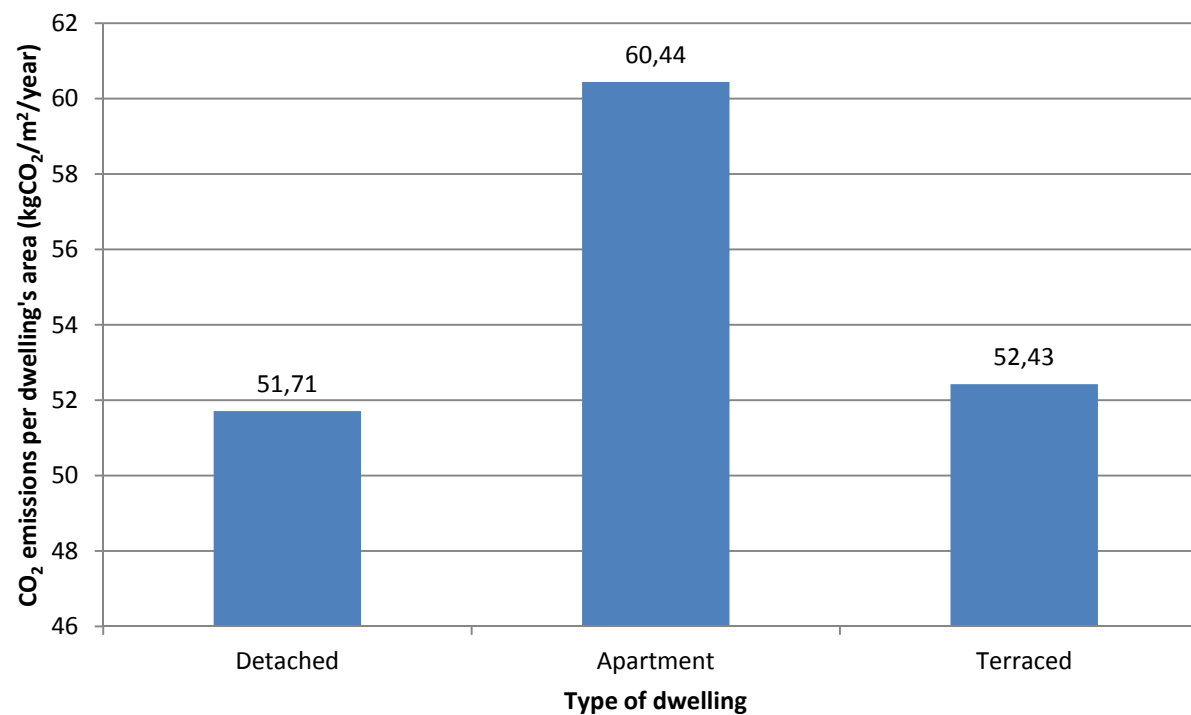
CO₂ emissions per capita (tons/capita/year)
(residential sector excluding transport)

Results and Discussion



CO₂ emissions per dwelling type (tons/year)

Results and Discussion



CO₂ emissions per area per dwelling type (kgCO₂/m²/year)

Results and Discussion (Photos)



PP13 – Indoor and outdoor before



PP13 – Indoor and outdoor after



PP16 – Thermal Insulation of the roof



PP16 - Thermal Insulation of the roof

Results and Discussion (Photos)



PP20 – Roof before insulation



PP20 – Roof with thermal insulation

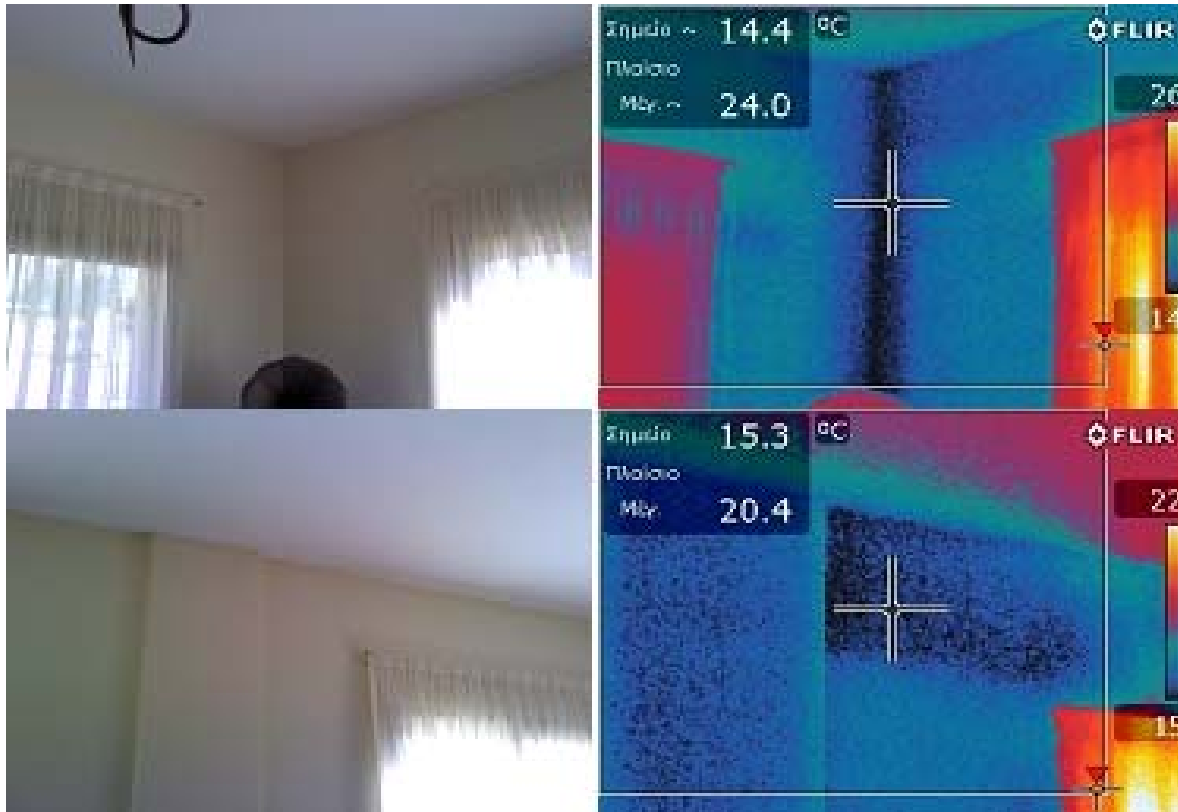


PP25 – Before works



PP25 – After thermal plaster

Thermal images of the dwellings



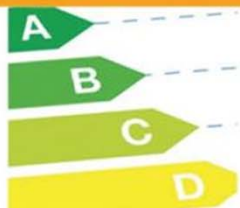


Results and Discussion (Photos)





Conclusions



The analysis of the work revealed some very interesting results concerning the CO₂ emissions of dwellings in Cyprus.

- The majority of the dwellings in the sample (52%) are responsible for the emission of 5-10 tons of CO₂ per year.
- The mean CO₂ emission for a dwelling in Cyprus is 7.76 tons of CO₂ per year.
- The highest emission of CO₂ according to the dwelling's area (33%) is between 41-60 kg CO₂ per m² year followed by 30% of the dwellings which emit 21-40 kg CO₂ per m² year.
- The mean CO₂ emission per capita in Cyprus is 2.5 tons of CO₂ per year and the majority in the sample (55%) are responsible for the emission of 0-2 tons of CO₂ per year.
- Finally, the results for the CO₂ emissions according to the type of the dwelling showed that
 - detached dwellings represent 71% of the sample and have the highest average emissions of CO₂ equal to 8.25 tons of CO₂ per year
 - Terraced dwellings represent 17% of the sample and emit 7.19 tons of CO₂ per year
 - Apartments represent 10% of the sample and emit 6.03 tons of CO₂ per year.



Thank you!



Questions please?



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