



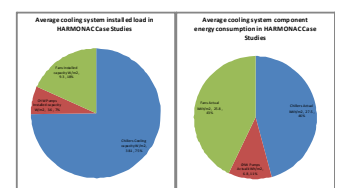
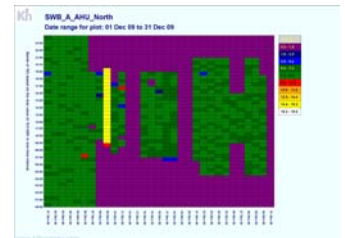
Project Fact Sheet

Created: October 2010

Harmonizing Air Conditioning Inspection and Audit Procedures in the Tertiary Building Sector (HARMONAC)



Programme area:	SAVE: Energy efficient buildings
Status:	Complete
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Partners:	National and Kapodestrian University of Athens, Greece Politecnico di Torino, Italy MacWhirter Ltd, UK Association pour la Recherche et le Développement des Méthodes et Processus Industriels, France INEGI - Instituto de Engenharia Mecânica e Gestão Industrial, Portugal Université de Liège, Belgium Univerza v Ljubljani (University of Ljubljana), Slovenia Österreichische Energieagentur - Austrian Energy Agency
Websites:	http://www.harmonac.info http://paginas.fe.up.pt/~harmonac/site/?option=case http://www.cf.ac.uk/archi/harmonac/
Objective:	Evaluating through measurement the energy savings to be made from inspection of Air Conditioning systems
Benefits:	To help MS achieve robust affordable A/C Inspection and Audit procedures
Keywords:	Air-conditioning, Inspection, Energy
Duration:	09/2007 – 08/2010
Budget:	€1,818,148 (EU contribution: 50%)
Contract number:	EIE/07/132/SI2.466705



Short description

Through undertaking monitoring and measurement of the energy use in 42 AC systems and their components in 8 EU Member States, HARMONAC has been able to provide an evidence based report on the Energy Conservation Opportunities (ECOs) generally available in Air Conditioning systems. These in-depth Case Studies have then compared with ECOs found from Field Trials of HARMONAC AC system inspection procedures which are based on EN15240 - the CEN Standard for AC Inspection. This comparison has enabled conclusions to be reached about how many of the ECOs that are available would be able to be identified and implemented in EU Member States as a result of the EPBD Inspection process.

The project has also produced tools for use in the Inspection process, and a Teaching Package to assist in the Training of Inspectors.

Outputs

HARMONAC has produced:

- A report detailing the measured energy savings from A/C systems and their components from across Europe through Inspection actions.

- *A guide to Energy Conservation Opportunities (ECO's) for A/C systems derived from the measured data on the energy savings achieved, and showing the average energy savings achieved in practice for each ECO where available.*
- *A teaching package resource for use by trainers of Inspectors for A/C systems*
- *Six separate computer-based tools for use during the Inspection of A/C systems to speed up the Inspection process and to provide robust estimations of potential energy savings where required.*
- *A searchable database of the Case Studies and Field Trials undertaken during HARMONAC, which can be found at: <http://paginas.fe.up.pt/~harmonac/site/?option=case> Measured energy consumptions from A/C systems and their components from across Europe are included, and where applicable the Studies show the savings achieved in each system through actions undertaken during maintenance.*
- *3 AC Inspection Methodologies to illustrate potential options for Member States*

Major findings from the project

The following bullet points summarise the main findings/outputs:

- *The project completed 42 Case Studies and 394 Field Trials in 8 Member States to provide information on how AC systems consume energy. Each of these Case Studies and Field Trials can be searched for and downloaded in pdf format from an online database.*
- *Over 140 ECO's have been identified to date, most of which have been described and have some information on the likely savings to be achieved. The majority also have an indication of which Inspection item(s) will identify them, and therefore the likely time:energy savings ratio. Over 50 of these ECOs have been described in detail.*
- *The **average** energy savings potential found for individual AC systems was 35 – 40% of their measured consumption.*
- *The majority of the savings came from Operational issues (ensuring components and systems are off when not required), component cleaning, and replacement with more efficient hardware*
- *The measured and modelled potential energy savings from AC systems are equal to 0.7% of EU Primary Energy Use (8 MTOE, 93.04 TWh, 18.31 Mtonnes CO₂)*
- *Estimated potential energy savings available using current Inspection approach is equal to 0.26% of EU Primary Energy Use (3 MTOE, 34.89 TWh, 6.87 Mtonnes CO₂)*
- *The “missing” energy savings are due to sub-optimal system design, it being uneconomic to upgrade working existing systems, and inadequate operational performance data to identify problems during normal operation or an Inspection*
- *The findings from the project have been presented three times to the European legislators responsible for implementing the EPBD Inspection of AC systems in their national legislation.*
- *The project interim findings also had a significant impact on the recast of the EPBD for AC systems which will become a legal requirement in 2013*
- *The AC Inspection Field Trials undertaken by the Partners using the HARMONAC Inspection procedures have taken between 1 and 3 days on average to complete including writing the report. This covers all AC system types.*
- *Many of the Energy Conservation Opportunities (ECO's) identified through the project Case Studies and Field Trials were potentially possible to identify without actually visiting the system had sufficient performance and other information been kept by the system owner. This led to HARMONAC proposing a two stage Inspection procedure as being the most efficient use of resources. However, experience has shown that very little of the required data is currently collected or saved by the system owner leading to increased length and cost of Inspection, or as appears to be more common now, a reduced quality of Inspection being undertaken down to a price.*
- *The final versions of the HARMONAC Inspection procedures include estimates of time to undertake an Inspection item; the ECO's likely to be identified by that Inspection item; and the likely average savings to arise when each ECO is applicable.*