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Implementation of EPBD



Directive 2002/91 EC (EPBD) of the European Parliament and of the Council

- 1. Principles how to calculate the energy consumption of buildings (Article 3)
- 2. Performance based maximum values of energy consumption for buildings (Article 4)
- 3. Considering more economical systems in case of new buildings; required measurements (Article 5)
- 4. Improvement of the energy efficiency of the renovated buildings (Article 6)
- 5. Energy performance certification for all buildings (Article 7)
- 6. Inspection of boilers (Article 8)
- 7. Inspection of air conditioning systems (Article 9)

Implementation of EPBD



Directive 2010/31/EU (EPBD recast) of the European Parliament and of the Council

- Calculation of the cost-optimal levels of minimum energy performance requirements.
- Setting of energy performance requirements
 Cost effectiveness in focus
- Nearly Zero Energy Buildings
- Inspection of heating and air conditioning systems
 Continuous manitaring and honohmarking

Continuous monitoring and benchmarking



Inspection of HVAC systems through continuous monitoring and benchmarking

www.iservcmb.info



iSERV - a practical process for achieving long-term energy reductions in buildings

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iSERV Partners



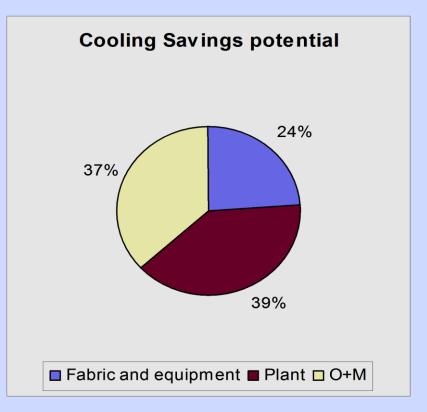
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Université de Liège Belgium	Université de Liège	Univerza v Ljubljani Slovenia	
University of Pecs Hungary	CHARTER CONTROL OF CON	Austrian Energy Agency Austria	-en °
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Context: Potential Energy Saving



Potential for savings through:

- Load reduction (24%)
- Improved efficiency (39%)
- Better operation (37%)



Source: HarmonAC project results. http://www.harmonac.info/

A 20th Century approach to a 21st Century problem

- ➔ Most EU MS Legislation aimed at reducing energy use looks at whole buildings and annual energy use due to the availability of billing meters for most buildings
- So we know WHAT we are using, but not WHY we are using it.
- Current processes do not show what is possible to achieve with our actual existing building and activity mixes
- ➔ Most organisations JUST comply with legislation, i.e. they spend time and money on compliance exercises but not improving their energy use in a robust manner.
- ➔ We lack DETAIL on benefits and savings

Display Energy Certificate HM Government How efficiently is this building being used? Certificate Reference Number: Department of Energy & Climate Change 3-8 Whitehall Place 0098-9592-5110-2590-8003 I ONDON SW1A 2H This certificate indicates how much energy is being used to operate this building. The operational rating is based on meter readings of all the energy actually used in the building. It is compared to a benchmark that represents performance indicative of all buildings of this type. There is more advice on how to interpret this information on the Government's website www.communities.gov.uk/epbd. Energy Performance Operational Rating Total CO, Emissions his tells you how efficiently energy has been used in the building. The numbers d This tells you how much carbon dioxid not represent actual units of energy consumed; they represent comparative energy efficiency. 100 would be typical for this kind of building. the building emits. It shows tonnes per vear of CO. More energy efficient 0-25В 26-50 Electricity Heating **C** 51-75 11-2009 05-2010 11-2010 100 would be typical •••••••••••••••••• Previous Operational Ra This tells you how efficiently energy ha 2 been used in this building over the last three accounting periods 11-2010 05-2010 C **Over 150** 11-2009 ess energy efficient chnical information Administrative information This tells you technical information about how energy This is a Display Energy Certificate as defined in SI 2007/991 as amended is used in this building. Consumption data based on Assessment Software: CLG. ORICalc. v3.5.1 actual meter readings Property Reference: 885505120000 Main heating fuel: Natural Gas Assessor Name Darren Myers Building Environment: Air Conditioning Assessor Number LCEA129289 Total useful floor area (m²): 10960 Accreditation Scheme CIBSE Certification Limited sset Rating: Not available Employer/Trading Na Briar Associate Employer/Trading Address: York House, High Street, Amblecote, DY8 4BT Issue Date: 12-11-2010 Nominated Date 12-11-2010 ual Energy Use (kWh/m²/year) Valid Until: 11-11-2011 Typical Energy Use (kWh/m²/year) 108 Related Party Disclosure: Not related to the occupier Recommendations for improving the energy efficiency of the building are Energy from renewable 0%

contained in the accompanying Advisory Report.

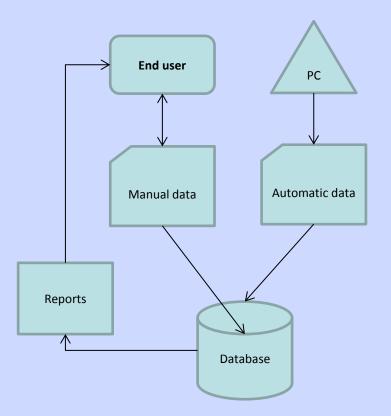


What iSERVcmb is doing



Remotely monitoring HVAC systems across Europe

- Target 1600 HVAC systems of all types in 16+ EU countries
- Range of building sectors
- Size: 10's to 10,000's m²
- Sub-hourly data for individual HVAC components
- Mostly using existing or easyto-add monitoring
- Collating and analysing all data in a web-based database



iSERV



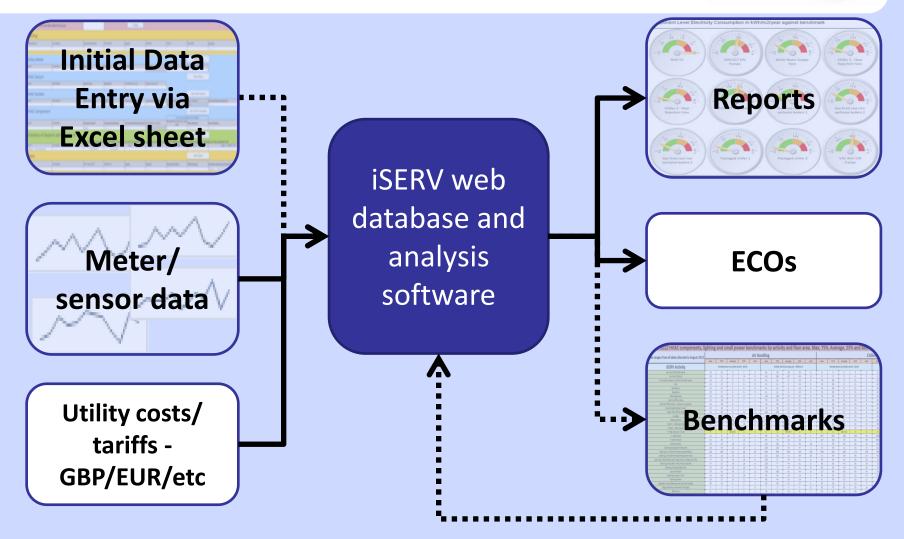
➔ A way to show owners of real buildings the . energy savings possible FOR THEIR BUILDINGS, by comparing their use with the performance of other real buildings using the same equipment to service the same activity and floor area



- → iSERV uses an empirical process based on physical items that can be measured and found in all buildings
- → This means that reports can refer to actual items in a building
- ➔ Gives confidence to the owner/operator that the information is relevant to them
- → Reduces RISK therefore enables INVESTMENT

Overview of basic process





Collate information on the building



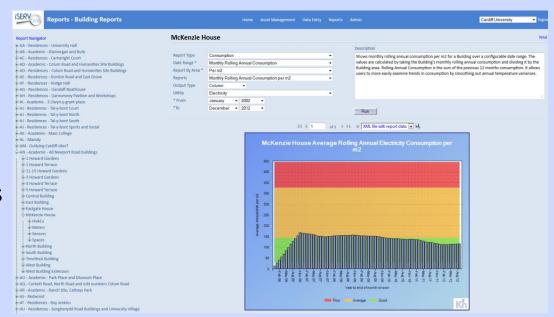
- → iSERV has set up a spreadsheet to act as a data collection focus for the building, meters and services physical elements
- → The spreadsheet also acts as a means of **connecting** all the elements

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Database



- → A bespoke database has been written for the project
- → Based on a commercial product
- → Acts as the focus for the iSERV project elements:
 - Data collection
 - Benchmark use
 - Benchmark generation
 - Reports
 - Energy Conservation Opportunity algorithms

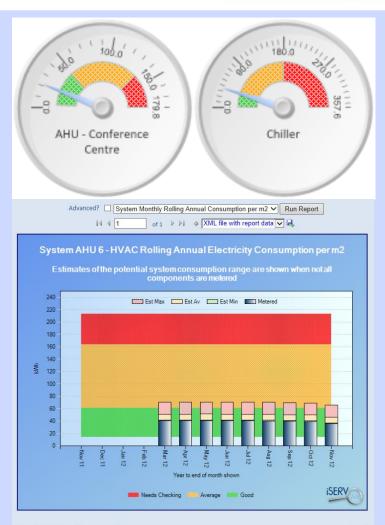


Three ways to save energy – install more efficient equipment



➔ Install more efficient equipment. Even if equipment is well controlled it may well require more power when in use than more modern equipment

Benchmarks based on power demands when in use can help show this difference and when equipment might benefit from being upgraded



Reports



➔ The key is to not just present meter data but to interpret it with respect to the situation in the real building

➔ A number of report sets are being trialled to see which provide the information in the best form to allow decisions

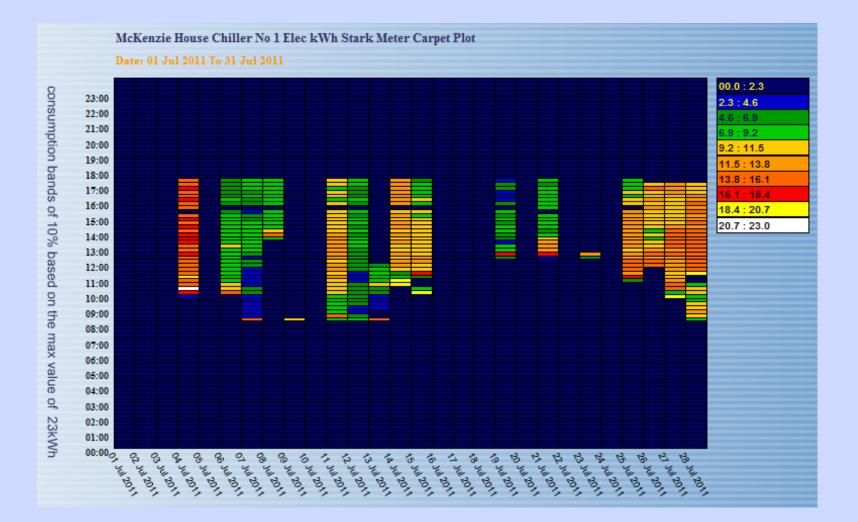


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Identification of Energy Conservation Opportunities (ECOs)

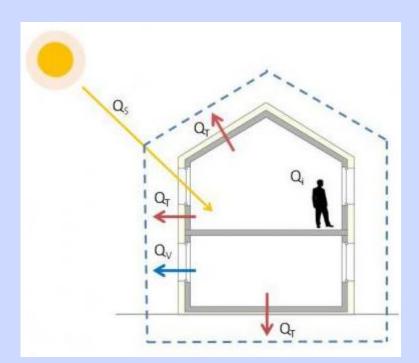




The near future



- Near zero energy buildings will require us to BALANCE the energy loads in a building with minimum NET use of energy
- ➔ With highly insulated structures this balance is mainly about how Solar Gains, Internal Gains and Ventilation energy needs interact with each other
- The most controllable parameter is Ventilation



Ref: https://www.educatesustainability.eu/portal/content/thermal-balance-buildings

➔ In both hot and cold climates energy efficiency can be achieved by MINIMISING ventilation rates, with the attendant potential for IAQ problems and Health

Monitoring savings: 3 Case Studies



- → Building electrical savings of between 19% to 33% p.a.
- → Building electrical savings/m² between 61 to 100 kWh/m²/a
- ➔ No Fossil Fuel figures yet
- ➔ In economic terms:
 - Measured recurrent savings of 9 to 14 EUR/m²/a
 - Recorded 'one-off' setup costs between 0.1 to 2 EUR/m²
 - Estimated 0.1 3 EUR/m²/a to maintain.
 - Net returns between 7 13 EUR/m²/a
- \rightarrow Exceeding the HARMONAC predicted building electrical savings of 1-5%
- ➔ The savings actually achieved in these 3 buildings indicate more significant ACTUAL savings could be achieved in the wider building stock.
- ➔ Success in reducing HVAC energy use is providing the confidence and finance (from savings) to tackle other electrical use as well





Monitoring brings:

- Clarity and Certainty
- Proven energy and cost savings to the end user and MS
- End user engagement and ability to contribute to 2020 targets
- Proof of impact achieved
- Increased use of energy efficient products
- Reduced Risk
- Ability to use Smart Metering data which is coming



Inspection of HVAC systems through continuous monitoring and benchmarking

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Thank you the attention!

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