

# 3<sup>rd</sup> EnercitEE Symposium on Energy Efficient Buildings and innovation,

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## **DIRECTIVE 2010/31 EU (EPBD)**

### Art.8: Technical Building System:

#### Member States....

- set system requirements for overall energy performance, .... adjustments and control of technical building systems...in existing buildings
- Encourage introduction of intelligent metering systems;
- Encourage the installation of active control systems: i.e.: automation, control and monitoring systems, that aim to save energy

# Integrated Building Automation System

## EN 15232

### Definitions

#### **BACS** (Building Automation Control Systems)

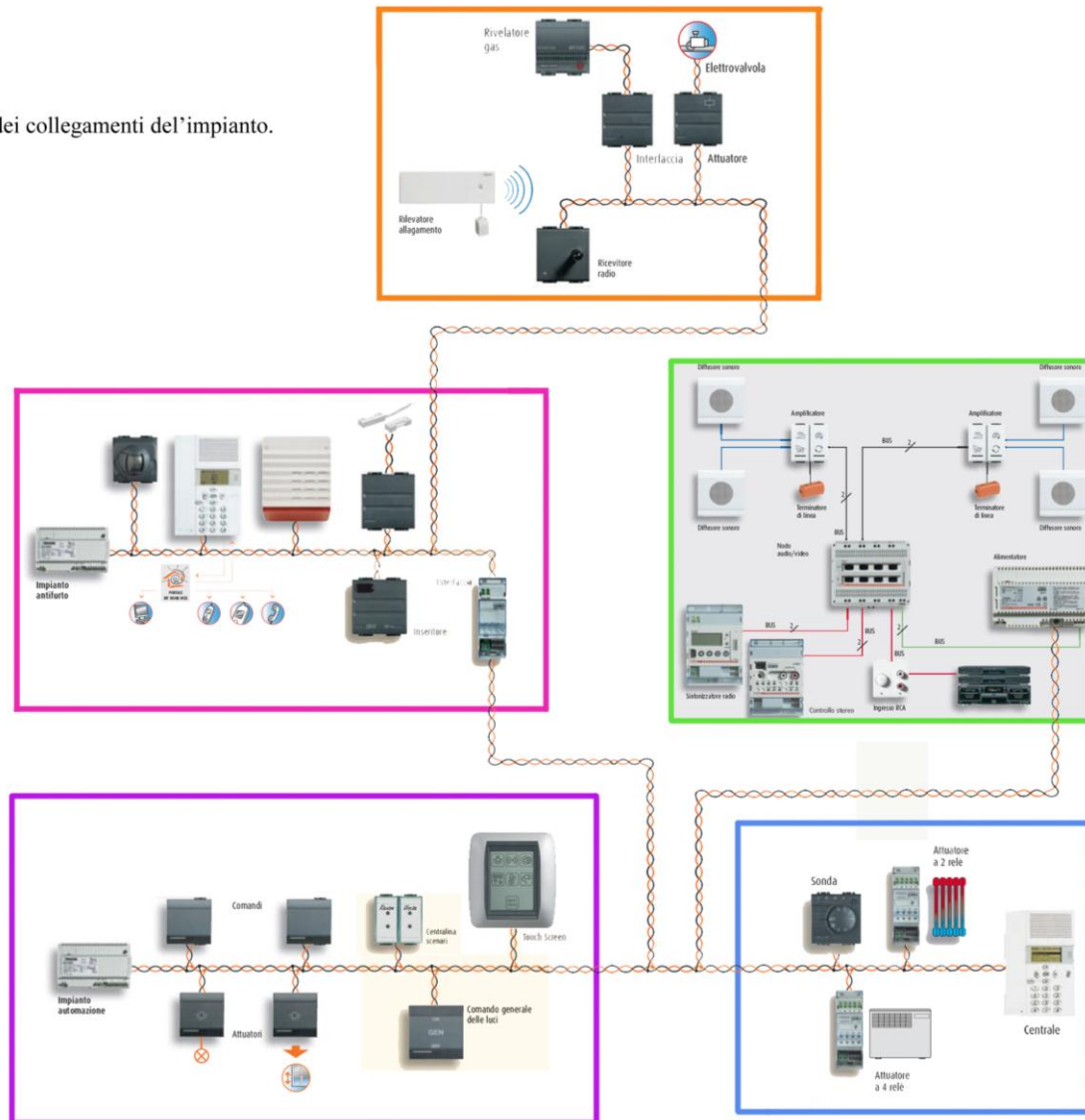
Systems, comprising products and engineering services, for automatic control, monitoring, optimisations, for operation, intervention, management for energy-efficiency, economical, safe operation

#### **HBES**: (Home and Building Electronic Systems)

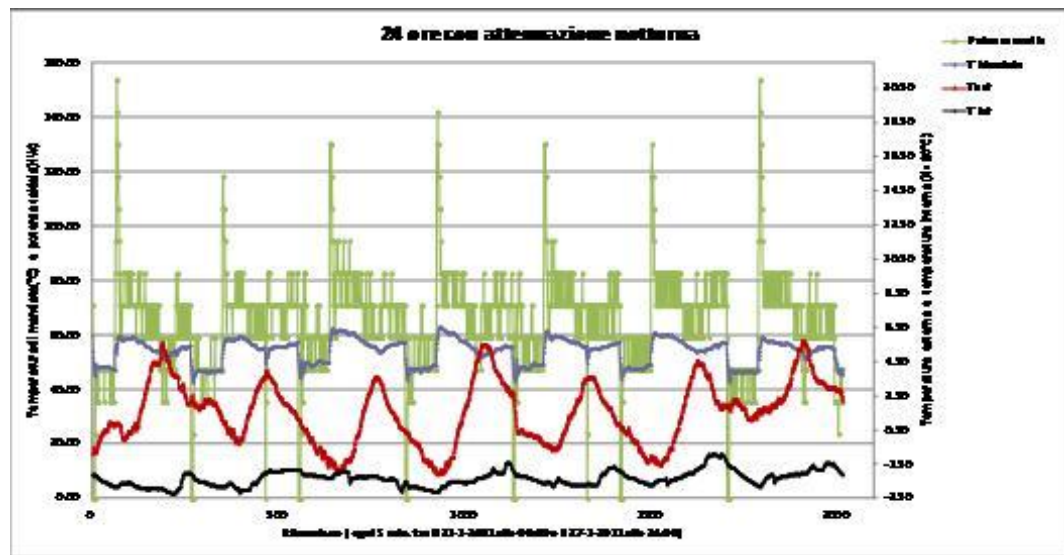
#### **TBM** (Technical Building Management)

EN 15232 standard defines functions and main approaches for the calculation of the impact of BACS on energy consumption

Schema dei collegamenti dell'impianto.



## Data Monitoring to optimize energy performance



## **Building Automation Control System – BACS**

### **DGR 156/08 RER**

#### **Minimum requirements:**

- **Control systems for thermal plants:**
  - programmable central unit for each heat generator (based on internal and external temperature values)
  - variable control system heating for each rooms and/or zone
- **Heat-meters for each flat with central heating production**
- **Relevant BACS or HBES for all plant consuming energy**
  - All BACS systems are classified in 4 performances-classes (0, I, II, III) depending on the energy efficiency
  - For new buildings: min. equipment class I (standard)
  - For public use buildings: min. equipment class II (advanced)

# Building Automation Control System – BACS

## DGR 156/08 RER

Rif EN 15232	FUNZIONI		Residenziale			Non residenziale		
			classi di prestazione					
			I	II	III	I	II	III
funzione codice	Livello							
		<b>CONTROLLO RISCALDAMENTO E RAFFRESCAMENTO</b>						
		<b>Controllo di emissione</b>						
F1C F15C	2	Controllo automatico di ogni ambiente con regolatore elettronico	X			X		
F2B F16B	3	Controllo automatico di ogni ambiente con comunicazione tra i regolatori e verso il sistema - BUS		X			X	
F3A F17A	4	Controllo integrato di ogni locale con gestione di richiesta (per occupazione, qualità aria,...)			X			X
		<b>Controllo temperatura rete di distribuzione acqua</b>						
F4C F18C	1	Compensazione della temperatura esterna	X			X		
F5C F19A	2	Controllo temperatura interna		X	X		X	X



# Building Automation Control System – BACS

## DGR 156/08 RER

		<b>CONTROLLO DELLA VENTILAZIONE E DEL CONDIZIONAMENTO</b>								
		<b>Controllo mandata aria in ambiente</b>								
F31B	2	Controllo a tempo	X	X			X			
F32A	3	Controllo a presenza			X			X		
F33A	4	Controllo a richiesta							X	
		<b>Controllo aria nell'UTA</b>								
F34AC	1	Controllo On/ Off a tempo	X	X	X		X			
F35A	2	Controllo automatico di flusso o pressione						X	X	
		<b>Controllo sbrinamento recuperatore di calore</b>								
F36A	1	Con controllo di sbrinamento	X	X	X		X	X	X	
		<b>Controllo surriscaldamento recuperatore di calore</b>								
F37A	1	Con controllo di surriscaldamento	X	X	X		X	X	X	
		<b>Raffrescamento meccanico gratuito</b>								
F38C	1	Raffrescamento notturno	X				X			
F39A	2	Raffrescamento gratuito (free cooling)	X					X	X	
F40A	3	Controllo H-x, entalpia			X					
		<b>Controllo della temperatura di mandata</b>								
F41C	1	Setpoint costante	X				X			
F42B	2	Setpoint dipendente dalla temperatura esterna		X				X		
F43A	3	Setpoint dipendente dal carico			X				X	
		<b>Controllo umidità</b>								
F44C	1	Limitazione umidità dell'aria di mandata	X				X			
F45C	2	Controllo umidità dell'aria di mandata		X	X			X	X	
F46	3	Controllo umidità dell'aria nel locale o emessa								



## Smart metering

Remote Control system based on a sensor network (wireless, plc, RS485) for real time monitoring for energy consumption (electricity, gas, water, etc)

- Measuring and Gives information about energy consumption
- actions on plants, allowing to adjust and manage energy exchanges and informations about the operation state of the plant
- Possibility to act in case of failure without intervention on the spot

## ENEL Smart Metering System



The System is a smart infrastructure where the electronic meters installed at Customer's premises provide access to the actual parameters and contractual data of the supply through a display;

a module for communicating with the Enel central systems and a switching device enabling, remotely, the consensus to connection and supply disconnection are also featured. Meters are therefore able to transmit data regarding consumptions, receive updates of the contractual parameters and remotely manage the supply connectivity.

The remote management of the large majority of commercial transactions and main activities on meters also help Enel in reducing the green house effect, since on-site interventions are no longer needed.

## ENEL Smart Metering System



The project began in 2001 with the installation of electricity smart meters, data concentrator devices and remote metering management system.

Enel was the first company in the world that replaced old electromechanical meters with electronic ones, installing 32 million of them in only five years.

Today this project, so called Telegestore, represents the largest and most widespread remote management infrastructure in the world and is a benchmark for all energy distribution companies.

In Italy, 95% of old devices to be replaced by 2011;

## ENEL Smart Metering System

The Smart Metering System enabled, since 2005, the introduction of a hourly-based tariff system, flexible and adaptable to the various needs, allowing Customers to select supply contract tailored on their needs and consenting a cost saving. The System represents also a step forward for the electrical system at large, improving the services to the Customers, supporting the demand side management and providing a ground to Enel for the improvement of its internal processes.

*Zone F1: mon-fri (08.00-19.00)*

*Zone F23: mon-fri (19.00-08.00), week-end, holiday*

*Mono-hourly rate: same tariff all day:*

*fixed + variable (€/kWh for different range of consumption)*

*Bi-hourly rate: variable for Zone F1 or F23 consumption*

*fixed + variable (€/kWh for different range of consumption)*

*Different tariff for maximum power available : < 3 kW or > 3 kW*

## ENEL Smart Metering System



Various items of information can be displayed concerning electricity consumed, thus obtaining direct control of contract data and consumption.

It is possible to access tariffs which better respond to various behaviours in electricity consumption.

In the case in which the customer has his own electricity production plant (e.g. photovoltaic panels, etc.) the electronic bidirectional meter shows both energy emitted into the network (via one's own production plant) as well as that taken from the Enel network, allowing easier management of the in loco energy exchange contract.

## ENEL Smart Metering System



The remote management system (Telegestore) is a set of electronic devices and software whose main elements are:

The electronic meter;

The concentrator installed in medium to low voltage substations, to gather the data recorded by the connected meters;

The central system for remote management of meters, processing billing information as well as to monitor the quality of service.

In particular, the Telegestore allows to easily read the consumption of its customers and remotely manage contractual operations. At the same time, it can gather relevant data on the quality of electricity supplies while monitoring, in real time, service continuity, intervening promptly in case of network failure or malfunctioning.

## MultiReader-C

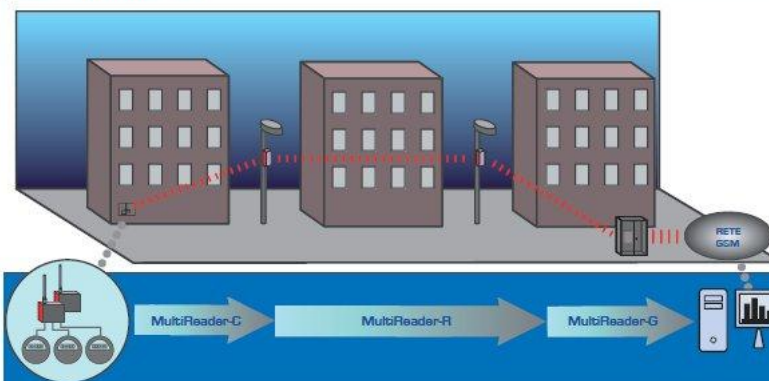
**smart metering**

### Descrizione

Il MultiReader-C è una centralina elettronica per telelettura wireless, alimentata a batterie, interfacciabile a uno, due o tre lanciaimpulsi per contatori d'acqua. La centralina realizza le funzioni di conteggio bidirezionale, memorizzazione e comunicazione dati nel sistema di telelettura MultiReader, funzioni finalizzate anche al monitoraggio di distretti idrici. La centralina è in grado di misurare, nonché immagazzinare, non solo i consumi idrici assoluti e parziali, ma anche i riflussi e le perdite; essa è inoltre in grado di rilevare la frode operata sul lancia impulsi, il livello di carica della batteria, la qualità della connessione radio. La centralina è dotata della capacità di ripetere i segnali radio di altre centraline ed adotta particolari filtri contro le interferenze radio; inoltre è possibile acquisire i dati della centralina tramite computer palmare, sia per eseguire attività di installazione, che per il completamento di giri di lettura di tipo walk-by o drive-by, qualora non sia stata installata una rete fissa con ripetitori MultiReader-R.



### Sistema MultiReader



### Dati tecnici

Tipologie comunicazione	bidirezionale, multicarica, 10 livelli di ripetizione
Frequenze	433,050 - 434,790 MHz
Potenza TX ERP	+3 dBm
Modulazione	FSK
Sensibilità RX	-100 dBm @ 0,1% BER
Blocking a 10 MHz	>85 dB
Batterie	2 pile al litio
Autonomia	10 anni (2 letture / mese)
Interfacce lanciaimpulsi	4 contatti puliti (open collector / open drain)
Temperature operative	-20 °C + +55 °C
Umidità operative	fino al 100 %
Temperature di immagz.	-20 °C + +55 °C
Grado di protezione	IP68
Certificazione	CE, direttive R&TTE (EN300220, EN301409, EN60950, EN50371)

### Portate radio

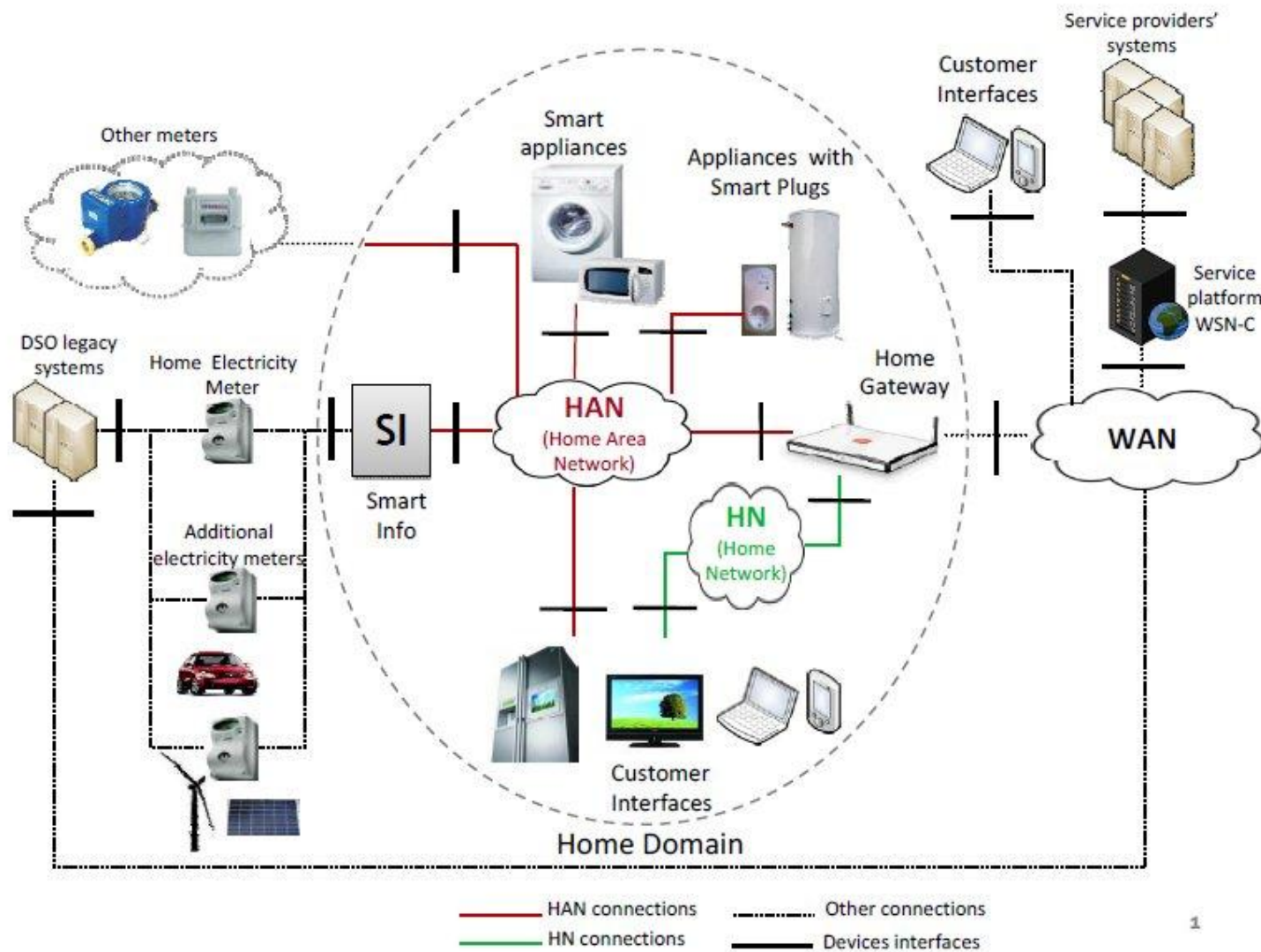
Camera interrrete	25 m
Pozzetto	40 m
Nicchie metalliche h=0m	100 m
Ante libere h=4m	1000 m

*Nota: portate radio in assenza di ostacoli secondari*

### Contenitore

Materiale	ABS
Larghezza	108 mm
Profondità	32 mm
Altezza corpo	88 mm
Altezza incluse antenne	188 mm







## Case study: Bologna – Corticella Urban area with district heating



$$S_u = 90.000 \text{ m}^2$$

$$V = 420.000 \text{ m}^3$$





## ✓ Thermal power station

- N°5 boiler  $P_n = 3 \text{ MW}$
- Temperatura di esercizio di  $80\text{-}90^\circ\text{C}$
- Fuel oil BTZ
- MANUAL Control





## What strategies?

policy development and implementation by introducing incentives and disincentives (Volumetric compensations, Tax reductions, PAYS, etc.) within the regulative framework

Refurbishment of buildings

New thermal plant (cogeneration, heat pumps, solar thermal, PV)

Installation of smart meter systems to reduce energy consumption and to trigger sustainable behaviour of inhabitants

Develop a Social energetic Community

.....

PROGETTO

VISTE PROSPETTICHE

