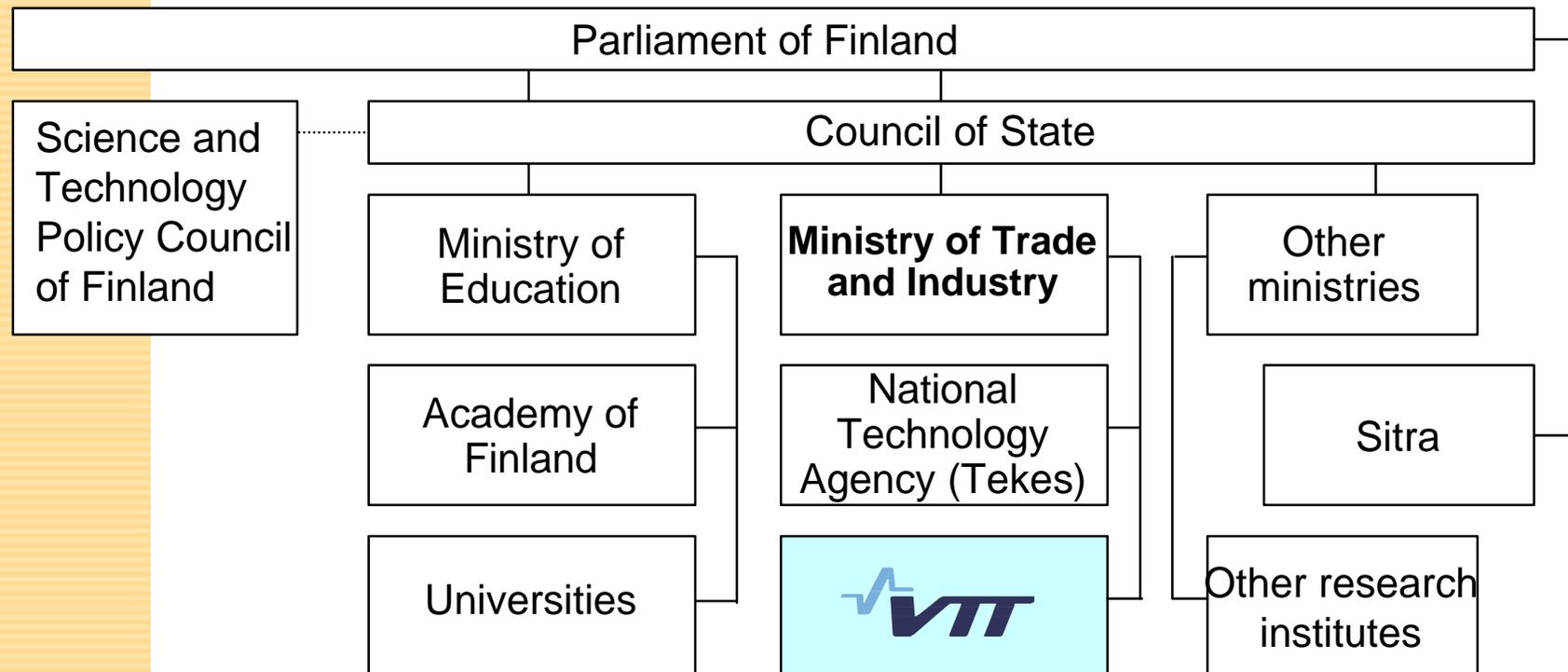


# LONG TERM MONITORING VIA INTERNET

Jorma Pietiläinen



## THE MOST IMPORTANT DECISION MAKERS, FINANCCERS AND PERFORMERS OF RESEARCH IN THE PUBLIC SECTOR



# VTT IN BRIEF

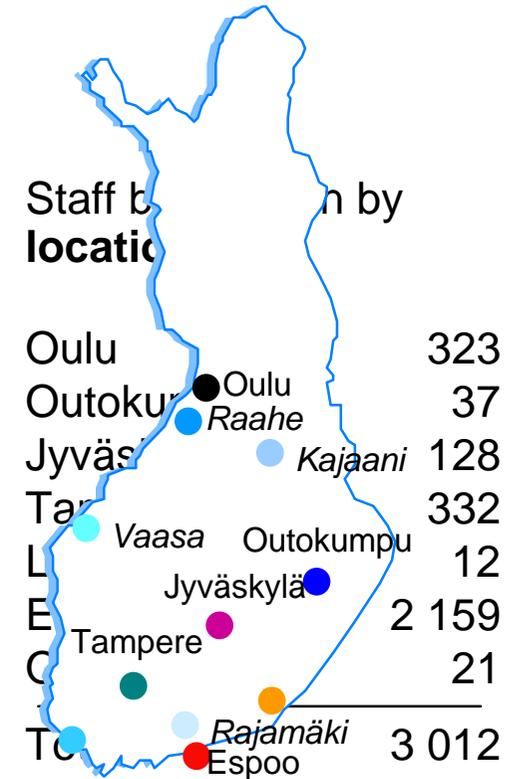
## Units:

- VTT Electronics
- VTT Information Technology
- VTT Industrial Systems
- VTT Processes
- VTT Biotechnology
- VTT Building and Transport**
- VTT Information Service
- VTT Corporate Management and Services

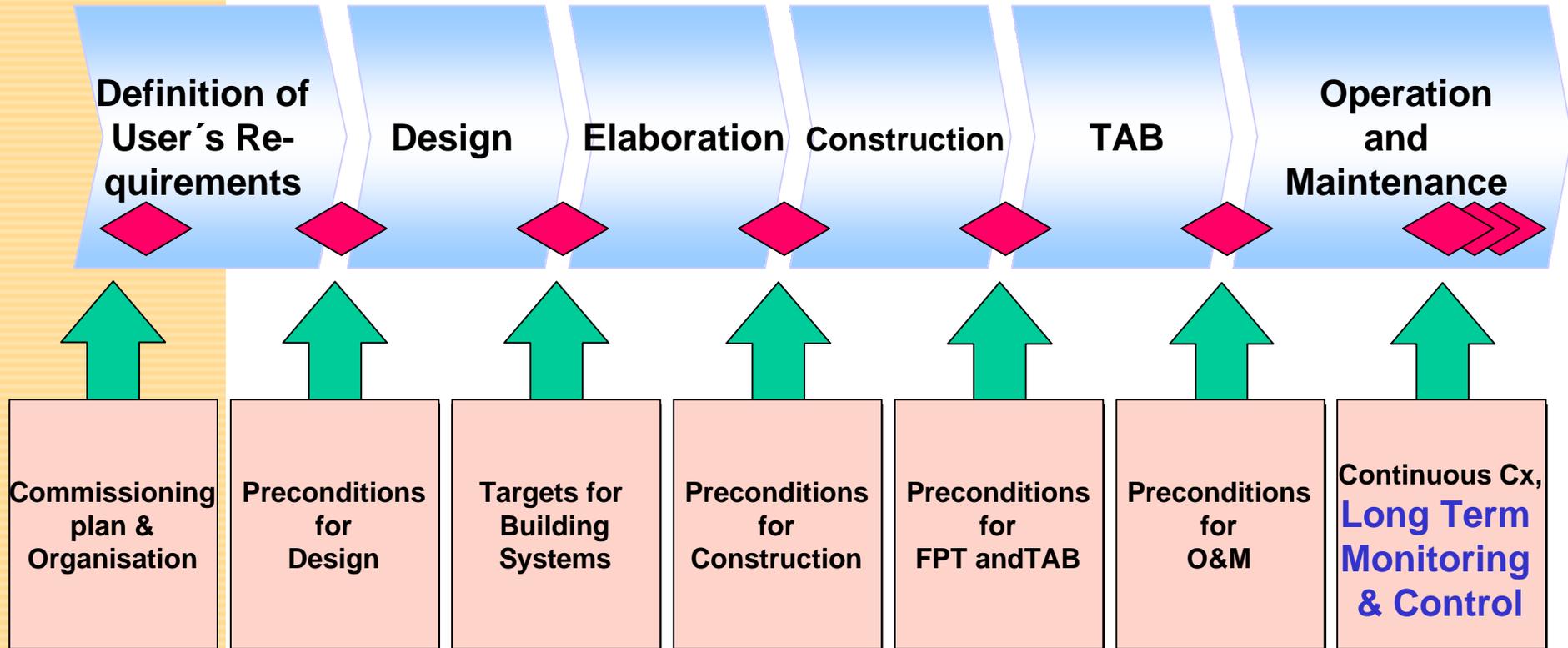
**Staff: 3 012**  
**Turnover: 214 M€**

- Basic govern. funding to R&D on VTT's own initiative 34 M€
- Jointly funded projects 92 M€
- Commercial activities 88 M€

[www.vtt.fi](http://www.vtt.fi)



# Quality Control Systematics



**Monitoring is an essential part of the quality control!**

# Monitoring = Basis for Everything!

- Reliable consumption data forms the **basis for proper energy management and succesful saving projects**
- **Verification** of implemented saving measures is impossible without reliable consumption figures:

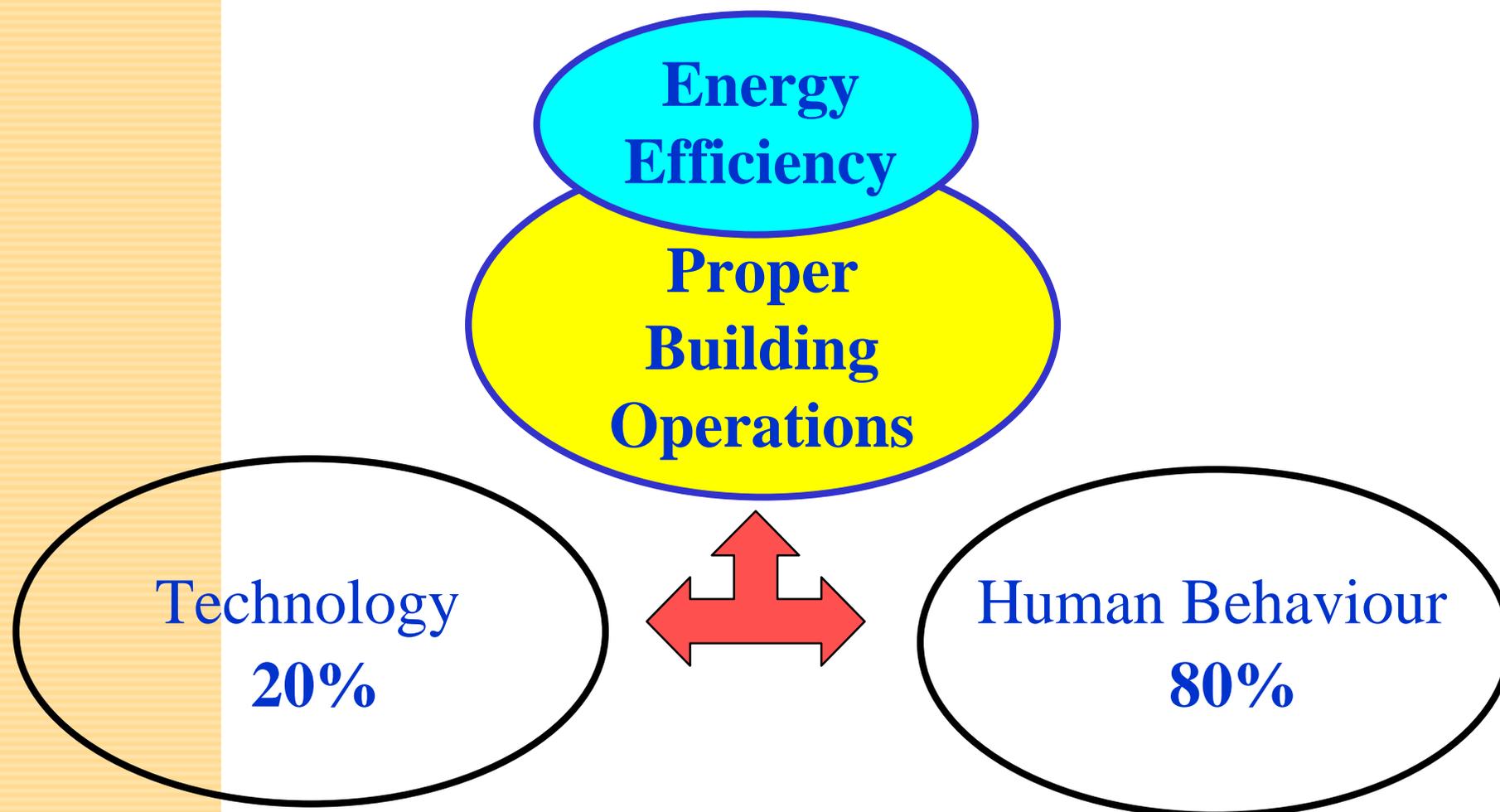
$$\star \text{ Energy Saving} = \text{Baseline Energy Use} - \text{Post Installation Energy Use}$$

- **Monitoring data** can be used for **Feedback** activities in order to **improve Awareness and Motivation**
  - of **M&O personnel**
  - **users and owners**
  - **decicion makers**
  - **designers**



# Existing buildingstock in key position

## Operation & Maintenance is underestimated!



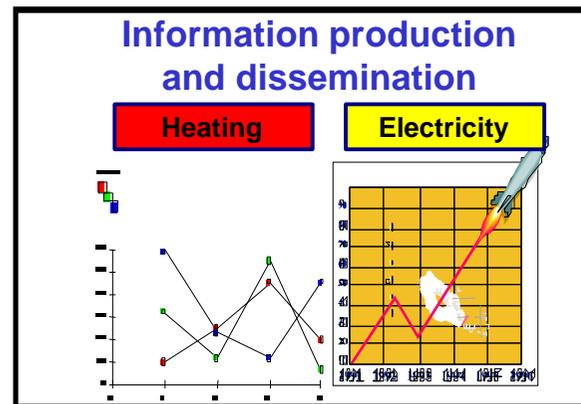
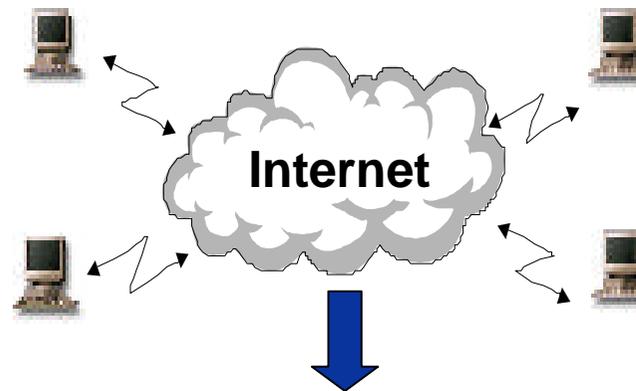
# ICT offers new possibilities for O&M:

## More's Law: Exponential growth of computing capacity

April 19, 1965 Electronics Magazine published a paper by Gordon Moore in which he made a prediction about the semiconductor industry that has become the stuff of legend. Known as Moore's Law, his prediction has enabled widespread proliferation of technology worldwide, and today has become shorthand for rapid technological change. This year we are celebrating the 40th anniversary of Moore's Law.

# Internet - a Platform for

- Monitoring and control



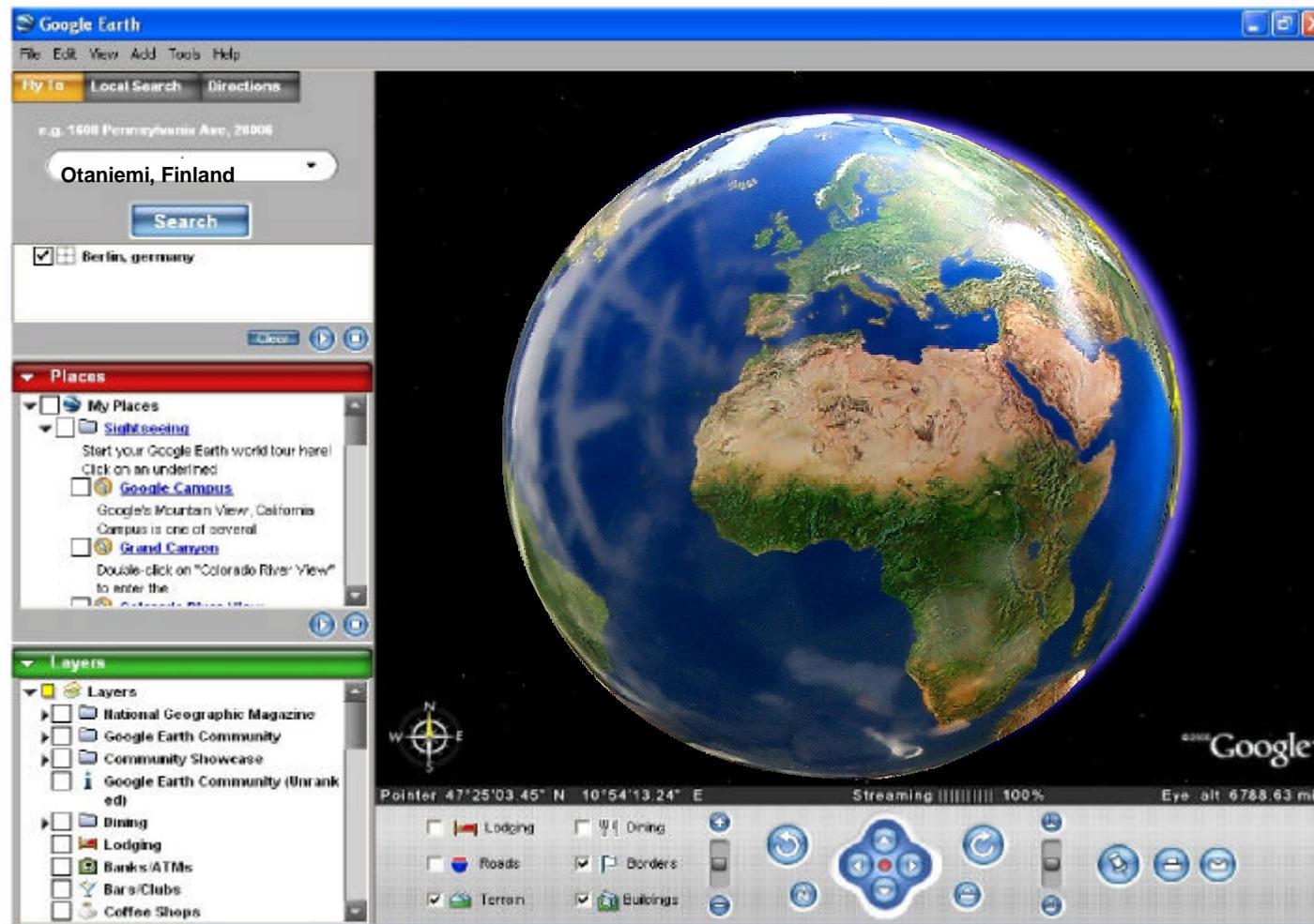
# ”Next Generation” Internet

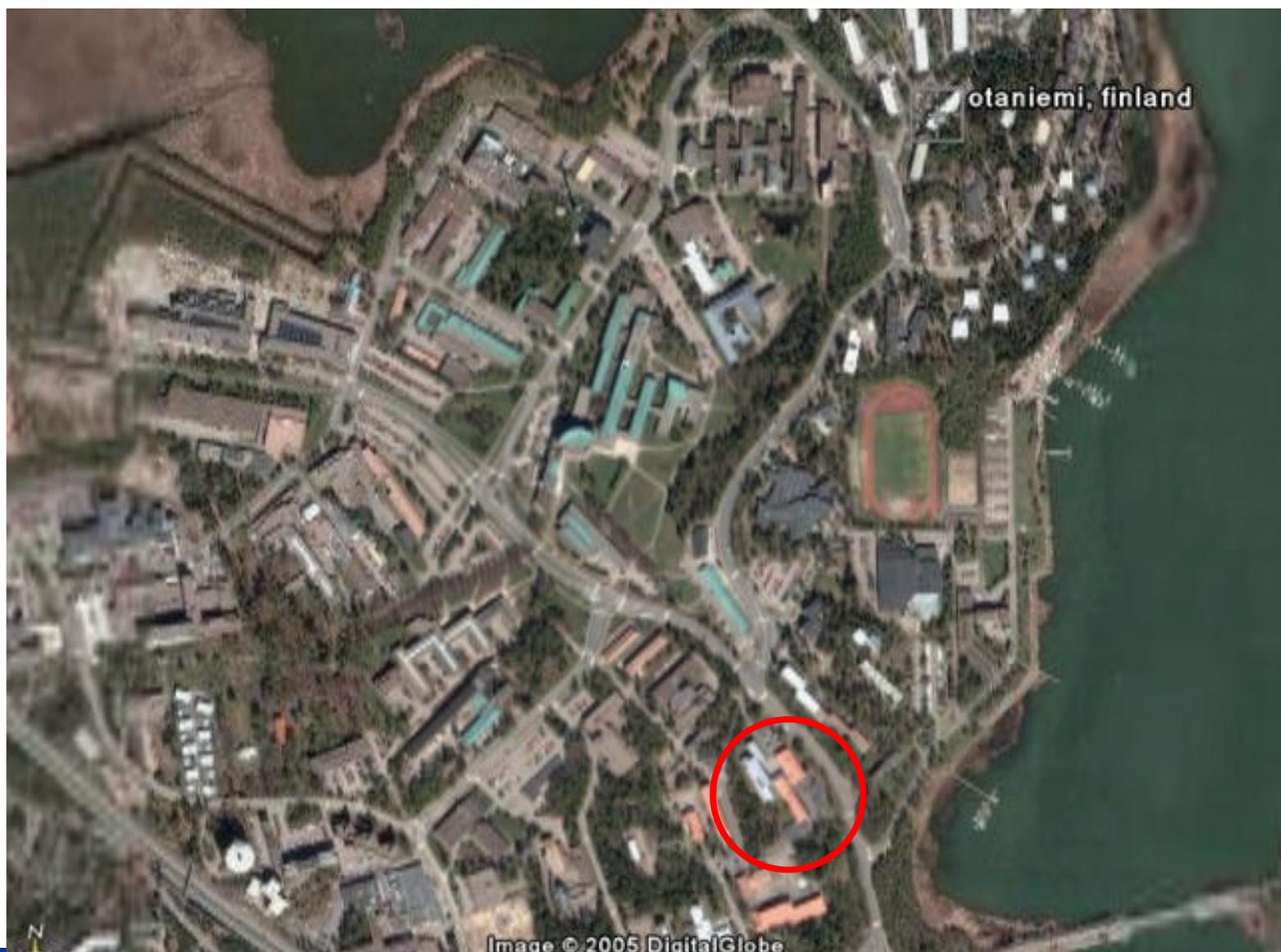
## IPv6 "Internet Protocol Version 6,

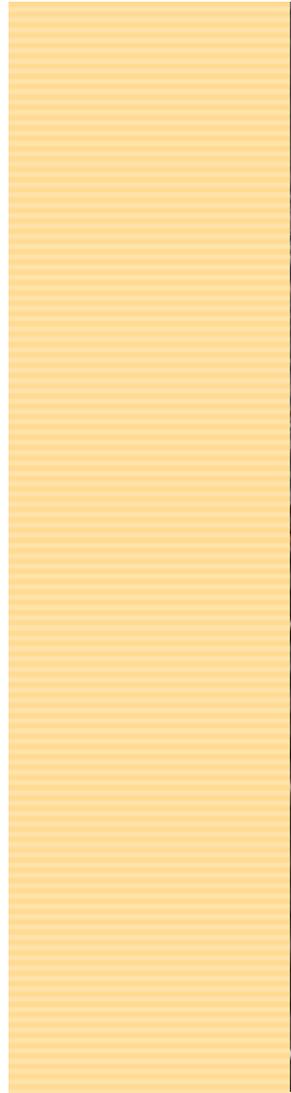
- extremely large address space  
(In a theoretical sense this is approximately:)
- **665,570,793,348,866,943,898,599 addresses per square meter of the surface of the planet Earth** (assuming the earth surface is 511,263,971,197,990 square meters).



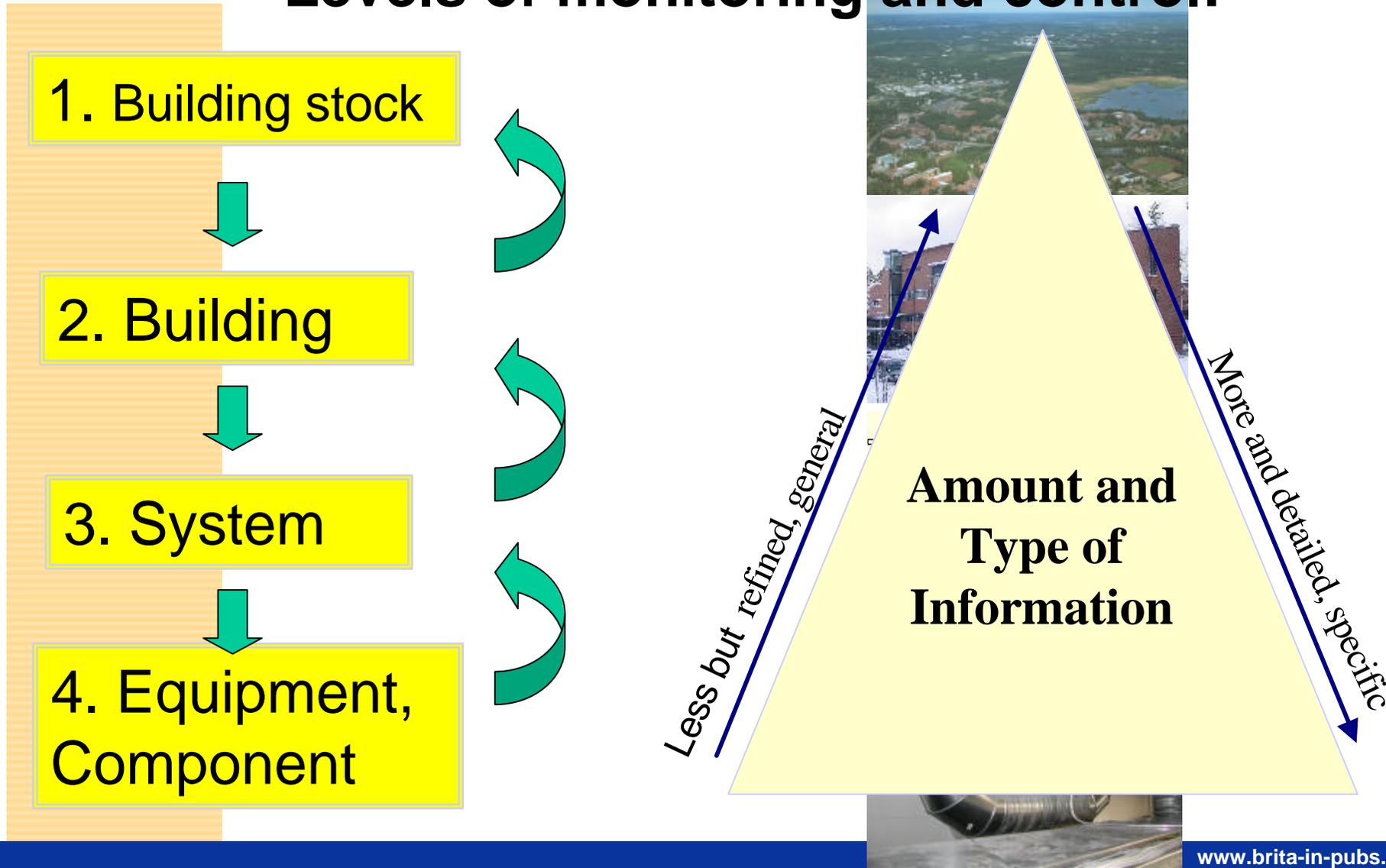
## Tools for visual monitoring:



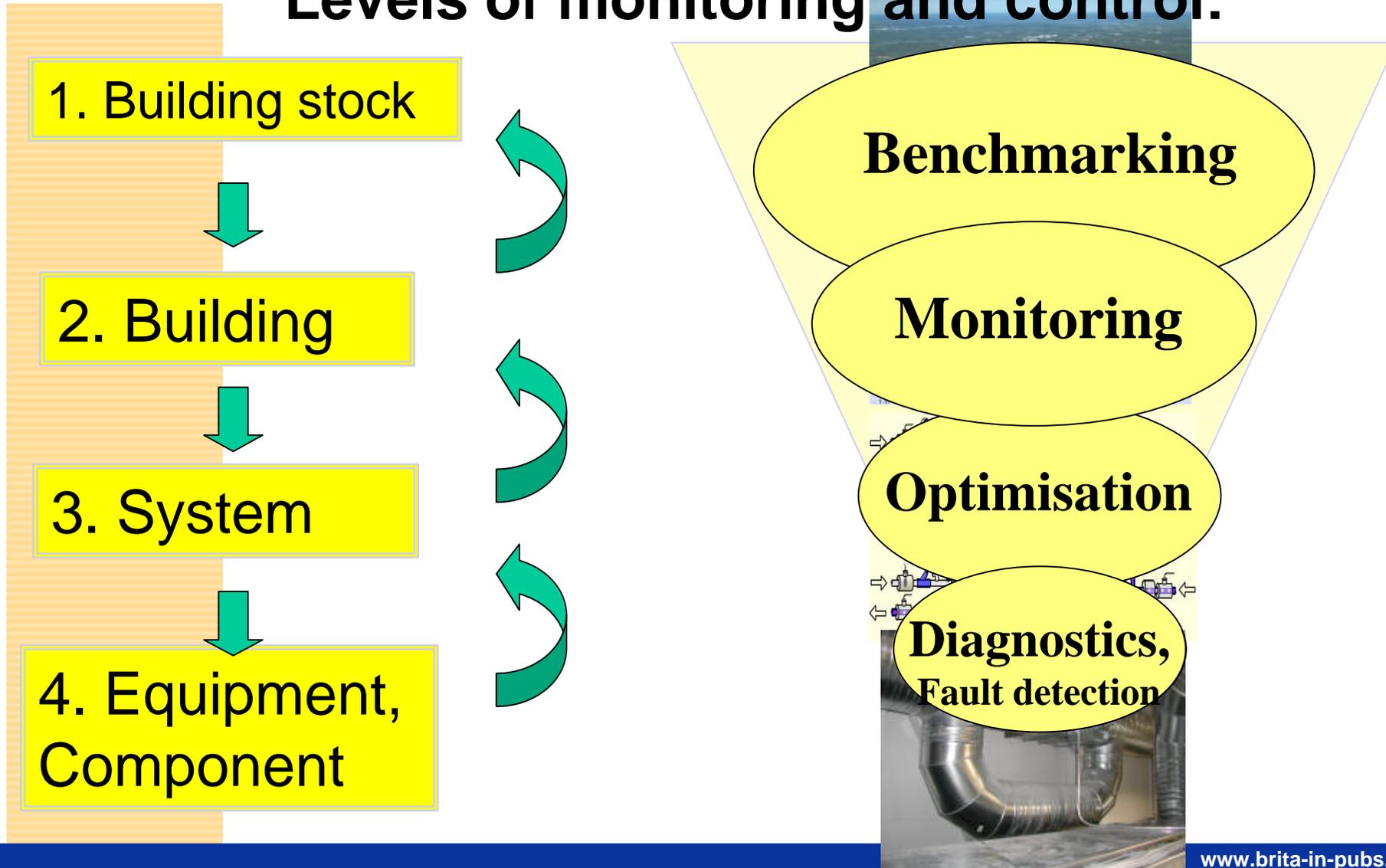




# Levels of monitoring and control:



# Levels of monitoring and control:



# Software tools developed at VTT:

⇒ Monitoring & Targeting

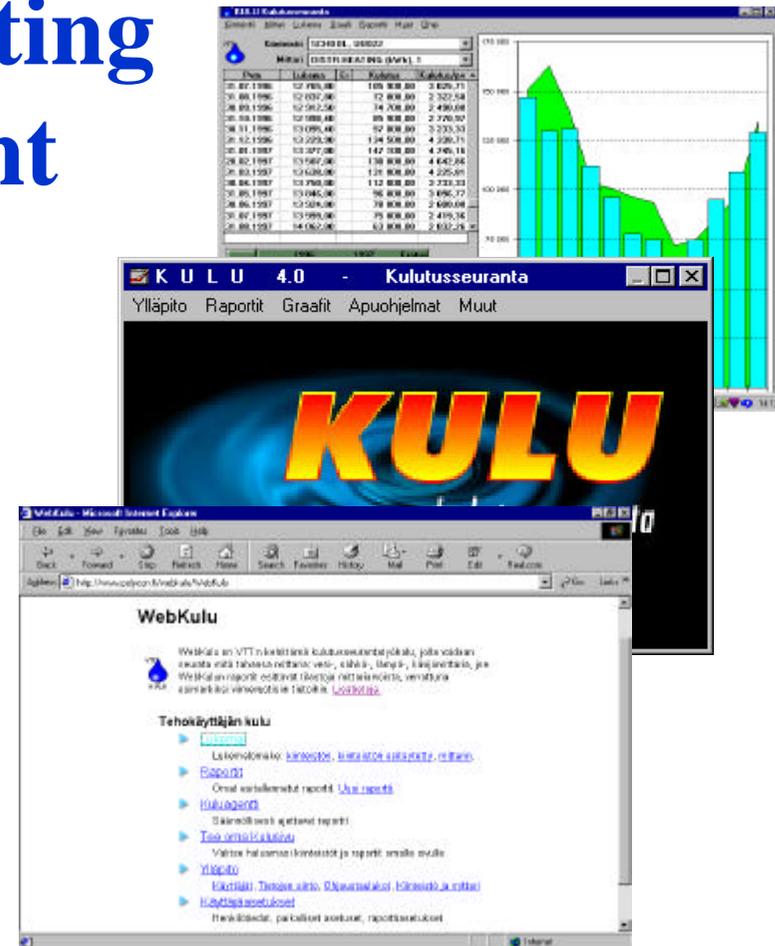
⇒ Energy Management

⇒ Analysing

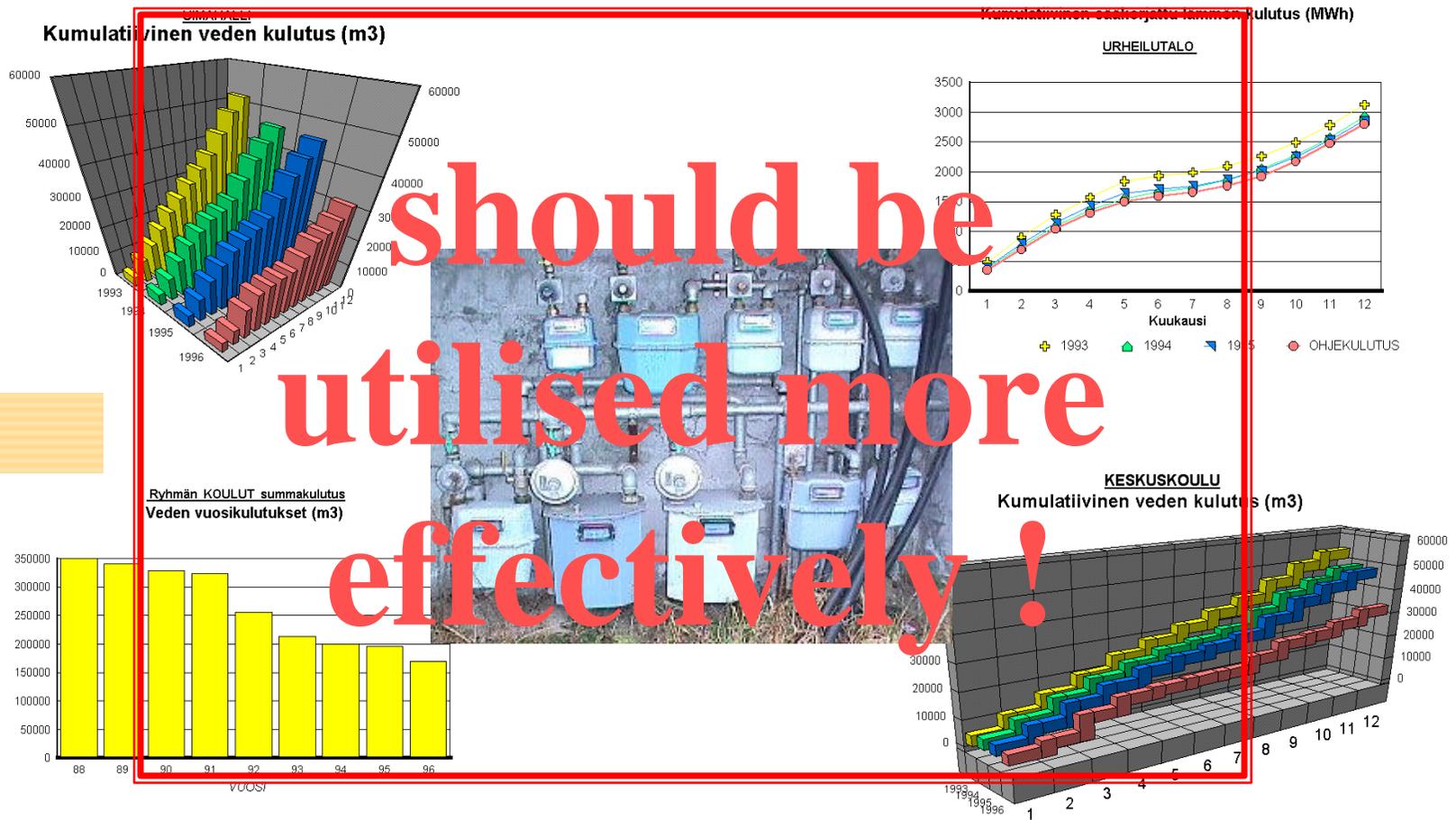
⇒ Benchmarking

⇒ Feedback

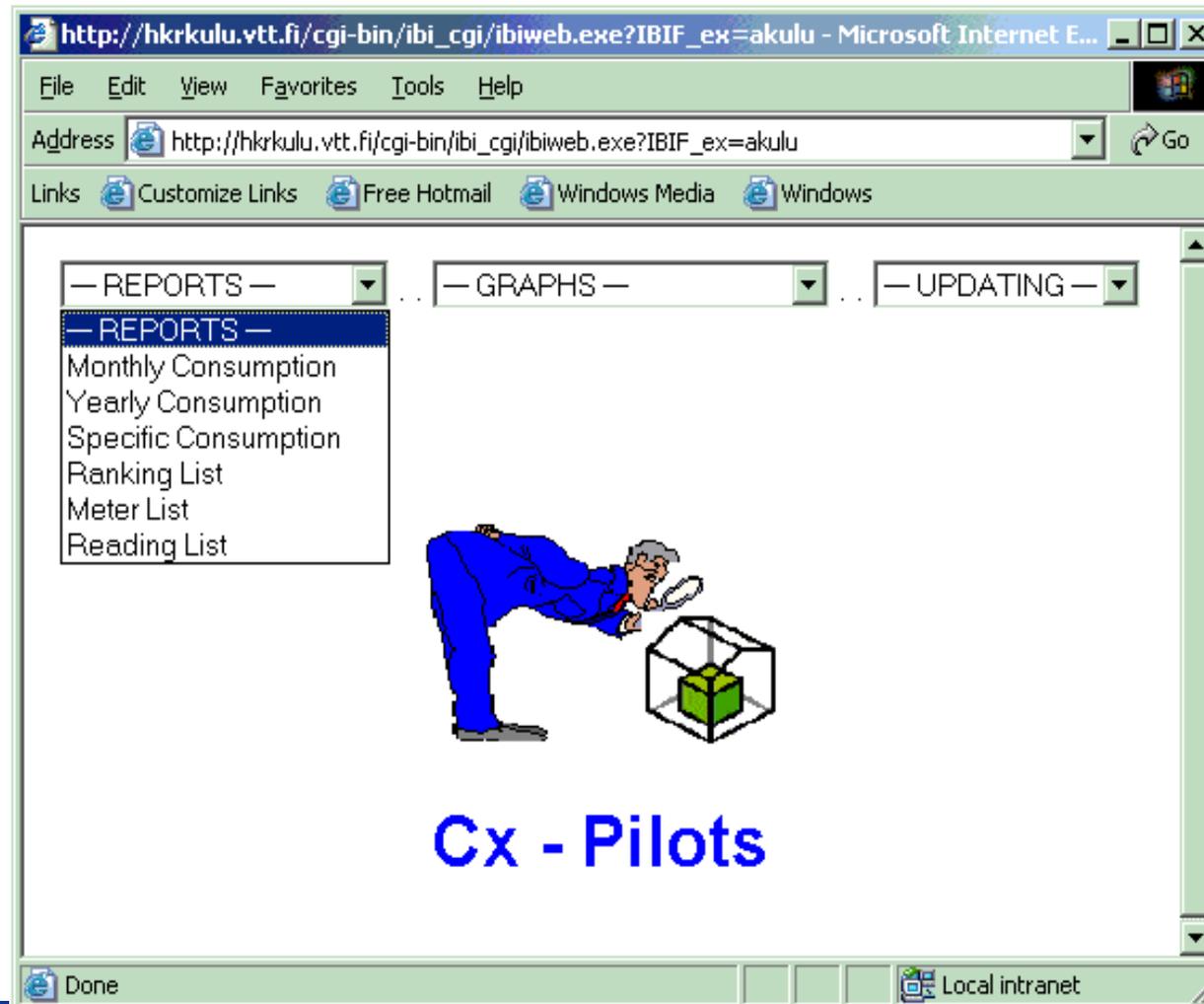
⇒ Motivation



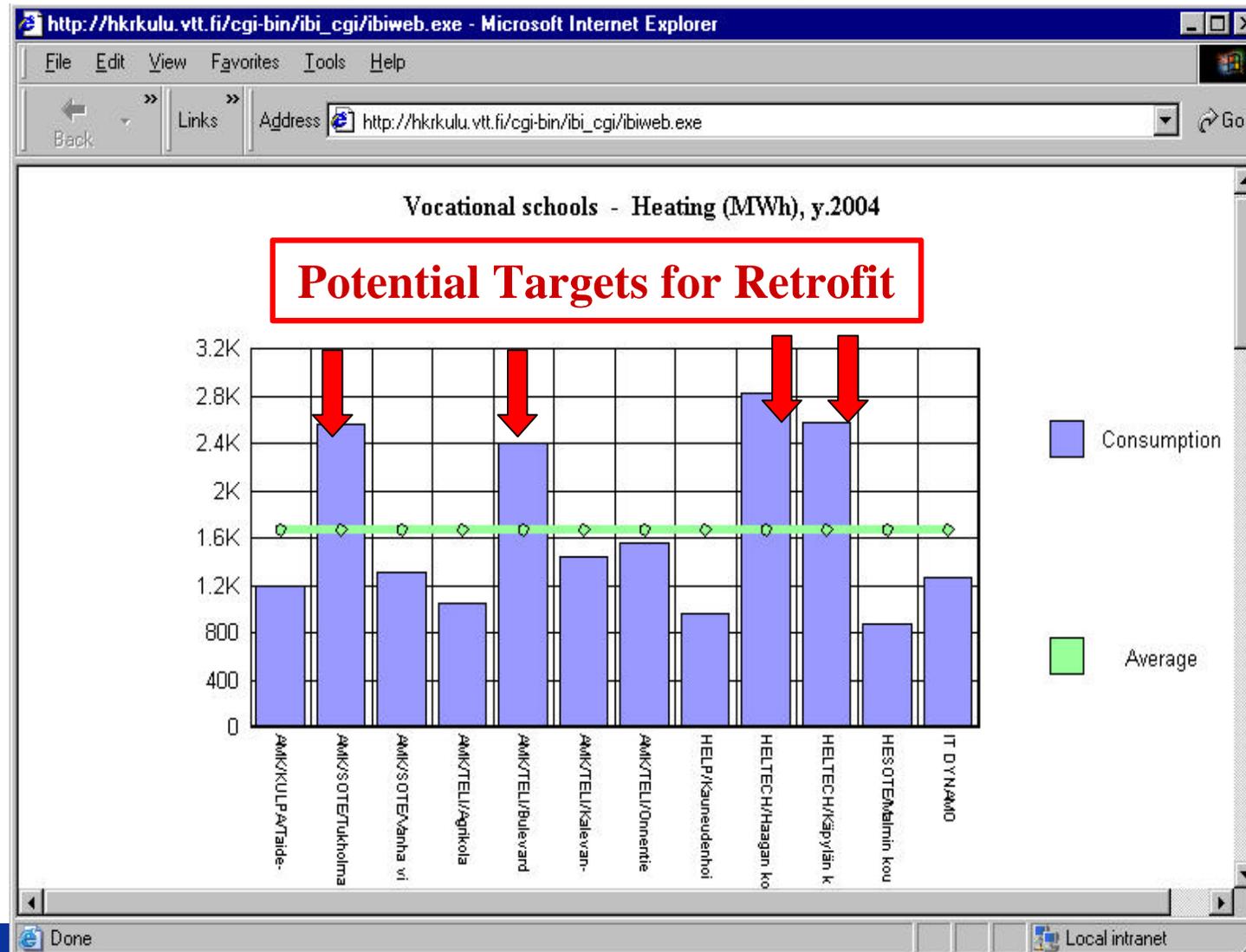
# Data from Existing Utility Meters



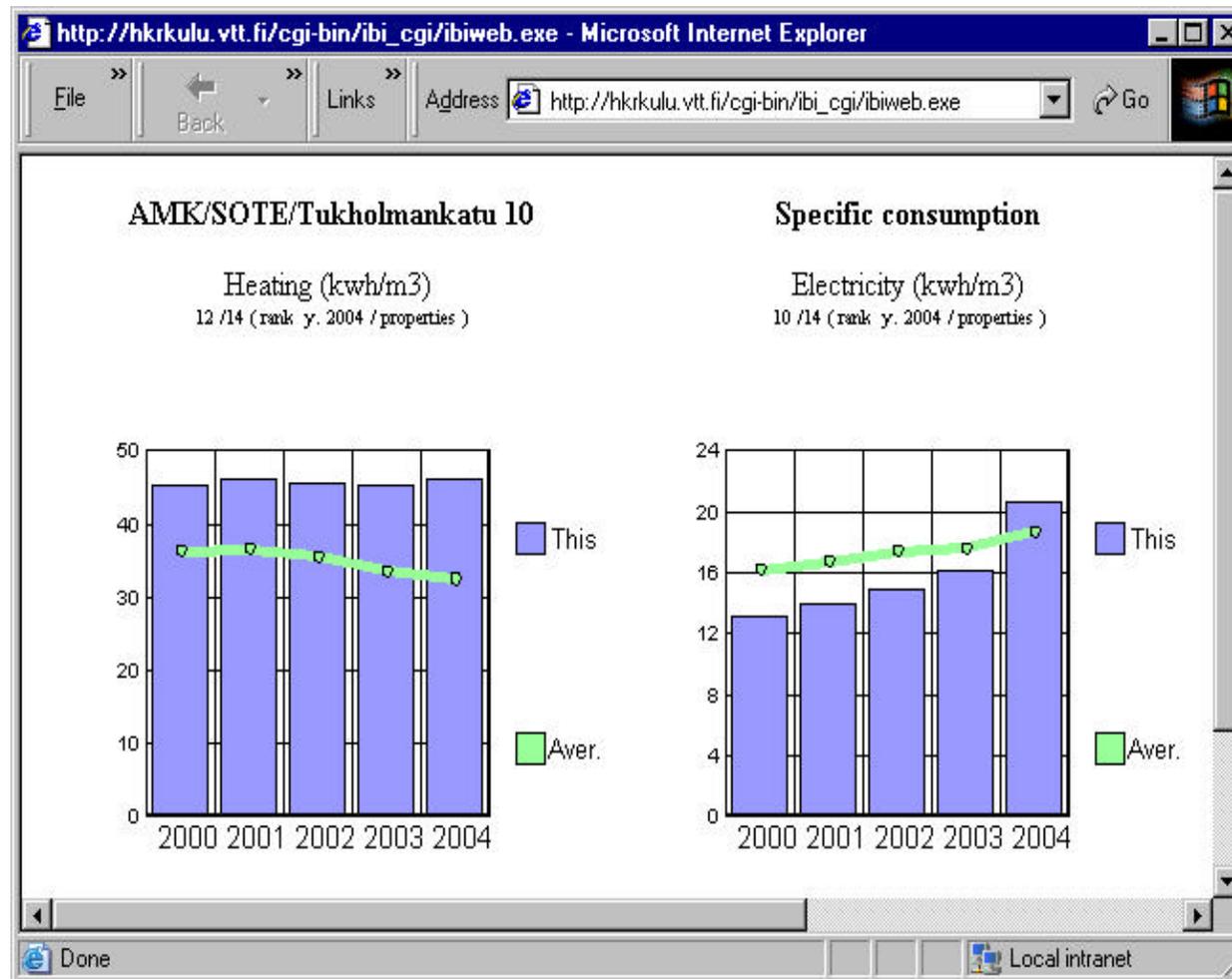
# Web based tools for basic tasks:



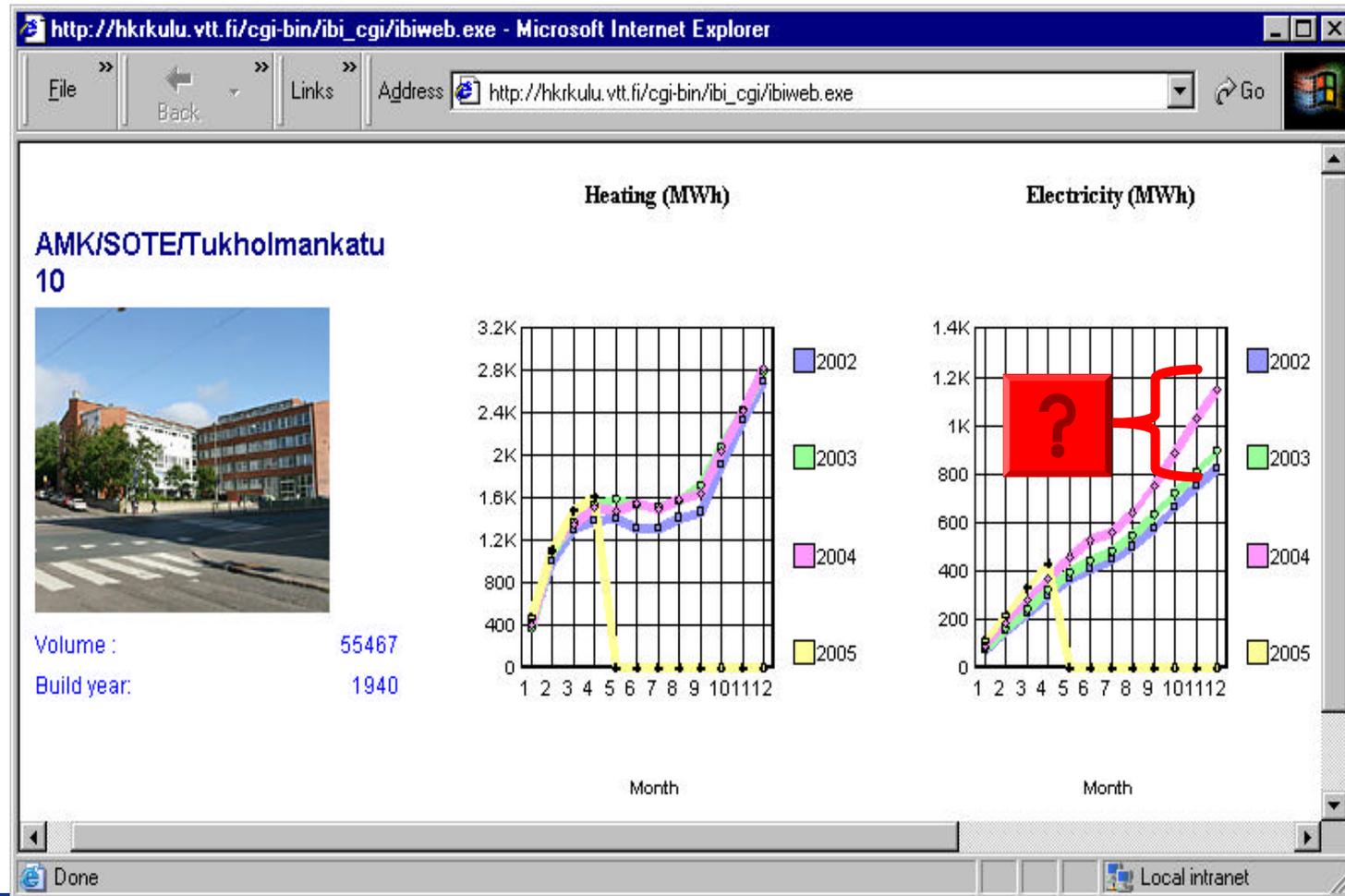
# Monitoring on Building Stock Level:



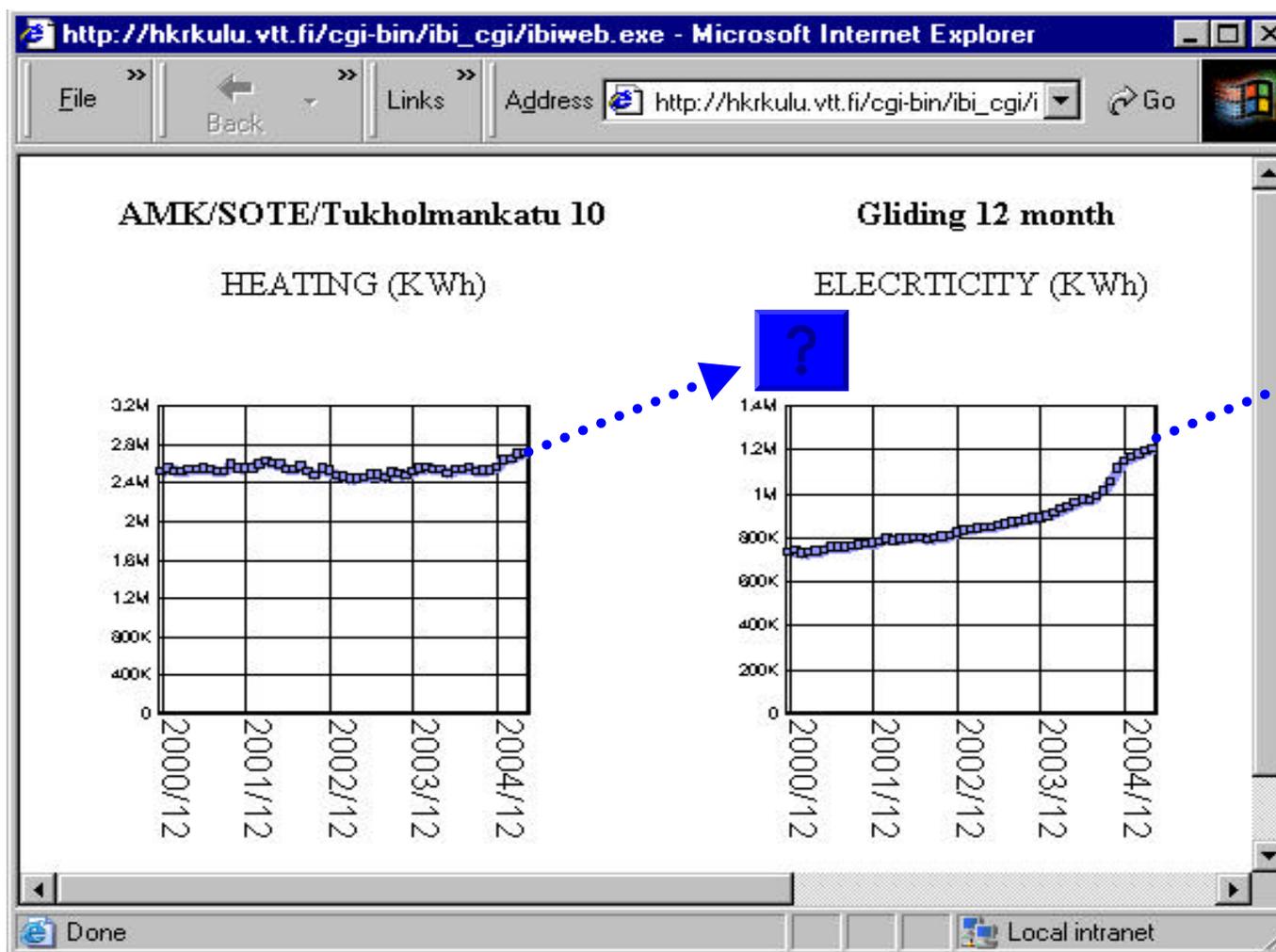
# Benchmarking on Building Stock Level:



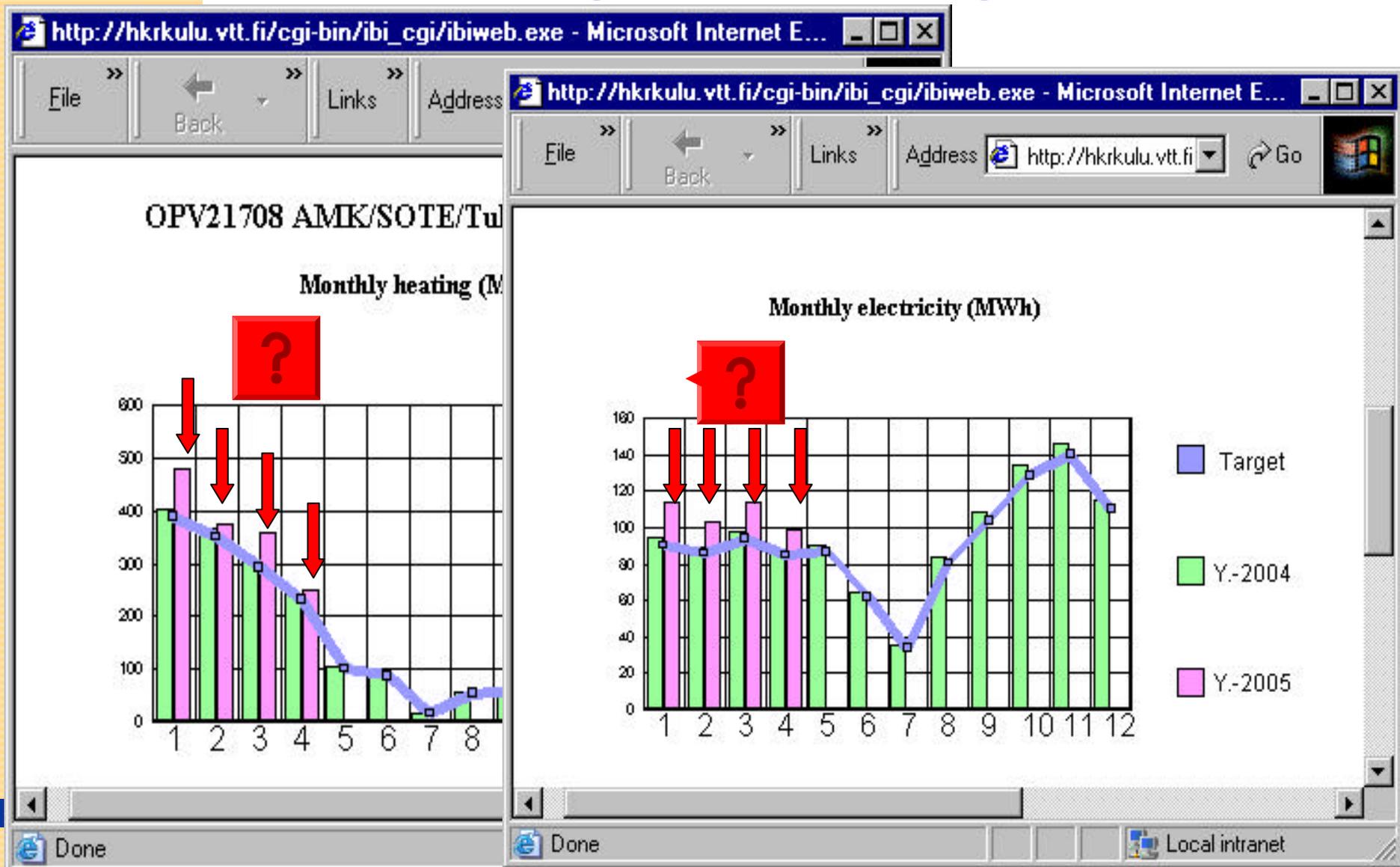
# Monitoring on Building Level:



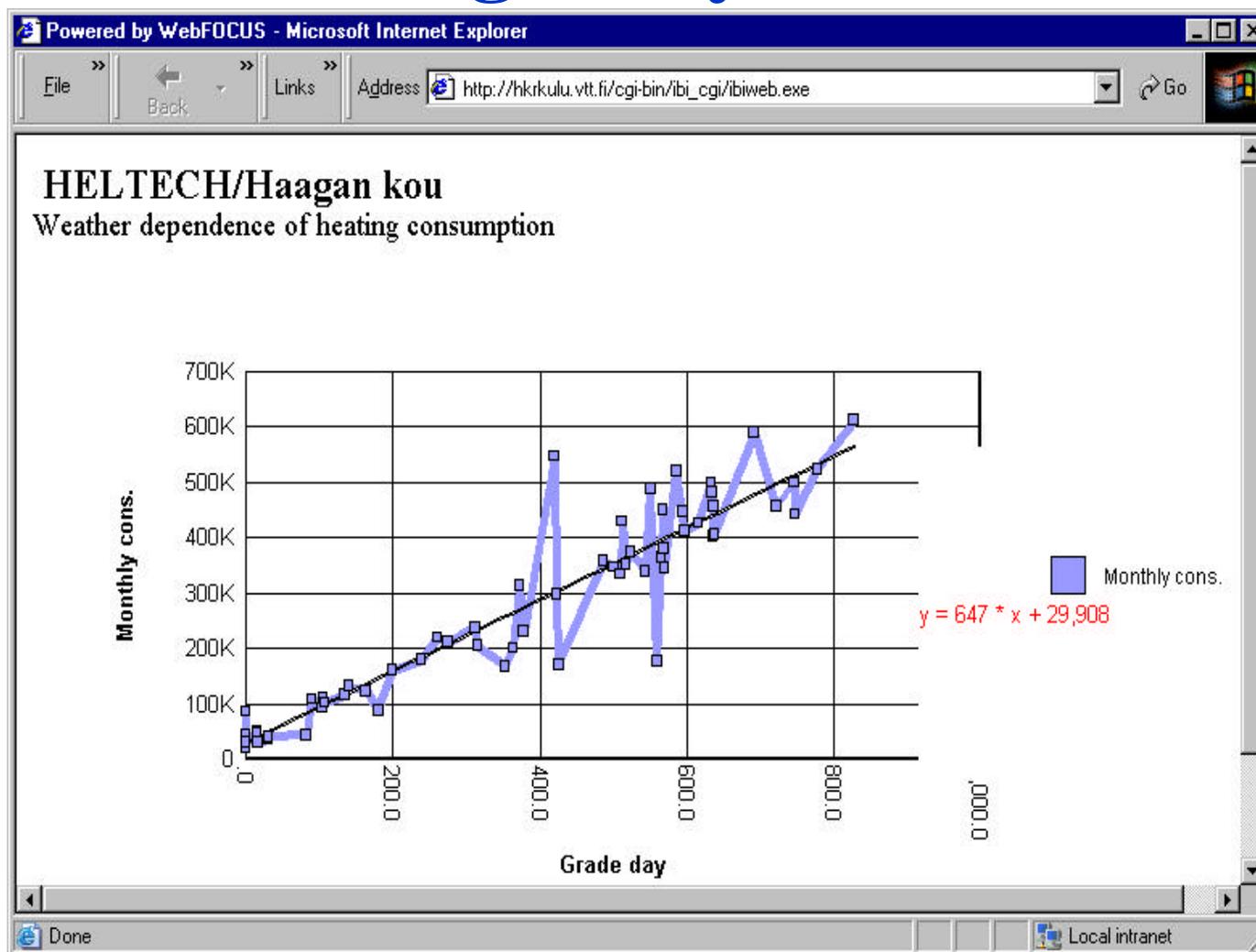
# Monitoring on Building Level:



# Monitoring on Building Level:



# Monitoring on System Level:



## Portal for information and tools

### <http://e3portal.vtt.fi>

**e3Portal - Information for the building energy management in municipalities - Microsoft Internet Explorer**

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss Real.com

Address <http://e3portal.vtt.fi/index.asp> Go

**e3 ENERGY ENVIRONMENT ECONOMY** **e3Portal**  
Information for the building energy management in municipalities

FI | SE | EN | ES

- ENERGY MANAGEMENT
- ENERGY TARGETING
- ENERGY MONITORING
- ENERGY CONSUMPTION
- ENERGY AUDITS
- IMPLEMENTATION AND FINANCING
- CLEARING HOUSE
- E3P TOOL BOX
- HELP AND CONTACTS

Energy efficiency plays an important roll in the implementation of sustainable development in municipalities. Better awareness and motivation are needed on local level when aiming at greenhouse gas mitigation and combating

**News**

- 6/30/2004 [Portaalin versio 1.5 on valmistumassa. \(FI\)](#)
- 5/26/2004 [Portaalissa työkalu kulutusilaston ylläpitoc](#)
- 5/18/2004 [Portaalin tiedonsiirto-tapaaminen Kuntaliitos 2.6.2004 \(FI\)](#)
- 5/17/2004 [e3Portaali jalostaa kulutuslukemia tiedoksi](#)

e3P-1.5-20040531

© 2004  
VTT Building and Transport

e3 - Microsoft Internet Explorer

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EUROPEAN ENERGY ENVIRONMENT

FIN | ENG | SWE

## Energy Certification

18.3.2003

Rakennustunnus: 04901000140001065  
 Lähiosoite: VUORIMIEHENTIE 5  
 Postiosoite: 02150 Espoo  
 Kokonaisala: 8656 m<sup>2</sup>  
 Kerrosala: 7650 m<sup>2</sup>  
 Huoneistoala: 7650 m<sup>2</sup>  
 Rakennustilavuus: 35320 m<sup>3</sup>  
 Kerroksia: 4  
 Käyttöönottovuosi: 1975  
 Käyttötarkoitus: 532  
 Käyttäjämäärä: 4

© 2002  
 VTT Rakennus- ja yhdyskuntateknikka

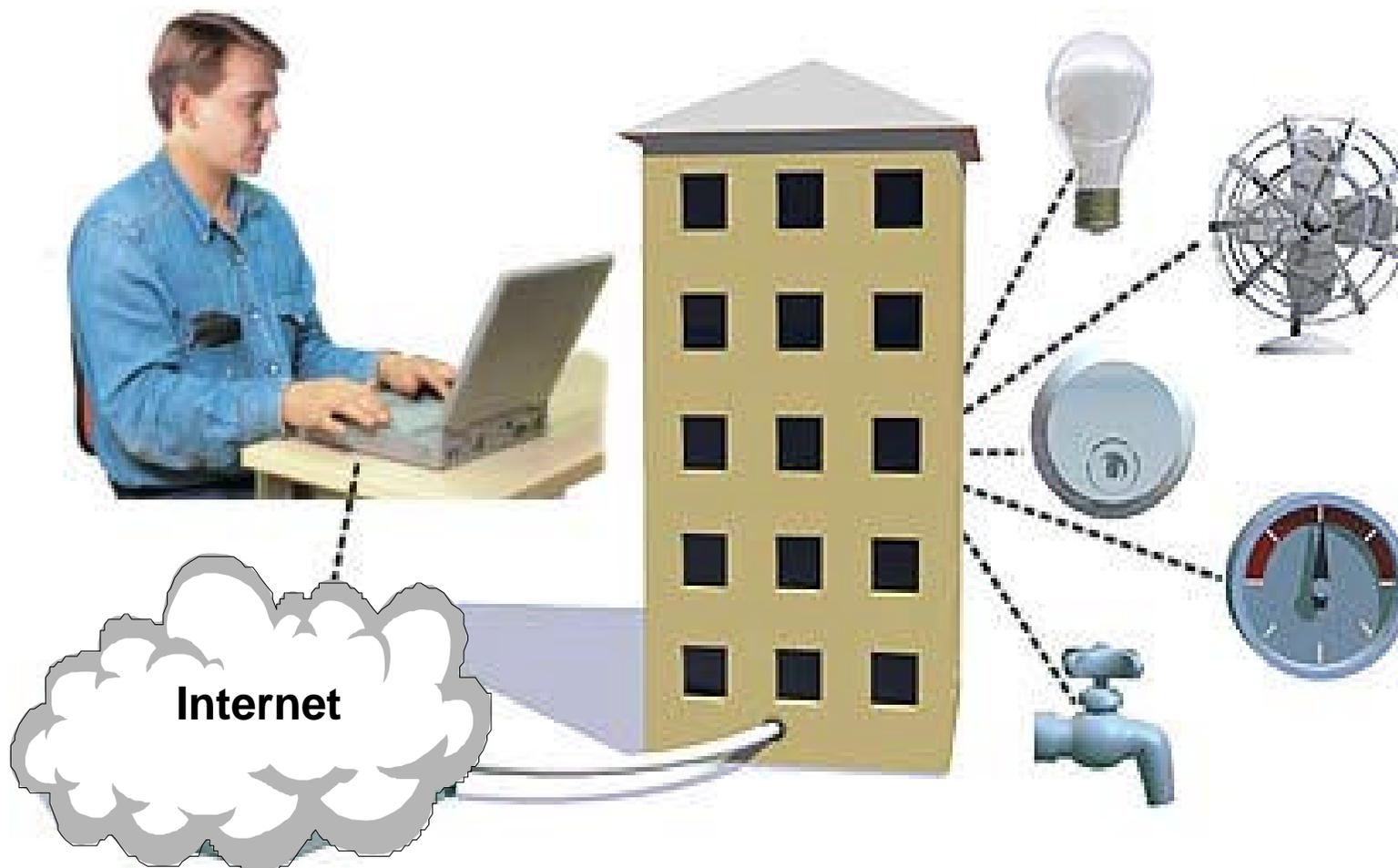
[RHR](#)  
[WebEtana](#)  
[WebKulu](#)  
[Energy Labeling](#)  
  
[Info](#)

Energian kulutuksen arvosana  
 Vähän energiaa kuluttava

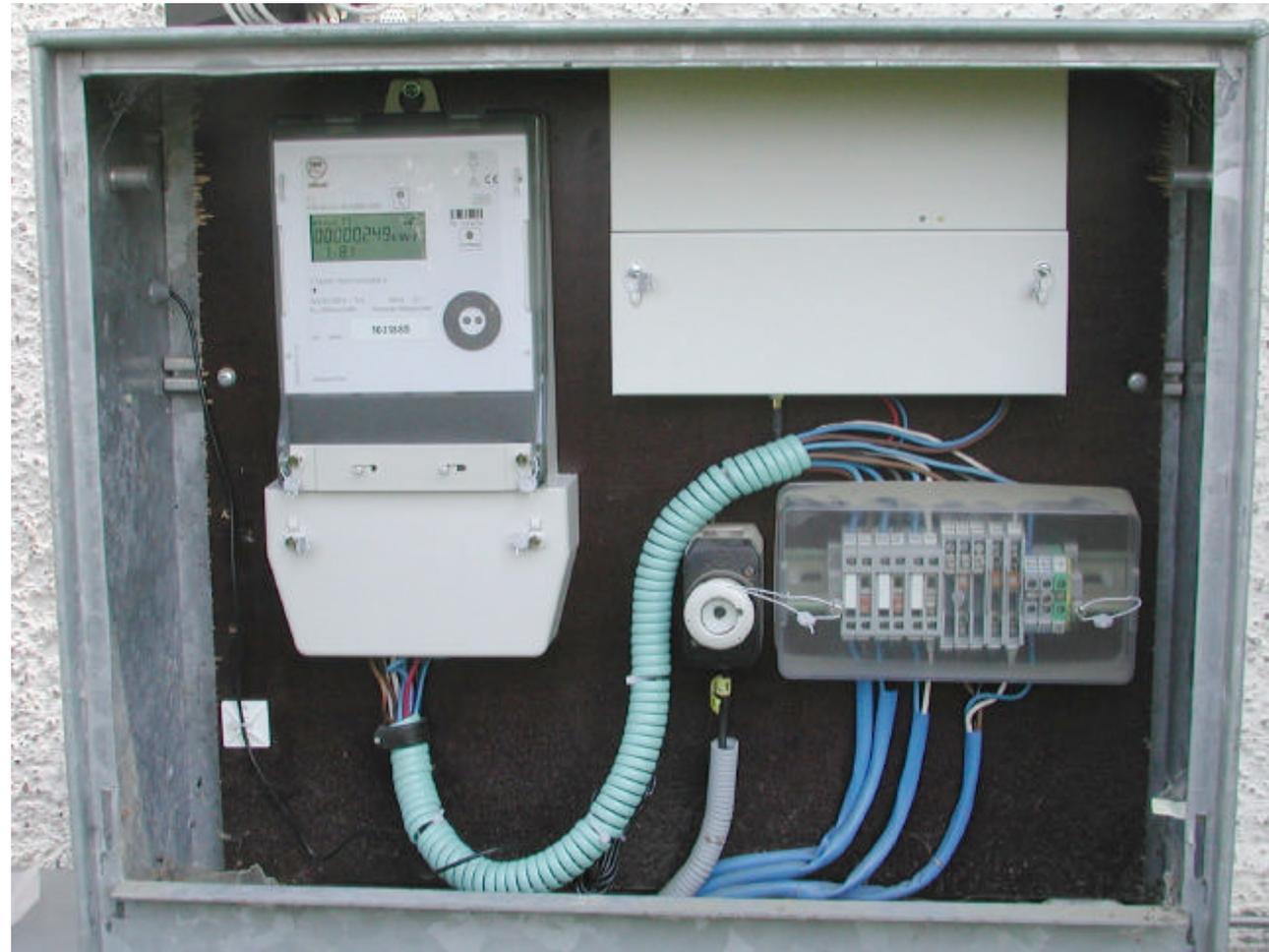
Calculated: **B**  
 Measured: **D**

Done Local intranet

## Buildings and equipments will be connected as well



## New meter technology for AMR solutions



## Several communication options available

The screenshot shows a web browser window displaying the Enermet website. The browser's address bar shows the URL <http://www.enermet.com/en/metering/communication.php>. The website's navigation menu on the left includes: Metering, Applications, Communication Options & Devices (highlighted with a red circle), Wireless Solutions, Wired Solutions, LV Power Line, MV Power Line, Meters, AIM Services, Load Management, Locations & Contacts, Media releases & Magazines, Success Stories, Meet Us, About Us, and Feedback. The main content area is titled "Communication Options and Devices" and contains the following text:

The Enermet AIM solution offers both wireless, wired and PLC-alternatives for communication.

Enermet provides communication solutions that utilise a variety of media, including the Public Switched Telephone Network (PSTN), GSM/GPRS and both medium and low voltage Power Line Carrier (PLC) technologies. Our system architecture allows for the easy implementation of all media!

Available communication terminals support a variety of types and numbers of inputs and their modular construction makes them compatible with Enermet measurement devices, ensuring ease of installation.

Communications is a rapidly changing field of technology, compared to the life expectancy of an electricity meter. Thus, a degree of flexibility is needed to keep up with future requirements.

Links provided:

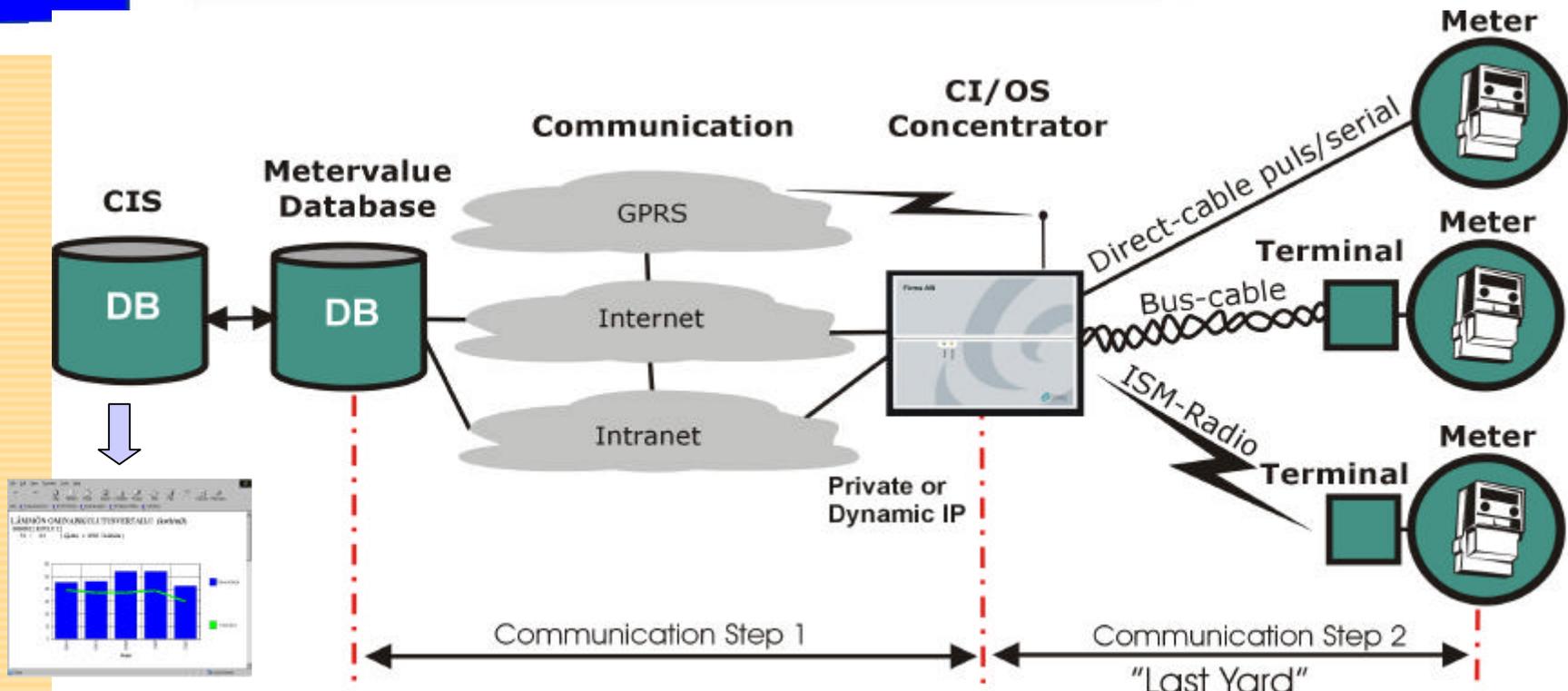
- [Wireless Solutions](#)
- [Wired Solutions](#)
- [LV Power Line](#)
- [MV Power Line](#)

At the bottom of the page, there is a "Questions? Contact us:" section with a "Choose country" dropdown menu and a "GO" button. The footer of the website includes the text "Siirretään dataa osoitteesta www.enermet.com..."

## New AMR-solutions based on opens standars!



<http://www.comsel.com>



**1 Information Technology**

Building database (terminal)  
 Consumption (meter value) database  
 Web-based analysing and reporting

**2 Communication Technology**

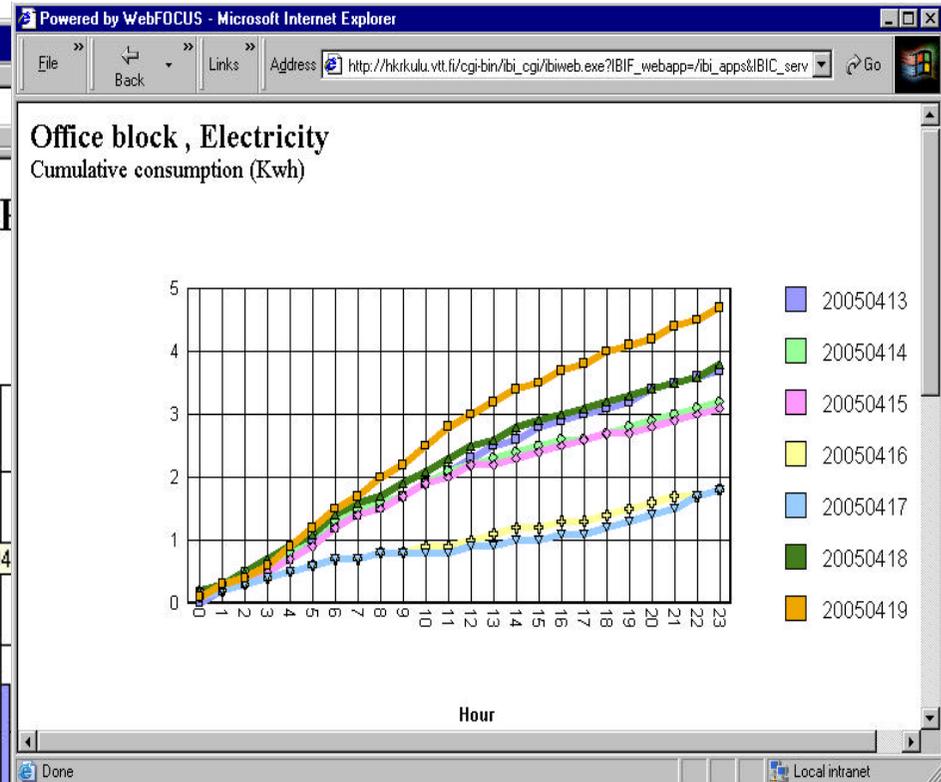
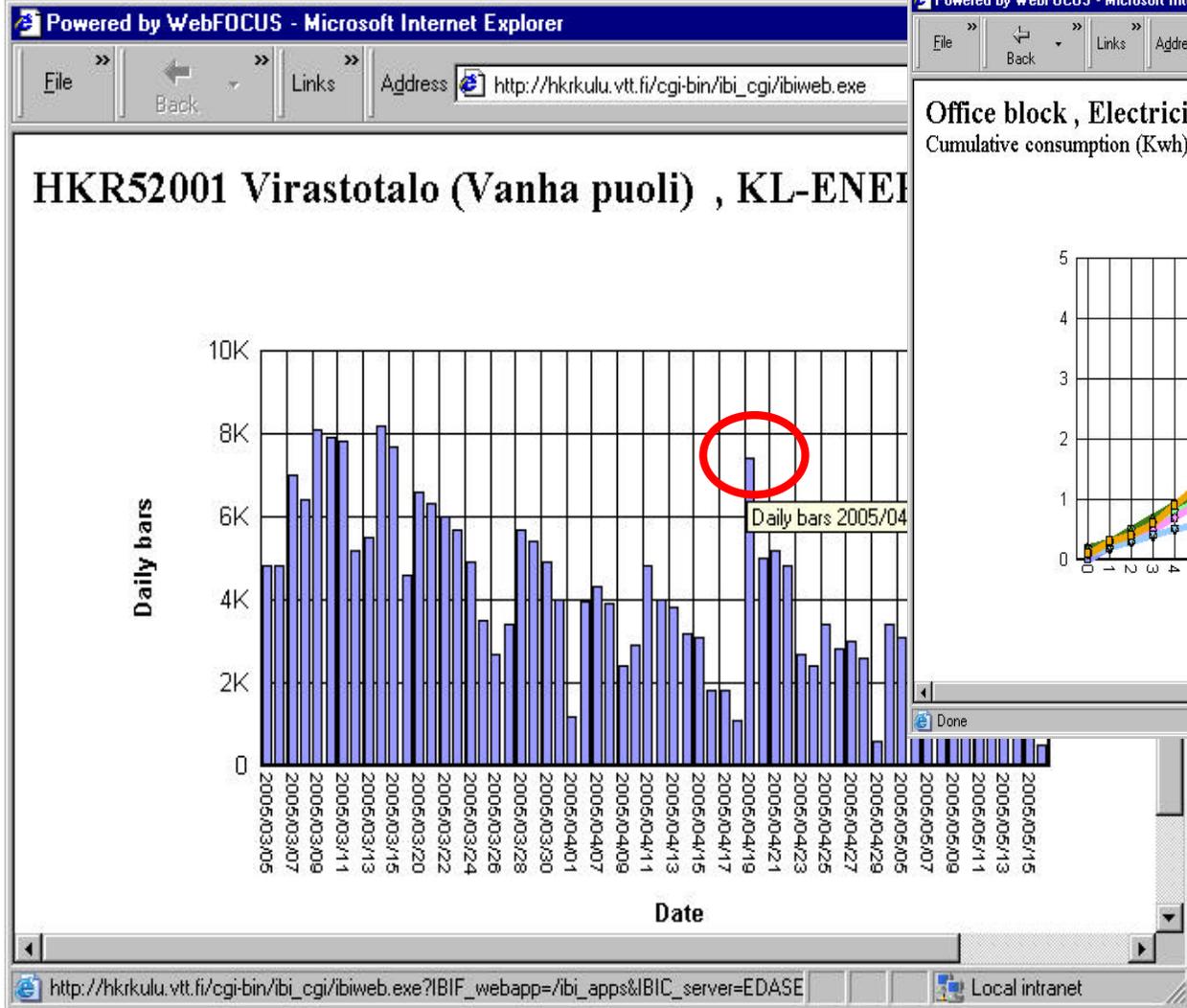
Data collection (concentrator)  
 Data transfer over internet

**3 Metering Technology**

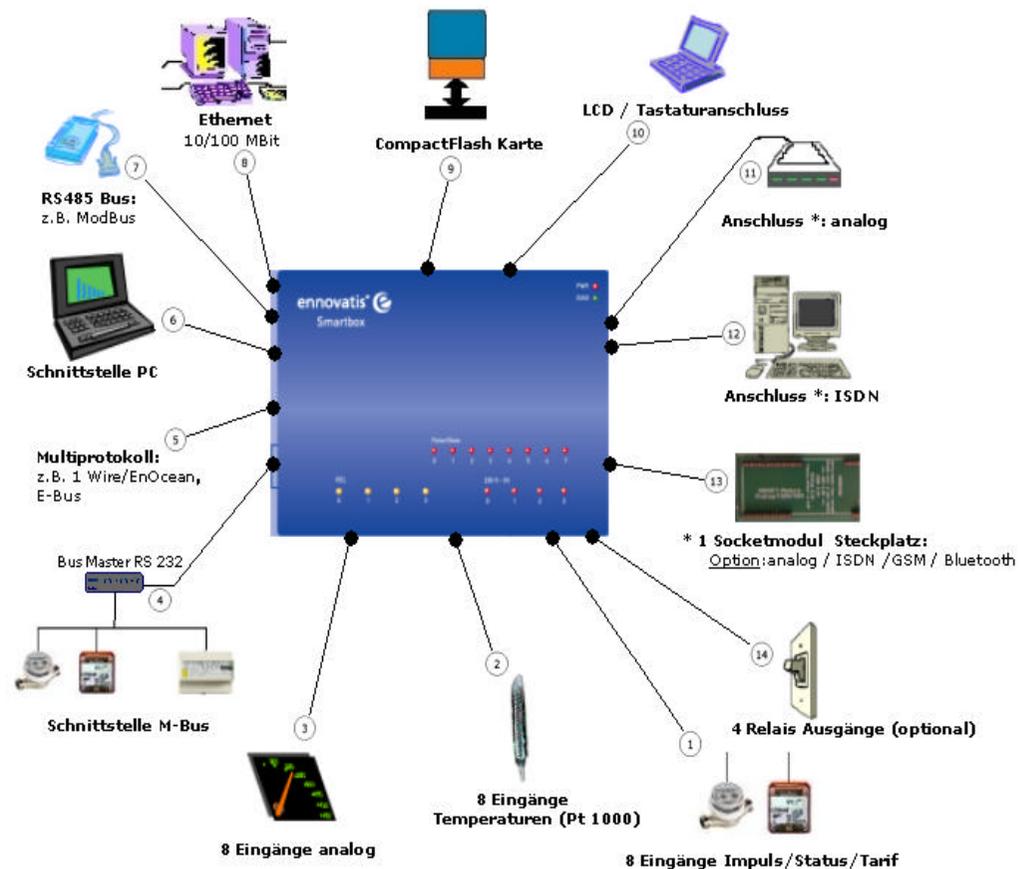
Local connection device  
 Metering device (meter)

**Comsel Systems: Open system based upon standards**

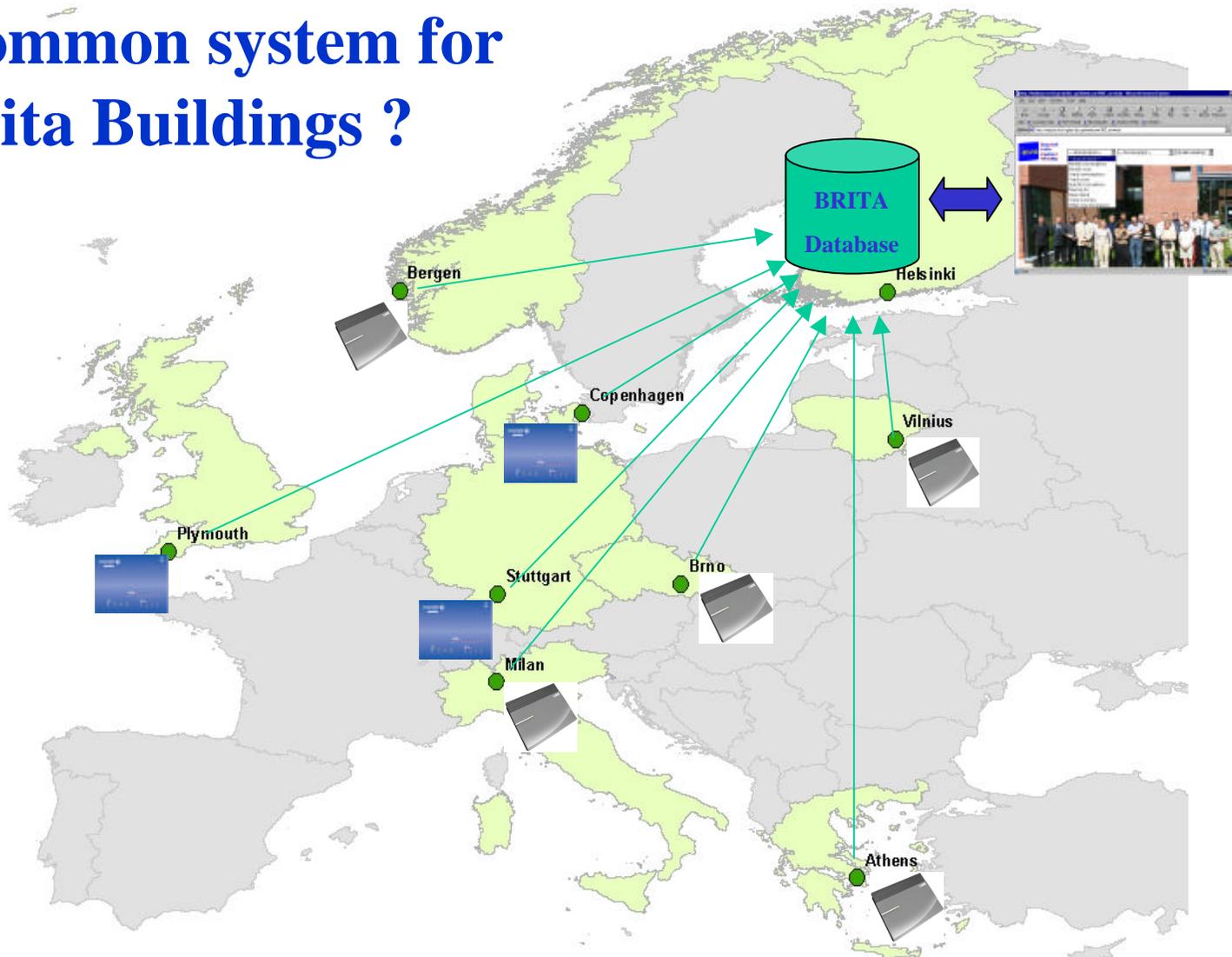




## Similar development in other countries as well:



# Common system for Brita Buildings ?







# Thank You!