NRG4CAST

ENERGY FORECASTING

ΥΠΗΡΕΣΙΕΣ ΕΝΕΡΓΕΙΑΚΗΣ ΠΡΟΓΝΩΣΗΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗΣ

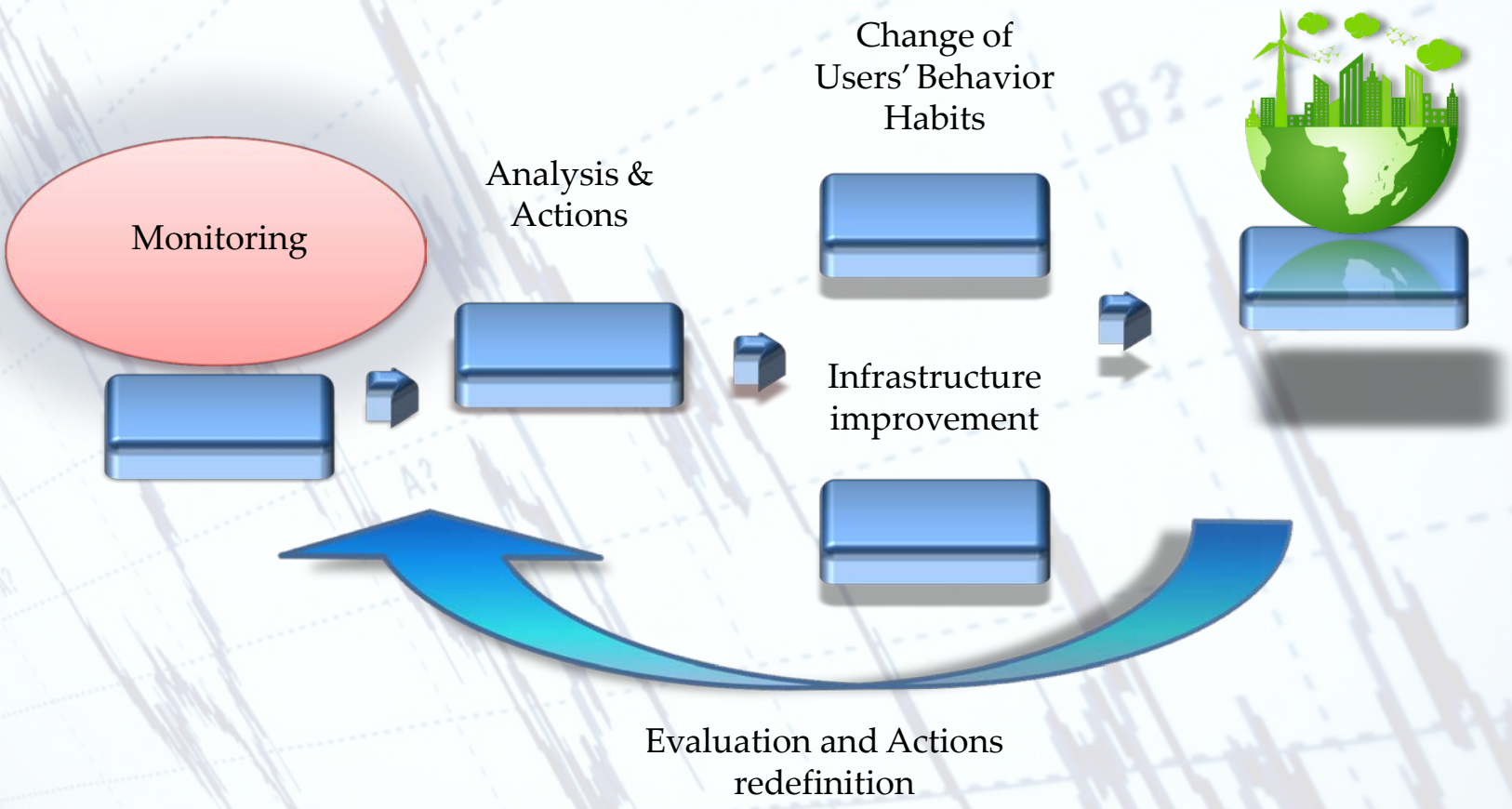
Τετάρτη 18 Νοεμβρίου 2015

NTUA Case Study

Ass.Prof. Irene P.Koronaki

SEVENTH FRAMEWORK PROGRAMME

NTUA Scope


Monitoring
Analysis & Actions
Change of Users' Behavior Habits
Infrastructure improvement
Evaluation and Actions redefinition

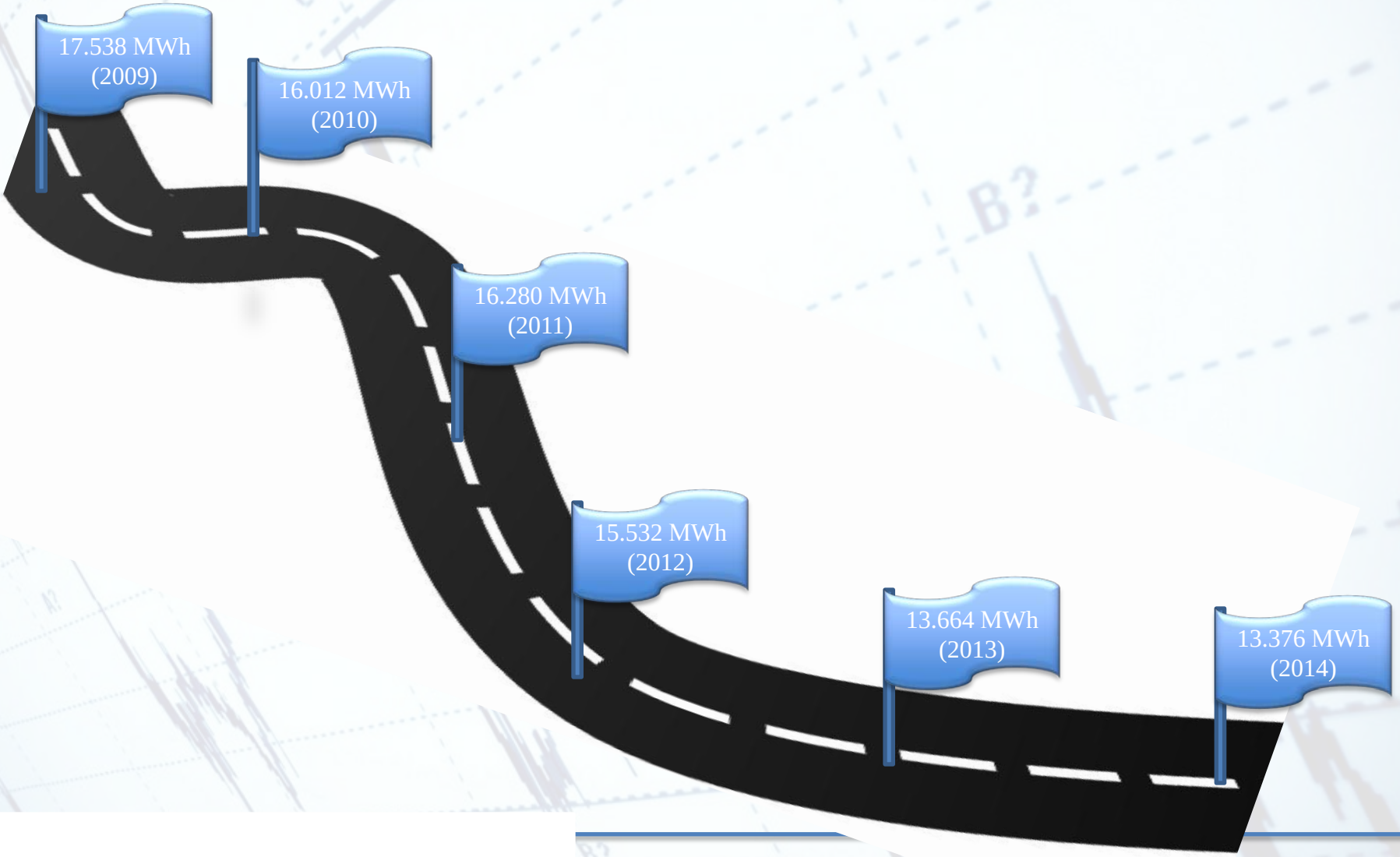
NTUA Campus

- School of Civil Engineer
- School of Mechanical Engineer
- School of Electrical and Computer Engineering
- School of Chemical Engineering
- School of Rural and Surveying Engineering
- School of Mining Engineering and Metallurgy
- School of Marine Engineering
- School of Applied Mathematical and Physical Science

Annual energy needs are:

- Annual heating needs: 8100MWh
- Installed heating power: 25MW
- Installed cooling capacity: 14.5MW (70% due to heat pumps)
- Annual electricity needs are round 16000MWh and gradually decreasing

Annual Energy Consumption of NTUA



Current Situation

Analog Door instruments

Departures other (Tables of Low Voltage) from 250 A to 2000 A.

Regulations

Regulations for the design and operation of buildings

- 2002/91/ΕΚ «Οδηγία για την ενεργειακή απόδοση των κτιρίων»
- 2006/32/ΕΚ «Οδηγία για την ενεργειακή απόδοση κατά την τελική χρήση
- Ν 3661/2008 «Μέτρα για την μείωση της ενεργειακής κατανάλωσης και άλλες διατάξεις». Εναρμόνιση με 2002/91/ΕΚ
- Υπ. Απ. Δ6/Β13826, ΦΕΚ 122/Β/07 «Μέτρα για την βελτίωση της ενεργειακής απόδοσης και την εξοικονόμηση ενέργειας στο Δημόσιο και ευρύτερο δημόσιο τομέα»
- ΚΕΝΑΚ ΚΥΑ Δ6/Β/οικ.5825/30-03-2010

Electrical Installations

- ΕΛΟΤ HD 384 «Απαιτήσεις για ηλεκτρικές εγκαταστάσεις»
- IEC standard 61140 «Protection against electric shock – Common aspects for installation and equipment»
- DIN VDE 0100-600 (2008-06) «Low Voltage Electrical Installations»

Regulations

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Automation Standards

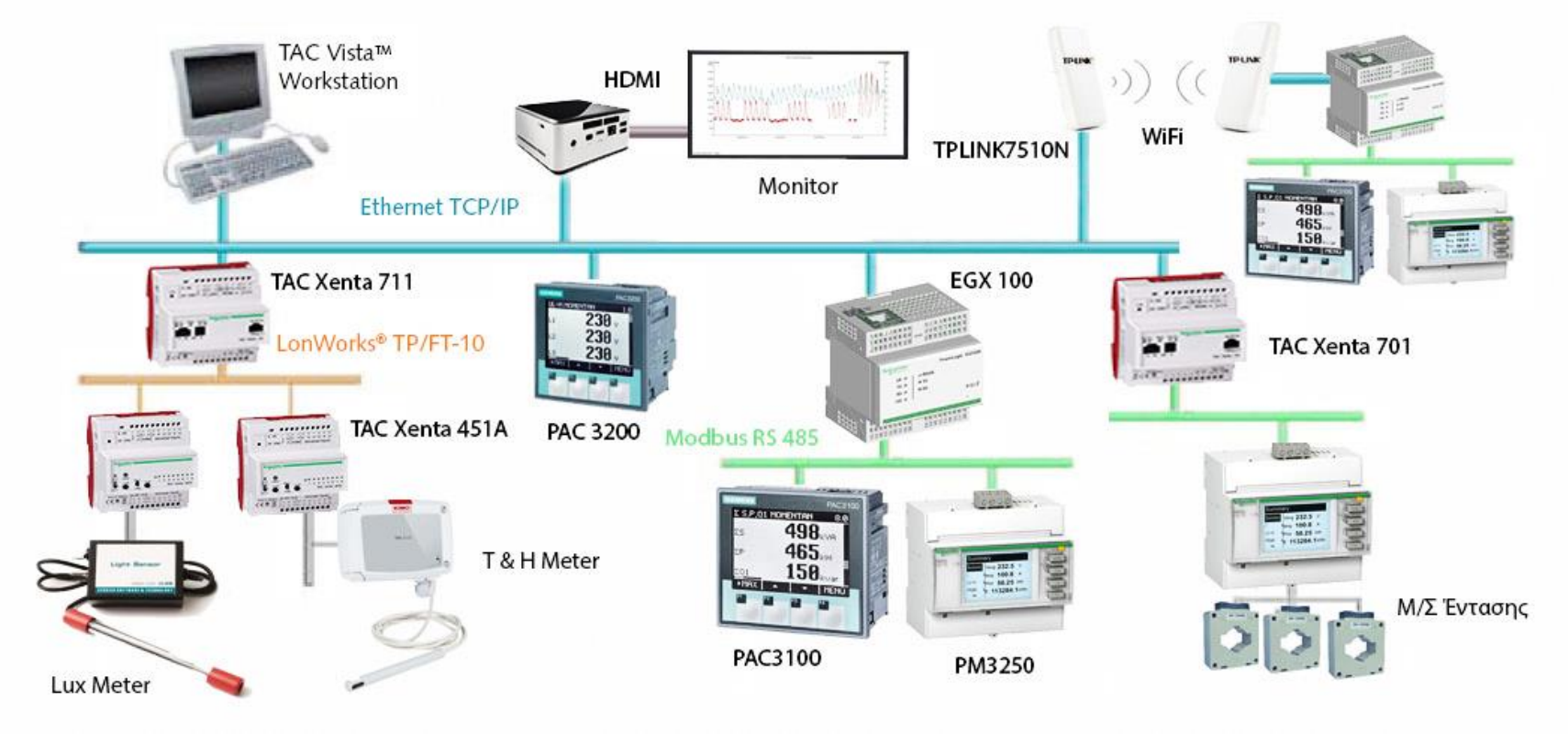
- ISO 16484 «Building automation and control systems – BACS»
- EN 14908 «Open data communication in building automation, controls and building management»
- EN 50090 «Home and building electronic systems – HBES»
- IEC 61850 «Power Utility Automation»
- Modbus Standard

Additional Standards

- IEEE 802.3 «Ethernet Protocol»
- IEEE 802.11 «WiFi Protocol»

System's Definition

System's Topology



Implementation phases

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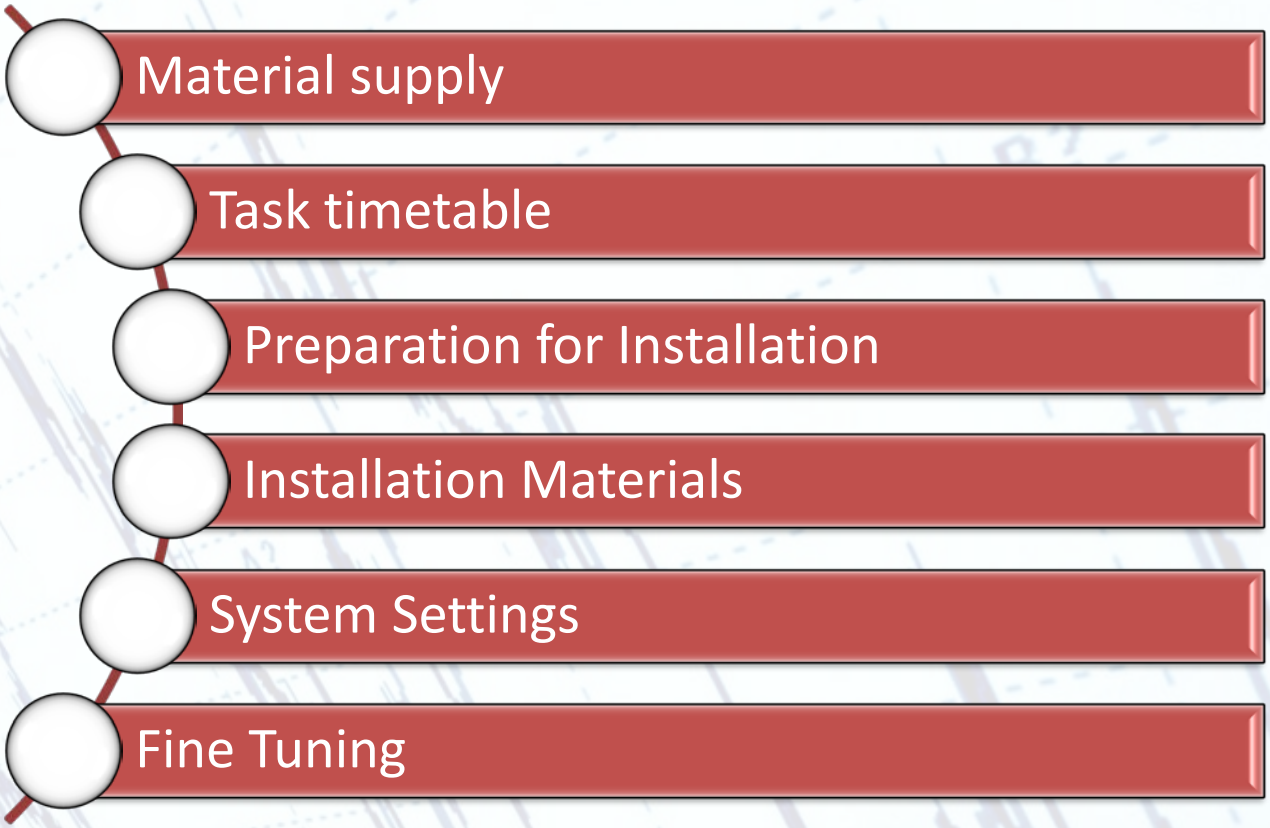
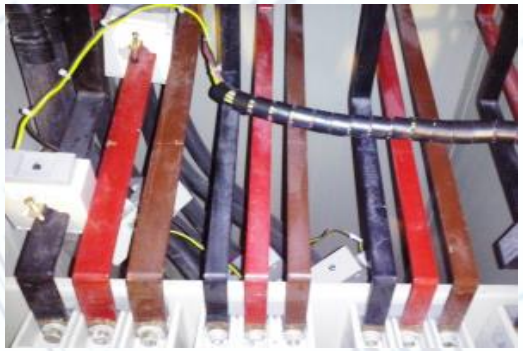


System Installation



Εγκατάσταση Μ/Σ έντασης

Εγκατεστημένος μετρητής πόρτας PAC3100

Μετρήσεις σε
αναχωρήσεις άλλων ΠΧΤ

Εγκατάσταση μετρητών ράγας
σε εξωτερικό επίτοιχο πίνακα

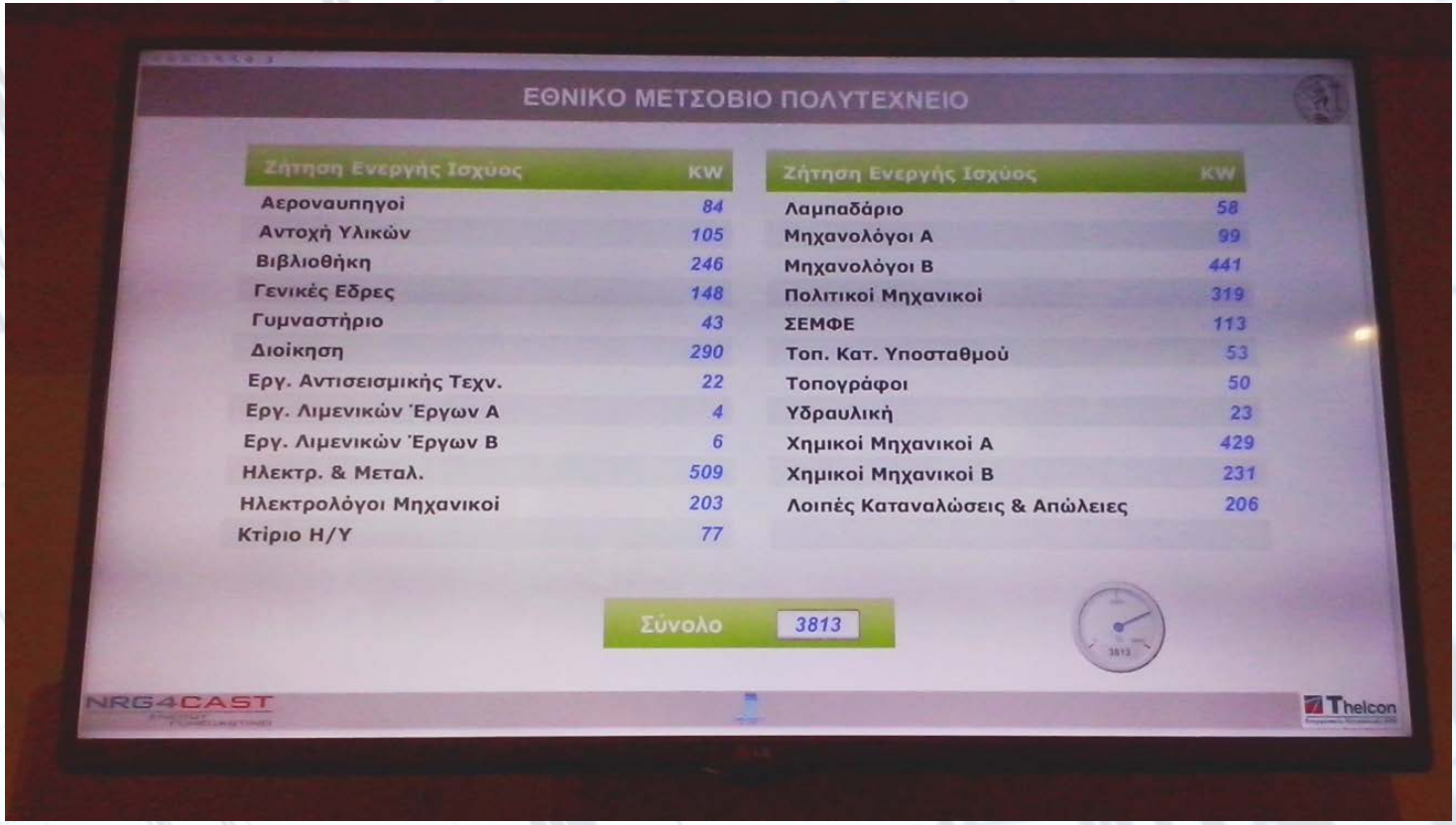
System Installation

Control point with the strongest signal transmission

Xenta Controller 711 & I/O Modules

Xenta Controller 701

System Installation



Projection screen showing buildings power demand

System Settings

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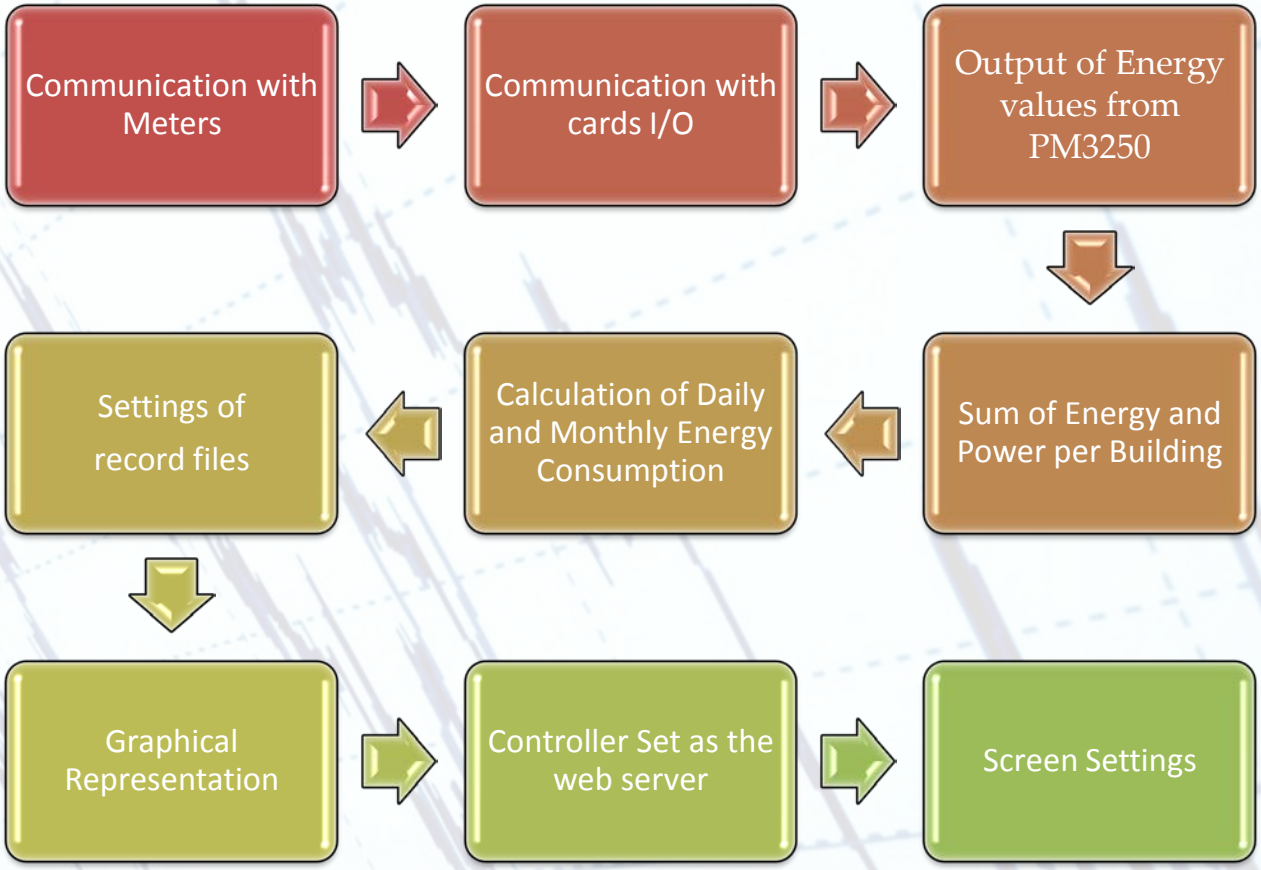
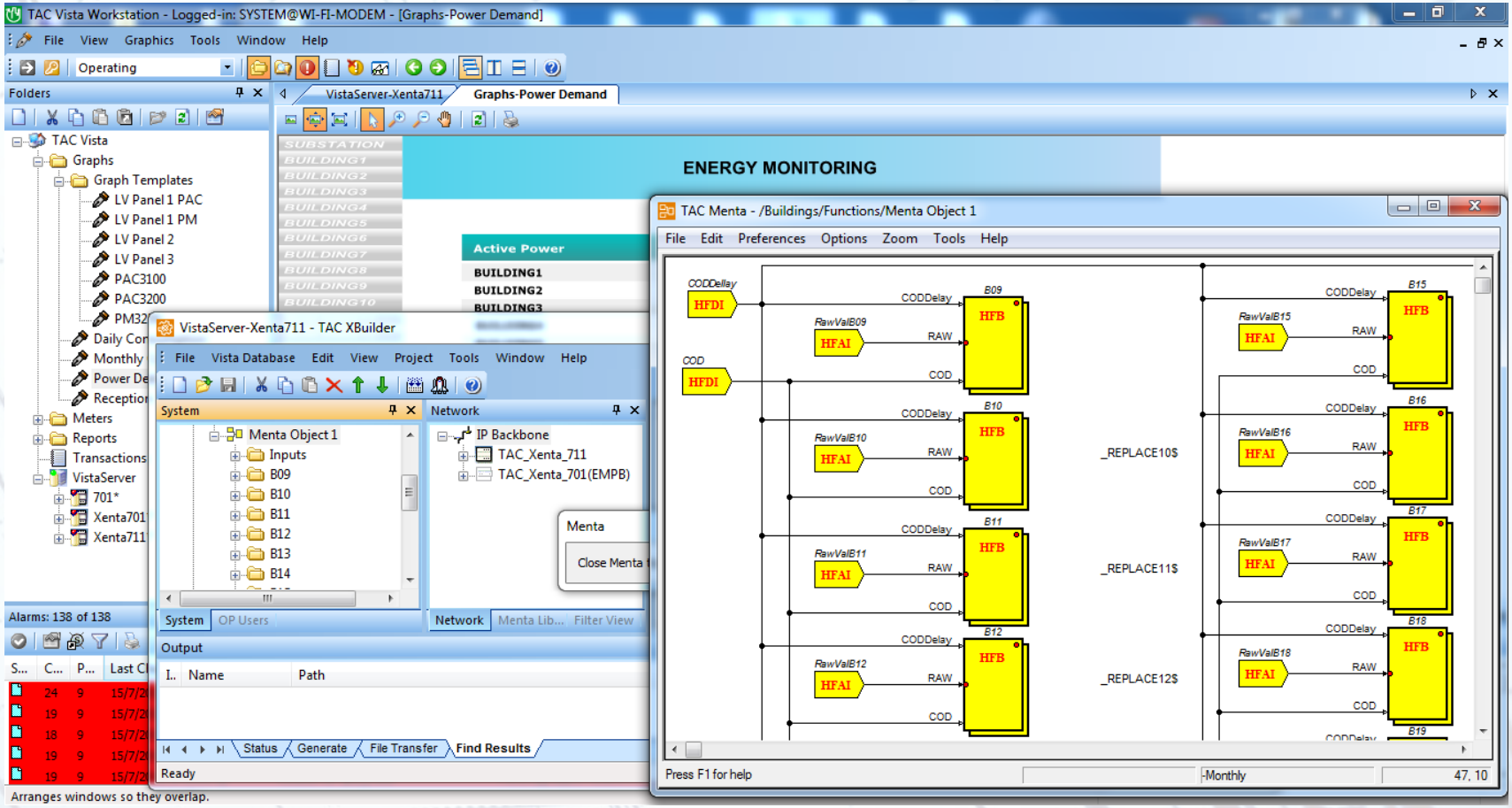
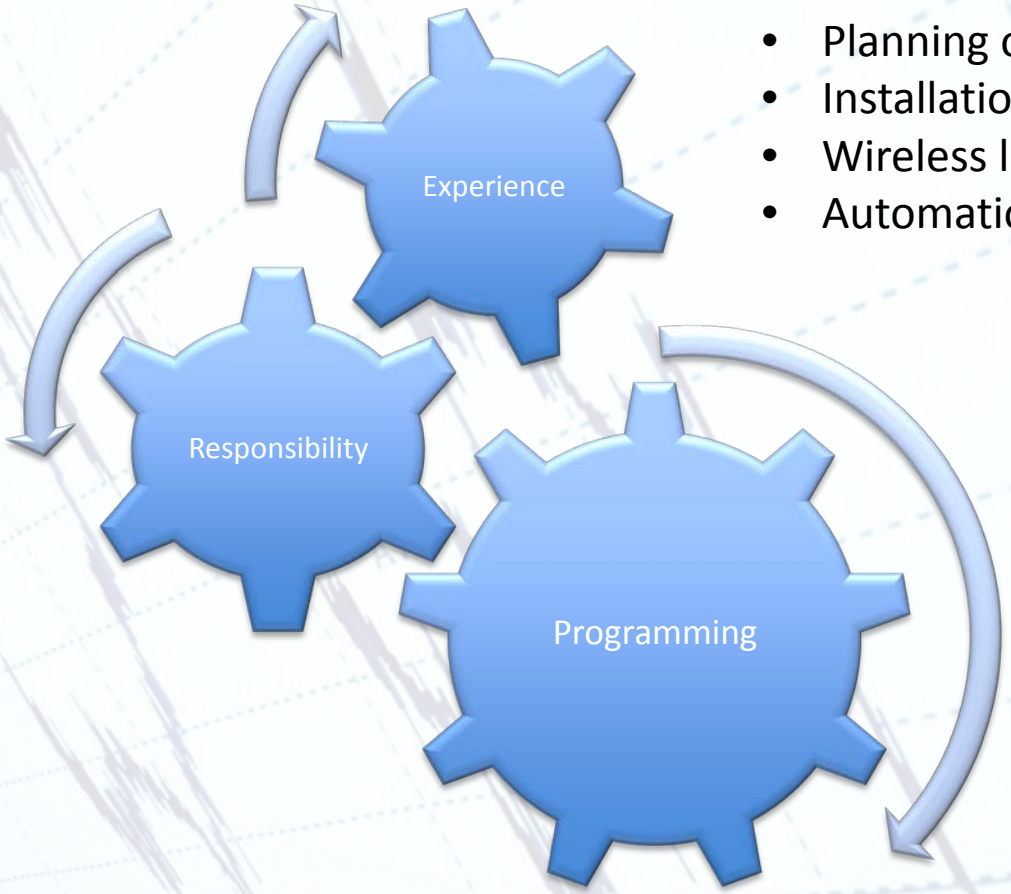


Management System's Environment



Obstacles



- Users enrollment
- Material supply
- Planning of tasks
- Installation work
- Wireless link
- Automation of Operating screen

Actions – Scenarios for NTUA savings

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Scenario 1: Lighting Schedule according to daylighting
Lecture Rooms Building (2000 m2) May

Scenario 2: Awareness Energy Savings Campaign –
Turn off Computers and printers
Administration Office Building (2500m2) July

Scenario 3: Changing schedule of Lecture Rooms
2 Lecture Rooms Buildings (3400 m2) September

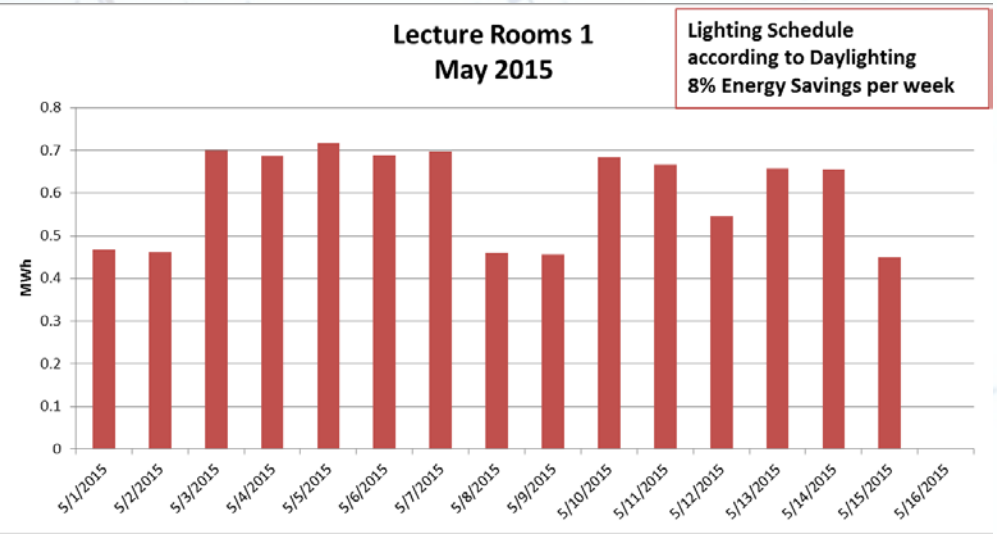
Scenario 4: Night Cooling
Laboratory Building (14000 m3) July

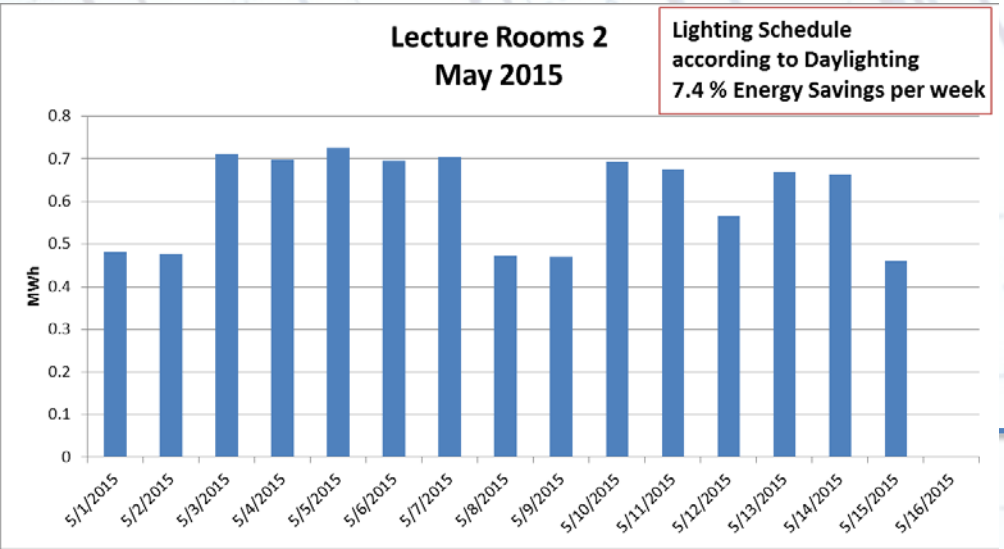
Different periods,
Buildings
from
May to September 2015

Actions – Scenarios for NTUA savings

NRG4CAST ENERGY FORECASTING

Scenario 1: Lighting Schedule according to daylighting





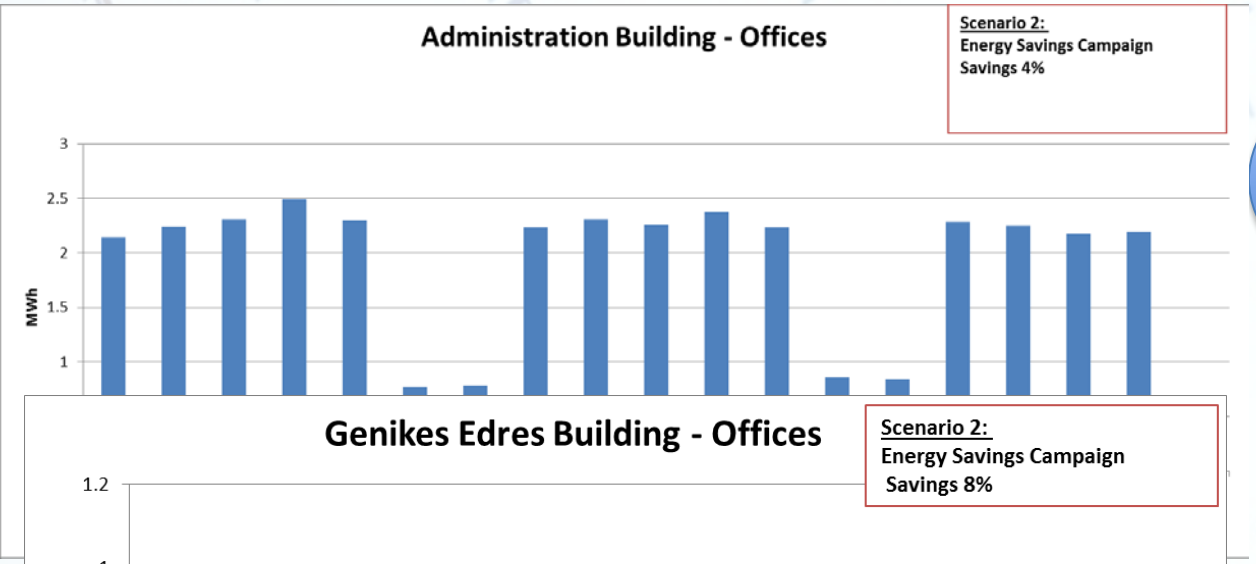
Estimation
for whole Campus
1052 MWh
85000 Euros

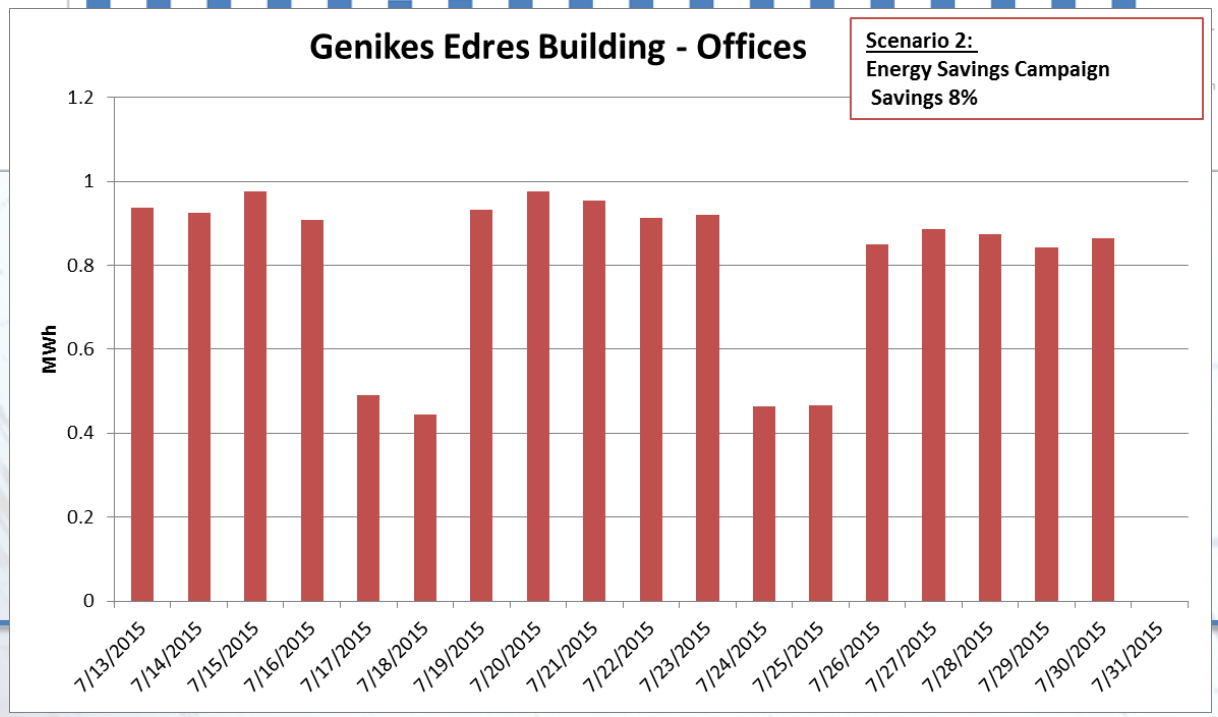
NRG4CAST CONTRIBUTION
High Level of Daily Lighting Consumption

Actions – Scenarios for NTUA savings

NRG4CAST ENERGY FORECASTING

Scenario 2: Energy Savings Campaign – Turn off Computers and printers





Yearly
Estimation for whole Campus 7300 MWh
430000 Euros

NRG4CAST CONTRIBUTION
High level Base Load

NRG4CAST ENERGY FORECASTING 0.7.1 NTUA

PILOTS LIST

2015
November 17

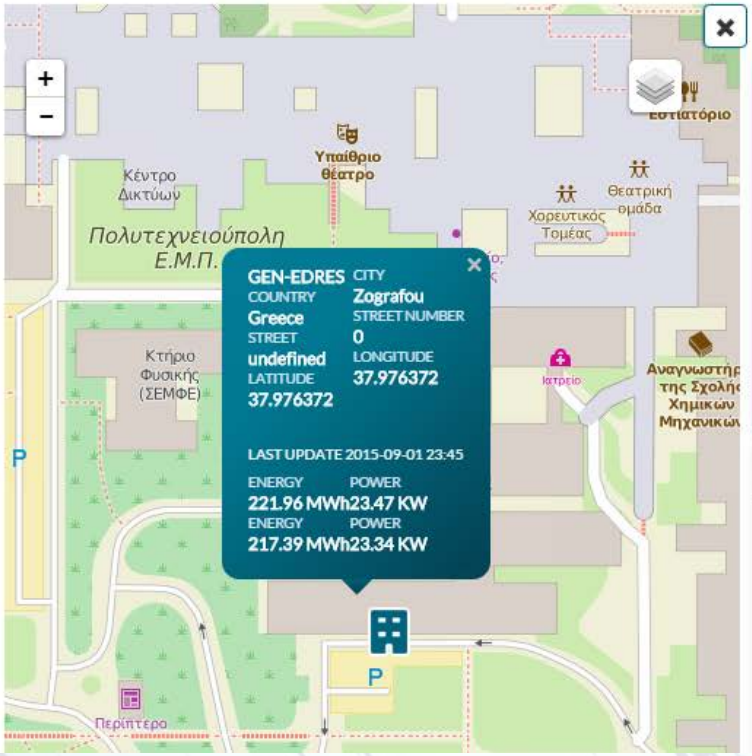
20:49

ELECTRICITY CONSUMPTION
now
13243.4 MWh
predicted today
n/a

CARBON FOOTPRINT
so far this week
3.4 Tons of CO2
last year
86.9 Tons of CO2

TEMPERATURE
now
23.2 C
predicted tomorrow
14.5 C

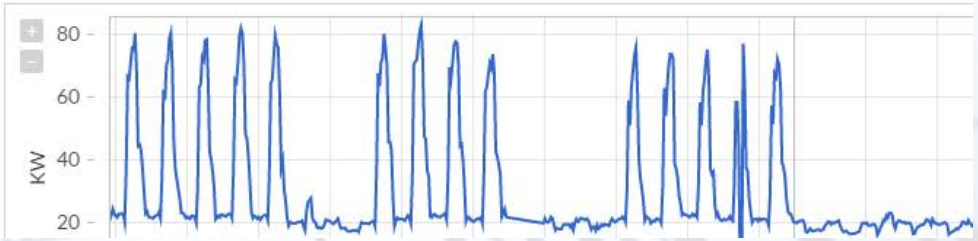
CLOUDCOVER
today
40 %
predicted tomorrow
0 %



ELECTRICITY LOAD | ELECTRICITY CONSUMPTION | ACTUAL MEASUREMENTS | SAVINGS | FORECAST

AGRO TOPO KT MS1 | AGRO TOPO KT MS2 | ANTOCHIS YLIKON | CHEM ENG A1 | CH
CHEM ENG B MS2 | CIVIL ENG AS S1 | CIVIL ENG AS S2 | CIVIL-ENG-HYDR-KT | CIVIL-
CIVIL-ENG-LMENIKA-A | CIVIL-ENG-LMENIKA-B | GEN-EDRES-MS-1 | GEN-EDRES-MS-2
HLMHX MHXHY MS2 | HLMHX MHXHY NEW BUILDING | LIBRARY | MECH ENG MN MS1
MECH ENG O MS1 | MECH ENG O MS2 | NAYP MHX MHX KT MS1 | NAYP MHX MHX KT M
NTUA ADMIN MS1 | NTUA ADMIN MS2 | GYM ST | MHX METAL MS1 | MHX METAL M

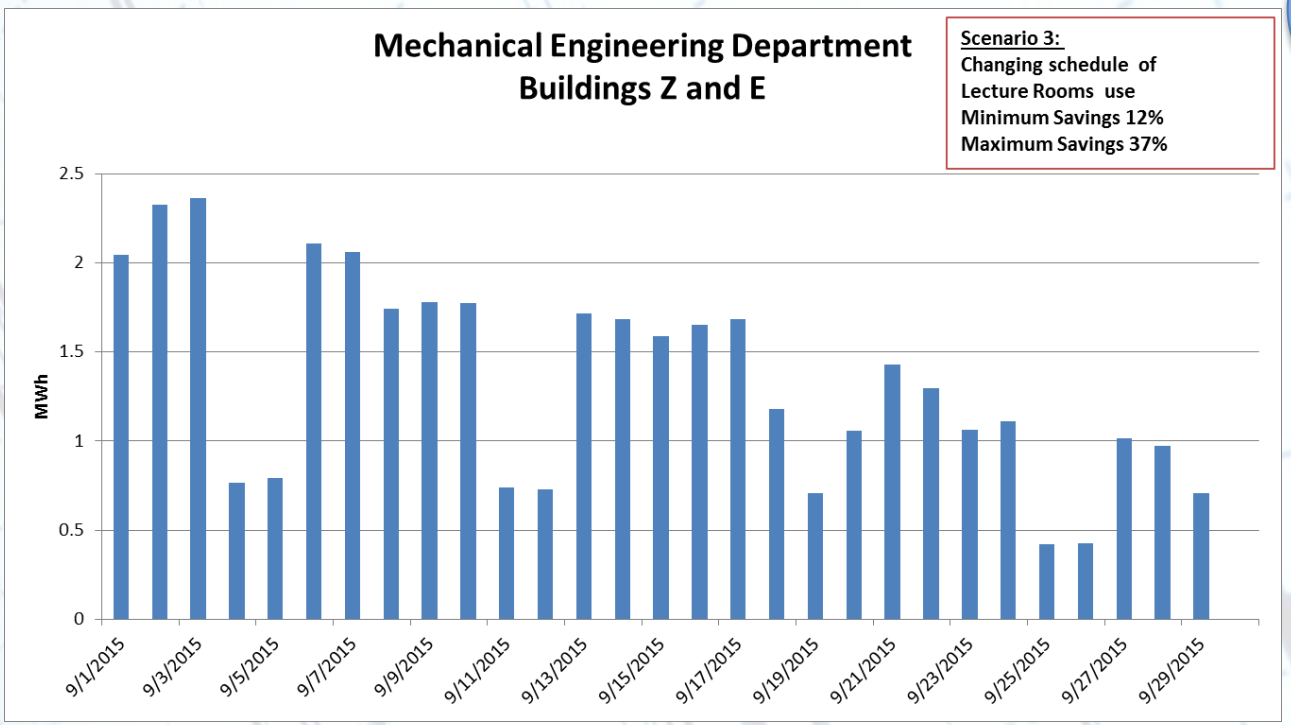
Electricity load of the GEN EDRES MS 2, 2015: Electricity load ntua-BUILDING-GEN-EDRES-M



Actions – Scenarios for NTUA savings

NRG4CAST ENERGY FORECASTING

Scenario 3: Changing schedule of Lecture Rooms



Yearly Estimation for whole Campus 5200 MWh 310000 Euros

NRG4CAST CONTRIBUTION
Due to High level Daily Energy Consumption in Lecture Room Buildings

November 17

20:49

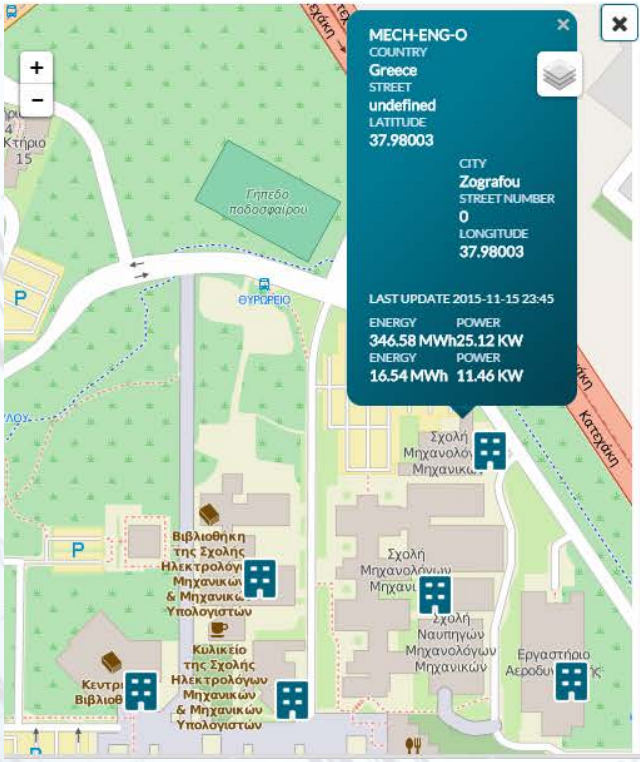
CONSUMPTION
now
13243.4 MWh
predicted today
n/a

so far this week
3.4 Tons of CO2
last year
86.9 Tons of CO2

now
23.2 C
predicted tomorrow
14.5 C

today
40 %
predicted tomorrow
0 %

today
60 %
predicted tomorrow
0.81 %



ELECTRICITY LOAD | ELECTRICITY CONSUMPTION | ACTUAL MEASUREMENTS | SAVINGS | FORECAST | ADVANCED SEARCH

AGRO TOPO KT MS1 | AGRO TOPO KT MS2 | ANTOCHIS YLIKON | CHEM ENG A1 | CHEM ENG A2 | CHEM ENG B MS1
CHEM ENG B MS2 | CIVIL ENG AS S1 | CIVIL ENG AS S2 | CIVIL-ENG-HYDR-KT | CIVIL-ENG-KT-MS1 | CIVIL-ENG-KT-MS2
CIVIL-ENG-LMENIKA-A | CIVIL-ENG-LMENIKA-B | GEN-EDRES-MS-1 | GEN-EDRES-MS-2 | HLMHX-MHXHY-MS1
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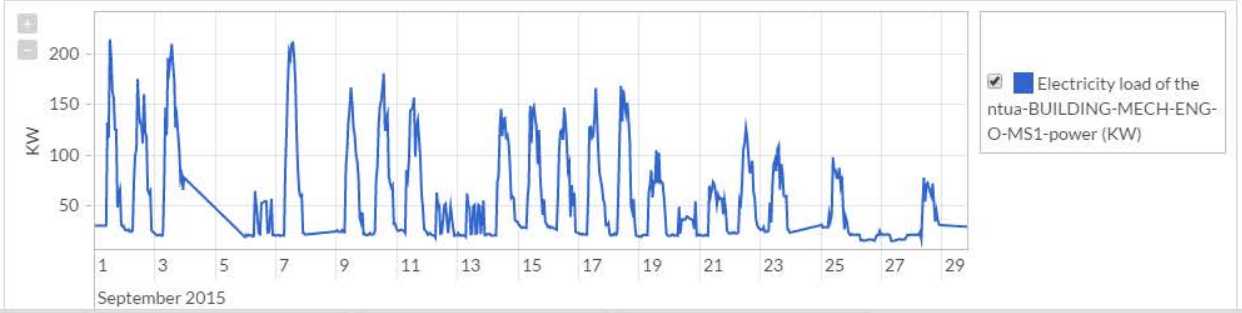
NTUA ADMIN MS1 | NTUA ADMIN MS2 | GYM ST | MHX METAL MS1 | MHX METAL MS2

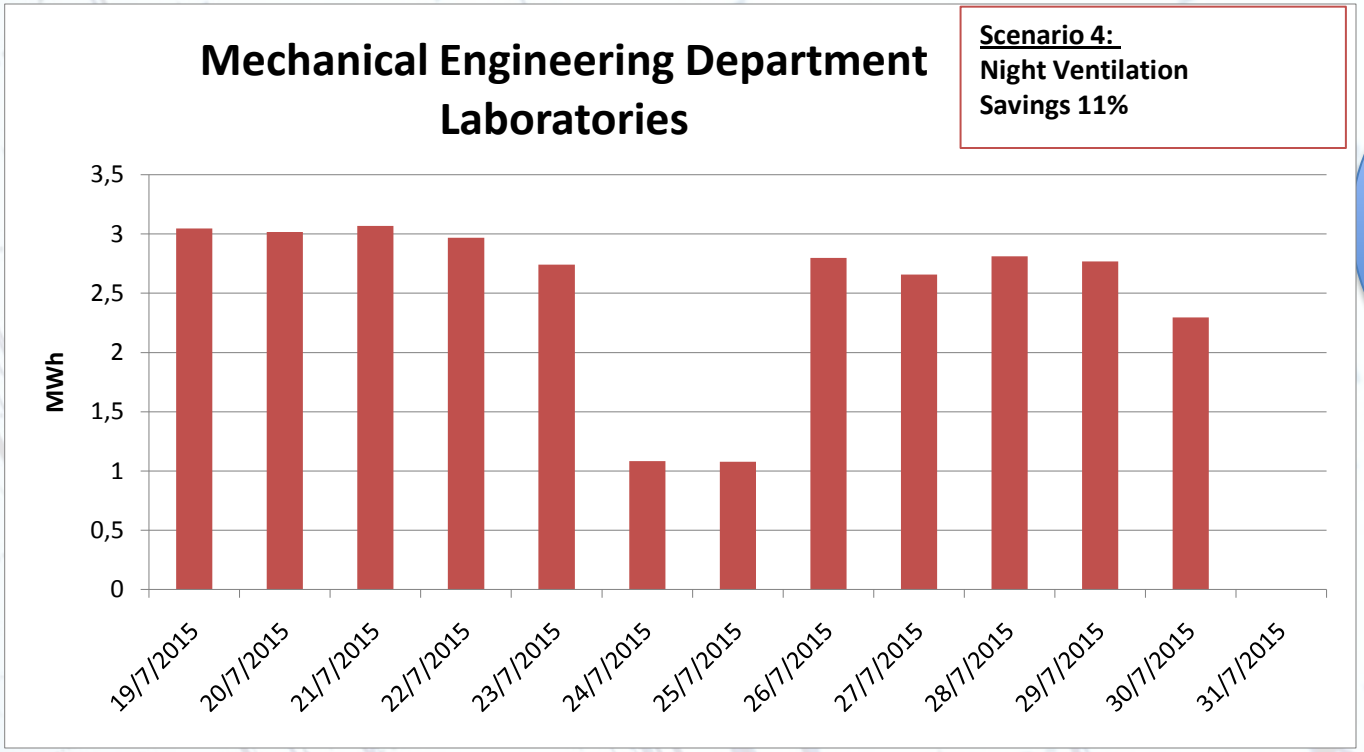
Electricity load of the MECH-ENG-O-MS1, 2015: Electricity load of the ntua-BUILDING-MECH-ENG-O-MS1-power (KW)



Actions – Scenarios for NTUA savings

NRG4CAST ENERGY FORECASTING

Scenario 4: Night Cooling



Yearly Estimation for whole Campus (Laboratories)
700 MWh
36000 Euros

NRG4CAST CONTRIBUTION:
Weather and Energy Forecasting

Conclusions

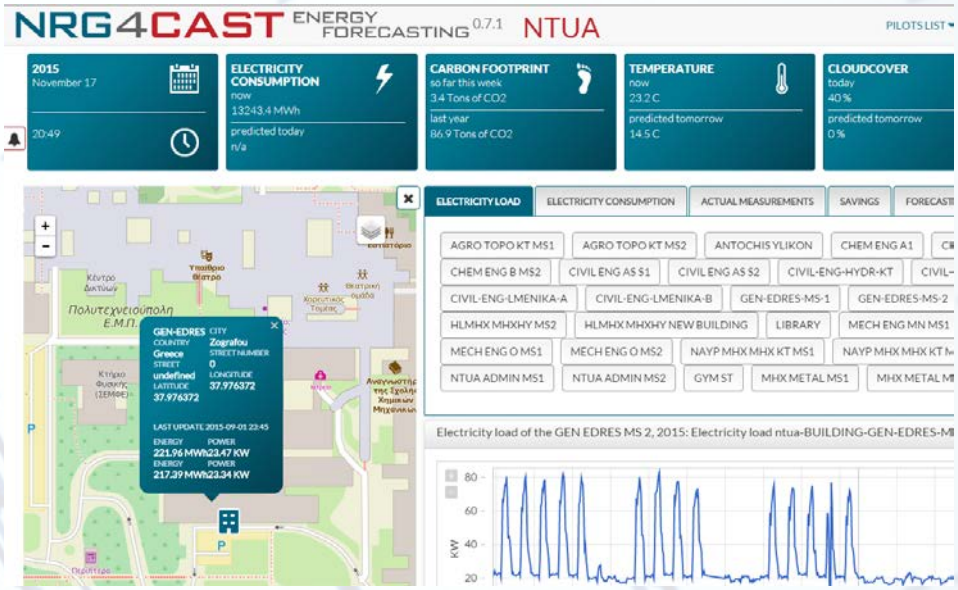
Πρόγνωση

Χρήσης

Καιρικών συνθηκών

Μέτρα Εξοικονόμησης

Εξοικονόμηση μέχρι και 30%



THANK YOU

FOR YOUR ATTENTION