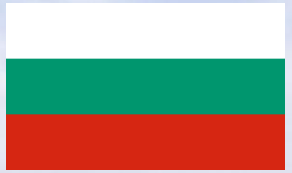
Welcome to Taiwan

Honorable Delegation from Bulgaria



Institute for Information Industry

Republic of China (Taiwan)

2017-11-07

Welcome to
Institute for Information Industry (III)

In Light of the Partnership with

New Bulgarian University (NBU)

December 4, 2017

Intelligent Energy Management System for Lighting

Cooperation Project in Cloud-based IoT

New Bulgarian University (NBU)

Institute for Information Industry (III)

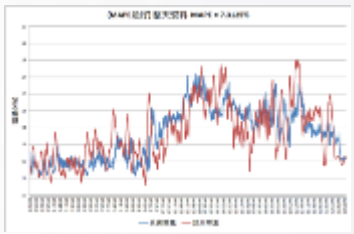
2017-12-04

III Mission

Institute for Information Industry (III) **www.iii.org.tw**

- Founded in 1979 by government and industry jointly as a non-profit organization sponsored by the Ministry of Economic Affairs (MOEA) with founding mission of:
  - Facilitate the development of Taiwan's ICT industry.
  - Promote the deployment of ICT in public and private sectors, and provide innovative ICT services worldwide.
- Provides fully integrated Smart Grid and Energy Management R&D and system implementation solutions.

Intelligent Device and Tools for Management



Analytics

Activity Detection

Smart Meter

Smart Grid

Organization and Manpower

- Chairman
  - Auditing Office
  - President
    - Executive Vice President
    - Chief Technology Officer
    - Chief Information Officer
  - Secretary General

Industry Service

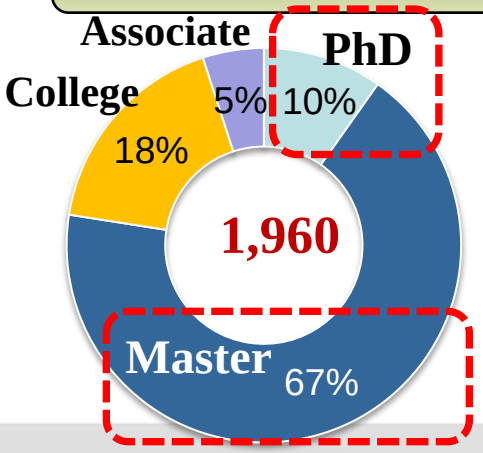
- International Division
- Industry Development Augmentation Division
- Southern Industry Service Division
- Central Industry Research &Service Division

R&D Institutes

- Smart Network System Institute (SNSI)
- Innovative DigiTech Enabled Applications & Services Institute (IDEAS)
- Data Analytics Technology & Applications Research Institute (Data)
- Cyber Security Technology Institute (CSTI)
- Digital Education Institute (DEI)
- Market Intelligence & Consulting Institute (MIC)
- Science & Technology Law Institute (STLI)

Supporting Units

- Finance and Resource Management Division
- Planning & Evaluation Division
- Accounting Division
- Human Resource Development Division
- Information Technology Services Division

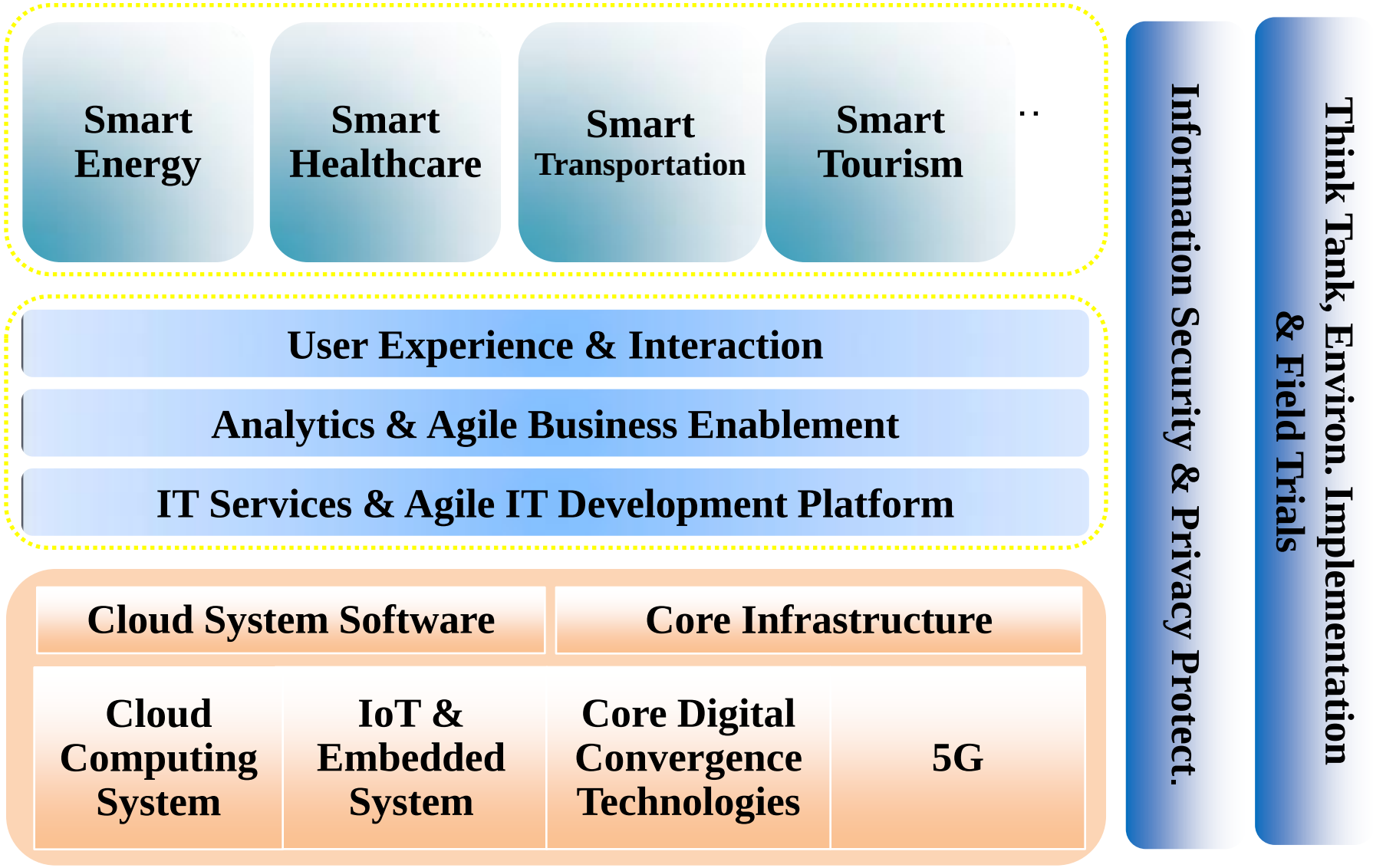


Source: III, 2015.3

Business Focus

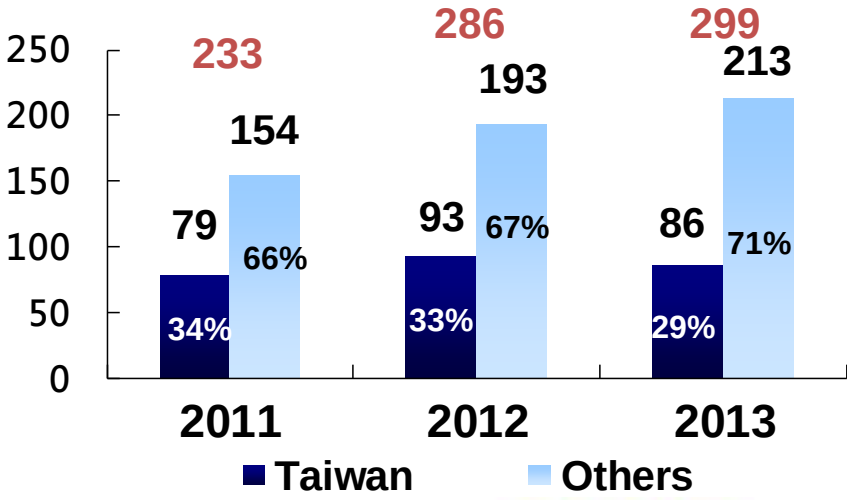
As the bridge between government and industry to facilitate the ICT enabled innovation ecosystem in Taiwan.

R&D Framework

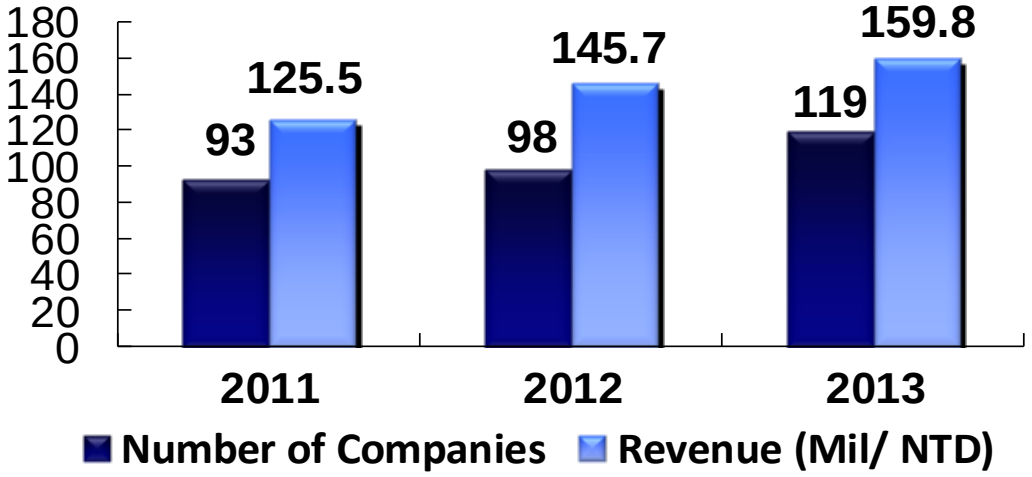


Patent Application and Commercialization

Patent Applications and Awards



Technology Transfer Revenue



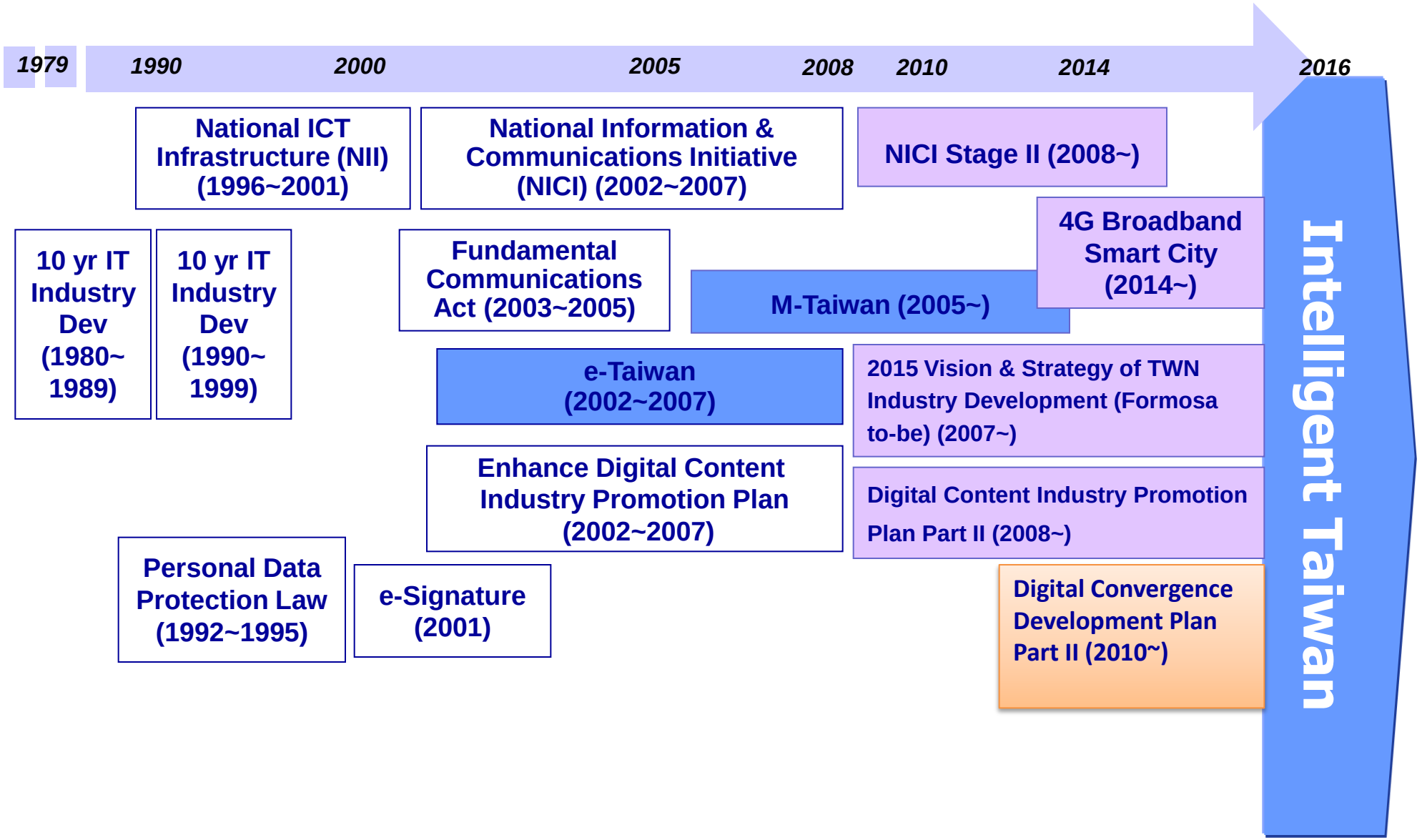
Inventec ASE WNC Wistron NeWeb Corp. TATUNG 創新 品質 信賴 AboCom MEDIATEK iSET Hwacom

BenQ acer MOXA UMC Lifecom TECO DELTA DELTA ELECTRONICS, INC.

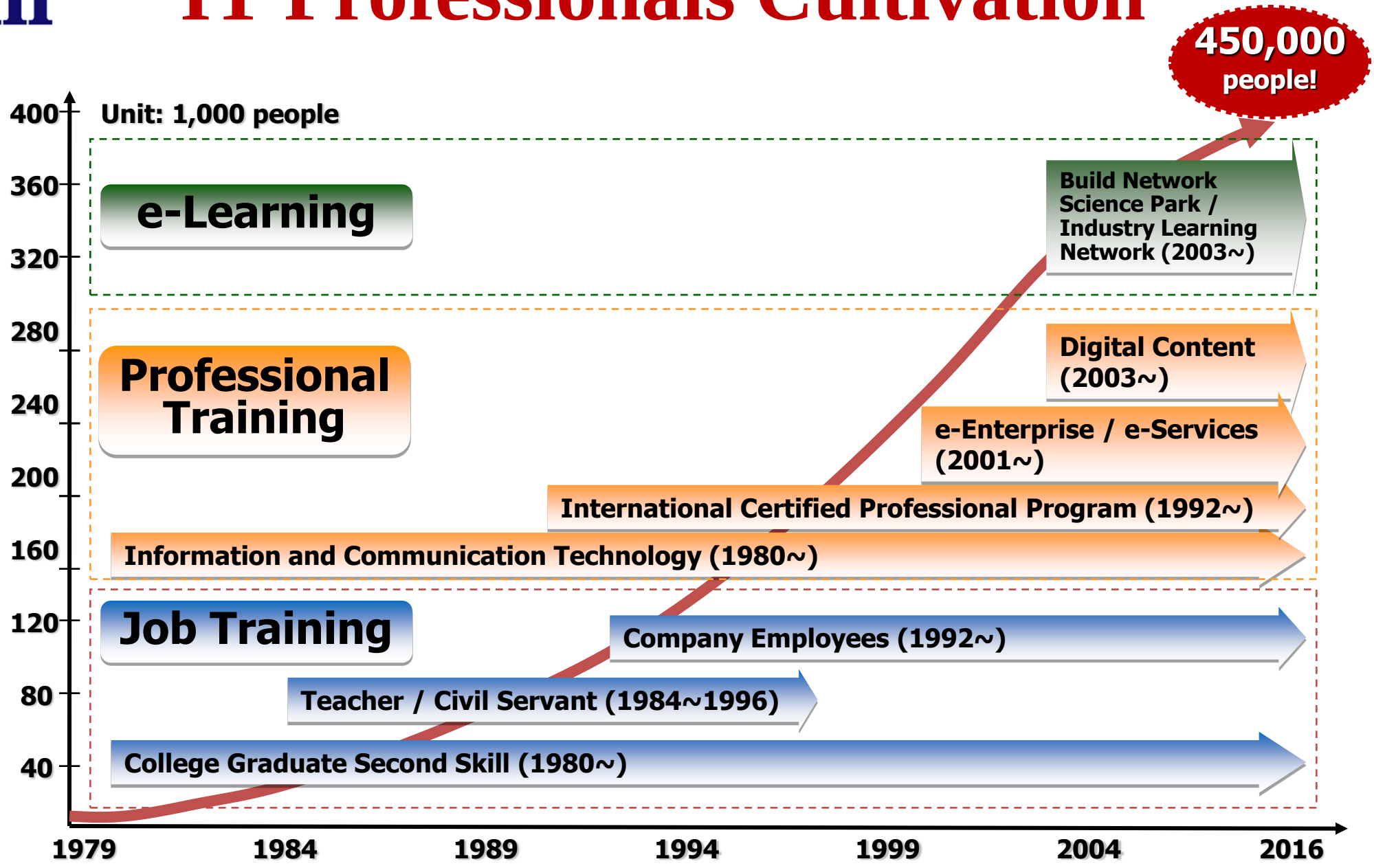
- Patents awarded globally: 1 ,000+
- Technology Transfer: 675+ companies
- Averages over 100 cases every year of commercialization on its patents

Source: III, 2014.04

Government Think Tank



IT Professionals Cultivation



Taiwanese Semiconductor Industry - World Stage

Taiwanese Semiconductor Industry in 2014

Sub-industry	Shipment Value (US$ Million)	WW Share	WW Ranking	Lagging behind
IC Design	17,593	18.7%	2	US
Memory Fabrication	8,627	11.8%	4	South Korea, US, Japan
IC Foundry	30,724	75.4%	1	
IC Packaging & Testing	13,375	51.3%	1	

Source: MIC, January 2015

- The Taiwanese semiconductor contract manufacturing services continue to lead the world, particularly in IC foundry. The country's IC packaging & testing also has an edge on the global stage, capturing nearly 50% of the worldwide market.

Major e-Government Systems Development

Citizen ID Card Household Reg

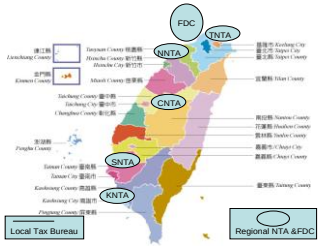
E-Agriculture

E-Healthcare

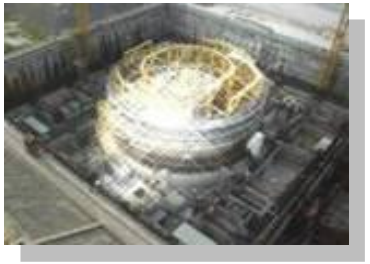
Weather

Banking

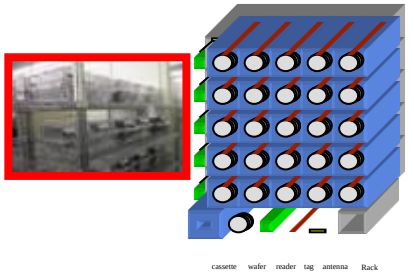
E-Tax / Custom



Logistics



RFID

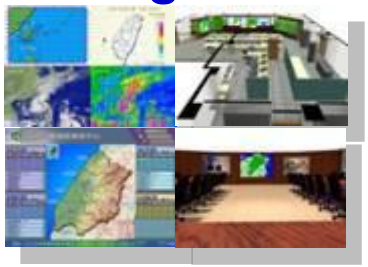


E-Passport / E-Gate

Scheduling

Transportation

Disaster Mitigation



e-Government Rankings – Waseda University, Japan
Taiwan Ranking 8 – 10 during 2007 – 2016 (excluding 2011, 14, 15)

Rank	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1	US	US	Singapore	Singapore	Singapore	Singapore US	Singapore	US	Singapore	Singapore	
2	Singapore	Singapore	US	UK	US	-	Finland	Singapore	UK	US	
3	Canada	Canada	Sweden	US	Sweden	Korea	US	Korea	Denmark	Denmark	
4	Japan	Korea	UK	Canada	Korea	Finland	Korea	UK	UK	Korea	
5	Korea	Japan	Japan	Australia	Finland	Denmark	UK	Japan	Korea	Japan	
6	Australia	Hong Kong	Korea	Japan	Japan	Sweden	Japan	Canada	Japan	Estonia	
7	Finland	Australia	Canada	Korea	Canada	Australia	Sweden	Estonia	Australia	Canada	
8	**Taiwan**	Finland	**Taiwan**	Germany	Estonia	Japan	Denmark	Finland	Estonia	Australia	
9	UK	Sweden	Finland	Sweden	Belgium	UK	**Taiwan**	Australia	Canada	New Zealand	
10	Sweden	**Taiwan**	Germany Italy	**Taiwan** Italy	UK Denmark	**Taiwan** Canada	Netherland	Sweden	Norway	UK Taiwan	

- Source: The 2016 Waseda University International e-Government Ranking

Global Presence

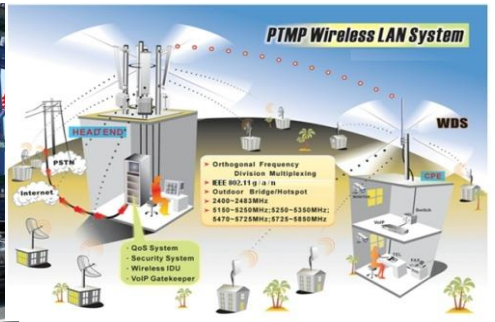
• H.Q. • Liaison Offices • Digital Divide Partnership

International R&D Awards

2016 – Smart Glass Guidance System

2013 – Zigbee CraneAbide

2013 – BestLink



2012 – RFID-MF

2011 – In-Snergy

2012 - Interactive InMedia Bus info stop

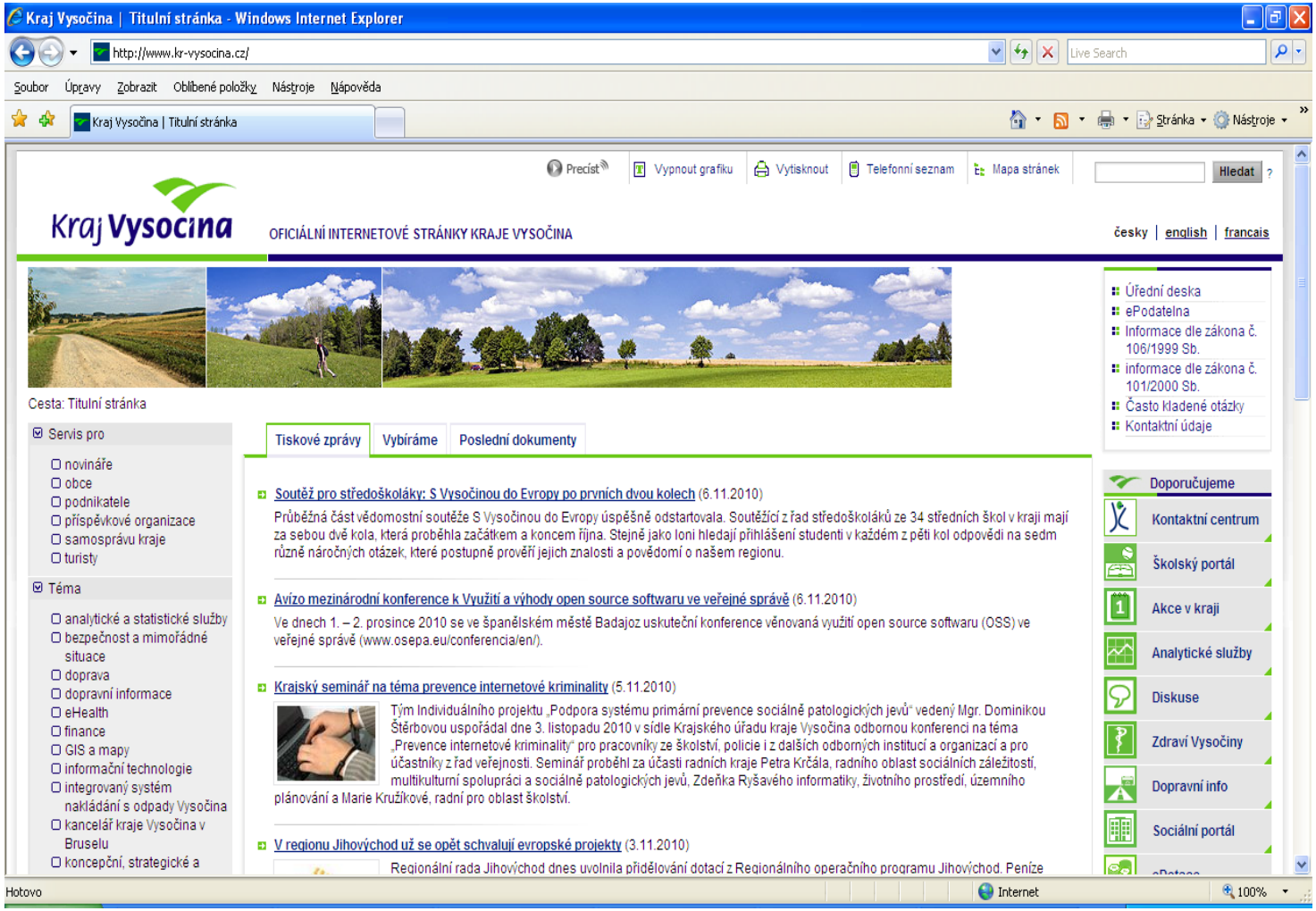
e-Registration System for Hospital Network in Czech

- **Proven solution in Vysocina, Czech Republic and Asia**
  - **Czech Republic successful e-Registration system implementation and operation in Vysocina Regional Hospitals with +57,000 users**
    "2011 Best e-Government Service" prize awarded in Nov. 2011
    (1) Jihlava Hospital, system operation started in June 2011
    (2) Pelhrimov Hospital, system operation started in Feb 2012
    (3) 3 hospitals, system operation started in June 2012

- **More than 30 hospitals with e-Registration System, Integrated Hospital Information System implemented in Taiwan, China, Vietnam**

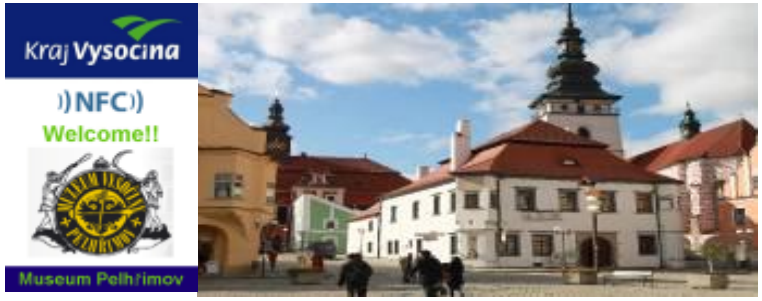
Hospital e-Registration System - More than 60,000 Users

2017 Best e-Government Award, Czech Republic



2017-04-03 ISSS/V4DEV
Hradec Kralove,
Czech Republic

Smart Guide System *iiiGuide©*



Pelhrimov Museum, Czech

Using Visitors' Smartphone for Multi-media Guiding with iPhone or Android

2012 Best e-Gov Service Gold Medal Czech Republic

Wilanow Palace Museum Poland

Smart Touring via iBeacon – Indoor and Outdoor
Zelena Hora, Vysocina, Czech Republic
UNESCO Sites – November 2016

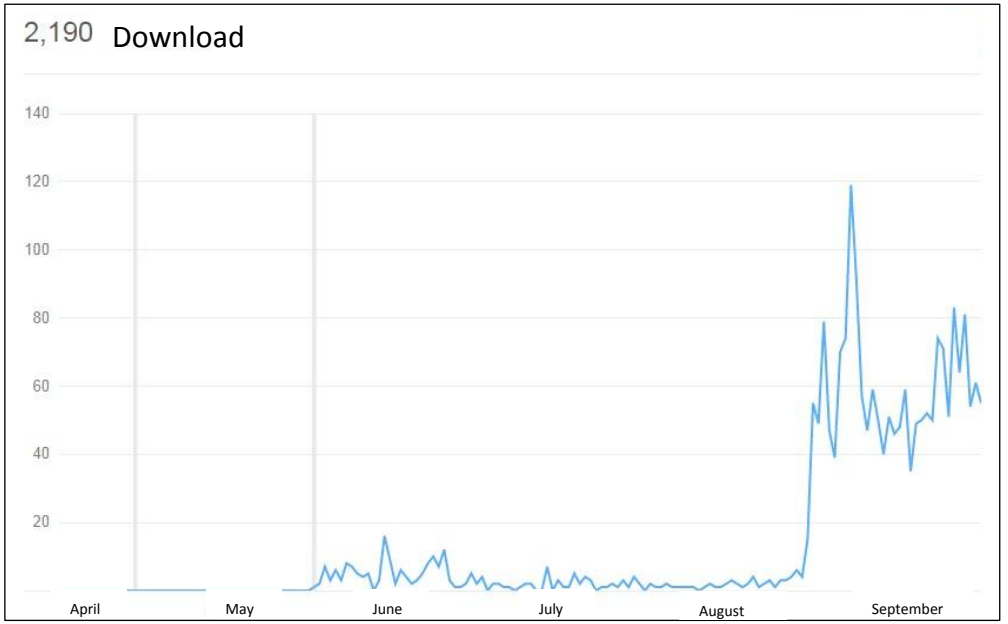
“iBeacon as infrastructure” enables more IoT (Internet of Things) services in scenic site

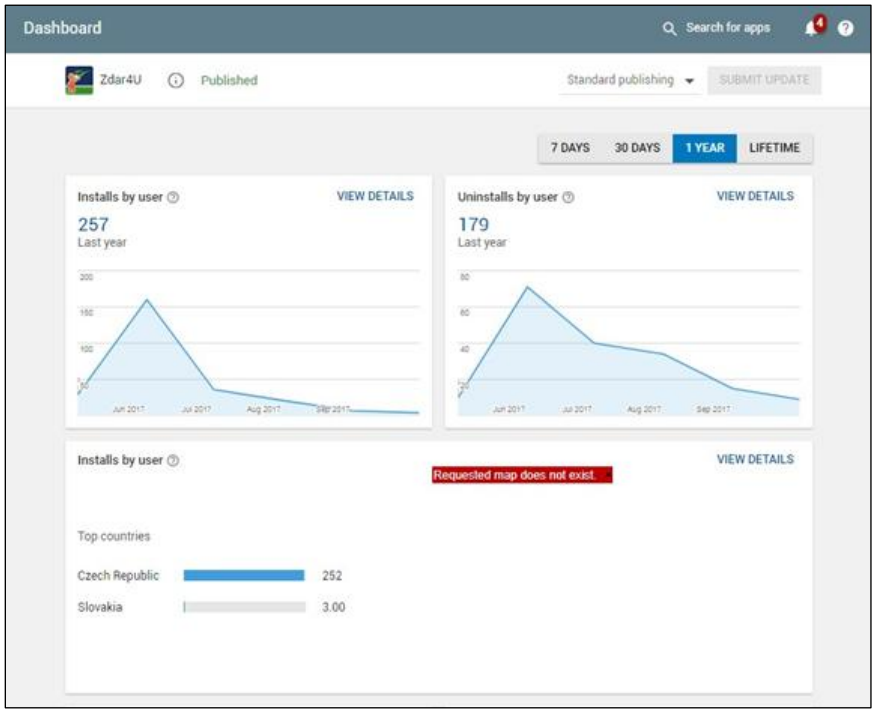
Zelena Hora, Vysocina, CZ iBeacon(Zdar4U) APP Analysis

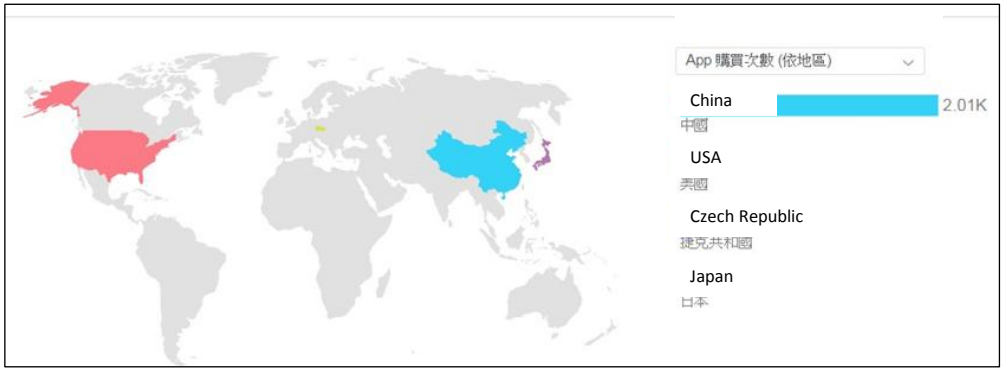
Zdar4U

O.S.	Download	Active user
iOS	2190	459
Android	257	78
Total	2447	537

April 2017 ~September 2017







Service Scenario (Sofia)

new-era smartest city

Bus stop/station
(travel points)

Share and remind the City after back home

Promote App at info Center

Best Practice of Taiwan for EBRD project – AFC System for Pitesti City Bus, Romania

A. The European Bank for Reconstruction and Development (EBRD) is helping to modernize public bus transport in the Romanian City of Pitesti with 13 million EURO loan to the City.

B. The EBRD loan will allow the city to upgrade its aging fleet with the purchase of 70 new environmentally friendly buses. The loan will also be used to introduce an **Automated Fare Collection System (AFC), using Contactless Smart Card.**

C. Through EBRD tendering processing, III consortium, integrating the members of e-Ticketing experts, has awarded the contract in 2015 to contribute the successful best practice of Taiwan for the City of Pitesti, Romania for city bus transportation.

e-Ticketing of City Bus, Metro and Other Applications

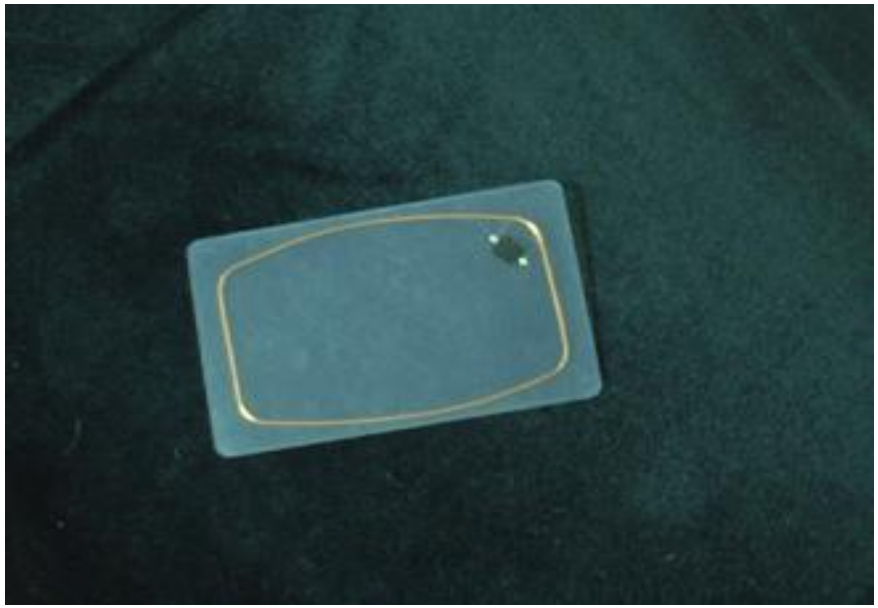
(1) Smart EasyCard for Taipei MRT

(2) Bus

(3) Smart EASYCARD

- A contactless IC card with an embedded chip and wired antenna. Its functions include data storage, logical operations, security, and more.

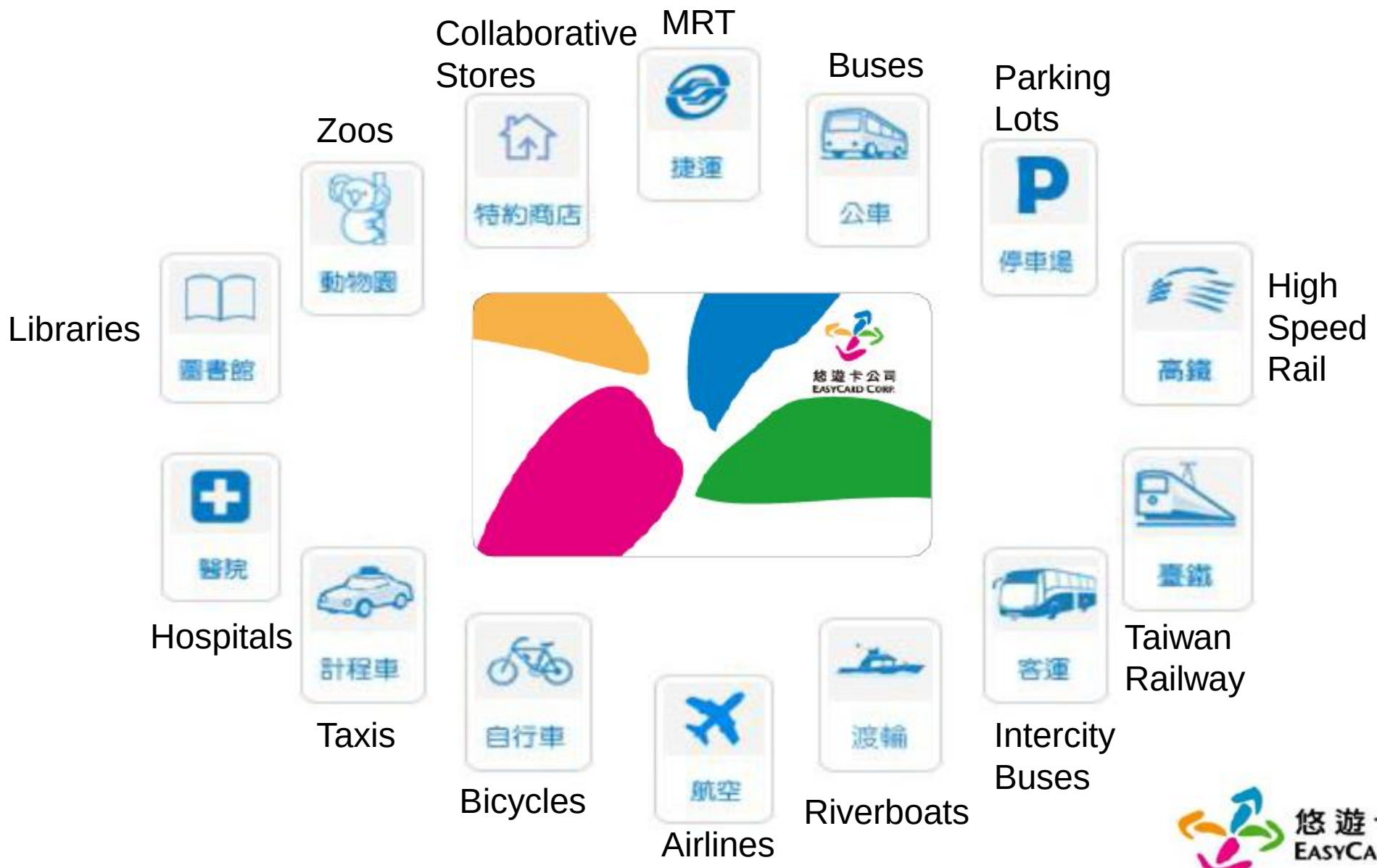
- Usage area: MRT, buses, trains, parking lots and merchants, etc.



EASYCARD Milestones

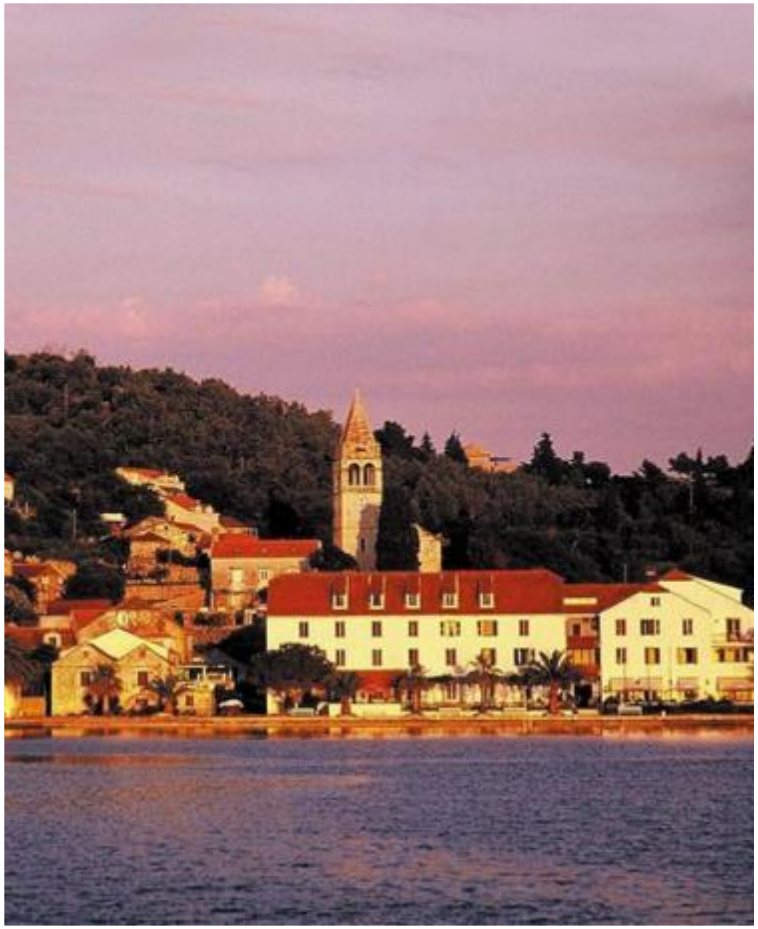
2000	• EasyCard Corporation established
2002	• EasyCard launched on public transport systems
2006	• Co-brand cards issued with auto top-up service
2007	• More than 10 million cards issued
2010	• Small-value purchase service launched
2012	• Second-Generation EasyCard launched
2016	• More than 65 million cards issued

Operation Status—Operation Scope



EBRD Turnaround Management (TAM) Programme

HGSpot of Zagreb, CROATIA 2008 - 2010



Identify potential areas of improvement to ensure the company's sustainability

EBRD EGP (Enterprise Growth Programme) of Business Matching Trip (BMT) in Taiwan for III ICT Workshop and Visiting COMPUTEX 2012 for West Balkan Countries, Europe

Albania Bosnia and Herzegovina Croatia Kosovo Macedonia Montenegro Serbia (June 2012)

44 delegations of 33 ICT companies established 255 business partners in Taiwan

EBRD Green Energy Technical Visit in Taiwan

Bulgaria, Jordan, Kazakhstan, Romania and UK

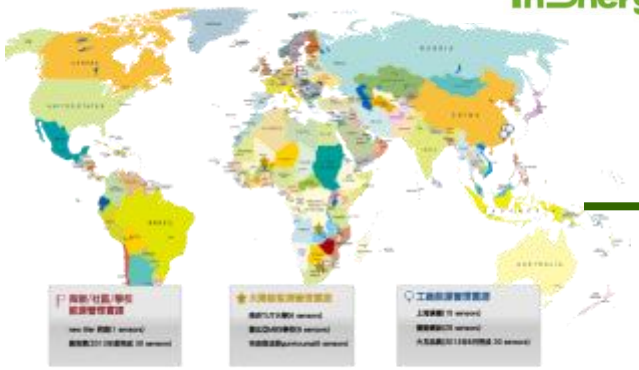
10 delegates 2013-10-29 - 11-01

EBRD Smart City Technical Visit in Taiwan – June 19 ~ 22, 2017

19 Delegates - Bulgaria Hungary Kazakhstan Mongolia Romania Serbia Ukraine, including 6 delegates from Bucharest and Pitesti, Romania

In-Snergy Provides 4+1 Solutions for Intelligent Energy Management System (IEMS)

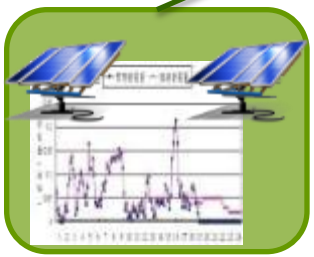
Global Service



Green IOT Cloud Services

Strtaus

Green IOT Applications



Liza

Renewable Energy Solutions

Ectuary

Enterprise Energy Management Solutions

iFamily

Smart/Green Home Solutions

In-Light

Smart Lighting Management Solutions

Cloud-Based Intelligent Energy Management System (IEMS)

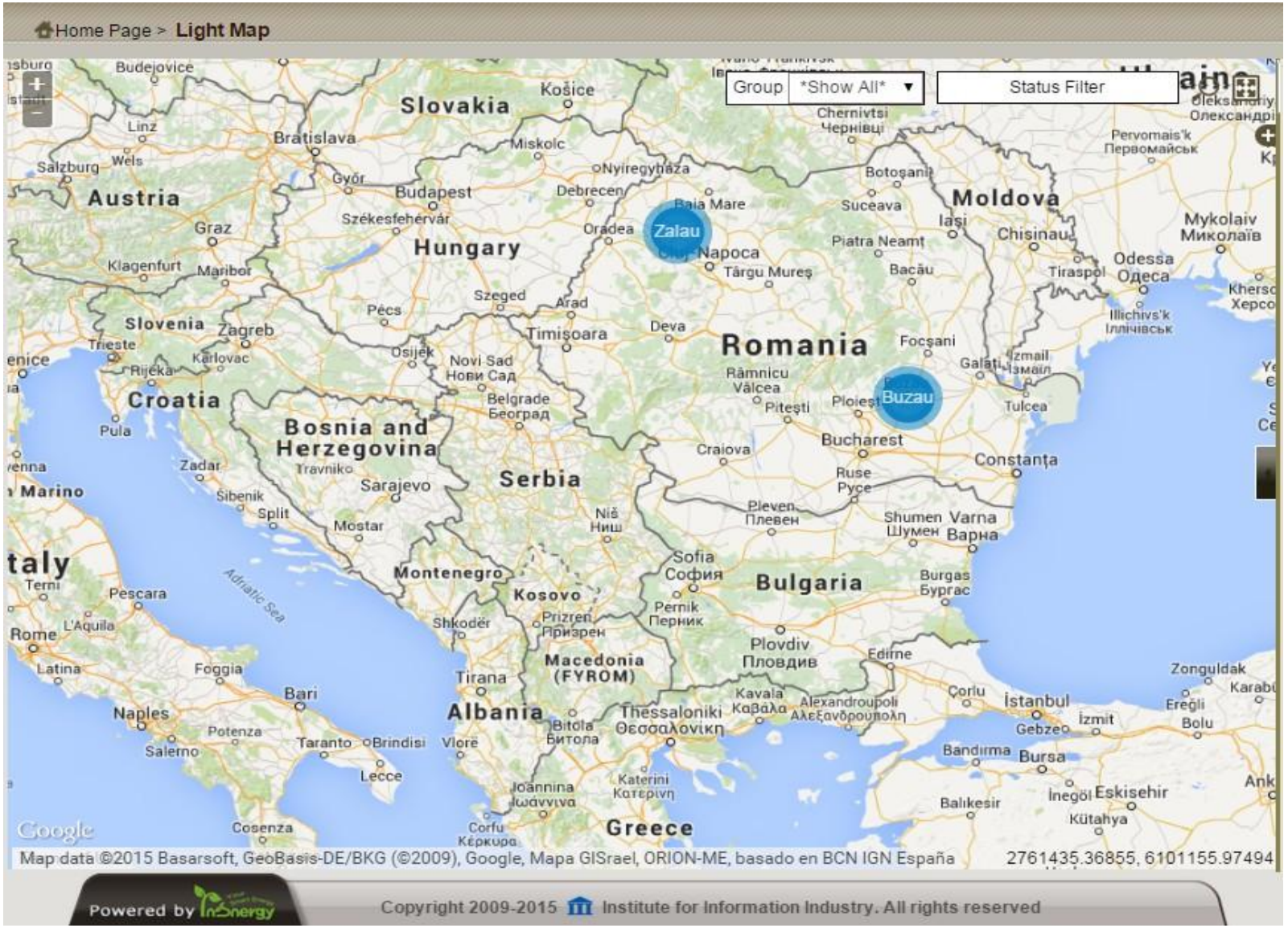
2011 World R&D 100 Awards, 45 International Patents

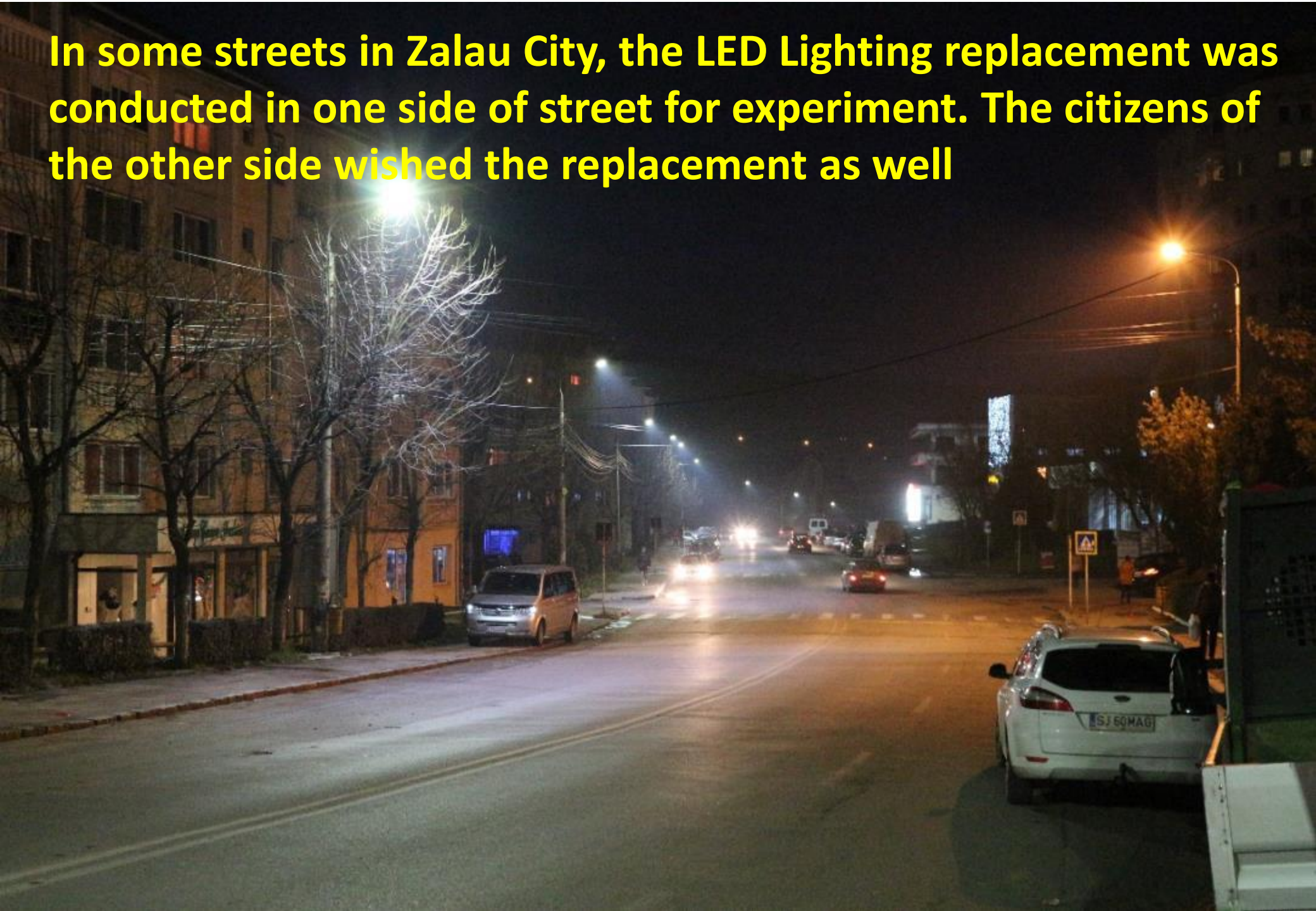
In-Snergy (Internet Smart energy):

- Green IOT(Internet of Things) Platform
- Internet-based cloud technology offers always-on 24 hours a day year-round service in monitoring and optimizing electricity usage environment to raise power usage efficiency and help to ensure comfortable outdoor and indoor environments
- Simple, adaptable, ready-to-use energy monitoring and management solution, applicable in various environments
- A scalable cloud platform, that is easily installed to offer the desired features based on end-customers' needs
- Capable to interact with and manage large-scale sensor equipment
- Based on Open data communication interface (JSON/ SOAP) that can easily integrate with commercially available sensor devices, electric meters, and others
- **Implemented in more than 370 sites worldwide in Europe, Africa, Asia**

Intelligent Energy Management System (IEMS)

Lighting Map - Romania



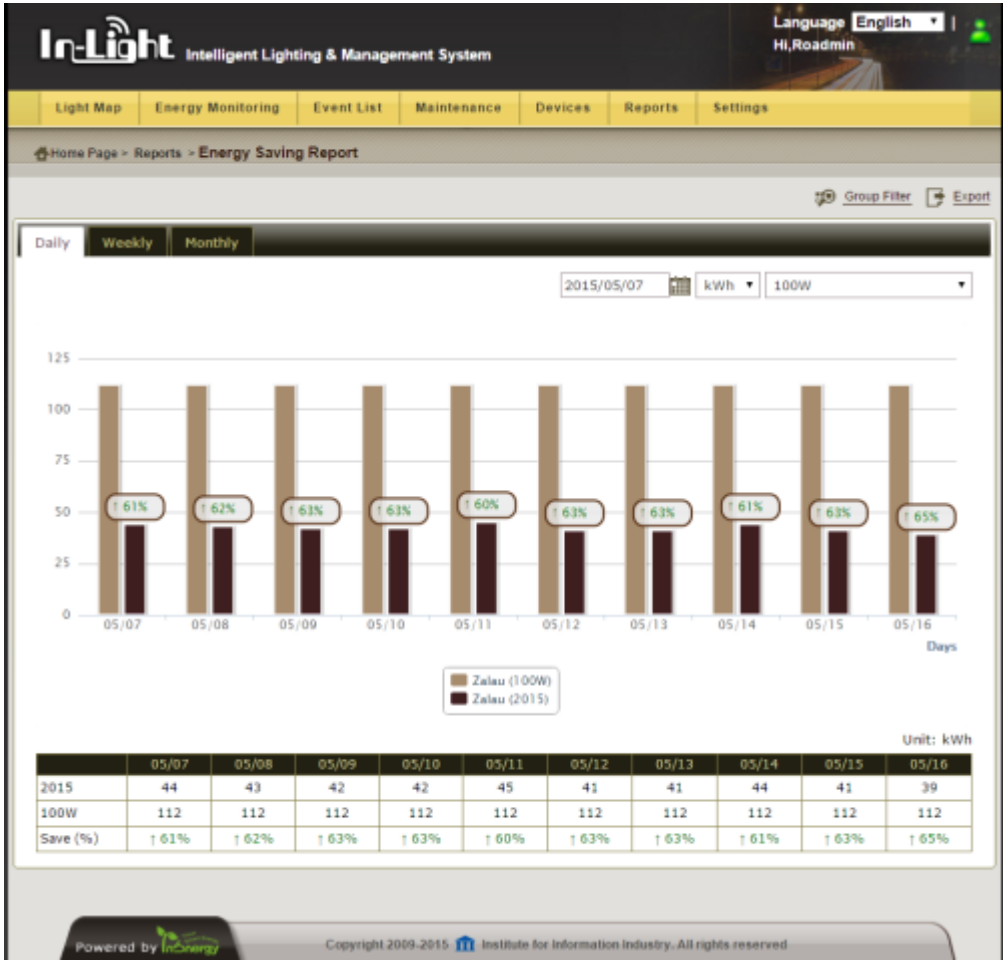

In some streets in Zalau City, the LED Lighting replacement was conducted in one side of street for experiment. The citizens of the other side wished the replacement as well

Lighting in Buzau and Zalau, Romania

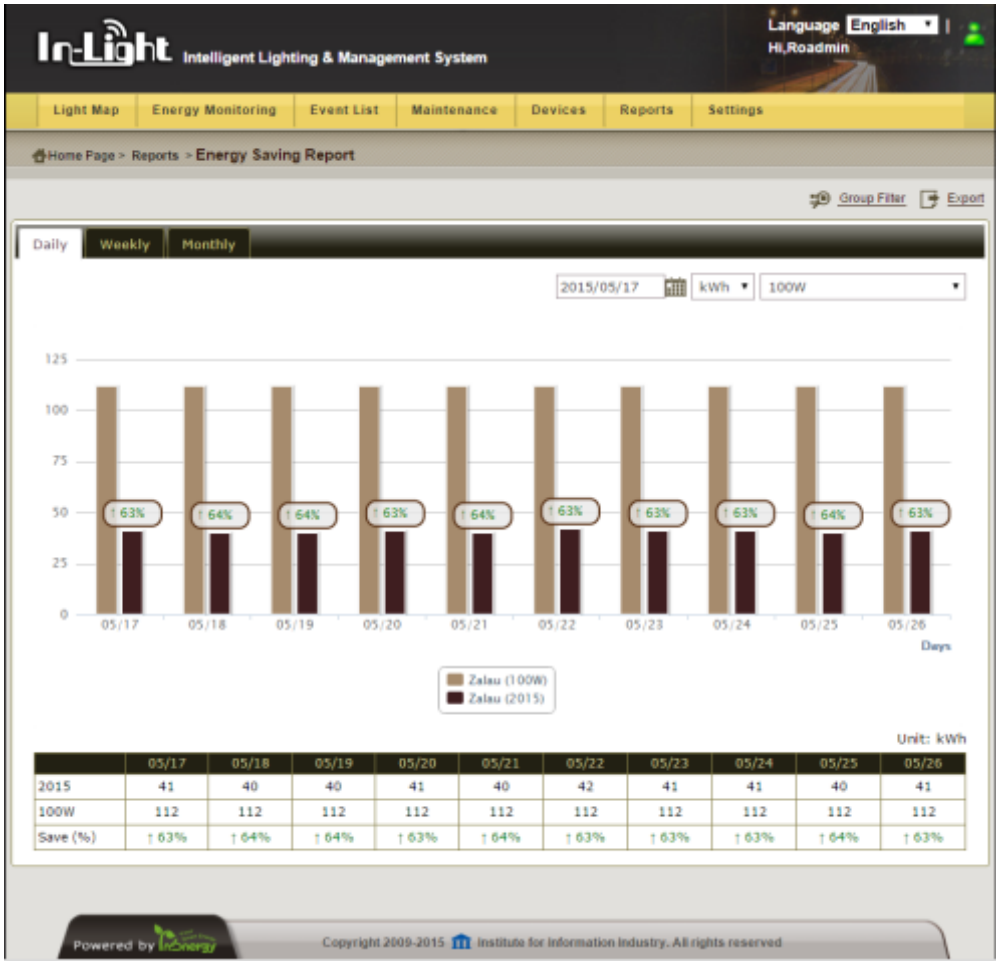
Before the replacement of LED lighting, the lighting was High Pressure Sodium/HPS). The HPS lights were not bright, and the road were not bright either.

After the Installation of LED Lighting, The brightness of road has improved Substantially.

Power Saving Statistics – Zalau City



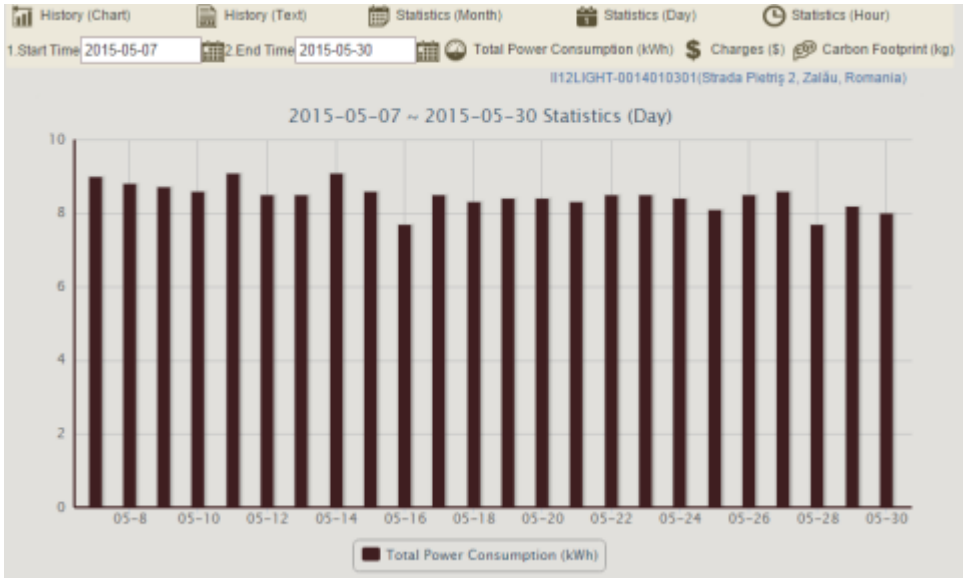
	05/07	05/08	05/09	05/10	05/11	05/12	05/13	05/14	05/15	05/16
2015	44	43	42	42	45	41	41	44	41	39
100W	112	112	112	112	112	112	112	112	112	112
Save (%)	↑ 61%	↑ 62%	↑ 63%	↑ 63%	↑ 60%	↑ 63%	↑ 63%	↑ 61%	↑ 63%	↑ 65%

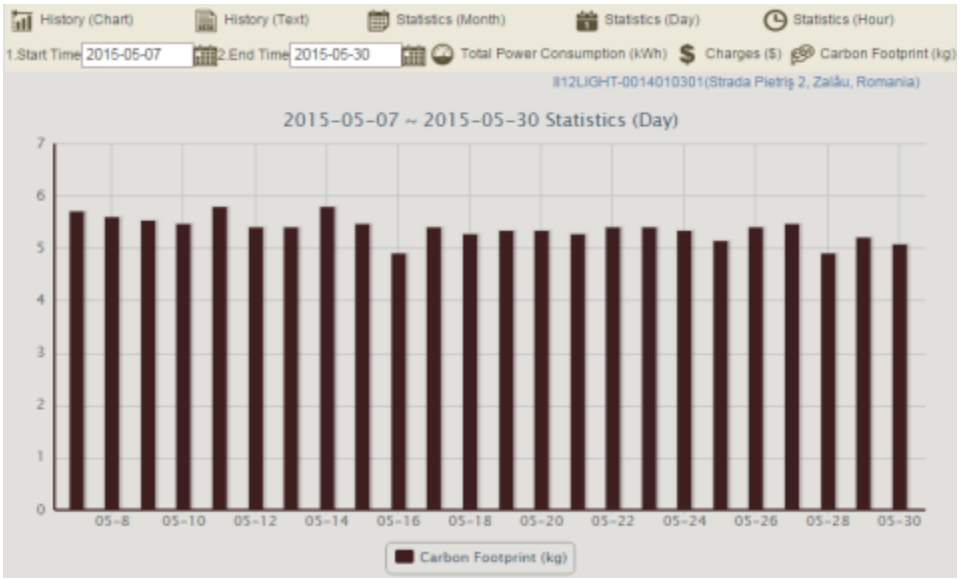


	05/17	05/18	05/19	05/20	05/21	05/22	05/23	05/24	05/25	05/26
2015	41	40	40	41	40	42	41	41	40	41
100W	112	112	112	112	112	112	112	112	112	112
Save (%)	↑ 63%	↑ 64%	↑ 64%	↑ 63%	↑ 64%	↑ 63%	↑ 63%	↑ 63%	↑ 64%	↑ 63%

1. In Zalau, 100W HPS lights were replaced by 60W LED lights (Circuit 1)
2. During 2015-05-07~26, the new LED lights consumed 41 kWh/per day, comparing to the 100W HPS 112kWH/per day, the power saving rate was (112-41 = 71) / 112 kWh = 63%

Lighting Statistics – Zalau City





Total Power Consumption (kWh)

Total Carbon Footprint (kg)

2015-05-08~30 Daily Statistics of Power Circuit 1：

1. **Total Power Consumption (kWh): 9 kWh/per day**
2. **Total CO2 Generated (kg): 5.8 kg**

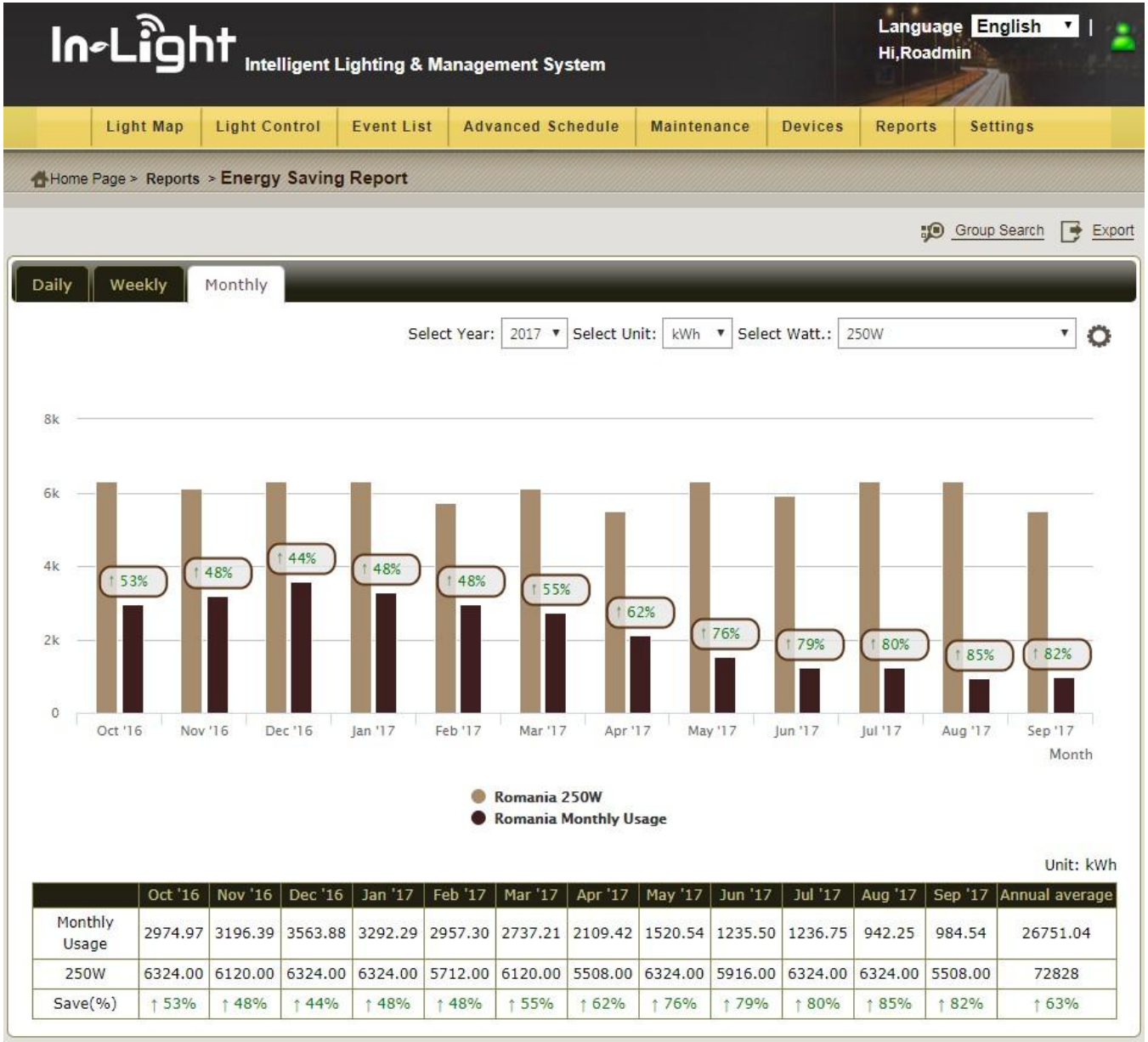
(Total CO2 generated by HPS lights is 2 – 3 times of LED lights, LED lights reduce CO2 emission

LED Lighting and Monitoring Control System Appreciated by Zalau City Mayor and Staff

III Project Team discussed the system operation with Zalau City system maintenance Staff. Mayor greeted Mr. Damov and III Project Team.


Thanks from the Deputy Mayor of Buzau City
for the Successful Implementation of the
Intelligent LED Lighting and Monitoring System

Power Saving 82% in September 2017 in Zalau, Romania



Unit: kWh

	Oct '16	Nov '16	Dec '16	Jan '17	Feb '17	Mar '17	Apr '17	May '17	Jun '17	Jul '17	Aug '17	Sep '17	Annual average
Monthly Usage	2974.97	3196.39	3563.88	3292.29	2957.30	2737.21	2109.42	1520.54	1235.50	1236.75	942.25	984.54	26751.04
250W	6324.00	6120.00	6324.00	6324.00	5712.00	6120.00	5508.00	6324.00	5916.00	6324.00	6324.00	5508.00	72828
Save(%)	↑ 53%	↑ 48%	↑ 44%	↑ 48%	↑ 48%	↑ 55%	↑ 62%	↑ 76%	↑ 79%	↑ 80%	↑ 85%	↑ 82%	↑ 63%

LED Lighting Saves More Than 60% of Power and Cost
With CO2 Reduction for Environmental Friendliness and
Return of Investment (ROI) less than 2 Years for outdoor lighting,
less than 1 year for indoor lighting – Czech Republic

The Intelligent Lighting Monitoring Control System provides functions to automatic schedule and real-time monitor the lighting operation

IEMS Implementation in Pelhrimov Hospital
Vysocina Region, Czech Republic Nov 27-Dec 1, 2017

Findings from the System Daily Monitoring

Outdoor Lighting
53 Lights

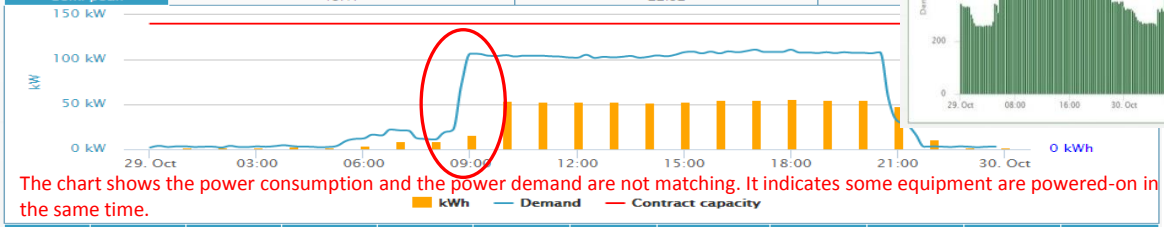
Specification 3774 W
Monitored 4630 W

(4630-3774)/3774 = 22.6%

Successful 12% Power / Cost Saving through Demand Power Management and Energy Efficiency Implementation in Factory in the Philippines - 2014

高雄市立圖書館左新分館總表 (II12IIKPL-0001010101|3) 2014-10-29 Daily deman

	Energy Consumption(kWh)	Maximum demand(kW)
Full period	1,370.56	111.02
Peak	987.42	111.02
Semi-peak	40.17	22.02



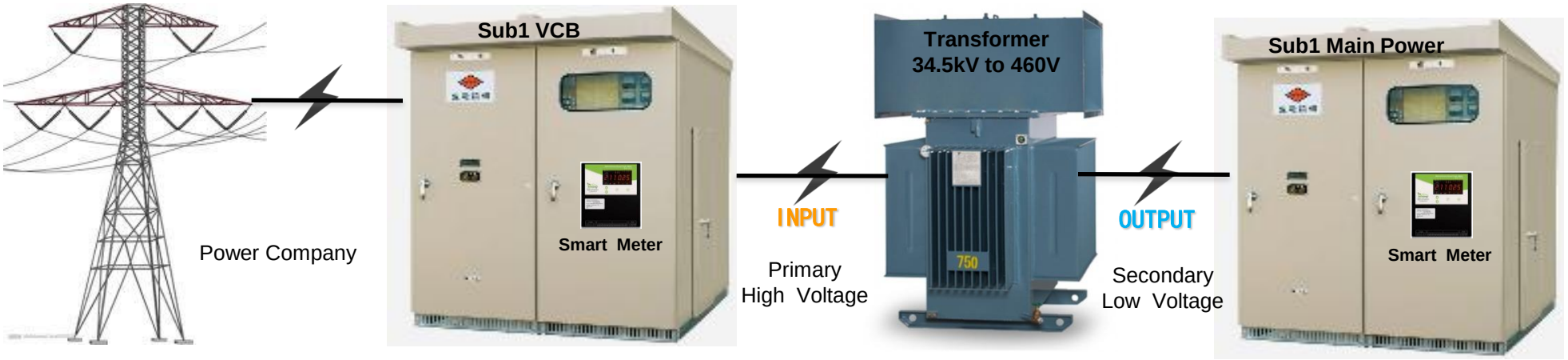
The chart shows the power consumption and the power demand are not matching. It indicates some equipment are powered-on in the same time.

Hour	0 - 15	15 - 30	30 - 45	45 - 60	kWh	Hour	0 - 15	15 - 30	30 - 45	45 - 60	kWh
0-1	1.92	3.84	2.56	3.20	2.88	12-13	102.10	105.26	101.80	103.04	103.05
1-2	3.20	2.56	2.86	2.90	2.88	13-14	102.40	103.04	103.98	102.06	102.87
2-3	1.92	3.84	2.56	2.56	2.72	14-15	103.08	104.62	103.68	105.30	104.17
3-4	3.20	2.86	3.54	4.48	3.52	15-16	108.12	108.80	106.88	108.80	108.15
4-5	3.50	2.90	2.86	2.26	2.88	16-17	106.88	109.14	108.16	109.44	108.41
5-6	2.56	3.84	9.26	11.52	6.79	17-18	★111.02	108.50	108.46	108.50	109.12
6-7	12.12	16.34	15.40	22.02	16.47	18-19	110.95	107.81	107.81	107.23	108.45
7-8	21.12	20.82	12.20	11.48	16.41	19-20	108.16	107.17	108.16	107.52	107.75
8-9	10.88	18.56	21.42	73.13	31.00	20-21	107.52	106.94	108.16	55.58	94.55
9-10	106.54	106.28	104.28	104.02	105.28	21-22	31.36	28.16	17.06	2.85	19.86
10-11	104.92	103.38	104.32	104.36	104.25	22-23	3.20	2.91	2.56	3.20	2.97
11-12	104.28	103.68	103.38	102.36	103.42	23-24	2.85	2.27	2.85	2.91	2.72

Prev 1 Day ★ : Maximum demand - : No data available Next 1 Day

The peak demand power was caused by the power-on of the waste water treatment plant WWTP

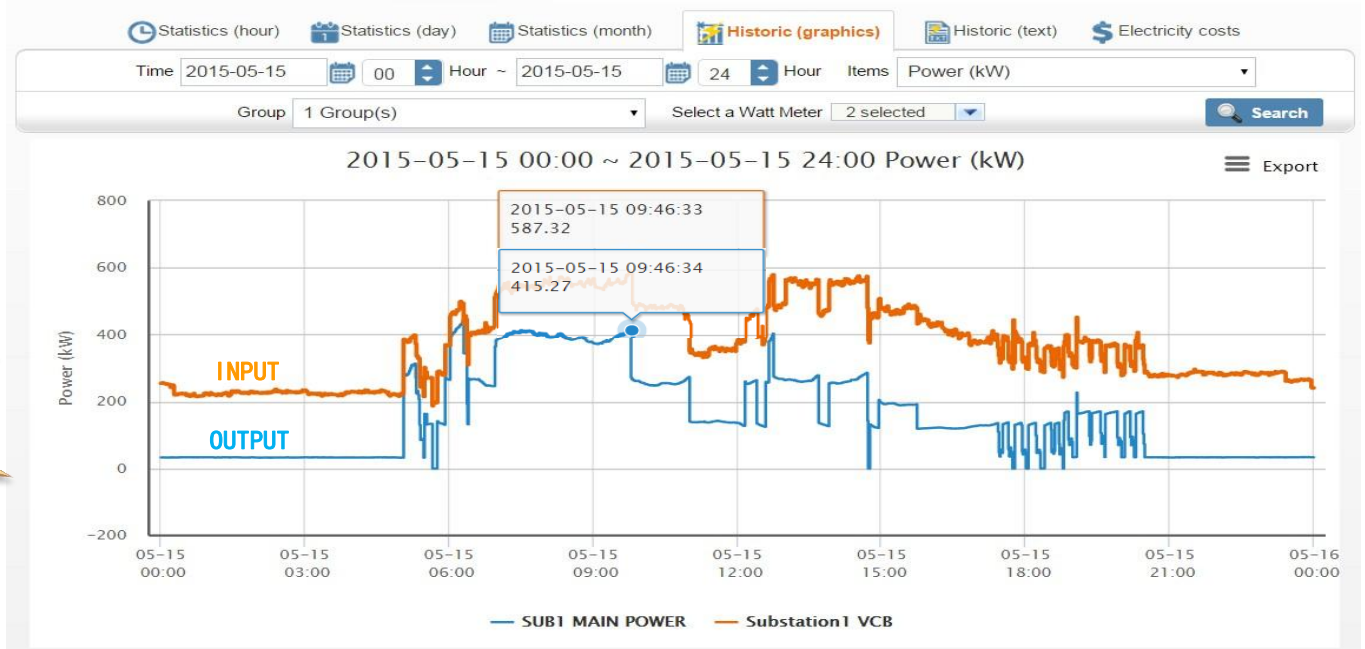
Phase 3 – Transformer Efficiency Diagnosis and Analysis (Sample)



- Input=587.32 kW
- Output=415.27 kW
- System Loss=587.32-415.27=172.05kW
- 172.05/587.32*100%=29%

Transformer Loss

29%



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Successful Project Cooperation 2014 and 2015 - Intelligent LED Street Lighting and Monitoring System in Technology University of Tshwane (TUT), South Africa

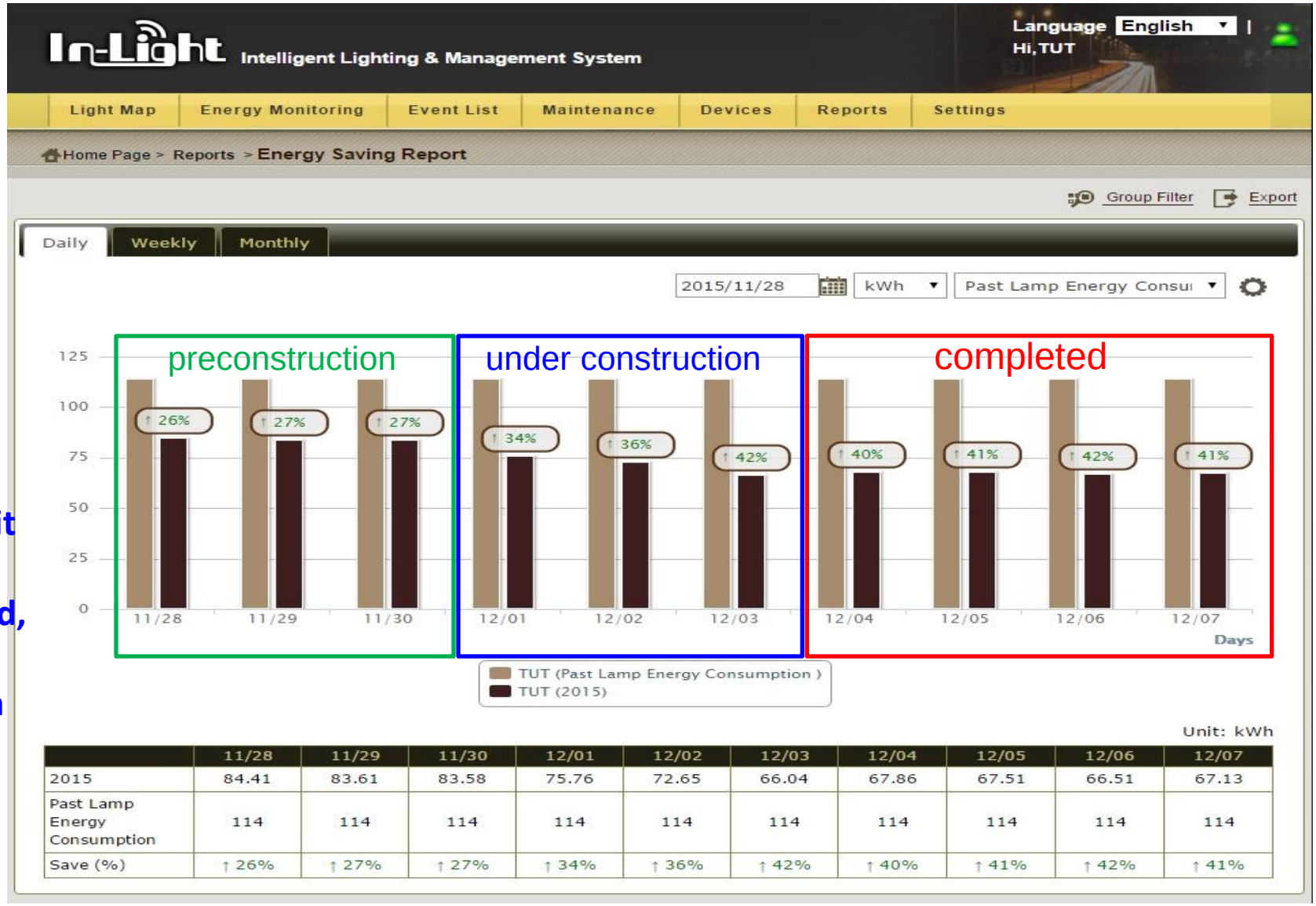
TUT Street Light Energy Saving Report

Power Saving

2014 – 27%

2015 – 42%

Due to the circuit has HPS Remained, saving is Less than 60%

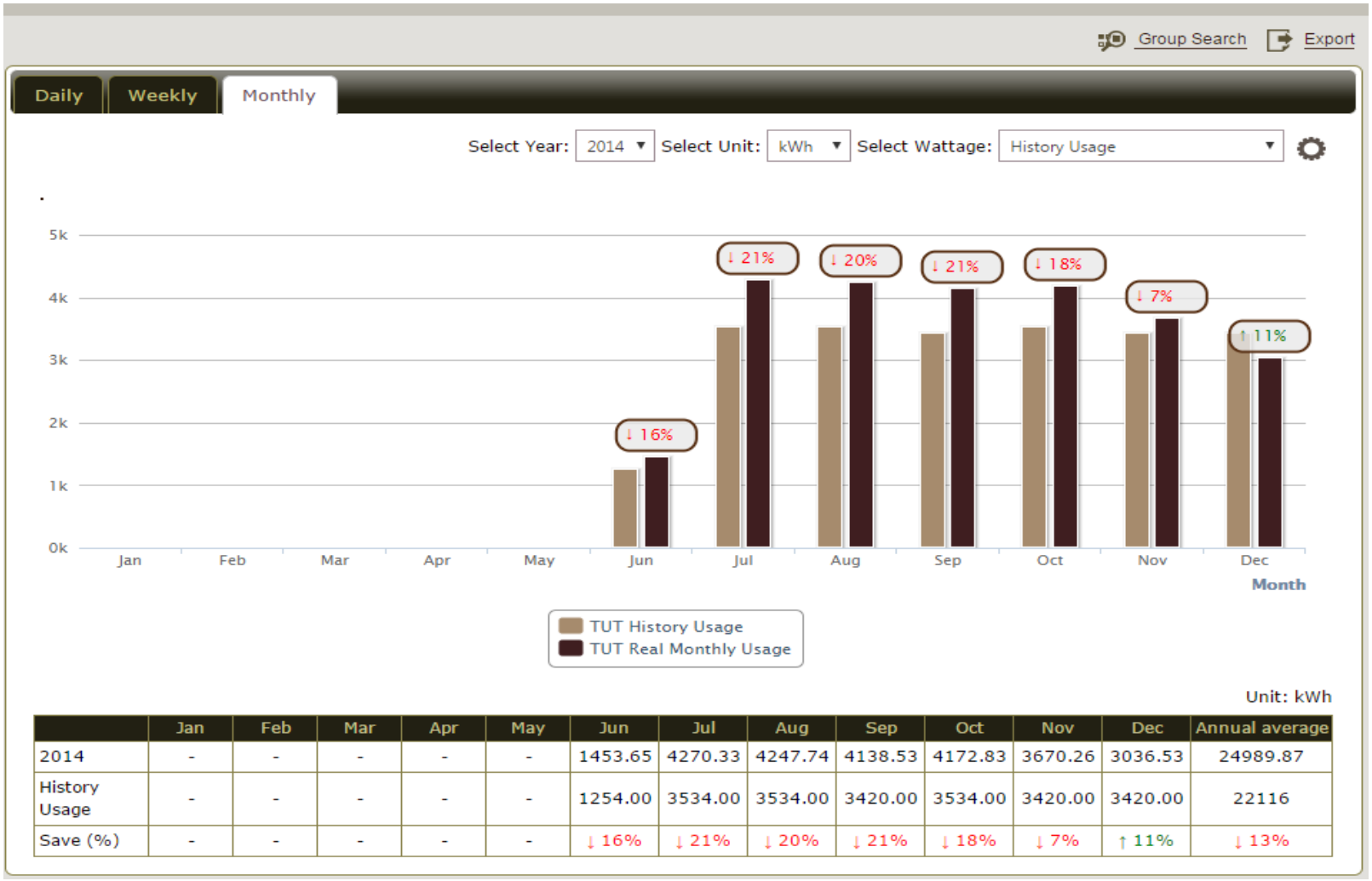


Unit: kWh

	11/28	11/29	11/30	12/01	12/02	12/03	12/04	12/05	12/06	12/07
2015	84.41	83.61	83.58	75.76	72.65	66.04	67.86	67.51	66.51	67.13
Past Lamp Energy Consumption	114	114	114	114	114	114	114	114	114	114
Save (%)	↑ 26%	↑ 27%	↑ 27%	↑ 34%	↑ 36%	↑ 42%	↑ 40%	↑ 41%	↑ 42%	↑ 41%

In 2014, when 24 LED lights were installed, the power saving was 27%. When additional 8 LED was Installed during Dec. 1 – 3, 2015 the power saving increased to 42%, and stayed 42% after Dec. 4

21% inefficiency of HPS was identified



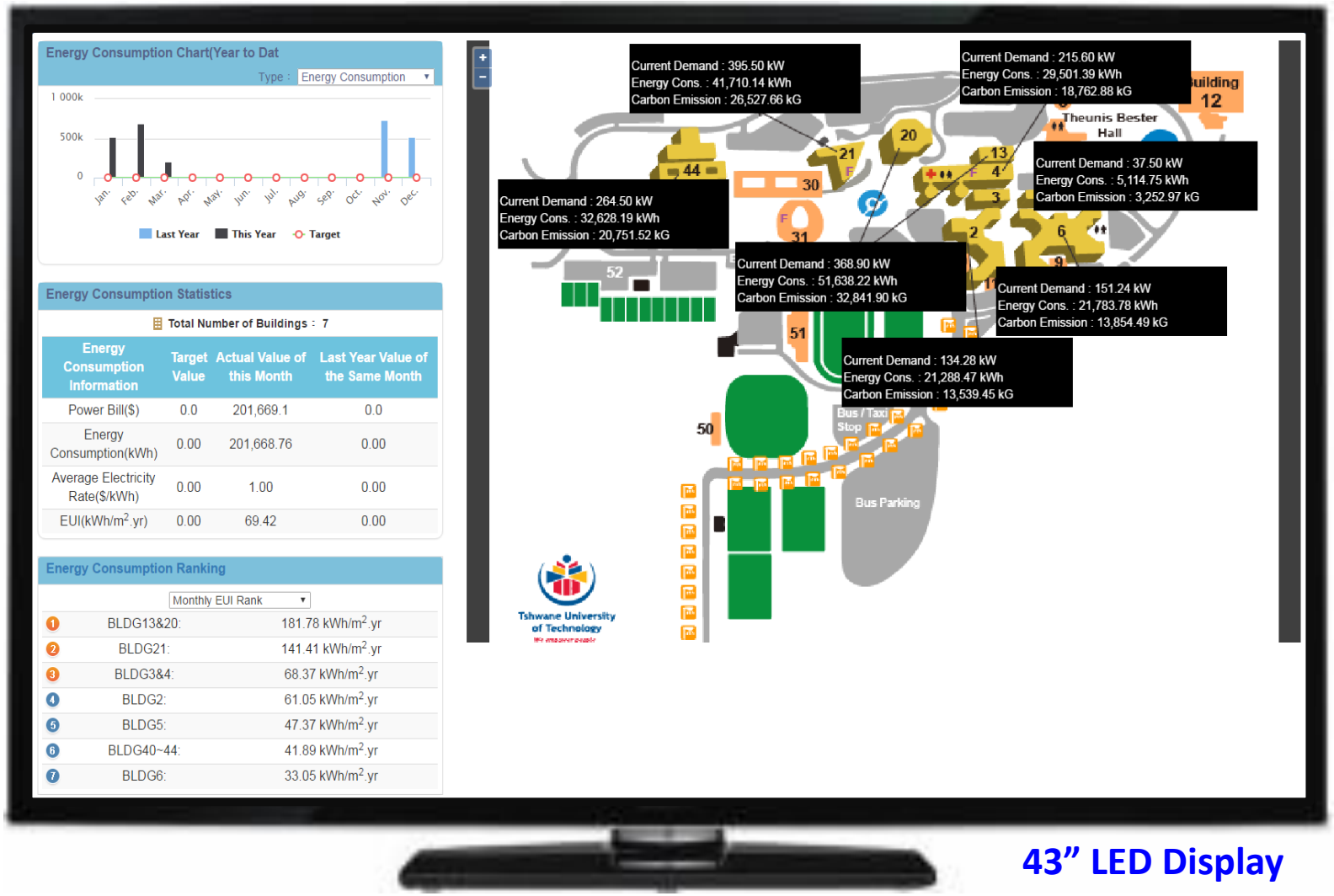
Unit: kWh

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual average
2014	-	-	-	-	-	1453.65	4270.33	4247.74	4138.53	4172.83	3670.26	3036.53	24989.87
History Usage	-	-	-	-	-	1254.00	3534.00	3534.00	3420.00	3534.00	3420.00	3420.00	22116
Save (%)	-	-	-	-	-	↓ 16%	↓ 21%	↓ 20%	↓ 21%	↓ 18%	↓ 7%	↑ 11%	↓ 13%

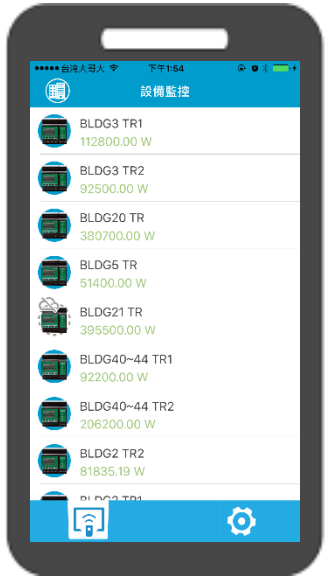
The lighting monitoring system was implemented in June 2014. In July, 21% of surplus energy consumption was recorded which may be caused by the aging of the HPS lights decreasing efficiency.

2016 IEMS Implementation in TUT University Campus, South Africa
Real-time Energy Consumption Monitoring

Instant visibility of electricity consumption on campus to educate and develop energy-saving awareness and habit



43” LED Display



Mobile APP

IEMS System Architecture

Signal line
RS485
Internet

Campus Area 1

Gateway
AEG-200 #1

Meter
ST-12#1

Meter
ST-12#2

Meter
ST-12#3

Meter
PA-310

Campus Area 2

Gateway
AEG-200 #2

Meter
ST-12#4

Meter
ST-12#5

Campus Area 3

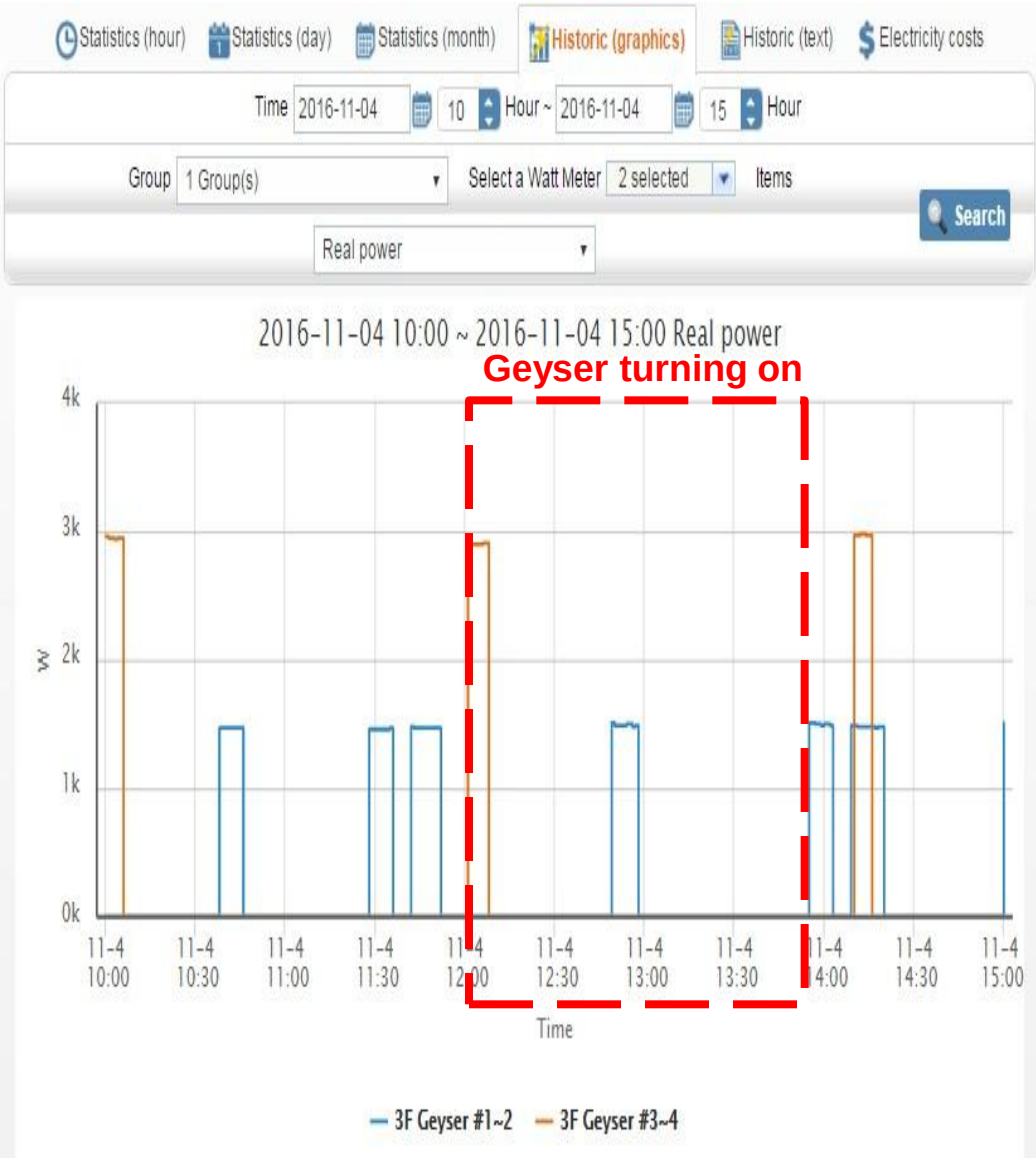
Gateway
AEG-200 #3

Meter
ST-12#6

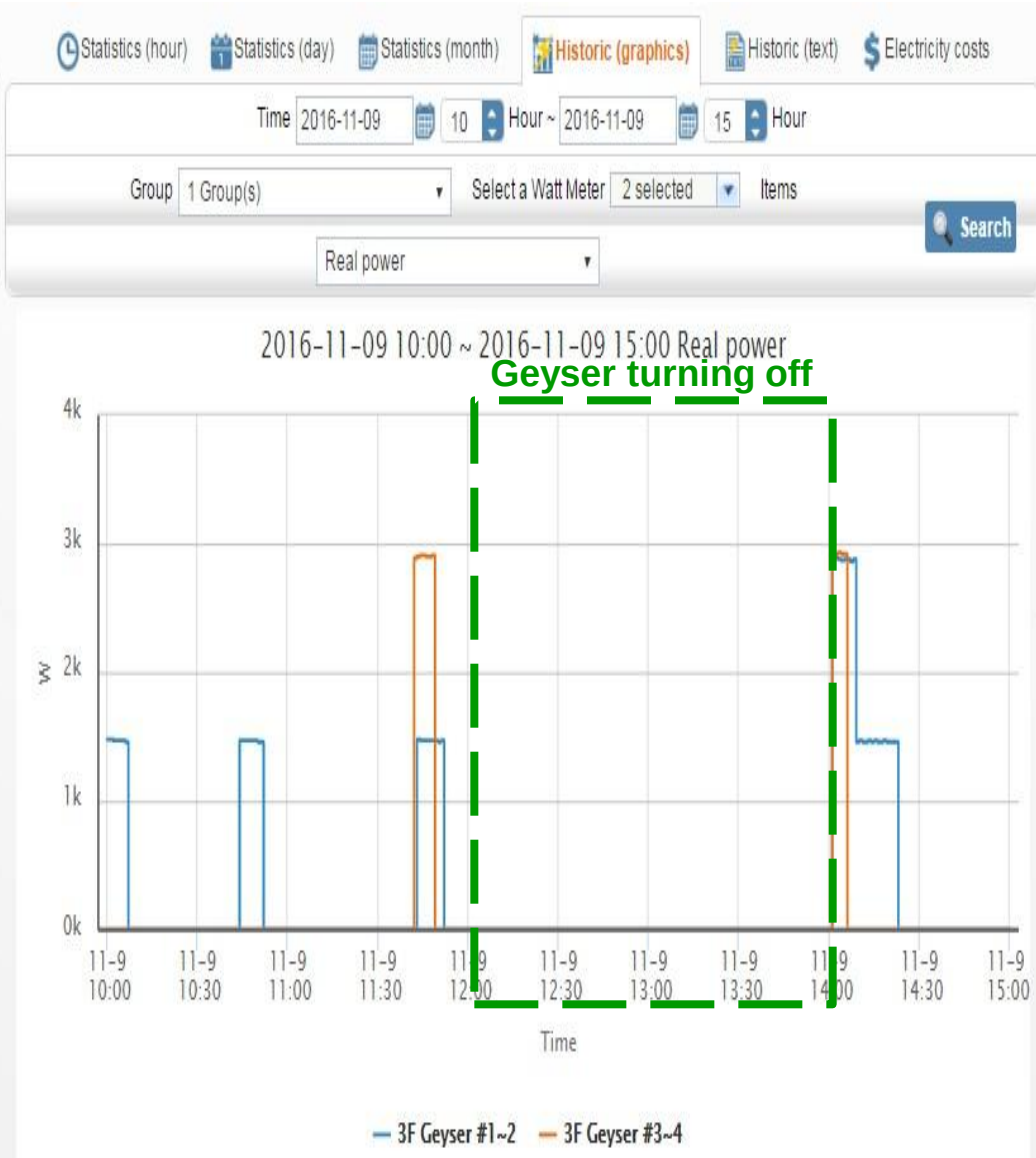
Meter
PA-310

iEMS Demand Control Demonstration – Water Heater in Resident

Before Scheduling Control

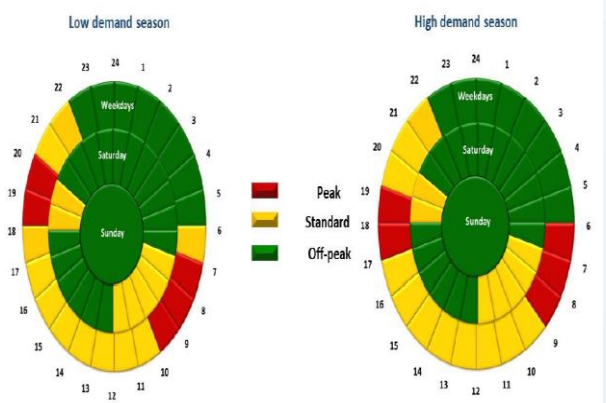


After Scheduling Control



TUT iEMS Scheduling and Control According to TOU

Eskom TOU Table



System Benefit for Power, Cost, and Manpower Reducing:

- Shifting power usage between peak and off-peak period to saving the cost of power consumption
- Reducing the peak of power demand to reduce the Power Demand Charge.
- Using the system feature of scheduling to enable the automatic power utilization management

International Recognition and Potential Cooperation with Bulgaria

2015 APICTA Gold Winner Awards
(Asia Pacific ICT Alliance)
CIA (Cloud-threat Intelligent Appliance)

2014 Sustainable Growth Awards
(Smart Energy Management System)
World Information Technology and Services Alliance

Potential Cooperation with Bulgaria:

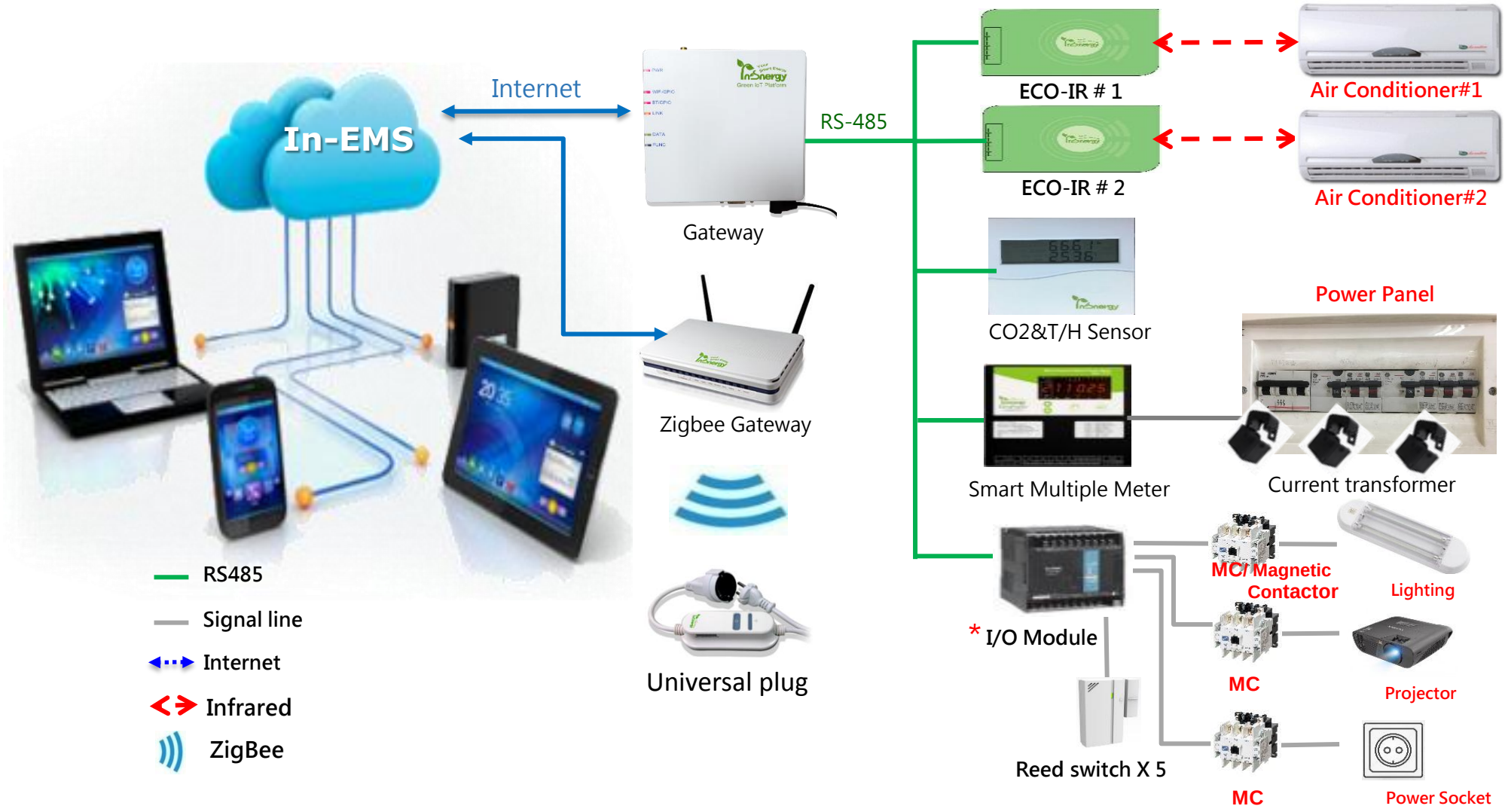
1. Intelligent Energy Management System (IEMS) for Smart Lighting, Green Building and Factory
2. e-Ticket System of Smart Card for Bus and Transportation
3. Hospital e-Registration System
4. iBeacon Smart Phone Tour Guiding

Project Cooperation in NBU

1. **Measuring the Main Switch Board**

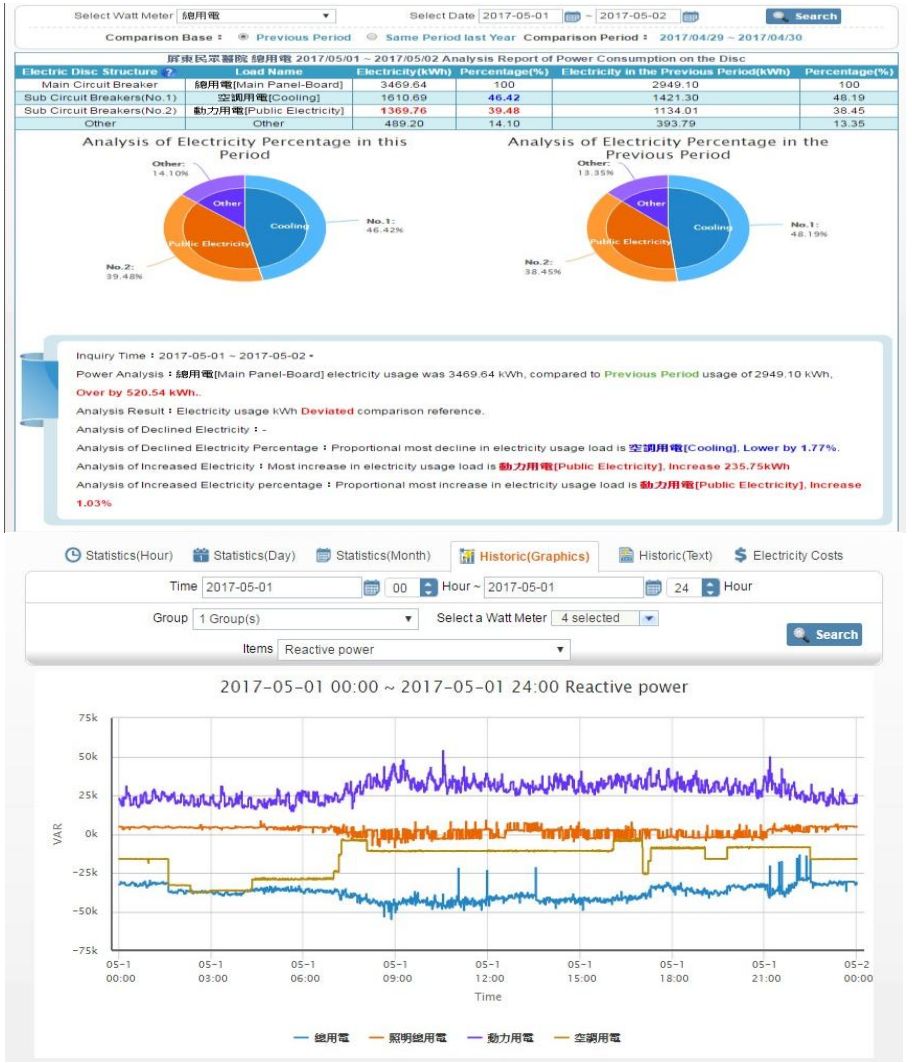
2. **Monitoring and Control for the IoT Lab**

Cloud-based IoT IEMS System Architecture



* Remark: The Intelligent Control has Bypass Function to allow control to be switched-off and on

Web-Automatic Report Management



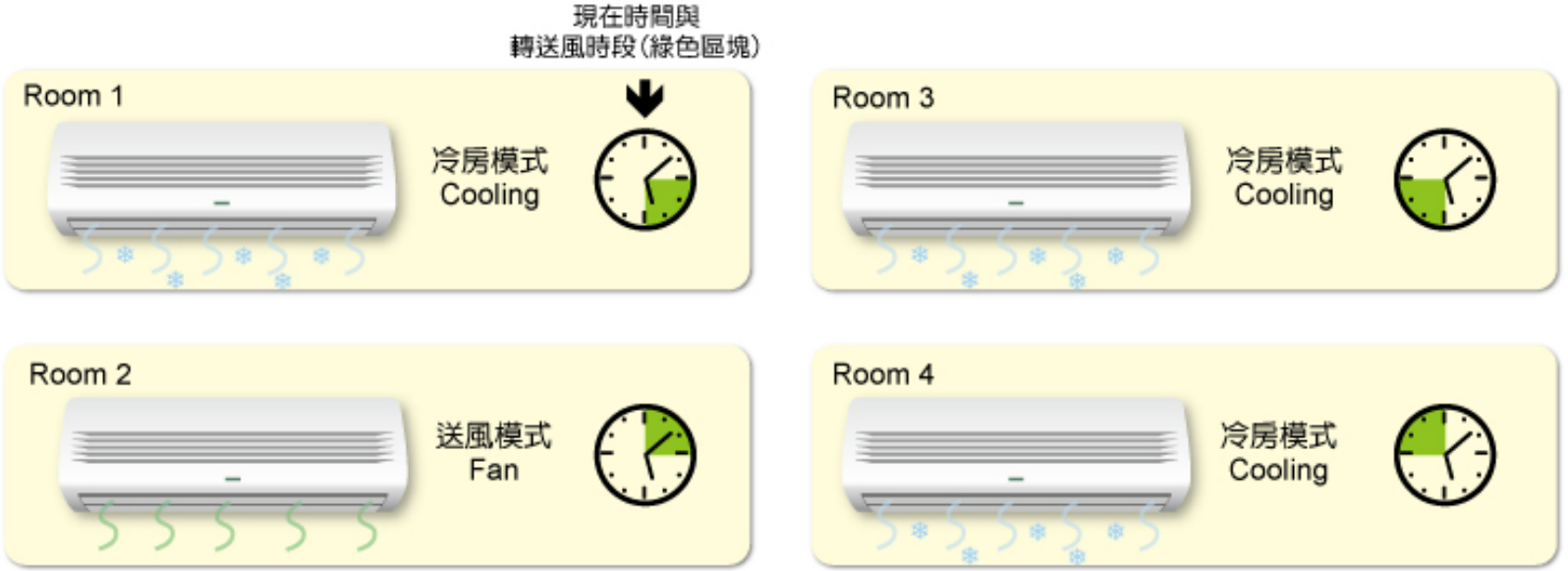
- Subscribe Automatic Daily Power Consumption Report ，send to the mail address of the System Administrator

ECO-IR for Saving

Scheduling Rotation Control

- Rotate multiple air conditioners in fan mode in a short amount of time to save energy
- Over 16.7% energy can be saved according to actual tests

時序輪停
透過多台冷氣輪流短時間轉送風模式以達到節能效果
根據實測,有效節能達16.7%以上



Cycling Suspension Control

Thank You