EUROPEAN UNION ACADEMIC PROGRAMME
HONG KONG

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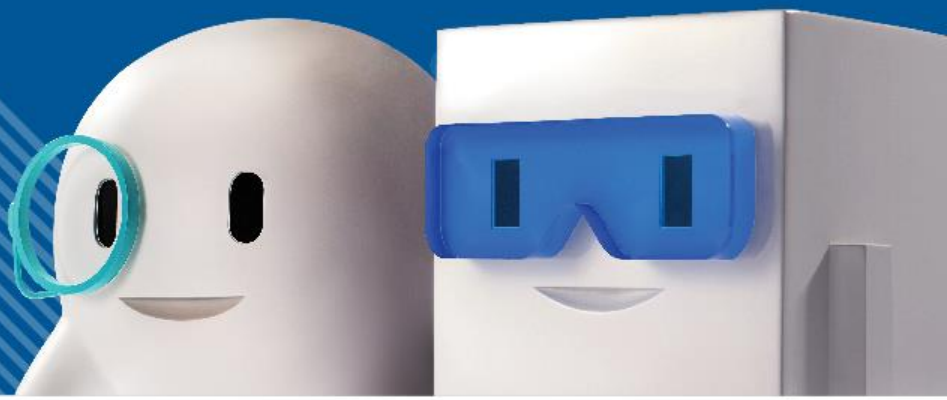
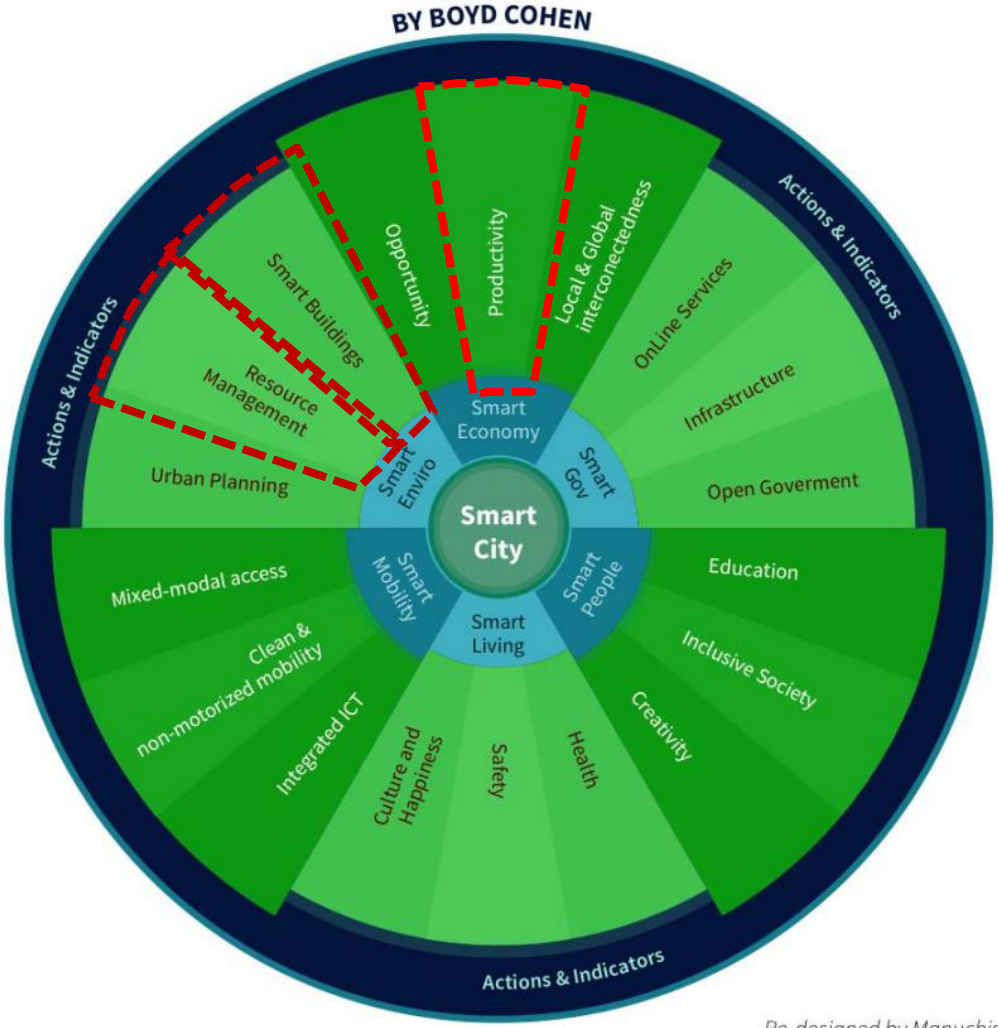
Smart Energy Management
Productivity Gain & Energy Saving
Hands-in-Hands

Ir. Raymond Fong, General Manager
Environmental Management Division
Hong Kong Productivity Council

25th November 2016



All-round Productivity Partner
全方位企業伙伴



The Smart City Wheel by Boyd Cohen.
Source: https://www.wien.gv.at/english/transportation-urbanplanning/interview-boyd-cohen.html

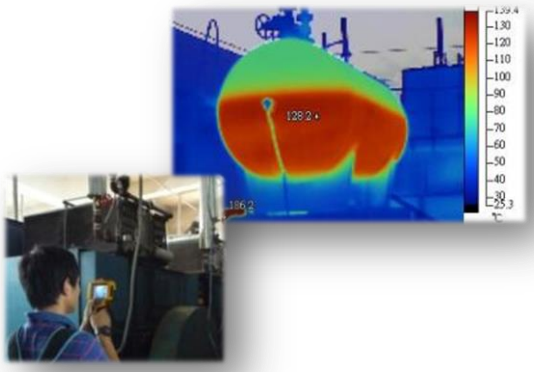
Smart Energy Management

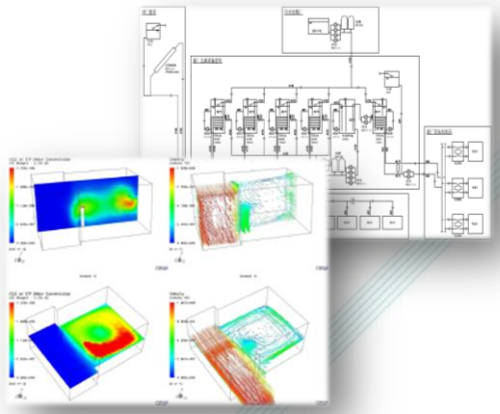
Research & Studies

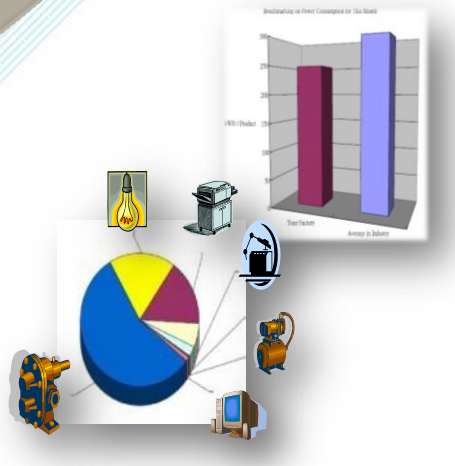
Energy Audits

System Design

Online Energy Management Systems



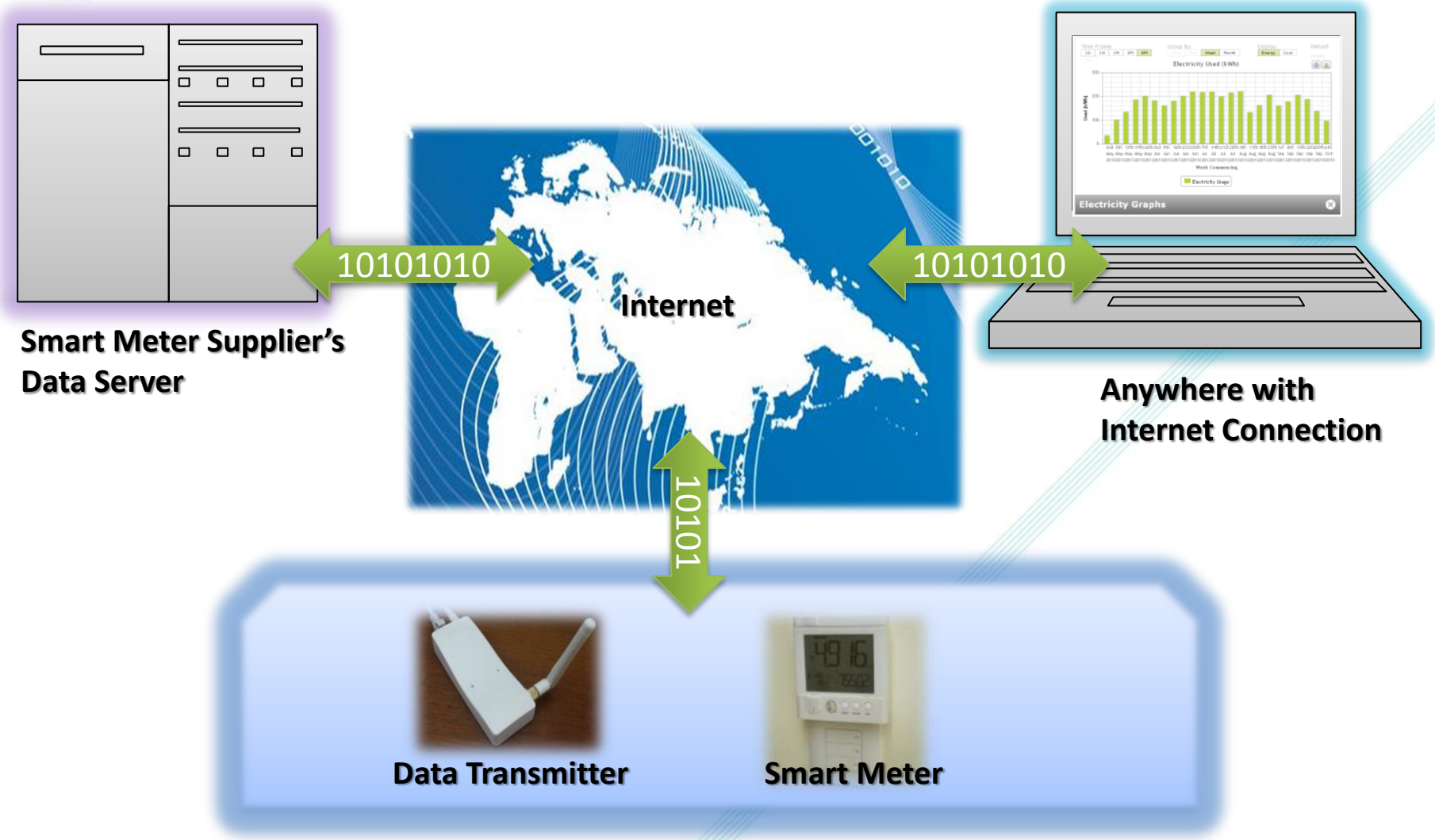


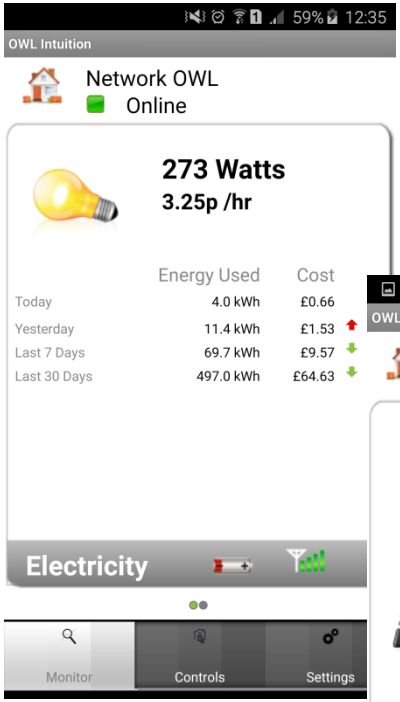


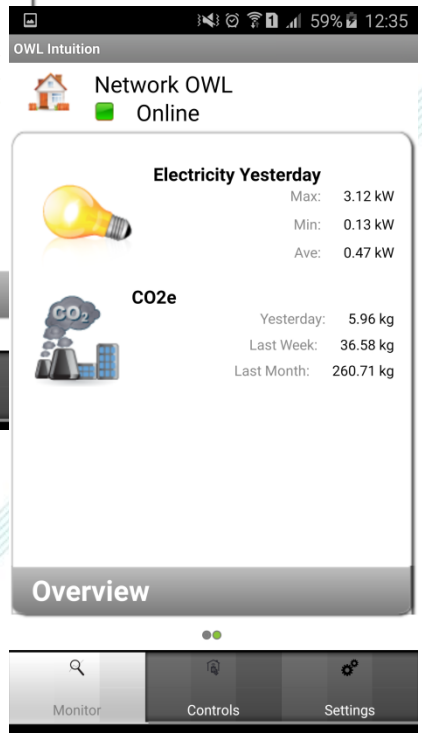
Our Energy Management Projects

HKPC©

Smart Meters


10101010
Internet
10101010
Smart Meter Supplier's
Data Server
Electricity Graphs
Anywhere with
Internet Connection
10101
Data Transmitter
Smart Meter





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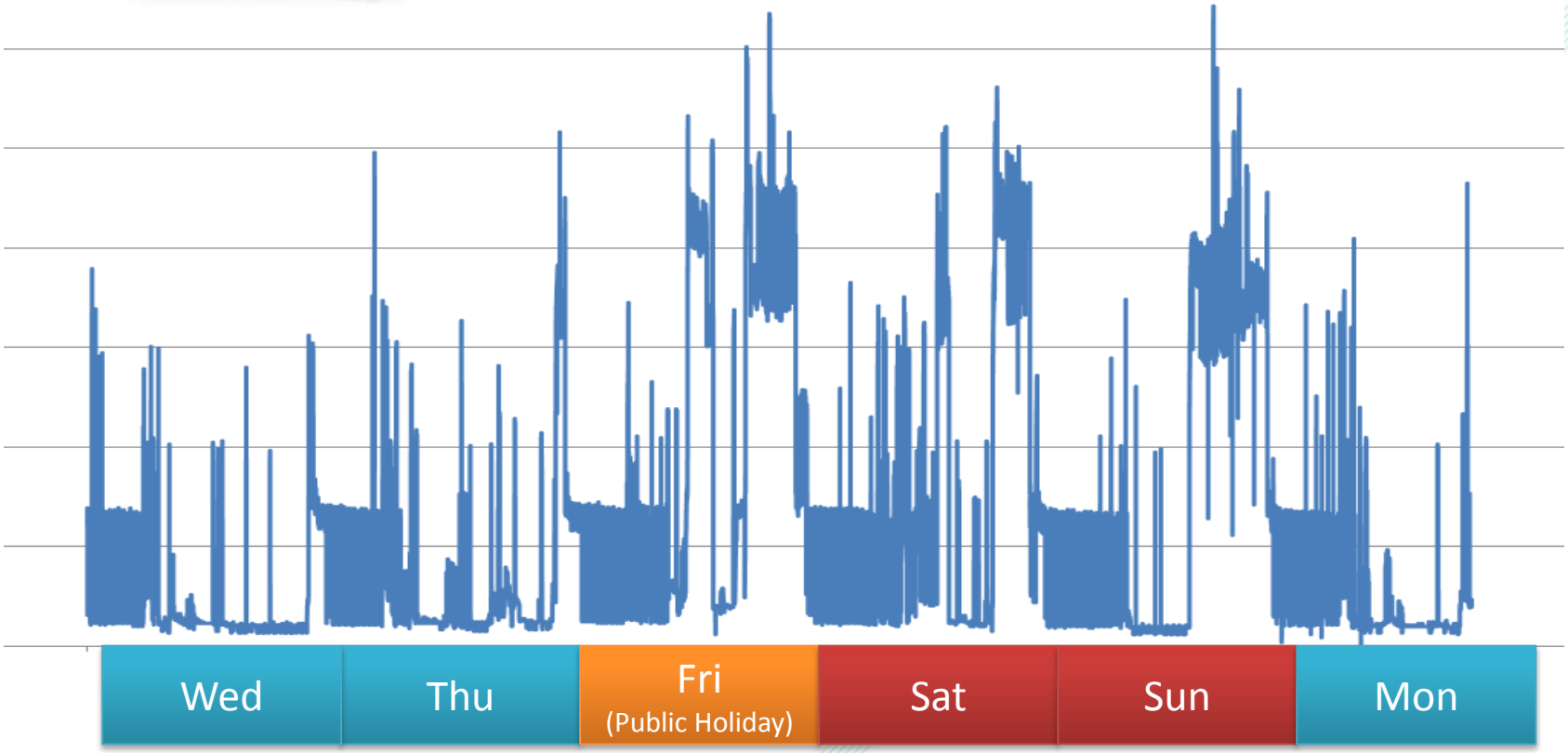
Smart Meters



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Smart Meters

APD Pot-Hunters Are Data-Mining at AE

Are you using 'too much' energy? Inquiring drug cops want to know.

BY JORDAN SMITH, FRI., NOV. 16, 2007

Source: http://www.austinchronicle.com/news/2007-11-16/561535/

21 SEPTEMBER 2011

Researchers claim smart meters can reveal TV viewing habits

Münster, Germany --- (METERING.COM) --- September 21, 2011 - A group of researchers at the Münster University of Applied Sciences have claimed that it is possible to use the electricity usage data from a smart electricity meter to determine which programs a consumer is watching on a standard TV set.

Source: https://www.metering.com/researchers-claim-smart-meters-can-reveal-tv-viewing-habits/

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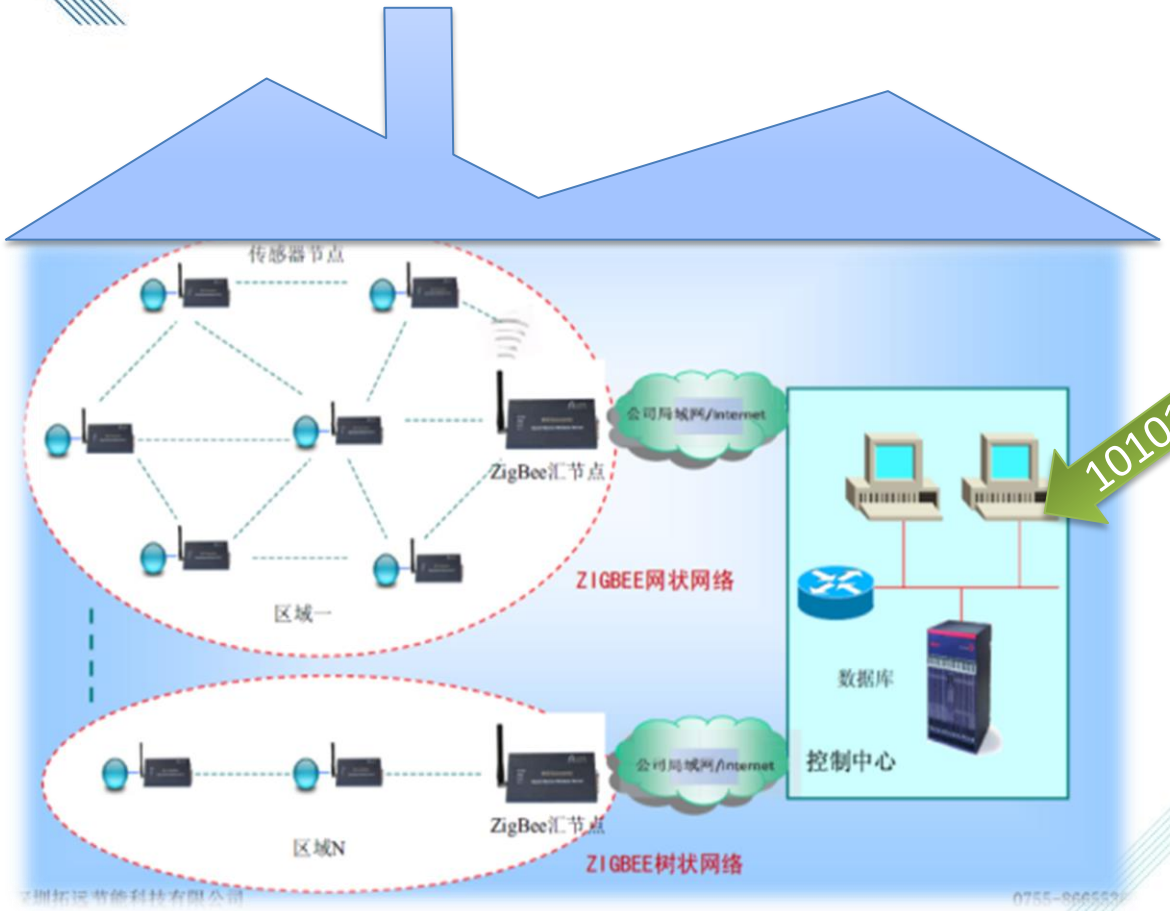
Smart Meters

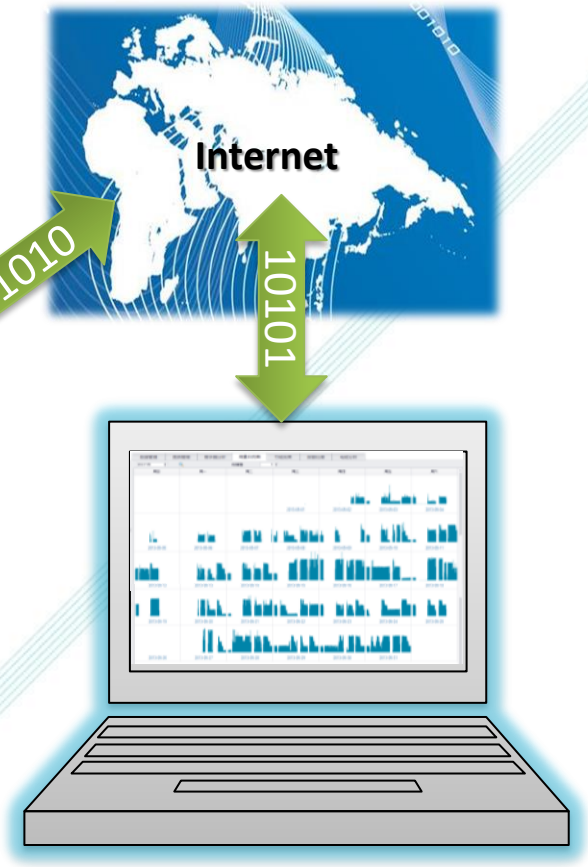
Guangdong Province

HKPC

HK-owned Factories



Wireless Energy Metering Network in Mainland Factory



Manage Data over Internet

HKPC

Factory Energy Management System

Driving Force from Government

- **Aggressive Targets:**
- **Pledge under Paris accord COP21: 60-65% Reduction in Carbon Intensity by 2030 (compared to 2005)**
- **15% Reduction in Energy Consumption per GDP in Thirteenth Five Year Plan by 2020 (compared to 2015)**
- **Online Energy Information System Platforms in Shaoguan, Dongguan, Huizhou, Zhuhai, etc. to monitor industrial energy consumptions**

东莞市经济和信息化局

东经信函〔2015〕824号

关于"十三五"期间全面推进能耗在线监测
加强能管中心建设有关事项的通知

将能管中心作为"十三五"最重要的节能工程

Driving Force from Buyers

- Buyers set targets for Suppliers, e.g.

Walmart

- ✓ Walmart engage 70% of its China's sourced business in a factory energy efficiency program by 2017

MARKS & SPENCER

- ✓ Marks & Spencer requested its top 100 factories to reduce their energy usage by an estimated 10% by 2020.

- Buyers require Suppliers to disclose GHG Emissions Information

Increasing Energy Cost

e.g. Government requires steam boilers to use cleaner fuels:

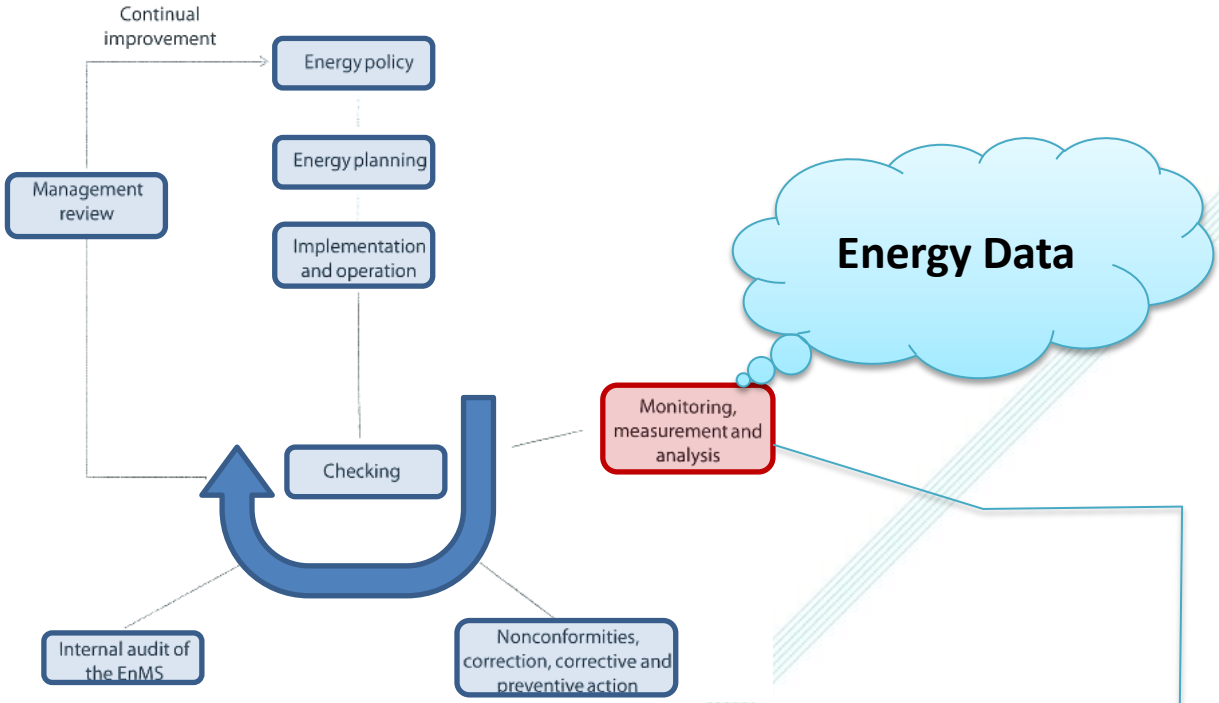
Coal

Wooden Biomass Fuel Pellets

Natural Gas

Corporate Social Responsibility (CSR)

ISO 50001 (Energy Management Systems):

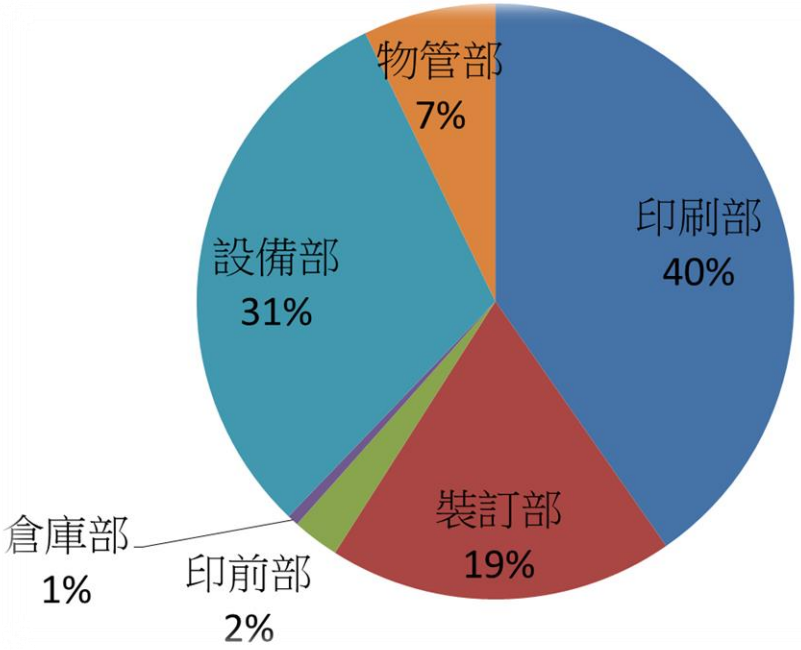


"…**complete monitoring and measurement systems** connected to a **software application** capable of consolidating data and delivering automatic analysis."

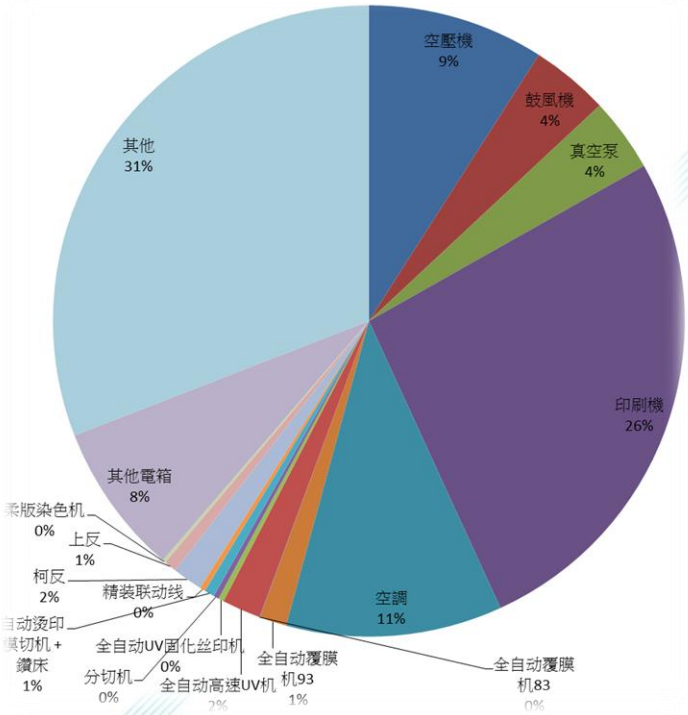
Customized User Interface & Reports

- Energy
- Cost
- GHG Emission

Energy Data Accounting

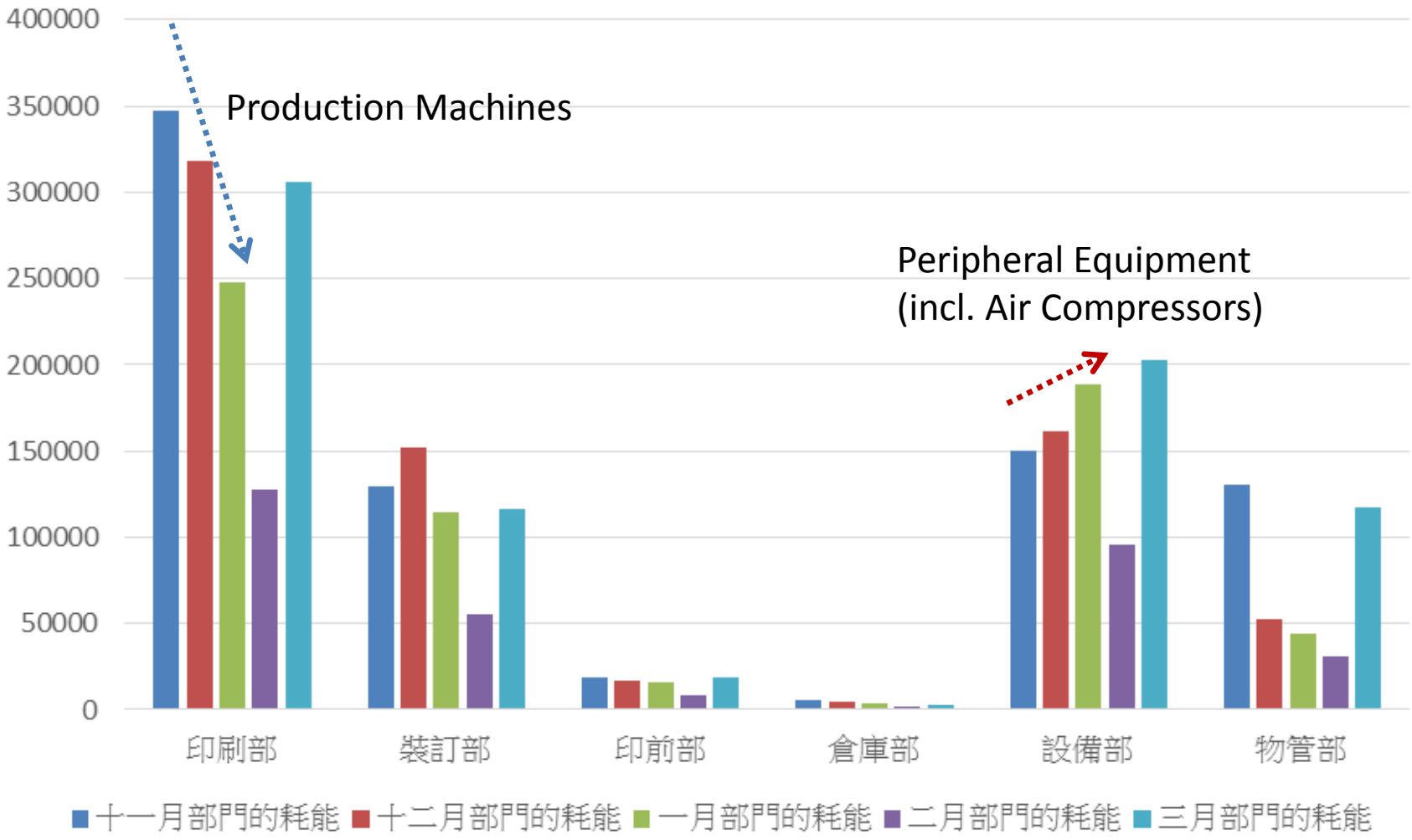


By Managing Departments

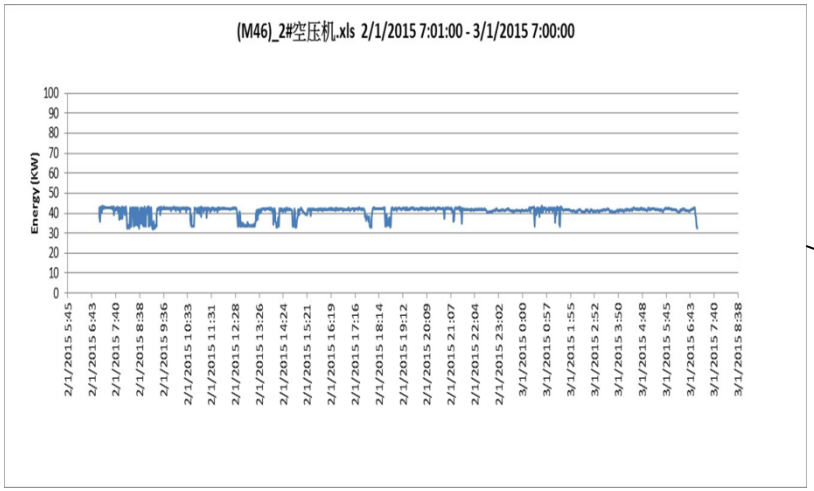


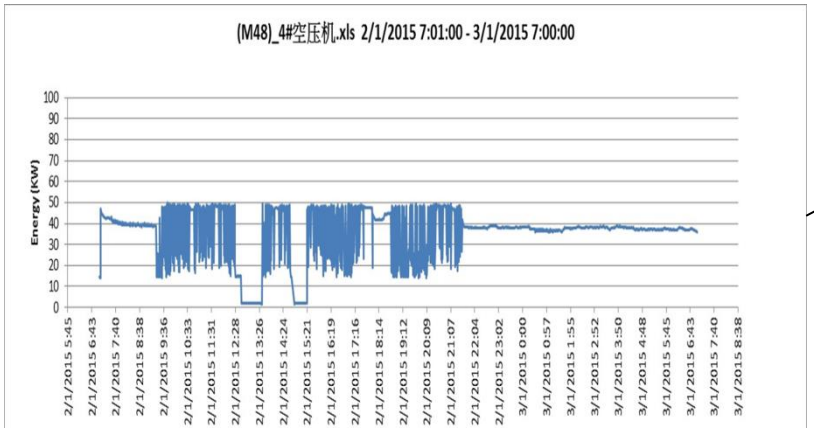
By Machines

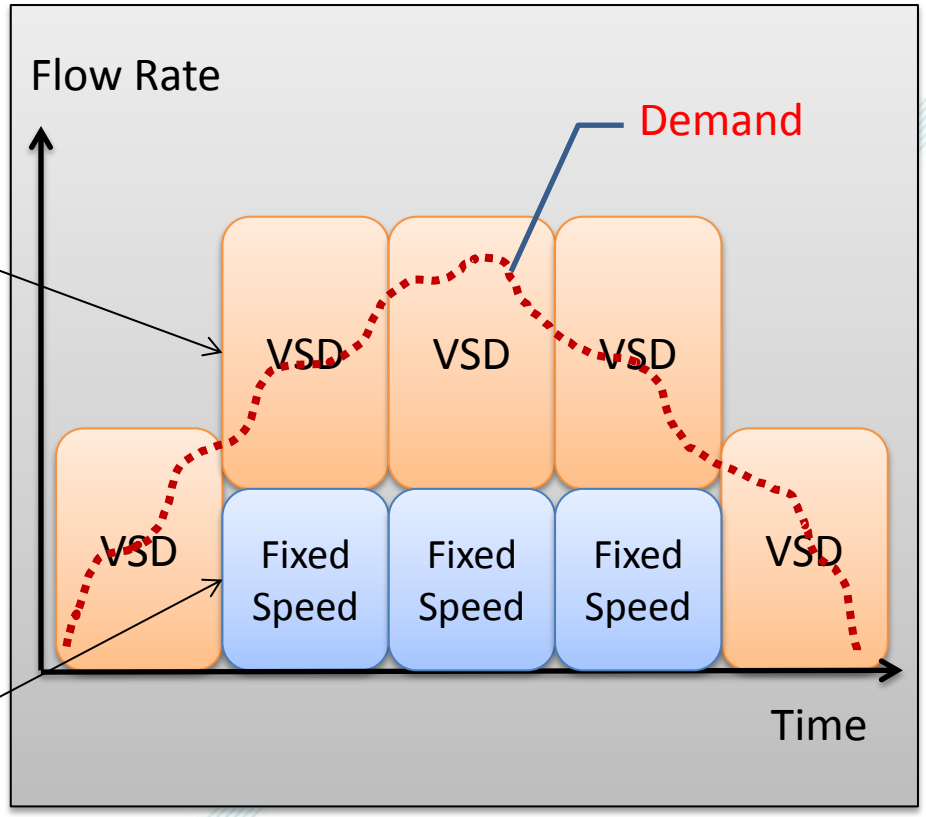
Energy Consumption Trend Analysis



Central Control System Failure

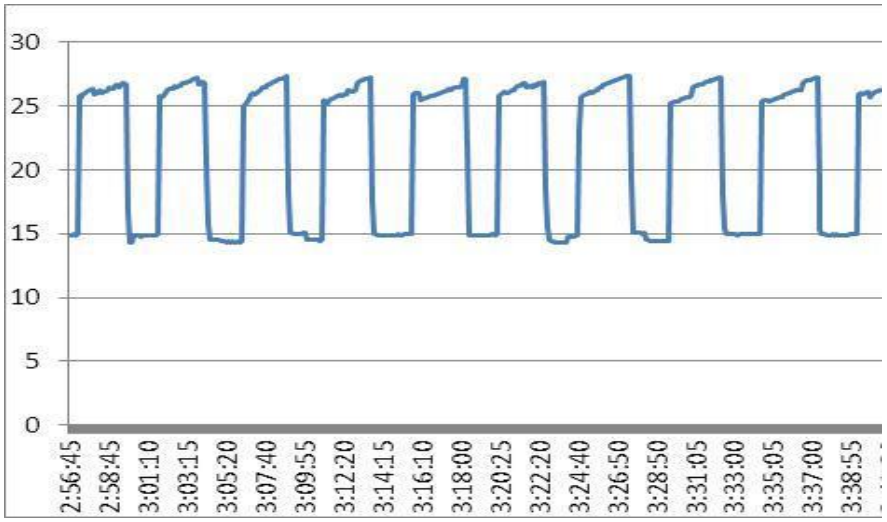






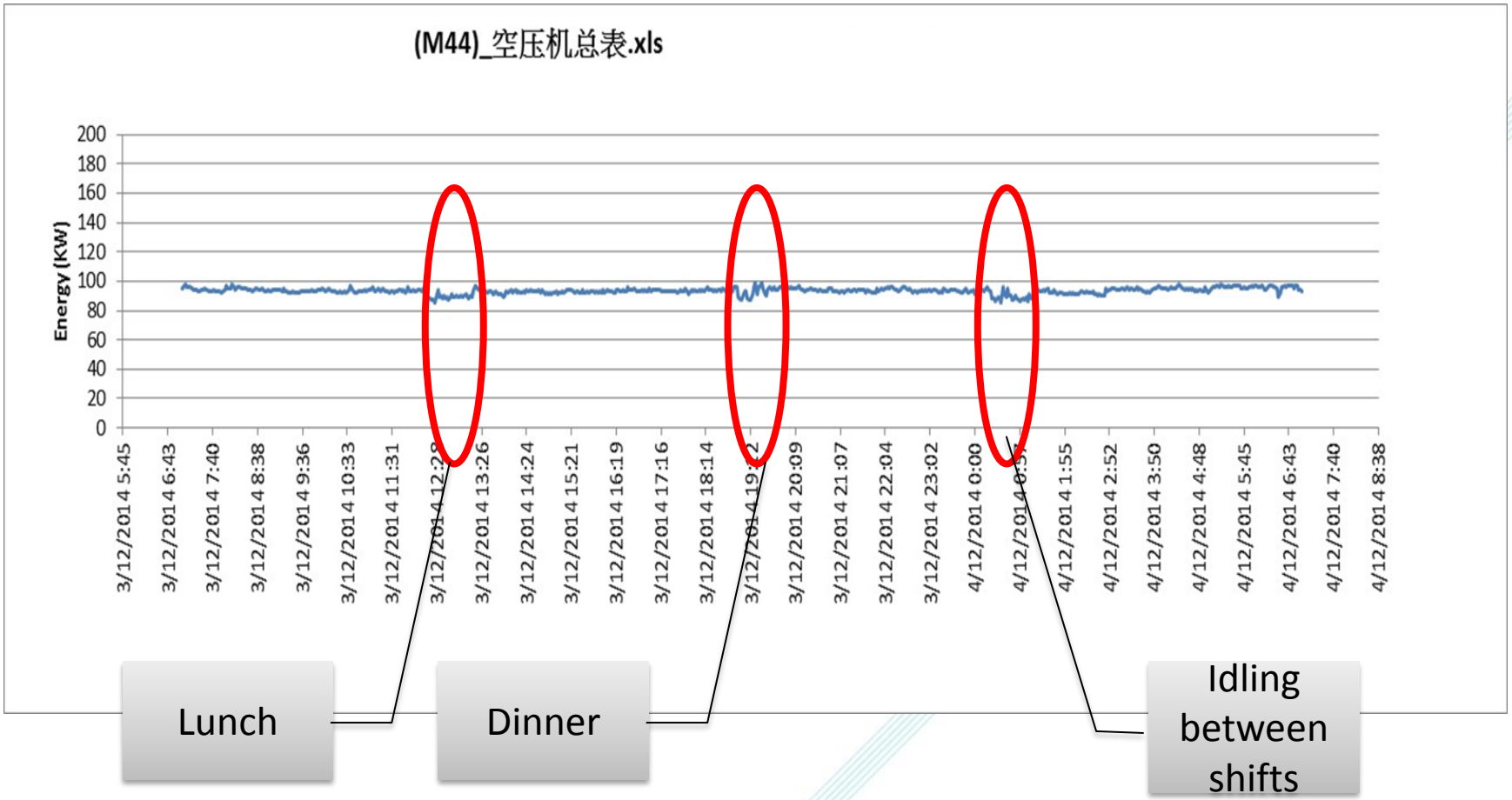
=> Variable Speed Drive is not saving energy due to control failure

Compressed Air Leakage Test



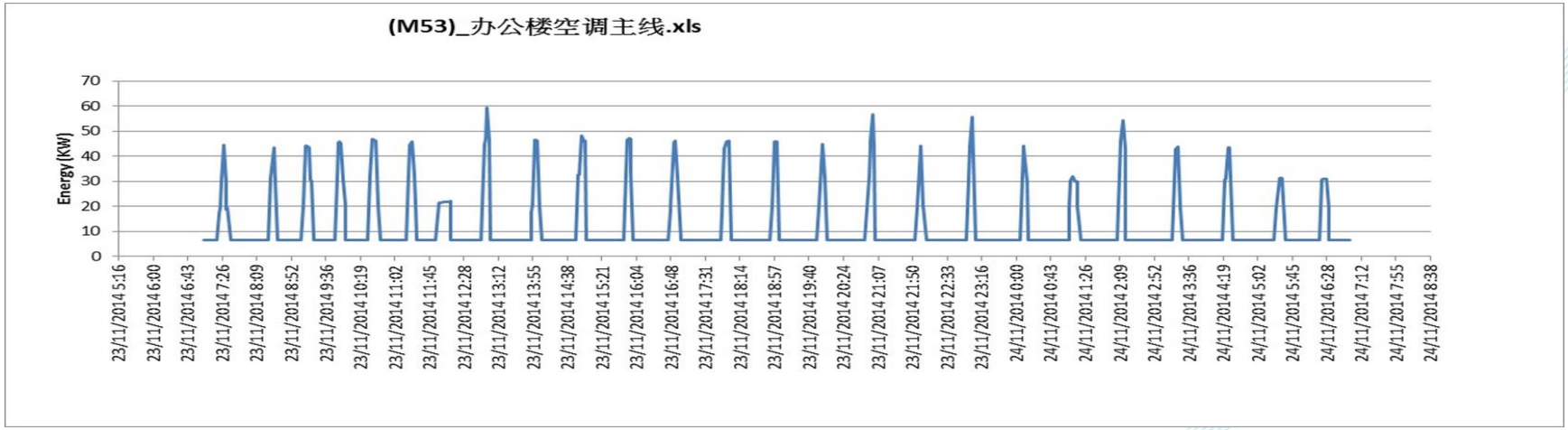
- Compressor on/off load time ratio during No Demand period
- Leakage rate 27% (<10% for well maintained systems)

Non-operating time Wastage

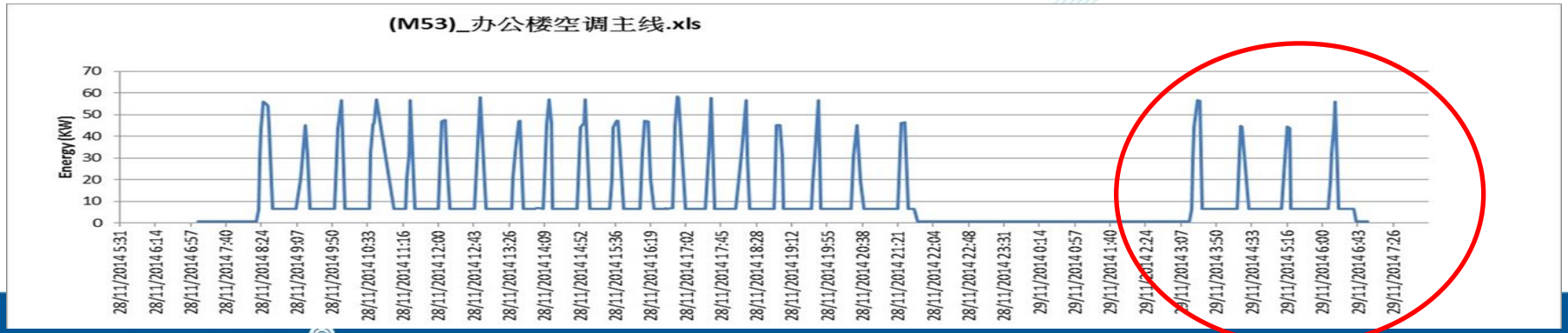


Air Conditioning System in Office

A/C Plant turned on during Holiday:

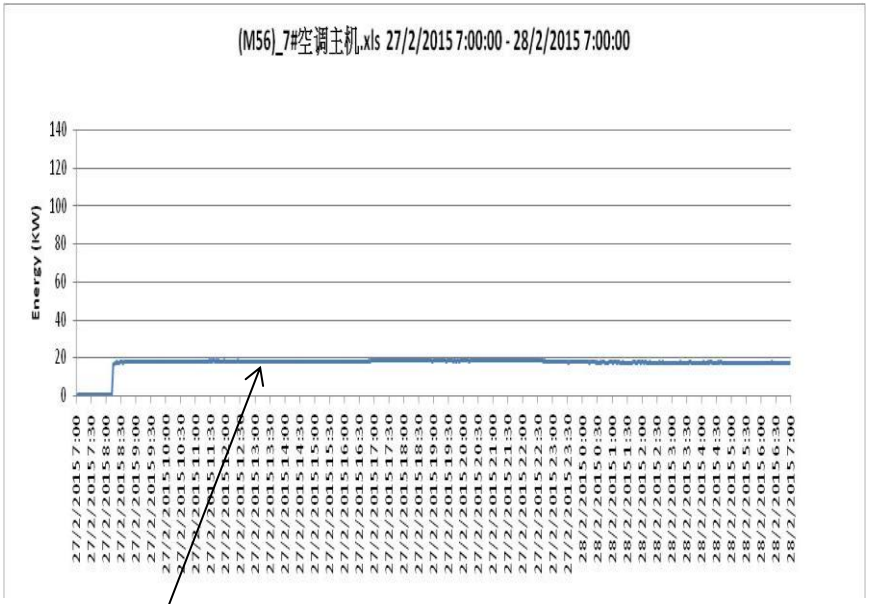


A/C Plant turned on during midnight:

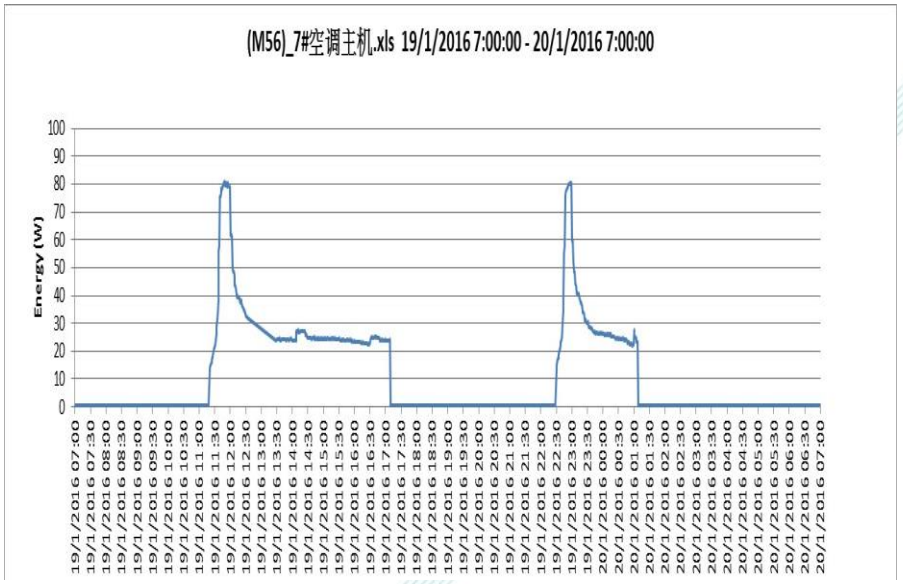


Facilitate Equipment Maintenance

Central Chiller Plant



Before



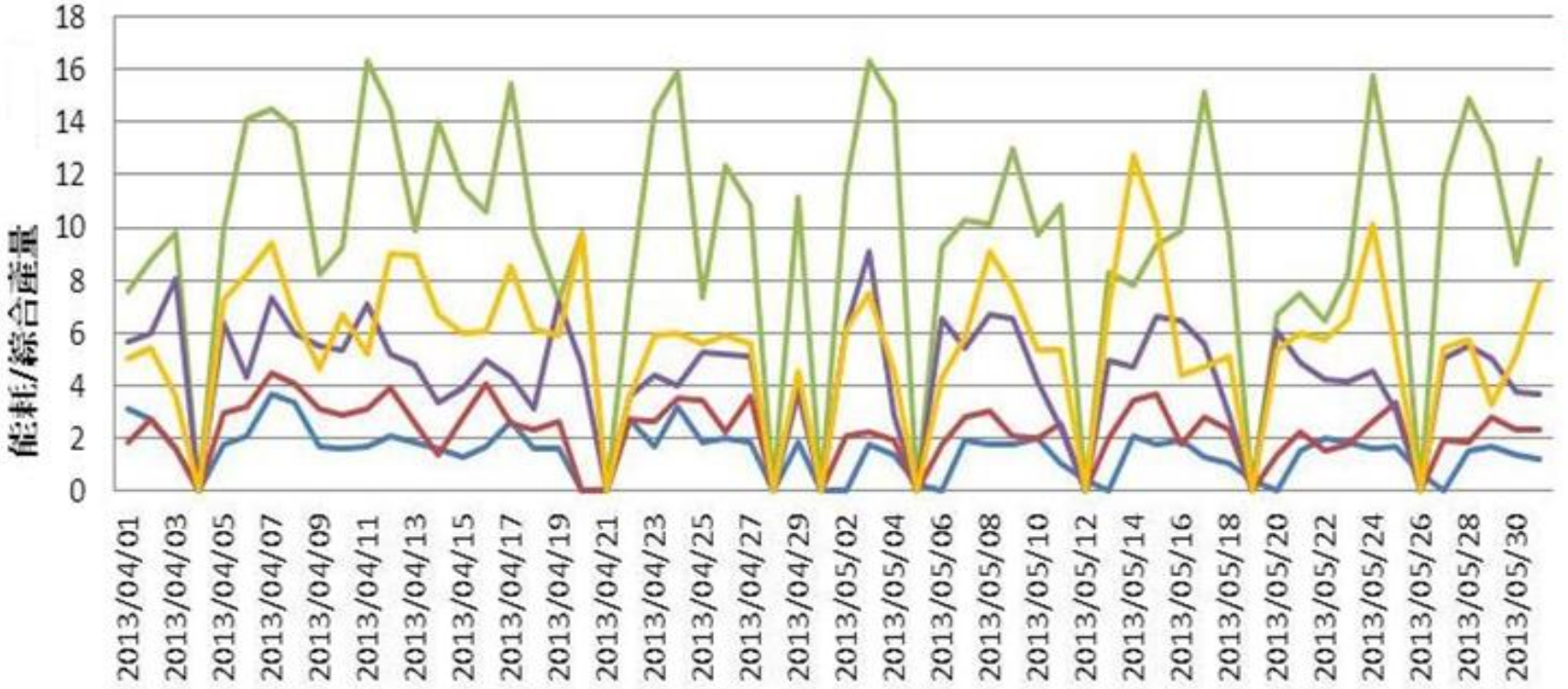
After

Abnormal power consumption for chiller plant

=> Malfunctioning for months but not noticed!

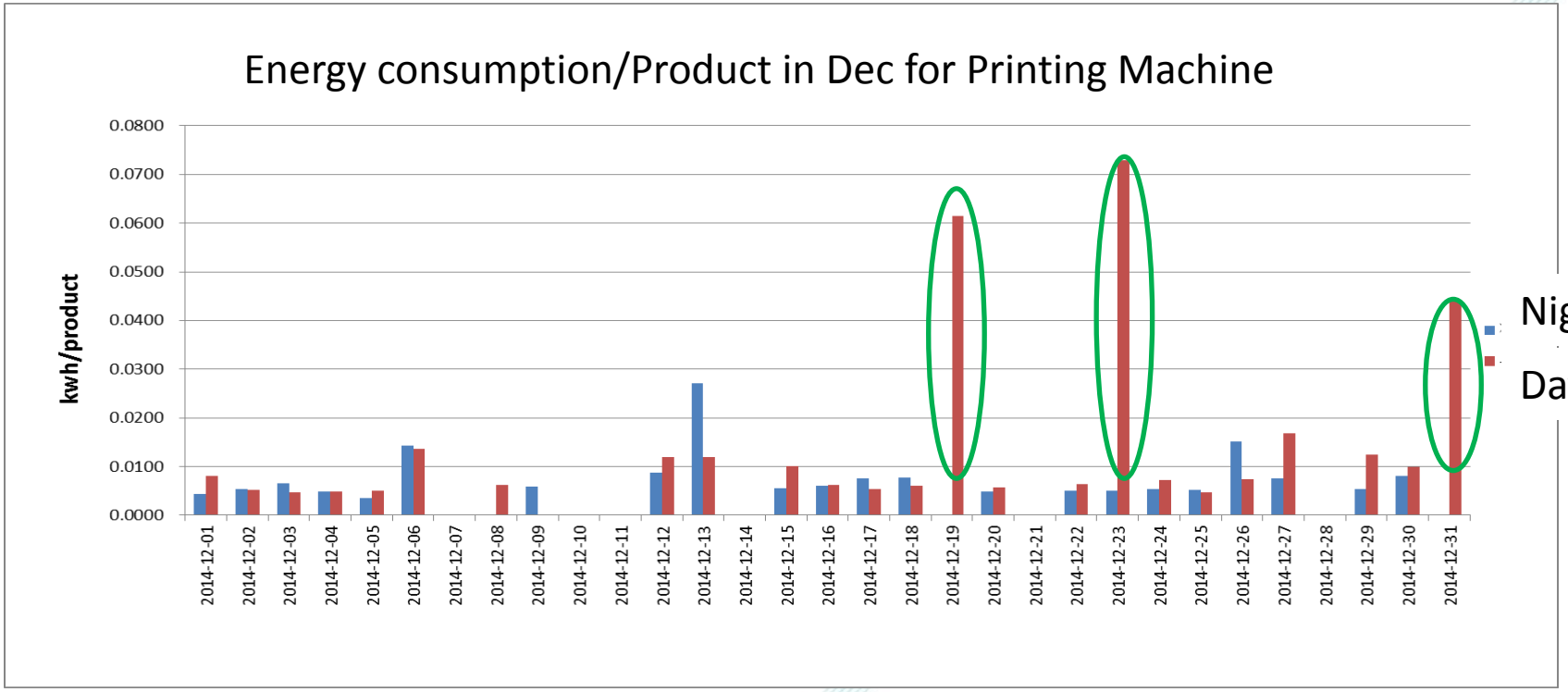
Energy Performance Indicators & Benchmarking

☐ Benchmark between different machines

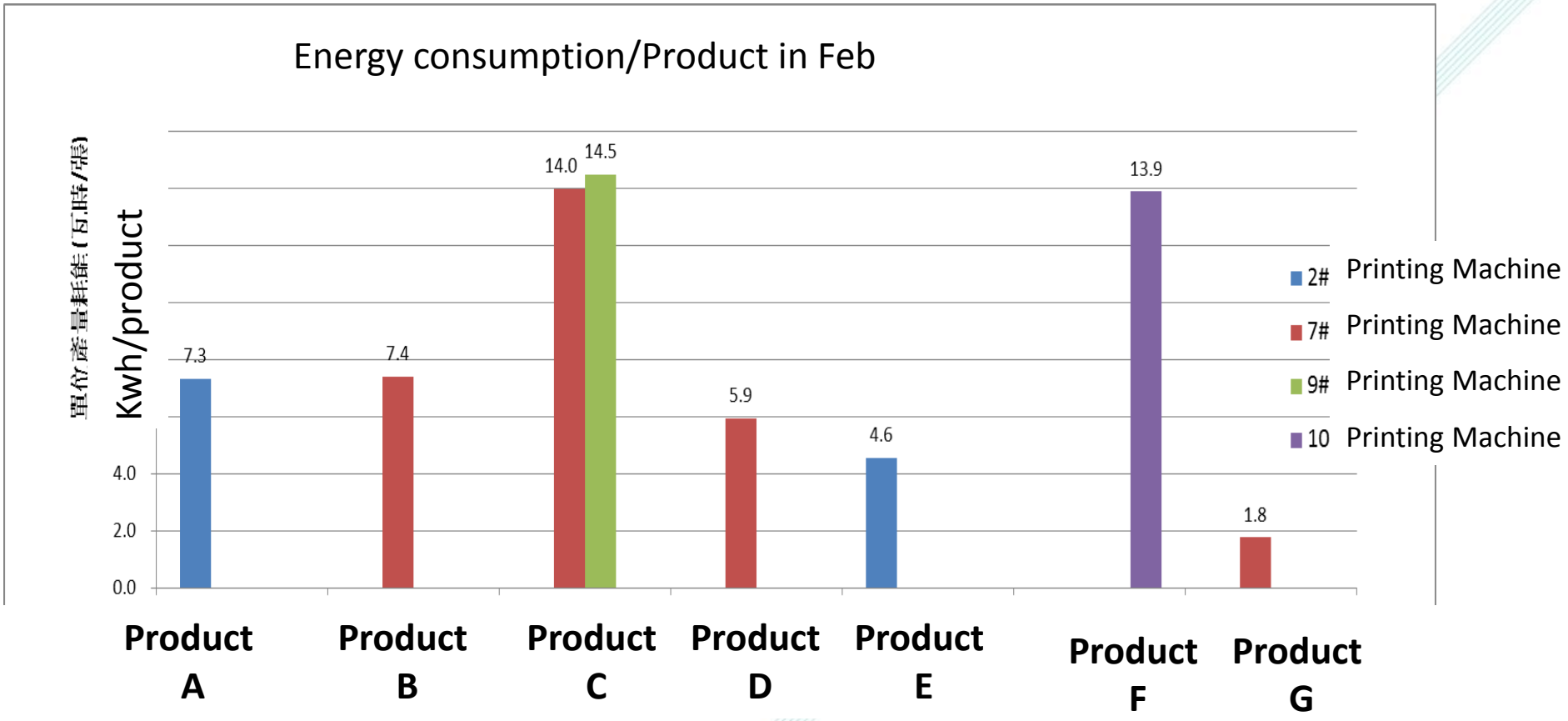


Energy Performance Indicators & Benchmarking

☐ Benchmark against different work shifts



Energy Consumption /Product for different Products

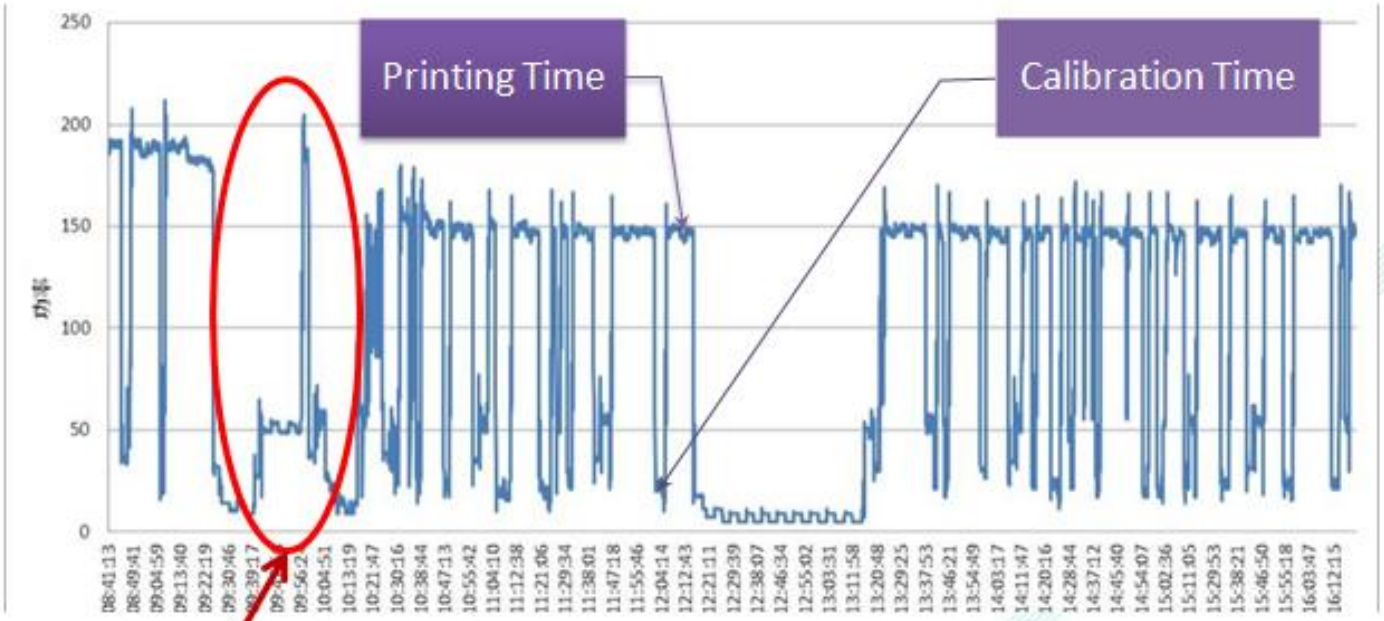


“Cardiograms” of Production Process

- Historical Record of Production Process
- Surveillance on “Health” of Production Process
- Potential in Automatic Problem Diagnosis

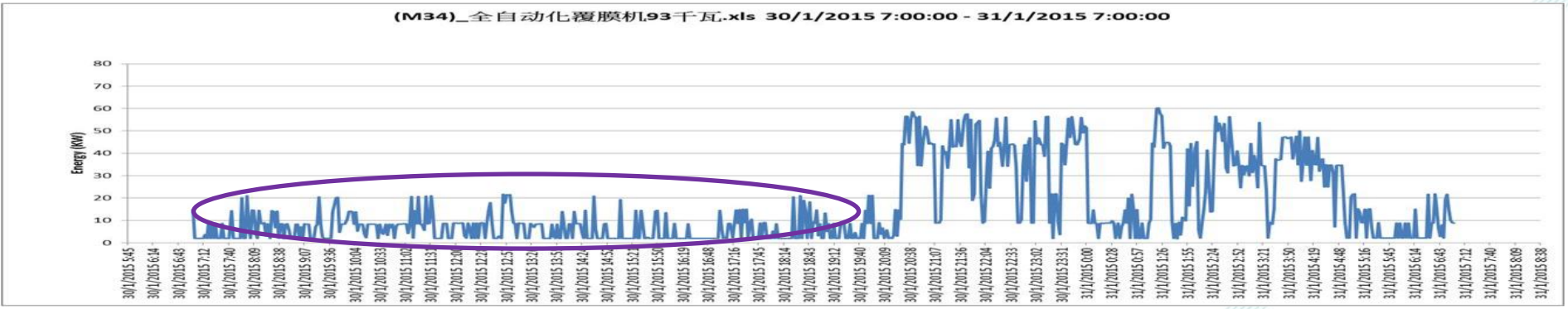
✓ To achieve High **PRODUCTIVITY**

Automated Diagnosis on “Cardiogram” of Printing Machines

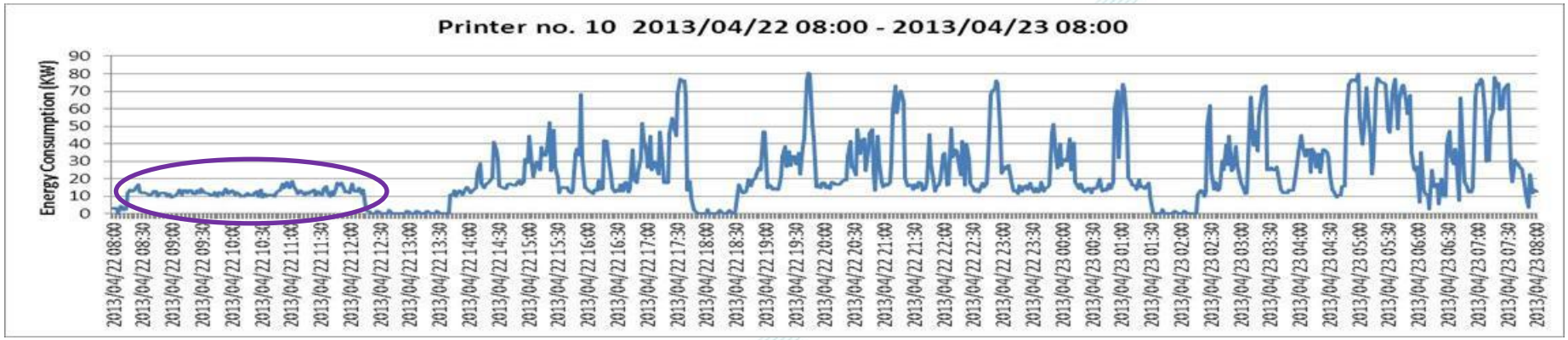


Machine	Unplanned Paper Refills	Long Calibration (>2hrs)	Printing / Calibration Time Ratio
A	12	6	53%
B	6	2	74%
C	8	2	75%
D	3	1	63%

Prolonged standby mode



Prolonged machine calibration



Raise Operators' Awareness

CEO's Confidence in "Investment"

- FEMS is NOT an Energy Saving Measure
- TOOL for Effective Planning, Implementation & Verification on ESMs
- "Payback" varies in different factories

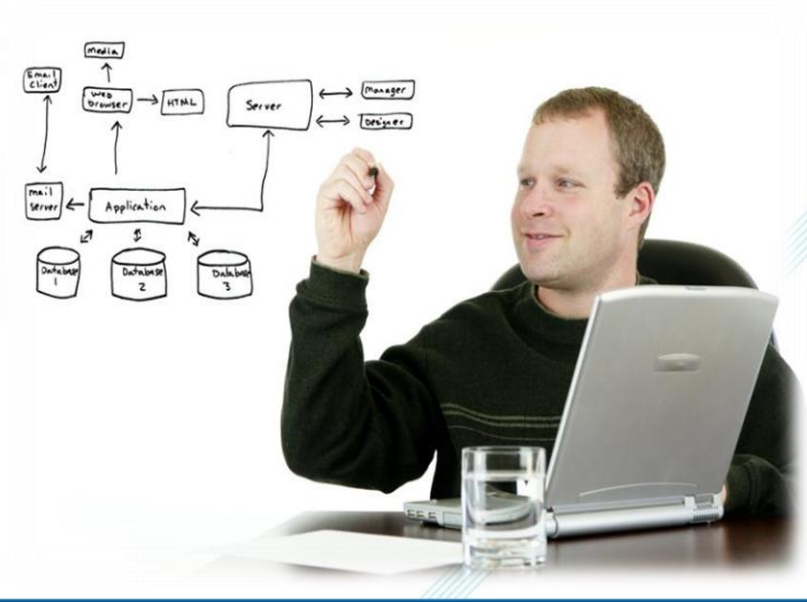
$$\frac{\text{PRODUCTIVITY}}{\text{ENERGY}}$$

Production & Facility Managers' Support

- Ready for Revealing "Mal-practices" & "Poor Operation & Maintenance"
- Collaborate Designer to Develop Useful Performance Indicators

Employ an Energy Manager / Consultant

- To design and set up the FEMS (Metering Strategy is crucial!)
- Who knows how to use the FEMS



Good Planning on Project Implementation

- Interruption on Production
- Power Suspensions

Thank You!

Ir. Raymond Fong, General Manager

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Email: rayfong@hkpc.org