

# Energy Consumption Report

## **Thaweesak Aranchot**

Electrical Engineer  
Power Quality (Thailand) Company., Ltd.



Thaweesak graduated with a Bachelor's Degree of Electrical engineering from Mahanakorn University of Technology in Bangkok.

He started working with Mr. Terry Chandler and his team at Power Quality Thailand about two years ago. Previously during his studies, he worked freelance with his advisor in the maintenance field.



# A Case Study: Energy Usage report for a small office facility

Prepared by Thaweesak  
Aranchot  
Electrical Engineer  
Power Quality (Thailand) Co.,  
Ltd

# 1

## Outline

- A plan
- Introduction
- Load of the building
- A consumption for working day
- A consumption for non-working day
- Total consumption for a month
- Saving cost.
- Summary

## A plan for study

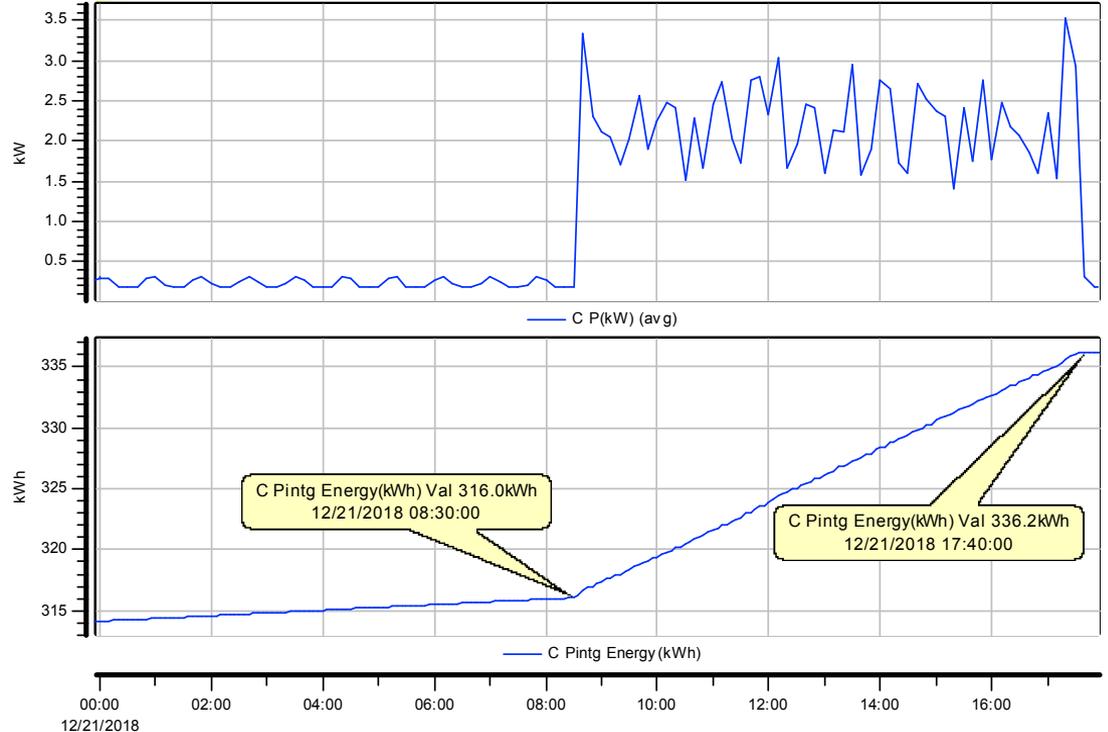
- Measure actual usage of each load for recording a consumption. Then determine a way to reduce the usage without impacting a business efficiency.
- Investigate the actual data comparing with Electricity bill

## Introduction

- The energy consumption at PQT was studied to determine how much energy was used, where it is being used, and how much it costs.
- Dranetz HDPQ Xplorer was setup for monitoring the usage at the main board of small office facility. EP1 was setup for determining an individual load.
- Then investigate an energy usage and compare with a MEA electricity bill to determine the exact energy usage and cost.

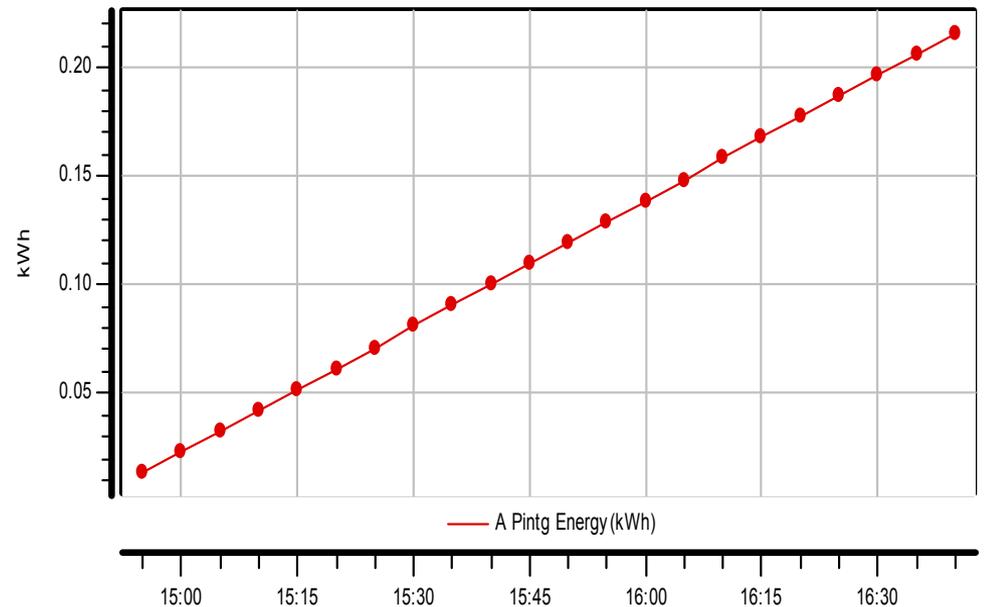
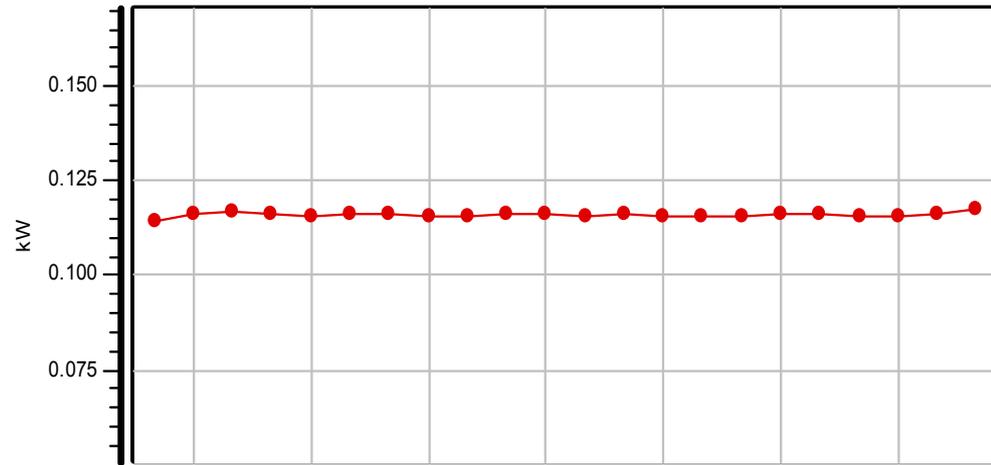
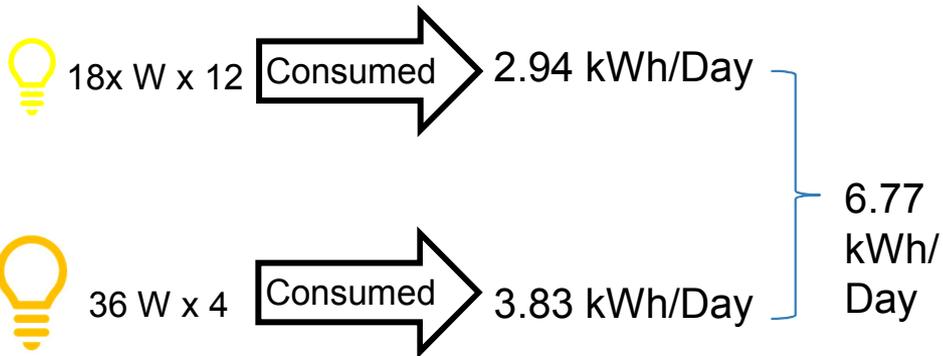
## Loads of the building

- A main of air Conditioner is set as 25 degree.
- Operate continuously 9 hours.
- The usage is 18.8 kWh on working day



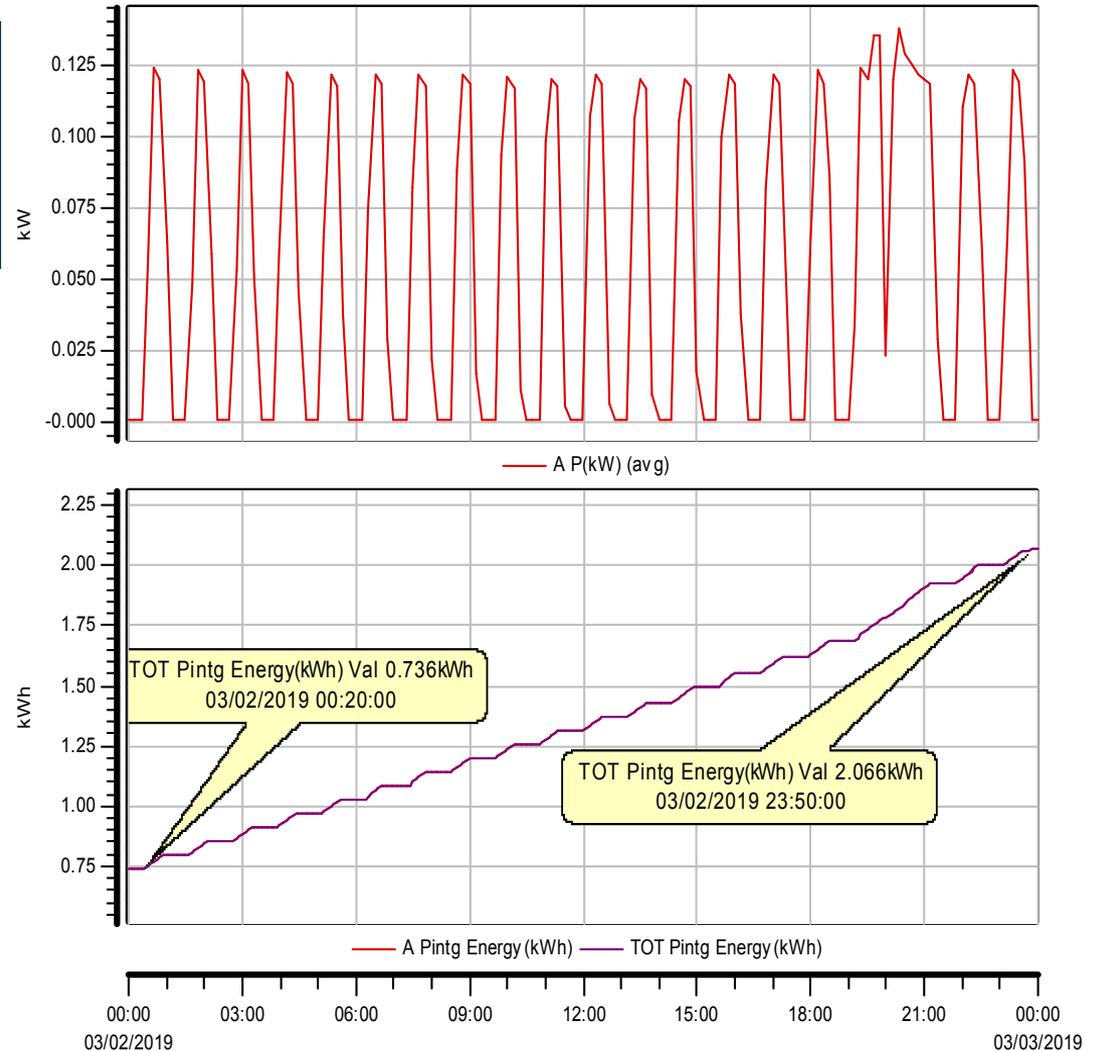
# Loads of the building

- A trend plot is showing a usage of two 36 watt fluorescent lamps in an hour.



## Loads of the building

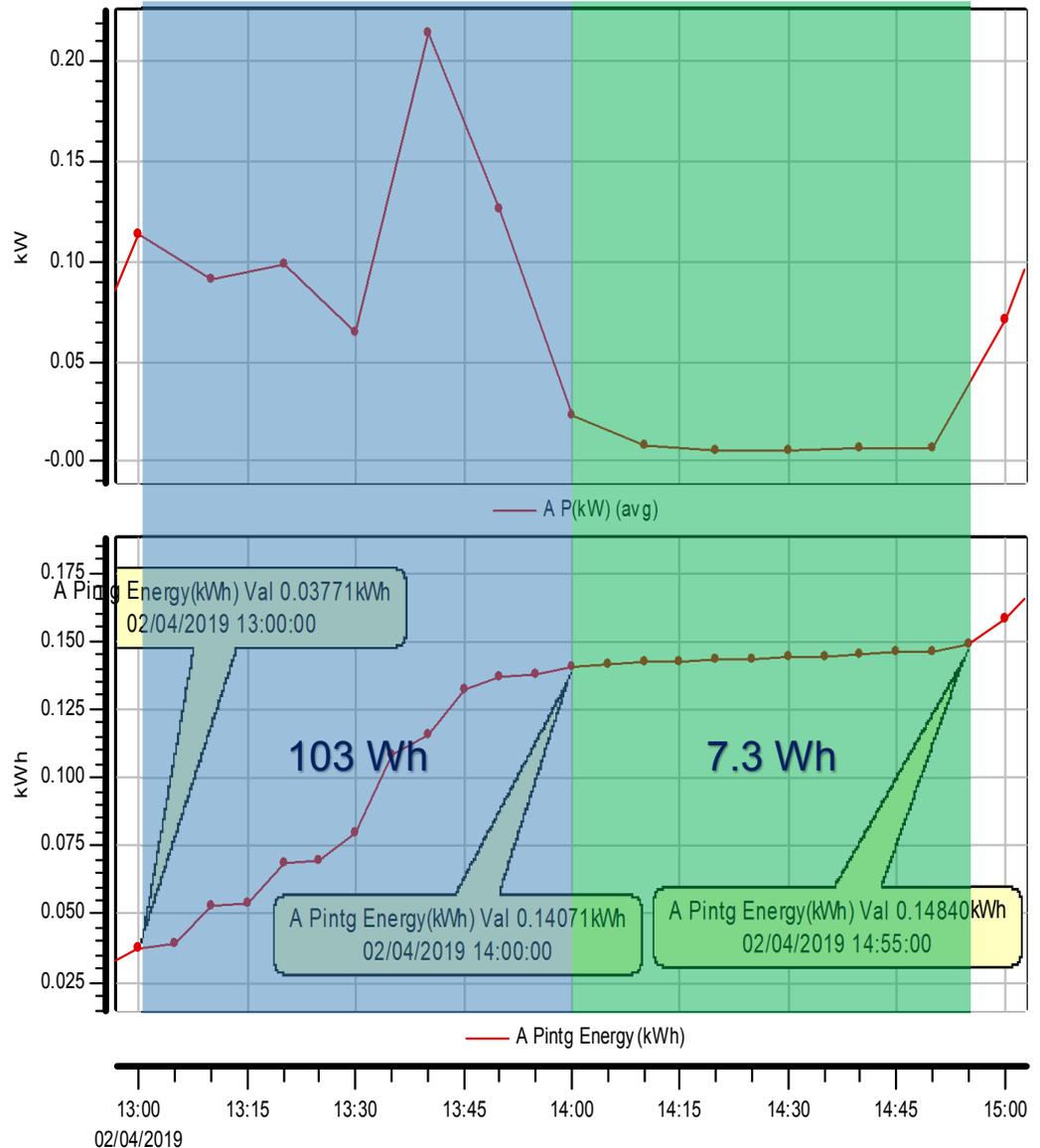
- A full day used 1.29 kWh without opening a door.
- The usage will be 1.77 kWh per day if disturbs refrigerator operating.



# Loads of the building

- Water pump usage is operated for part time.
- Trend plot displays an hour usage of a water pump.

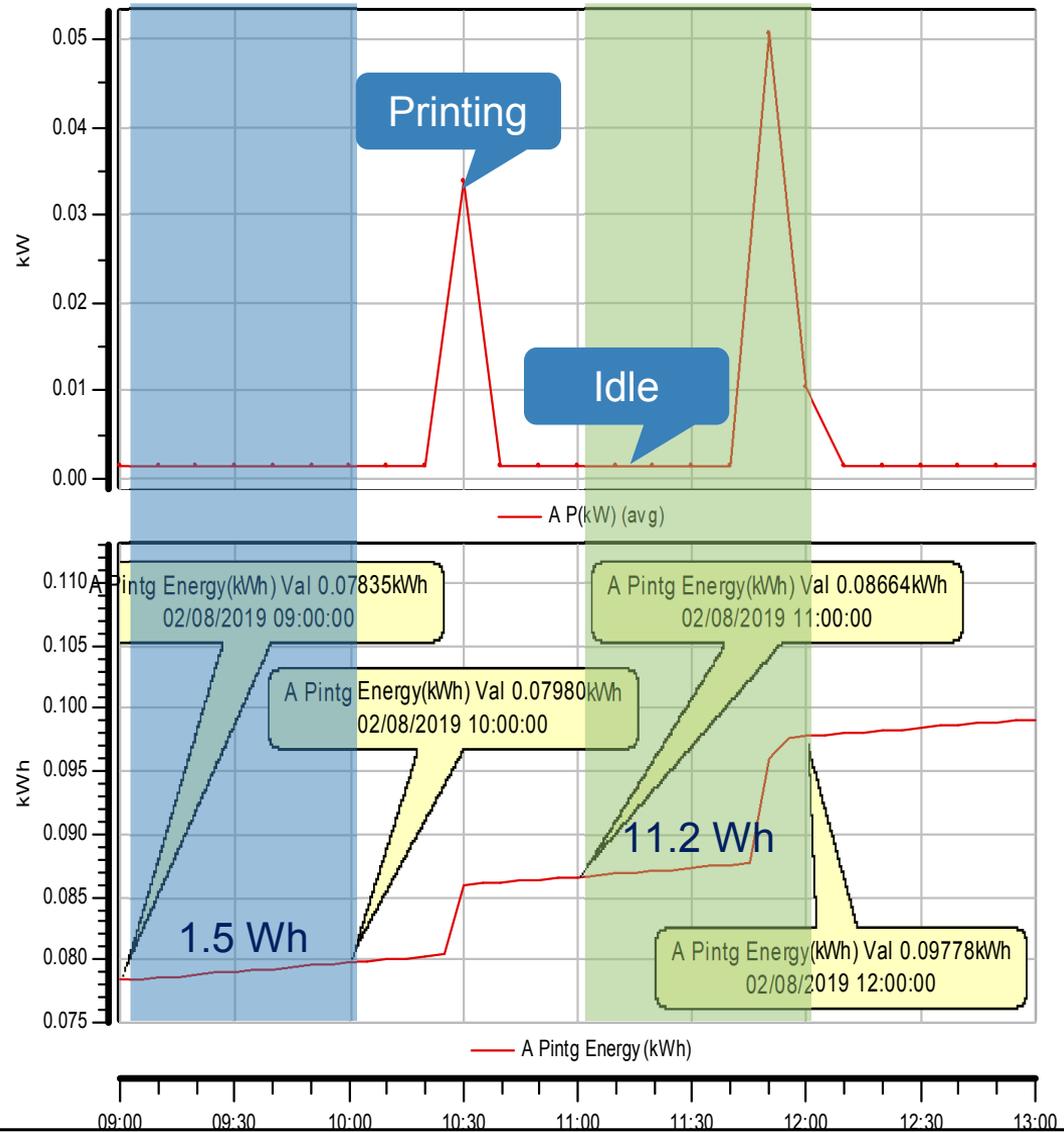
Note: Blue area is operating area  
Green area is non-operating area



## Loads of the building

- Office equipment: computer, router, printer and CCTV.
- Illustration is a consumption of Printer
- Consumption is 2.35 kWh per Day

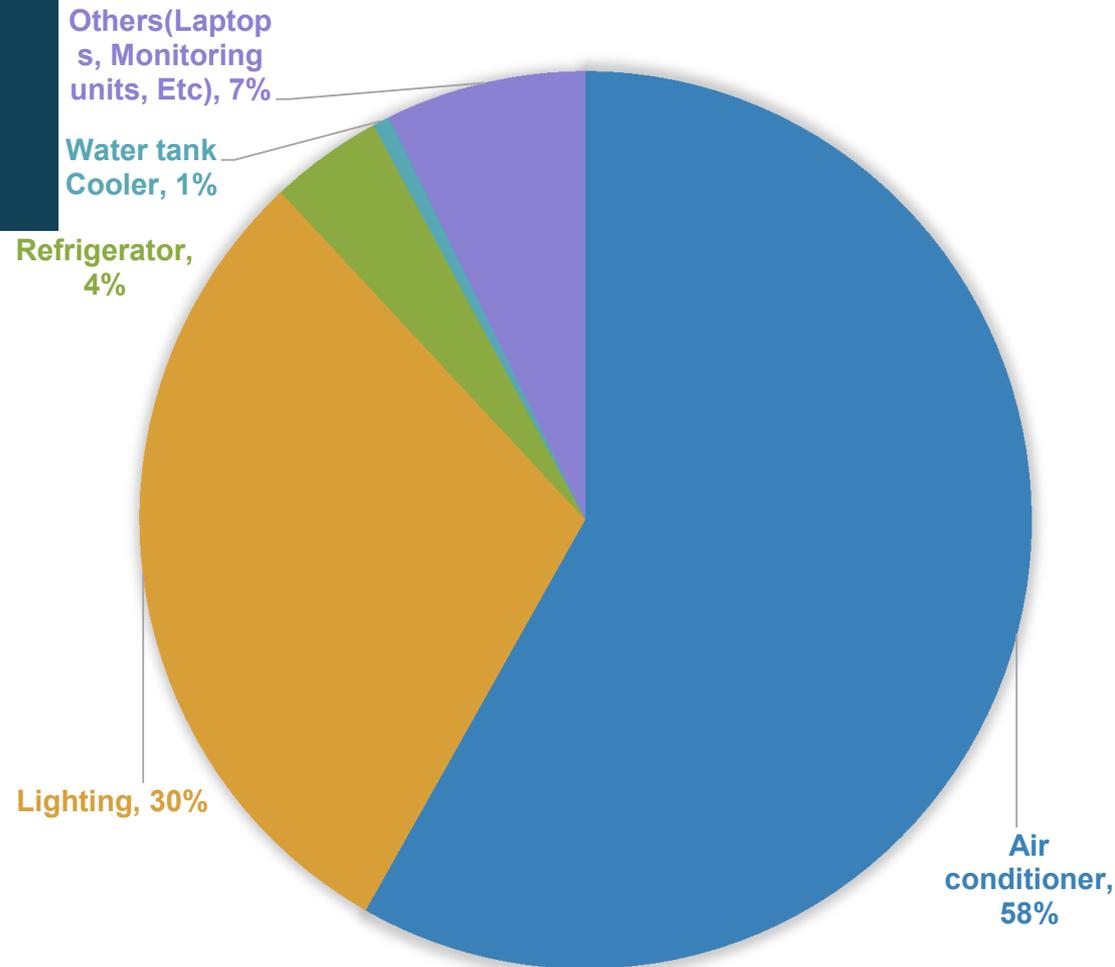
Note: Blue area is non-operating area  
Green area is operating area



## A consumption for working day

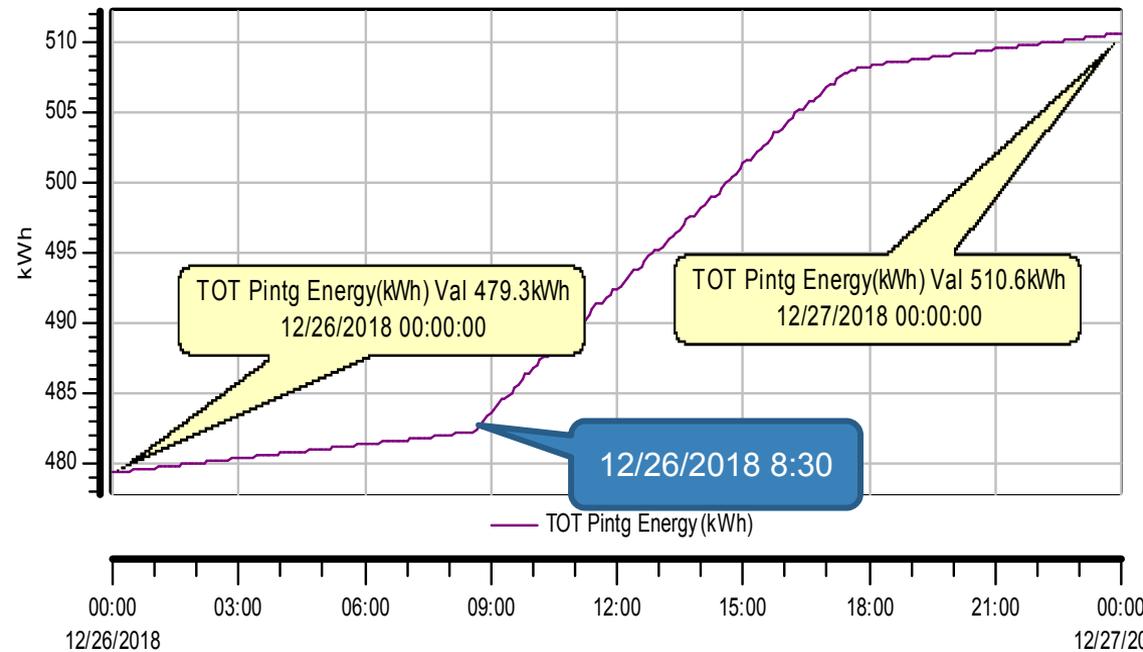
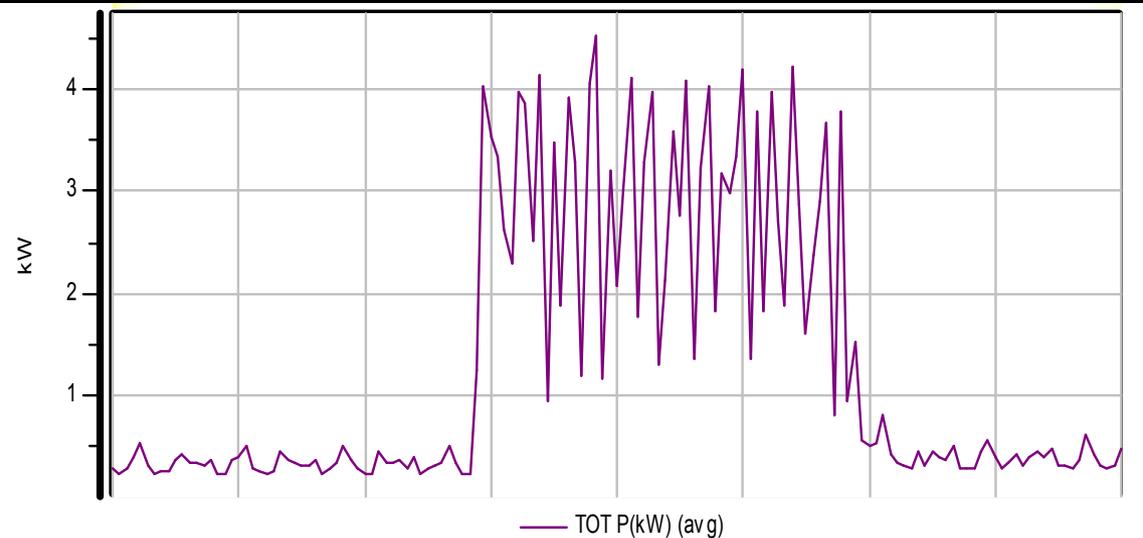
- Load consumption of a working day in Percentage.
- Average consumption is 30 kWh per day.

## PORTION OF DAIRY USAGE



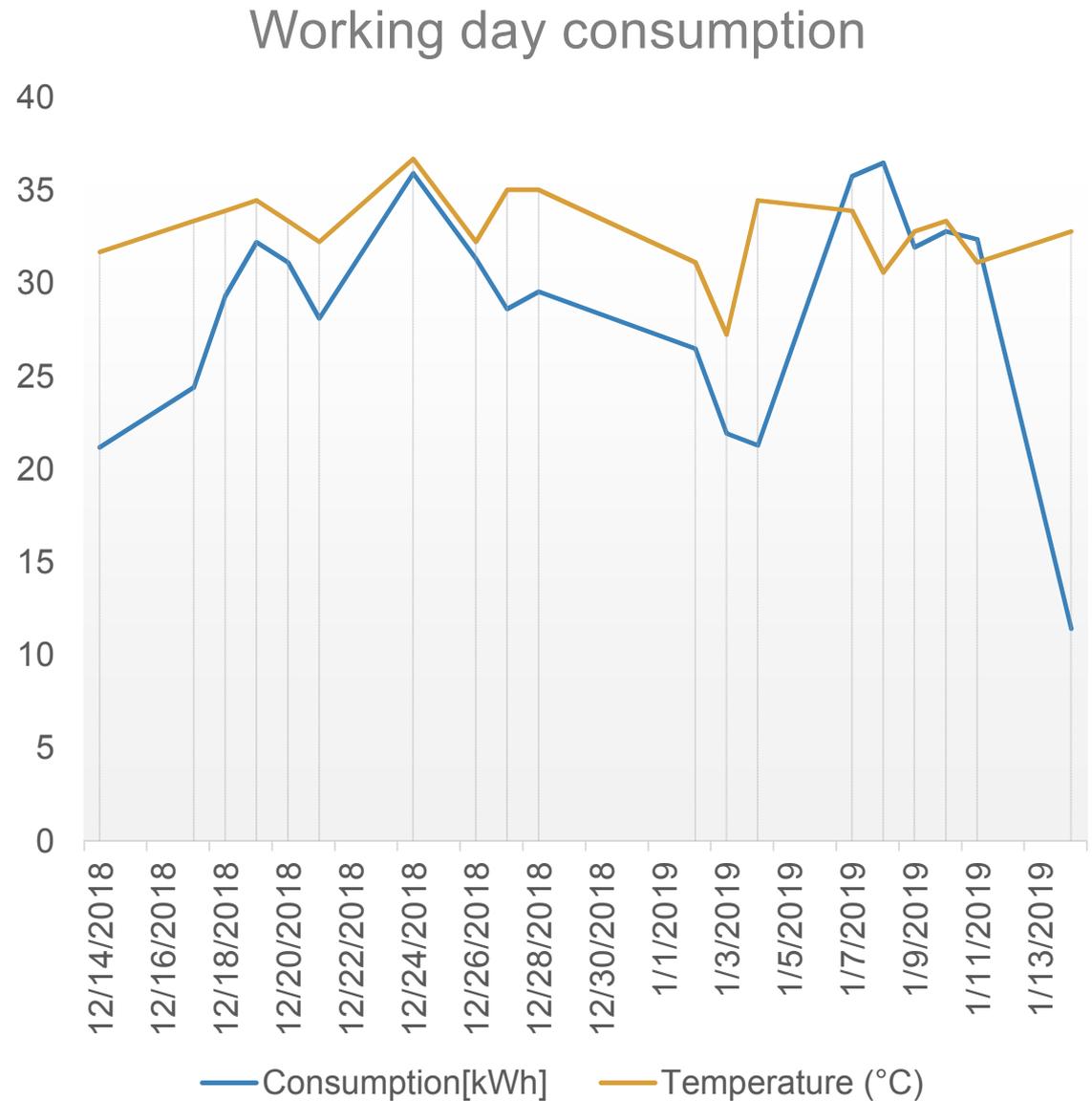
## A consumption for working day

- Trend plot is displaying a business day usage for all loads in the office.
- A business day usage is 31.3 kWh for per day



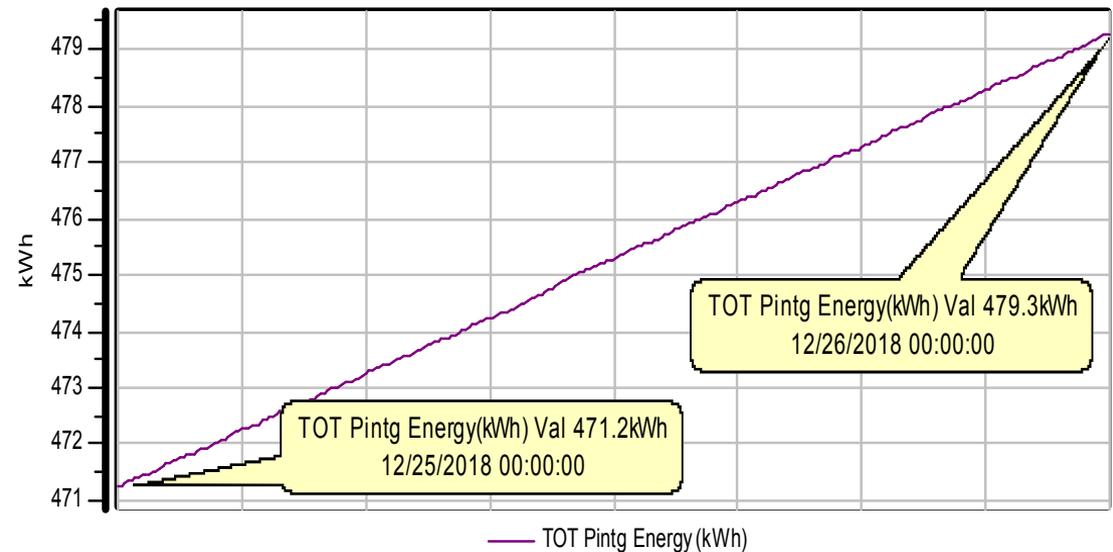
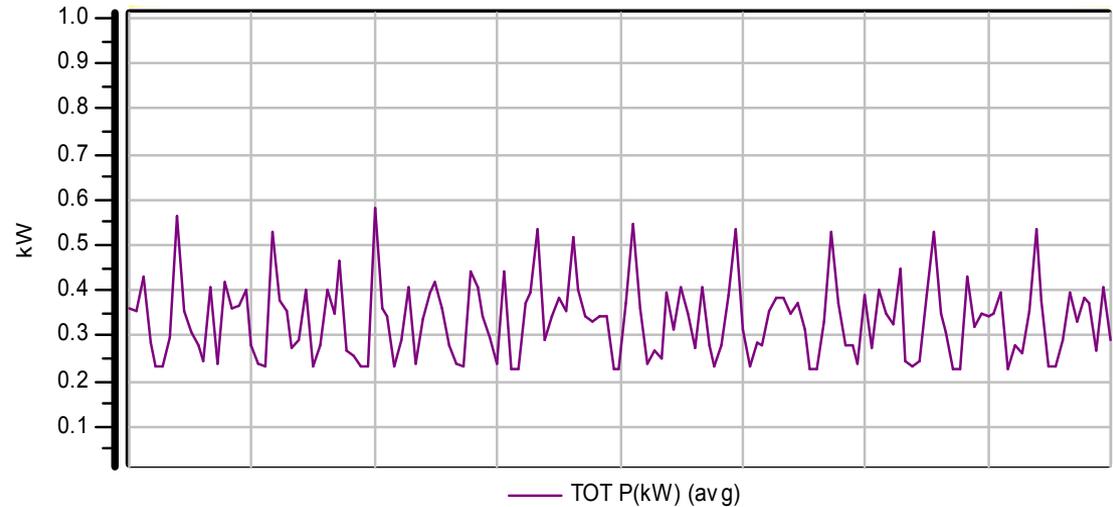
## A consumption for working day

- Working day usage between middle of December to middle of January



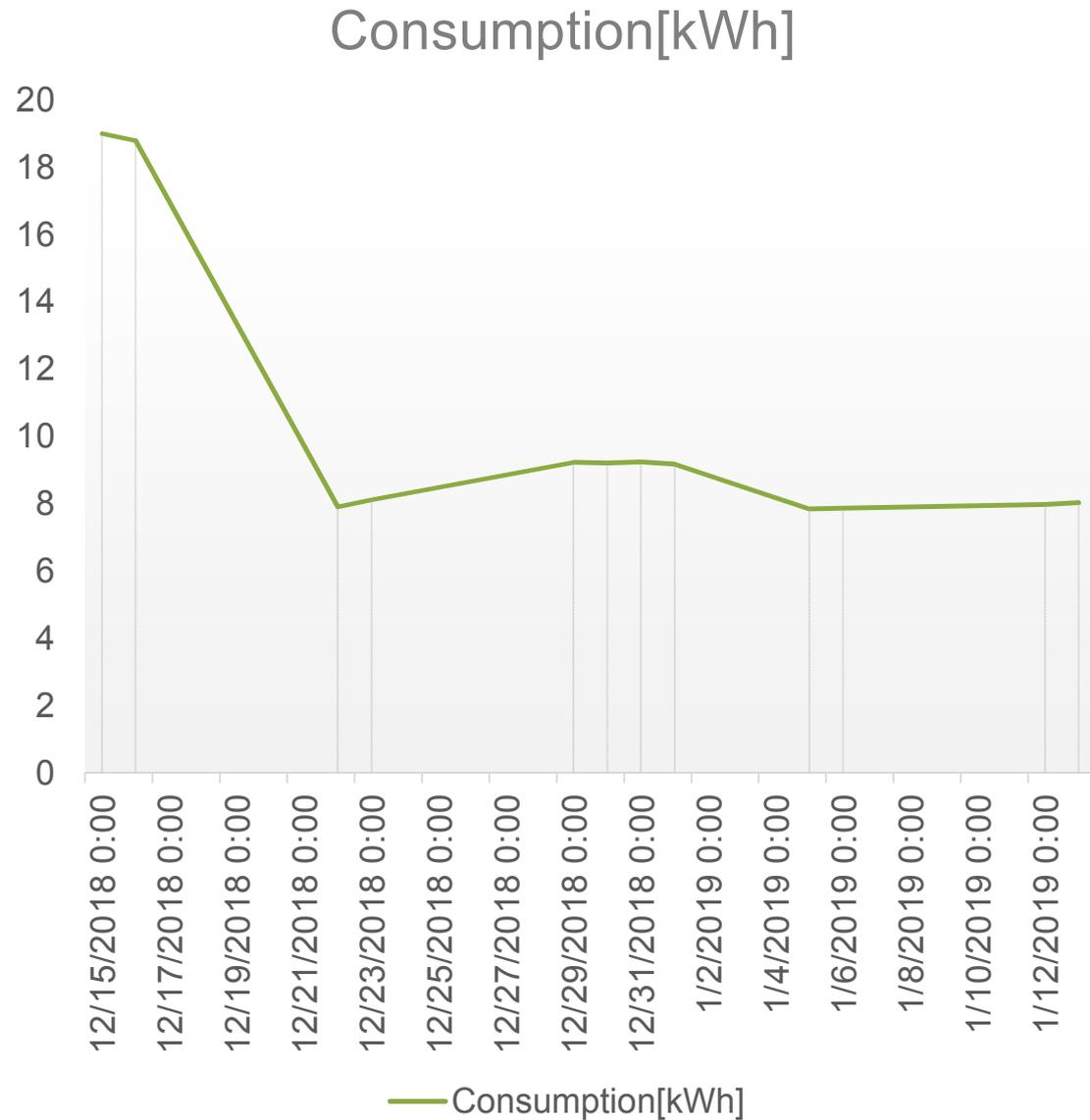
## A consumption for Non-Working day

- Display a single day usage for **Non-Working day**
- A day off usage is about 8 kWh
- There is kinds of load that always run all times such as CCTV, security lights, router, refrigerator.



## A consumption for non-working day

- Non-working day usage between December 2018 to January 2019



# Total consumption

- Electricity bill displays monthly usage during December 14, 2018 and January 14, 2019.
- Total cost is 3,323.54 THB including vat, service charge and FT factor.


**การไฟฟ้านครหลวง**  
 Metropolitan Electricity Authority

เขตสาทรกระบี่  
**ใบแจ้งค่าไฟฟ้า**  
 An V3.2.2-R00007800  
<http://www.mea.or.th> , MEA Call center 1130

<b>ชื่อผู้ใช้ไฟฟ้า (Name)</b> บริษัท รุ่งกิจ บ้านและที่ดิน จำกัด <b>สถานที่ใช้ไฟฟ้า (Premise)</b> 52/44 ม. รุ่งกิจฯ ถ.รามคำแหง แขวงสะพานสูง เขต ส				
<b>บัญชีแสดงสัญญา</b> (CA/Ref No.1) 011122955	<b>รหัสเครื่องวัดฯ</b> (Installation) 66034340	<b>MRU</b> 60660216	<b>เลขที่ใบแจ้งฯ</b> (Invoice No./Ref No. 2) 00601302201	<b>ประเภท</b> (Type) 1.2
<b>วันที่จดเลขอ่าน</b> (Meter Reading Date) 14/01/62 10:38	<b>เลขอ่านครั้งหลัง</b> (Last Meter Reading) 72845	<b>เลขอ่านครั้งก่อน</b> (Previous Meter Reading) 72080	<b>จำนวนหน่วย</b> (KWh) 765	<b>ตัวคูณ</b> (Multiplier)

<b>รายละเอียดค่าไฟฟ้า (Description)</b>		
ค่าพลังงานไฟฟ้า		3,156.63
ค่าบริการ		38.22
ค่าไฟฟ้าเกินแปร (FT) -0.1160 บาท/หน่วย		-88.74
ส่วนลด		0.00
<b>รวมค่าไฟฟ้าก่อนภาษีมูลค่าเพิ่ม</b>		3,106.11
ภาษีมูลค่าเพิ่ม 7 %		217.43
<b>รวมค่าไฟฟ้าเดือนปัจจุบัน</b>		3,323.54

 011122955  
 QR Cross Bank

ค่าไฟฟ้าค้างชำระเดือนก่อน	0	ฉบับ	0.00
<b>รวมเงินที่ต้องชำระทั้งสิ้น (Amount)</b>			<b>3,323.54</b>

**โปรดชำระเงินถึงแต่วันที่ (Due Date) 15/01/62 - 25/01/62**

\* กรณีมีค่าไฟฟ้าค้างชำระเดือนก่อน โปรดชำระโดยทันที เนื่องจากมีกำหนดจ่ายไฟ และหากค้างชำระเป็นวันกว่าแล้ว ต้องขออภัยด้วย

<b>ประวัติการใช้ไฟฟ้า</b>						
วันที่จดเลขอ่าน	14/12/61	14/11/61	14/10/61	14/09/61	14/08/61	14/07/61
จำนวนหน่วย	1013	1227	961	1249	772	1321

จกหน่วย-แจ้งค่าไฟฟ้าโดย ฝ่ายบิ.บิ.ค. จำกัดav โทร. 02-056-0511

  
 099400016520000 01112295500601302201 112501620000765 332354



**How can we save  
cost of electricity?**



## Saving cost

- We could reduce electricity of the main load for example: Air conditioner:
  - Typically, higher temperature can be able to reduce energy usage by decreasing 10% of usage.

After adjusting	Normal Temperature (Celsius)						
	22	23	24	25	26	27	28
22		-10%	-20%	-30%	-40%	-50%	-60%
23	10%		-10%	-20%	-30%	-40%	-50%
24	20%	10%		-10%	-20%	-30%	-40%
25	30%	20%	10%		-10%	-20%	-30%
26	40%	30%	20%	10%		-10%	-20%
27	50%	40%	30%	20%	10%		-10%
28	60%	50%	40%	30%	20%	10%	

## Saving cost

- **We could reduce electricity of the main load for example:**  
**Air conditioner:**
  - Clean an air filter regularly for saving 10% of the air conditioner consumption.
  - Reduce an operation time of air conditioner for an hour that can be able to reduce 10 % of Air conditioner usage.

Credit: Analysist energy management book for small and medium business, December 2012, Ministry of Energy, Thailand.

## Saving cost

- **We could reduce electricity of the main load for example:**  
**Air conditioner:**
  - Install an insulation on wall or ceiling to reduce temperature inside that allow the air conditioner work less than high temperature.

Credit: Department of Energy, United State of America .

## Saving cost

- **We could reduce electricity of load for example:**  
**Lighting:**
  - Fluorescent lamp can be replaced with LED lamp to reduce energy usage.
  - A LED lamp costs 400 THB and owner will get back in 12.7 month.

Lamp	Hours	Watt (kWh)	Consumption for a month (kWh)	Total (kWh)	Cost (THB)
Fluorescent	180	0.06	10.8	10.8	42.8
LED Lamp	180	0.016	2.88	2.88	11.4
Different cost					31.4

Thank you for your attention

**Power Quality (Thailand) Co., Ltd.**

52/44 Moo. 1 Ramkamhaeng Rd., Soi 90, Sapansoong, Sapansoong, Bangkok 10240

Tel: 02-373-6340, 02-373-6824 Fax: 02-373-2532

Email: [info@powerquality.co.th](mailto:info@powerquality.co.th)