
University of Yangon
RE implementation project in Myanmar
Dr Hla Toe

History

- Established on 1st Dec, 1920
- Oldest national university in Myanmar

Academic Departments

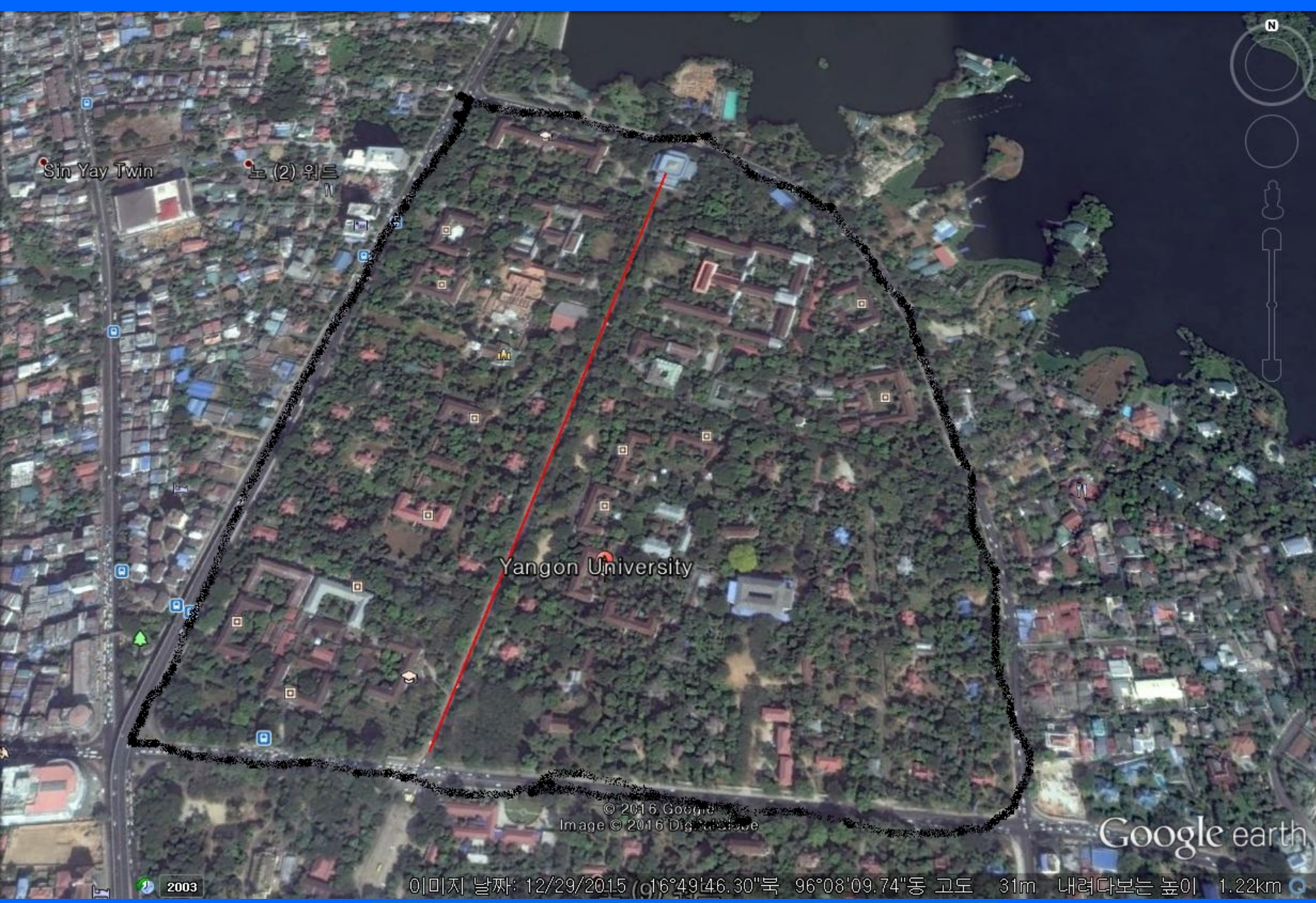
- 21 academic departments
- Headed by a professor

- 13 Arts Departments

- 8 Science Departments

Degrees Offered

- **Yangon University is now an institution for undergraduate & postgraduate studies offering the following degrees:**
  1. **BA & BSc (Dec, 2013)**
  2. **Postgraduate Diploma**
  3. **BA (Hons), BSc (Hons)**
  4. **MA, MSc**
  5. **MRes**
  6. **PhD**
- **Academic Year begins in June and ends in March.**
- **Two semesters in each AY.**
- **First semester is from June to September and Second semester, from December to March.**



Yangon University

Nine Points of National Energy Policy

1.To implement short term and long term comprehensive energy development plan based on systematically investigated data on the potential energy resources which are feasible and can be practically exploited, considering minimum impact on natural environment and social environment

2. To institute laws, rules and regulations in order to promote private sector participation and to privatize State Energy Organizations in line with State Economic Reform Policy

3. To compile systematic statistics on domestic demand and supply of various different kinds of energy resources of Myanmar

4.To implement programs by which local population could proportionally enjoy the benefit of energy reserve discovered in the areas

5.To implement programs on a wider scale, utilizing renewable energy resources such as wind, solar, hydro, geothermal and bio energy for the sustainable energy development in Myanmar

6. To promote Energy Efficiency and Energy Conservation

7.To establish R, D, D&D (Research, Development, Design and Dissemination) Institution in order to keep abreast with international practices in energy resources exploration and development works and to produce international quality products in order to manufacture quality products and in order to conduct energy resources exploration works in accordance with international standard

8.To promote international collaboration in energy matters

9.To formulate appropriate policy for energy product pricing meeting economic security of energy producers and energy consumers

On processing Electrical power project

source- M.O.E.P and NLM

	Ministry		BOT		JV/BOT	
Kind of energy sources	quantity	MW	quantity	MW	quantity	MW
Hydro Power	11	2132	5	497.6	43	41655.5
Coal fire	0	0	0	0	4	1670
Natural gas	1	240	1	100	5	1783
Wind power	0	0	0	0	17	4032
Solar power	1	200	0	0	2	200+50

Solar PV project in YU

Background

- We want to set up solar PV system by the two factors there are teaching and solar cell research for our student.
- To supply a stable electricity, installation of MEGA-Solar system of 1-2 MW has been planned in University of Yangon.
- The PV system will be separated from national grid system. (No interference from outside)
- Researchers in Department of Physics, University of Yangon, and Kyoto University have been collaborating with Renewable Energy Education Program in 2014.(Continue from : YU-KU Energy Science Education for Sustainable Development in Myanmar ESE workshop 2013-2015)
- MEGA-Solar system is very expensive.

However…

- Lacking of precise data of the electricity consumption in the science building of UY where the MEGA-Solar system will supply the electricity.
- Not enough experiences of installation of a huge scale PV systems in Myanmar.
- Therefore we are going to install measurement system to monitor the electricity supply and consumption of building in University of Yangon continuously.
- Several important data, such as solar radiation, ambient temperature, output current and voltage of the small PV module, grid voltage and current injected from the grid and so on, will be logged by data logger 24 hours/more than 1 year.

Proposal for successful installation

❖ Two step installation,

1) Installation of a small PV system (100 kWp) and study of optimum PV system, (1-1.5 years)

2) MEGA-Solar system (1-2 MWp) installation, (-2 years- April-2016 to 2018)

Investigation of the electricity consumption data in the science building of UY is strongly recommended to optimize the expensive MEGA-Solar system, as well.

❖ **Part I**:

Installation and data collection of Electricity consumption in Physics Building in University of Yangon. (April 2016 to Dec 2016)

Measurement of the electricity consumption

- Daily
- Monthly
- Yearly (could be 1 year, due to limited time schedule)

Proposed measurement system

- Total electricity consumption of the building (case 1)
- Each electricity consumption of large equipment (case 2)

❖ **Part II**:

Data collection and design of PV–Backup System. (Jan 2017 to Dec 2017) According to the measurement, PV system will be designed in coupling with generator backup system as well as energy storage unit.

❖ **Installation of a small PV system (100 kWp) and study of optimum PV system**

- Measurement of the grid response
- Spike, stability, Stand-by time, etc.

❖ **Optimization of MEGA-Solar system**

- Backup system (super-capacitor, battery, diesel, grid)
- Cost minimization
- Maintenance

- "Promotion of Energy Science Education for Sustainable Development in Myanmar" has been cooperated with Kyoto University and this group of University of Yangon for education of renewable energy for sustainable development in Myanmar supported by Japanese ODA-UNESCO support program from 2013 to 2015. Implementation of solar PV system and energy policy in Myanmar have been studied.

- Principal investigator (Dr Aye Aye Thant) and co-researcher (Dr Hla Toe) attended the International Training on New Applied Technology of Solar Energy Adapted to Tropic and Sub-tropic Regions at Kunming, China (**25th Aug to 12nd Sep. 2014)**

  (Organizer: Solar Energy Research Institute of Yunnan Normal University (YNNU, based in Kunming) Administrated by: Ministry of Science and Technology, PRC)

Expected outcome

The expected output from the research project are as follow:

- Data on precise electricity supply and consumption in Physics Building in University of Yangon will be obtained.
- Design of PV–Backup System in coupling with generator back system as well as energy storage unit will be developed.
- The numbers of equipment and power production will be optimized based on the site location, selection of equipment and change of design.
- The control system will also be developed to switch power sources intelligently.
- Upgrade system for more wide area will be proposed.

Cont:

- Proposed solar PV system will provide substantial benefits to University of Yangon.
- A well-designed PV system with a clever control system will be developed to be a promising technology to supply stable electricity in this region.
- A practical solution to the problem of power generation in remote areas will be developed.
- Solar PV system has no GHG emission, no noise, no smell, no ash, or other produce of particles and therefore environmental friendly system will motivate relevant authorities and students of University of Yangon.

- Prof. Nasrudin Bin Abd Rahim is co-investigator from MI, University of Malaya. His main role to provide technical advice to the project, especially on the solar data collection and design of power controller.
- Prof. Hideaki Ohgaki is the co-investigator from JSU, Kyoto University. His main role to provide technical advice to the project, especially on the energy consumption data analysis and small/large PV system design. He also bridges Kyocera Company to installation of measurement equipment and coordinates visiting from research member to Kyoto University.

- Prof. Pho Kaung is the co-investigator from University of Yangon and he will participate in the development of a design of PV–Backup System in coupling with generator back system as well as energy storage unit.

- Prof San Yee is one of the co-investigators from University of Yangon and she will work to obtain data on precise electricity supply and consumption in Physics Building in University of Yangon.

- Dr Hla Toe is co-researcher and he will conduct research to optimize the numbers of equipment and power production based on the site location, selection of equipment and change of design.

Step 1 : Installation of Small PV system

PV Capacity	:100KW
Annual Yield	: 130,000 kWh
Qty of PV panels	: 360pcs
Space	:1,500 – 2,000 m2

Assuming to install on South-facing roof.

Final PV capacity varies depending on roof type etc.

PV power is assumed to be consumed on site.

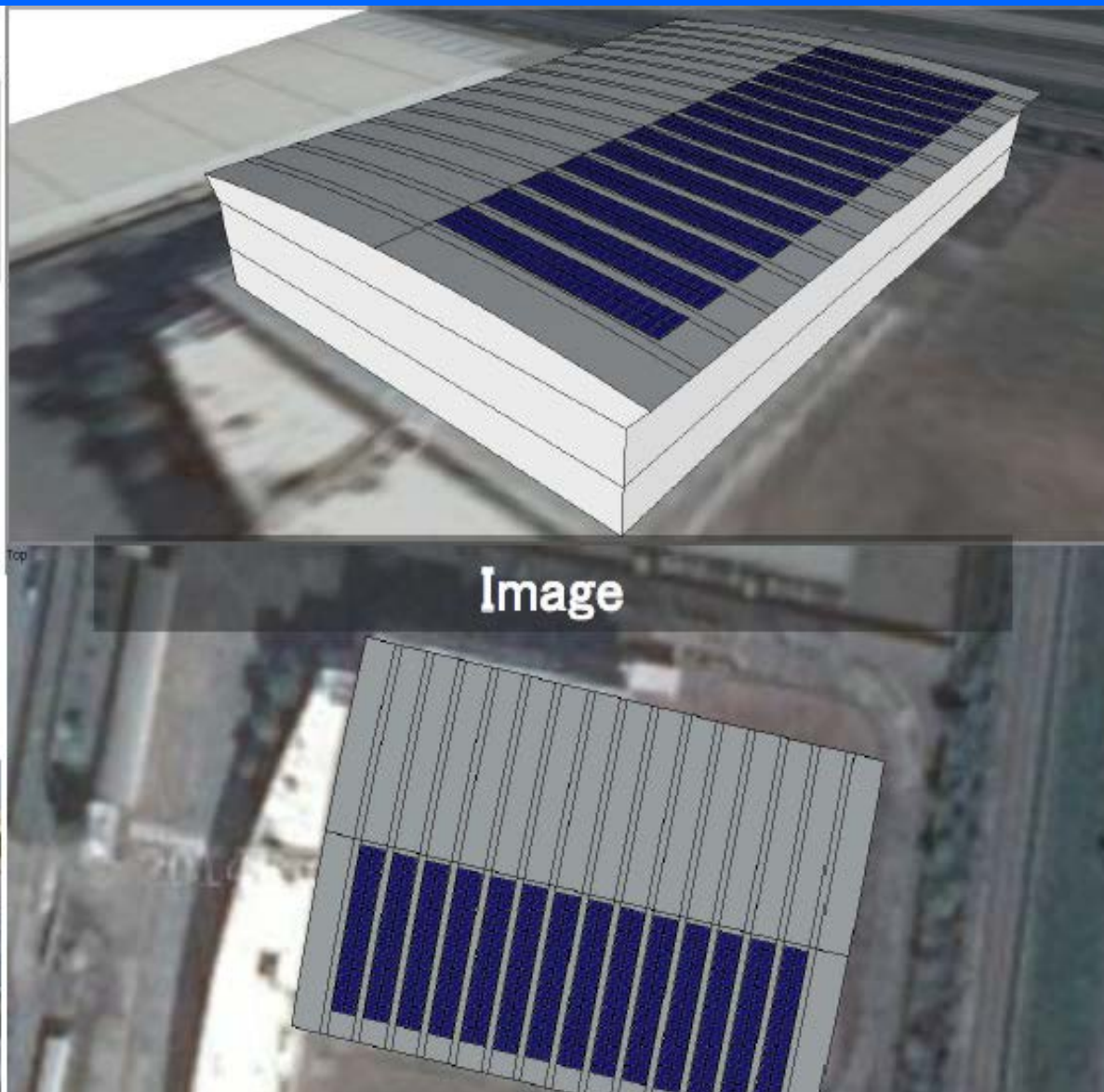
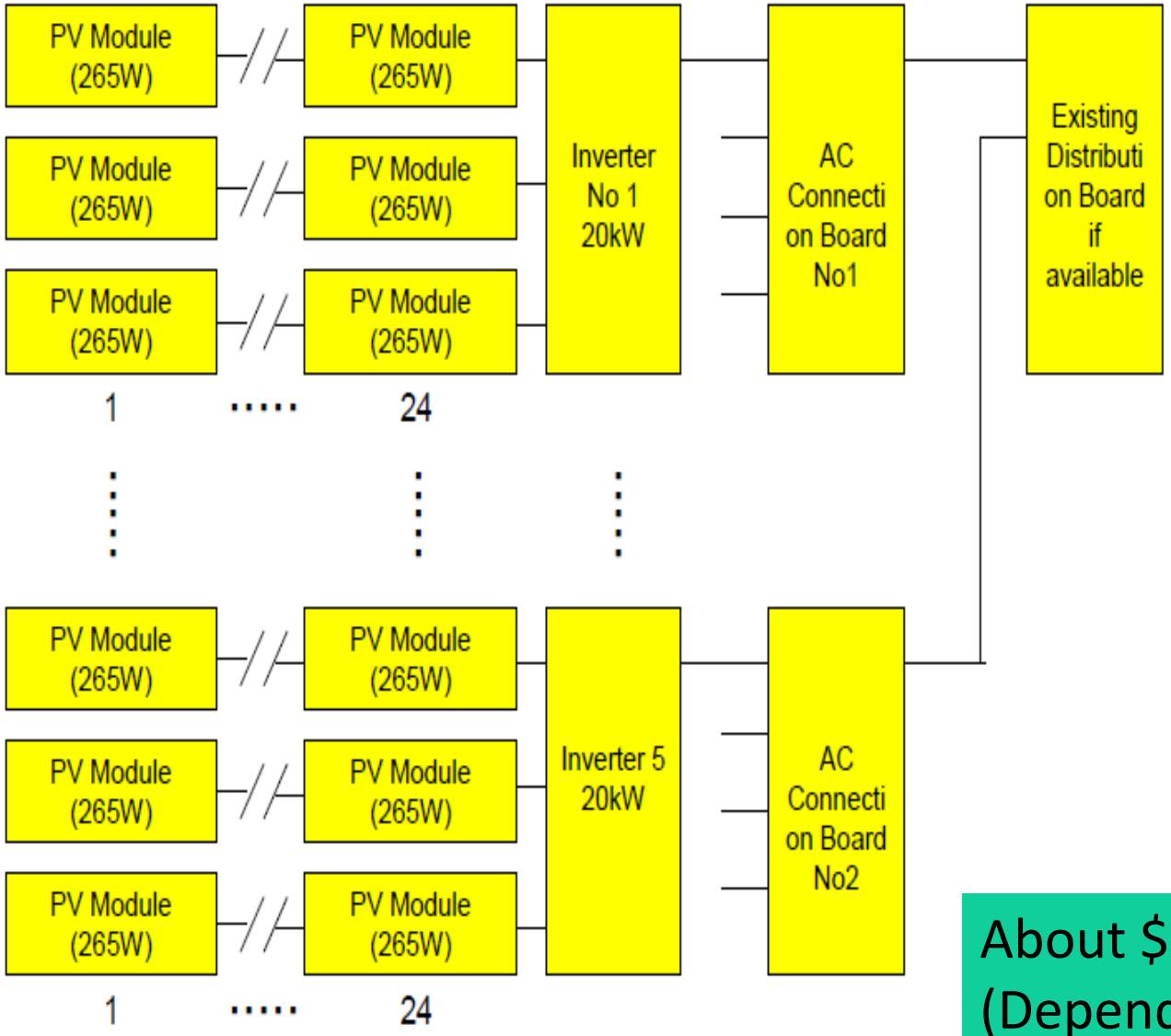


Diagram of 100 kWp PV system in YU (by Kyocera)

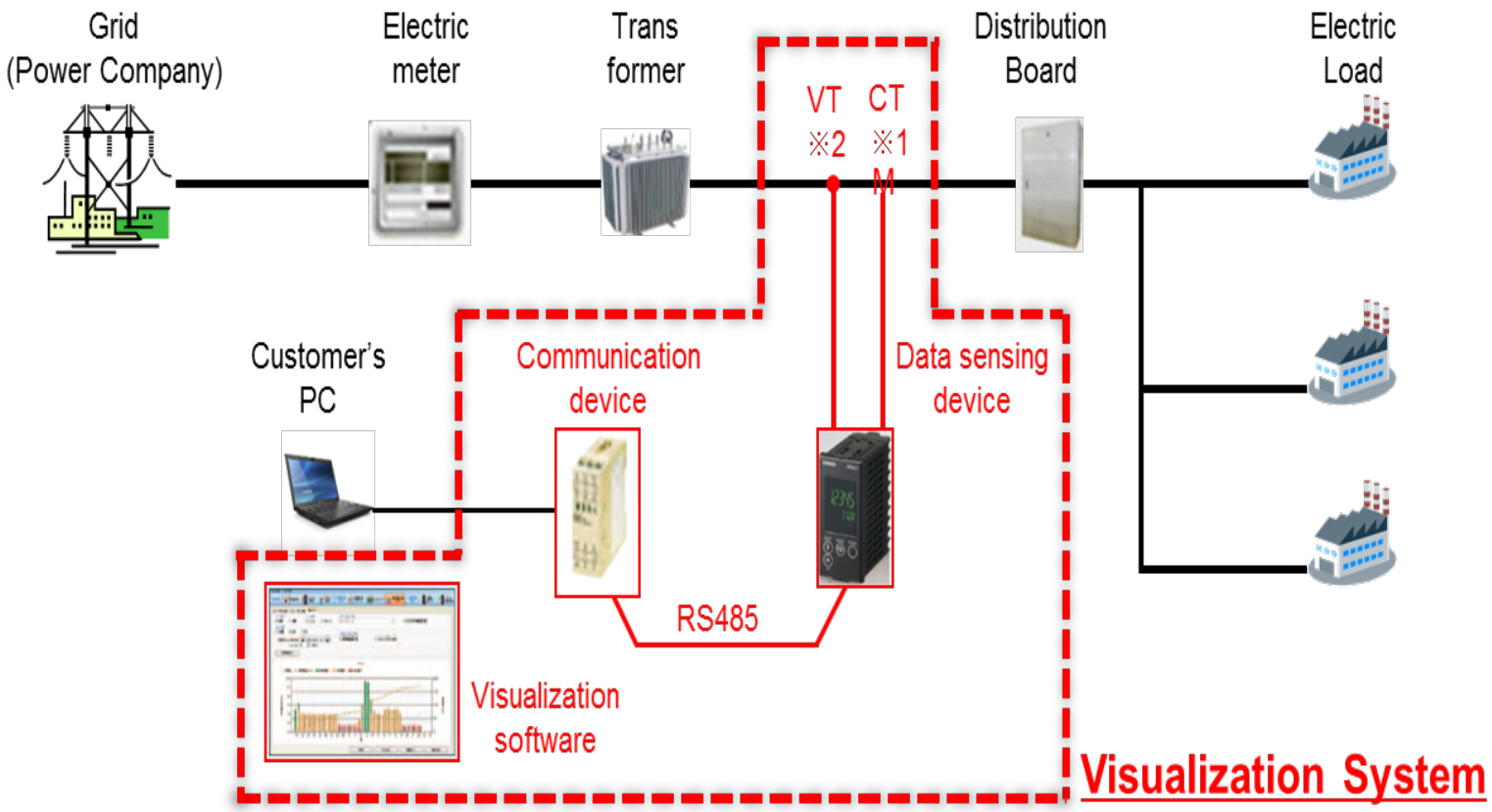


About $250,000, include install
(Depend on the location of PV,

CASE 1 : Visualization of TOTAL electrical consumption

System Configuration

※1 CT : Maximum current 600A
Maximum power 480kW
※2 VT : If AC400V, direct input

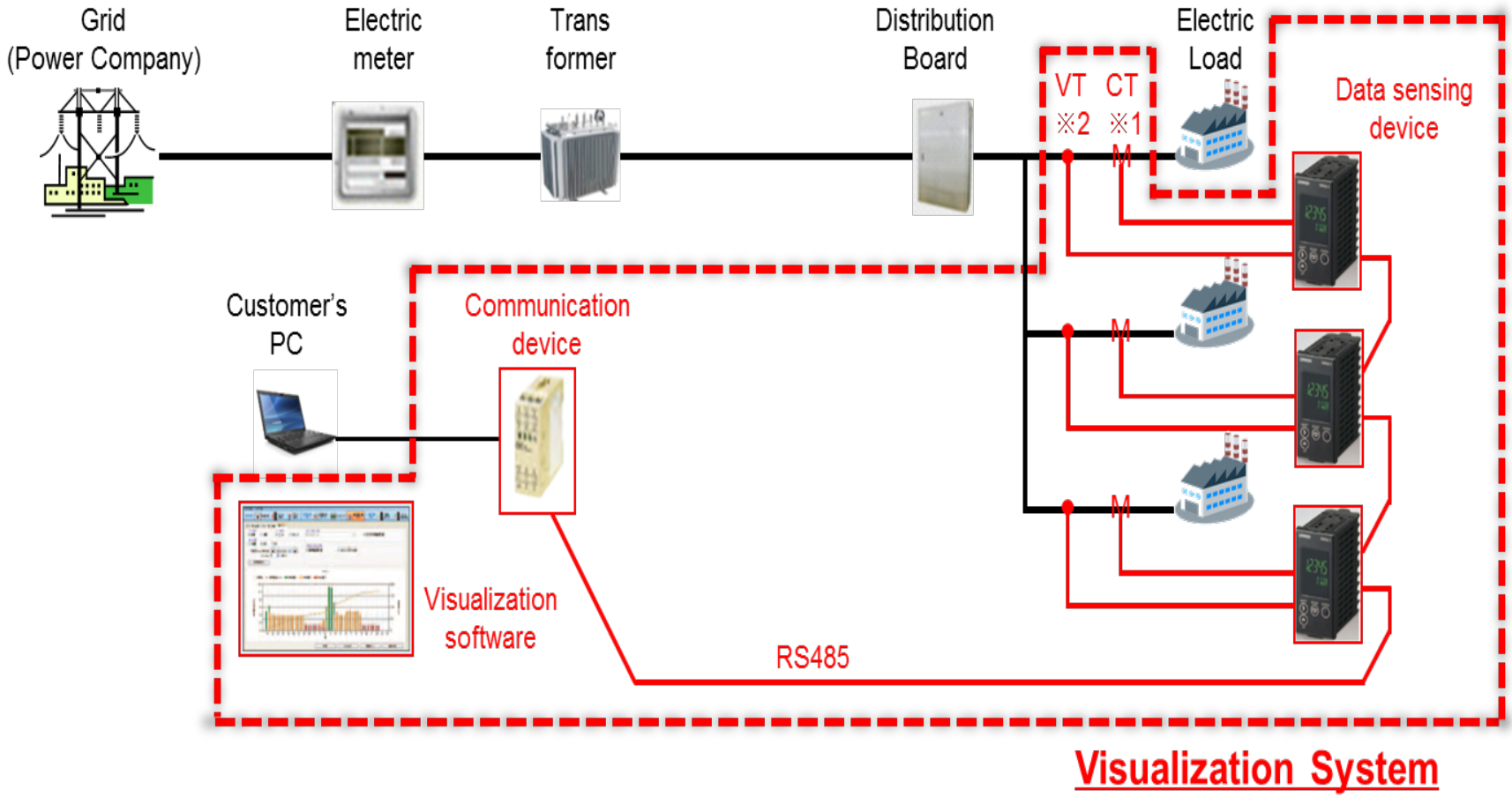


- Inexpensive system (around $5,000 without installation fee)
- Easy to monitor the macro behavior

CASE 2 : Visualization of EACH electrical consumption

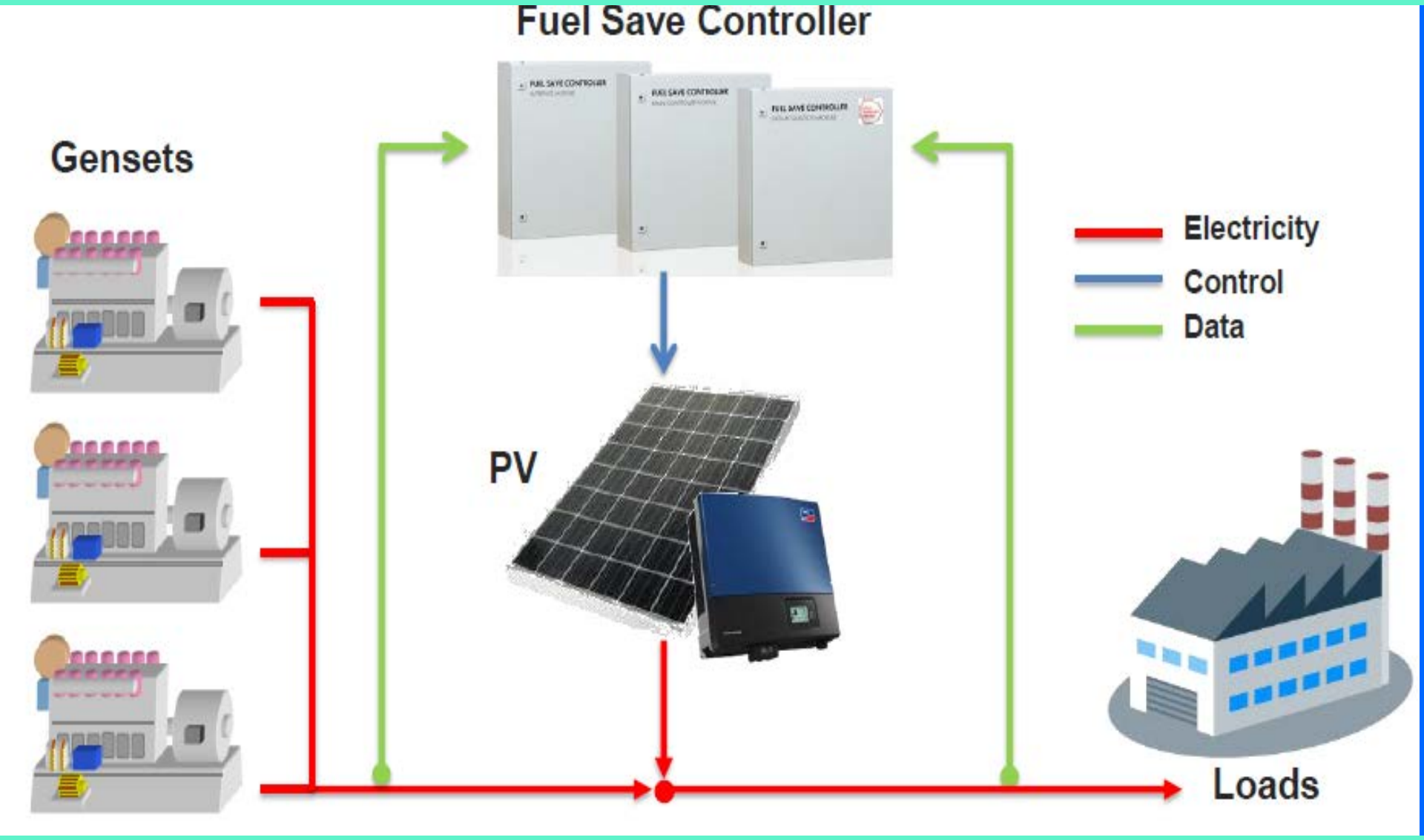
System Configuration

※1 CT : Maximum current 600A
Maximum power 480kW
※2 VT : If AC400V, direct input



- Rather expensive system
- Energy efficiency management can be introduced

Example : PV-Diesel hybrid system



Diesel backup system case. Battery or other backup system can be introduced upon the consumption data and requirement from large equipment.

Step 2 : Installation of MEGA-Solar system

Kyocera corporation has enough experiences even in ASEA

SoftBank Kyoto Solar Park

The first of two phases of the overall project sees 8,680 Kyocera modules equaling approximately 2.1MW of solar power installed in the southern part of Kyoto City, Japan. This will generate roughly 2.1MWh of electricity annually. The second phase of the project to install another 2.1MW system has already finished.


Thank you
Dr Hla Toe
Associate Professor