What's the Next Step ?
For Joint Credit Mechanism (JCM)
Emission Reduction Through
MRV Methodology

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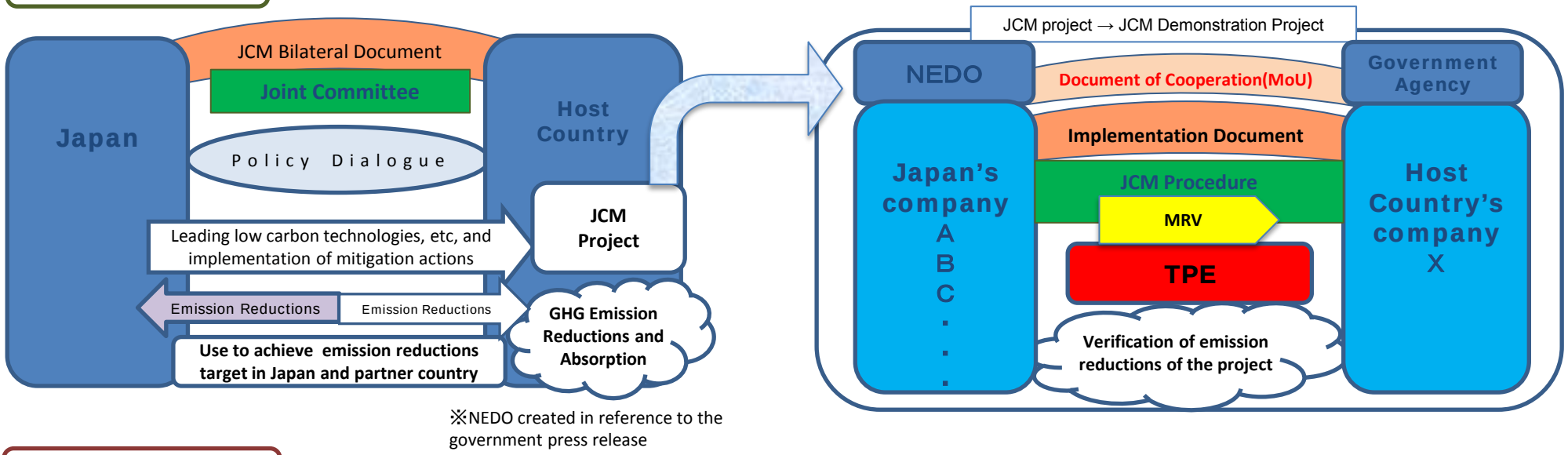
Technologies for Countermeasure against Climate Change

- Energy Conservation
  - Energy management – HEMS, BEMS, CEMS
  - Energy Storage
  - Heat Pump
  - Combined heat and power
- New Energy
  - Smart Grid
  - Photovoltaic power generation
  - Wind power generation
  - Energy from Waste
  - Fuel Cell technology (PEFC, SOFC)
  - Solar power generation
  - Ocean energy utilization
- Fuel for Transportation
  - E.V., Hybrid V., Fuel cell V.
  - Secondary battery
  - Gas to liquid (GTL) technology
  - Biomass fuel production
  - Hydrogen production
- Fossil fuel production and clean technology
  - Clean coal technology
  - CO2 capture and storage
  - New coke-making technology
- Non-fluorocarbon technology
  - Non-fluorocarbon refrigerator
  - Non-fluorocarbon insulator
  - Fluorocarbon decomposition

Summary of JCM Demonstration Project

Scheme of JCM



※NEDO created in reference to the government press release

Business Content

- In countries where bilateral agreement relating to JCM has been made, in this system under GHG reduction technology implementation project (JCM project) the participating countries are: Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Vietnam, Laos, Indonesia, Costa Rica, Palau, Cambodia and Mexico (25 July 2014).

- MRV methodologies are being used in JCM Demonstration projects where low carbon technologies are being demonstrated. With the screening procedure under the JCM Joint Committee, JCM Demonstration Project aims to acquire validation from Third Party Entities regarding the accurate amount of emission reduction.

Screening Criteria

Make a comprehensive evaluation based on the following screening criteria:

1. Matches qualification requirement
2. Consistent with the purposes of the project
3. Submission of reference materials/ application forms
4. Project implementation resulting high emission reduction and strong dissemination strategy
5. Effectiveness of the methodology needs to be confirmed
6. Intended to contribute to the promotion of a wide range of low-carbon technology and products
7. Usage of Japanese technology, Know-how and products itself
8. Politically and strategically of great importance in strengthening ties between JCM countries
9. Cooperation framework such as Project Implementation structure with local counterpart is well organized
10. Ideas effective in enhancing the project results and methods to disseminate the relevant technology can be seen
11. Implementation of application required for the proposal and implementation schedule must be appropriate
12. Expenses for project must be appropriate
13. Knowledge in related fields or experience in equivalent project in the past

Secretary progress of the Joint Committee Partner Countries

Countries			Mongolia	Bangladesh	Ethiopia	Kenya	Maldives	Vietnam	Laos	Indonesia	Costa Rica	Palau	Cambodia	Mexico
Bilateral Documents/ Joint Committee		Bilateral Documents	2013/1/8	2013/3/19	2013/5/27	2013/6/12	2013/6/29	2013/7/2	2013/8/7	2013/8/26	2013/12/9	2014/1/13	2014/4/11	2014/7/25
		1st Joint Committee	2013/4/11	2013/7/29	2013/8/19 -20	2013/8/23	2014/3/20	2013/9/18		2013/10/16 -17		2014/5/12		
		2nd Joint Committee	2014/2/20	2014/1/14				2014/2/17		2014/5/19 -20				
Guidelines	General	Rules of Implementation	○	○	○	○	○	○		○		○		
		Glossary of Terms	○	○	○	○	○	○		○		○		
	Project Cycle	Project Cycle Procedure	○	Scheduled for adoption	○	○	○	○		○		○		
		Guidelines for Developing Proposed Methodology	○	○	○	○	○	○		○		○		
		Guidelines for DEVELOPING Project Design Document and Monitoring Report	○	○	○	○	○	○		○		○		
	Third Party Entities	Guidelines for Designation as a Third-Party Entity	○	○	○	○	○	○		○		○		
		Guidelines for Validation and Verification	○	Scheduled for adoption	○	○	○	○		○		○		
	Joint Committee	Rules of Procedures for the Joint Committee	○	○	○	○	○	○		○		○		
Adopted/ Approved	Methodologies	Proposed number	1	0	0	0	0	0	0	2	0	0	0	0
		Approved number	1	0	0	0	0	0	0	1	0	0	0	0
	Nominated TPE	Specified number	10	0	5	0	0	0	0	0	0	0	0	0

※source from New Mechanisms Information Platform , listed by NEDO (www.mmechanisms.org/index.html)

“Key concepts” In the proposed methodology development guidelines

Countries	The concept of reference emissions	Treatment of net emission reduction
Mongolia	The reference emissions are calculated to be below business-as-usual (BaU) emissions which represent plausible emissions in providing the same outputs or service level of the proposed JCM project in Mongolia.	-
Bangladesh	The reference emissions are calculated to be below business-as-usual (BaU) emissions which represent plausible emissions in providing the same outputs or service level of the proposed BOCM project in the People’s Republic of Bangladesh **as decided by the Joint Committee.**	-
Ethiopia	The reference emissions are calculated to be below business-as-usual (BaU) emissions which represent plausible emissions in providing the same outputs or service level of the proposed JCM project in the Federal Democratic Republic of Ethiopia.	-
Kenya	The reference emissions are calculated to be below business-as-usual (BaU) emissions which represent plausible emissions in providing the same outputs or service level of the proposed JCM project in the Republic of Kenya.	-
Maldives	The reference emissions are calculated to be below business-as-usual (BaU) emissions which represent plausible emissions in providing the same outputs or service level of the proposed JCM project in the Republic of Maldives.	-
Vietnam	The reference emissions are calculated to be below business-as-usual (BaU) emissions which represent plausible emissions in providing the same outputs or service level of the proposed JCM project in the Socialist Republic of Viet Nam.	-
Laos	Pending	-
Indonesia	The reference emissions are calculated to be below business-as-usual (BaU) emissions, **either by discounting BaU emissions or by other methods determined in the methodologies to be approved by the Joint Committee.**	**The net emission reductions from JCM projects are accounted as Indonesian domestic emission reductions.**
Costa Rica	Pending	-
Palau	The reference emissions are calculated to be below business-as-usual (BaU) emissions which represent plausible emissions in providing the same outputs or service level of the proposed JCM project in the Republic of Palau.	-
Cambodia	Pending	
Mexico	Pending	–

Emission reduction for JCM Projects

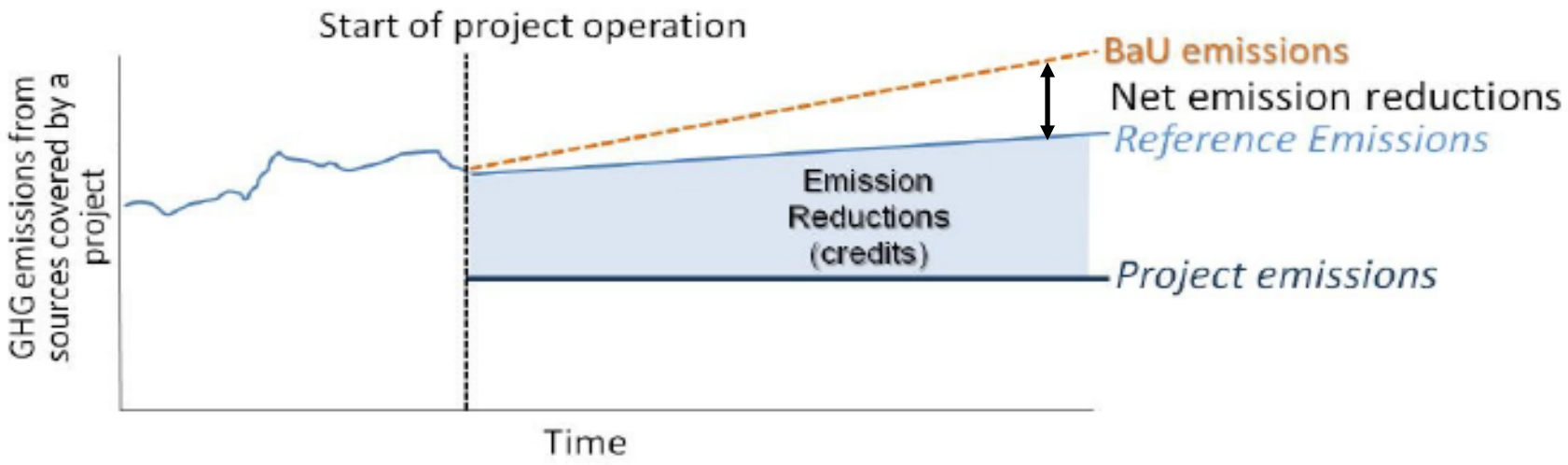


Figure: Indicative diagram of the relationship between the BaU emissions, reference emissions and project emissions

∗ from Indonesian JCM ” methodology development guidelines”

NEDO Program For Dissemination and Promotion of Global Warming Countermeasure Technology Program

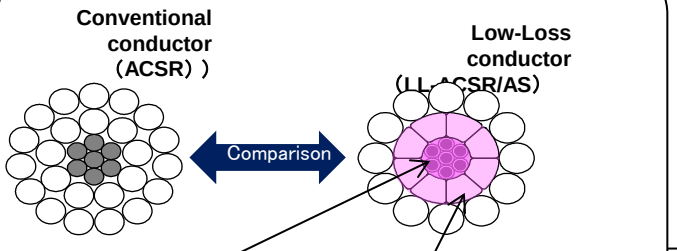
"High Efficiency and Low Loss Power Transmission and Distribution System in Mongolia"

Summary

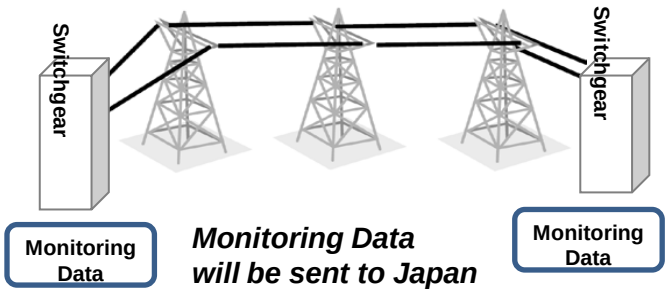
Ensuring stable supply and promoting efficient use of power supply is one of the key challenges Mongolia is facing today. Introducing Japanese technology to construct energy saving transmission and distribution system will provide a solution in undertaking this issue and ultimately contribute to the prevention of global warming using Joint Crediting Mechanism(JCM).

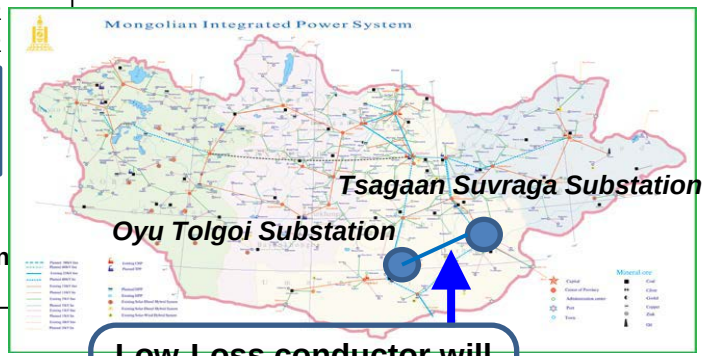
Technical Study Item

①Applicability study of New Low-Loss conductor
② Power System Analysis of Mongolian Power network



Advantage of Low-Loss conductor
1)Transmission Loss is reduced 10 – 15%
2)The Tower using conventional conductor can
3)The expected lifetime is longer





Low-Loss conductor will be installed at 220kV line (160km)

MOU on 12th September 2013

Expected reduction

11,787 ton CO_2/year

JCM demonstration project "Energy saving by optimum operation at oil refinery"

Summary

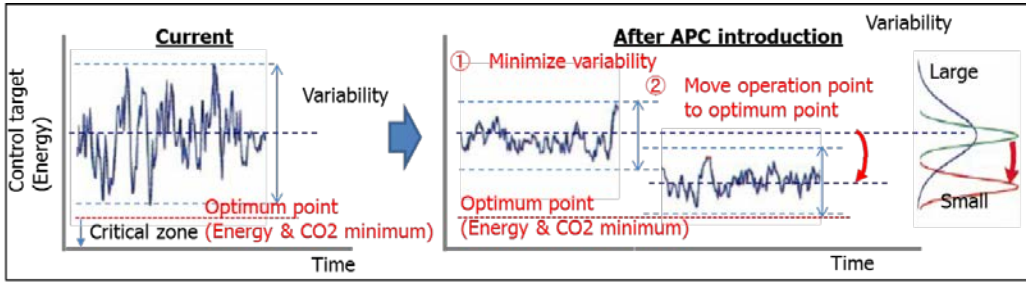
– Multivariable model predictive control is a kind of advanced optimization control in the oil refinery plant, to realize the automatic operation control at the optimum area, Add-on to the DCS is a remote operation control device and energy efficiency of manufacturing facilities optimization and control.

– Introduce Advanced Process Control (APC) system proved at Japan and global oil majors, customize to meet local environment, then verify effective and sustainable CO2 emission reduction by fossil fuel reduction.

Country	Indonesia
Contract company	Yokogawa Electric Corporation
Site Location	PT. Pertamina, Balikpapan Refinery (Kalimantan)
counterpart	Ministry of Energy and Mineral Resources
Expected Fuel reduction	47 TJ/ year reduction
Expected CO_2 reduction	3,400t-CO2/year reduction (quantity of limited part of the plant facilities)
Total project cost (borne by NEDO)	million yen(million yen)

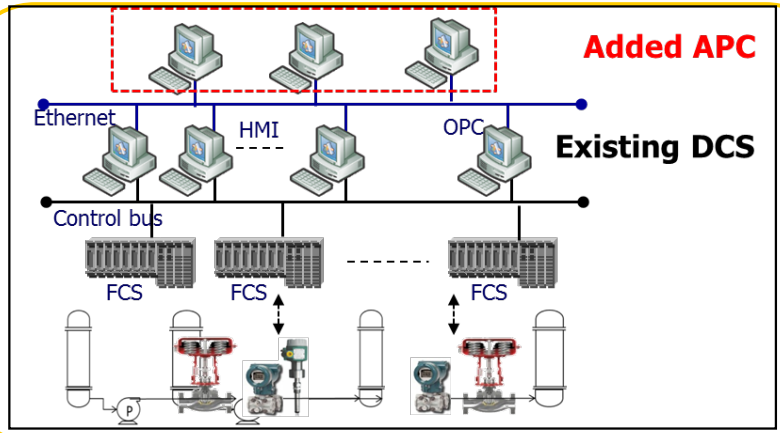
Project overview

Energy saving/CO2 emission reduction: Basic scenario



Process with large operation variability will be changes by APC.

1. To minimize the variability
2. Then movable the operation point to optimum point (minimum energy and CO2 emission)



Summary of Introduced Technology

① Elemental technology (Advanced Control System) introduction,A system to be added and linked to Distribution Control System (DCS)

② Includes process model to simulate multi-variable process behavior to be able to operate the process at optimum minimum energy and CO2 emission

③ No process modification is required when the system is introduces

④ To be added during the process operation

⑤ High return on investment (Most of energy and CO2 emission reduction effective Japanese oil refineries have already introduced.)

JCM demonstration project “Operation Optimization in Utility Facility (“RENKEI” Control)

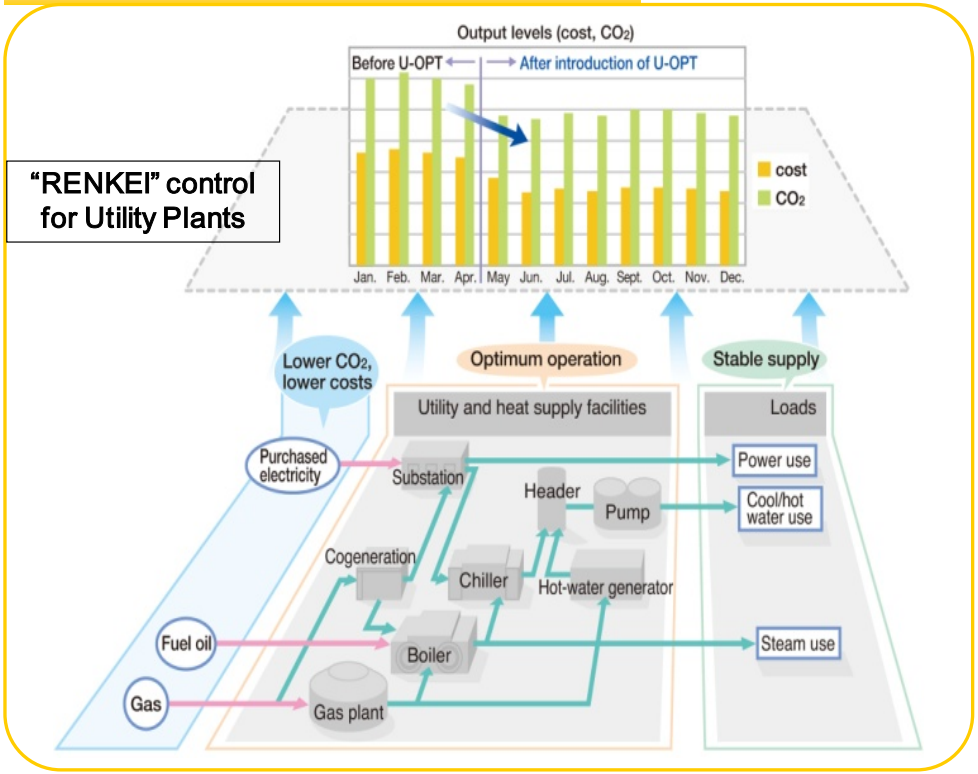
Summary

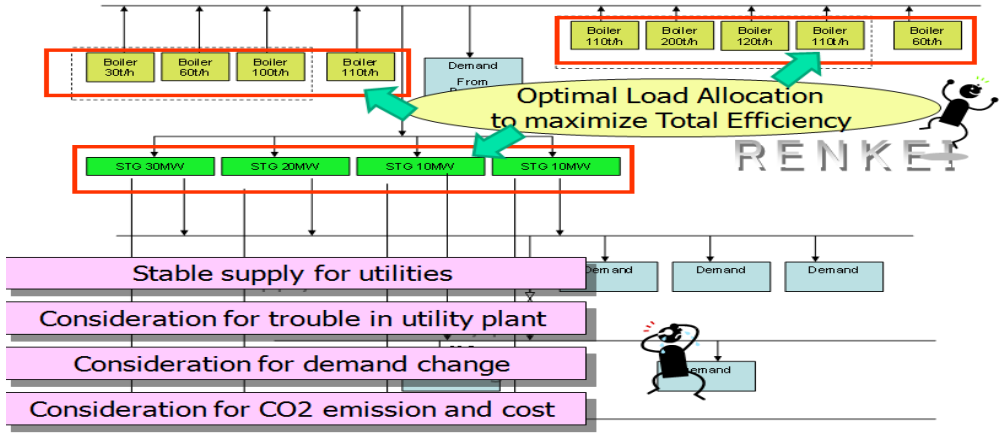
– Utility Facility Operation Optimization Technology is a “RENKEI” control, which is Japanese leading-edge technology. By using optimization technology, the system determines the optimum selection and the optimum load allocation for utility equipment.

– Such as boilers, steam turbines, and chillers used in utility facilities, in order to minimize CO_2 emissions. Without any change of utility facility hardware, this technology will realize a great amount of CO_2 reduction.

Country	Indonesia
Contract company	Azbil Corporation
Site Location	PT. Pertamina Cilacap Refinery (Central Jawa)
counterpart	Ministry of Energy and Mineral Resources
Expected Fuel reduction	800 TJ/year reduction
Expected CO_2 reduction	55,000t-CO_2/year reduction
Total project cost	million yen

Summary of Introduced Technology





Details for process

① Create a PDD, certified by DOE

② Development of power facilities-linkage system

③ Connect to Pertaminas’ existing power control system

④ Baseline calculation for this project, develop CO_2 reduction program

⑤ Dissemination activities (Training for Energy saving diagnosis for improvement of utility operation)

JCM Demonstration Project
"Low Carbon Hotel-a New Energy Management System for Vietnam (V-BEMS)"

Proposed by Hibiya Engineering, Ltd. and Mitsubishi UFJ Morgan Stanley Securities Co., Ltd

The Project aims to achieve large-scale GHG emissions reduction by demonstrating and disseminating Japan's state-of-the-art energy saving technology in commercial buildings in Vietnam where energy consumption is expected to increase continuously reflecting economic growth in the country.

Summary

The Project will develop a new energy saving product for wide spread use in Vietnam by integrating highly-proven Japanese existing technology while demonstrating energy saving effect.

Items

1. Development and verification of BEMS for buildings in Vietnam
2. Development and verification of lighting control system for buildings in Vietnam
3. Development and verification of the best structure of hot water supplying system

Project Site

- Renaissance Riverside Hotel Saigon
- Hotel Nikko Hanoi

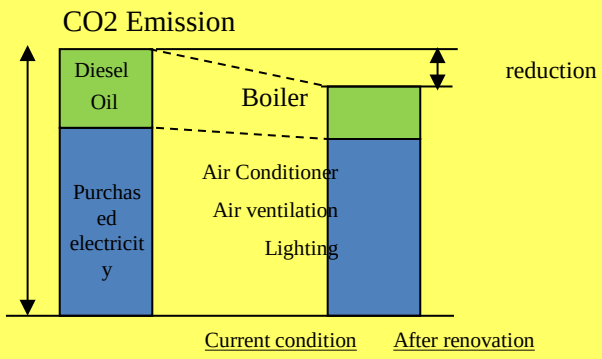
Estimated Reduction amount

About 12 percent (605 tons of CO2 per year) in the model project

Amount of the Reference Emission

- Diesel Oil 1,218 KL
- Electrical power 17,371 MWh
- Total CO2 5,102 t-CO2

Current condition



Amount of the Project Emission

- Diesel Oil 879 KL
- Electrical power 17,285 MWh
- Total CO2 4,497 t-CO2

After renovation

"Promotion of green hospitals by improving efficiency / environment in national hospitals in Vietnam"

Proposed by：Mitsubishi Electric Corporation, Ltd., Mitsubishi Corporation, Mitsubishi UFJ Morgan Stanley Securities Co., Ltd.

High efficiency inverter air conditioners (ACs), Japan's advanced technology targeted for the demonstration have high potential for energy conservation. Previous studies conducted by the proposing companies show that introduction of the technology can lead to energy efficiency improvement by 30-40%. As such, the wide spread use of the technology will greatly contribute to sustainable development of Vietnam.

Summary

In order to improve the situation where the use of inefficient non-inverter RAC is prevalent, Energy Management System (EMS) that efficiently controls multiple units of inverter ACs will be developed and its effectiveness will be demonstrated.

Items

① **Development of EMS for RAC(RAC is measured and evaluated with balanced ambient room-type calorimeter)**

② **Impact assessment of high efficiency-air purification technology and balanced ambient room-type calorimeter**

③ **Submission of JCM methodology for approval**

④ **Demonstration of GHG emission reduction based on the JCM methodology**

Partner / Site

- **People Hospital115 (Ho Chi Minh City)**
  Viet Duc Hospital (Hanoi)
- **TVCI**

Estimated Reduction amount

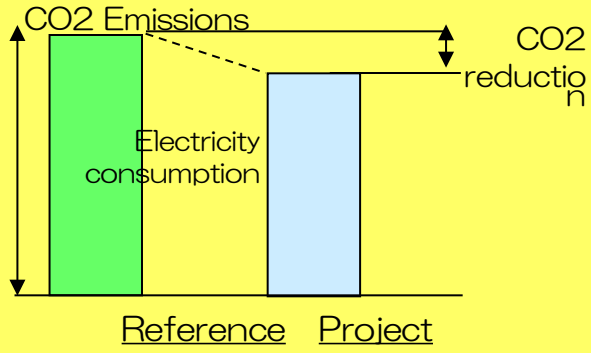
Reduction amount；1,749tCO2/y

Reference scenario

Operation of non-inverter AC

$$RE_y = \sum_i EC_{REF,i,y} \times EF_{CO2,ELEC,y}$$

=8,086,356(kWh) / 1000
×0.5408(tCO2/MWh)=4,373(tCO2/y)



Emission reductions by project

Operation of high efficiency inverter AC

$$PE_y = \sum_i EC_{PJ,i,y} \times EF_{CO2,ELEC,y}$$

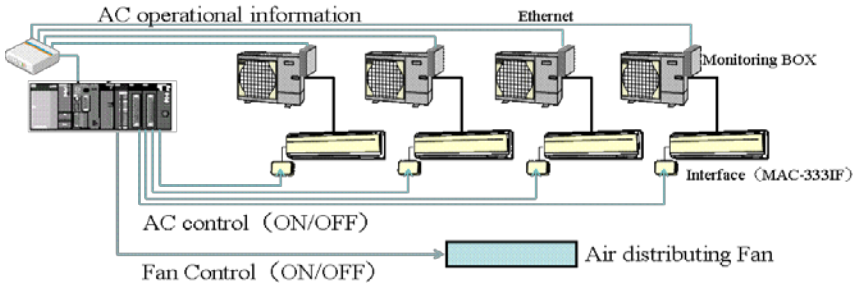
=4,851,813(kWh) / 1000
×0.5408(tCO2/MWh)=2,624(tCO2/y)

Summary of Introduced Technology

Inverter AC

•High efficiency operation enabled by DC inverter compressor using joint wrap motor uniquely developed by Mitsubishi Electric
•Long-lasting cleaning/energy saving performance by "EASY CLEAN" function that enables cleaning of indoor unit fan.
•Air quality is improved by anti-allergy filter utilizing anti-bacterial enzymes.

EMS for RAC

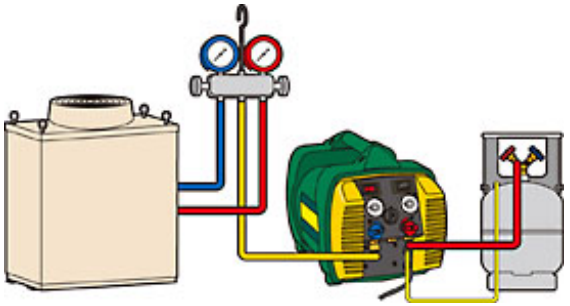


In the multiple AC system commonly used in Japan, each indoor unit is optimally controlled according to its operation conditions. However, in most hospitals in Vietnam where individual RACs are still used, EMS is yet to be introduced. By collecting data on operation condition (frequency, current, piping temperature, air speed, etc.), performance is assessed and optimal operation control of each unit is realized.

Energy recovery ventilation fan

Japanese company's leading technology will improve hospital environment and energy efficiency by minimizing heat loss.

Collect CFC12,HCFC22 etc from each Air-conditioner



Source: Asada Corporation

Estimated emissions of CFCs & HCFCs in Japan (2006)

Estimated emissions in Japan in the fiscal year 2006

	Emissions (t) submitted by operators	Potential emissions (t) estimated by government	Total (t)	Emissions in million t-CO_2 eq.
CFCs	39	1,490	1,529	12.64
HCFCs	2,088	15,262	17,350	22.25
HFCs				11.60
Total				46.49

Note) CFCs and HCFCs are estimated based on the law of PRTR(Pollutant Release and Transfer Register), and HFCs are estimated based on the inventory methodology under the UNFCCC.

Estimated amount of recovery and destruction in the fiscal year 2006

	Refrigerants for commercial-use (t)	Refrigerants for home-use and automobile (t)	Total (t)	Emissions in million t-CO_2 eq.
CFCs	348	476	824	8.84
HCFCs	1,987	1,035	3,022	5.47
HFCs	206	634	840	1.32
Total	2,961	1,724	4,685	15.62

Estimated amount of recovery and destruction in the fiscal year 2013

	Refrigerants for commercial-use (t)	Refrigerants for home-use and automobile (t)	Total (t)	Emissions in million t-CO_2 eq.	estimate GWP
CFCs	165	16	181	1.973	10900
HCFCs	2,363	0	2,363	4.277	1810
HFCs	1,153	787	1,940	2.774	1430
Total	3,681	803	4,484	9.024	

Even in Japan, emissions of CFCs and HCFCs are still larger than those of HFCs. (based from METI News Release 18 July 2014)
Thus, it is a critical problem that we only focus on emissions of HFCs under the Kyoto protocol but take no notice of emissions of CFCs and HCFCs under any protocols.

Methodology for Mongolia's Project

Reference emissions are calculated by the following equation.

$$RE_y = \sum_L \left(LOSS_{RF,L,y} \times EF_{Grid,y}\right) \qquad LOSS_{RF,L,y} = LOSS_{PJ,L,y} \times \frac{Rdc_{RF,L}}{Rdc_{PJ,L}}$$

Project emissions are calculated by multiplying transmission loss in the project ($LOSS_{PJ,L}$) by the CO_2 emission factor of the grid ($EF_{Grid,y}$).

$$PE_y = \sum_L \left(LOSS_{PJ,L,y} \times EF_{Grid,y}\right) \qquad LOSS_{PJ,L,y} = E_{L,send,y} - E_{L,receive,y}$$

Emission reductions are calculated by the following equation

$$ER_y = RE_y - PE_y$$

Methodology for Vietnam's Project

Reference emissions are calculated by the following equation.

$$RE_y = \sum_i EC_{REF,i,y} \times EF_{CO2,ELEC,y} \qquad EC_{REF,i,y} = EC_{PJ,i,y} \times \left(\frac{\eta_{PJ,i}}{\eta_{REF}}\right)$$

Calculation of power consumption by the non-inverter air conditioner

Project emissions are calculated by numbers of inverter-air conditioners total power consumption and sample of inverter-air conditioners named i 's total power consumption to get the CO_2 emission .

$$PE_y = \sum_i EC_{PJ,i,y} \times EF_{CO2,ELEC,y} \qquad PE_y = \sum_i EC_{PJ,i,y} \times EF_{CO2,ELEC,y} \qquad EC_{PJ,i,y} = n_{PJ,i,y} \times \left(\frac{n_{PSG,i,y}}{n_{PSG,i,total}}\right) \times \left(\mu_{EC,PSG,i,y} - \frac{\sigma_{EC,PSG,i,y}}{\sqrt{n_{PSG,i,y}}}\right)$$

Emission reductions are calculated by the following equation

$$ER_y = RE_y - PE_y$$

ER_y = Emission reduction in year y [tCO_2/y]
RE_y = Reference emission in year y [tCO_2/y]
PE_y = Project emission in year y [tCO_2/y]

Why is JCM expected to supplement CDM?

JCM ***doesn't require*** economic additionality.

CDM strictly requires "additionality", which makes it difficult to achieve "economic viability".

→Under the CDM regime, a project will NOT be viable WITHOUT revenue from carbon credit issuance.

For countries that are facing **(rapid) economic growth**, it is necessary for them ;

a) to choose **less GHG emission technologies** which meet each projects having economic viability, and

b)to mitigate GHG emission while **supporting domestic growth and business activities.**

Why is JCM expected to supplement CDM?

Simplification of Procedure in MRV

MRV(Measurement, Report, Verification) of the project is often a big burden for Project participants in the host country .

ex. number of items, collection of various data, difficulty to follow up original monitoring plan…etc

→Sophisticatedly-**simplified** but **conservative** methodologies are developed and adopted under the JCM

ex. **easier** accessibility of data, **simpler** measurement and calculation, **effective and efficient** monitoring…etc

→Low carbon growth projects in developing countries may be more viable under JCM !

NEDO would like to co-operate with each country's GHG inventory offices.
Contact Point

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Thank you !