Improve distribution network efficiency in Thailand with Amorphous metal

Energy saving and CO_2 emission reduction in Thailand by engineering collaboration between Hitachi Metals and Thai companies

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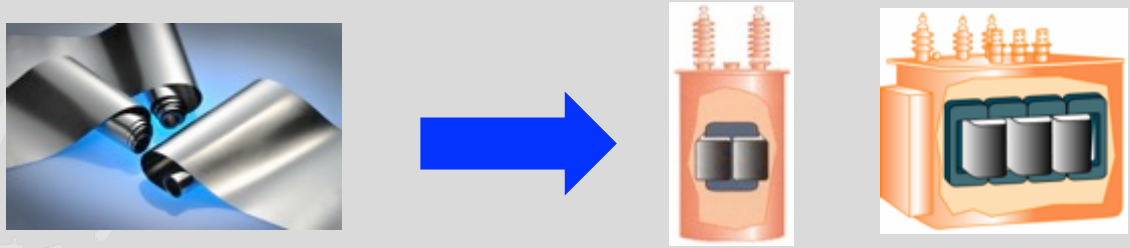


Company name : Hitachi Metals Ltd.

Samurai Name : Ryuichi Kamoshita

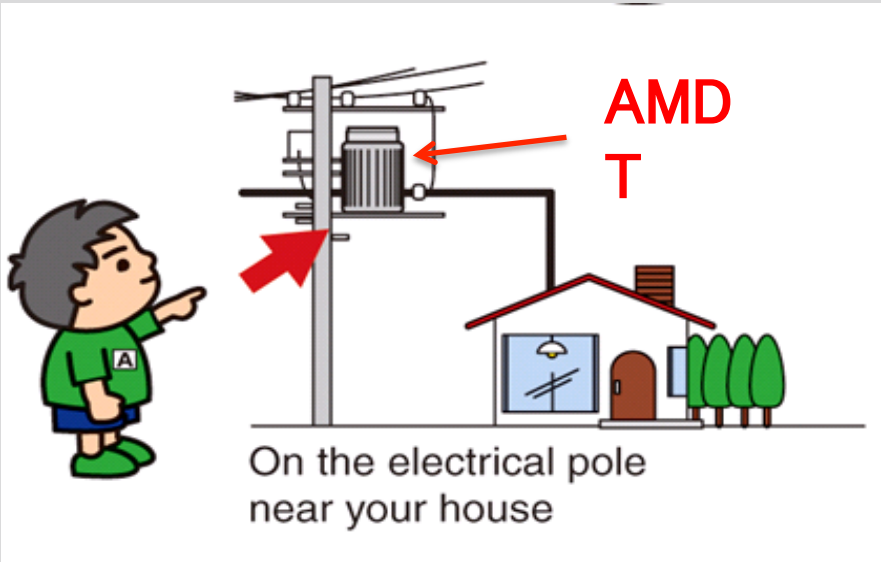
23 Sep. 2015

1.Contribution to Thailand

Amorphous distribution transformer (AMDT) , is produced by collaboration between Thailand partners and Hitachi Metals, can contribute to

1. Energy saving : 10GWh / year
2. Cost saving : 38.3 million THB / year
3. CO_2 emission reduction : 5,300 t-CO_2 / year

Hitachi Metal's estimation in case Thailand installs 10,000 units of 3Ph-50kVA Amorphous transformer annually, in stead of traditional transformer.



Transformers are always on operation (24hours/365days) in any of power supplies of electricity.

AMDTs continuously save energy cost and reduce CO_2 emission through the life time (more than 20 years).

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2.Selling point

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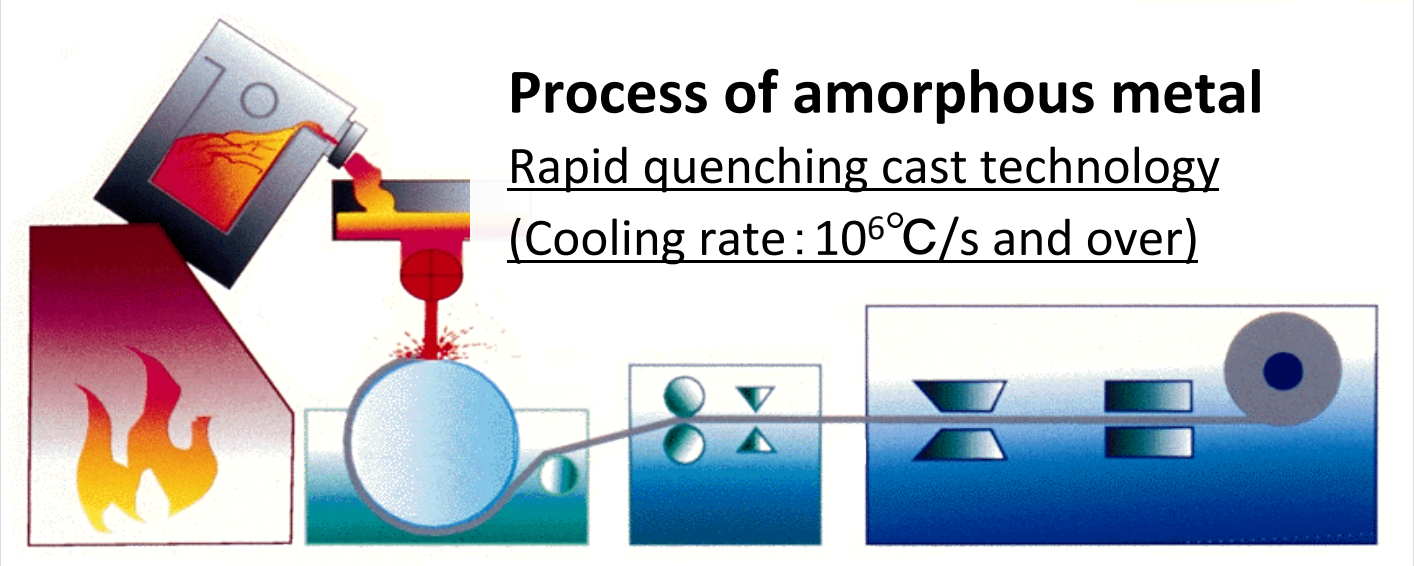
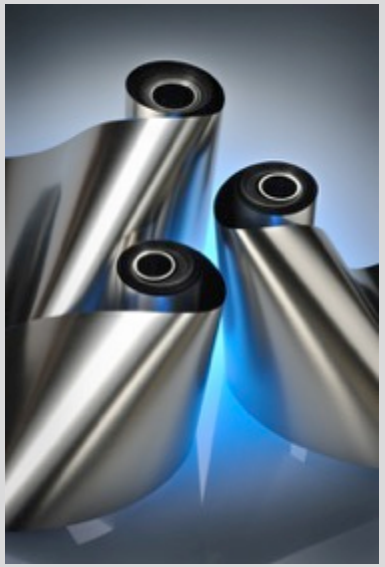
2.1. Hitachi Metals : Supplier of Amorphous metal (AM)





Metglas Yasugi factory (Yasugi City, Shimane prefecture)

AM : Very low loss metal

High energy efficient transformer

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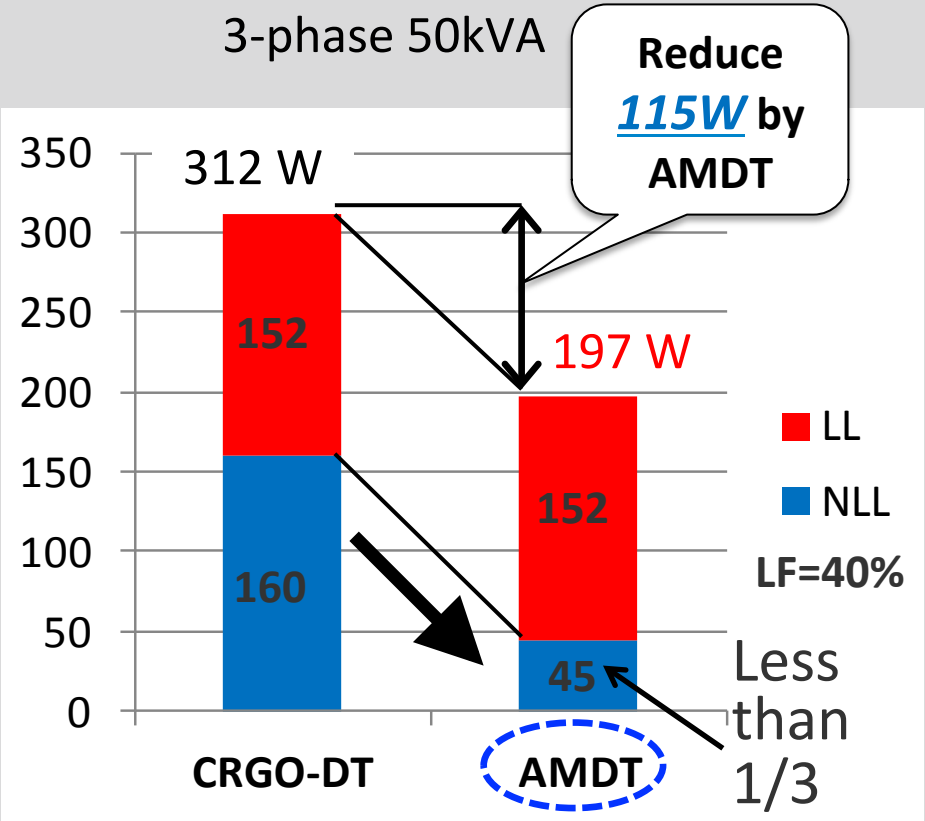
2.2. Feature of AMDT :
Very Low Standby loss(No-Load Loss : NLL)

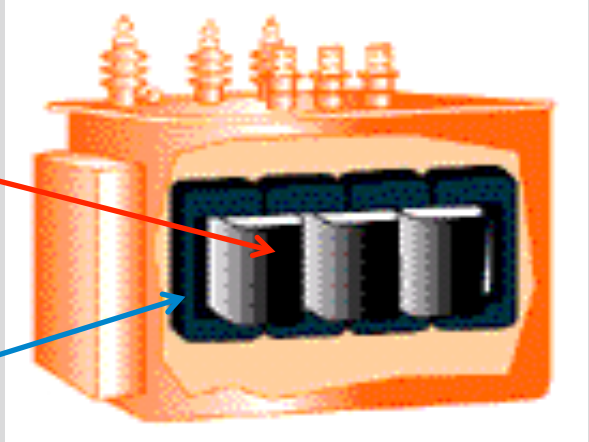
Average Rating of transforer in PEA
3-phase 50kVA

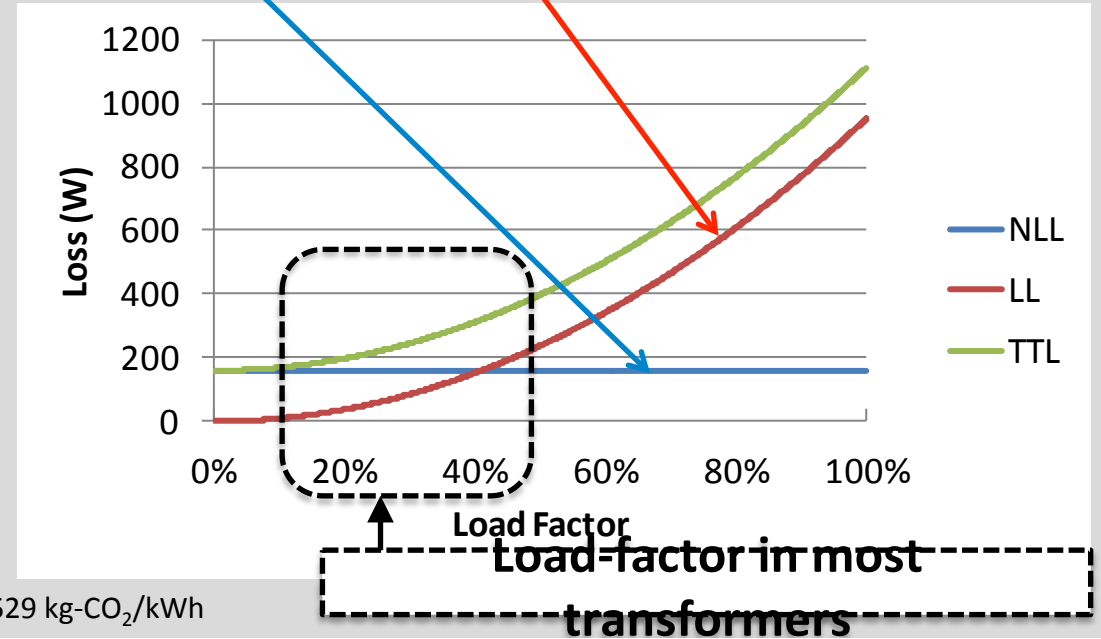


CO_2 emission reduction
0.533t-CO_2 / (kWh・unit・year)

Load Loss
(LL : from coil)
Depends on LF

No-Load-Loss
(NLL : from core)
Constant





CO_2 emission reduction = Reduction of loss (W) × 24 (hours) × 365 (days) × 0.529 kg-CO_2/kWh

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3. Spirit of OTAGAI

3.1. Hitachi Metals business scheme

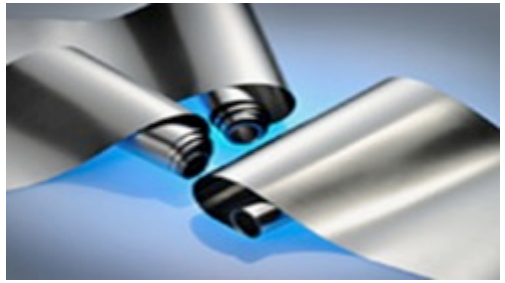
1) Hitachi Metals supply amorphous (Anko = Key material) to the partner.
2) Thai partners (transformer makers) produce AMDT (world's best energy efficient transformer) by their technology and HM's amorphous metal.
3) Cooperation between HM (Anko) and Thai partner (transformer technology)

Shimane JAPAN (Anko)

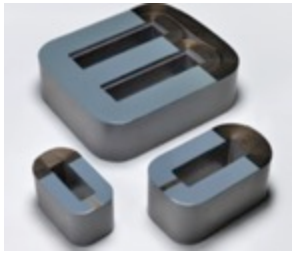
Supply AM
(Hitachi Metals)

THAILAND (Transformer Technology)

Assembling of AM-core (not started yet) and AMDT



Amorphous metal



Amorphous core

AMDT

- HM can't produce AMDT in the market alone.
- Thai partners need high performance material.

→ Collaboration is necessary each

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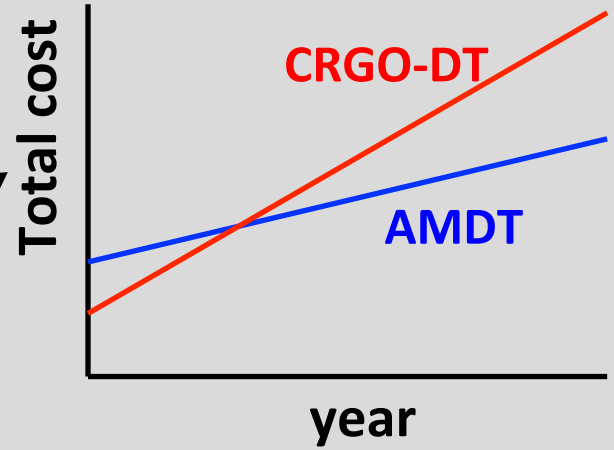
3.2. Environment for AMDT

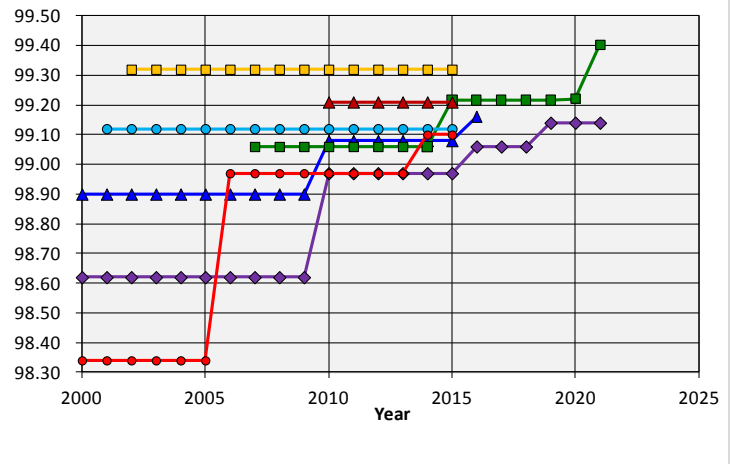
1. TOC or Payback must be utilized when DT is purchased.
   AMDT is world's best energy efficient transformer, but initial cost is a little higher than a conventional transformer (CRGO-DT). But total cost through its life time should be calculated with the initial cost and running cost. And total cost of AMDT is lower than CRGO-DT's.

   Initial cost + Running cost = Total Ownership Cost

   Therefore, running cost should be taken into consideration when DT is purchased.



2. Energy saving action.
   1) Enhance efficiency standard of transformer
   2) Prepare future plan, Labeling system, and etc of transformer .



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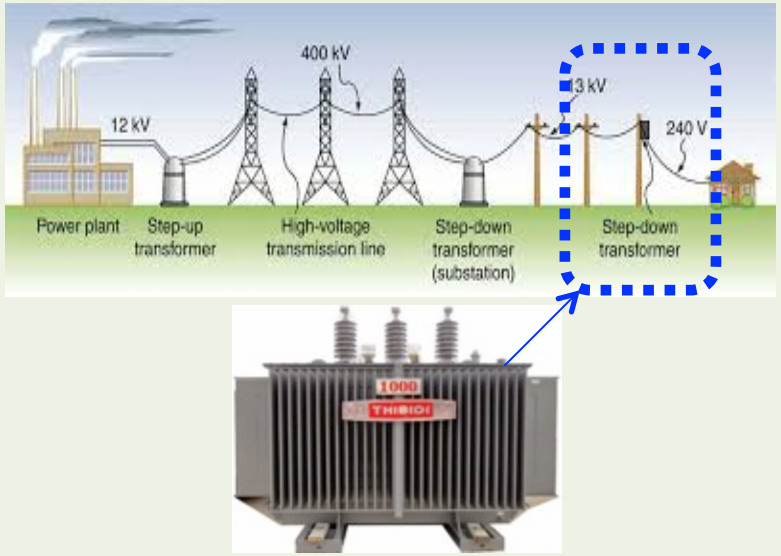
3.3. Introduction of JCM project using AMDT in Vietnam

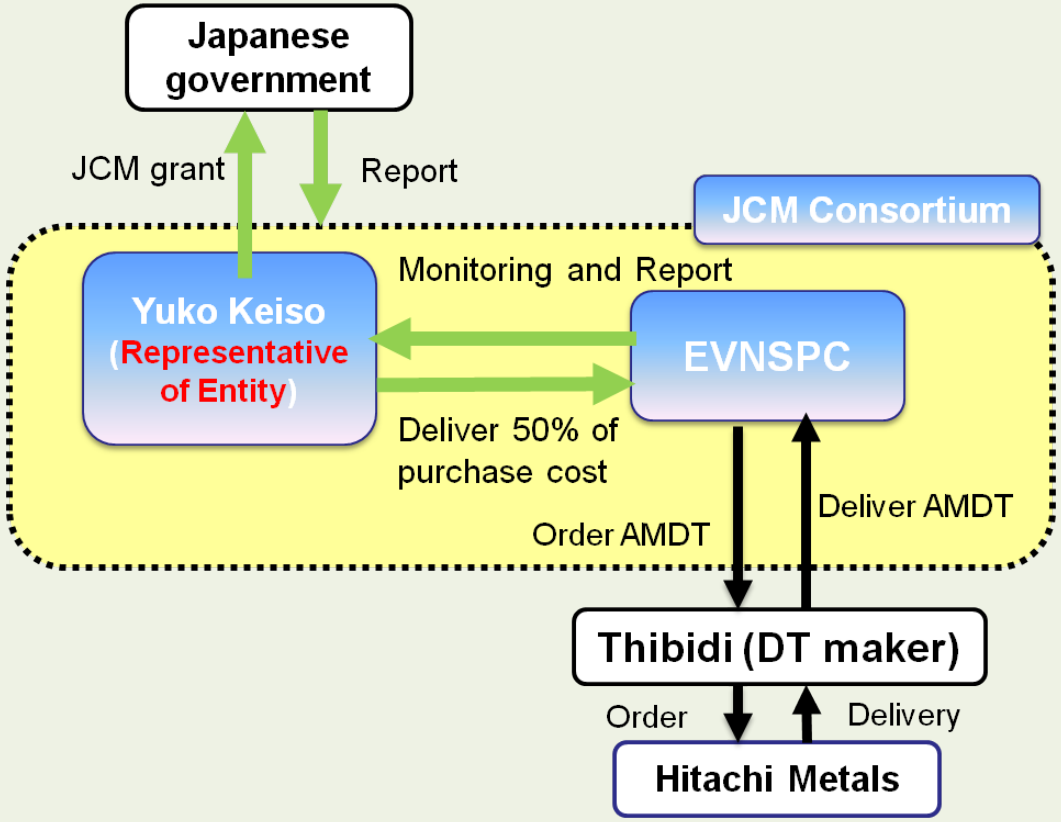
■ Project outline



AMDT made in Vietnam

MOEJ's Subsidy Project "JCM Model Project" to help installed High Efficient Amorphous transformers in the EVN Southern Power Company's Distribution Network

■ Project structure



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4.Summirize

1. Amorphous metal and collaboration between Thai partners and Hitachi metals contribute to improve energy efficiency of power grid in Thailand.
2. Hitachi support Thai partners to develop AMDT.
3. AMDT can contribute to reduce losses in distribution network (can contribute to improve efficiency in distribution network)
4. Reduce greenhouse gas emissions from generation facilities. Reduce cost of generation per kWh consumed.
5. ：Hitachi Metals suggests that Thailand adopts higher efficiency transformers with lower life time costs based on [Total Ownership Cost methodology] TOC with confidence.

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5.Company Information

Hitachi Metals is a materials manufacturer that offers quality in a wide range of industrial fields based on materials development.

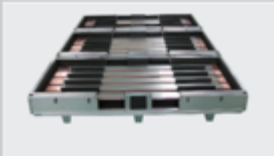
The Hitachi Metals Group boasts a treasure trove of global “only one, number one” products with applications spanning a variety of fields. This achievement is the result of well-coordinated efforts in our production, development and marketing sections to ascertain the requirements of society at large and work in unison with customers.

Committed to anticipating future needs, we will eagerly pursue new challenges and responsibilities. As a manufacturer of highly functional materials, the Hitachi Metals Group will continue to develop innovative products that create new markets.

High-Grade Metal Products and Materials

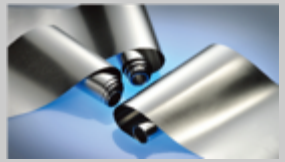
High-grade specialty steel, rolls, cutting tools, and amorphous metals

DAC-MAGIC® die cast tool steel


Sputtering target materials

Piston ring materials

Rolls for steel mills

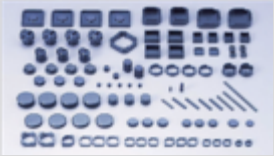

Metglas® Amorphous metal

Magnetic Materials and Applications

Magnets, soft ferrite and other soft magnetic materials, and their applications

NEOMAX® rare-earth magnets

NMF™ series sintered ferrite magnets


Soft ferrite and other soft magnetic materials, and their applications

FINEMET® nanocrystalline magnetic materials

Amorphous metal cut cores

High-Grade Functional Components and Equipment

High-grade casting components for automobiles, piping components, and construction components

HERCUNITE® heat-resistant exhaust casting components

High-toughness ductile iron castings HNM™ series

SCUBA™ aluminum wheels

Polyethylene gas piping systems

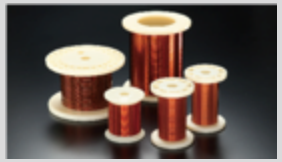
Pipe fittings for general use

Wires, Cables, and Related Products

Electric wires and cables, automotive products, information system devices and materials, metal and component products

Wires and cables for rolling stock

Probe cables for ultrasound diagnostic equipment


Enameled wire for high-efficiency motors

Harnesses for use in hybrid vehicles

APRESIA™ Ethernet switches

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Reference 1 : AMDT's Installed in ASEAN

1 company will start AMDT production soon.

2 manufactures produce AM core(AMC) & AMDT. 1 company will start AMDT production soon.

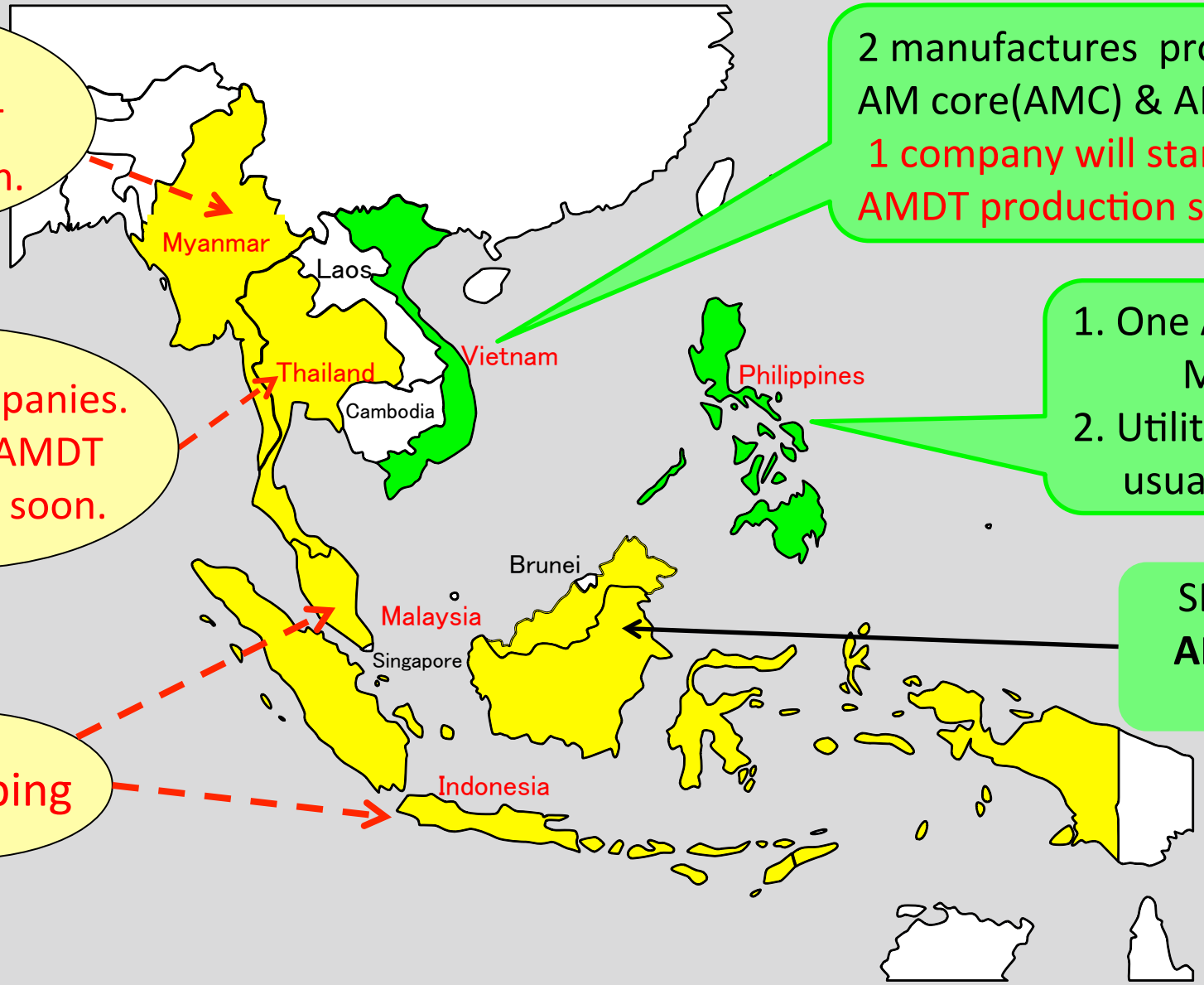
2 AMDT companies. 2 will start AMDT production soon.

1. One AMC&AMDT Manufacture
2. Utility in Manila usually use AMDT

SESCO **issued AMDT tender in 2012**

Developing

Developed market of AMDT.



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Reference 2 : Three major reasons Why Countries use AMDT's

1) **COST benefit** :

   Utility can save cost in terms of TOC*, though initial cost is little high** to minimize lifetime costs.

2) **Proven technology (for installation** in grid) :

   (1) **No special technique required to use AMDT**.

   Just replace CRGO-DT*** with AMDT.

   (2) **Can reduce losses in distribution system**.

3) **Proven technology (for production)** :

   (1) **Can produce AMDT by standard industry technology**, and **Hitachi Metals will teach technology** and support start-up of production at transformer makers.

* Total Owning Cost

** If Efficiency Standards are at a certain level, AMDT can be lower first cost

*** Cold Rolled Grain Oriented Electrical Steel

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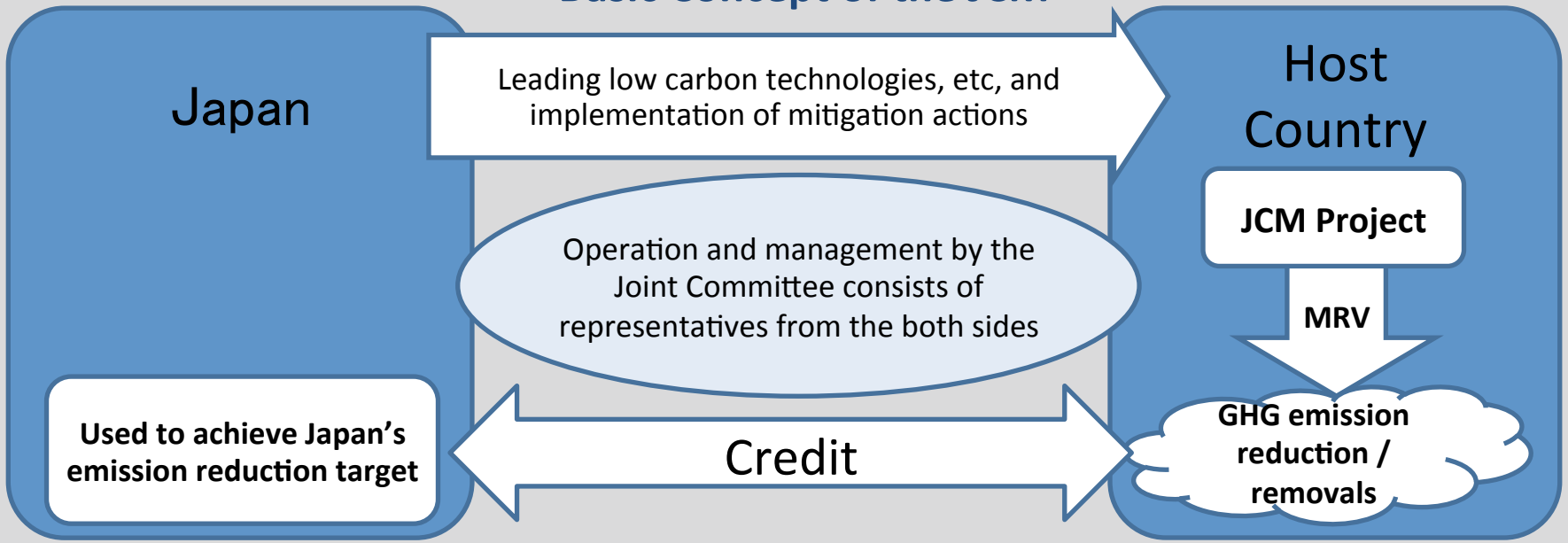
Reference 3 : Introduction of JCM using AMDT

Basic Concept of the JCM



Support program by Japan government to develop JCM

- **JCM Demonstration Projects and JCM Financing Programe**
- **Feasibility Studies**
- **Capacity Building**

Refer to "New Mechanisms Information Platform" by MOEJ
http://www.mmechanisms.org/e/initiatives/jcm.html

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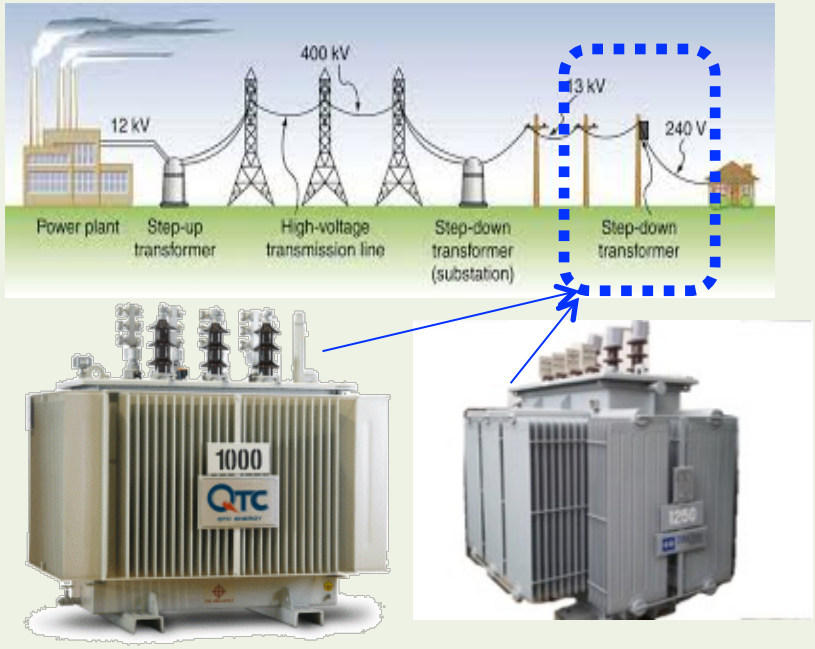
Reference 4 : Idea of JCM project using AMDT in Thailand

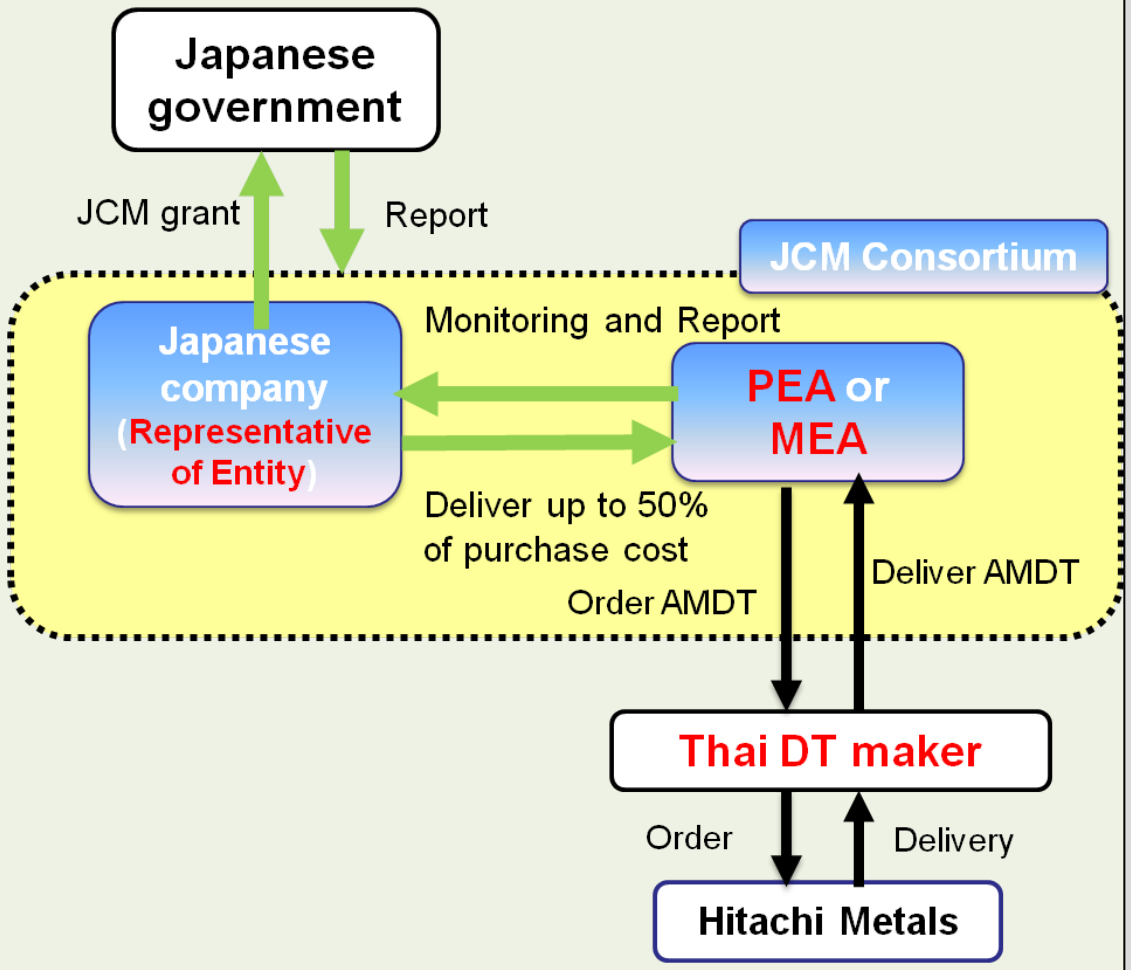
■ Project outline



AMDT made in Thailand

MOEJ's Subsidy Project "JCM Model Project" to help installed High Efficient Amorphous transformers in the PEA or MEA's Distribution Network

■ Project structure



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Reference 5 : JCM Financing program by MOEJ

JCM Financing programs by MOEJ（FY2013/2014/2015）

Thailand:
- ○ Energy Saving at Convenience Stores with High Efficiency Air-Conditioning and Refrigerated Showcase
- ○ Introduction of Solar PV System on Factory Rooftop
- ○ Reducing GHG Emission at Textile Factory by Upgrading to Air-saving Loom (Samutprakarn)
- ○ Energy Saving for Semiconductor Factory with High Efficiency Centrifugal Chiller and Compressor

Bangladesh:
- ○ Energy Saving for Air Conditioning & Facility Cooling by High Efficiency Centrifugal Chiller (Suburbs of Dhaka)
- ○ Installation of High Efficiency Loom at Weaving Factory
- ○ Introduction of PV-diesel Hybrid System at Fastening Manufacturing Plant

Myanmar:
- ○ Introduction of Waste to Energy Plant in Yangon City

Kenya:
- ○ Solar Diesel Abatement Projects

Maldives:
- ○ Solar Power on Rooftop of School Building Project
- ■ Smart Micro-Grid System for POISED Project in Addu Atoll

Malaysia:
- ○ PV power generation and relevant monitoring system for the office building

Mongolia:
- ○ Upgrading and Installation of Centralized Control System of High-Efficiency Heat Only Boiler (HOB)※

Viet Nam:
- ○ Anaerobic Digestion of Organic Waste for Biogas Utilization at Market
- ○ Eco-driving with the Use of Digital Tachographs
- ○ Introduction of amorphous high efficiency transformers in power distribution systems
- ○ Introduction of High Efficiency Air-conditioning in Hotel
- ○ Energy Saving in Lens Factory with Energy Efficient Air-Conditioners

Cambodia:
- ○ Introduction of High Efficiency LED Lighting Utilizing Wireless Network

Palau:
- ○ Small-Scale Solar Power Plant for Commercial Facilities in Island States Project
- ○ Small-Scale Solar Power Plants for Commercial Facilities Project II
- ○ Solar PV System for Schools Project

Mexico:
- ○ Domo de San Pedro II Geothermal Power Generation
- ○ Energy Saving by Converting from Hg-Cell Process to Ion-exchange Membrane Process at Chlorine Production Plant

Indonesia:
- ○ Energy Saving for Air-Conditioni0ng and Process Cooling at Textile Factory (in Batang city)
- ○ Energy Savings at Convenience Stores
- ○ Energy Efficient Refrigerants to Cold Chain Industry※
- ○ Energy Saving by Double Bundle-Type Heat Pump at Beverage Plant
- ○ Energy Saving for Air-Conditioning and Process Cooling at Textile Factory
- ○ Power Generation by Waste Heat Recovery in Cement Industry
- ○ Solar Power Hybrid System Installation to Existing Base Transceiver Stations in Off-grid Area
- ○ Energy Saving through Introduction of Regenerative Burners to the Aluminum Holding Furnace of the Automotive Components Manufacturer
- ○ Energy Saving for Textile Factory Facility Cooling by High Efficiency Centrifugal Chiller
- ○ Introduction of high efficient Old Corrugated Cartons Process at Paper Factory
- ○ Reducing GHG emission at textile factories by upgrading to air-saving loom
- ○ Installation of Cogeneration System in Hotel
- ○ Energy Saving by Utilizing Waste Heat at Hotel
- ○ Energy Saving for Air-Conditioning at Shopping Mall with High Efficiency Centrifugal Chiller
- ○ Energy Saving for Industrial Park with Smart LED Street Lighting System
- ○ Energy Saving for Office Building with High Efficiency Water Cooled Air-Conditioning Unit
- ○ Introduction of High Efficiency Once-through Boiler System in Film Factory

○ Model project in FY 2013 (3 countries, 7 projects)
○ Model project in FY 2014 (7 countries, 15 projects)
■ ADB project in FY 2014 (1 country, 1 project)
○ Model project in FY 2015 (7 countries, 18 projects)

Total 12 countries, 41 projects

- The underlined projects have been registered as the JCM projects (6 projects)

※these projects account for 2 registered JCM projects respectively, as they're operating in different sites

Refer to "New Mechanisms Information Platform" by MOEJ
http://www.mmechanisms.org/e/initiatives/jcm.html

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