

International Copper Association Southeast Asia

Defend and grow copper markets while contributing to the UN's Sustainable Development Goals

About ICA

The International Copper Association Southeast Asia (ICA-SEA) is a member of the Copper Alliance – a global network with presence in North and South America, Europe, India, China, East and Southeast Asia.

" Our mission is to defend and grow copper markets while contributing to the UN's Sustainable Development Goals. "



ICA-SEA supports market transformation programs in favor of higher efficiency electric motors, distribution transformers, air conditioners and other electric equipment and appliances.

Copper and Higher Efficiency Electric Equipment

Copper is an excellent electric conductor – about 40% more efficient than aluminum. It is therefore a material of choice for manufacturers of electricity-using equipment to minimize losses and meet higher energy performance requirements.

Industrial electric motors (typical copper contents) Cu (Kg/kW)



Copper and Renewable Energy Technologies

RE power systems tends to be of smaller size compared to conventional power generation systems, which implies more wiring, especially in distributed generation systems. Conventional power stations use about 1tCu/MW, while RE systems use 2 to 10 tCu/MW. ICASEA therefore supports efforts to promote and develop renewable energy systems.



ICA-SEA Sustainable Energy Interventions



Authorities

- Develop MEPS with standard making bodies
- Support development of policies to promote EE and RE
- Capacity building and technical assistance
- White papers



Industry

- Demand-side: promote life-cycle costing, advocate for investment in higher efficiency equipment, capacity building
- Supply-side: technology development, capacity building, develop tools for decisionmaking, establish industry alliances

Inte

Intermediaries

- Capacity building programs for engineers, installers, system designers
- Cooperation with institutes of engineers, industry associations, contractors associations, consumer associations, universities



Strategic Partnerships

- Local influencers and local experts
- Industry and professional associations, training institutions
- International agencies such as UNEP, APEC, European Union
- Utilities
- Ministries



Distribution Transformers (DTs)

Background

Based on IEA data, transmission and distribution (T&D) losses in electricity networks in APEC economies vary from a low of 2.8% to a high of 15.6% of final consumption.

About a third of transmission and distribution losses take place in distribution transformers (DTs). In parallel, many countries still have no mandatory EE policy for DTs.



Losses in electricity networks



Source: United for Efficiency - https://united4efficiency.org/

Promotion of Low Loss DTs - 50% Load versus Load/No Load Losses

Actual losses in a DT are determined by: No Load Loss + (Load Loss X Load Factor2)



For practical reasons, many standards measure the energy efficiency of DT at 50% load ("Ideal" case). In reality, the load varies throughout the day, and the performance of DTs varies accordingly, as shown in the table below:



Daily Energy Loss of Diverse 25 kVA, 1 ph DT Designs complying to MEPS at 50% Load

The IEC TS 60076-20 offers a better way of measuring the losses of a DT according to real conditions of utilization, as it does not consider 50% load only. For end-users, the IEC TS 60076-20 allows to select the most efficient DT to minimize future losses. For manufacturers, the IEC TS 60076-20 provides a framework to improve the design of their DT, as illustrated in the figure above.

PROJECT APEC Distribution Transformers Survey: Estimate of Energy Savings Potential from Mandatory Efficiency Standards (MEPS)



Results in APEC Region



32 terawatt hours (TWh) of electricity savings in 2030, roughly equivalent to the output of eleven 500MW power plants.



20% reduction over the 157 TWh electricity distribution losses projected in 2030



18 million tons (Mt) of annual carbon dioxide (CO2) emissions reductions by 2030



135 Mt of cumulative emissions savings between 2016 and 2030



19 billion USD in cumulative consumer financial benefits



PROJECT Reducing Losses in Power Distribution through Improved Efficiency of Distribution Transformers

Detailed Comparative and Gap Analysis



www.apec.org

International Dissemination Conference: 18-19 December 2017, Bangkok, Thailand

Multiplier Effect: 0 HAPUA

Development of education campaign for non-utility market in cooperation with HAPUA (Heads of ASEAN Power Utilities / Authorities) – ongoing. Stakeholders Consultation Workshop: 27-28 March 2017 in Jeju, South Korea

Policy Recommendations

- Adoption of IEC 60076-20 as testing standard
- Adoption of MEPS to regulate the non-utility market
- Education campaign on the advantages of low loss DTs, based on Total Cost of Ownership



Policy Recommendation



Funding Agency



International Copper Association Southeast Asia



Implementation Period

2016 - 2017

Project Value

Project Partners

USD\$189K



International Copper Association Southeast Asia Copper Alliance



Aligning Conformity Assessment Efforts for Energy Efficiency Regulations of Motors in the APEC and ASEAN Regions

Funding Agency



Overall Objective

Support market transformation in favor of higher efficiency industrial electric motors through:

- Adoption of international standards and MEPS
- Improvement of MV&E framework

Role of ICA

- Project management and organization of regional workshops
- Conduct of gap analysis study
- Preparation of recommendations

Major Recommendations

- Adoption of IEC60034 series and MEPS
- Adoption of the Global Motor Energy Efficiency (GMEE) program's approach to allow "Direct to Market" Certificate approach
- Promotion of deemed saving methodology to support ESCO model (based on EESL experience in India)

Key Partners



International Copper Association Southeast Asia Generations

Program Value

USD\$195K



Major Deliverables

- MV&E and S&L status report (February 2019)
- 2 workshops in Hongkong, China (March 2019) and Chinese Taipei (October 2019)
- Policy recommendation reports https://www.apec.org
- Recommended regional policy roadmap



1st workshop: 19 March 2019, in Hongkong, China



2nd workshop: 28-29 October 2019, in Chinese Taipei



Roadmap for Harmonization Report, IIEC



Policy Recommendation Report, APEC





International Copper Association Southeast Asia Copper Alliance



Overall Objective

 Improve quality, reliability and efficiency of solar rooftop PV systems through training of designers and installers

Funding Agency



Role of ICA

- Develop training curriculum
- Empower local training institutions
- Develop national training and certification programs

Major Recommendations

- Project management
- Organize regional workshops
- Develop training curriculum
- Identify local training institutions
- Organize training of trainers
- Develop training curricula and training materials











Copper Alliance

Program Value

USD\$306.2K

Implementation Period

2014 - 2015

Major Deliverables

- Training curriculum for PV system designers, in 30 modules
- Training curriculum for PV system installers, in 30 modules
- Training curriculum for trainers
- "Train-the-Trainers" workshop in Bangkok, 6-7 April 2015; 80 participants
- Final report
 - · Mapping of training institutions
 - Roadmap for the development of national training and certification programs



"Train-the-Trainers" Workshop, Bangkok, 2015



Training curriculum - https://www.apec.org



Final report - https://www.apec.org

Multiplier Effects

• Development of ASEAN regional HR development program for solar PV (work in progress)



International Copper Association Southeast Asia Copper Alliance



in all

Integrated Energy Solutions in Agro-Farming Pilot Phase in Shrimp Farming

Project Rationale

- Decentralized renewable energy systems and energy efficiency improvements are usually promoted independently, notably in the agro-farming sector in Mekong countries.
- The project proposed a holistic approach to improve the efficiency of the energy supply and energy use in shrimp farms by combining solar PV systems and energy efficient (EE) pump sets.
- The objective of the project (2011 2012) was to reduce farmers' diesel consumption, therefore not only reducing GHG emissions but also improving the farmers' economic situation.

Development and implementation of pilot project

The pilot project was located in Pranburi district (member of Sam Roi Yod Cooperation), Prachuap Kiri Khan Province, Thailand.

The selected farm has several ponds of which pond number 1 was used for the project. The pond included 5 aerators. The pilot project consisted of:

- Built electric power supply in alternating current (AC) 2.2 kW, 3-phase
- Installed 2.2 kW solar PVs system, able to supply continuously 10 hours / day
- Motor improvement: high efficiency motor-gear and 2.2 kW, 3-phase

















Pilot Project, Prachuap Kiri Khan Province, Thailand

Results indicated a reduction of energy costs of 20–30% as compared to the baseline scenario (diesel for energy supply and low efficiency motor).

Development of Financing Model

The financing model was designed primarily for the participating shrimp farms. The model was made user-friendly and versatile enough for easy use in other agricultural sectors and/or by ESCOs.

Project Impact and Sustainability

Dissemination of Project Outcomes

- 120 Members of FOSCOT (Federation of Shrimp Cooperatives of Thailand) expressed willingness to follow the model promoted (joint adoption of solar PV and High Efficiency Motors)
- The pilot project was reconverted as a training facility for FOSCOT members (over 1,000 members)

Poster

Guidebook for Farmers



Educational Video for Farmers, via CD-Rom and uploaded to Youtube



Information panel at the entrance of the pilot site



Leaflet and Flyers



Training visit at the pilot site



International Copper Association Southeast Asia Copper Alliance



Energy Management Gold Standard

Establishment of the ASEAN ENERGY Manager Accreditation Scheme (AEMAS)

Rationale

- In non-energy intensive industries, energy cost is often 5-7% of the total production cost. In turn, little attention is paid to energy management
- Energy management actions are often taken in response to regulation but rarely in a pro-active manner
- The energy manager is too often a technical-only function

Overall Approach

Make the Energy Manager a top-managerial staff

- The energy manager should have a top-managerial position to ensure Board's commitment and secure budget
- ASEAN-wide certification will improve the standing of energy managers

Provide international recognition to companies committed

- Providing an international recognition for companies adopting pro-active energy management practices will increase the demand for certification
- Such certification (Energy Management Gold Standard) mandates the actual investment in energy saving measures (to be quantified and audited)



Process for empowerment of Energy Managers

Funding Agency

Funded by the European Union

Program Value

€1.7 million





Certification of companies based on excellence in **Energy Management**

Based on international standards and recognition of performance to continuously improve energy efficiency

Training and Certification of Energy Managers

Empowerment of energy managers with skills to drive companies towards Energy Management Gold Standard and other international certificates

Achievements as of 2014

100 +certified local trainers

100 +certified local auditors

3,500+trained and certified energy managers

125 training workshops for energy managers

30 technical seminars

26 **AEMAS National Conferences**

2 **AEMAS** International Conferences

66 issues of the AEMAS newsletter with over 16,000 recipients

7 Companies certified / applying for certification



Project Partners

International Copper Association Southeast Asia, Country Coordinator, Thailand, Laos, Cambodia

ASEAN Centre for Energy, **Regional Coordinator**

Greentech Malaysia, Country Coordinator, Malaysia

Energy Practitioners Association of the Philippines, Country Coordinator, Philippines









Action for Sustainable Development, Technical Partner, France

Research Center for Energy

and Environment, Country

Coordinator, Vietnam



ASD

Myanmar Engineering Society,

PELANGI, Country Coordinator, Indonesia

Country Coordinator, Myanmar







International Copper Association Southeast Asia Copper Alliance

ASEAN SHINE

History

In November 2010:

 International Copper Association (ICA) together with United Nations Environment Programme (UNEP) conducted a survey on energy savings potential and current status in Energy Efficiency Standards and Labeling for Air Conditioners.

In May 2011:

 To be in line with priorities of the ASEAN Plan of Action for Energy Cooperation (APAEC), the EEEtC SSN endored the strategic framework for the Promotion of Higher Efficiency Appliances developed with the technical assistance of UNEP and ICA

In 2012:

 ICA, with the help of IEEJ from Japan, secured funding from APEC (111,000 USD) to implement the first phase of ASEAN SHINE: harmonization of ASEAN standards

2013 - 2016:

 ICA and UNEP received a grant from the European Union (1.7 million EURO) to implement ASEAN SHINE for air conditioners. ASEAN SHINE aims at promoting higher efficiency air conditioners through harmonization of test methods and energy

2017:

 ASEAN SHINE becomes a Private Public Partnership between UN Environment and ICA in support of United for Efficiency and Sustainable Energy for All. ASEAN SHINE extended to other technologies (lighting, refrigerators, etc.) and endorsed by ASEAN Ministers of Energy Meeting (AMEM) as Dialogue Partner. Replication of SHINE model to Latin America under preparation. Efficiency standards, increase of Minimum Energy Performance Standards, and inform consumers about economic benefits of higher efficient air conditioners.





€23 million

Benefits

asear

Based on an external evaluation conducted in 2017 by IIEC, the program has allowed to reduce electricity consumption by 7,261 GWh, equivalent to GHG emissions of 4.7 MtCO2, and 968.13 million USD, over the 2017-2019 period.



"The Ministers agreed to pursue the dynamic collaboration with Dialogue Partners in the area of energy efficiency and conservation and acknowledged the continued implementation of the EU SWITCH Asia's ASEAN-SHINE programme."

Joint Ministerial Statement 34th ASEAN Energy Ministers Meeting, September 2016

Major Deliverables



Establishment of Country Chapters

Country Chapters have been established in Indonesia, Malaysia, Philippines, Thailand and Vietnam. They assemble strategic national stakeholders including Ministries in charge of Energy, professional institutes, industry associations, national standard making body, testing laboratories.

Harmonization of testing standards

The TWG advised ASEAN Member States to adopt ISO5151:2010 as a single standard across ASEAN countries; ASEAN member states announced the adoption of this standard in 2015.



Regional Policy Roadmap

Following the adoption of the harmonized test standard, ASEAN Member States agreed to develop a regional policy roadmap that would set aspirational goals in terms of increasing MEPS over time



National Policy Roadmaps

Following the adoption of the regional policy roadmap, UNEP and ICA provided technical assistance to the governments of Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand and Vietnam to develop their national policy roadmaps.



Capacity building for testing laboratories

Technical staff from five ASEAN testing laboratories were trained on ISO 5151 standard.



Capacity building for local AC manufacturers

Two softwares (HXSim v2.1 and RACSIM v1.0) were designed to assist AC manufacturers with the design of higher efficiency air conditioners using the MicroGrooveTM technology.



Consumer awareness campaigns Extensive campaign including AC Select Application (for salespersons), YouTube Video, and training for 2,500 sales persons.





International Copper Association Southeast Asia Copper Alliance

Increasing the uptake of High Efficiency Motors (HEMs) and Drive Systems in Philippine Industries

Project Rationale and Objectives

The specific objective of the project was to increase the deployment of high efficiency electric motors and drives systems in Philippine industries through the design of model investment and financing schemes, the implementation of replicable pilot projects, and through the mobilization of key stakeholders including government authorities and agencies, industries (endusers and service providers), and the private financing sector. The project thereby aimed to contribute to:

- Increase the energy efficiency of the electricityintensive industries and achieve reduction in electricity consumption
- Reduce the contribution of industries in GHG emissions from energy use
- Help defer the implementation of additional generating capacity from fossil fuels



27.4% of the Phillippines' total electricity consumption is due to the energy-intensive industrial sector



65 - 70% of the total electricity consumption of local industries is due to the use of electric motors



55% potential electricity savings of companies that would invest in using high-efficiency motors.

Particular Case of Sugar Mils

Sugar mills in the Philippines, typically have excess electricity-generating capacity during the non-milling period. This creates specific opportunities for these mills to sell excess electricity to the grid. Using higher efficiency motors is a means to reduce losses, and thereby to maximize the potential for selling excess electricity to the grid. Sugar mills were therefore specifically targeted for pilot implementation of high efficiency motors.



switchasia



Project Partners



Program Value

€2 million

Implementation Period

2014 - 2017

Pilot Projects

With the support of the Philippines Sugar Millers Association (PSMA), and project partners' networks, pilot sites were identified, and agreements were signed with the following companies:

- Lopez Sugar Corporation (LSC)
- Central Azucarera De La Carlota (CACI)
- Central Azucarera Don Pedro Incorporated (CADPI)
- CEMEX Philippines (Solid Plant in Tanay Rizal, and Apo Cement in Naga, Cebu).

Investment grade audits and full feasibility studies were subsequently carried out for each pilot location. IE2 and IE3 motors were installed at the pilot sites, in replacement of IE1 old motors.



Signing of MOA with CEMEX Philippines, December 12, 2016

Financing and Capacity Building for Commercial Banks

- Integration of motor credit lines in EE financing programs of 3 commercial banks
- Training for: Landbank of the Philippines, Development Bank of the Philippines, Philippine National Bank
- Training program extended to (Banco De Oro (BDO) Universal Bank, Metropolitan Bank and Trust Company, Security Bank and Trust Company, China Banking Corporation, Small Business Guarantee Corporation (SB Corporation, Philippine Export-Import Bank (PHILEXIM), Bangko Kabayan, etc.

Policy

- White paper on MEPS and creation of a Working Group with DOE for MEPS adoption (2017)
- Establishment of a Technical Working Group on Motors under Department of Energy (DOE)
- Adoption of IEC 60034 standards (test methodology and energy efficiency classes) as national Philippine Standards.

Capacity Building for ESCOs

Basic training (1-day) was provided to 51 ESCOs.

In addition, the project developed a series of 9 training modules which were offered as the "ESCO Business Development Series" (3-days). The training program aimed to give companies the raw tools and practical knowledge needed to bid for an ESCO project and implement it.

24 ESCOs were trained using the ESCO Business Development Series. Of these, 9 ESCOs participated in the conduct of the feasibility studies and investment grade audits for the potential pilot sites



ESCO Business Development Workshop – July 11, 2016, Mandaluyong City (in cooperation with Asian Development Bank)



Training of LandBank of the Philippines, April 4-5, 2016



Integration of motor credit lines in EE financing programs of 3 commercial banks (Bank of the Philippine Islands, Development Bank of the Philippines, Landbank of the Philippines)





ASEAN Low Carbon Energy Programme (LCEP)

Program Introduction

The ASEAN Low Carbon Energy Programme (LCEP) is a £15m aid programme of the UK Prosperity Fund. In close collaboration with local and international entities from both the public and private sectors, the programme will help ASEAN harness the benefits from the deployment of low carbon energy by leveraging the UK's extensive and proven expertise in green finance and energy efficiency.

Expected Annual Savings by 2030*



8,510 GWh per year of savings in electricity consumption



836.3 million USD per year in monetary savings

5.5 million tCO2 per year in GHG emissions savings

Source: United for Efficiency - https://united4efficiency.org/

Benefits and Objectives

Primary Benefits

Inclusive growth and poverty reduction through increased energy efficiency and adoption of low carbon energy, including through the use of green finance.

Secondary Benefits

Improved trade in green finance, energy efficiency and low carbon technology between partner countries and the rest of the world, including the UK.

Program Component Higher Efficiency Motors

Objectives

Support countries for the adoption of IEC 60034, MEPS and MV&E framework



* In Indonesia, the program will focus exclusively on green finance

Work Plan







Role of ICA (Regional Policy Expert - Energy Efficiency)



Market Transformation Framework



International Copper Association Southeast Asia Copper Alliance

International Copper Association Southeast Asia Level 18, Park Ventures Ecoplex, 57 Wireless Road, Lumpini, Pathumwan, Bangkok 10330, Thailand +662-309-3438 https://www.copperalliance.asia/en/SEA

