



**Asia-Pacific
Economic Cooperation**



**International Copper
Association**
Copper Alliance

Reducing Losses in Power Distribution through Improved Efficiency of Distribution Transformers (EWG 05 2015A)

Project Updates

11 April 2018 | Washington DC – 51st EGEEC meeting

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International Copper Association

Project ID

- Project overseer: China Standard Certification Company (Ms. An Min)
- Project implementing partner: International Copper Association
- Consultant (sub-contracted): IIEC
- Budget (actual): 291,846USD including 150,000USD from ICA

Outline

1. Project objectives
2. Main activities
3. IEC 60076-20 technical specifications
4. Project status
5. Next Steps

Project Objective

Long-term Objective:

To improve the energy performance of DTs in APEC economies, resulting in reduced electricity losses and GHG emissions.

Specified Objectives:

Objective 1:

To build the capacity of policy makers on the (positive) impact of adopting **IEC 60076-20 technical specifications** for their economies in terms of electricity distribution loss reductions and GHG emission reductions

Objective 2:

To provide policy makers with clear policy recommendations that are made in consultation with key stakeholders (testing laboratories, manufacturers, standard making bodies)

Main Activities

- Data collection
- Organization of consultation workshops
- Technical analysis
- Impact analysis
- Preparation of policy and regulatory recommendations

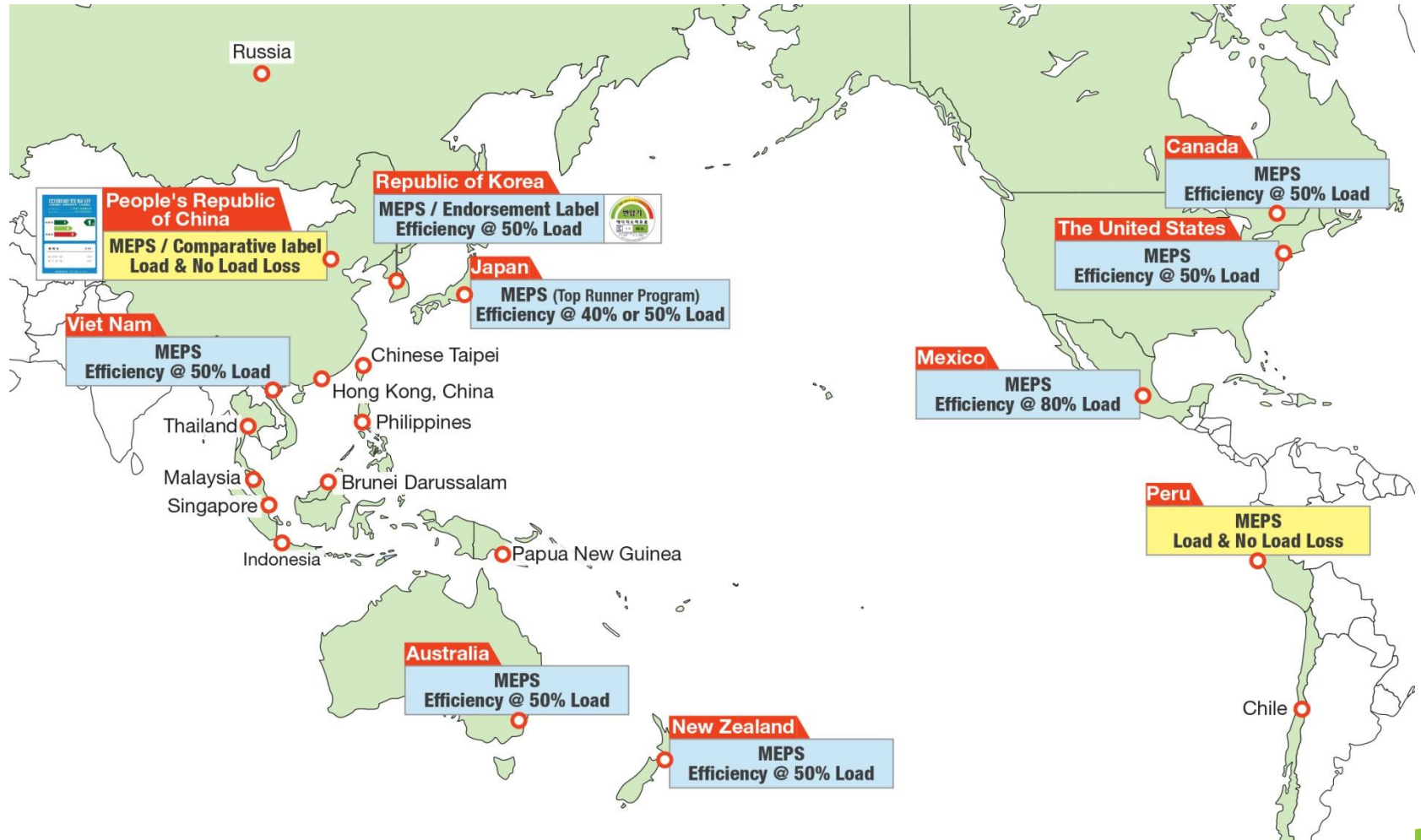
IEC 60076-20 Technical Specifications

- The most recent edition published in 2017
- Provides methods for efficiency and efficiency index calculation
- Provides two levels of recommendations for 50 Hz and 60 Hz distribution transformers
 - Level 1 is for basic energy performance
 - Level 2 is for high energy performance
- Energy performance **MAY** be specified in one of the following ways:
 - Minimum PEI (Peak Efficiency Index) for 50 Hz and 60 Hz
 - Maximum load losses and maximum no-load losses for 50 Hz
 - Minimum Efficiency Index at a load factor of 50% for 50 Hz and 60 Hz

Project Status - Data Compilation

- Questionnaires distributed through APEC focal points, utility contacts and during the 1st consultation workshop
- Feedback received from:
 - Philippines (3 utilities)
 - Peru (13 utilities)
 - Thailand (2 utilities)
 - Chinese Taipei
 - USA (PG&E)
- Remaining data compiled from secondary resources

Current DT MEPS in APEC Economies



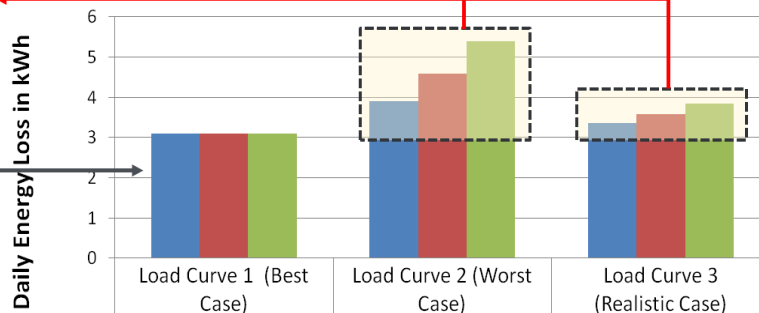
Project Status – Technical and Impact Analysis

- Energy efficiency index at 50% loading (EI_{B50}) and Peak Efficiency Index (PEI) do not well represent annual energy losses of a distribution transformer.
 - Two distribution transformers with the same EI_{B50} value can have different energy losses at the same specific % loading depending on their design characteristics.
 - A high PEI transformer may deliver higher energy losses than a low PEI transformer at the same % loading.
- No-load and losses requirements allow:
 - More accurate estimation of energy losses and saving potentials of a distribution transformer at different loading points.

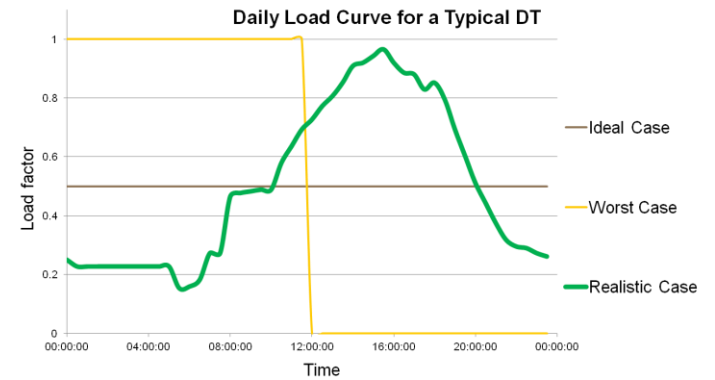
Analysis

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

These losses are not measured with standards using 50% load method



	Load Curve 1 (Best Case)	Load Curve 2 (Worst Case)	Load Curve 3 (Realistic Case)
Design A (NLL = 96 W, LL=144 W)	3.102	3.912	3.367
Design B (NLL = 66 W, LL = 264W)	3.102	4.587	3.588
Design C (NLL = 30W, LL= 408W)	3.102	5.397	3.854



Key recommendations

- Consultant report TOC:

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Key recommendations

- Only 10 APEC economies have adopted MEPS for DTs
- Adoption and improvement of MEPS in APEC economies can save up to 30TWh of electricity (eq. to 17 MtCO₂/year)
- From data gathered, most DTs used do NOT work on 50% load; change standard required to reduce losses

Project Status - Outputs

Outputs	Status
Project methodology and work plan	Submitted (Nov 2016)
Data collection	Completed (Jan – Jul 2017)
First stakeholder consultation workshop, Jeju, South Korea	Completed (Mar 2017)
Impact analysis modeling	Completed (Aug 2017)
Technical and impact analysis report	Completed (Oct 2017)
Final draft report on policy and regulatory recommendations	Completed Nov 2017
Second stakeholder consultation workshop, Bangkok, Thailand	Completed 18-19 Dec 2017

Next Steps

ICA-UN Environment through ASEAN SHINE:

- Provide technical support to APEC economies to adopt policy recommendations
- ASEAN member states already discussing establishment of ASEAN SHINE task force on DT to adopt policy recommendations made by the APEC-funded study



THANK YOU

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