IIEC
International Institute for Energy Conservation

Leading the Transition to Clean Energy

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The International Institute for Energy Conservation (IIEC)

IIEC was founded in 1984 to dramatically increase the use of energy efficiency as an important clean energy approach in developing countries. We believe local presence is the best way to bring about results and, through our regional offices all over the world, we have been effective in bringing about progress in energy efficiency policy and implementation that has both reduced energy demand by thousands of MWs, and fostered economic development in the countries we serve. IIEC works with stakeholders across all sectors to connect international best practice with the unique needs of the communities in which we operate, combining sound energy efficiency, Demand-Side Management (DSM) and renewable energy policy with hands-on implementation in order to reduce greenhouse gas emissions and encourage sustainable development.

IIEC's Key Activities

> Through our global network, we partner with public and private sectors, NGOs, community groups, universities, and other stakeholders to develop, implement and evaluate energy efficiency, DSM and renewable energy programs and policies. Our activities are multi-disciplined in nature, requiring interaction between regional, national and local governments as well as partnership with the private sector. We design, implement, and scale up programs in order to provide maximum efficiency gains.

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IIEC's Experience Timeline

- ENERGY EFFICIENCY AND DEMAND SIDE MANAGEMENT
- ENERGY EFFICIENCY AND RENEWABLE ENERGY POLICY DESIGN
- IMPLEMENTATION (FINANCING AND TRAINING)

1984 - 2000

1989 : Thailand
Thai End-Use Analysis Workshop

1989 : USA
DSM Study Tour of U.S.

1992-1993 : Thailand
Demand Side Management Pre-Investment Feasibility Assessment

1996 : Asia
Asia Regional Standards Initiative

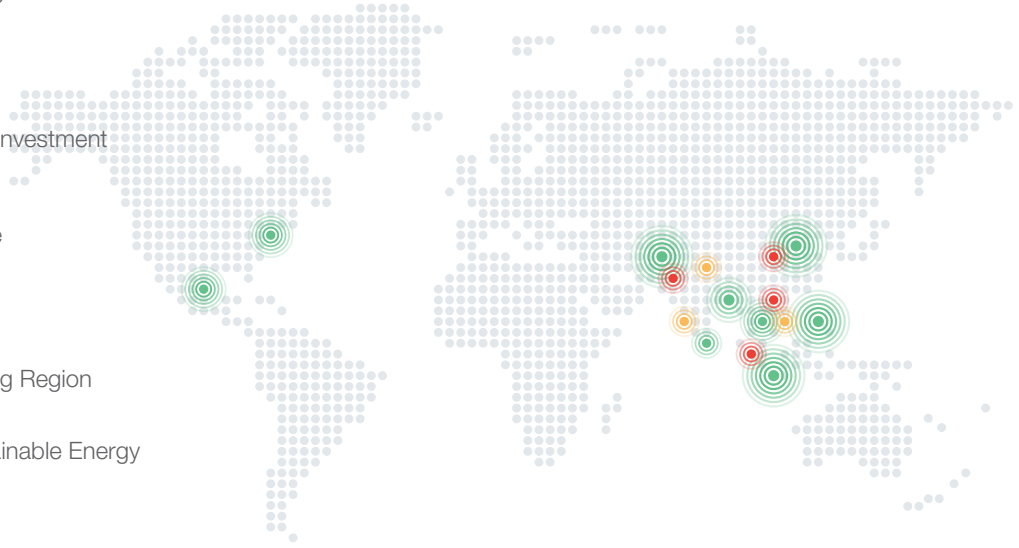
1997 : Indonesia
Indonesia Energy Policy Study

1997-1999 : Mekong Region
Sustainable Energy in the Mekong Region

1998-1999 : Asia
Asian Business Council for Sustainable Energy

1998 : Southeast Asia
Green IPPs for Southeast Asia

1998 : Vietnam
Vietnam Rural Electrification Master Plan



2001 - 2010

2004-2005 : ASEAN
Energy Standards and labelling Program

2004-2015 : Lao PDR
DSM/EE Implementation Project

2006-2007 : Fiji Islands
Development and Implementation of S&L Program

2007-2010 : Vietnam
Energy Efficiency Public Lighting Project – VEEPL

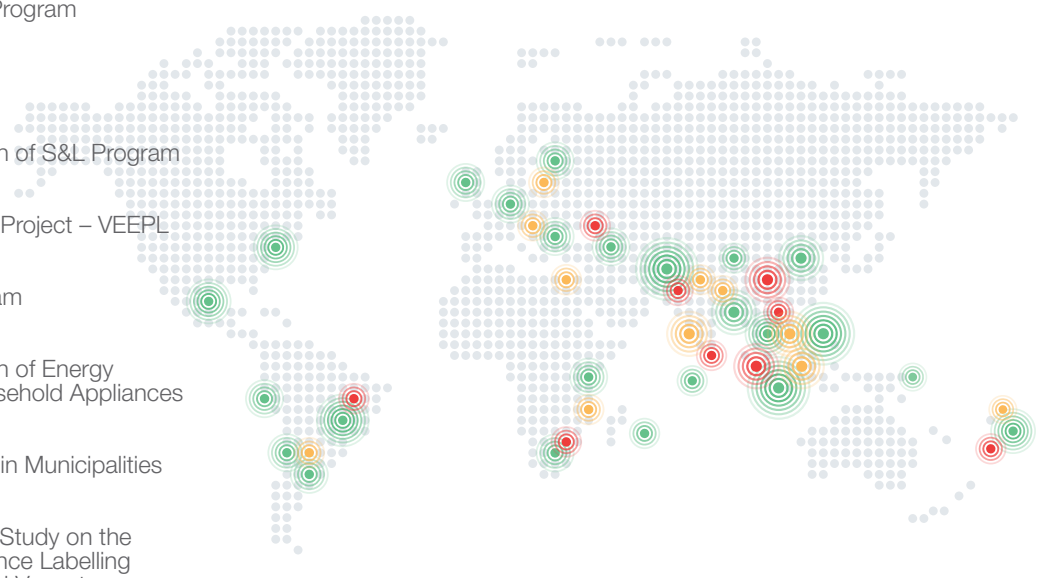
2008-2010 : Vietnam
National Energy Efficiency Program

2009-2010 : ASEAN
Development and Implementation of Energy Standards and Labelling for Household Appliances

2009-2011 : Thailand
Mainstreaming Energy Efficiency in Municipalities

2010 : Pacific Island Countries
Situation Analysis and Feasibility Study on the Impacts of Introducing an Appliance Labelling Programme in Samoa, Tonga and Vanuatu

2010-2013 : Philippines
Philippine Energy Efficiency Project – PEEP



2011 - Present

2011-2012 : Cambodia
Renewable Energy Promotion and Awareness Project

2011-2015 : South Pacific Islands
Promoting Energy Efficiency in the Pacific – Phase 2

2012 : Pacific Island Countries
Technical Analysis of Appliance Markets to Support the Pacific Appliance Labelling and Standards (PALS) Programme

2013 : Kenya
Training for Energy Standards and Labels

2014-2016 : Myanmar
Energy Efficiency & Conservation Policy, Strategy and Roadmap

2015-2016 : Federated States Of Micronesia
Energy Audit in Government and Commercial Buildings

2015-2016 : Indonesia
Development of a LED Street Lighting Retrofit Project for Surabaya, Indonesia

2015-2017 : ASEAN
Standards Harmonization Initiative for Energy Efficiency (ASEAN SHINE)

2015-2017 : Pakistan
Standards and Labelling Program for Punjab

2015-2017 : Mongolia
Assessing Energy Efficiency Potential in Mongolia

2016-2017 : Sri Lanka
Green Power Development and Energy Efficiency Improvement Investment Program

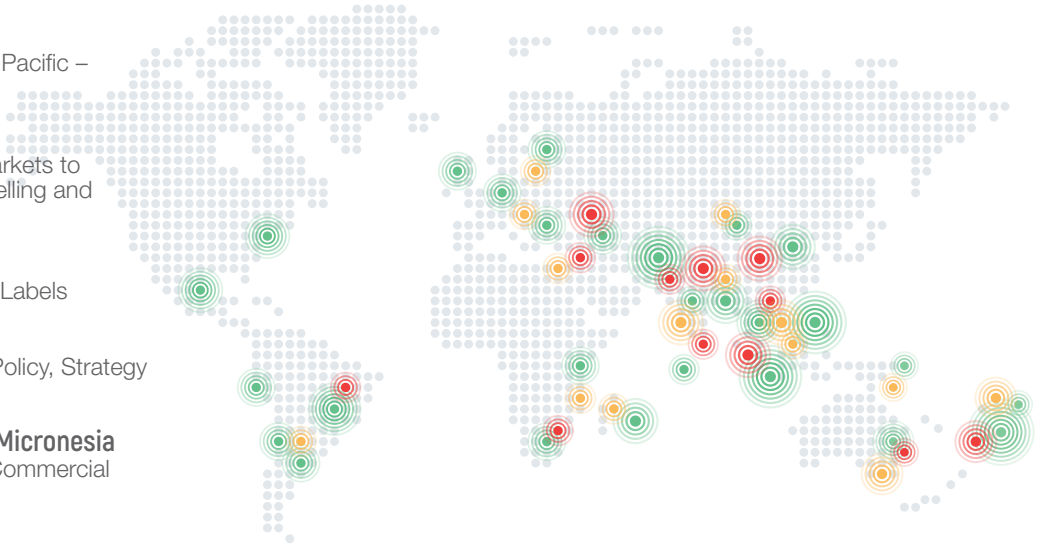
2017 : Myanmar
Energy Audit and Environmental Impact Reduction Project

2017-2018 : Mongolia
Transition to Green Development Project: Market Scoping, Program Design, and Impact Assessment for a Mongolian Standards & Labeling (S&L) Program

2017-2019 : Lower Mekong Region
Lower Mekong Initiative on Air Conditioning Efficiency

2018-2020 : Pacific Islands
Supporting Policies and Financing Mechanisms for Energy-Efficient and Climate-friendly Cooling in the Pacific

2018-2020 : Southeast Asia
Southeast Asia Cooling Program



01

Energy Efficiency and Demand Side Management

At a Glance :

IIEC is at the forefront of planning and implementing global Energy Efficiency (EE) and Demand-Side Management (DSM) programs. Our recent experience extends to Asia, Africa and the Pacific Islands and includes EE and DSM policies, program design, implementation, and Measurement and Verification (M&V). The projects we implement deliver significant amounts of verifiable energy and demand savings that have been acknowledged by host agencies and funders.

The Challenge :

Lack of generation capacity is extremely common in developing countries, particularly in Asia and Africa. This hinders economic development due to inadequate and unreliable power supply. Providing affordable and reliable energy is a key challenge for most electric utilities, and Energy Efficiency (EE) and Demand-Side Management (DSM) techniques are key solutions for addressing this challenge. Even though it has been proven that saving 1 MW of demand through EE measures is more cost effective than installing 1 MW of generation capacity, demand savings take a longer time to achieve. In order to address these issues, we have developed a number of implementation models that produce EE and DSM outcomes with a short lead-time.

Our Experience :

We take a comprehensive approach to implementing EE and DSM projects. Our experts start with focused load research and detailed energy audits, allowing them to identify opportunities, technology options and proper baselines for verifying program impacts. The implementation phase includes procuring equipment that meets the highest international standards while remaining adaptable to local conditions. Our M&V procedures conform to those followed by the International Performance Measurement and Verification Protocol (IPMVP) and the United Nations Framework Convention for Climate Change (UNFCCC). Through this approach, we develop implementation models that can be used for large-scale replication both nationwide and in other countries.

Pacific Islands

In the Pacific Islands, IIEC is the lead implementer of the **Promoting Energy Efficiency in The Pacific - Phase 2 (PEEP2) Project**, funded by the Asian Development Bank (ADB). This project covers the Cook Islands, Papua New Guinea, Samoa, Tonga and Vanuatu, and aims to stimulate EE through demand-side improvements to energy use in each country's residential, commercial, and government sectors. The project includes the development of an energy use database, EE policies, minimum energy performance standards (MEPS) for appliances, capacity building, and implementation of EE projects in residential, commercial and government buildings, as well as hotels and street lighting.

High Pressure Sodium and LED Street Lights in Samoa

Presentation on Lessons Learned from PEEP2 Implementation at the 2014 Pacific Power Association (PPA) Annual Conference in Tahiti

Malawi

IIEC designed and implemented a nationwide **Compact Fluorescent Lamps (CFL) Program** that replaced incandescent bulbs with 2 million CFLs in both the commercial and residential sectors. The verified demand savings of 65 MW during morning peak and 51 MW during evening peak enabled the utility, Electricity Supply Corporation of Malawi (ESCOM), to significantly reduce daily load shedding and connect an additional 18,500 new customers to the grid.

Official Launch of Malawi CFL Program by the Hon. Minister of Natural Resources, Energy and Environment, Mr. Goodall Gondwe

CFL Mascot Participates to Raise Awareness about Energy Efficient Lighting in the Community

India

Formal Launching of the USAID-funded BESCOM Efficient Lighting Program (BELP), a part of the ECO II Project in Bangalore, India

IIEC carried out the first large-scale market driven CFL program in India under the United States Agency for International Development (USAID)-funded **Energy Conservation and Commercialization II (ECO II) Project**. The project was executed in partnership with the Bangalore Electricity Supply Company (BESCOM) and resulted in peak demand savings of 17 MW over a nine-month period.

Philippines

IIEC was contracted by the Philippine Department of Energy to implement the US$46 million **Philippine Energy Efficiency Project (PEEP)**. Supported by a loan from ADB, the project included large-scale implementation of several EE and DSM components. Activities included energy efficient lighting retrofits in 135 public buildings, distribution of 8.6 million CFLs, public and street lighting projects in several cities, and development of a Green Building Rating Scheme. The project impacts, confirmed by the Philippine Department of Energy, included demand savings of 248 MW and annual energy savings of 321.75 MWh.

Installation of a Demonstration LED System at the Department of Energy's Headquarters

Signing Memorandum of Agreement to Retrofit Government Buildings

Lao PDR

IIEC contributed significantly to the **Lao PDR Demand-Side Management and Energy Efficiency Project** since its inception in 2004. Our main activities comprised implementing EE measures in public buildings, and a nationwide residential lighting program.

Lighting System Retrofits in Public Buildings

Opening Ceremony on Distribution of 400,000 CFLs

Thailand

The introduction of Light Emitting Diodes (LED) street lighting in 6 municipalities, under the ADB-funded **Mainstreaming Energy Efficiency Measures in Thai Municipalities (MEET) Project**, resulted in the development of a business model for municipalities to undertake EE and DSM activities in partnership with the electric utility, Provincial Electricity Authority (PEA). MEET acted as a scalable business model, advancing methods for increasing lighting efficiency across other Thai municipalities.

Vietnam

IIEC was the lead consultant for an ADB-financed project to identify potential EE improvements in large, energy-intensive industries. Primary industries targeted by the program were cement, chemical, steel, beverage, and plastic. The key outputs included an EE Project Finance Model and the identification of over US$100 million investment opportunities in the steel and cement industries in Vietnam.

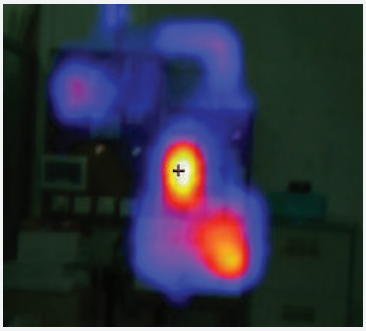
Myanmar

Energy Efficiency & Conservation Policy, Strategy and Roadmap (2014 - 2016). This project was under the Institutional Strengthening of the National Energy Management Committee (NEMC) in Energy Policy and Planning. The scope included the review of Energy Efficiency (EE) activities in Myanmar, determination of EE potential across all sectors, review of relevant energy policies and regulatory framework, development of a national EE Strategy and a 5-year implementation roadmap which included 34 activities for meeting the EE policy targets. The activities included the development of a **Roadmap for Appliance Standards & Labeling Program**. The EE Policy was approved by the Cabinet in February 2016 and IIEC is currently assisting in implementation of the activities under the EE Roadmap. Funding Agency – Asian Development Bank (ADB).

Appliance Energy Standards and Labeling Workshop in Myanmar

Energy Audit and Environmental Impact Reduction Project (2017). The scope includes review of the Environmental Footprint Assessment (EFA), conduct of energy audits in UNICEF Country office in Yangon, Mandalay and Myitkyina; conduct of on-the-job training to selected staff, preparation of specifications and procurement documents for selected EE measures. Funding Agency – United Nations Children's Fund (UNICEF).

Inspection of the Main Switch Board by IIEC Staff during the Energy Audit



Loose Connections detected by a Thermal Imaging Camera at the Main Switch Board in the UNICEF Myitkyina Field Office

Pakistan

Standards and Labelling Program for Punjab (2015 - 2017). This project aimed at supporting the Government of Punjab and the National Energy Efficiency and Conservation Authority (NEECA) to develop and implement the first ever MEPS and labelling program for electric fans as well as design and develop supporting programs (e.g., promotional and awareness campaigns, verification testing) for Punjab and NEECA. Main activities include: conducting market and industry surveys on electric fans and motors in Pakistan; supporting development and implementation of communication and awareness campaigns to promotion MEPS and labelling for electric fans; supporting development and implementation of MV&E frameworks; and coordinating with NEECA on verification testing of electric fans. Funding Agency – International Finance Corporation (IFC).

Pakistan Energy Label and Security Sticker affixed on a Fan Motor

Mongolia

Assessing Energy Efficiency Potential in Mongolia (2015 – 2017). This project aimed at accelerating Demand Side Energy Efficiency (DSEE) investment projects in Mongolia, and the scope includes data collection and analysis to determine DSEE potential in the key sectors; and identification of key end-use sectors and conduct of investment-grade energy audits in selected industrial and commercial facilities. Funding Agency – Asian Development Bank (ADB).

Cashmere Production Line at GOBI LCC in Ulaanbaatar, Mongolia

Traditional Coal Stoves (Left), Low-Emission Coal Stoves (Middle) and a Coal Stove in a Ger (Right)

Transition to Green Development Project (2017 – 2018). The primary objective of this assignment is to provide the initial evidence base to support the development of a well-designed and effective MEPS and labelling programs that help reduce energy consumption and local air pollution. Main activities include: conducting market and industry surveys; reviewing institutional frameworks for MEPS and labelling program and local testing capacity; conducting technical and environmental impacts analysis; and recommending priority products and institutional frameworks for implementation of MEPS and labelling programs. Funding Agency – Global Green Growth Institute (GGGI).

Sri Lanka

Green Power Development and Energy Efficiency Improvement Investment Program (2016 – 2017). IIEC was responsible for the Smart Building component of the project and the activities included: conduct of detailed building energy and infrastructure audits (lighting, cooling, heating, security and alarm systems, access control, audio-visual and entertainment systems, etc); design of the smart building pilot projects with Building Energy Management System (BEMS), Solar Rooftop and energy efficient lighting, energy efficient HVAC systems; and preparation of prepare technical specifications and provision of support for the procurement phase. Funding Agency – Asian Development Bank (ADB).

Air Handling Units in Bank of Ceylon Building

Southeast Asia

Southeast Asia Cooling Program (2018 – 2020). IIEC is partnering with CLASP to provide comprehensive advisory support, comprehensive technical and market evidence and training and capacity building to policy makers in the Philippines, Thailand and Vietnam to raise efficiency standards and testing efforts to ensure integrity of policies and the realization of energy and carbon savings. The project aims to promote more stringent AC MEPS; increased rates of MEPS compliance; enhanced MV&E capabilities nationally and regionally; lower trade barriers; and, in some instances, implementation of disposal and recycling activities of cooling products; and increased penetration of High Efficiency/low-GWP cooling products. Funding Agency – CLASP.

Our Achievements at a Glance

Country	Project	Funding Agency	Impacts
Global	Efficient Lighting Initiative (ELI)	IFC	Transition to high efficiency and high quality CFLs, fluorescent tubes, and ballasts in Argentina, the Czech Republic, Hungary, Latvia, Peru, the Philippines, and South Africa
Global	APEC Standards and Labeling Program	APEC	Establishment of baseline on energy standards and labeling in APEC economies Program enhancement for several existing appliance labeling programs
India	Energy Conservation and Commercialization II Project	USAID	Demand savings of 17 MW, with potential savings of 300 MW across Karnataka
India	Implementing Public Sector EE Project via Energy Service Companies (ESCOs)	WB	Energy efficiency projects implemented in 6 public sector buildings in 3 states
Lao PDR	DSM/EE Project – Phases I and II	WB	10% reduction in energy consumption in rural households
Malawi	EE Lighting Project	DfID	51 – 65 MW peak demand savings, allowing connection of 18,500 new customers to existing electricity grid
Myanmar	Development of the National Energy Efficiency Policy, Strategy and Roadmap	ADB	Energy security for sustainable economic development in Myanmar
Pacific Islands	Promoting Energy Efficiency in the Pacific - Phase 2 (PEEP2)	ADB	Reduction of energy consumption in the residential, commercial and public sectors and establishment of policy frameworks for reduction of fossil fuel imports
Philippines	Philippine Energy Efficiency Project (PEEP)	ADB	Estimated savings of 248 MW demand and 321 GWh annual energy consumption
Sri Lanka	Implementation of Energy Efficiency Policy Initiatives	ADB	Development of roadmap for the promotion of quality energy efficient lighting technologies
Thailand	Mainstreaming Energy Efficiency Measures in Thai Municipalities (MEET)	ADB	50% reduction in average energy consumption in public lighting; and expansion of LED street lighting to other municipalities
Vietnam	Implementation of National EE Program	ADB	Cost effective investment of US$100 million identified in 5 cement and 2 steel plants
Vietnam	Demand Side Management (DSM) Phase 2 Program	WB	120 MW of peak demand reduction; 3,000 GWh of cumulative energy savings over 3 years (2004-2007); and reduction of 0.6 million tons of CO_2

ADB = Asian Development Bank ; APEC = Asia-Pacific Economic Cooperation ; DfID = UK Department for International Development ; IFC = International Finance Corporation ; USAID = US Agency for International Development ; WB = The World Bank

02

Renewable Energy

The Challenge :

The complex issues facing our global energy landscape require dynamic solutions. Although recent decades have seen major advances in research and development in the field of clean and Renewable Energy (RE), we are now faced with the challenge of integrating and mainstreaming these opportunities into the international market. Lack of funding to develop enabling policies, raise awareness and address knowledge gaps creates barriers to RE project implementation in developing countries. With knowledge and experience in mapping RE projects, policies and funding mechanisms, IIEC is at the forefront of helping create a sustainable energy future.

At a Glance :

This century has reached a critical juncture in energy use and climate change. As the planet's average temperature rises, the frequency and scale of extreme weather events increases, and non-renewable resources become increasingly scarce, the importance of changing international energy trends has never been so clear. IIEC is committed to bringing about major change in the types and sources of energy we use. Renewable Energy (RE) provides an opportunity to deliver clean energy at a low cost, while reducing the emission of greenhouse gases (GHGs). IIEC has a long history of success and demonstrated expertise in implementing RE projects, and bringing these resources to scale.

Our Experience :

RE applications in developing countries are mainly off-grid or rural electrification. IIEC has implemented projects on solar photovoltaic, biomass and biodiesel for power production in Cambodia, India and the Philippines. Thermal power from renewable sources can often be cost competitive with fossil fuel in industrial process. We have been helping to guide the industrial transition to solar thermal and biogas from industrial waste in food and beverage industry in India and Thailand. Our expertise ranges from policy planning, project feasibility study, technical and financial assessment, to innovative financing schemes for RE projects.

Cambodia

In Cambodia, where electricity prices are among the highest in Asia, imported diesel is still the main fuel used for power generation, particularly in rural areas. As a result, low-income households have limited access to energy, which is a significant impediment to their economic prosperity. With support from the World Bank, IIEC implemented the **Renewable Energy Promotion and Awareness Project** to raise awareness about RE through television and radio advertisements and nationwide events in rural areas, leading to installation of 12,000 solar home systems in 7 provinces in Cambodia. IIEC conducted an assessment of RE stakeholders for scalable project investments, and stimulated discussions and workshops on rural RE opportunities among local commercial banks, rural electricity enterprises, and the Rural Electrification Fund (REF).

► *Benefits of Using Solar Lights in Cambodia*

► *Solar Photovoltaic (PV) System in Cambodia*

Philippines

Finding the most effective funding mechanism for RE has been a major challenge in the Philippines. As an implementer of the **New and Renewable Energy and Livelihood Support Project**, IIEC designed and piloted a risk-sharing funding mechanism in the province of Palawan to support RE. A portfolio of partial risk sharing guarantee funds was pilot tested to promote the commercialization of solar home systems. The Global Environment Facility (GEF) and the United Nations Development Programme (UNDP) jointly funded the project.

Under the **Philippine Energy Efficiency Project (PEEP)**, the use of LEDs in solar home systems was piloted in 223 households in off-grid areas of Aklan, Antique, Palawan, and Davao. The project scope included the procurement, installation and performance monitoring of the solar home systems, and resulted in an estimated 10,704 liters of avoided kerosene use per year.

► *Solar LED Public Lighting in Off-Grid Areas in the Philippines*

India

Wastewater Treatment Plant

IIEC developed a **Scalable Program for the Productive Use of Methane from the Dairy Industry** with funding from US EPA. Our team managed the project development process with three dairies in India, as well as the regulatory process of tariff setting. IIEC also helped install electricity generation equipment (micro-turbine and internal combustion engines) to enable the dairies to utilize the methane from the wastewater systems. Furthermore, we set up a large-scale distributed generation program for the dairy industry in partnership with the Ministry of New and Renewable Energy and state agencies involved in the promotion of RE technologies in various states of India.

Thailand

IIEC, in partnership with the Fraunhofer Institute for Solar Energy Systems and the Joint Graduate School of Energy and Environment, implemented the **Market Development for Solar Thermal Applications in Thailand (Soltherm Thailand) Project** to revive the solar thermal market in Thailand. IIEC collaborated with the industry to strengthen its capacity and diversify its market segments in the residential, commercial and industrial sectors. The project resulted in the formation of the Thai Solar Thermal Association and the launch of government subsidies for solar thermal technology.

Survey of Solar Thermal Systems in Hotels in Thailand

Thai Technical Committee Participated in the IEC Meeting

Implementation of **Photovoltaic (PV) Standardization, Certification and Labeling for Thailand Project** – under the European Union (EU)-Small Project Facility fund – led to harmonization of test standards across European and Thai solar industries, and to cooperation between respective test laboratories. For this project, IIEC carried out research and analysis of the solar PV industry, and provided technical assistance for incorporating International Electrotechnical Commission (IEC) standards in the Thai PV standards, as well as recommendations for the development of a Thai PV quality label.

Sri Lanka

Green Power Development and Energy Efficiency Improvement Investment Program (2016 – 2017). IIEC was responsible for the Smart Building component of the project and the activities included: conduct of detailed building energy and infrastructure audits (lighting, cooling, heating, security and alarm systems, access control, audio-visual and entertainment systems, etc); design of the smart building pilot projects with Building Energy Management System (BEMS), Solar Rooftop and energy efficient lighting, energy efficient HVAC systems; and preparation of prepare technical specifications and provision of support for the procurement phase. Funding Agency – Asian Development Bank (ADB).

Our Achievements at a Glance

Country	Project	Funding Agency	Impacts
Bangladesh, Sri Lanka, Thailand, the Philippines, and Vietnam	Solar Water Heater Market Assessment	UNEP	Strengthened market development of solar water heaters in 5 countries
Cambodia	Renewable Energy Promotion and Awareness Project	WB	12,000 Solar Home Systems installed successfully and supporting promotional materials designed
India	Solar Thermal Market Development (various projects)	BASF, USAID, UNEP	Solar thermal market developed for residential, commercial and industrial sectors
India	Assessment of the Potential to Capture Methane from Distillery and Winery Waste (M2M)	US EPA	Assessed distillery and winery waste in India and potential methane capture
India	Productive Use of Methane in Indian Dairies	USAID	Installed methane capture technologies in Indian dairy farms
Philippines	Green Independent Power Producer	WB / IFC	Developed business plan for power aggregation (including a framework for trading in the Philippines Wholesale Electricity Spot Market) that can be adopted by any prospective renewable energy company
Philippines	Energy Production from Biomass Materials	NZAID	1.5 MW biomass power plant on-stream for feasibility and investment packaging
Philippines	Green Energy Rating Program under the Philippine Capacity Building to Remove Barriers to Renewable Energy Development (CBRED) Project	UNDP / GEF	Institutionalisation of the Green Energy Rating Program; provided mechanism to award and incentivize active project developers and end-users for participation in successful RE projects
Philippines	LED Solar Home Systems	ADB	Off-grid supply to 223 households – reduced kerosene use by 10,700 liters/year
Thailand	Market Development for Solar Thermal Applications in Thailand	EU	Initiation of an assessment of solar thermal in commercial application project by a government agency; and Development of the Thai Solar Thermal Association
Thailand	Photovoltaic Standardization, Certification, and Labeling for Thailand	EU	Formation of the Thai Technical Committee on Photovoltaics and the adoption of International Electrotechnical Commission (IEC) standards
Thailand	Policy Research for the Promotion of R&D in RE and EE in Thailand	TRF	Policy recommendations and R&D priorities for the Thai government

ADB = Asian Development Bank ; US EPA = US Environmental Protection Agency ; EU = European Union ; GEF = Global Environment Facility ; IFC = International Finance Corporation
NZAID = New Zealand Aid Programme ; TRF = Thai Research Foundation ; UNDP = United Nations Development Programme ; UNEP = United Nations Environment Programme
USAID = US Agency for International Development ; WB = The World Bank

03

Rural Electrification

The Challenge :

Expanding the coverage of the grid electricity service and improving its quality pose formidable challenges, many of which are common to rural areas across developing countries. Addressing these challenges requires a comprehensive approach through effective rural electrification strategies and programs.

Rural areas are characterized by low population density and typically have a significant number of low-income households. The average household's demand for electricity is low and generally peaks in the evening. Electricity distribution costs must also be spread among relatively few people, resulting in high costs for each unit of electricity consumed and high grid expansion costs. As a result, many poor households in rural and peri-urban areas thus have no access to the grid, which impacts their livelihoods.

Demand for electricity normally matures slowly as consumers invest in appliances, and make the switch from other fuels for their lighting and cooking. Designing and implementing rural electrification projects with a focus on clean and efficient technologies presents a key opportunity to minimize the costs and environmental impacts of the projects, and to maximize the financial and socio-economic benefits to a community or region. In order to increase access to clean, reliable energy for consumers of all kinds, we promote efficient grid connections and support off-grid Renewable Energy (RE) technologies.

At a Glance :

IIEC works collaboratively with national, local and community level partners in developing countries to provide robust models, policies and action plans for effective and sustainable implementation of clean energy technologies and services to improve the lives of rural communities. We integrate Renewable Energy (RE) technology into rural electrification markets in Asia, Africa and the Pacific Islands.

Our work in this sector consists of feasibility studies, market assessment and development, policy research and comparative assessment of relevant technologies. IIEC's projects focus on addressing knowledge gaps, and linking energy access to social development goals through policy assessments, framework development, design of knowledge materials, and training and capacity building of relevant stakeholders. We address the problem of low access to electricity in rural areas and insufficient capacity on the grid through installation of appropriate technologies for rural households.

Our Experience :

IIEC provides support to both public and private sector stakeholders in developing countries in order to enhance rural and peri-urban electrification planning, project development, and implementation. We design rural electrification programs that promote Energy Efficiency (EE), and support a livelihood based and a gender focused approach to energy access.

To address electrification needs in developing countries, IIEC's comprehensive approach includes :

- **Delivery of Technology Packages** – Identify and design appropriate grid connected and off-grid solutions for both commercial and non-commercial entities.
- **Policy Support and Policy Frameworks** – Develop policy and institutional arrangements conducive for the integration and provision of off-grid electricity services (mini/micro grid) within existing rural grid electrification programs.
- **Awareness Raising and Capacity Building** – Design and implement awareness raising campaigns, as well as training and capacity buildings programs for policy-makers, technology providers, manufacturers, financial institutions, and rural consumers on the importance of small-scale rural electrification programs.
- **Financing Mechanisms** – Provide technical assistance in developing appropriate financing mechanisms for large-scale dissemination of rural electrification technologies and programs.
- **Learning and Replication** – Publish strategy papers, technology guidebooks, articles, and discussion papers; organize events and workshops to disseminate experience and lessons learned to promote rapid implementation of rural electrification based on clean energy technologies.

Cambodia

Under the World Bank's Energy Sector Management Assistance Program, IIEC conducted a **Comparative Assessment of Existing Renewable Energy-Based and Biofuel-Based Electrification Options**. This consisted of a technical, economic and financial assessment of selected RE-based rural electrification projects utilizing different technologies such as solar PV, micro hydro and biomass gasification in Cambodia. Our project team performed a comparative analysis of these existing RE projects and the use of bio-diesel (e.g., coconut oil and jatropha curcas oil) as an alternative fuel in diesel generators. This analysis substantiated the possibility of integrating bio-diesel options into the rural electrification industry.

IIEC also carried out an awareness campaign about RE technology – particularly solar home systems in rural Cambodia – in collaboration with the Rural Electrification Fund (REF). This involved the development of TV and radio advertisements, brochures, and local events that successfully supported the installation of 12,000 solar home systems across the country.

Philippines

IIEC initiated the concept of Green/Renewable Independent Power Producer (Green IPP) or Greenergy, which is a package of lower cost EE resources and higher cost RE resources delivered to the grid that can compete with the traditional fossil fuel power resource options. This low-carbon approach enables the use of energy from both off-grid and on-grid sources as well as from hybrid sources.

As part of ADB's **Philippine Energy Efficiency Project (PEEP)**, IIEC procured, installed and monitored the use of LED lighting powered by solar home systems in 223 rural off-grid households.

► *LED Solar Home Systems in Off Grid Areas in the Philippines*

Thailand

► *A Solar Home System on Koh Pu Island, South of Thailand*

For the Heinrich Böll Foundation, IIEC evaluated the most cost effective and reliable hybrid energy systems – comprising of solar, wind, and diesel hybrid technology – through a community-based approach for islands located in the Andaman Sea.

Our Achievements at a Glance

Country	Project	Funding Agency	Impacts
Cambodia	Comparative Assessment of Existing Renewable Energy Based and Biofuel Based Electrification Options	ESMAP / WB	Increased the percentage share of RE in Cambodia's energy mix
Philippines	LED Solar Home Systems	ADB	Off-grid supply to 223 additional households – reduced kerosene use for lighting by 10,700 liters/year
Philippines	Green Independent Power Production	RBF	Substantial co-generation investments undertaken by 3 sugar milling companies
Thailand	Renewable Energy Options for Islands in the Andaman Sea: PV/Wind/Diesel Hybrid	HBF	Evaluation of the most cost effective and reliable hybrid system with a community based approach for islands in southern Thailand

ADB = Asian Development Bank ; ESMAP = Energy Sector Management Assistance Program ; HBF = Heinrich Böll Foundation ; RBF = Rockefeller Brothers Foundation ; WB = The World Bank

04

Integrated Approach to Sustainable Livelihoods

At a Glance :

Human consumption of water, food, and energy directly and indirectly affects the ecosystems and natural resources on which society depends for its survival. Rising energy and food prices, and crisis events such as droughts, increasingly demonstrate the dangers of managing water, energy, and food systems in isolation. IIEC has contributed to several initiatives that integrate energy and these other critical areas to ensure a balanced approach to development.

The Challenge :

Exacerbated by rapidly accelerating urban development, huge challenges face developing countries in terms of **water**, **energy**, and **food security**. These three systems intersect in numerous ways:

- Energy is required to treat wastewater and transport water for drinking, agriculture, and commercial/industrial uses, as well as to power pumps and other equipment used to grow food.
- Water is needed to grow food, sustain communities, produce electricity, and manufacture products.
- Certain crops are increasingly used to produce energy.
- Water quality can be adversely affected by food and energy production.

Scarcities of all three are exacerbated by policies developed to govern the management of one resource, without consideration of the impacts on the others. These inter-linkages point to a critical need for co-management of the three resources.

Our Experience :

Water, energy and food security can be achieved through a nexus approach – integrating management and governance across sectors and scales. Such an approach can support the transition to a green economy, which aims, among other things, at resource use efficiency and greater policy coherence.

India

Adopting a **Water – Energy – Biomass Nexus (WEB)** framework can link critical water and energy resource management systems with human livelihoods in order to achieve more effective services. The other key component of this nexus, the agricultural sector, offers important opportunities to co-manage energy and water resources through enhanced power distribution and end-use efficiency, coupled with sound water management practices. Along this conceptual framework, IIEC implemented a USAID funded project in India to develop a model for the co-management of water, energy and biomass. The project was designed to enhance efficiency in energy and water use by establishing the critical link with biomass-based sustainable agriculture and alternative electricity generation practices. Improving the efficiency of WEB resource management will enhance social, political and economic aspects of rural India.

Storing Ground Water in an Open Ditch Wastes Both Water and Energy

Brazil

Energy Efficiency Pollution Prevention (E2P2) was based on the simple idea that industries create waste through the inefficient use of energy and materials, and that these processes could be altered to produce more, and requiring fewer input costs. The E2P2 project extended the "industrial ecology" concept – harnessing potential benefits of wasted energy and materials through novel technologies, and using them to design profitable projects that increased Energy Efficiency (EE) while decreasing pollution.

The E2P2 concept:

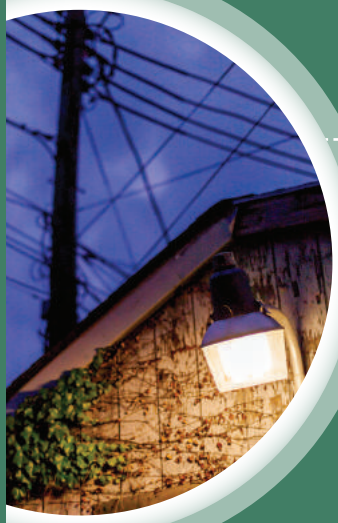
- Added economic value to projects,
- Promoted the use of innovative technology, and
- Reduced the cost of environmental compliance.

IIEC helped integrate energy and material efficiency by evaluating the impact of various processes over project life cycles. In Brazil, we performed an integrated assessment of EE and pollution prevention opportunities in the textile industry – this research was subsequently used to propose potential investments. The immediate investments in the proposed areas provided a commercial opportunity for 15% reduction in water-use and 5% reduction in energy consumption. As a result of this initiative, numerous industrial firms throughout Brazil integrated E2P2 concepts into their process of financial due diligence.

Our Achievements at a Glance

Country	Project	Funding Agency	Impacts
Brazil	Energy Efficiency and Pollution Prevention (E2P2) in Brazilian Textile Industry	Luce Foundation	Development of packaged, environmentally sound and energy efficient closed loop systems in textile industries
India	Water Energy Biomass Nexus	USAID	1 MW of biomass based power designed
India	Addressing Climate Change with Low Cost Green Housing where Green is Affordable	WB / IFC	Review and evaluation of low-cost, sustainable technology systems and their large-scale replication for affordable housing
India	Strategic Framework for Implementation of EE Projects for Indian Water Utilities	WB	Participation of the private sector in the implementation of EE projects in Indian water utilities

IFC = International Finance Corporation ; USAID = US Agency for International Development ; WB = The World Bank



05

Sustainable Urban Development

The Challenge :

More than half of the current global population lives in urban areas, and almost all new population growth is expected to occur in cities. The speed and scale of urban population expansion represents enormous challenges in terms of meeting the growing demand for energy services; but also presents a range of opportunities for addressing energy use, mitigating global Greenhouse Gas (GHG) emissions, and improving living standards. Our goal is to design and implement effective sustainable projects that help reduce GHG emissions, energy use and costs, as well as to improve the overall quality of life of urban populations.

At a Glance :

Given the rapidly accelerating pace of urban development in emerging economies and the resulting climatic and environmental impacts, IIEC is committed to providing ongoing advice and expertise to government stakeholders and the private sector on resource use, energy efficient buildings, sustainable construction practices, and healthy and productive indoor environments.

Our Experience :

When implementing sustainable urban development projects, IIEC's primary focus is to provide new technological solutions for energy efficient housing and other buildings, as well as public lighting systems and other urban services. We are doing so by building the capacity of local institutions and forming strategic local and international partnerships. We assess the innovative use of materials, scale up proven technologies, and use new business models and contemporary practices to adopt integrated design solutions. IIEC has successfully carried out green and energy efficient building projects in residential, commercial, public, and industrial sectors in India, Malawi, the Philippines, South Africa, Sri Lanka, and the Pacific Islands.

India

To address the challenges resulting from the resource intensive housing construction boom in India, IIEC launched an **Eco-Housing Partnership** to scale up the use of energy efficient technologies and practices in the residential sector. This initiative was implemented with support from USAID and the Global Development Alliance. The first phase of the Eco-Housing Program built significant momentum in the market toward eco-housing practices by providing policy support at both the local and state levels, and supporting the set up of tax rebates by urban local bodies as well as specific housing mortgage products.

The eco-housing assessment criteria, which formed the basis for the voluntary eco-housing certification, received an encouraging initial response from private developers, with a total of four residential projects in Pune complying with the certification process. Under the second phase of the program, IIEC extended the program to other states and focused on sustainable construction practices, provided training to professionals (designers, architects, engineers, and policy-makers), and established a Sustainable Building Technology Center (SBTC) to build awareness of eco-housing concepts among consumers. The SBTC was instrumental in showcasing the performance of proven and eco-friendly building technologies.

Philippines

Because significant opportunities exist for energy savings in buildings of all types in the Philippines, IIEC's focus in this country is primarily on large-scale implementation of building retrofits to reduce energy costs and improve comfort levels.

In the **USAID Green Buildings / Green Resorts Program**, we worked with corporate leaders, electric utilities, and government agencies to facilitate Energy Efficiency (EE) investment in industrial and commercial buildings. The overall approach focused on creating and strengthening energy services companies (ESCOs) for implementation and project financing, independent measurement and verification (M&V), and certification of carbon credits under the United Nations Framework Convention on Climate Change (UNFCCC). As part of the program, IIEC established a **Green Malls Program**, which conducted energy audits in malls and shopping centers, and implemented EE measures in 12 commercial organizations; these efforts resulted in an estimated annual energy savings of 2,000 MWh (representing displacement of 11,870 t CO_2 per year).

IIEC also supported the **Development of Energy Efficient Buildings Program** in Quezon City as part of the **Energy Efficient Cities Initiative** under the World Bank's Energy Sector Management Assistance Program. The aim was to develop a detailed program plan for implementing large-scale retrofits and provide guidance on long-term development of green/energy efficient buildings in Quezon City. The programs proposed by IIEC included a Green Schools Retrofit Program with an estimated potential annual electricity reduction of 18 GWh, an EE program for offices and hospitals with an estimated annual electricity reduction of 23.5 GWh, benchmarking of public and private sector buildings, and enforcement of the Green Building Ordinance.

On behalf of the ADB, IIEC implemented a series of EE projects in residential, commercial and public sector buildings as part of the **Philippine Energy Efficiency Project (PEEP)**. Activities included retrofitting 150 government buildings with energy efficient lighting, resulting in an estimated power demand reduction of 635 kW and an annual energy savings of 1.37 GWh. In addition, IIEC assisted the Philippine Department of Energy in the nationwide distribution of 8.6 million CFLs to the residential sector, resulting in an estimated annual energy savings of 223.56 GWh. Under the PEEP, IIEC also contributed to the development and upgrade of the Green Building Rating System in collaboration with the Philippine Green Building Council (PHILGBC).

► *Nationwide Simultaneous CFL Distribution*

South Africa

IIEC carried out an innovative, multi-year **Sustainable Housing Initiative Project**, which targeted the development of energy efficient housing for low-income populations in South Africa. This was the first ever climate change project in the housing sector under the UNFCCC's Clean Development Mechanism. IIEC and its local partners successfully trained local builders in sustainable building design and supported construction of energy efficient and zero-carbon homes for low-income households under the project's Housing for a Healthier Future component. Furthermore, our team built 16 new energy efficient demonstration homes in township communities, which were comprised of energy efficient components and incorporated passive-solar design.

Sri Lanka

As part of USAID's Tsunami Reconstruction Project, IIEC supported the **Green Building Certification for Vocational Centers Project** in Sri Lanka, which was based on the Green Building Design and Leadership in Energy and Environmental Design (LEED) certification. This was the first LEED certification project in Sri Lanka and resulted in three vocational centers achieving LEED Silver certification.

Thailand

In Thailand, IIEC provided technical assistance to the ADB and the Provincial Electricity Authority (PEA) to identify standard EE measures that could be applied to buildings and street lighting. Activities included demonstrating LED technology for street lighting applications in selected municipalities in order to facilitate **Mainstreaming Energy Efficiency Measures in Thai Municipalities (MEET)**.

► *Installation of Two LED Street Lighting Luminaires and Verification of Road Surface Illuminance*

Our Achievements at a Glance

Country	Project	Funding Agency	Impacts
India	Mainstreaming Eco-housing Partnership	USAID	Creation of Sustainable Buildings Technology Center
India	Creation of Mumbai Energy Alliance	Blue Moon Fund, The Overbrook Foundation and AFD	Massive scale-up of climate-friendly, energy efficiency implementation in Mumbai
Philippines	Green Buildings Project	USAID	Green buildings projects that saved 2,000 MWh per year and displaced 11,870 tCO_2e
Philippines	Development of Energy Efficient Buildings Program in Quezon City	WB / ESMAP	Development of long-term Energy Efficiency Green Building Program Plan; and Institutionalization of City Future Building Ordinance
South Africa	Sustainable Housing Initiative	UNFCCC	Development of energy-efficient housing for low-income South Africans
Sri Lanka	Green Building Certification for Vocational Centers	USAID	Construction of 12 energy efficient Vocational Centers; and three achieved LEED Silver certification
Thailand	Mainstreaming Energy Efficiency Measures in Thai Municipalities	ADB	Increased awareness of using energy efficient lighting for sustainable urban development

ADB = Asian Development Bank ; AFD = Agence Française de Développement ; ESMAP = Energy Sector Management Assistance Program ; UNFCCC = United Nations Framework ; Convention on Climate Change ; USAID = US Agency for International Development ; WB = The World Bank

06

Clean Energy Finance

The Challenge :

The Energy Efficiency (EE) and Renewable Energy (RE) technologies and practices needed to develop the global clean energy market exist, but must be implemented on a massive scale in order to address growing energy demand and achieve significant greenhouse gas emission reductions. This will require the financial commitment of stakeholders in both the public and private sectors to galvanize change in the ways we use and produce energy. Although such changes provide tremendous financial opportunities for stakeholders at all levels, the current lack of knowledge, the need for suitable financial products, and the barriers to making initial investments are significant constraints to scaling and implementing clean energy solutions. IIEC uses our extensive knowledge of clean energy finance to address these financial barriers and increase access to capital through development of innovative financing policies and mechanisms.

At a Glance :

IIEC designs innovative financing mechanisms and provides capacity building in project financing to facilitate access to finance for Energy Efficiency (EE) and Renewable Energy (RE) projects. We seek to identify and promote financing opportunities for employing technologies and initiatives to mitigate carbon emissions. Our programs foster growth in clean energy markets by developing financing solutions, identifying economic opportunities, reducing perceived investment risks, and connecting stakeholders across sectors in order to build environmentally sound financial partnerships.

Our Experience :

Our programs address all stages of project finance – from identifying appropriate funding mechanisms to capacity building on clean energy project finance for stakeholders on both the supply and demand sides. We work with financial institutions, entrepreneurs, project developers, governments, and Energy Service Companies (ESCOs) to build investment potential and ensure both monetary and environmental returns. This involves helping institutions assess the financial viability of clean energy programs, and designing financial models to suite programmatic needs.

Recognizing the economic potential of EE and RE programs, we use a market-based approach to scale up and sustain clean energy projects in emerging economies. By building the capacity of organizations to assess, plan and implement fiscally viable clean energy programs, we ensure that low-carbon growth initiatives move beyond pilot phases and continue to deliver sustainable economic, social and environmental benefits. In short, we leverage the financial opportunities inherent in clean energy solutions as a means of driving down emissions and stimulating socioeconomic growth.

IIEC encourages building investment opportunities in energy efficient, low-carbon growth areas for the simple reason that it costs less and delivers more – clean energy is just a good fiscal policy. We are committed to helping investors realize the tremendous economic potential of clean energy development in developing economies. By strengthening the linkage between private sector interest and sustainable development, we are demonstrating that ecologically sound development is also the most economically viable method of building infrastructure and commerce.

Philippines

IIEC conducted a study that enabled the International Finance Corporation (IFC) to identify sustainable energy efficient investment opportunities in the commercial building sector. We also designed an effective and viable EE financing project to encourage collaborative undertakings between private stakeholders and IFC.

► *Stakeholders' Meeting for Consumer and Housing Cooperatives on Micro Financing Schemes for Efficient Lighting*

Under the UNDP funded **Philippine Efficient Lighting Market Transformation Project (PELMATP)**, IIEC assessed consumer cooperatives, developed Energy Efficient Lighting (EEL) Micro Financing Models, conducted regional consultations and provided training to consumer cooperatives. We also negotiated the financing of bulk procurement arrangements with EEL suppliers, and enabled households to access EEL technologies using the micro financing model. The project assessed the capacity and training needs of financial institutions for financing EEL projects and developed and delivered a training program for them. In addition, our team developed promotional materials for EEL financing products and provided technical assistance to the Development Bank of the Philippines on EEL ESCO financing guidelines.

Under the **Capacity Building to Remove Barriers to Renewable Energy Development in the Philippines Project**, funded by UNDP, IIEC provided financial advice on the design of a Renewable Energy Guarantee Fund, Project Feasibility Fund, and Micro-Financing Fund. For the UNDP-funded **Palawan New and Renewable Energy Livelihood Support Project**, we designed an appropriate risk sharing delivery mechanism for solar home systems in Palawan.

Maldives

IIEC designed the operating guidelines, project eligibility criteria, loan terms, borrowers' eligibility criteria, and fund management terms and conditions for a RE Fund in the Maldives. IIEC also designed and conducted training for financial institutions and private entrepreneurs on project financing of RE projects and RE based livelihood projects. These activities supported the UNDP-funded **Renewable Energy Technical Development and Applications Project**.

► *Presentation of Guidelines for the RE Fund and Capacity Building for RE Project Financing*

Vietnam

IIEC assessed market opportunities for sustainability projects in Vietnam's steel and chemical fertilizer sectors from the perspective of the financial institutions and service providers. The aim of the UNDP funded project – **Strengthening Capacity on Climate Change Initiatives in the Industry and Trade Sectors** – was to remove barriers in Vietnam's industrial sector to adopting efficient processes and trade practices in order to achieve Greenhouse Gas (GHG) emission reductions, resilience to climate change, and increased industrial competiveness.

Under the Implementation of National EE Project, IIEC provided consultancy services to the Asian Development Bank (ADB) to carry out the following tasks: identifying financial barriers for EE projects; reviewing past and on-going energy efficiency financing programs in Vietnam; assessing the capacity of local financial institutions for funding efficiency projects, developing options for structuring a financing mechanism; making recommendations on how to enhance the capability of the financial institutions; and recommending suitable financial mechanisms for the identified projects.

Under the UNDP-funded **Promoting Energy Conservation in Small and Medium Enterprises (PECSME) Project**, IIEC developed and conducted EE project financial analysis and evaluation training modules. The training materials included an automated spreadsheet for the projected cash flow, income and balance sheet statements suited to the SMEs and the Vietnamese economy.

Mongolia

As part of the **Commercialization of Super Insulated Buildings Project** funded by UNDP, IIEC reviewed the financing systems and relevant legislation for energy efficient housing in Mongolia, and evaluated the financial mechanisms developed by the project staff. To step up financing for building energy efficient housing, our team proposed alternative funding mechanisms and formulated fund-raising guidelines.

Malawi

IIEC developed the fund management strategies and work plan for an EE Revolving Fund to be established from the proceeds of the sale of CFLs in Malawi. The project aimed to reduce the overall system peak demand of Electricity Supply Corporation of Malawi Ltd and to expand the level of electrification. The project included the procurement of 2 million CFLs, of which 1.3 million were installed free of charge in order to replace existing incandescent bulbs in the residential sector, small and medium enterprises and public buildings. The balance was sold to the commercial sector and proceeds of the sale were used to finance other EE projects through the EE Revolving Fund.

Pacific Islands

Supporting Policies and Financing Mechanisms for Energy-Efficient and Climate-friendly Cooling in the Pacific (2018 – 2020). IIEC with support from the Kigali Cooling Efficiency Programme (K-CEP) will provide technical support to the national energy offices and local financial institutions in the Cook Islands and Palau to develop financial mechanisms for suppliers and end-users to adopt high-efficiency climate-friendly air conditioning. The activities also include: design and implementation of training programs for commercial end-users on benefits and operations of energy-efficiency and climate-friendly air conditioners, as well as coordination with the PALS programme to promote adoption of more stringent MEPS and labelling requirements with climate-friendly features air-conditioners. Funding Agency – ClimateWorks Foundation/the Kigali Cooling Efficiency Programme (K-CEP).

Our Achievements at a Glance

Country	Project	Funding Agency	Impacts
China	Strategy for Establishing a Venture Capital Fund for GHG Reduction Projects in China	UNIDO	Establishment of a private equity fund to provide capital to Chinese small and medium enterprises (SMEs)
India	Development of Financial Products and Related Institutional Mechanisms	ADB	Establishment of an EE market
India	Design and Road Map for State Clean Energy Funds for End-use EE and RE Projects	UK FCO	Developing design documents for Clean Energy Funds for 2 Indian States
Malawi	EE Lighting Project	UK DFID	Establishment of an EE Revolving Fund
Maldives	RE Technology Development and Application	UNDP/GEF	Development of guidelines and manual for the management and operation of an RE Fund
Mongolia	Commercialization of Super Insulated Buildings in Mongolia	UNDP/GEF	Funding mechanism for EE housing
Philippines	PELMATP – Leasing Model & Micro Financing Scheme for EE lighting	UNDP/GEF	Development of an efficient lighting installment scheme model for electric cooperatives and distribution utilities; and Development of CFL micro-financing schemes for consumer cooperatives and housing cooperatives
Philippines	Barrier Removal for RE Development – Finance Delivery Mechanism	UNDP/GEF	Establishment of a Guarantee Fund, Micro Finance Fund and Project Preparation Fund for RE projects
Philippines	Market Development of Solar Energy Home Systems (SHSs) in Palawan	UNDP/GEF	Pilot testing of a risk sharing mechanism between financial institution and an SHS supplier
Thailand	Survey of Sustainable Energy Leasing and ESCO Business Opportunities in Thailand	IFC	Identified market potential, market drivers and business opportunities in lease financing combined with ESCO, EE, RE and cleaner production (CP) services and other financing options available for ESCO/EE/RE/CPs in Thailand
Vietnam	Promoting EE in SMEs	UNDP/GEF	Establishment of a EE Loan Guarantee Fund for SMEs

ADB = Asian Development Bank ; GEF = Global Environment Facility ; IFC = International Finance Corporation ; UK DFID = UK Department for International Development ; UK FCO = UK Foreign and Commonwealth Office ; UNDP = United Nations Development Programme ; UNIDO = United Nations Industrial Development Organization

07

Training and Capacity Building

At a Glance :

IIEC enables sharing of knowledge and best practices across countries, and facilitates the mainstreaming of successful energy policies and projects. We accomplish this through our focus on local needs and delivery of training and capacity building programs customized to suit local contexts. The core objective of our training and capacity building programs is to ensure that stakeholders can implement energy related policies and activities in a sustainable manner.

The Challenge :

Lack of knowledge and appropriate skills to identify and address the needs in clean energy development is common among policy makers, regulators, financiers, and private sectors in developing countries and economies in transition. These barriers have hampered greater adoption of clean energy policies and projects by policy makers and stakeholders. Often, even successful Energy Efficiency (EE) and Renewable Energy (RE) projects cannot be replicated due to a lack of market-supporting conditions, such as limited knowledge within financial institutions about financing such projects. The limited capacity of local technology suppliers and installers is another barrier to development and scaling up of clean energy projects.

Our Experience :

IIEC's training and capacity building programs are developed through a comprehensive process. In each program, we assess specific needs and address them by using customized training tools, materials, and training approaches. Quantitative and qualitative market surveys, and in-depth analyses are the core elements in our capacity building needs assessment exercises, which help IIEC define the capacity building requirements of the recipients. International experience and lessons learned are seamlessly integrated into our customized training tools and materials.

Simple classroom training is never sufficient; IIEC always combines hands-on implementation or a "learning-by-doing" approach with conceptual training. Monitoring and evaluation of the program effectiveness are integrated into the design phase to ensure that the program objectives are met.

By sharing lessons learned and knowledge on practical solutions, IIEC catalyzes the uptake of clean energy implementation worldwide. Enabling stakeholders to develop and implement EE and RE projects helps communities achieve energy and financial savings while building livelihoods and transforming the global energy market. IIEC has extensive experience in planning and conducting comprehensive training and capacity building programs related to clean energy in the Asia-Pacific and African regions.

Pacific Islands

► *Energy Audit Training in Samoa*

Under the **Promoting Energy Efficiency in the Pacific - Phase II (PEEP II) Project**, IIEC conducted a training program to support the development of EE projects in five Pacific Island Countries: the Cook Islands; Papua New Guinea; Samoa; Tonga; and Vanuatu. The training modules covered energy auditing, financial analysis, measurement and verification (M&V), contracting, marketing, and project management.

Vietnam

IIEC conducted several training programs in Vietnam covering the commercial, industrial and Small and Medium Enterprise (SME) sectors with funding from the World Bank, UNDP and ADB. A four-year program titled **Commercial EE Pilot Program (CEEP)** focused on the private sector (ESCOs, financial institutions and equipment suppliers) and EE project development, resulting in the implementation of 205 EE projects. In the industrial sector, the training focused on energy management practices for senior and middle management and investment-grade energy audits. In the SME sector, training was provided to potential ESCOs and energy efficient equipment suppliers.

► *Training Session for Equipment Manufacturers and Suppliers*

Lao PDR

► *Advanced Energy Audit Training in Lao PDR*

As a part of the World Bank funded **Demand-Side Management and Energy Efficiency (DSM/EE) Project**, IIEC conducted an advanced energy audit training program for DSM staff and energy coordinators at Electricite du Laos (EdL), and prepared a professional development program for EdL staff.

Kenya

IIEC delivered a detailed introductory and technical training on Standards and Labeling (S&L) to key implementers in Kenya. This project was part of the national S&L Programme, which was a 5-year initiative designed to remove barriers to market transformation of energy efficient products and services in Kenya. The program was funded by UNDP and supported by the Ministry of Industrialization and Enterprise Development.The training covered testing procedures, performance standards and certification for CFLs and fluorescent tubes, domestic and commercial refrigerators, air conditioners, and three-phase electric induction motors.

► *S&L Training in Kenya*

Lebanon

For the **Lebanese Center for Energy Conservation (LCEC) Project on Capacity Building of ESCOs**, funded by UNDP, IIEC designed, developed and conducted training modules on EE project financial analysis and evaluation. The training materials included the development of an automated spreadsheet for the financial projection of project cash flow, income and balance sheet statements tailored for the Lebanese economy.

Myanmar

Energy Efficiency & Conservation Policy, Strategy and Roadmap (2014 – 2016). This project was under the Institutional Strengthening of the National Energy Management Committee (NEMC) in Energy Policy and Planning. The scope included the review of Energy Efficiency (EE) activities in Myanmar, determination of EE potential across all sectors, review of relevant energy policies and regulatory framework, development of a national EE Strategy and a 5-year implementation roadmap which included 34 activities for meeting the EE policy targets. The activities included the development of a **Roadmap for Appliance Standards & Labeling Program**. The EE Policy was approved by the Cabinet in February 2016 and IIEC is currently assisting in implementation of the activities under the EE Roadmap. Funding Agency: Asian Development Bank (ADB).

Federated States of Micronesia

Energy Audit in Government and Commercial Buildings (2015 – 2016). The scope includes the conduct of Preliminary Energy Audits (PEA) in five selected sites of the Pohnpei State and a Detailed Energy Audit (DEA) in one site, capacity building in energy auditing of staff of the Department of Energy, Ministry of Resources & Development (DOE-MRD) and supporting the implementation of EE measures. The sites included the government complex, College of Micronesia, State Executive Building, State hospital and a Hotel. The Government Complex was chosen for the DEA. Funding Agency – United Nations Development Programme (UNDP).

► *Energy Audit Training for DOE-MRD Personnel in Pohnpei, Micronesia*

ASEAN

Standards Harmonization Initiative for Energy Efficiency (ASEAN SHINE) (2015 – 2017). The ASEAN SHINE is a joint effort of UN Environment and the ASEAN Centre for Energy. The main objective is to support promotion of energy efficient room air conditioners and lighting products through understanding of energy efficiency potential, harmonization testing standards and energy efficiency requirements, and capacity buildings on MV&E. Main activities include: conducting market and industry surveys in 10 ASEAN member countries; conducting small-scale household appliance saturation surveys; conducting technical and environmental impact analysis at the national and regional levels; implementing capacity building activities on MV&E in selected ASEAN member countries through development of MV&E procedures; conducting market sampling and verification testing, and evaluation of test results; and conducting evaluation of the overall project impacts. Funding Agency: United Nations Environment Programme (UN Environment).

► *ASEAN-SHINE Regional Workshop to Discuss Technical and Environmental Analysis Results by IIEC*

► *Household Appliance Saturation Surveys in Myanmar*

Lower Mekong Region

Lower Mekong Initiative on Air Conditioning Efficiency (2017 – 2019). IIEC is partnering with CLASP to support LMI partner countries (Cambodia, Lao PDR, Myanmar, Thailand and Vietnam) in implementation and enforcement of MEPS for air-conditioners LMI partner countries and also other countries in Southeast Asia. The main activities include organization of training workshops, conduct of round-robin energy performance testing for room air conditioners and provision of support for LMI countries to conduct market surveillance activities for room air-conditioners. Funding Agency: US Department of State.

► *LMI Workshop in Bangkok, Thailand, in January 2018 (left) and Site Visit to AC Testing Facility at Electrical and Electronics Institute in Thailand (right)*

Our Achievements at a Glance

Country	Project	Funding Agency	Impacts
India	Technical Assistance to Small Industries Development Bank of India (SIDBI) on Energy Efficiency and Clean Production Credit Lines	KfW / SIDBI	Development of assessment tools and capacity building of bank staff on EE financing to SMEs with M&V for credit line performance assessment to achieve target emission reduction
India	Design of Bank Capacity Building as part of ECO-Asia Clean Development and Climate Program	RDMA	Capacity building of banks and financial institutions on financing EE projects
India	Capacity Building of Banks and Financial Institutions for Energy Efficiency Project Financing	BEE / HSBC India	Development of a customized capacity building program for bank branch managers and loan officers to effectively appraise and finance EE projects
Lebanon	Energy Service Company (ESCO) Training	UNDP	ESCO capacity building on financial evaluation of EE projects
Pacific Islands	Promoting Energy Efficiency in the Pacific – Phase II	ADB	More than 100 participants in 5 Pacific Islands trained on energy auditing
Philippines	Business Finance Capacity Building on Efficient Lighting	UNDP / GEF	Capacity building of financial institutions on efficient lighting
Vietnam	Commercial Energy Efficiency Pilot Project	WB	205 EE projects implemented by trained energy service providers
Vietnam	National Energy Efficiency Program	ADB	Investment Grade Audits in 7 industrial sites with investment potential of US$100 million
Vietnam	Promoting Energy Conservation in SMEs	UNDP	Training for more than 60 energy service providers to support implementation of projects in the brick, ceramics, paper & pulp, textile and food processing sectors
Vietnam	Vietnam Energy Efficiency Public Lighting (VEEPL) Project	UNDP	Capacity building on design, installation, operation, maintenance and management of public lighting system; and Development of a national testing and certification facility in compliance with national and international standards
Kenya	Removal of Barriers to EE and Energy Conservation in SMEs	UNDP / GEF	Capacity building of SMEs in developing bankable EE projects
Kenya	Prepare & Deliver Training for Energy Standards and Labels	UNDP	Capacity building on energy performance standards and labels for policy makers, implementers and distributers/importers
Lebanon	Energy Auditing and Project Development	UNDP	Enhanced audit quality and bidding procedures for implementation

ADB = Asian Development Bank ; BEE = Bureau of Energy Efficiency - India ; GEF = Global Environment Facility ; HSBC = Hongkong and Shanghai Banking Corporation Limited - India ; KfW = Kreditanstalt für Wiederaufbau (German Government Owned Development Bank) ; RDMA = USAID's Regional Development Mission for Asia ; SIDBI = Small Industries Development Bank of India ; UNDP = United Nations Development Programme ; WB = The World Bank

08

Communication and Outreach

The Challenge :

A lack of comprehensive knowledge management resources – such as project databases, networks and implementation guides – creates significant barriers to scaling and replicating successful clean energy programs. At the same time, lack of consumer knowledge impedes adoption of energy efficient practices and technologies. In spite of the large volume of global pilot projects, many policy makers lack the technical capacity to design, implement and extend successful Energy Efficiency (EE) and Renewable Energy (RE) programs. The lack of consolidated project information makes it difficult for leaders to learn from and improve upon past projects. Failure to consolidate and distribute lessons learned across regions and sectors represents a significant constraint to international progress in clean energy and climate change mitigation efforts. Creating mechanisms to communicate and reach out to key stakeholders, intermediary organizations, and the public is therefore a key challenge.

At a Glance :

In order to bring good energy policy into practice and raise its profile in international dialogue, IIEC develops strategic communication and outreach plans to raise public awareness of Energy Efficiency (EE) and Renewable Energy (RE) as well as to stimulate stakeholder participation, education and engagement in sustainable energy. IIEC provides assistance in planning and designing promotional materials and programs, including event management in Asian countries such as Cambodia, China, India, Lao PDR, the Philippines, and Thailand. IIEC manages and maintains information-sharing platforms to provide a dynamic and robust mechanism for disseminating research efforts and knowledge to the broader community.

Our Experience :

To promote awareness, IIEC facilitates replication and mainstreaming of successful projects by compiling lessons learned and disseminating program knowledge and best practice methods to leaders and consumers alike. IIEC crystalizes data and program experience by developing and maintaining comprehensive implementation manuals, websites, databases, social media, advertising (print, online, radio, or television commercial), marketing collaterals (brochures and case studies), events (workshop proceedings), and trade shows; this allows us to bridge the gap between global knowledge and local action. We integrate web-based applications and databases for supporting online promotional and educational activities, which have become an essential tool in the communication and marketing environment.

IIEC creates international networks, tailors best practice methods to local needs, and reaches out to consumers across sectors. Our integrated knowledge management programs compile international project data and lessons learned into comprehensive guides, ensuring that success is replicated and brought to scale. In order to reach residential and small business consumers, we carry out marketing and advertising campaigns that incorporate all key media platforms. Our strategy is to pioneer new methods while ensuring that success is brought to scale across communities.

Regional and Global

► *ASEAN Climate Change Action Database (www.accad.sean-cc.org)*

Over the past decade, IIEC has initiated and maintained various portals of energy information for the energy community worldwide. IIEC has made itself known as a developer and pioneer of energy related web-based knowledge management systems such as:

- Asian Climate Change Action Database *(www.accad.sean-cc.org)*
- Energy Standard and Labeling Information Clearinghouse *(www.clasponline.org)*
- APEC Energy Standard Information System *(www.apec-esis.org)*
- International Performance Measurement and Verification Protocol (IPMVP) *(www.evo-world.org)* and
- Efficient Lighting Initiative *(www.efficientlighting.net).*

Lao PDR

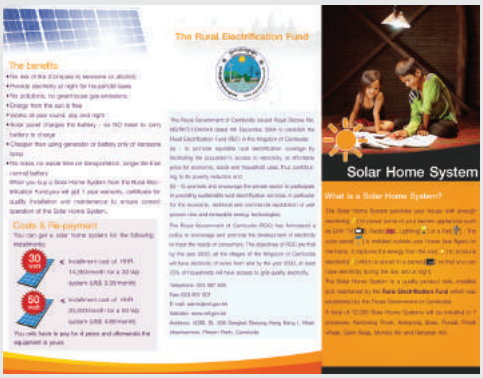
IIEC provided technical assistance to the national utility of Lao PDR, Électricité du Laos, for the Demand-Side Management and Energy Efficiency (DSM/EE) Project - Phase I and II, a World Bank and GEF funded project during 2007–2015. The overall objectives were to determine the energy consumption levels for the major ministries/agencies and to address the issue of inefficient practices in all significant end-user sectors. IIEC was tasked with the communication and outreach about this project and launched a public awareness campaign for promoting energy efficiency in public, residential and small-scale commercial sectors. We conducted a household appliances saturation survey to facilitate the development of a roadmap for the implementation of an appliance S&L program. IIEC, in collaboration with the new DSM Cell in the utility, published a series of bi-lingual (Lao & English) DSM/EE newsletters on a quarterly basis and created a social networking site to provide updates on project activities and raise energy efficiency awareness. The objective was to strengthen understanding of the DSM/EE project approach for promotion of energy efficiency, and to increase public awareness and encourage more active stakeholder participation. More information is available at www.laodsm.net.

► *Appliance Saturation & Energy Efficiency Awareness Survey to Assess and Develop S&L Roadmap, in Savannakhet, June 2014*

► *Bi-lingual (Lao & English) DSM/EE Newsletter*

Cambodia

In Cambodia, IIEC completed a series of promotional activities on RE as part of the Renewable Energy Promotion and Awareness Program (REPA) under the Renewable Energy Fund (REF) in Cambodia, funded by a World Bank/GEF grant and REF. In this project, REF installed 12,000 solar home systems in rural villages throughout Cambodia. IIEC organized on-site events in rural villages to promote solar energy, solar home systems, and rural electrification. At each event – attended by an average of 200 people – an educational video, developed by IIEC was shown, in conjunction with distribution of promotional materials such as T-shirts, caps, calendars, and bags.



Solar Home System Brochure

On-site Events in Balang, Kampong Thom to Promote Solar Energy, November 27, 2011

IIEC also organized a workshop and study tour to two biomass gasification plants outside Phnom Penh in order to trigger greater discussion and interest in RE financing for rural electrification in Cambodia. Workshop participants were asked to highlight current challenges to securing financing for rural electrification, and to identify prominent knowledge barriers. Finally, IIEC created a bilingual project website to share project results and clean energy knowledge.

Thailand

IIEC developed a communication and outreach plan for the Mainstreaming Energy Efficiency Measures in Thai Municipalities (MEET) Project, to enhance and scale up municipal EE projects throughout Thailand. The MEET project was initiated in 2008 following the Government of Thailand's request for technical assistance from ADB to support the Provincial Electricity Authority (PEA). Under this plan, IIEC organized and promoted a series of workshops, and designed and developed a web portal to increase awareness and disseminate results – this included the Manual of EE Projects in Thai municipalities.

The regional and national workshops provided agency representatives with a forum to discuss and review the draft action plan for replicating municipal EE projects in Thai municipalities and to showcase project demonstration sites for interested municipalities. More than 100 representatives from Thai municipalities, government agencies, academic institutions, consultants, and ESCOs participated in the workshops. A key outcome of the MEET project was the strengthened capacity of PEA and municipalities to identify, design, finance, and implement EE measures.

MEET National Workshop to Solicit Inputs on Technology, Resources and Implementation Issues to Support Large Scale Replication, February 2012

Manual of EE Projects in Thai Municipalities

Our Achievements at a Glance

Country	Project	Funding Agency	Impacts
APEC Economies	APEC Energy Standards Information System (ESIS) www.apec-esis.org	APEC	Increased awareness and understanding of S&L issues
Cambodia	Renewable Energy Promotion and Awareness	WB	Increased awareness of Renewable Energy among key stakeholders in Cambodia's renewable rural electrification industry; and Stimulation of new investments in renewable rural electrification in Cambodia
Global	Energy Efficiency Standards and Labelling Information Clearinghouse – CLASP www.clasponline.org	USAID, UN Foundation, US EPA, US Dept. of State	More than 1,000,000 hits from more than 80 countries
Global	Efficiency Valuation Organization (EVO) www.evo-world.org	EVO	Over 65,000 hits from 100 countries; subscriptions have reached to 200
Global	Efficient Lighting Initiative (ELI) Project www.efficientlighting.net	IFC	High market penetration rate of ELI certified products
Lao PDR	Demand Side Management/ Energy Efficiency (DSM/EE)	WB	Increased awareness of EE and adoption of EE technologies and practices in all major end-used sectors
Southeast Asian countries (ASEAN)	Asian Climate Change Action Database (ACCAD)	UNEP	Development of a database to support sound policy, technology and investment choices to achieve reduction in GHG emissions; and potential co-benefits by sharing information on resource potentials pertaining to climate change actions in ASEAN region
Thailand	Mainstreaming Energy Efficiency Measures in Thai Municipalities (MEET)	ADB	Establishment of a sustainable business model(s) for the large scale implementation of EE measures in buildings

ADB = Asian Development Bank ; APEC = Asia-Pacific Economic Cooperation ; EVO = Efficiency Valuation Organization ; IFC = International Finance Corporation ; UNEP = United Nations Environment Programme ; UN Foundation = United Nations Foundation ; USAID = US Agency for International Development ; US Dept. of State = US Department of State ; US EPA = US Environmental Protection Agency ; WB = The World Bank

COUNTRIES OF EXPERIENCE : Europe

- Czech Republic
- Estonia
- Hungary
- Latvia
- Lithuania
- Poland
- Romania
- Slovakia
- Ukraine
- United Kingdom (UK)

COUNTRIES OF EXPERIENCE : Asia

Bangladesh	Maldives
Bhutan	Mongolia
Cambodia	Myanmar
China	Nepal
Georgia	Pakistan
India	Philippines
Indonesia	Singapore
Jordan	Sri Lanka
Lao PDR	Thailand
Lebanon	Vietnam
Malaysia	

COUNTRIES OF EXPERIENCE : North America

- Mexico

COUNTRIES OF EXPERIENCE : Africa

- Egypt
- Kenya
- Malawi
- Mauritius
- South Africa

COUNTRIES OF EXPERIENCE : South America

- Argentina
- Brazil
- Chile
- Peru

COUNTRIES OF EXPERIENCE : Pacific Islands

- Cook Islands
- Federated States of Micronesia
- Fiji
- Papua New Guinea
- Samoa
- Solomon Islands
- Tokelau
- Tonga
- Vanuatu

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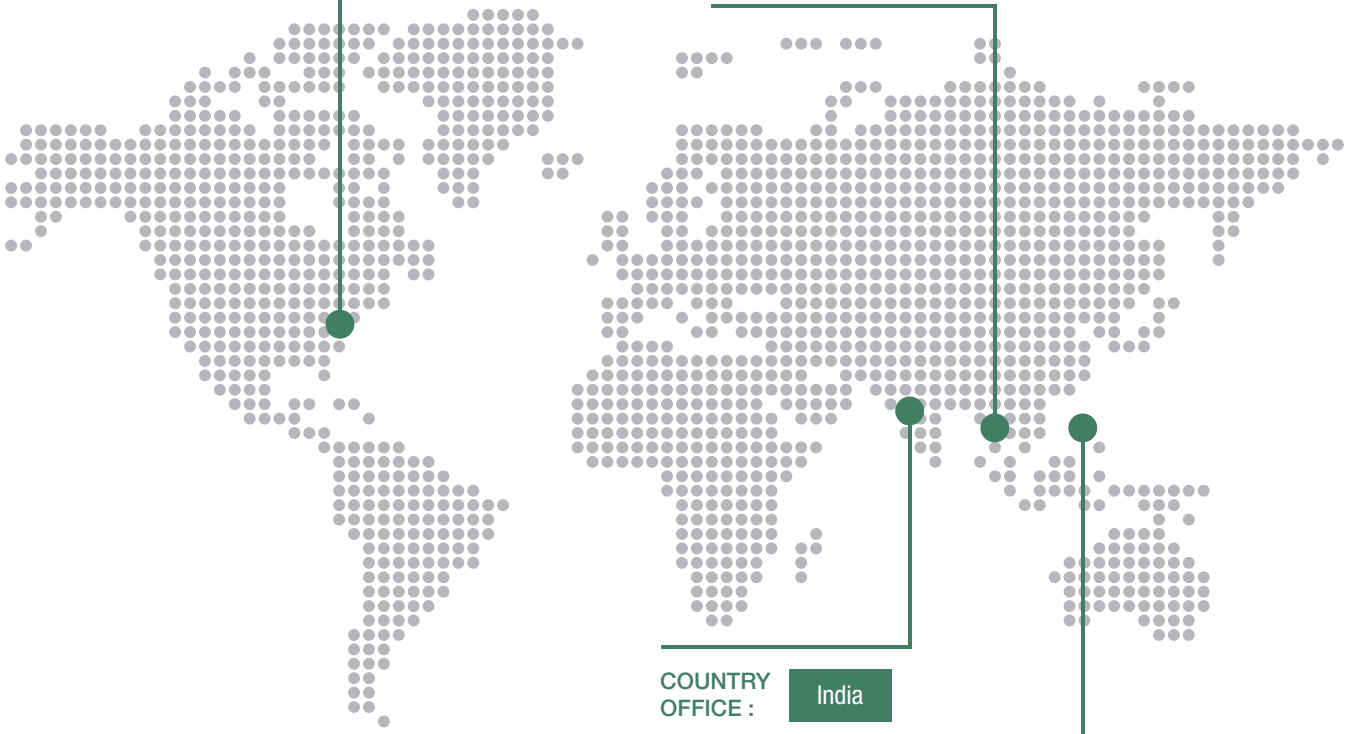

HEAD OFFICE : USA

e-mail : iiecdc@iiec.org

ASIA REGIONAL OFFICE : Thailand

e-mail : iiecbangkok@iiec.org

COUNTRY OFFICE : India

e-mail : iiecindia@iiec.org

COUNTRY OFFICE : Philippines

e-mail : iiecmanila@iiec.org