



## Balance for Sustainability



# Balance for Sustainability



PEA is moving forwards with innovation and learning, enhancing the development of integrated electrical system. Being prepared to become a potential leader for the electric energy sector, covering the excellent and livable society also, surrounding environment to become a national organization of Thai people in order to balance lives for sustainable future.



PEA Operates under the Principles of Good Corporate Governance



7

Anti-Corruption Policies

7

Principles of Good Corporate Governance

Operational Guidelines under CSR Standards

“

PEA has its significant and unchanged intentions of fair, transparent and also anti-corruption operations under ethical standards. In addition, maintenance of corporate values, good services as well as integrity. Adhering to professional ethics under the occupational health and safety policy. Moreover, happy working lives of more than 29,000 employees nationwide and creation of balanced energy security.

”

ISO 26000



“1 Unit contribute 1 Baht”

Energy saving campaign for industrial customers could save up to **43,000,000** units of electricity consumption.



**1129**  
PEA Call Center  
24-hour service

Social : PEA Social Innovation for Modern Living with CSR

“

PEA has electrified 99% of Thailand's total area to support the development of the country's social and economy, PEA's Community.

Safety project has been introduced to perform electrical power system healthy check for over 1,000,000 households.

PEA's Mobile Medical Unit project has been carried out continually to offer better-living of remote villagers.

And with PEA Smart Grid project will make path towards brighter future.

”

**99%** of the total areas in Thailand will have PEA Smart Grid for modern lives.

**82%**

of Thai people were satisfied with the implementation of PEA's CSR projects.

“

PEA is ready to provide the best electricity services through over 540 substations and support a variety of alternative energy for forests and environmental protection with projects of nationwide plantation of over 10,000 trees per year.

Furthermore, almost 2,000 shelters for fish with artificial reef has been built in the project, “PEA Fish Shelters in Thai Seas”. Also, to build almost 2,000 weirs in commemoration of H.M. the King for water source conservation together with the LED tube-driven sustainability of the tourism of Thailand.

”

Environment : Growing together with PEA in the good Surrounding Environment

**10,000** trees



**9** Locations of light-decorated historic sites and cultural-based tourism


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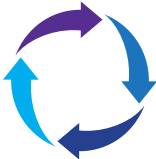


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# Vision, Mission and Core Value



## Vision:

PEA, a leading modern organization, aims to provide efficient and reliable electricity services for quality of life, sustainability of economy and society.

## Mission:

PEA is responsible for the provision of standardized electricity services and related business to attain the customer's satisfaction on products and services through PEA's continual corporate development plans with the recognition of social and environmental responsibility.

## Core Values:

Good Services, Good Governance.



## The Message from PEA Governor

“

The Provincial Electricity Authority (PEA) is a leading modern and effective organization that has met international standards for the operation of energy, services and related businesses....

”



Provincial Electricity Authority (PEA) is a leading modern and efficient organization that has met international standards for the operation of energy, services and related businesses. PEA is capable of adapting itself to changes and maintaining its social and environmental responsibilities, in meeting the demand for energy, which is one of the significant factors for driving the economy. PEA aims to create sustainable and quality living conditions for people through management of the value chains based on the four areas of the Principles of Sustainability as follows:

### 1. Visionary Leadership of the Organization

PEA has emphasized the allocation of resources to provide the utmost efficiency to its future investments, to promote and support the use of renewable or alternative energy and to continue to lead in the innovation and power industry.

### 2. Good Corporate Governance

PEA has emphasized the promotion of the Principles of Good Corporate Governance, which are Accountability, Responsibility, Equitable Treatment, Transparency and Value Creation, Ethics and Public Participation.

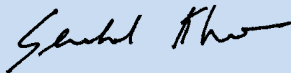
### 3. Personnel Development

PEA has emphasized the development of personnel capabilities, including the continuous improvement of necessary skills and expertise, establishment of a proper working environment by taking into account occupational health and safety, in line with the balanced development of the quality of life for personnel encouraging positive attitudes to ensure long-term engagement of the employees.

### 4. Social and Environmental Responsibility

PEA has emphasized the enhancement of sustainable growth of the organization in accordance with the balanced improvement of the quality of life between societies, communities and environment; through the addition of operational measures, promotion and dissemination of knowledge on the electricity safety, including risk and crisis management to ensure rapid recovery.

For these four areas of the Principles of Sustainability, PEA is prompted to become the electricity utility of the future and sustainable organization.

  
(Mr. Sermsakool Klaikaew)  
PEA Governor



On the basis of continuous promotion for good value to the economy, society and the environment within the electric energy business, in 2015 PEA received rewards of success and pride of personnel throughout the entire organization, as the follows:

1. **Role Model Plaque on the Establishment of Official Information Centre** as per the project of development of role models on the premises of the Official Information Centre at ministerial level (One Ministry, One Role Model) in the name of the Ministry of Interior on 13<sup>th</sup> February 2015 at Santi Maitree Building, the Government House.

2. **Safety Award** as per the Zero Work Injuries Campaign 2015, PEA received a golden plaque from the Occupational Safety and Health Bureau, Department of Labour Protection and Welfare on 17<sup>th</sup> August 2015.

3. **Thailand IPv6 Award and Certificate of IPv6 Ready Award** as an innovative agent towards IPv6 from the Ministry of Information and Communication Technology on 8<sup>th</sup> September 2015.

4. **Outstanding State Enterprise Award** PEA received an individual consolation prize for outstanding innovation for the aerial cable construction equipment distribution system (22 kV and 33 kV) on 22<sup>nd</sup> September 2015 at Santi Maitree Building, the Government House.

5. **Thailand Public Service Awards 2015** Office of the Public Sector Development Commission (OPSDC) has granted an honourable award to government agencies for their commitment and determination in the development of quality public service provision. PEA received the award in the category of outstanding development for excellent service and performance "PEA: Making Shopping and Payment of Electricity Bills Convenient" and received the award in the category of innovation for excellent service from its performance "One Touch Service Application for Electricity Use" on 25<sup>th</sup> September 2015 at the Auditorium of the Royal Thai Navy, Bangkok.

6. **The Best AP Smart City Initiative on the Smart Grid** from International Data Corporation (IDC) under "Thailand's Provincial Electricity Authority (PEA) Smart Grid Pilot Project", in 2015, Asia Pacific Smart City Development Forum in Shenzhen, People's Republic of China on 17<sup>th</sup> November 2015.

## Pride Rewards





## About PEA

### Provincial Electricity Authority (PEA)



PEA is a state enterprise within the energy sector reporting to the Ministry of Interior. PEA was established under the Provincial Electricity Authority Act B.E.2503 on 28<sup>th</sup> September 1960, with its main mission to procure, supply and distribute electric energy to people, businesses and industries accessing the distribution areas of 74 provinces (except for Bangkok, Nonthaburi and Samut Prakarn), covering an area of 510,000 square kilometers, the equivalent to 99.98% of the total areas of Thailand and with 18.17 million electricity users.

PEA Head Office is located at No.200 Ngamwongwan Road, Ladyao Sub-district, Chatuchak District, Bangkok 10900. PEA's obligations are to determine policies and plans, to give advice and to supply materials and equipment to regional units nationwide, which are divided into four regions, i.e., Northern Region, Northeastern Region, Central Region and Southern Region, each of which consists of three areas of PEA, totaling 12 areas, and 186 PEA offices (job focal points), 288 PEA branch offices, 459 PEA sub-branch offices, covering service provision to villages, sub-districts, districts and provincial levels.

### Affiliated Company:

#### PEA ENCOM International Co., Ltd.

PEA ENCOM International Co., Ltd. ("PEA ENCOM") is the first affiliated company of PEA, established as per the Cabinet's Resolution on 3<sup>rd</sup> June 2009 for the business operation of local and overseas investment in electric energy, together with the planning of training on the electric system. PEA ENCOM was registered as a limited company on 14<sup>th</sup> October 2009, with its initial registered capital of 100 million Baht (100% owned by PEA). At present, PEA has a registered capital of 473.284 million Baht (as of 31<sup>st</sup> December 2015).

According to previous operating performances, PEA ENCOM co-invested in a total of four projects locally in the field of alternative energy, for example, a power production plan from solar energy, a power production plan from biomass gas, an operation and investment in the construction of a power plant from waste disposal in Phra Nakhon Si Ayutthaya Province. Moreover, the Company is studying and preparing a project of power production from other alternative energies, particularly energy plants. With regards to overseas operations, PEA ENCOM has co-invested in a power production plan from solar energy project in Japan and has also provided services of design, construction and maintenance of the electric system and other related works.

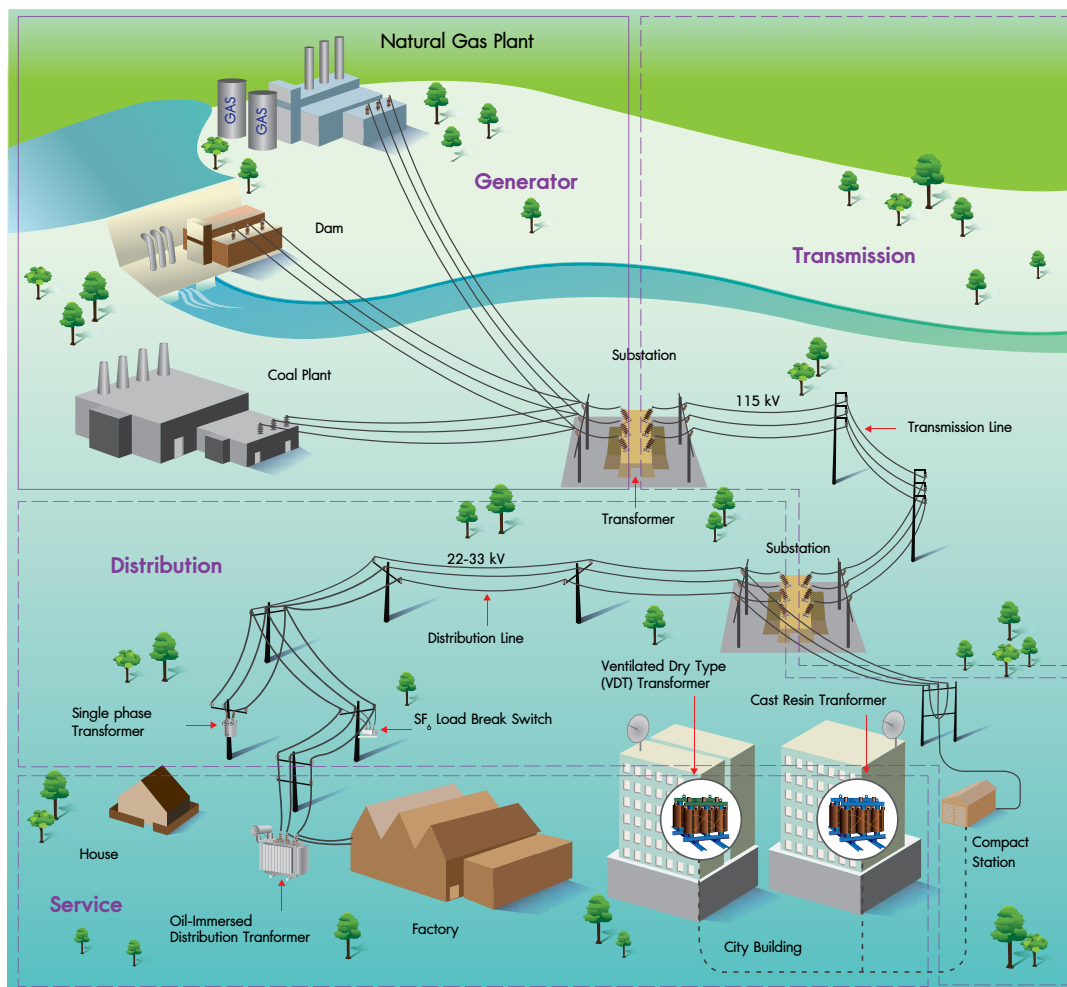


## Types of Electricity Users:

There were a total of 18,171,025 electricity users of PEA. This figure was divided into 4 types as per the nature of electricity consumption patterns and the groups of electricity fee rates of which the structure was in accordance with the Thailand Standard Industrial Classification (TSIC); whereas, in 2015, there were electricity users in each group, according to the following:

Groups of Electricity Users	Numbers of Electricity Users in 2015 (Users)
1. Residences	16,339,328
2. Commerce	1,516,430
3. Industries	33,766
4. Others	281,501
<b>Total</b>	<b>18,171,025</b>

## Value Chains



PEA Chart of Value Chains

PEA LED

The Central Mosque of Pattani



The value chains consist of work streams and significant operating procedures, as follows:

Main Processes	Operations in Each Work Stream	Stakeholders				
		Public Sector	Employees (Internal Units)	Suppliers, Trading Partners and Collaborators	Customers/ Users	Communities, Societies and Environment
<b>Electricity Distribution System Work Stream</b>						
Facility Planning	Forecast electricity demand for power system analysis, planning and standardization to achieve safety and continual research and development;	✓	✓	✓	✓	✓
Facility Engineering	Design of civil works and electrical works of electricity stations, transmission systems and related control systems;		✓	✓		✓
Construction	Construction of electricity stations, transmission systems; installation and testing of protective and control equipment, including consideration for the distribution of electric current;		✓	✓	✓	✓
Power Generation Management	Procurement of electric energy, power production and purchase from EGAT, Department of Alternative Energy Development and Efficiency, VSPP and Solar PV Rooftop;		✓	✓	✓	
Network Maintenance	Maintenance of command equipment, electric system, communication system, electricity stations, transmission system, distribution system, manufacturing and machinery system;		✓	✓	✓	✓
Network Control	Analysis and management of command equipment, electric system and control system and linkage of electric system for power distribution;		✓	✓	✓	✓
<b>Retail Work Stream</b>						
Marketing and CRM	Analysis of customer data, customer group management planning, research and development of strategies, sales and customer service channels;		✓	✓	✓	
Customer Service and Support	Customer sales and service provision on electricity user meters, recording of power units, printing of bills, receipt of payment and other services, customer service centre, including acceptance of notification and coordination for the correction of power failure.		✓	✓	✓	



## Participation of Stakeholders

PEA has given the utmost importance to the stipulation of guidelines for the participation of significant stakeholders in the value chains. These include groups of personnel, trading partners, suppliers, customers, users, communities, societies and the environment, as well as groups of the public sector compliance units/shareholders. The seven best practices have been applied under the principle of ISO26000 Standard throughout the organization since 2011; whereas, such practices contain significant issues which can be summarized, as follows:

- **Organization Governance:** Focusing on the Board of Directors and executives to prescribe, supervise and convey the responsibilities to society and the environment for a definite achievement.
- **Human Rights:** Focusing on non-discrimination of conduct, particularly towards groups of women and young girls, indigenous people, immigrants and foreign workers and also those discriminated by caste, class or race.
- **Labour Practices:** PEA has developed a good working environment by taking into account occupational health and safety; this has given its personnel the freedom to express opinions to assist in improved work performance.
- **Environment:** PEA has determined its policies, measures and plans to affirm the use of resources, environmental protection and the reduction of greenhouse gas emission, which may affect climate changes.
- **Fair Operating Practices:** PEA has implemented its anti-corruption and fair procurement policies by encouraging its trading partners in the value chains to comply with the sound principles of PEA.
- **Consumer Issues:** PEA has conducted fair marketing activities and has provided services for good and safe living for sustainable consumption by electricity users.
- **Community Involvement and Development:** PEA has emphasized on the development towards education, culture, skills and the secure living condition of the communities.

According to its commitment to joint operations with stakeholders, PEA continually recognizes the demands and expectations of their products and services. When combining the collected data with the results of an opinions survey of stakeholders, through focus group discussions and the design of questionnaires, PEA is able to determine guidelines for the creation of sustainability, with an emphasis to meet the demands and expectations of stakeholders, as follows:



Stakeholders	Details of Stakeholders	Guidelines for Participation and Opinion Hearing	Expectation/ Requirements	Responses of PEA	Achievements
1. Personnel	<ol style="list-style-type: none"> <li>1. PEA personnel</li> <li>2. Temporary employees</li> </ol>	<ul style="list-style-type: none"> <li>• The Management meets employees</li> <li>• Executive Committee meetings</li> <li>• Meetings/ seminars</li> <li>• Media releases of printed materials, emails and social media channels</li> </ul>	<ul style="list-style-type: none"> <li>• Executives' vision and effective management</li> <li>• Career advancement opportunities and job security</li> <li>• Salaries, eligible welfare, remunerations and benefits from PEA</li> </ul>	<ul style="list-style-type: none"> <li>• PEA has given on a regular basis, importance to the improvement of organizational structure to properly support current and future missions in terms of all units work load.</li> </ul>	<ul style="list-style-type: none"> <li>• PEA Improved the duties and responsibilities of all units and applied new structure on 1<sup>st</sup> January 2015 to keep abreast of the times and flexibility to changes.</li> </ul>
2. Trading Partners	<ol style="list-style-type: none"> <li>1. Electricity station and electric system contractor</li> <li>2. Third-party ICT service providers</li> <li>3. Employment agencies</li> <li>4. Payment receiving agents</li> <li>5. On-site billing agents</li> <li>6. Call Center</li> <li>7. Meter service contractors</li> <li>8. Tree-trimming contractors</li> </ol>	<ul style="list-style-type: none"> <li>• Meetings/ seminars/focus groups</li> </ul>	<ul style="list-style-type: none"> <li>• Transparency in joint business operations</li> <li>• Compliance with contractual obligations agreed</li> <li>• Timely share of information for collective development of works</li> </ul>	<ul style="list-style-type: none"> <li>• PEA has improved the communication system to support the users' demands in a more stable and effective manner and to assist with the strategic thrust of organizations.</li> </ul>	<ul style="list-style-type: none"> <li>• In 2015, PEA designed, procured and installed IP Core Network, Phase 1 nationwide.</li> </ul>
3. Suppliers	<ol style="list-style-type: none"> <li>1. Electricity Generating Authority of Thailand (EGAT)</li> <li>2. Very Small Power Producers (VSPP)</li> <li>3. Department of Alternative Energy Development and Efficiency</li> <li>4. Solar PV Rooftop</li> </ol>	<ul style="list-style-type: none"> <li>• Meetings/ seminars/focus groups</li> </ul>	<ul style="list-style-type: none"> <li>• Fair competition</li> <li>• Fair execution of contracts</li> <li>• Compliance with contractual obligations agreed</li> </ul>	<ul style="list-style-type: none"> <li>• PEA carried out the procurement, based on the rules and regulations governing supplies, including methods of registration of vendor lists.</li> </ul>	<ul style="list-style-type: none"> <li>• PEA had no complaints on unfair procurement.</li> </ul>



Stakeholders	Details of Stakeholders	Guidelines for Participation and Opinion Hearing	Expectation/ Requirements	Responses of PEA	Achievements
4. Customers/ Users, Communities, Societies and Environment	1. Residences 2. Industries 3. Commerce 4. Others	<ul style="list-style-type: none"> <li>Meetings/ seminars/ focus groups</li> </ul>	<ul style="list-style-type: none"> <li>Reliable, safe and environment-friendly power system</li> <li>Obtain PEA's support for sustainable CSR activities</li> </ul>	<ul style="list-style-type: none"> <li>PEA put much of its effort into providing electricity service provision by taking into account users' safety through projects such as reliability and improvement to the electricity distribution system, construction of loop lines (115 kV); and improvement to the distribution system of the underground cable system (22 kV), totally 14 circuit-kilometers, etc.</li> </ul>	<ul style="list-style-type: none"> <li>PEA has improved the electricity distribution system by the replacement of SAC insulated wires in urban areas, totally 150 circuit-kilometers, with a cumulative completed operation of 1,050 circuit-kilometers.</li> <li>PEA constructed reliability and quality loop lines of 115 kV, totally 20 circuit-kilometers, with a cumulative completed operation of 102 circuit-kilometers.</li> <li>PEA improved the distribution system to underground cable system, totally 14 circuit-kilometers, with a cumulative completed operation of 42 circuit-kilometers.</li> </ul>
5. Public Sector Compliance Unit/ Shareholders	1. The Government 2. Ministry of Interior 3. Ministry of Finance 4. Ministry of Energy	<ul style="list-style-type: none"> <li>Meetings/ seminars</li> </ul>	<ul style="list-style-type: none"> <li>Promote effective energy consumption policies and support energy conservation and participation in electricity generation of the private sector</li> <li>Expand the electricity distribution system thoroughly</li> <li>Improve the electric system for functional, secure, reliable and safe use and be prepared to handle energy crisis and development to the smart grid system</li> <li>Continually develop the management system and create financial strength and efficiency of remittance of incomes, including the use of resources and cooperation between state enterprises.</li> </ul>	<ul style="list-style-type: none"> <li>PEA has improved the electric system, quality of service provision and has expanded on the electricity distribution system by implementing the electricity area expansion project for new residences and households in remote areas, to meet customers' demands for coverage and utmost satisfaction.</li> </ul>	<ul style="list-style-type: none"> <li>The electricity area expansion project for new residences has been completely implemented, totally 84,086 households or equal to 63.88%.</li> <li>The electricity area expansion project for households in remote areas has been completely implemented, totally 4,116 households or equal to 35.48%.</li> </ul>

## Good Corporate Governance

In 2015, PEA has emphatically committed its strategies towards sustainable growth through “Excellence in Governance” in order to develop its proficiency of good corporate governance, transparent and a corruption-free operation, under the ethical standards and professional codes of ethics. PEA has created a prototype of transparent an electricity authority, personnel development in terms of soft skills, hard skills, including the announcement of “PEA Good Corporate Governance Policy” to gain awareness of the Board of Directors, executives and PEA employees; and PEA has adhered to the compliance under five frameworks, as follow:

1. The State Acting as an Owner
2. Equitable Treatment of Shareholders
3. Relations with Stakeholders
4. Transparency and Disclosure
5. The Responsibilities of the Boards of State-Owned Enterprises.

To enhance transparency to the general public, PEA has disseminated significant, complete, accurate together with reliable information through its annual reports, sustainability reports and website ([www.pea.co.th](http://www.pea.co.th)) to allow general public to access the information thoroughly. Furthermore, PEA has prescribed its ethics and operational code of conduct thus the Board of Directors, executives and employees will be informed of good practices and core values, procedures relating to conflicts of personal and public interests, mechanism and system enforcement of the Code of Conduct and processes of punishment. Ultimately, PEA will be able to achieve the prescribed objectives as per the seven components of the Principles of Good Corporate Governance, consisting of:

1. Accountability
2. Responsibility
3. Equitable Treatment
4. Transparency
5. Value Creation
6. Ethics
7. Participation (PEA has disseminated to the general public, participation opportunities relating to the expression of opinions on any actions which may impact on the environment, health, quality of life and livelihood of communitie or local people).

In addition, PEA has adhered to its core values of “Good Services, Good Governance” as the behavioural framework of ethics for compliance by the Board of Directors, executives and all groups of personnel. PEA has also enhanced and audited complaints relating to behaviour and ethics within nationwide operational areas of PEA through the complaints management system named “Project Tracking”, which will be handled and completed within 30 days prior to the preparation and submission of a quarterly summary report to top level management. This will result in the reduction of complaints relating to behaviour and ethics of employees in a concrete manner. The number of personnel who have been punished, due to commission of severe disciplinary offences includes dismissal, release from office, salary cut, probation and salary reduction, has decreased from 42 people in 2014 to 15 people in 2015.





## ● Anti-Corruption and Transparency:

In 2015, PEA announced its policy on anti-corruption and transparency for awareness and implementation by personnel at all levels as role models within and outside the organization, emphasizing operational behaviour with integrity, honesty, transparency and non-exercise of powers and duties for personal and partisan interests. On the understanding that the implementation of its policy of anti-corruption and transparency was effective in all of its operational areas, PEA prepared its operation plan of anti-corruption and transparency as part of its good corporate governance plan, which was successful in 2015, as follows:

- Good corporate governance and an anti-corruption action plan, consisting of 23 projects which could be fully implemented as intended in all plans/projects (equal to 100%).
- According to the public sector, the Integrity and Transparency Assessment (ITA) in 2015 conducted by the National Anti-Corruption Commission (NACC) Office, PEA obtained 89.86% scores (meaning “very high level of integrity and transparency in operations”).
- Persistence with the anti-corruption policy and the announcement of intentions “Anti-Corruption and Creation of PEA Awareness of No-Corruption”; the anti-corruption policy was announced on 15<sup>th</sup> June 2015 and PEA’s intentions were announced for the successful compliance by 12 PEA operational areas nationwide.
- PEA established the Anti-Corruption Operation Centre on 21<sup>st</sup> January 2015 and prepared processes and information system development manuals for handling matters of corruption and misconduct.
- PEA established Rangsit PEA as a pilot transparent PEA on 10<sup>th</sup> July 2015 and prescribed the standard of transparent PEA for magnification of outcome to all PEA operational areas nationwide.
- PEA organized activities to establish the awareness on transparency, integrity and work-ethics for personnel at all levels. 91% of PEA personnel affixed their signatures as acknowledgement and compliance with the Manual of Good Corporate Governance. According to the survey result, the level of awareness, recognition and application on Good Corporate governance was 90.18%.
- PEA has reviewed the Soft Control Plan and magnified the outcome of the “Transparent PEA” based on the pilot transparent PEA (Rangsit PEA) covering all 12 PEA operational areas nationwide. The Information Command Centre was established as per the assessment criteria of the Office of the Official Information Commission (OIC) under the Office of the Permanent Secretary, Office of the Prime Minister, to support the correct, complete together with reliable disclosure of information. As a result, PEA was selected as a role model determined by the Official Information Centre at ministerial level, in the name of the Ministry of Interior.



# Creation of Excellent Growth to the Economic System

## Excellent Business Operation and Management of the Value Chains

PEA is a business operator in the public utilities sector (electricity) covering energy and service companies, as follows:

**1. Energy Business:** The energy business is the main concern of PEA's operations, of which the procured energy sources can be divided into 3 main groups, these are:

- Group 1: Electric energy purchased from Electricity Generating Authority of Thailand (EGAT).
- Group 2: Electric energy directly purchased from Very Small Power Producer (VSPP), Solar PV Rooftop and the Department of Alternative Energy Development and Efficiency (DEDE).
- Group 3: Electric energy produced from PEA's small power plants.

**2. Service Business:** PEA operates additional businesses such as construction work of the electric system, rental services, repair and maintenance of the electric system, audit/test and analysis of the electric system, personnel training and development, consultancy and design of the electric system, etc.



## Research and Development of Innovation for Excellent Electricity Service Provision

PEA has used the research and development of innovation as a mechanism to promote the supply chain as a whole to sustainably create value added and has set a policy and the innovation process development plan. Quality Assurance Week has been held every year so that PEA personnel will continually be able to create quality innovative work, as they have performed since 2009. In order to promote continuous creation of innovation, PEA has allocated budgets, tools and equipment for research and development which will be beneficial to the organization, societies and the environment. Management knowledge relating to the electric energy business has been provided. PEA has cooperated with its business alliances, suppliers, trading partners and collaborators in the supply chains for regular development of innovation; determining the roles and duties of each group, as follows:

Groups of Suppliers, Trading Partners and Collaborators	Details of Suppliers, Trading Partners and Collaborators	Roles, Duties and Responsibilities	Roles in Creation of Innovation
Electric Energy Suppliers	<ol style="list-style-type: none"> <li>1. Electricity Generating Authority of Thailand (EGAT)</li> <li>2. Very Small Power Producer (VSPP)</li> <li>3. The Department of Alternative Energy Development and Efficiency (DEDE)</li> <li>4. Solar PV Rooftop</li> </ol>	<ul style="list-style-type: none"> <li>• Distribute electricity network through 115 kV, 22-33 kV network</li> <li>• Distribute electricity to PEA, not exceeding 10 MW</li> <li>• Distribute electricity generated from renewable energy</li> </ul>	<ul style="list-style-type: none"> <li>• Develop alternative energy to increase the sufficiency of sources of renewable energy</li> </ul>
Equipment Suppliers	<ol style="list-style-type: none"> <li>1. Suppliers of electric equipment such as transformers, etc.</li> </ol>	<ul style="list-style-type: none"> <li>• Distribute equipment under contracts made with PEA</li> </ul>	<ul style="list-style-type: none"> <li>• Improve efficiency of electric equipment</li> <li>• Improve efficiency of production and supply</li> </ul>
Trading Partners	<ol style="list-style-type: none"> <li>1. Construction contractors of electricity stations and electric systems</li> <li>2. Third-party ICT service providers</li> <li>3. Employment agencies</li> </ol>	<ul style="list-style-type: none"> <li>• Construct electricity stations and electric system as targeted under the Employment Contract</li> <li>• Outsource for development of ICT system, including audit, maintenance and repair of computer equipment</li> <li>• Supply adequate workers as per the PEA Work Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Develop construction efficiency to reduce the construction period and to improve the standard of construction works</li> <li>• Apply ICT system to support the improvement of work process efficiency</li> <li>• Organize personnel training; development of their energy skills, knowledge and abilities in cooperation with PEA</li> </ul>
Collaborators	<ol style="list-style-type: none"> <li>1. Government sectors and state enterprises</li> <li>2. Domestic educational institutions (researches)</li> <li>3. Foreign organizations</li> </ol>	<ul style="list-style-type: none"> <li>• Support the development of systems</li> <li>• Support research and studies</li> <li>• Offer technical and technological assistance</li> </ul>	<ul style="list-style-type: none"> <li>• Support the innovation of electricity in co-operation with PEA</li> <li>• Support research work to potentially increase the outcome for excellence as a service provision</li> </ul>

## Management of Availability and Reliability of the Electric System

PEA has managed the availability and reliability of the electric system and has used the System Average Interruption Frequency Index (SAIFI) and the System Average Interruption Duration Index (SAIDI) as the indexes for successful operations as per the Electric System Development Plan provided by PEA, using basic data from the load forecast of 2 levels, including:

1. Macro Load Forecast, which is a load forecasting approximately 20 years into the future, covering the overview of PEA.
2. Micro Load Forecast, which is a load forecasting individual electricity stations of EGAT and PEA for approximately 20 years into the future.

The results of the load forecast at each level will be considered together with the 11<sup>th</sup> National Economic and Social Development Plan (2012-2016). Policies and strategies for national development of the Government and all units will be determined in an investment plan for the electric system development to conform to the load forecast provided. In 2015, PEA used the load forecast approved by the Working Group on Provision of Load Forecast on 16<sup>th</sup> October 2015, which envisaged at the end of the 11<sup>th</sup> National Economic and Social Development Plan, the use of electric energy would be approximately 126,873 million units. The maximum demand of electric energy would be approximately 19,919 Megawatt (MW). Additionally, the number of electricity users would be approximately 18.75 million users; whereas, the average growth rate per year would be approximately 4.27%, 4.19% and 3.20% respectively. Therefore, in order to get the investment in the PEA electric systems in conformity with the national development guidelines and strategies, the electricity demand in the future, the financial status and the investment for electric system development will be carried out as follows:

## Significant Investment Projects for Electric System Development during 2015-2017

Unit: Million Baht

Projects	Investment Limits			Operation Status (As of 31 <sup>st</sup> December 2015)
	Domestic Loans	Proceeds	Total Limits	
1. Transmission and Electricity Station Development Project, Phase 9 (Part 1)	5,295	1,765	7,060	Project Progress: 15.36%
2. Transmission and Electricity Station Development Project, Phase 9 (Part 2)	3,405	1,135	4,540	Project Progress: 22.84%
3. Transmission and Electricity Station Development Project, Phase 9 (Part 3)	11,314	3,771	15,085	Project Progress: 16.28%
4. Transmission and Electricity Station Development Project, Phase 9 (Part 4)	3,360	1,125	4,485	Project Progress: 25.65%



Projects	Investment Limits			Operation Status (As of 31 <sup>st</sup> December 2015)
	Domestic Loans	Proceeds	Total Limits	
5. Construction and Improvement of Distribution System Project, Phase 7	12,950	4,320	17,270	Project Progress: 86.09%
6. Electric System Reliability Improvement Project, Phase 3	11,365	3,790	15,155	Project Progress: 35.00%
7. Submarine Cable Construction Project to Koh Phangan, Surat Thani Province	820	274	1,094	The installation of submarine cable has been completed. The power station on the island is under construction. Project Progress: 20.36%.
8. Electricity Area Expansion Project for New Residences	2,761	926	3,687	The project is complete, covering 84,086 households or equal to 63.88%.
9. Electricity Area Expansion Project for Households in Remote Areas	910	305	1,215	The project is complete, covering 4,116 households or equal to 35.48%.
10. Smart Grid Development Project in Pattaya City, Chonburi Province	802	267	1,069	The consultant is preparing reports and drafts of bidding documents.
11. Electricity Area Expansion Project for Agricultural and Farming Areas, Phase 2	1,520	510	2,030	The Ministry of Interior is submitting the project for the cabinet's approval.
12. Wind Turbine Field Electricity Generation System Development Project in Southern Region	910	305	1,215	The consultant is preparing the project feasibility study report.
13. Outage Solution and Analysis Centre Development Plan (Plan 2)	780	265	1,045	The consultant is preparing the project feasibility study report.
14. Renewable Energy-Based Electricity Generation System Development Project on Koh Kood, Koh Mak, Trat Province	241	81	322	The project is being submitted for approval from the PEA Board, which is expected to be approved within the 1 <sup>st</sup> Quarter of 2016.
15. Micro Grid Electric System Development Project, Mae Sariang District, Mae Hong Son Province	185	80	265	The Ministry of Interior is requesting opinions from related agencies with regards to the project being submitted for the cabinet's approval.
16. Community Hydro Power Plant Project	120	40	160	The consultant is preparing the project feasibility study report.
<b>Total</b>	<b>127,083</b>	<b>42,439</b>	<b>169,522</b>	

# Management of Social Sustainability

## Management of Relationship with Electricity Users

### Health and Safety of Electricity Users

PEA has classified its electricity users as per the behaviour patterns of electricity usage and the structure of electricity charge rates into 4 groups, under the Thailand Standard Industrial Classification. These four groups are:

1) Residential group

2) Commercial group

3) Industrial group

4) Others (non-profit organizations, water pumping for agricultural activities, temporary electricity use and free electricity) covering present and future electricity users, electricity users of competitor companies, including potential electricity users.



PEA has regularly provided communication and public hearings through 8 public hearing channels (one-way and two-way communication), to address issues of demands and expectations of the electricity users, in order to create and retain good relationships and satisfaction amongst electricity users. These are:

- 1) Survey of electricity user data
- 2) Receipt of complaints
- 3) Seeking feedback from the electricity user
- 4) Dialogues
- 5) Opinions from executives and regulatory organizations
- 6) 1129 PEA Call Center
- 7) Activities to create relationships with electricity users
- 8) Web-based technology and social media, such as the PEA Website, Email, Facebook, Instagram, etc.

PEA has utilised the data of such demands and expectations of the electricity user groups by means of screening, prioritization and the preparation of plans, projects and activities for forming and maintaining relationships and satisfaction among the electricity users. These are as follows:

Significant Issues of Demands and Expectation of Electricity Users	Plans/Projects/Activities
<ul style="list-style-type: none"> <li>• No incidents of outage or voltage sag</li> <li>• Safe and standardized electric system</li> <li>• Electricity service provision covering all areas</li> </ul>	<ul style="list-style-type: none"> <li>• Electric System Development Plans during the 10<sup>th</sup> and the 11<sup>th</sup> National Economic and Social Development Plans</li> <li>• Outage Solution and Analysis Centre Development Project</li> </ul>
<ul style="list-style-type: none"> <li>• Accurate and punctual recording of units and electricity billing charges</li> </ul>	<ul style="list-style-type: none"> <li>• Smart Invoice Plan</li> </ul>
<ul style="list-style-type: none"> <li>• Convenient and rapid channels of electricity billing charges</li> <li>• Written warning, notified before suspension of power supply</li> </ul>	<ul style="list-style-type: none"> <li>• Plan for Expansion of electricity billing charges ratios and other data via mobile phone SMS</li> </ul>
<ul style="list-style-type: none"> <li>• The variety channels of electricity payment charges for electricity users</li> <li>• Easily accessible service points for PEA offices</li> </ul>	<ul style="list-style-type: none"> <li>• Online application for electricity use as per “Happy Touch” Project</li> <li>• Electricity Service Provision Plan in Significant Commercial Areas/department stores (PEA Shop)</li> <li>• One Touch Service Provision Plan</li> <li>• Provision of user manuals under the Act on Facilitation of Consideration and Approval of the Authorities B.E.2558</li> </ul>
<ul style="list-style-type: none"> <li>• Analysis and notification of Ft trends</li> <li>• Creation of aiding tools for calculation of electricity charges and instructions for proper use of electricity</li> <li>• Immediate responses relating to causes of outage/voltage sag/pulsating current</li> </ul>	<ul style="list-style-type: none"> <li>• Improvement of PEA website to obtain accurate data that has met demands and expectations of electricity users such as calculation of electricity charge rates, data of application for extra services and other services</li> <li>• Development of website and Mobile Application for transaction services and data of electricity under unusual situations</li> </ul>

Significant Issues of Demands and Expectation of Electricity Users	Plans/Projects/Activities
<ul style="list-style-type: none"> <li>• Provision of enough personnel/information centres</li> <li>• Friendly and immediate response service personnel</li> <li>• Knowledgeable employees able to answer questions clearly</li> </ul>	<ul style="list-style-type: none"> <li>• Plan for Development of Service Provision Skills of Employees and Management of Expectation of Users (Lobby Manager)</li> <li>• Marketing and Customer Relationship Management</li> </ul>
<ul style="list-style-type: none"> <li>• Provision of data relating to behaviour patterns of electricity usage in each period of time in an easy-to-understand format</li> <li>• Recommendations and guidelines for economical electricity use</li> <li>• Installation of AMR meters</li> </ul>	<ul style="list-style-type: none"> <li>• GPRS (Automatic Meter Reading: AMR) Project</li> <li>• Plan for development of website and applications of GPRS (Automatic Meter Reading: AMR) Project</li> <li>• Advance Metering Infrastructure (AMI) Project</li> </ul>
<ul style="list-style-type: none"> <li>• Easily accessible complaints channels</li> <li>• Polite and friendly complaint receiving personnel</li> <li>• Rapid response and solutions to complaints</li> </ul>	<ul style="list-style-type: none"> <li>• 1129 PEA Call Center</li> <li>• E-One Portal Information System Project</li> <li>• Development of Complaint Management Process</li> </ul>

In 2015, PEA provided and increased plans/projects/activities for the creation of relationships and satisfaction of electricity users, as follows:

1. The Supervisory Control and Data Acquisition (SCADA) Project to rapidly meet the demands of all groups of electricity users, by means of the integration of systems such as 1129 PEA Call Center, outage management system (OMS), GIS system and PEA-Map. At present, the operation is completed in 12 operational areas of PEA nationwide;
2. Plan for an increased outcome on automatic billing to major electricity users in all operational areas of PEA (job focal points), to meet the demands of electricity users in commercial/industrial groups by accurate and punctual recording and billing of electricity charges via Emails, Fax or Smart Invoice;
3. Plan to improve the format of electricity invoice charges to meet the demands of all groups of electricity users in terms of accuracy of electricity invoice charges and increase the variety of payment channels for electricity charges;
4. Plan for the provision of user manuals to meet demands of electricity users in the residential group and other groups and to facilitate the provision of services and data to electricity users under the Act on Facilitation of Consideration and Approval of the Authorities 2015;
5. Smart Card Plan to meet the demands of electricity users in the residential and other groups and to facilitate the audit and duplication of data of house registration and ID cards.

According to the electricity user relationship and satisfaction management process as mentioned above, in 2016 the level of the electricity user satisfaction with PEA service provision was the equivalent of 84.37%.





# Personnel Management

## Employment

“Employment” is an initial process of personnel management. In order to provide equal and non-discriminative employment, PEA has provided regular reviews and development of various and easily accessible communication channels and information notifications of personnel recruitment, such as job application notices in newspapers, TV and the PEA Website, which displayed the employment opportunities at PEA, classified by gender, age-span and areas during the period 2013-2015, as follows:

Table of Newly Recruited Personnel During 2013-2015								
Year	Gender		Age					Total (People)
	Male	Female	< 20 Yrs	21-30 Yrs	31-40 Yrs	41-50 Yrs	51-60 Yrs	
2013	331	186	-	401	112	4	-	517
2014	2,651	1,749	35	2,473	1,109	610	173	4,400
2015	1,646	472	77	1,825	143	55	18	2,118
<b>Total</b>	<b>4,628</b>	<b>2,407</b>	<b>112</b>	<b>4,699</b>	<b>1,364</b>	<b>669</b>	<b>191</b>	<b>7,035</b>

Table of Numbers of Personnel Classified by Age-Span and Gender/Area in 2015								
Area	Gender		Age					Total (People)
	Male	Female	< 20 Yrs	21-30 Yrs	31-40 Yrs	41-50 Yrs	51-60 Yrs	
Head Office	2,436	1,566	19	749	950	891	1,393	4,002
Region 1	4,654	1,398	19	1,111	1,011	1,286	2,625	6,052
Region 2	5,242	1,532	10	1,175	1,099	1,835	2,655	6,774
Region 3	5,456	1,638	21	1,529	1,563	1,590	2,391	7,094
Region 4	4,181	1,299	24	1,040	1,061	1,243	2,112	5,480
<b>Total</b>	<b>21,969</b>	<b>7,433</b>	<b>93</b>	<b>5,604</b>	<b>5,684</b>	<b>6,845</b>	<b>11,176</b>	<b>29,403</b>

With regards to the employment of PEA personnel, and temporary employees can be divided into 2 groups, including a group of monthly employees employed according to the Manpower Plan and a group of daily employees stationed at the Concrete Product Factory Section, who are employed through the third-party private enterprises, which can be summarized as follows:



Table of Numbers of Contract Employees in 2015					
Area	Monthly Employees				Total (People)
	Male	%	Female	%	
Head Office	142	4	108	6	250
Region 1	843	23	354	18	1,197
Region 2	873	24	473	24	1,346
Region 3	1,075	29	560	29	1,635
Region 4	743	20	463	24	1,206
<b>Total</b>	<b>3,676</b>	<b>100</b>	<b>1,958</b>	<b>100</b>	<b>5,634</b>

In order to achieve personnel satisfaction and organization towards positive working attitudes and motivation, PEA has annually reviewed and analyzed factors affecting the personnel satisfaction and commitment which will lead within the entire organization. In 2015, PEA applied Herzberg's Two-Factor Theory for consideration of survey results of personnel satisfaction and commitment in 2014. The result of the statistical analysis (Multiple Regression) identified the 7 factors affecting employees' satisfaction and commitment and 6 factors affecting temporary employees. These are as the following:

7 Factors Affecting Employees' Satisfaction and Commitment
1. Job Security
2. Challenging Work
3. Corporate Image
4. Clear Accountability/Empowerment
5. Work-life Balance
6. Career Growth
7. Performance Evaluation & Feedback

6 Factors Affecting Workers' Satisfaction and Commitment
1. Corporate Image
2. Relationship with Colleagues
3. Work Environment
4. Clear Accountability/Empowerment
5. Work-life Balance
6. Respect and Admiration from Others

According to the factors mentioned above, PEA has come up with a plan to enhance the personnel satisfaction and commitment, including:

1. Enhancement of values for personnel co-operation through team-working activities amidst the units;
2. Sharing personnel skills through knowledge management, organizing of activities for sharing skills, knowledge and expertise to personnel within the organization;
3. Mobile meetings with all sectors of the service areas for transfer of organizational policies and the hearing of personnel opinions;
4. Organization of quality expositions and contests of innovation and outstanding PEA units for enhancement of personnel initiation on improvement and development of work systems;
5. Empowerment of decision making to the Board of Directors or working groups established for operational flexibility, immediate decision-making and problem-solving skills.

According to the survey results of personnel satisfaction and commitment in 2015, there were high levels of satisfaction and commitment as per the following details:

- The overall level of satisfaction of employees (a total of 11,681 people) was equal to 4.20 (high); their overall level of commitment was 4.33 (high).
- The overall level of satisfaction of temporary employees (a total of 2,140 people) was equal to 4.42 (high); their overall level of commitment was 4.47 (high).

## Personnel Training and Development

PEA has valued the importance of creating personnel commitment through job security and advancement by promoting personnel development using various methods, emphasizing continuous learning and promoting personnel self-development by means of the provision of Individual Development Plans (IDP), also by promoting cultural awareness for transfer to new areas of knowledge and experience to assist personnel in their continuous study and development. In 2015, the number of training hours has increased per PEA's trained personnel and temporary employees when compared to those of the previous year, as follows:

Year	Total (People)	Average Training Hours	Expense per Person (Baht)
2013	37,113	7.99	202.07
2014	45,686	15.76	257.62
2015	46,525	30.28	248.05



## Occupational Health and Safety

Occupational health and safety is a significant issue affecting the quality of life and livelihood of PEA's personnel. PEA has appointed the Incident Prevention Committee to apply safety laws, safety policies, external rules and regulations to develop a good environment in the workplace. Requirements, standards and measures have been provided on occupational health and safety in manuals and procedures to be communicated and understood with personnel at all levels. Also necessary safety tools and equipment for adequate use have been prepared for personnel at an operational level.

In 2015, PEA supported a total of 1,498 personnel to take part in the Occupational Health and Safety and Working Environment Committee and the Safety Unit. A plan for enhancement of occupational health and safety was prepared for its personnel. Significant plans/projects can be divided into 3 areas of successful performances, as follows:

Plans/Projects		Successful Performances
1. Safety	<ul style="list-style-type: none"> <li>Review and development of work safety manuals</li> </ul>	Bi-annual review of PEA's safety standard manuals;
	<ul style="list-style-type: none"> <li>Review and development of instruction manuals in case of unusual events</li> </ul>	Provision of plan in case of unusual events, such as fire extinguishing, prevention and mitigation of disasters from earthquakes and building collapses;
	<ul style="list-style-type: none"> <li>Training personnel on safety and supervision in the work-place</li> </ul>	Organization of training on supervision of safety work, totaling 6 groups. Organization of training under the Work Safety Program for Executives, totaling 4 groups;
	<ul style="list-style-type: none"> <li>Rehearsal of fire extinguishing</li> </ul>	Rehearsal of fire extinguishing annually;
	<ul style="list-style-type: none"> <li>Instill the safety culture to personnel within the organization through activities such as safety talks activities, etc.</li> </ul>	Dissemination of Occupational Health and Safety and Working Environment Policy and safety measures to employees within the organization on the unit's website and regular written notification to units.
2. Health	<ul style="list-style-type: none"> <li>Dissemination of related information on health promotion to personnel</li> </ul>	Dissemination of information through newsletters on a monthly basis;
	<ul style="list-style-type: none"> <li>Organization of exercise activities</li> </ul>	Provision of exercise areas for PEA employees;
	<ul style="list-style-type: none"> <li>Vaccination</li> </ul>	Provision of vaccination services to PEA employees on an annual basis;
	<ul style="list-style-type: none"> <li>Annual personnel health check-up</li> </ul>	Provision of an annual personnel health check-up;
	<ul style="list-style-type: none"> <li>Provision of basic sanitary treatment services for PEA personnel</li> </ul>	Provision of sanitary and first aid unit for treatment in the office;
	<ul style="list-style-type: none"> <li>Provision of special smoking areas for smoking personnel to reduce impact of smoke on non-smoking personnel</li> </ul>	Safety, Occupational Health and Working Environment Committee has provided smoking areas outside the building as prescribed by law.

Plans/Projects		Successful Performances
3. Working Environment and Security	<ul style="list-style-type: none"> <li>• Inspection and improvement of different areas of the workplace which may affect the operators' health, including light, airborne dust and oxygen levels in confined spaces</li> </ul>	Annual inspection and improvement of the workplace, including light, airborne dust and oxygen levels in confined spaces;
	<ul style="list-style-type: none"> <li>• Development of the security system within the office compounds</li> </ul>	Use of CCTV system to monitor movements within the building and in the surrounding areas of PEA;
	<ul style="list-style-type: none"> <li>• Inspection of third parties accessing the office</li> </ul>	Third parties will exchange their ID Cards at the security checkpoint and affix visitors' cards.

### Fair Treatment on Welfare and Benefits

Welfare and benefits are significant motivational factors for PEA personnel and temporary employees with regard to their work performance. PEA has provided and allocated welfare and benefits to its personnel and temporary employees by taking into account human rights and fair treatment under the PEA Regulations Governing Employees' Rules B.E.2517 and its Amendments (No.1-21). Also, as per the principles of ISO26000, remunerations and welfare of the PEA personnel should be suitable to the economic conditions and the standard of living for the different levels of personnel. Moreover, PEA has given its personnel the opportunity join PEA's State Enterprise Labour Union to protect the welfare and benefits of PEA personnel. In 2015, there were a total of 21,423 subscribed members of the labour union or the equivalent of 72.88% of PEA's personnel.



# Management of Relationship with Stakeholders



## Development and Enhancement of Communities' Strengths

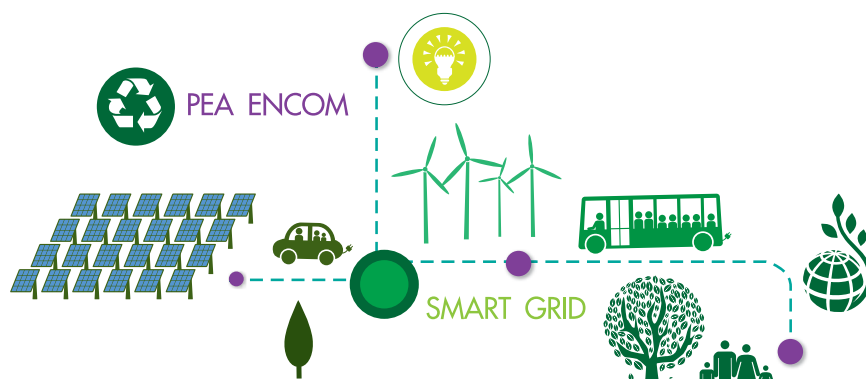
PEA is aware of the importance of sustainable co-existence between communities and the environment, particularly communities surrounding PEA offices in central and regional areas, the total of 12 offices. As PEA is the interested party who has received the direct impact from service provision of electric energy, including the implementation of the electric system development project, which is the main mission of the organization, PEA has taken action with its commitments to reduce the impact on communities and the environment, before, during and after operations, through participation with the local communities; provided that the creation of good relationships and receipt of confidence from the communities to enable PEA to carry out its businesses continuously.

For a balanced co-existence between PEA and the communities, together with the inception of an economic, social and environmental value, PEA has determined its policies and applied the operational guidelines under the standard of the corporate social responsibilities of (ISO26000); "participation of communities and community development" to its practices, emphasizing on the livelihood, health and safety, including the reduction of impacts from the implementation of the electric system development project, the construction of transmission and distribution systems in certain areas where will be constructed in restricted areas, such as quality river basin regions, national parks and forests, etc. Likewise, PEA has also taken into account the potential environmental impact from project implementation, by complying with the prescribed laws including Environment Impact Assessment (EIA) reports, Initial Environmental Evaluation (IEE) reports or environmental information checklists for study and assessment of positive and negative environmental impacts. Besides, PEA and has given opportunities to communities, non-governmental organizations as well as related agencies to express opinions, present information, disputes or recommendation properly, submit reports for the Cabinet's approval of project implementation, follow up and audit the environmental impacts by providing reports of work performances under the measures of prevention as well as correction of environmental impacts to the Office of Natural Resources and Environmental Policy and Planning (ONREPP) for consideration twice a year (in January and July of each year) with types of significant electric system development projects which shall be evaluated, followed up and audited, consisting of:

- 1) Overhead Transmission and Distribution System
- 2) Submarine Cable Transmission and Distribution System



# Management of Environmental Sustainability



## Responsibilities to the Environment

PEA has communicated to all levels of personnel to become aware of the importance of the efficient use of resources in 2015. For management of the environmental sustainability, clear framework and directions, PEA has announced the policy for the provision of green offices and development of alternative energy, including energy conservation to support a sufficiency of energy sources and to increase the capacity to meet the present and future demands. Regarding energy, PEA has ascertained measures to reduce a use of energy by reusing transformer oil as a replacement for diesel oil. PEA began this process in a sound manner and will continue to do so.

Unit : litres

Reuse of Used Oil	Responsible Units	2014	2015
Use transformer oil instead of diesel oil	Manufacturing System Control Division	6,000	2,000
	Machine Service and Maintenance Division	-	2,000
	Depot Management Division 3	-	800
	PEA, Area 2 (Southern Region)		5,800
	PEA, Nakhon Si Thammarat Province	1,600	600
Apply transformer oil to the concrete formwork for casting of concrete poles (deteriorated)	PEA, Ratchaburi Province	24,000	23,800
	PEA, Kanchanaburi Province	22,000	19,000
Transformer oil which has been filtered and reused	PEA, Koh Samui District	590	590

With regard to promoting alternative and green energy in order to reduce greenhouse gas emission and to solve problem of global warming, PEA has specifically developed 3 types of alternative energy, including:



## 1. Hydro Energy

Locations	Installed Production Capacity (Kilowatt : kW)	Year Completed
Hydro Power Plant, Mae Tien, Chiang Mai Province	2,000	1985
Hydro Power Plant, Mae Jai, Chiang Mai Province	875	1985
Hydro Power Plant, Mae Ya, Chiang Mai Province	1,000	1989
Hydro Power Plant, Khun Pae, Chiang Mai Province	90	1989
Hydro Power Plant, Mae Toey, Chiang Mai Province	2,000	1994
Hydro Power Plant, Mae Pai, Chiang Mai Province	2,000	1994
Hydro Power Plant, Nam Mun, Loei Province	5,000	2009
Hydro Power Plant, Nam San, Loei Province	6,000	2009

## 2. Wind Energy

1) Wind turbine electricity generation project (capacity: 250 kW) distributes electricity together with a diesel generator, in Koh Tao, Surat Thani Province.

2) Wind turbine electricity generation project (capacity: 1.5 kW) distributes electricity in parallel to the distribution system in Sating Phra District, Songkhla Province.

## 3. Solar Energy

Locations	Installed Production Capacity (Kilowatts : kW)	Year Completed
Solar Power Plant, Den Mai Sung, Tak Province	60	1986
Solar Power Plant, Mae Kasi, Nakhon Sawan Province	60	1986
Hybrid Solar Power Plant, Koh Kood, Trat Province	12	1999





PEA also has provided its plan for the development of small hydro power plants at flood gates and reservoirs of the Royal Irrigation Department during 2013-2017, totalling 10 projects, as follows:

No.	Locations	Installed Production Capacity (Kilowatts : kW)
1	Kew Lom, Lampang Province	1,869
2	Nong Pla Lai, Rayong Province	280
3	Klong Sano, Trat Province	856
4	Huay Khon Kaen, Petchabun Province	1,088
5	Mae Guang, Chiang Mai Province	1,751
6	Huay Raeng, Trat Province	233
7	Prasae, Rayong Province	426
8	Klong Saphan Hin, Trat Province	831
9	Klong Sadao, Songkhla Province	647
10	Nam Un, Sakon Nakhon Province	435

Furthermore, PEA has also provided its plan for the development of a biomass (Acacia wood) electricity generation project (capacity: 1 Megawatt (MW)) at Wat Phrabat Nampu, in Lopburi Province and incineration power plant construction project (capacity: at least 5 Megawatts (MW)) in Phra Nakhon Si Ayutthaya Province.

## Management for Reduction of Greenhouse Gas Emission

PEA has employed a consultant (ERM-Siam Co., Ltd.) to provide an assessment on greenhouse gas and to stipulate guidelines for the management of greenhouse gas emission based on their collective data. PEA has adjusted the structure of responsible personnel; for example, the Social and Environmental Affairs line of business will be obliged to supervise social and environmental affairs. As a result, PEA is able to directly reduce the quantity of greenhouse gas emissions into the atmosphere, as follows:



## Overview of Greenhouse Gas Emission of PEA (2011-2015)

tCO<sub>2</sub>/Year

Activity Type	2011	2012	2013	2014	2015
<b>Activity Type 1</b>					
Electricity generation activities from diesel power plant	22,071.25	20,521.38	25,883.86	31,867.79	104,968.73
Vehicle operation activities that PEA will be responsible for fuelling	42,981.04	44,765.92	42,853.48	45,071.92	48,290.75
Leakage of Sulphur Hexafluoride (SF <sub>6</sub> )	13,608.54	8,000.67	9,600.77	9,812.26	13,821.36
Leakage of Hydro Fluorocarbons (HFCs) and Per Fluorocarbons (PFCs)	-	-	195.56	118.48	96.00
<b>Total of Greenhouse Gas Emitted in Activity Type 1</b>	<b>78,660.83</b>	<b>73,287.97</b>	<b>78,533.67</b>	<b>86,870.45</b>	<b>167,176.84</b>
<b>Activity Type 2</b>					
PEA Electricity Usage	53,610.81	59,497.47	59,455.36	56,407.70	60,449.07
Energy lost in the transmission and distribution systems	2,764,952.70	3,589,201.82	3,165,032.35	3,500,340.04	3,668,749.82
<b>Total of Greenhouse Gas Emitted in Activity Type 2</b>	<b>2,818,563.51</b>	<b>3,648,699.29</b>	<b>3,224,487.71</b>	<b>3,556,747.74</b>	<b>3,729,198.89</b>
<b>Total of Greenhouse Gas Emission</b>	<b>2,897,224.34</b>	<b>3,721,987.26</b>	<b>3,303,021.38</b>	<b>3,643,618.19</b>	<b>3,896,375.73</b>

## Overview of Reduction of Greenhouse Gas Emission of PEA (2011-2015)

tCO<sub>2</sub>/Year

Activity Type	2011	2012	2013	2014	2015
Electricity generation from alternative energy	48,367.57	34,368.20	34,965.26	31,776.69	21,608.77
Use of diesel oil mixed with biodiesel	1,073.94	2,052.35	1,964.68	1,424.06	2,791.54
Projects supporting the reduction of greenhouse gas emission	909,105.01	1,529,860.54	1,986,942.58	2,685,909.56	3,014,885.09
<b>Total Reduction of Greenhouse Gas Emission</b>	<b>958,546.52</b>	<b>1,566,281.09</b>	<b>2,023,872.52</b>	<b>2,719,110.31</b>	<b>3,039,285.39</b>







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