



**Asia-Pacific
Economic Cooperation**

Peer Review on Energy Efficiency in Indonesia

June 2012

Report endorsed by the APEC Energy Working Group

CONTENTS

Contents.....	ii
Preface.....	iv
Executive Summary	v
Recommendations	vii
PART 1: BACKGROUND INFORMATION	1
1. Statistics, Forecasts and Trends in Energy Consumption.....	2
1.1. Trends in Energy Supply	2
1.2. Trends in Energy Consumption.....	5
2. Energy Efficiency Institutions, Policies and Major Programs	7
2.1. Institutional Framework.....	7
2.2. Energy Efficiency Policy.....	14
PART 2: Review team report.....	27
1. Institutional Context	28
1.1. Critique.....	28
1.2. Recommendations	32
2. Energy Efficiency Goals, Targets and Strategy	33
2.1. Critique.....	33
2.2. Recommendations	38
3. Energy Data Collection and Monitoring.....	39
3.1. Critique.....	39
3.2. Recommendations	40
4. Policy Measures – Industry Sector.....	40
4.1. Critique.....	40
4.2. Recommendations	42
5. Policy Measures – Electricity Sector	47
5.1. Critique.....	47
5.2. Recommendations	49

6.	Policy Measures – Commercial and Residential Sector	49
6.1.	Critique.....	49
6.2.	Recommendations	51
7.	Appliances and Equipment.....	52
7.1.	Critique.....	52
7.2.	Recommendations	53
8.	Education and Energy Efficiency Related Research and Development	54
8.1.	Critique.....	54
8.2.	Recommendations	57
	Appendix A: Peer Review Team Members	61
	Appendix B: Organisations and Officials Consulted	62
	Appendix C: Distribution of Energy Saving Potential	64
	Appendix D: References	66

PREFACE

According to the guidelines for the APEC Peer Review on Energy Efficiency (PREE), the objectives of the PREE, endorsed by APEC leaders at their 2007 meeting is to:

- Share information on energy efficiency performance as well as on policies and measures for improving energy efficiency
- Provide opportunities for learning from the experiences of other economies and for broadening the network among energy efficiency policy experts
- Explore how energy efficiency goals on an overall and /or sectoral basis and action plans could be effectively formulated in each economy under review, taking into account the range of possible strategies that could be used, according to the circumstance of each economy
- Monitor progress attaining energy efficiency goals on an overall and/or sectoral basis and implementing action plans, if such goal and action plans have been already formulated at the time of the review
- Provide recommendation for voluntary implementation on how implementation of action plans could be improved with a view to achieving energy efficiency goals

Two activities are undertaken as part of the PREE:

- a) **Peer Review** of volunteer member economies
- b) The **Compendium** of energy efficiency policies of APEC member economies based on either the APEC voluntary PREE or energy efficiency aspects of the IEA Energy Policy Review.

Indonesia volunteered to undertake a peer review. This report presents the results of a peer review of energy efficiency policies conducted in Indonesia.

The primary accountability for each peer review is shared by the economy being reviewed and the Review Team. The peer review in Indonesia was conducted by a Team of seven experts (see Appendix A) who visited Indonesia from 10 -14 October 2011.

During the visit, the Review Team had comprehensive discussion on energy efficiency with representative and experts from government ministries and agencies, private and state companies (see Appendix B). The Review Team wishes to thank all the presenters and others that spent time with the team for discussions, especially the representatives of the Ministry of Energy and Mineral Resources who organized the event.

EXECUTIVE SUMMARY

Indonesia has in place comprehensive energy efficiency and conservation programs mandated by Law and regulation. There is evidence of strong political leadership in Law No. 30 of the Year 2007 regarding Energy, which is referred to as the Energy Law. The Energy Law calls for establishment of the National Energy Council (DEN) in national energy policy making, the Energy Law also mandates implementation of specific energy conservation measures that are elucidated in the Law's explanatory Government Regulation No. 70 of the Year 2009.

To implement energy conservation programs mandated by Law, the regulations to this effect are being finalized by the Ministry of Energy and Mineral Resources (MEMR). The MEMR is the agency in government which by Law is responsible for energy conservation. The MEMR's energy conservation responsibility is entrusted to the Directorate of Energy Conservation, which is technically the *focal point* of energy conservation in Indonesia. The Directorate of Energy Conservation has finalized drafting plan of action and programs to execute mandates by Law and other energy conservation programs in the National Energy Conservation Master Plan (RIKEN), which is legally binding.

The Review Team is pleased to note that the Directorate of Energy Conservation is to implement best practice energy conservation programs in RIKEN in coordination with other ministries, agencies, and is engaging with other stakeholders and the public on energy efficiency and conservation issues. Government leadership is crucial in ensuring progress in energy efficiency and conservation. The Review Team recognized however that there could be alignment issues with regard to the Energy Law's perception on energy conservation, with perception of other energy efficiency and conservation programs and endeavours in RIKEN on objectives, incentives, financing energy efficiency, and other matters.

Legislation addresses energy conservation as a matter of compliance by large energy users, that they shall implement *Energy Management* by definition of the Law, with emphasis on executing periodic energy audits and realizing their recommendations. The Law does not address the financial aspects to implement the energy efficiency and conservation recommendations; legislation however mandates that large energy users shall be given easiness and incentives by the government and/or regional government for achieving energy conservation. Programs in RIKEN in contrast address a range of energy efficiency and conservation *barrier mitigation* including removing financial barriers to increase the viability to invest in energy efficiency and conservation, RIKEN also address the importance of information to targeted stakeholders, standards and labelling, and other national programs that apply to all energy uses in the economic sectors. The Review Team believes that identifying and mitigating barriers is a critical aspect in the fundamentals of energy conservation.

The Review Team believes that execution of mandates of the Law would require close and competent regulatory oversight however this issue was not addressed in legislation. The Review Team suggests that sufficient and highly qualified regulators under exclusive regulatory framework should be established for effective and accountable implementation of mandates of the Law.

Indonesia has comprehensive elements of law, policies, programs, action plan, goals and targets nonetheless with the presence of some alignment issues the Review Team proposes that Indonesia establish an overarching strategy on energy efficiency and conservation based on aligned basic principles, programs, goals, and targets.

The Review Team proposes greater emphasis on short to medium term energy efficiency and conservation targets that would realize identified potential energy savings, besides setting targets based on long term aspirational goals. With regard to the institutional responsibilities on energy conservation, the Review Team proposes high level coordination of relevant Ministers in a permanent inter Ministerial team to establish cross-sector programs and action plans especially those pertaining to *barrier mitigation* and to ensure their effective implementation.

Data collecting, data management, and analysis of energy strategy is well established in the Data and Information Center of the Ministry of Energy and Mineral Resources, its role however needs to be strengthened and the flow of data on energy supply and energy use to the Ministry of Energy and Mineral Resources from other ministries, government agencies, and state owned energy enterprises should be established as being obligatory.

The industry sector is making significant efforts to implement energy efficiency and energy conservation measures particularly to increase competitiveness of the industry. The government-private sector Partnership Program found that most of the participating industries in the Program are reluctant to make medium to high cost energy efficiency investments. The unavailability of financial incentives and other special terms on commercial financing is identified as the main barrier. The Review Team believes in this regard that incentives, such as financial incentives, should be made available up-front to industry towards the possibility of making investments, rather than for achievements of energy conservation.

The Review Team commends compulsory appointment of an energy manager in large energy users which are mostly enterprises in industry. The role of the energy manager nonetheless needs to be clarified. An energy manager's role is necessary in promoting energy conservation however meaningful investment in energy efficiency measures is the decision of the board of directors of companies, the Review Team for this reason commends the Directorate of Energy Conservation for its program to establish an energy conservation forum for executives of companies. The Review Team proposes continuous capacity building in energy manager's ability to develop energy saving plans, energy reporting and financial plans addressed to the company's board of directors regarding concepts to reduce energy consumption. Government information to the industry sector should promote energy efficient technologies, and energy conservation best practices, and establish a sector energy consumption benchmark and energy indices.

The Review Team proposes that the Ministry of Public Works be the government authority responsible for energy efficiency and conservation in buildings, which includes commercial buildings and residential sector buildings. The Review Team proposes that the Ministry of Public Works be one of the members of the Review Team's proposed inter-ministerial framework of relevant Ministers. Because Indonesia already has building standards for commercial buildings; the Review Team proposes implementation of energy building codes and the creation of an appropriate regulatory framework to ensure compliance. Mandatory building codes should be implemented gradually beginning from a select local level. The government should lead in setting examples in energy efficiency and conservation in buildings, through government programs such as the program to Save Energy and Water by Presidential Instruction No. 13/2011. Data is the basis of analysis, monitoring, and design of policy and gathering data on energy use in buildings should be extended specifically to commercial buildings to be able to establish relevant policies and regulations. The government should allocate more resources to lay the foundation for improvement of energy performance in buildings

Green buildings with advanced energy efficiency features are the direction of the future, which means energy saving, water saving, material saving, and a healthy and comfortable building and environment. In many other economies, the development of green buildings is considered as an effective measure to greatly contribute to energy saving and GHG emission reduction in the building sector, also as a chance to promote the improvement of science and technology and create growth in the national economy. The Review Team commends the efforts to implement a green building program in Jakarta.

The Review Team proposes that a statement of standards compliance (Declaration of Conformity) be issued by an independent accredited certification agency, when such agency is available. The Review Team proposes Indonesia implement minimum energy performance standards (MEPS) as envisioned. Adoption of regional MEPS should be considered.

The Review Team proposes that training for energy managers and energy auditors should be made available by the Education and Training Center in other large cities in Indonesia, besides Jakarta; the Research and Development Centre should be involved in broader range R&D, particularly in industrial related energy conservation technology applications.

RECOMMENDATIONS

Institutional Context

Recommendation 1 *Sufficient number of government regulators with appropriate training to high level qualification should be established for realistic, effective and accountable implementation of energy conservation as mandated by Law.*

Recommendation 2 *Special regulatory unit should be established for the purpose of oversight of energy conservation compliance as mandated by Law. The regulatory unit should have sufficient authority to carry out its task by sufficient, qualified and dedicated government regulators; to ensure proper oversight on execution of energy conservation as mandated by Law; and other energy conservation mandates.*

Recommendation 3 *Permanent Minister level inter-ministerial institutional framework on energy efficiency and conservation should be established for effective barrier removal. The framework should include an inter-ministerial Working Team.*

Recommendation 4 *The Directorate of Energy Conservation should in the mean time heighten coordination with related ministries, agencies, and other stakeholders for effective implementation of cross sector programs of RIKEN and barrier removal in general.*

Recommendation 5 *Financial incentives that apply up-front should be established, to enhance removing barriers on financing energy efficiency and conservation projects, especially in financing medium to high cost energy efficiency projects.*

Recommendation 6 *The Directorate of Energy Conservation should enhance the function and role of the Energy Efficiency Clearing House Indonesia (EECHI), given that its cooperation with DANIDA will end in 2012.*

Energy Efficiency Goals, Targets and Strategy

Recommendation 7 *A particular national energy policy goal provides better policy guidance, rather than having several valid goals.*

Recommendation 8 *Energy goals stated in terms of energy intensity or energy elasticity should be used appropriately within its context, in policy.*

Recommendation 9 *The policy goal to achieve energy elasticity less than 1 in 2025 may need to be reconsidered or the definition of energy elasticity as perceived by the policy explained.*

Recommendation 10 *Target setting which is based on aspirational goals should be re-examined from time to time, to account for its viability with regard to technology and supporting policies expectations.*

Recommendation 11 *The targets to realize energy savings potential should be established gradually as data and information on potential energy savings becomes more comprehensive and accurate; so that targets on realizing potential energy savings are more applicable and realistic.*

Recommendation 12 *Identifying and updating data and information on potential energy savings should be a continuous process.*

Recommendation 13 *Strategy on energy efficiency and conservation should be established along synchronized principles and concepts in addressing essential elements of goals, objectives, policies, targets, programs, accountabilities, and monitoring and reporting.*

Recommendation 14 *The requirement to produce a strategy or to have in place one at any time should be established in legislation.*

Recommendation 15 *The types of energy audits which are to be conducted routinely, as mandated by Article 12 in Government Regulation 70/2009 should be explained and regulated.*

Energy data collection and monitoring

Recommendation 16 *Enhance data collection and monitoring by these measures:*

- a) Increase cooperation and coordination among ministries and regional government in data monitoring and reporting which should be addressed in current high level regulations.*
- b) The MEMR should establish ministerial regulation on data collection and management with clear accountability for each unit or the MEMR, other ministries, agencies and state owned energy enterprises when it comes to the provision of data to PUSDATIN.*
- c) The MEMR should develop an analytical energy efficiency monitoring system in line with the National Energy Conservation Master Plan. This system should help evaluate and monitor sector and overall achievements of national energy efficiency targets.*

Recommendation 17 *The MEMR should enhance the capability of PUSDATIN through the following measures:*

- a) Establish a specific group in PUSDATIN that focuses on energy efficiency analysis. The duty of this group should be as follows:*
 - o To develop an energy efficiency data system and energy efficiency indicators at subsector, sector and economy-wide levels*
 - o To support the Directorate General of New Renewable Energy and Energy Conservation in making Energy Efficiency (EE) policies and monitoring the formulation and enactment of the National Energy Conservation Master Plan.*
 - o To establish an energy efficiency database covering all sectors, especially the building sector.*
- b) Expansion of an online network on data to directly communicate between PUSDATIN and other data information centres (under other ministries and local governments).*
- c) Upgrade the infrastructure in communication technology (hardware, software, and so forth) including development of human resources and capacity building for PUSDATIN.*

Industry Sector

Recommendation 18 *Continue to build energy manager's capacity to develop energy saving plans, energy reporting, financial plans addressed to the company's board of directors regarding concepts such as retrofitting and process change to reduce energy consumption.*

Recommendation 19 *Continue the capacity building of energy auditors and consider creating energy audit guidelines to improve the quality of the energy audit results.*

Recommendation 20 *Encourage large energy users to report energy data and follow the progress (Law No.70 2009). It is also important to spread EE regulation information among company employees.*

Recommendation 21 *The government should provide information on the international best practice technologies within all energy consuming sectors.*

Recommendation 22: *The government should make large information, education and communication campaigns across demand sectors, particularly those from the energy intensive industrial establishments to be able to educate the sector on matters that require government compliance for better energy management.*

Recommendation 23: *The government in cooperation with the private Energy Service Provider (ESP) must promote energy audit services and their recommendations as the first key step for energy conservation in the industrial sector.*

Recommendation 24: *Given that the industrial sector is a large energy consuming sector, policies targeted at energy efficiency and long term energy supply security should be handled and coordinated by a central agency such as the MEMR.*

Recommendation 25: *The Review Team suggests the emphasis of the relevance of the financial sector in providing financing opportunities for EE projects; this includes State Owned or private financial institutions.*

Recommendation 26: *In the short-term plan, the MEMR must consider the endorsement of imported Energy Saving Capital Equipment or pioneering energy efficient technologies and products for use by the Industry through the Ministry of Finance through tax incentives.*

Recommendation 27: *With the government lacking the necessary resources (financial and manpower), the government must consider strengthening its ties under a "Voluntary Program" with its stakeholders such as NGOs, Professional Associations, environmental advocacy groups, Information agency of the government, and other private entities; to become a partner in delivering the needed services to industry.*

Recommendation 28 *SPV is part of one of the most energy intensive industries in Indonesia which necessitates assistance from the government through MEMR. The government should extend the above mentioned recommendations to SPV as well and focus on assistance with energy management within a company and on the evaluation of workshops held, participation at workshops can be encouraged through a National Efficiency Award program that recognizes and acknowledges companies efforts in reducing their energy consumption through improved energy consumption performance supported by energy efficiency projects and actual energy saved.*

Electricity Sector

Recommendation 29: *With regard to current achievements and challenges in the future, PLN should maintain frequent training on energy efficiency and conservation; establish energy manager qualifications – to power industry specifications for personnel in power generation, in particular; and exchange of experience in implementing Efficiency Drive Program.*

Recommendation 30: *PLN should formally establish an energy manager and energy team in its units to execute energy audits and establish energy efficiency and conservation targets and programs for approval by management.*

Recommendation 31: *The Review Team considers that PLN should formally declare energy reduction targets and thermal efficiency targets for power generation as part of the combined energy efficiency and conservation target in electric supply, stated in the electricity supply master plan – RUPTL. Energy reduction targets and thermal efficiency targets in power generation should be one of the criteria for assessment of the company's performance and the direct responsibility of management.*

Commercial and Residential Sector

Recommendation 32 *The responsibility or role for energy efficiency and energy conservation (EE & C) in the commercial and residential sectors should be clearly defined. The Review Team proposes that the Ministry of Public Works, as the Ministry responsible for EE&C in the building sector (including the commercial and residential sectors), should participate in the Review Team's proposed structure within the government whose members are from relevant ministries that implement national energy conservation programs to foster cooperation with other relevant ministries, especially the MEMR, the ministry responsible for the success of EE&C in Indonesia.*

Recommendation 33 *Develop energy codes for building and building EE&C regulations for commercial building, including regulatory compliance and enforcement processes.*

Recommendation 34 *Emphasize on energy management of large-scale public and government buildings. Enhance the deployment of the monitoring and control system in energy intensive buildings. Adopt cost-effective measures to promote the energy performance in existing buildings.*

Recommendation 35 *Encourage the development of Green Buildings. Develop the rating and labelling system. Enhance the demonstration of Green Buildings, especially in government buildings. Meanwhile provide financial support and enhance the capacity building of related players.*

Recommendation 36 *Enhance the foundation of EE&C in the building sector, including energy data collection and analysis, an energy saving potential study, etc.*

Recommendation 37 *Develop building EE&C regulations or building energy codes for residential buildings, based on life cycle cost effective energy efficient measures. Enhance the implementation of these regulations.*

Recommendation 38 *Improve the EE&C awareness of public, encourage the behaviour of energy saving through displays at shopping malls, schools and handing out of pamphlets at public gatherings or places.*

Appliances and Equipment

Recommendation 39 *Certification of conformity for the purpose of standards and labelling by an independent accredited certification agency/institution should be considered.*

Recommendation 40 *Endorsement labelling for certain products should be considered.*

Recommendation 41 *Plans to implement minimum energy performance standard (MEPS) should be realized.*

Education and Energy Efficiency Related Research and Development

Recommendation 42 *Collaboration between the research and development unit and industry could see an expansion of research and development projects and lead to good energy efficiency solutions. International collaboration could see the same results.*

Recommendation 43 *Seeking of sustainable government funds for research and development.*

Recommendation 44 *The development of a formal Energy Efficiency R&D plan within National Research Council and monitoring system to clearly state objectives and goals of projects and evaluate their success.*

Recommendation 45 *It is vital that there are more training centres across Indonesia so that people living across the country are able to access training.*

Recommendation 46 *As the energy manager program evolves it may be necessary to consider different levels of energy managers and the specific qualifications they will need.*

Recommendation 47 *It is vital that much consideration and careful planning of syllabuses for training courses continue and that thought put into courses that build on previous courses.*

Recommendation 48 *It would be very helpful to have basic energy efficiency and energy conservation educational courses at primary and high school level as well as at university level.*

Recommendation 49 *It is critical that there are well developed training programs and clear accreditation avenues for energy auditors.*

PART 1: BACKGROUND INFORMATION

The background information contained in this report has been contributed by Indonesia. This information is intended to provide some context to the recommendations of the PREE Team. The first section discusses the trends in Indonesia's energy consumption. The second section provides information on Indonesia's energy efficiency institutions, current policies and objectives and energy efficiency programs.

1. STATISTICS, FORECASTS AND TRENDS IN ENERGY CONSUMPTION

1.1. Trends in Energy Supply

Indonesia is endowed with large hydrocarbon and renewable energy resources. Indigenous oil, gas and coal reserves have played an important role in Indonesia's economy as a source of energy, industrial raw material and foreign exchange earner.

Primary Energy Supply

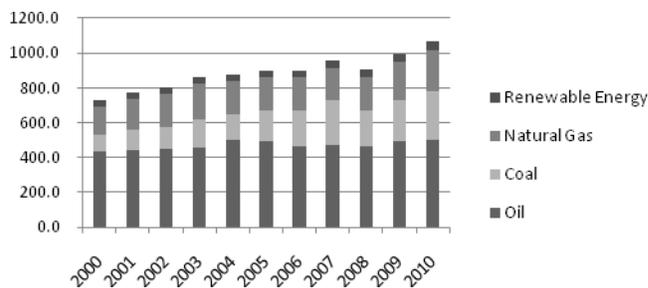
In 2010, Indonesia produced crude oil (945 thousand barrels per day); natural gas (9336 million standard cubic feet - scf per day); and coal (275 million tonnes). Indonesia is the world's largest exporter of steam coal, and currently the world's third largest LNG exporter.

Total primary energy supply (TPES) was 1350 (BOE) in 2010 includes biomass energy of about 280.5 million BOE, which is mostly non-commercial biomass. The TPES of commercial energy in 2010 excluding biomass was 1069.5 million BOE. Oil constituted the largest share in the TPES of commercial energy at 46.8%, followed by coal 26.3 %; natural gas 21.8 %; and renewable energy 5.1 %, renewable energy in this case constitutes geothermal power and hydropower.

TPES of commercial energy grew at an average annual rate of 4.5 % from 2000 to 2010; over the period, TPES increased in absolute terms by 275.2 BOE, or 27.6 %. Coal in the TPES increased most rapidly at an average annual rate of 14.3 %, followed by renewable energy 5.6 %; natural gas 4.2 %; and oil at 1.7 %. The trend of TPES in 2000-2010 is as shown in **Figure 1**.

Figure 1: Historical TPES, commercial energy

Units: in million barrels of oil equivalent (BOE)



Center for Data and Information on Energy and Mineral Resources, Ministry of Energy and Mineral Resources (2010)

Indonesia experienced rapid increase in annual crude oil imports in the first half of the past decade however the trend was averted onwards of 2005. The balance of crude oil exports and imports is however diminishing as Indonesia's crude oil exports is on a declining trend, as shown in **Figure 2**. Crude oil import was 119600 barrels in 2009.

Refinery product annual imports increased in the first half of the past decade; further import increase was averted in the years at the end of the decade. Refinery product import was 22157 kiloliters in 2009, which constitute mostly of RON 88 gasoline 46.3 %; and automotive diesel oil (ADO) 38.4 %. Refinery product import is gaining on exports since exports is on a declining trend, as shown in **Figure 3**.

Figure 2: Crude oil export and import

Units: in thousand barrels of oil

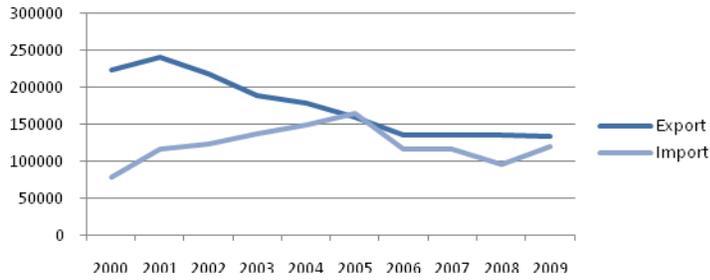
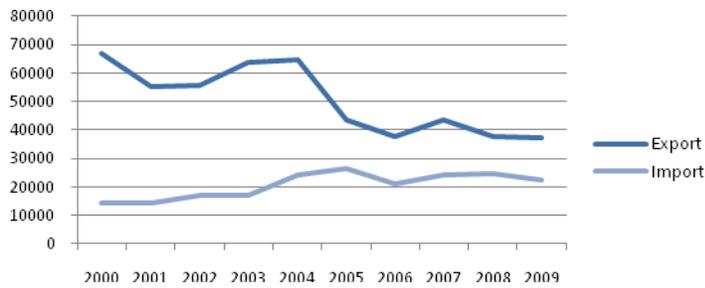


Figure 3: Refinery product export and import

Units: in thousand kiloliters



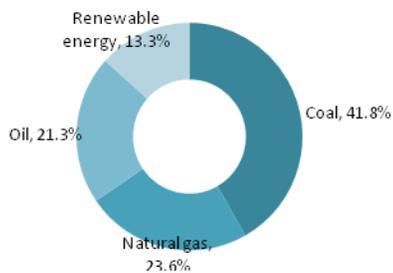
Center for Data and Information on Energy and Mineral Resources, Ministry of Energy and Mineral Resources (2010)

The Power Sector

Electricity supply to the national electricity grid comes from generating capacities of the state owned, state electric company – PLN, IPPs (independent power producers), and captive power through power purchases. PLN is the single-buyer of IPP power and captive power purchase. In 2009, Indonesia’s total power generating capacity to the grid was 31453 MW.

Figure 4: Share of primary energy in power generation of combined PLN, IPP, and captive power purchases, in 2009

Units: in percent



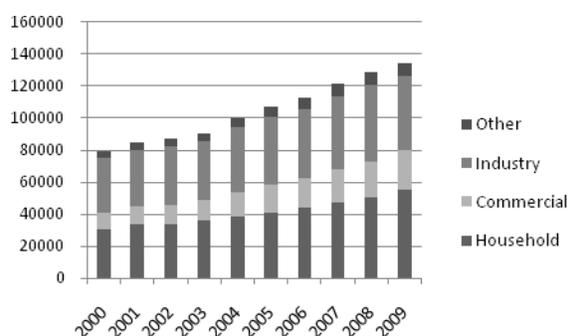
Center for Data and Information on Energy and Mineral Resources, Ministry of Energy and Mineral Resources (2010) and APERC assumptions

Coal power generation produced 41.8 % of total grid power in 2009. The shares of primary energy utilized by PLN, IPP power generation and captive power purchase are as shown in **Figure 4**. In 2009, total electricity generated was 155.3 TWh, of which 77.7% was produced by PLN; total electricity sold was 134.5 TWh.

In 2009, electricity use was mostly in the residential sector 40.8%; followed by industry 34.3 %; commercial sector 18.4 %; and Other 6.4 %. Electricity supply to the commercial sector increased most rapidly at an average annual growth rate of 10.0 %; followed by residential sector, 6.8 %; and the industry sector 3.5 %. Indonesia however has substantial self generation or captive power in industry. Grid electricity supply increased at an average annual rate of 6.1% in 2000-2009, as shown in **Figure 5**.

Figure 5: Electricity supply

Units: in GWh



Center for Data and Information on Energy and Mineral Resources, Ministry of Energy and Mineral Resources (2010)

Recovery from the financial crisis

The 1998 financial crisis was particularly severe for the power sector. The drastic devaluation of the local currency induced by the crisis reduced the power sector’s ability to make meaningful investments for many years; and for the first time electricity subsidy was required, which increased to substantial levels in subsequent years. A decade later in 2007, by government initiation, the power sector commence on a power development plan that would build new generation capacities totalling 50732 MW by 2020 and the expansion of transmission and distribution capacities to match.

The plan would make up for postponed electricity supply in the past and anticipates strong electricity demand from economic growth in the near future. The program will add substantial geothermal and hydropower capacities of 5792 MW and 5596 MW respectively that would notably increase renewable energy share in the national primary energy supply mix.

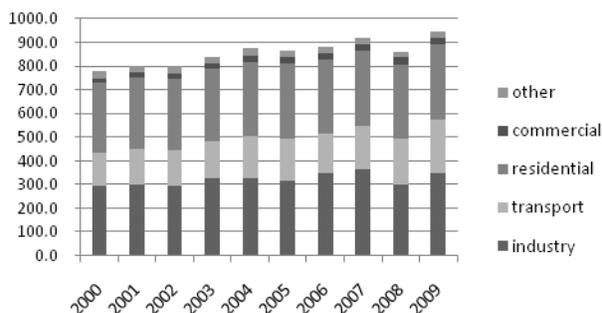
The state electricity company - PLN is confident in achieving its goal of 95 % national electrification ratio, which is the share of the population having access to electricity in 2020, from the current ratio of 67.2 %.

1.2. Trends in Energy Consumption

Final energy consumption including biomass was 946.0 million BOE in 2009, consumption increased at an average annual rate of 2.3 % over the past decade from 2000, the trend of final energy consumption is as shown in **Figure 6**.

Figure 6: Historical trend of final energy consumption

Units: in million BOE



Center for Data and Information on Energy and Mineral Resources, Ministry of Energy and Mineral Resources (2010)

Residential sector

Residential sector final energy consumption was 314.7 million BOE in 2009, increasing at an average annual rate of 0.7 % from 2000-2009. Residential energy consumption saw structural change over the period specifically, kerosene consumption declined from 63.2 million BOE to million 24.2 BOE. On the other hand, LPG consumption increased from 5.9 million BOE to 23.4 million BOE, and natural gas consumption increased from 81 thousand BOE to 120 thousand BOE.

Industry Sector

Industry sector final energy consumption was 347.8 million BOE in 2009, increasing at an average annual rate of 2.4 % from 2000-2009. Coal use in industry notably increased from 36.0 million BOE to 82.0 million BOE. Natural gas supply to industry had been at an average of around 85.0 million BOE for most of the past decade, however consumption increased to 117.5 million BOE in 2009, mitigation of supply constraints explains this increase. Refinery product use in industry is on a slight declining trend however remains significant at a total of 75.8 million BOE in 2009.

Transport sector

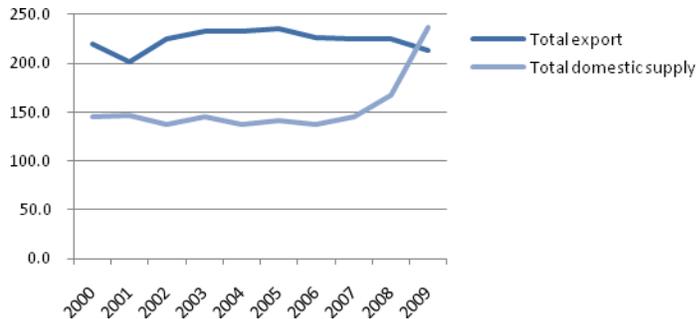
Transport sector final energy consumption was 226.5 million BOE in 2009, increasing at an average annual rate of 5.8 % from 2000-2009. Most notable increase of final energy consumption was for aviation turbine fuel from 7.1 million BOE in 2000 to 16.2 million BOE, and RON 88 gasoline from 70.3 million BOE in 2000 to 125.4 million BOE, in 2009. Consumption of industrial diesel oil (IDO) and fuel-oil declined significantly, from combined 0.82 million BOE to 0.19 million BOE. Though relatively small in absolute terms, electricity use in transport increased by 152 %.

Demand for natural gas

Natural gas use had been increasing since 2008 from a declining trend. In 2009, domestic gas supply for domestic use was 213.3 million BOE, and for the first time exceeded combined LNG exports and pipeline gas exports, as shown in **Figure 7**. Domestic natural gas demand increases in recent years mostly went to industries directly, and to the “City Gas” gas grid, the historical trend is as shown in **Figure 8**.

Figure 7: Combined LNG and pipeline natural gas exports, and domestic natural gas supply

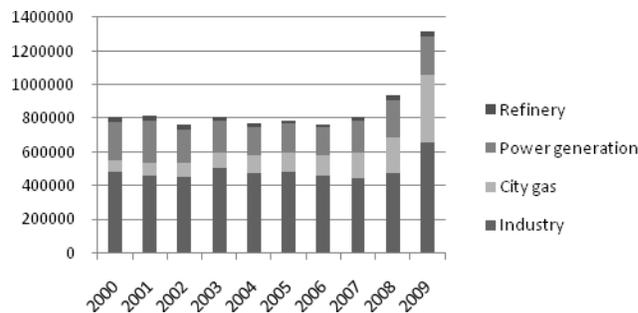
Units: in million BOE



Center for Data and Information on Energy and Mineral Resources, Ministry of Energy and Mineral Resources (2010)

Figure 8: Natural gas to the domestic market

Units: in million standard cubic feet (scf)



Center for Data and Information on Energy and Mineral Resources, Ministry of Energy and Mineral Resources (2010)

Energy subsidies

Historically, Indonesia commenced sustained economic growth from low development levels, low average income, and limited commercial energy supply in the early 1970's. To increase well being of its large population by the benefits that sufficient affordable commercial energy supply may bring and to allow for the formation of broad economic base, Indonesia chose to delay full exposure to energy prices that reflect the cost of supply. The policy was possible by the increase of oil and gas production for their exports, and oil export wind-falls.

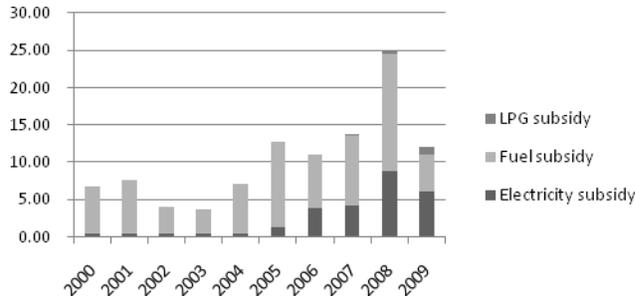
In more recent history, the severe devaluation of the local currency in 1998 prompted a series of energy price adjustments and in the process removal of certain subsidy categories on oil and electricity use, including for industrial use. The aftermath of the crisis was nonetheless a set-back to efforts in energy subsidy removal, particularly for transport fuels.

Energy subsidies in recent years became most significant, trend of energy subsidies is as shown in **Figure 9**. In 2009, fuel subsidy was IDR 45.04 trillion (approximately USD 5.06 billion); electricity subsidy was IDR 53.72 trillion (approximately USD 6.04 billion); and LPG subsidy was IDR 7.78 trillion (approximately USD 0.87 billion). Although overall energy subsidies in 2009 were substantial, it was significantly lower than energy subsidies in 2008. It is acknowledged that energy subsidy restricts greater energy supply possibilities and endeavours to substitute oil.

The government is working on energy subsidies' gradual removal; in the mean time the remaining bulk of subsidies remain substantial.

Figure 9: Historical trend of energy subsidies

Units: in approximate USD billion



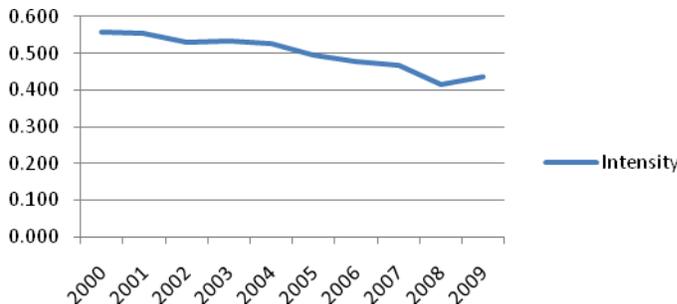
Source: Directorate of Energy Conservation, DGNREEC, MEMR

Energy intensity

Energy intensity of final energy consumption (in million BOE) over GDP (in constant 2000 IDR trillion) is declining at an average annual rate of 2.7 %, as shown in **Figure 10**.

Figure 10: Energy intensity

Units: energy consumption in million BOE/ GDP in IDR trillion



Source: Review Team – data source: the Centre for Data and Information, MEMR

2. ENERGY EFFICIENCY INSTITUTIONS, POLICIES AND MAJOR PROGRAMS

2.1. Institutional Framework

The Energy Law

Law No. 30 of the Year 2007 regarding Energy, also referred to as the Energy Law, is a historic law for Indonesia. The Energy Law calls for a new institutional framework in energy policy making. The Law mandates creation of the National Energy Council (DEN – *Dewan Energi Nasional*) to establish the National Energy Policy. The Energy Law mandates the Government to establish a National Energy General Master Plan based on the National Energy Policy, and with due consent of the National Energy Council. The National Energy General Master Plan is by Law the basis for the National Energy Conservation Master Plan.

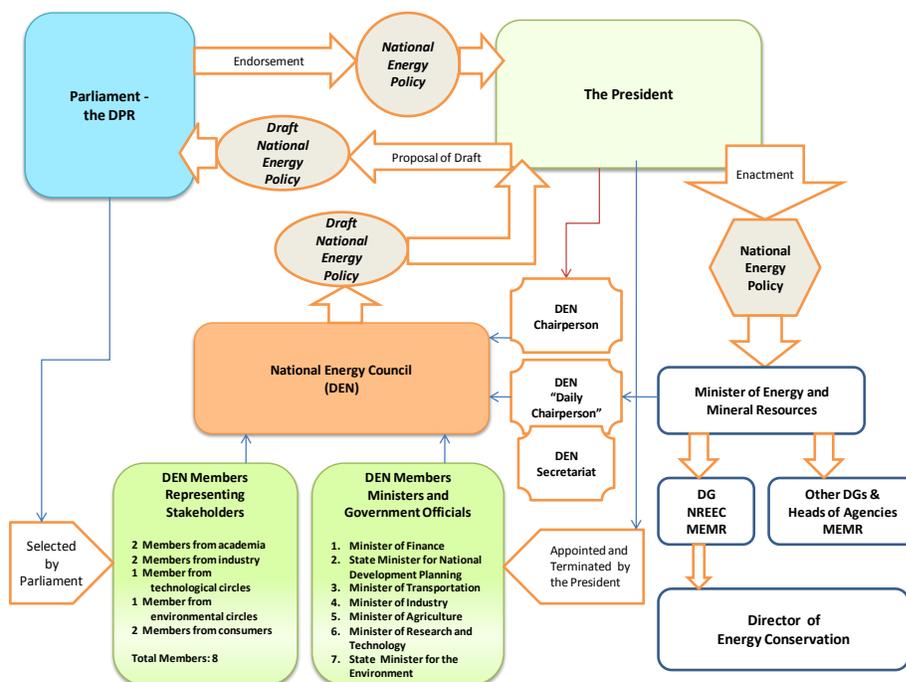
National energy conservation is by Law obligatory and shall be the responsibility of the Government, the regional government, business entity, and the community. The Law mandates energy conservation shall *cover all phases of energy management* as defined by Law. The Energy Law is specific on the means to achieve energy conservation. The Law mandates the government and/or regional government to provide *facilities* and/or *incentives* to energy users and the producers of energy saving equipment, for conserving energy and producing energy reductions; in addition, government and/or regional government shall apply *disincentives* to energy users and producers of energy saving equipment for not implementing energy conservation. The *incentive and disincentives* mandate calls for government regulation for their execution.

The Energy Law states that matters regarding energy conservation shall be elucidated in further detail in a separate legally binding government regulation, as explanatory of the Energy Law. The government regulation to this effect is Government Regulation No. 70 of the Year 2009 regarding Energy Conservation. The implementation of Government Regulation No. 70 of the Year 2009 regarding Energy Conservation is regulated by legally binding Ministerial Regulations. By Law, the Ministerial Regulations regulating execution of energy conservation is issued by *the government authority on energy matters*.

Institutional structure for the National Energy Policy

The Energy Law calls for a National Energy Policy (KEN – *Kebijakan Energi Nasional*). The Law elucidates that the National Energy Policy shall be formulated by the National Energy Council (DEN). DEN was established in 2008 by Presidential Regulation. By Law, DEN has 15 members, made up of 7 ministers and 8 non-government members that are selected by Parliament, the **DPR** (*Dewan Perwakilan Rakyat*). The President is chairperson of DEN. The Minister of Energy and Mineral Resources is *the daily chairperson* of DEN and is not one of the ministerial members of DEN. The draft National Energy Policy requires endorsement by Parliament, for its legal enactment by the President. The structure for formulation of the National Energy Policy is as shown in **Figure 11**.

Figure 11: Institutional framework for formulating the National Energy Policy

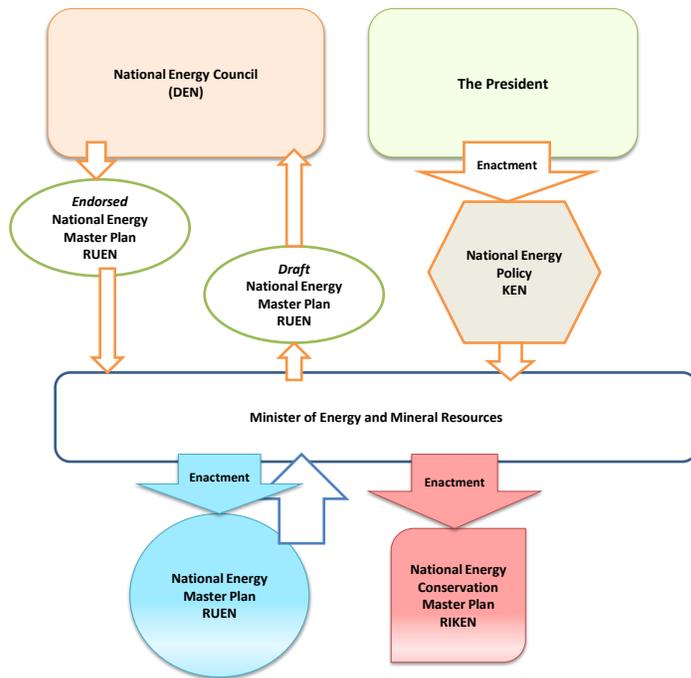


Law No. 30/2007 regarding Energy

By Law, the National Energy Policy shall be the basis for formulating the National Energy Master Plan (RUEN – *Rencana Umum Energi Nasional*). RUEN is drafted by Government and shall be endorsed by DEN for Government enactment by the Minister of Energy and Mineral Resources. The provincial government is by Law required to formulate a Provincial RUEN.

The National Energy Policy and RUEN shall be the guiding national policy and master plan on energy matters, including energy conservation. By Law, RUEN shall be the basis of a National Energy Conservation Master Plan (RIKEN – *Rencana Induk Konservasi Energi Nasional*). A simplified diagram on the institutional structure in formulating RUEN and RIKEN is as shown in **Figure 12**, all process as shown in Figure 11 apply.

Figure 12: Institutional framework for formulating RUEN and RIKEN - simplified



Law No. 30/2007 regarding Energy

2.1 Institutional Framework

The Energy Law: the responsibility domain of government

Law No. 30 of the Year 2007 regarding Energy, elucidates that energy conservation shall be the responsibility of the Government, the regional government, business entity, and the community.

Government responsibility on energy conservation is by Law defined along administrative domain/boundary of the government, provincial government, and regency/city government. At the three levels of government there are distinct responsibility on the legal act of law making, policy, regulation, and programs on energy conservation as shown in **Figure 13**. By law, provincial governments, and regencies/cities governments can establish *regional regulations and energy conservation management policies* that apply exclusively within their legal administrative boundary.

By Law, the government and regional government responsibility on energy conservation is as follows:

The Government authority on energy matters, shall:

- a. Define law and regulations;
- b. Determine national policy;
- c. Formulate and enforce standard; and
- d. Determine procedure.

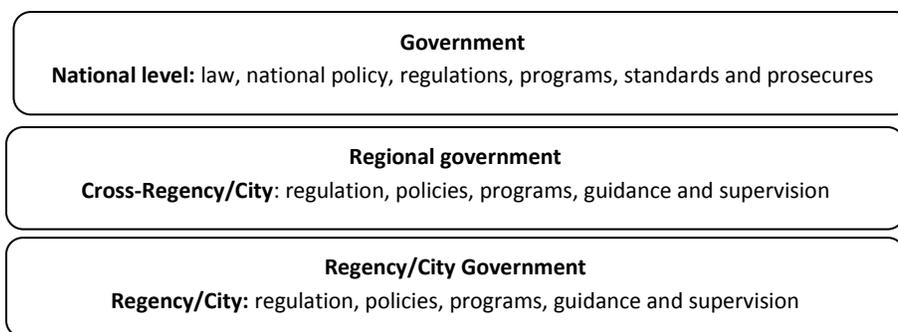
The provincial government authority in energy matters, shall:

- a. Define provincial/regional regulations;
- b. Provide guidance and supervision of cross regency/city endeavours; and
- c. Determine cross regency/city management policies.

The regency/city government authority in energy matters, shall:

- a. Define regency/city level regional regulations;
- b. Provide guidance and supervision on regency/city endeavours; and
- c. Determine management policies within a regency/city

Figure 13: Government responsibility domain



The Ministry of Energy and Mineral Resources, Directorate General of New Renewable Energy and Energy Conservation, Directorate of Energy Conservation

The *Government authority on energy matters* is the Ministry of Energy and Mineral Resources (MEMR), which by Law, is the entity in Government that is responsible for energy conservation. The Ministry's responsibility on energy conservation is vested in the Directorate General of New Renewable Energy and Energy Conservation (Directorate General of NREEC), established in 2010 with consideration to the institutional needs to implement the Energy Law. The responsibility on energy conservation in the Directorate General of NREEC is assigned to the Directorate of Energy Conservation.

The Directorate of Energy Conservation is one of four Directorates in the Directorate General of NREEC; The Directorate of Energy Conservation is currently staffed by 40 government officials of various ranks, its place in the organization structure diagram of the MEMR is as shown in **Figure 14**.

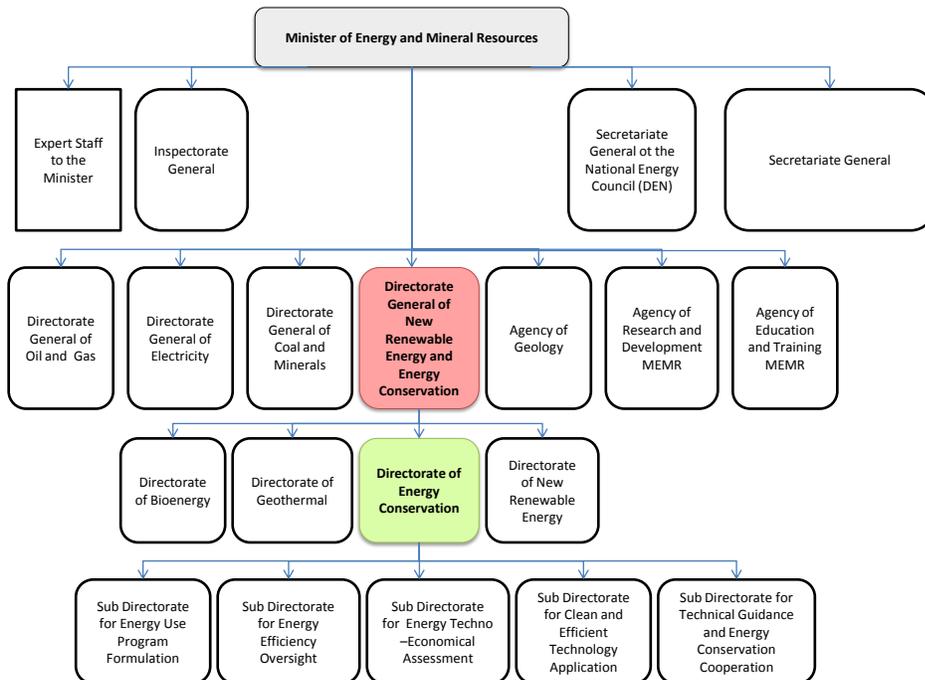
The Directorate of Energy Conservation has 5 *Sub-Directorates* that are dedicated to implement the government provisions on *incentives* and *disincentives* as mandated by Law, and other energy conservation programs.

The current role and responsibility of the Directorate of Energy Conservation, is to:

- a. Formulate and establish policy, strategy, and national energy conservation program

- b. Coordinate formulation of regulations pertaining to energy conservation, and implementation; the regulations are: 1) the Energy Conservation Master Plan; 2) Obligation to implement *Energy Management*; 3) Compulsory standard on energy efficiency; 4) Preparing *Functional Position* for energy conservation; 5) Fiscal incentive; 6) Development of energy service company (ESCO)
- c. Socialize energy saving measures to the public
- d. Create guidelines for implementing energy conservation to stakeholders, and regional governments, such as on: 1) energy management; 2) appointment of energy manager; 3) energy audit; 4) energy efficiency standard; 5) energy efficiency labelling
- e. Facilitate a forum for dialogue among stakeholders involving government, regional governments, energy users and energy producers, in various energy conservation programs, such as energy conservation partnership program
- f. Recommend energy efficient equipment and energy conservation projects that viably qualify for incentives
- g. Benchmark energy efficiency and energy intensity in industry, transport, and commercial buildings
- h. Provide technical assistance to local government energy conservation endeavours
- i. Monitoring and evaluating the implementation of national energy conservation
- j. Guidance and Supervision

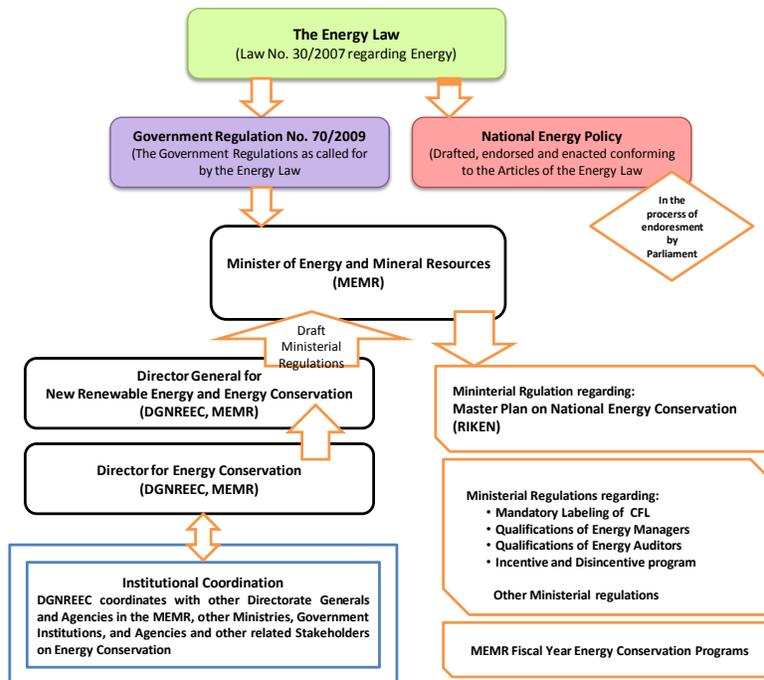
Figure 14: The Directorate of Energy Conservation in the organization structure of the Ministry of Energy and Mineral Resources (MEMR)



Law No. 30/2007 regarding Energy

The Directorate of Energy Conservation – MEMR, as lead agency for national energy conservation establishes coordination with other relevant ministries, agencies, and energy conservation stakeholders in formulation of Ministerial Regulations, and other programs, as shown in **Figure 15**.

Figure 15: Coordination by the Directorate of Energy Conservation



Law No. 30/2007 regarding Energy

Ministerial Regulations to be issued by the Minister of Energy and Mineral Resources to regulate implementation of Government Regulation No. 70 of the Year 2009 pertain to:

- The National Energy Conservation Master Plan (RIKEN)
- Preparation and Reporting Procedure on Implementation of the Energy Conservation Program for large energy users (6000 tonnes of oil equivalent per year)
- Implementation Procedure on Energy Conservation Incentives and Disincentives
- Competency Standard for Energy Manager in Building Sector; and Competency Standard for Energy Manager in Industry Sector
- Standard of Competency for Energy Auditor
- Standards and Labelling

At the time of Review Team visit, the Directorate of Energy Conservation had completed drafting some Ministerial Regulations as required by Law, and in the process of finalizing other mandated regulations, including on *Incentives* and *Disincentives*.

Responsibility of related Ministries and government agencies

The Directorate of Energy Conservation, MEMR as lead agency for national energy conservation, through inter ministerial and government agency coordination defined in the draft RIKEN the role and responsibility of related

Ministries and government agencies in national energy conservation. The related role and responsibility as stated in the draft RIKEN is concisely, as follows:

a. Ministry of Industry

Establish guideline to implement energy conservation in the industry sector; develop Ministerial initiatives to increase industrial energy efficiency and product competitiveness, and manufacture energy efficient products; establish energy intensity benchmarks, and energy efficiency standard; develop *top-runner* program.

b. Ministry of Public Works

Establish regulation on building energy performance, based on the Indonesia National Standard - **SNI** (*Standar Nasional Indonesia*) regarding energy conservation in Buildings; establish guideline to implement energy conservation in buildings; develop Ministerial initiatives to improve on energy use efficiency in buildings; establish energy intensity benchmarks and energy efficiency standard; develop *top-runner* program.

c. Ministry of Transport

Implement energy saving principles in planning, operation and management of national transport system; incorporate in vehicle road worthiness testing, an exhaust gas test regarding completeness of combustion in relation to energy efficiency; develop Ministerial initiatives for national transport to create energy efficient transport system and energy efficient vehicles

d. Ministry of Trade

Establish regulation on oversight of products in the market that they should have information on energy use efficiency, such as an energy label; promote use of energy saving products; implement Ministerial incentives for bringing into the market products that are energy efficient.

e. Ministry of Finance

Allocate funding for energy conservation in the national government budget for all sectors; create budget allocation guideline for government and regional government where energy conservation program is one of the criteria for budget allocation; provide national budget for incentive to producers of energy saving devices and for energy users who qualify energy savings.

f. National Development Planning Agency (BAPPENAS)

Incorporate energy conservation in the national development plan; create planning guideline for national development projects at the central and regional levels, where energy conservation is one of its criteria.

g. Ministry of National Education

Integrate energy conservation knowledge into the education curriculum in elementary education, to institutions of higher learning; develop Ministerial initiative in national education to establish a society well-informed in energy conservation.

h. Ministry of Research and Technology (the Agency for Assessment and Application of Technology – BPPT)

Disseminate information on energy saving technology; coordinate assessment about energy conservation; develop demonstration of energy saving process, technology, and devices.

i. Regional Government and Regency/City Government

Disseminate information on energy conservation; develop regulation which obligate energy conservation in industry and businesses; provide incentive and awards to achievers of energy conservation; mandate energy conservation standard, such as SNI regarding Energy Conservation in Building

2.2. Energy Efficiency Policy

Government Regulation No. 70/2009

Government Regulation No. 70 of the Year 2009 regarding Energy Conservation is a legally binding regulation explanatory of the Energy Law on matters of energy conservation. Government Regulation 70/2009 elucidates mandates of the Law specifically on policy and obligatory programs. A fair amount of the Government Regulation 70/2009 content is dedicated to elucidating the Energy Laws' Article on *Implementation of Energy Conservation*, such as on matters of *Incentives* and *Disincentive*.

Government responsibility

The regulation elucidates government responsibility in the three levels of government. The responsibility for all three levels is similar with the exception that the Government (there term referrers to Government, at the national level) has the responsibility to *assess, construct and establish policies*. The Government responsibility is to:

- a. *Formulate and establish policies, strategies, and energy conservation program*
- b. *Develop human resources qualified in the field of energy conservation*
- c. *Conduct complete and comprehensive socialization on the use of technology which apply principles of energy conservation*
- d. *Assess, construct, and establish policies, as well as allocate funds in order to implement the energy conservation program*
- e. *Provide easiness and or/or incentives in order to implement the energy conservation program*
- f. *Provide technical guidance about energy conservation to entrepreneurs, energy source users, and energy users.*
- g. *Implement the program and establish energy conservation activities; and*
- h. *Conduct guidance and supervision on the implementation of energy conservation program*

By Law, Energy Conservation is Obligatory

The Regulation mandates energy conservation in the activity of energy resource production, resource use, supply, and final energy use. Any person or enterprise involved in energy resource production, resource use, and energy supply is obliged to implement energy conservation; to be achieved through use of energy efficient technology which meets standard by law and regulation; energy efficient equipment, materials, process, and system; and endeavour in planning to use energy efficient technology.

Specific regulation for the largest energy users

Energy resources users and final energy users that use energy equivalent to the amount equal to or more than **6000 ton of oil equivalent annually** are obliged to implement energy conservation through **energy management**.

Energy management is by definition of the Law:

- a. Appointing an energy manager
- b. Establishing an energy conservation plan
- c. Conducting routine energy audit
- d. Implementing the steps recommended by the result of energy audit; and
- e. Reporting implementation of energy conservation annually to the appropriate authority: the Minister, governor, or regent/mayor.

Easiness, Incentive, and Disincentive

Government Regulation No.70/2009 formulates and regulates the concept of Easiness, Incentive and Disincentive on energy conservation, as follows:

Easiness: The Government and/or regional government shall provide easiness to large energy users and local manufacturers of energy-saving devices/equipment **who had implemented energy conservation**, in obtaining:

- a. Access to information regarding energy efficient technology, their specifications, and energy efficient measures; and,
- b. Consultation services regarding energy efficient measures

Incentives: Government and/or regional government shall provide incentive to:

- a. Energy users that use equal or greater than 6000 tons of oil equivalent annually; and
- b. Local energy saving product manufacturers that are able to implement and produce energy saving within a certain period of time, as regulated by Government.

Requisite: Incentives will be given towards **successful implementation** of energy conservation (through *Energy Management*), and qualify **Criteria of Success**. The Criteria of Success will be regulated by Ministerial Regulation.

Legally, the **Incentives for energy users** who **qualify criteria of success** are:

- a. Tax facilities for energy saving products;
- b. Breaks, reliefs, or exemption of local taxes for energy-saving products;
- c. Import tax facility for energy-saving products;
- d. **Low-interest financing for investment in energy conservation;**
In accordance with existing laws and regulations, and or
- e. Energy audit in partnership paid by the government

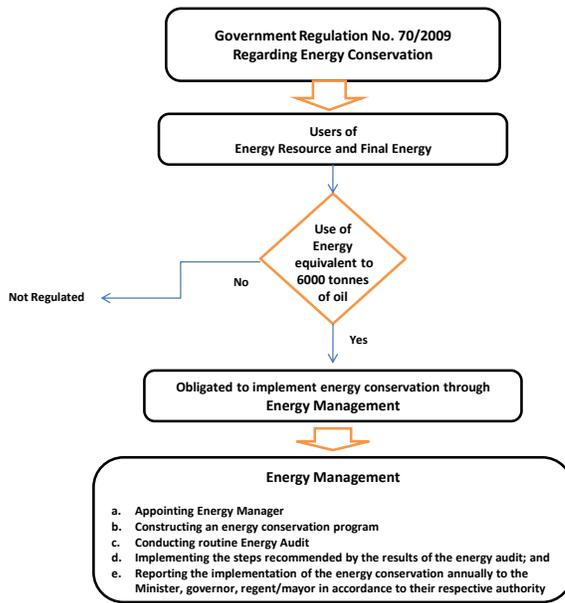
Legally, the **Incentives for energy-saving product manufacture** who qualify criteria of success are:

- a. Tax facilities for components/spare parts and raw materials used for manufacturing energy-saving products;
- b. Breaks, reliefs, and exemptions, of local taxes for components/ spare parts and raw materials used to manufacture energy-saving products ;
- c. Import tax facilities for components/spare parts and raw materials used to manufacture energy-saving products;
- d. **Low-interest financing for investments in order to manufacture energy saving products;**
In accordance with existing laws and regulations

Disincentive: Energy resource users and final energy users who **fail to implement energy conservation through energy management** will be subject to disincentives, imposed upon them by the Minister, governor, or regent/mayor, within their respective authority.

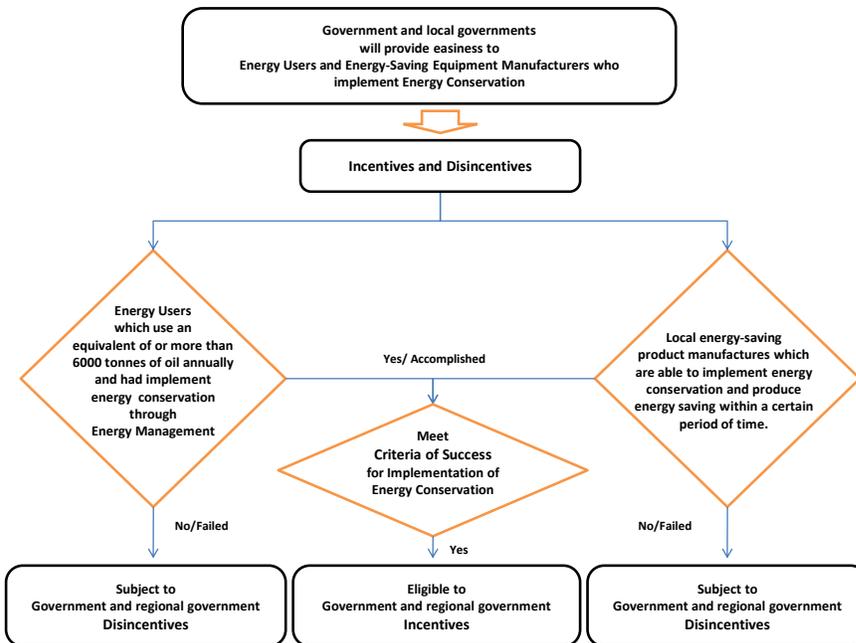
The process on obligation to implement *Energy Management* is as shown in **Figure 16**. The process on Incentive and disincentive is as shown in **Figure 17**.

Figure 16: Compulsory *Energy Management* for energy users that use equal and greater than 6000 tonnes of oil equivalent annually



Law No. 30/2007 regarding Energy

Figure 17: Compulsory qualification for Incentives and Disincentives



Law No. 30/2007 regarding Energy

Ministerial Regulation for Government Regulation No. 70/2009

The **Criteria of Success** for implementing energy conservation as explained in draft Ministerial Regulation includes energy saving reduction of at least 1 % a year. The draft Ministerial Regulation regarding method of reporting energy conservation outcome for energy users of 6000 tonnes of oil equivalent, regulates certain aspects of implementation of the mandate for large energy users, as follows:

Energy management

Qualifying users of energy resource and final energy users are obliged to create an Energy Management Team. The Energy Management Team is chaired by the Energy Manager.

The role of Energy Manager is to:

- a) Implement energy conservation planning which would include, establishing target and energy conservation program, formulating the energy efficiency operating procedure and executing energy audit.
- b) Implement energy conservation which would include **implementing energy conservation program**, carry-out **recommendation of energy audit** result; and increase employee awareness and motivation regarding energy conservation
- c) Monitor and evaluate, which includes taking measurements, making notes, prepare report and recommendation on improving the execution of the energy conservation program.

An energy manager is obliged to have a competency certificate in accordance to regulations and law.

Energy Audit

By Law, energy audit shall be performed **periodically, at least once every 3 years** applies to energy use in processes and primary energy conversion. Energy audit could be performed by an internal Auditor and/or External Auditor. An Auditor is obligated to have a competency certificate in accordance with regulations and law.

- a) Energy audit recommendation that requires no or low cost to implement shall be **compulsory implemented within 1 year**.
- b) Energy audit recommendation that requires medium to large investment which satisfies technical and economical investment viability that is measured such as by payback period shall be **compulsory implemented in less than 5 years**.

Presidential Instruction No. 13/2011 regarding Saving Energy and Water

Presidential Instruction No. 13 of the Year 2011 regarding Saving Energy and Water is directed to ministers, heads of the institutions of government, governors, regents/mayors, commander of the armed forces, and chief of the national police, to implement **Policy to Save Energy and Water**.

The Presidential Instruction mandates goal to achieve 20 % electricity saving; 10 % water saving, and 10% gasoline saving. The assignment to government institutions to save energy and water by this legislation is as shown in **Figure 18**.

Presidential Instruction No. 13/2011 mandates creation of a **National Team on Saving Energy and Water**. The task of the Team is to formulate and prepare policies, strategy, and program to save energy and water including their conservation.

The National Team consists of the Coordinating Minister of Economic Affairs, as chairperson and member; the Minister of Energy and Mineral Resources as **daily chairperson and member**; 10 Ministers as members; the Head of the Agency for the Assessment and Application of Technology, as member; and the Director General of New Renewable Energy and Energy Conservation, as Secretary of the National Team, as shown in **Figure 19**.

Presidential Instruction No. 13/2011 mandates that the National Team on Saving Energy and Water shall establish an **Executing Team**, chaired by the Secretary of the National Team. Members of the Executing Team are appointed by its chairperson. The measures on saving energy and water as mandated includes, **allocation of government budget, training, energy audit and water audit, use of energy and water saving technologies and monitoring.**

Figure 18: Presidential Instruction No. 13/2011 regarding Saving Energy and Water

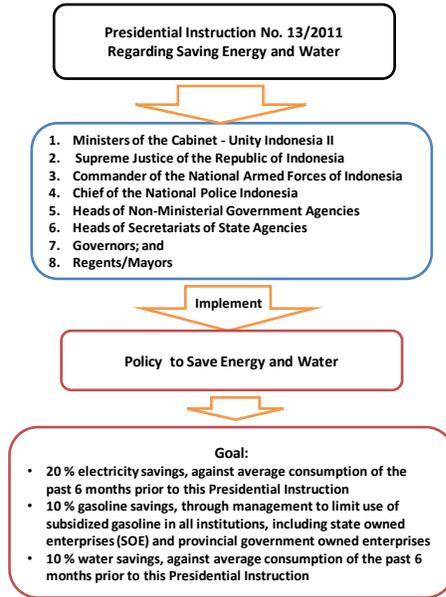
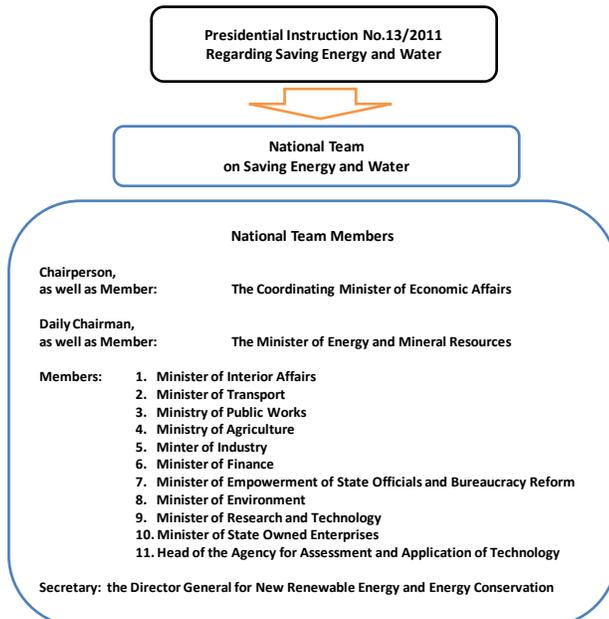


Figure 19: Presidential Instruction No. 13/2011: the National Team



Energy Efficiency Policies

a. Energy Vision 25/25

Indonesia's most recent policy on energy and energy conservation goal is called **Energy Vision 25/25**, adopted in November 2010. The Policy calls for 25% share of renewable energy in the primary energy supply mix in 2025. Energy Vision 25/25 expect primary energy share in 2025, as follows:

New renewable energy:	25 %
Coal:	22 %
Natural gas:	23 %
Oil:	30 %

Energy Vision 25/25 revised primary energy shares in 2025 as stated by Presidential Regulation No. 5 of the Year 2006 regarding Energy Policy. Energy Vision 25/25 calls for 33.85 % overall primary energy reduction from a business as usual (BAU) case, through energy conservation measures.

Energy conservation measures are expected to reduce overall primary energy consumption from 450 million tonne oil equivalent under a BAU case, to 380 million tonnes of oil equivalent in the energy conservation case, in 2025, which constitute energy saving through energy conservation of about 18%. The energy conservation goals are further elaborated in the draft of the National Energy Conservation Master Plan, RIKEN.

b. Presidential Regulation No. 5/2006

Presidential Regulation No. 5/2006 regarding Energy Policy, affirmed national energy policy goals to:

- Achieve energy elasticity of less than 1 (one) in 2025; and
- Realize primary energy mix in 2025, as follows:
 - Oil, less than 20 %
 - Natural gas, greater than 30 %
 - Coal, at least 33 %
 - Bio fuels, more than 5 %
 - Geothermal, more than 5 %
 - Other NRE and nuclear power, more than 5 %

The policy goal on energy elasticity still applies in certain statements.

c. National commitment to reduce GHG emissions

The President of the Republic of Indonesia declared in the G-20 summit at Pittsburgh in 2009 that Indonesia would voluntary reduce GHG by 767 million tonnes or 26 % from a business as usual case through own efforts. The energy sector is expected to contribute 30 million tonnes of this reduction. With international support, Indonesia expects 41 % GHG reduction.

d. National Energy Conservation Master Plan (RIKEN)

By Law, the National Energy Conservation Master Plan (RIKEN) shall be formulated based on the National Energy General Plan (RUEN). At time of the Review Team visit, the draft of RIKEN had been prepared and waits for the enactment of RUEN, for its own enactment. The enactment of RIKEN will replace previous RIKEN of 2005. By Law, RIKEN shall be valid for 5 years however can be reviewed annually as required.

- *Energy reduction goal through energy conservation*

The national energy conservation goal is based on Energy Vision 25/25 energy conservation scenario, which expects progressive energy saving from 2011 to 2025, to reach savings of 85 million tonne oil equivalent in 2025 or 18 % reduction through energy conservation measures, compared to the business as usual (BAU) case.

- *Energy conservation target in the sectors*

The energy saving target in final energy use in the economic sectors in 2025, is as shown in **Table 1**. The energy savings potential is derived from energy saving potential assessments in the sectors.

Table 1: Energy saving target in 2025: the economic sectors

Sector	Energy Saving Potential	Energy Saving Target in 2025	Share in Final Energy Consumption	Energy Saving Target in 2025
Industry	10% - 30 %	17 %	41%	6.9%
Commercial	10% -30%	15%	5%	0.7%
Transport	15% -35 %	20%	5%	7.4%
Residential	15% - 30%	15%	37%	2.0%
Others	15% - 30 %	0%	4%	0.0%
Total			100%	17.0%

Source: Draft RIKEN – Directorate of Energy Conservation

- *Energy conservation target in energy conversion, electricity transmission and distribution, and refining*

Energy saving target in primary energy conversion, electricity transmission and distribution, and refining in 2025, is as shown in **Table 2**. The draft of RIKEN expects only half of all potential energy saving identified in this group are targeted for saving.

Table 2: Energy saving target in 2025: power plant, transmission & distribution and refineries

Sector/activity	Energy Saving Potential	Share of Primary Energy Consumption	Energy Saving Potential in National Energy Supply	Energy Saving Target in 2025
Power plant	10%	12.5%	1.25%	0.5%
Transmission and Distribution	4%	12.5%	0.5%	0.25%
Refinery	1%	50%	0.5%	0.25%
Total				1.0%

Source: Draft RIKEN – Directorate of Energy Conservation

- *Energy conservation in energy resource exploration and exploitation of primary energy resource*

The energy saving target in energy resource exploration and exploitation is based on energy saving potential in this activity, which is 2% of energy production. The draft of RIKEN assumes that energy saving in exploration and exploitation would not decrease energy supply for national energy need, thus does not assign energy saving target for this group.

Table 3: Energy saving target in 2025: energy exploration and exploitation

Sector/activity	Energy Saving Potential	Energy Saving Potential in National Primary Energy Supply	Energy Saving Target in 2025
Energy Exploration and Exploitation	2%	-	-

3. ENERGY EFFICIENCY PROGRAMS

- By Law, RIKEN shall include programs for realization of policies as mandated by the Law, and other energy conservation programs.

The draft of RIKEN identified 20 energy conservation programs that would implement 5 policy mandates as shown in **Table 4**. The details of the programs such as, time frame of implementation, and intermediate goals have been defined. Most of the programs will be implemented by the government authority on energy conservation specifically, the Directorate of Energy Conservation, MEMR. The programs align to the institutional structure and mission of the Directorate of Energy Conservation.

Table 4: Energy conservation programs defined in RIKEN

No.	Related policy	Programs
1	Establish energy use efficiency targets in the regulations mandated by Law	Program 1: Preparation of technical regulation for implementing the Energy Law, and Governmental Regulation No. 30/2009 on Energy Conservation
2	Increase sustained social awareness campaign on energy frugality culture	Program 2: Energy saving campaign Program 3: Energy saving competition Program 4: Energy conservation dialogue forum for company executives
3	Mandate the implementation of <i>energy management</i> in large users of energy	Program 5: Monitoring and evaluation on implementation of <i>energy management</i> by large users of energy Program 6: Training and certification of energy managers Program 7: Training and certification of energy auditors Program 8: Development of energy manager network
4	Implement use of technologies and energy systems that are energy efficient from the energy supply side to final use of energy	Program 9: Mandatory frugal energy use standard for industry and building Program 10: Mandatory frugal energy use standard for household energy appliances Program 11: Labelling energy saving level for energy appliances Program 12: Development of an Energy Conservation Information Centre Program 13: Development of mass transport infrastructure Program 14: Application of traffic management Program 15: Energy conservation research and development Program 16: Energy conservation education and training Program 17: Formation of an Energy Conservation Functional Rank Group
5	Implement incentive for energy frugal equipment and energy users	Program 18: Energy Conservation Partnership Program Program 19: Energy Conservation Tax and Duty Incentives Program 20: Development of ESCO (Energy Service Company)

Energy Efficiency Programs

Energy conservation programs are implemented in Indonesia well before the Energy Law. Some of these programs are ongoing, lead by the Ministry of Energy and Mineral Resources, at the Directorate of Energy Conservation.

The Directorate of Energy Conservation particularly identifies and mitigates barriers to national energy efficiency and conservation; ongoing and current programs are as follows:

a. Creating Public Awareness

Public awareness pertaining to energy conservation is promoted by the MEMR, regional government, and state owned energy/electricity company, private companies, and NGOs. The public awareness campaign is by means of public advertisement, printed materials, and the web; and through seminars and workshop.

Barriers: Intensive and continuous public campaign is costly to implement. Finding participation for energy conservation award is found to be difficult.

b. Education and Training

Government officials could receive training on energy conservation at the Centre for Training and Education of the MEMR; and participate in energy conservation training abroad through bilateral programs and other international cooperation.

Barriers: Limited funding for education and training

c. Partnership Program in Energy Audit

The Government – Private Sector Partnership Program on Energy Conservation is designed to:

Encourage industry and commercial building to implement energy efficiency and conservation measures, through participating in free energy audit program provided by government.

Industry and commercial building need to qualify to participate in the program; sign an agreement to execute the energy audit recommendations, and report over a certain period.

Since the program was initiated in 2003 to 2010, some 452 industries and commercial building participated in the energy audit program. In 2011, the program will provide energy audit to 185 industry and commercial building. Select results of the partnership program are as shown in **Table 5**.

Table 5: Partnership Program on Energy Conservation – select results

	2003	2004	2006	2007	2008	2010
Participating industry	5	3	21	138	16	105
Participating commercial/government building	6	6	11	62	24	55
Overall potential energy saving per year in GWh	78.4	14.8	40.7	519	34	725
Saving acquired per year in GWh	34.4	14.1	30.1	307	15	On going

The Directorate of Energy Conservation identified that:

- **In most cases, only no-cost and low cost recommended measures have been implemented**
- Implementation of medium to high cost recommended measures are elusive; it is where most of the potential saving are to be gained
- **The lack of funding to industry and commercial building is identified as the main barrier to implement the medium and high cost recommendations**
- Overall potential energy saving has yet to be achieved, as shown in Table 5

Barriers:

Indonesia does not have a special financing framework for energy efficiency and conservation projects, neither by private financing institutions nor does government have a special financing scheme. There is no exception in acquiring financing from private financial institution with regard to lending interest rate and the need to provide collateral as required by the Central Bank regulations. The barriers are further explained in **Table 6**.

Table 6: Barriers and Mitigation: Investment in energy efficiency

Parties	Barriers	Measures to Mitigate Barriers
Government	No special regulation on commercial financing scheme for energy efficiency and conservation.	Develop special commercial financing scheme with the Central Bank – Bank Indonesia
Energy Service Company (ESCO)	Lack of competency of energy auditors such that they do not dare give energy performance guaranty Domestic ESCO financial capability is currently still low – not bankable	Capacity building and certification of energy managers Strengthen the financing capacity of domestic ESCO
Financial institutions/ Banks	Financial institutions are not familiar with aspects of cost and benefit of energy efficiency projects, such that they are reluctant to finance There are no examples of successful energy efficiency projects that is widely exposed to the public Collateral for loan is required by regulation	Capacity building on energy efficiency for financial institutions Develop energy efficiency pilot projects

The mitigation measures would need to involvement of the MEMR, Ministry of Industry, Ministry of Public Works, Ministry of Finance, and other related Ministries. The crucial role of government would be to create a special second-tier government loan mechanism to finance energy efficiency and conservation, through private financing institutions.

d. Implementation of Mandatory Energy Management for Large Energy Users

By Law, the MEMR is the regulator for implementation of compulsory *Energy Management* by large energy users by Government Regulation No. 70/2009 regarding Energy Conservation. The MEMR in its responsibility would draft and issue the implementing Ministerial Regulations, and thereafter provide the actual regulatory oversight on the execution of *Energy Management* programs. Initial estimates identified 200 industry and buildings which use energy equal to and greater than 6000 tonnes of oil equivalent per year.

Ministerial Regulation

The Ministerial regulations for implementing Government Regulation No. 70/2009, thus far published are:

- Ministerial Regulation No. 13/2010 regarding the Dissemination and Application of Competent Standards for Energy Managers in the Industrial Sector; and
- Ministerial Regulation No. 14/2010 regarding the Dissemination and Application of Competent Standards for Energy Managers in the Building Sector;

Preparation of certification designation is being finalized with HAKE (the Association of Energy Conservation Experts). The Directorate of Energy Conservation expects to certify 50 energy managers in 2011.

Ministerial regulations being drafted are:

- Energy auditor competency standard in industry and in building
- Procedure and method on reporting energy conservation outcome for energy users of equal to and greater than 6000 tonnes oil equivalent

Implementation of the *Energy Management* mandate for large energy users will be done step-by-step. The Directorate of Energy Conservation expects that by 2013, all industries and buildings that consume energy equal and greater than 6000 tonnes oil equivalent would have implemented *Energy Management*.

Barrier: Competent human resource to supervise implementation of energy management in large energy users is limited.

e. Energy Labelling

The energy labelling program is intended to provide information to consumers about the energy efficiency level of a product, as well as to encourage manufactures to increase the level of energy efficiency of products that they produce. Indonesia currently has an energy labelling system that uses a star-rating system of 4 stars, which also includes information about the absolute energy efficiency of the product. The energy labelling program is defined in RIKEN.

In 2011, Indonesia launched energy labelling for compact florescent lamps (CFL), by Ministerial Regulation No. 06/2011 regarding Applying Energy Saving Label for Self-Ballasted Lamp.

The Directorate of Energy Conservation with relevant stakeholders has developed testing procedures and criteria for energy-efficient refrigerators and air conditioners. Energy labelling for refrigerators and air conditioners is planned for 2012.

Barriers: Lack of accredited testing laboratories, especially for refrigerators and air conditioners.

f. Standards

Indonesia has energy performance testing standards (EPTS) for select electrical appliances/devices, which are established as Indonesia National Standard (SNI), as shown in **Table 7**. The purpose of these standards is to specify technical requirements on energy efficiency and safety, and for the purpose of energy labelling.

SNI standards on electrical appliances and equipment are drafted and registered under strict system and guidelines of the National Standardization Agency (BSN).

Table 7: SNI Standards: appliances and devices

	Product	SNI EPTS
1.	Ballast (magnetic)	SNI IEC 60929-2009
2.	Fluorescent lamp	SNI IEC 60901-2009
3.	Incandescent lamp	SNI IEC 60432-1-2009
4.	Room air conditioner – split type	ISO 5151
5.	Room air conditioner – window type	ISO 5151
6.	Household refrigerator	SNI IEC 15502-2009
7.	Clothes dryer	SNI IEC 60456-2009
8.	Electric iron	SNI IEC 60311-2000
9.	Vacuum cleaner	SNI IEC 60312-2009

Indonesia is updating its SNI building standard, as shown in **Table 8**. The SNI building standard covers 4 categories, that is:

- Building envelope: design criteria, design procedures, and energy efficiency standards
- Air conditioning systems: technical calculation, selection, measurement, assessment and energy efficiency standard
- Lighting system: lighting guidelines for optimal and efficient operation
- Energy audit procedure: energy audit procedures for office, hotel, shopping centre, hospital, apartment, and residential building

Table 8: SNI Building Standards

	Building standard	SNI
1.	Energy conservation for building envelope	SNI 03-6389-2000
2.	Energy conservation for air conditioning system in building	SNI 03-6390-2000
3.	Energy conservation for lighting system in building	SNI 03-6197-2000
4.	Energy audit procedure for building	SNI 03-6196-2000

g. Monitoring and Evaluating Implementation of Saving Energy and Water in Government Agencies

Presidential Instruction No. 2/2008 regarding Saving Energy and Water, which apply to all government agencies and institutions, regional government, state owned enterprises, and regional government owned enterprise is supposed to set an example on “National Energy Saving Movement”.

Monitoring and evaluating its implementation is the responsibility of the Energy and Water Saving Task Force.

Barriers:

a) Lack of ability to carry out energy management in government agencies, due to non-optimal role of the Energy and Water saving Task Force; b) Lack of qualified human resources in the field of energy saving; c) Lack of awareness of government officers to do energy saving.

h. International Cooperation

The MEMR has bilateral and regional/multilateral international cooperation specifically on energy efficiency and conservation. Some of the international cooperation involves multiyear programs.

- a) ASEAN, regional/multilateral cooperation: *Promotion of Energy Efficiency and Conservation (PROMECC)*, since 2000
Activity: Energy audit on the job training for building and industries; Seminar/workshop and training for Energy Management Handbook; ASEAN Energy Awards “Energy Conservation Best Practice Building Competition” and “Energy Management Competition for Building and Industry”
- b) Indonesia – Japan, International Cooperation Agency (JICA), bilateral cooperation: *Demand Side Management*
- c) Indonesia – Denmark, bilateral cooperation: *Energy Efficiency in Industry, Commercial, and Public Sector*, 2008-2012.
Activity: Strengthen clearinghouse on energy conservation as information centre of energy conservation activities; Pilot project on energy efficient building to be adopted by new buildings
- d) United Nations Development Program (UNDP), regional/multilateral cooperation: *Barrier Removal on Energy Efficiency Standard and Labelling (BRESL)*, 2009-2014.
Activity: energy appliance energy efficiency standard, and labelling policy making; capacity building; manufacturing support; regional cooperation; policy research; and pilot project
- e) Indonesia – the Netherlands, bilateral: *Training on Energy Potential Scan (EPS) and Energy Management*.

PART 2: REVIEW TEAM REPORT

This part of the report presents the PREE Team's conclusions and recommendation about energy efficiency policies and programs in Indonesia.

1. INSTITUTIONAL CONTEXT

1.1. Critique

Law No. 30 of the Year 2007 regarding Energy, and explanatory Government Regulation No. 70 of the Year 2009 regarding Energy Conservation, hereafter referred either singularly or jointly, simply as the Law, elucidates that the government shall implement comprehensive energy conservation means as defined by Law and Government Regulation. The Law states that energy conservation is institutionally the responsibility of government, regional government, and regency/city government, and calls for their role within their specific administrative domain in regulating energy conservation compliance and allocating budget for the program. Government Regulation mandates a national energy conservation master plan.

The Ministry of Energy and Mineral Resources (MEMR) as *the authority for matters on energy* is by Law, *the* responsible authority in government for energy conservation.

National energy policy is established by a process that involves the National Energy Council (DEN) and the parliament – the DPR. The Energy Law elucidates that the Minister of Energy and Mineral Resources is the “Daily Chairperson” of DEN. The Law specifically does not include the Minister of Energy and Mineral Resources as one of the seven Ministerial members of DEN, and does not elucidate that the Minister of Energy and Mineral Resources as the “Daily Chairperson” is also a Ministerial member of DEN. Unfortunately, the Law does not provide any definition on the task and role of the “Daily Chairperson” of DEN.

With regard to mandates of the Law on energy conservation, the MEMR is obligated to draft the National Energy Conservation Master Plan (RIKEN) based on the National General Energy Master Plan. The institutional process in policy making and planning that involves submission of a draft for endorsement suggests that the process is hierarchal and authoritarian, rather than coordinative.

The responsibility of the MEMR in energy efficiency and conservation is entrusted to the Directorate of Energy Conservation, in the Directorate General of New and Renewable Energy and Energy Conservation, of the MEMR. The Directorate of Energy Conservation is technically the national *focal point* for energy conservation.

Since *Law* is the highest level of legislation, the Review Team recognize that related Ministries, such as the Ministry of Industry and the Ministry of Public Works, are duly responding to implement mandates of the Law that are within their responsibility domain. The Review Team believes that advanced high impact energy efficiency and conservation program require close coordination among relevant ministries and other government agencies at the economy-wide level and local level; moreover, coordination would lead to more effective and efficient policy implementation.

The Review Team recognizes that the Law does not call for nor sees the need for cooperation of related ministries through a national inter-ministerial framework on energy conservation. The Review Team however commends the Directorate of Energy Conservation, for coordinating with related Ministries, government agencies, state owned enterprises, and other stakeholders in formulating the National Energy Conservation Master Plan (RIKEN); Ministerial Regulations as called for by Law; in implementing energy conservation programs; international cooperation; and training.

The Review Team believes that an inter-ministerial coordinative framework is crucial to understand the context and significance of energy efficiency and conservation. Coordinative effort is crucial in information propagation and creating understanding; collection and management of data and analysis of strategy; removing barriers to greater energy efficiency and in setting national priorities and allocating government budget for energy efficiency and conservation across the sectors for maximum benefit. The Review Team believes that a legally binding Joint Ministerial Regulation by related Ministers on endorsed inter-ministerial commitments to the national energy conservation plan would be more effective than a Ministerial Regulation which regulates energy efficiency and conservation across the sectors.

Inter-Ministerial Team

The Review Team recognizes that comparatively, Indonesia has a large inter-ministerial coordinating team on saving energy and water in the public sector. Presidential Instruction No. 13 of Year 2011 relates to Saving Energy and Water mandates creation of the National Team on Saving Energy and Water. The National Team members consist of the Coordinating Minister for Economic Affairs, as Chair and member; there are 11 cabinet Ministers as members; and the Head of the Agency for Assessment and Application of Technology (BPPT), is a member. The Minister of Energy and Mineral Resources is Chief Executive, and member of the National Team. In addition, the National Team is supported by an Executing Team, which is an expert body, whose members come from the institutions represented in the National Team.

National attention to save energy in the public sector is commended. Besides the energy saving to be gained in the public sector; the outcome of public sector energy saving programs in government and in state and regional government owned enterprise buildings should become models for energy saving in commercial buildings, to provide real case examples on the cost and benefits of making particular energy efficiency investments in buildings.

Since energy saving potential in the public sector is less than the potential energy savings in the overall economic sectors of industry, transport, commercial buildings and residential sector; Indonesia may wish to consider establishing an inter-ministerial team on energy efficiency and conservation of similar structure, focusing on these sectors and consisting of a National Team and Executing Team, though with smaller membership of relevant ministries.

Perception of Energy Efficiency and Conservation

The Review Team believes that the argument for requiring or not requiring an inter-ministerial framework in national energy efficiency and conservation program is rooted in the perception of energy efficiency and conservation. With regard to the national programs, Indonesia seems to be implementing two different perceptions on energy efficiency and conservation at the same time.

There is some concern on the part of the Review Team that the two different perceptions is beginning to blend, rather than being separate within their specific expectation and goal; implementing them under constrained resources could be putting pressure on both.

The two perceptions are:

- a) *Establishing Compliance by Law*; and
- b) *Removing Barriers*

Their most notable difference is in financing energy efficiency. *Establishing Compliance by Law* does not assume financing as an issue, while *Removing Barriers* finds financing as a major *barrier* to greater energy efficiency.

Observing the presence of the two perceptions on energy efficiency and conservation, the Review Team, rather than giving general critique and recommendation, needs to be specific to which perception the recommendation is directed to.

How the Perceptions Differ

Establishing Compliance

The Law calls for energy conservation compliance. Large energy users of equal or greater than 6000 tonne of oil equivalent (toe) per year are compulsorily required to implement *Energy Management* as defined by Law, which would include carrying out periodic energy audits, implement its recommendation, and appoint certified energy managers; and satisfy *success criteria* in energy reduction targets as defined and regulated by Ministerial Regulations. Large energy users that completed the process are eligible to an *incentive* from the government and/or regional government. Failure to implement and comply with mandates of *Energy Management*, and failure

to explain reason for inability to achieve energy reduction target, is subject to legal *disincentive*, regulated by the government and/or regional government. Energy users that use energy less than 6000 toe per year are notably excluded from the mandate. Government Regulation No. 70/2009 also calls for energy standards and labelling.

Producers of energy saving equipment/device may qualify for *incentives* under separate regulatory terms; specifically, producers of energy saving equipment/device may receive incentives when they conserve energy and in addition could prove that their equipment/device had contributed to energy use reduction over a certain period of time, measured in terms of energy users' specific energy consumption and/or energy consumption elasticity, by definition of *success criteria* established by regulation.

The Review Team recognize that the Law primarily perceives energy conservation as compulsory compliance to *Energy Management*, and *incentives and disincentives* by definition of the Law, which is to be regulated by the MEMR's institutional framework; with regard to this perception, it is obvious that there is little reason for needing any inter-ministerial coordination team on energy efficiency and conservation, with the exception of certain aspects of *incentives and disincentives*, where coordination with relevant ministries could be expected. The MEMR specifically, the Directorate of Energy Conservation would be the regulator for energy conservation compliance at the government level.

Notably, the Law does not address matters regarding financial matters for the investments in energy efficiency and conservation which are to be recommended by the energy audits. In addition, the Law does not address the regulatory framework and qualification of regulators to execute the energy conservation compliance mandate.

The Review Team believes that to implement the energy conservation compliance as mandated by Law require heavy and direct regulation that may involve regulators' oversight at the plant level. By estimates of the Ministry of Industry, there are currently 659 industrial energy users which use energy equal to and greater than 6000 toe per year, that are subject to the mandate. Since Indonesia's economy is expanding rapidly, we can expect that the number of large energy users will increase in the future. The Review Team believes that regulatory execution of energy conservation compliance as required by Law would require sufficient government regulators and with a high degree of qualification and proficiency in technical aspects of the industry and commercial buildings that are regulated.

The Review Team believe that the Directorate of Energy Conservation, which is staffed by 40 government officials of various rank would be hard pressed to regulate compliance as mandated by Law and implement other energy saving and conservation programs in terms of human resources and expertise; moreover, the institutional structure and officials of the Directorate of Energy Conservation was established and trained primarily in policy making.

Removing Barriers

The Review Team recognizes that the Directorate of Energy Conservation is duly implementing mandates of the Law, and is at the same time implementing energy efficiency and conservation programs based on identifying *barriers* and taking measures to mitigate them.

The Review Team believes that enhancement and follow through of this concept will establish regulation, incentives, government programs, and examples that will establish energy efficiency and conservation with less direct involvement of government at the energy user level.

The concept is based on regulatory compliance, standards and labelling, promotes cost/benefits reason to save energy, but crucially address the means to achieve them. The concept recognize that people waste energy conditionally due to lack of knowledge and understanding on the methods to save energy and lack of information on energy efficient devices/technologies; for this reason propagation of information and creating public awareness on energy conservation is considered crucial and should be a major priority; and recognize that energy use in the absence of general energy subsidies would be less wasteful and more efficient; its excludes direct energy subsidies for the poor and the needy to meet basic human needs.

The Directorate of Energy Conservation identified barriers to energy efficiency and conservation, they include: the lack of funding for energy conservation campaign, noting that they are costly; lack of special ruling for commercial financing of energy efficiency projects; lack of competent auditors to advice on energy saving measures; energy service companies (ESCOs) have low financial capability, noting that energy saving projects are considered risky by commercial financial institutions; financial institutions are not familiar with the cost and benefits of energy efficiency projects; there are no examples on financing energy efficiency projects that are widely exposed to the public.

The Review Team recognized that the energy efficiency and conservation program that the Directorate of Energy Conservation is implementing covers energy users of every level in the economic sectors of industry, transport, commercial buildings, and residential sector/ households.

Energy Conservation Programs

The Review Team commends the Directorate of Energy Conservation for creating 20 Energy Conservation Programs, in the National Energy Conservation Plan (RIKEN).

The Review Team praises the Appliance Mandatory Energy Standard Program that will rapidly introduce mandatory energy efficiency standard and labelling for appliances. The program established labelling for compact florescent lamp – CFL, in 2011, to be followed by refrigerator and electronic ballast in 2012, and other appliances in the following years. The Directorate of Energy Conservation however identified the lack of testing facility as one of the *barriers* to standardization.

The Review Team gives particular praise to crucial Programs such as the Energy Conservation Dialogue Forum for Executives of companies; the development of an Energy Manager Network; the Energy Conservation Information Centre; Development of ESCOs, and the cross-sector programs.

Special Financial Terms

The Directorate of Energy Conservation identified that most participating industry and commercial buildings in the Partnership Program are reluctant to carry out energy audit recommendations that require *medium to high* investment costs. Financing was identified as the major *barrier*, and noted that large commercial loans require collateral.

The Review Team commends the Directorate of Energy Conservation for seeking to establish special financial terms for financing energy efficiency and conservation projects, through coordination with the central bank - Bank Indonesia.

The Review Team commends the private initiative of APKENINDO an *association of companies supporting energy conservation in Indonesia* for their efforts to increase the role of ESCOs by creating a *limited participation mutual fund* which is a financial structure involving private investors. Notably, mutual fund financing is exempt from central bank regulation on collateral. The initiative was initiated in response to the fact that project financing for ESCO projects is not accepted by commercial financial institutions, since they have limited knowledge and understanding of energy efficiency projects and the performance contracting concept.

Incentives Up front

The Review Team noted that the Directorate of Energy Conservation has included a program in RIKEN to realize financial *incentives* as called for by Law. Implementation of *initiative* would be in the context of the Law that is, *incentives* shall be given for successful implementation of measures as recommended by energy audits within the context of *Energy Management* and achieve energy reduction targets of set *success criteria*.

Considering that financing is a major barrier to energy efficiency and conservation, the Review Team proposes that besides the special commercial financial terms being endeavoured, the Directorate of Energy Conservation should make coordinative efforts to make financial incentives available up-front to provide greater viability in financing energy efficiency projects.

The Review Team believes that availability of financial incentives up-front would enhance its purpose, and allows energy users to better plan for the long term. Up-front financial incentives nonetheless require regulation and a qualifying process.

The term financial incentive, in its general understanding in the APEC economies is that it applies up-front towards investment. Some of the kinds of financial incentives for energy efficiency projects that are available in several APEC economies include:

- Reduced income tax rates
- Income tax exemptions or credits
- Accelerated depreciation
- Exemptions from sales tax, value added tax or import tax
- Low-interest loans

Some of these financial incentives may currently be irrelevant in Indonesia's taxation law or regulation, in this case, Indonesia may wish to assess the net national benefits of financial incentives in financing energy efficiency projects, and consider special taxation reforms.

Inter Ministerial Coordination

The Review Team believes that the concept of removing *barriers* to energy efficiency and conservation requires strong government lead and inter-ministerial coordination. Since programs need to gradually evolve and mature in scope and sophistication, some form of permanent high-level permanent inter-ministerial framework on energy efficiency and conservation should be established.

Role of provincial government and regent/city government

National energy efficiency programs need to promote common principles and practices nationwide. Certain regional specifics such as climatic condition should also be addressed and implemented under the same principles. The Review Team commends the Directorate of Energy Conservation for coordinative efforts with provincial and regency/city governments.

Energy Efficiency Clearing House Indonesia

The Energy Efficiency Clearing House Indonesia (EECHI) is developed under cooperation between the Directorate of Energy Conservation and Danish International Development Agency (DANIDA). EECHI has a special role in promoting energy efficiency and conservation. Its high public relations profile and direct relation with energy users at every level is unique. Its programs are well directed to set examples of prudent best practices, including promoting energy audit with high quality assurance. The Review Team highly commends the role of EECHI.

1.2. Recommendations

Recommendation 1 *Sufficient number of government regulators with appropriate training to high level qualifications should be established for realistic, effective and accountable implementation of energy conservation as mandated by Law.*

Energy conservation as mandated by Law demands sufficient and highly qualified regulators. Regulatory oversight should pertain in every step of the process including: proper execution of energy audit, verifying measures recommended by the audit, compliance to energy audit recommendations, satisfying energy reduction targets, time frame compliance, site verification as required; processing reports, and, verifying approval for *incentives* and execution of *disincentives*. Regulator sufficiency should take into account the number and type of industry to be regulated currently and in the future.

Recommendation 2 *Special regulatory unit should be established for the purpose of oversight of energy conservation compliance as mandated by Law. The regulatory unit should have sufficient authority to carry out its task by sufficient, qualified and dedicated government regulators; to ensure proper oversight on execution of energy conservation programs as mandated by Law; and other energy conservation mandates.*

Institutionalizing regulatory framework would increase effectiveness of regulation and will improve on the aspects of regulation. Institutionalizing regulatory framework will crucially establish accountability on the properness of its execution.

Recommendation 3 *Permanent Minister level inter-ministerial institutional framework on energy efficiency and conservation should be established for effective barrier removal/mitigation. The framework should include an inter-ministerial Working Team.*

The permanent inter-ministerial framework should establish formal ministerial commitments to *remove barriers* through coordinative regulations, and establish national priority and sector goals on energy efficiency.

Recommendation 4 *The Directorate of Energy Conservation should in the mean time heighten coordination with related ministries, agencies, and other stakeholders for effective implementation of cross sector programs of RIKEN and barrier removal in general.*

In the absence of an institutionalized inter-ministerial framework on energy efficiency and conservation, the coordinative role of the Directorate of Energy Conservations is crucial.

Recommendation 5 *Financial incentives that apply up-front should be established, to enhance removing barriers on financing energy efficiency and conservation projects, especially in financing medium to high cost energy efficiency projects.*

Financial incentives up-front combined with special commercial financing terms for energy efficiency projects would create strong incentives to invest in energy efficiency and conservation. Indonesia may need to assess the net national benefits of up-front financial incentives in financing energy efficiency projects. Regulation to this effect will require close coordination of related Ministries.

Recommendation 6 *The Directorate of Energy Conservation should enhance the function and role EECHI.*

EECHI should continue to provide data, information, knowledge, awareness and encouragement on energy efficiency and conservation to the general public in all sectors, provide examples on proper implementation of energy efficiency and conservation principles, and in promoting energy audit with high quality assurance.

2. ENERGY EFFICIENCY GOALS, TARGETS AND STRATEGY

2.1. Critique

Goals

Indonesia's energy goals are stated numerically in different expressions, notably:

- Energy intensity reduction of 1 % per year.
Established in RIKEN 2005; adopted by the National Energy Council; adopted by draft Ministerial Regulation to implement Government Regulation No. 70/2009
- Energy elasticity of less than 1 in 2025.
Established in Presidential Regulation No. 5/2006 regarding Energy Policy; adopted by draft of RIKEN, and other documents

- Energy Vision 25/25, 2011; the policy vision calls for 25 % new renewable energy in primary energy supply in 2025; and final energy use in 2025 that is 18% lower than a BAU case in 2025, to be achieved through energy conservation measures identified in RIKEN

Adopted by draft RIKEN

The Review Team considers that it is prudent to have a particular national energy policy and goal. In the case a subsequent policy or goal is established then it should be clear that it is legitimately replacing previously established policies, which need not be referred any more. In the case national policy and goals are expressed differently, though applies for the same target year, then they should be fundamentally identical.

Energy Intensity

The Review Team considers that the energy goal that is stated in terms of *energy intensity*, typically defined as the ratio of national energy use over GDP in a particular year, should be used appropriately within its context, in policy.

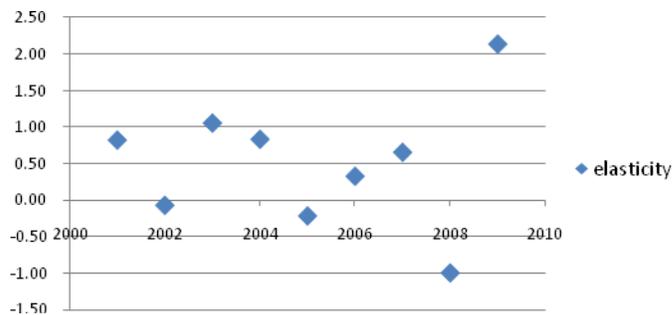
Energy intensity trend may not directly explain or correlate to energy efficiency and conservation trends, particularly in rapidly growing developing economies. Increasingly greater share of less energy intensive - high value added sectors in the structure of GDP, may contribute to *energy intensity* reduction. On the other hand, significant increase of certain heavy and energy intensive industries may bump up energy intensity, without being a particular set back. Expressing energy goals in terms of *energy intensity* reduction to explain energy efficiency and conservation gains should be considered with due prudence in the case where GDP structural change is taking place.

Energy Elasticity

The Review Team considers that the energy policy goal stated in terms of energy *elasticity* should be accompanied with the policy's definition on elasticity. The Review Team found that by basic definition of *elasticity*, Indonesia had attained average energy elasticity of less than 1 in recent years, well before the target year of 2025, as shown in Figure 20.

Figure 20: Energy Elasticity

Units: - none -



Source: Review Team – data: the Centre for Data and Information, MEMR

Target

a) RIKEN Energy Reduction Targets

The Review Team noted that Energy Vision 25/25 established an *aspirational* 18 % final energy reduction target from a business as usual (BAU) case in 2025, which is to be attained exclusively through energy conservation. The 18 % energy reduction target derived from the BAU case in 2025 is estimated to be equivalent to 85 million toe.

In RIKEN, the 85 million toe final energy reduction target by energy conservation is allocated top-down to the economic sectors and to the power sector and refinery, based on assigned *energy saving targets*. In the final analysis, the economic sectors are expected to realize 17/18 part of the energy reduction target or 80.3 million toe in the year 2025; with the power sector and refinery to realize the rest of the savings.

The Review Team noted that that Energy Savings Targets for the economic sectors which are established in RIKEN appear to be established based on Energy Saving Potential of the sectors. The Review Team also noted that the range of potential energy savings is quite broad, on average 10%-30%; however there is no explanation on how the levels of *energy saving potential* is distributed in each of the economic sectors. The Review Team cautions that without information about the distribution of energy saving potential, there is the risk of establishing unrealistic *energy savings targets*, a criterion that *energy savings targets* are within the range of potential savings may not be sufficient. The distribution of energy savings potential is discussed in the Appendix.

The Review Team noted that *potential energy saving* in 2025 is still large. The argument appears to be that as more and more energy users are implementing energy conservation and RIKEN programs implemented, energy savings will increase year by year and reach high energy savings at the end of the program, in 2021-2025. Considering the program's time frame, the Review Team expected more rapid energy efficiency and conservation gains and diminishing *potential energy saving* towards the end of the program as energy users attain expected energy efficiency levels.

b) Targets by Government Regulation

As discussed in the previous sections, the Law obligates large energy users to implement energy audit recommendations pertaining to energy conservation and reduction targets as conceived by energy audit.

Realizing Potential Energy Saving Targets

The Review Team commends the Directorate of Energy Conservation for distributing the *aspirational* 18 % final energy savings target to the sectors and sub-sectors in industry, transport, commercial, and residential sectors; power generation and refining by specific programs in the RIKEN timeframe from 2011-2025. The programs include the Partnership Program and *Energy Management* in industry as required by Law.

The Review Team believe however that setting long-term targets based on *inspirational* goals run the risks of being unrealistic and lack confidence building since expectations of energy users are not well addressed. Setting and achieving realistic targets in the shorter term and publicizing the achievements of these, can serve to reinforce a perception among energy users that their efforts and investments are making a difference.

The Review Team considers targets to realize identified *potential energy savings* in the sectors and subsectors is more applicable and realistic. In the process, intermediary targets would be addressed that may include policy and regulatory change. Having data and information on *potential energy savings* is central to this concept.

Potential energy savings is energy saving that could be achieved by viable measures and investments – including when *barriers* are removed. Potential energy saving is found from analysis of actual data and information. A good source of data and information is the government energy audits.

The technical *energy saving potential* should at least be based on category of measures such as: i) energy saving by energy management which in this case refers to measures to achieve energy saving by eliminating energy use that

does not contribute to productivity and safety, rational energy use in various applications, and maintain rated technical energy efficiency – at no or little cost; ii) technical energy efficiency improvement by low cost retrofitting; medium and high cost refurbishing and replacement; technological change; process change; iii) standards and labelling; and other means. The *energy saving potential* is found by rationalizing the technical potential against the road-map of *barrier removal* such as propagation of information and public campaign; special financial terms, government financial incentives for investments, mutual-fund financing for ESCO projects; realization and accreditation of testing facility; and other identified *barrier removal* and mitigation strategies.

The Review Team considers that identifying and updating *potential energy saving* data and information should be an ongoing process, since it is at the core of an energy efficiency and conservation program. *Energy saving potential* based targets addresses real challenges that may need to be resolved at the national level and is more relevant for energy users.

Efficiency and Intensity Target

Energy saving potential based targets could be expressed in terms of energy efficiency targets and energy intensity targets at the sector and sub sector levels, which is particularly useful in setting benchmark targets of similar types of energy use activity.

The approach would be based on a road-map and time frame of expected technical energy efficiency improvement and change of process in final energy demand sub sectors and power generation. The method would identify *barriers* to be removed for achievement of target.

The Public-Private Partnership Program

The Review Team commends the Government-Private Sector Partnership Program, which provides free government sponsored energy audit to industry and commercial buildings, and commends the principles of the Program. The Review Team recognizes that the Partnership Program requires industries and commercial buildings that are interested to join the program to apply, and pass a qualifying process. The industries and commercial buildings that qualify for the program are required to sign an agreement to implement the energy audit recommendations and to submit a quarterly energy use report every 3 years. The Directorate of Energy Conservation makes an assessment on the successfulness of the program, gathers information on potential energy savings in the sub sectors, and identifies barriers.

Routine Energy Audits

An energy audit identifies energy saving potential and recommends energy conservation measures, investments in energy efficient technologies and processes, and other means to realize the identified energy saving potential. Energy audits may include cost benefit analysis on the recommended energy savings measures.

Energy audits themselves however do not directly save energy. It is the follow-up actions by the Energy Manager and the Board of Directors of the company in making decisions to investment in energy efficiency and conservation that do.

The Energy Managers would implement energy audit recommendations on energy management matters and crucially expand on ways and means to increase energy savings, and endeavors in maintaining achieved high energy efficiencies, on a daily basis. The energy manager would propose energy saving measures and investments to the Board of Directors of the company. In large industries, the energy manager is supported by an energy team. The energy manager is basically performing all aspects of energy audit and better yet, is realizing the energy saving potentials.

Since commercial financing is one of the major barriers to implement medium and high cost energy efficiency projects; the role of government is imperative in removing barriers and in providing up-front incentives to allow for viable investments in energy efficiency. In conjunction with mitigation of barriers, the government should set the roadmap for adoption of energy saving technologies and achieving energy efficiency benchmarks by specific industry, and for other categories of large energy users.

The repeat of *formal* energy audits at least once every 3 years, as required by regulation, could be redundant in the case where:

- a.) Energy audit recommendations particularly those requiring medium and high cost investments in energy efficiency could not be implemented due to the existence of barriers;
- b.) Saving energy has become a corporate culture. The Energy Manager and Board of Directors are constantly identifying energy saving potential and executing measures and investments in energy efficiency and conservation, owing to greater viability to invest in energy efficiency and the benefits, including financial, of attaining high energy efficiency levels and energy conservation are becoming more apparent;
- c.) The Energy Manager with full support of the Board of Directors has achieved high technical energy efficiencies in production or operation and is able to maintain these high efficiency levels.

Strategy

The Review Team recognizes that Indonesia has in place, well established frameworks and corresponding energy policies, programs, laws, and action plans to promote greater energy efficiency and conservation with policy leadership on these matters from the National Energy Council, and execution leadership from the MEMR.

The Review Team however noted that policy frameworks could be mutually exclusive in perception, essential elements, objectives, and coverage, or could be complementary. The elaborate framework established by Law for large energy users and producers of energy saving devices is notably distinct from the *barrier removal* framework to achieve energy efficiency and conservation across the economic sectors, at every level. Separately, Energy Vision 25/25 establishes a national energy conservation target. The energy and water saving program by Presidential Instruction is a comprehensive national framework specifically for the public sector. In addition, there are sector programs executed by relevant Ministries.

While programs for certain purposes are well established, the Review Team considers that Indonesia is lacking a comprehensive *strategy* for energy efficiency and conservation that would *synchronize* national efforts on energy efficiency and conservation. The Review Team also noted with some concern that concepts developed specifically for mandates of the Law are incorporated unsuitably in *barrier removal* programs.

The Review Team considers that a comprehensive national strategy for energy efficiency and conservation should be established for Indonesia. The essential elements of strategy should be goal, objective, policy, target, program, accountabilities, and monitoring and reporting.

An energy efficiency and conservation strategy would establish accountabilities for ministries and agencies to achieve certain actions by certain dates (*who should do what by when*). A strategy would link expected outcomes in the existing framework and its key elements with the strategy based operational programs and other existing or to be developed *action plans*. A strategy should also systematically address the *barriers* to greater energy efficiency in the various economic sectors; it would set out a *barriers analysis*.

The Review Team envisage that such strategy would also specify energy efficiency targets for certain sectors and sub sectors of the economy, as referred to in the previous section, and assign accountabilities for the completion

of action to achieve those targets. The strategy should address the issue of what further *step changes* in energy using technologies and behaviours are required to meet targets.

The *requirement* to produce a strategy or to have in place at any one time should be set out in legislation; rather than establishing program details in legislation. The government of the day would amend or redraft the strategy as it saw necessary to reflect the emphasis of its own broader economic and energy policy, to provide a basis for ensuring efficient allocation of available resources and ensuring that available funding is assigned to its best uses within the possible mix of policies and programs on which it could be spent.

2.2. Recommendations

Recommendation 7 *A particular national energy policy goal provides better policy guidance, rather than having several valid goals.*

Having a particular national energy policy goal is more desirable for synchronized policy implementation. It is prudent that subsequent policies or goals legitimately replace previously established policies and goals.

Recommendation 8 *Energy goals stated in terms of energy intensity or energy elasticity should be used appropriately within its context, in policy.*

Under certain circumstances in developing economies, *energy intensity* trends may not directly explain energy efficiency and conservation trends. For this reason, energy efficiency and conservation goals may need to be established separately.

Recommendation 9 *The policy goal to achieve energy elasticity less than 1 in 2025 may need to be reconsidered or the definition of energy elasticity as perceived by the policy explained.*

The Review Team found that by general definition of *energy elasticity*, Indonesia had achieved average *energy elasticity* of less than 1 in recent years, well before the target year of 2025. However the definition of energy elasticity as used here needs to be clarified.

Recommendation 10 *Target setting which is based on aspirational goal should be re-examined from time to time, to account for its viability with regard to technology and supporting policies expectations.*

To distribute aspirational energy reduction goals is a difficult proposition, for the reason that the expected reduction target by sector and sub sector is also assigned aspirationally within the potential energy saving limits.

Recommendation 11 *The targets to realize energy saving potential should be established gradually as data and information on potential energy saving becomes more comprehensive and accurate. Targets on realizing potential energy saving is more applicable and realistic.*

Data serves a very important purpose in providing a foundation that provides a basis for the setting of energy savings targets.

Recommendation 12 *Identifying and updating data and information on potential energy saving should be a continuous process.*

Comprehension about the current status of *energy saving potential* should be at the core of the energy efficiency and conservation program.

Recommendation 13 *Strategy on energy efficiency and conservation should be established along synchronized principles and concepts in addressing essential elements of goals, objectives, policies, targets, programs, accountabilities, and monitoring and reporting.*

The strategy should address the *barriers* to greater energy efficiency in the various economic sectors it would set out *barriers analysis*; specify energy efficiency targets for certain sectors and sub sectors of the economy, and assign accountabilities for ministries and agencies for completion of action to achieve those targets.

Recommendation 14 *The requirement to produce a strategy or to have one in place at any one time should be established in legislation.*

The government would amend or redraft the strategy as it saw necessary to ensuring efficient allocation of available resources and ensuring that available funding is assigned to its best uses within the possible mix of policies and programs on which it could be spent.

Recommendation 15 *The types of energy audits which are to be conducted routinely, as mandated by Article 12 in Government Regulation 70/2009 should be explained and regulated.*

Routine energy audits, which is to be implemented every 3 years could be redundant if it were of the same type of basic energy audit to identify potential energy saving. Redundancy would also arise in the case energy users have difficulty in implementing initial/previous energy audit recommendations, such as those requiring high investment cost; and is also redundant when audit recommendations and all possible potential savings have been realized.

3. ENERGY DATA COLLECTION AND MONITORING

3.1. Critique

The Peer Review team observed that government agencies, state owned energy companies, and the National Statistical Agency (BPS) are involved in the collection of specific energy data and general energy data.

The Centre for Data and Information (PUSDATIN) under the Secretary General of the MEMR however has a unique leading role in energy data collection directly and energy data collection from first hand resources that are within the MEMR and from other ministries and agencies. PUSDATIN strives to enhance comprehensiveness and accuracy of energy data for purposes of quality energy policy analysis.

PUSDATIN publish data on a regular basis, publications include: the Handbook of Energy and Economic Statistics pertaining to key energy indicators and energy statistics, which is published annually; annual Energy Balance Tables at sector level; and the Energy Outlook which is published every few years. Direct data collection by PUSDATIN is conducted through surveys however these surveys are not done periodically since they are dependent on the availability of financial resources.

The PREE team found that there is monitoring and evaluation of energy savings. Energy use monitoring on a regular basis is however currently limited to the public sector, specifically energy use in ministries, government agencies, and in regional government, mandated by Presidential Instruction.

Participating industries and commercial buildings in the Partnership Program energy audit program are obliged to report on energy use every three years as required in the contract for participation.

The Review Team found that general availability of data for the purpose of more detailed energy efficiency analysis, energy indicator development, and the monitoring system, has yet to be developed.

1. Sub-sector level data on energy consumption by activity, in all practically does not exist; the formal compilation of such data has to be addressed. Sub sector data would include data of the building sector (such as, cooling m² floor space in office buildings, shopping malls, and so on; and their energy consumption for cooling).
2. As discussed in the previous section, the analysis of energy efficiency improvements at the sector and sub-sector levels at the very least requires end-use energy data by activity, nonetheless such data is limited.

3. There is not a sufficient monitoring and evaluation program covering all the programs in the National Energy Conservation Master Plan (RIKEN) to ensure that progress and achievement of targets can be controlled and measured at sector levels.
4. Energy efficiency indicators have yet to be developed.
5. There is no clear accountability for data reporting to PUSDATIN among the agencies inside and outside the MEMR.

Therefore, there seems to be some room for improvement in data collection and monitoring as well as setting of goals and targets.

3.2. Recommendations

Recommendation 16 *Enhance data collection and monitoring by these measures:*

- a) *Increase cooperation and coordination among ministries and regional government in data monitoring and reporting which should be addressed in current high level regulations.*
- b) *The MEMR should establish ministerial regulation on data collection and management with clear accountability for each unit or the MEMR, other ministries, agencies and state owned energy enterprises when it comes to the provision of data to PUSDATIN.*
- c) *The MEMR should develop an analytical energy efficiency monitoring system in line with the National Energy Conservation Master Plan. This system should help evaluate and monitor sector and overall achievements of national energy efficiency targets.*

Recommendation 17 *The MEMR should enhance the capability of PUSDATIN through the following measures:*

- d) *Establish a specific group in PUSDATIN that focuses on energy efficiency analysis. The duty of this group should be as follows:*
 - o *To develop an energy efficiency data system and energy efficiency indicators at subsector, sector and economy-wide levels*
 - o *To support the Directorate General of New Renewable Energy and Energy Conservation in making Energy Efficiency (EE) policies and monitoring the formulation and enactment of the National Energy Conservation Master Plan.*
 - o *To establish an energy efficiency database covering all sectors, especially the building sector.*
- e) *Expansion of an online network on data to directly communicate between PUSDATIN and other data information centres (under other ministries and local governments).*
- f) *Upgrade the infrastructure in communication technology (hardware, software, and so forth) including development of human resources and capacity building for PUSDATIN.*

4. POLICY MEASURES – INDUSTRY SECTOR

4.1. Critique

A. Energy Efficiency and Conservation in the Textile and Steel Sector Industries

The industry sector is the main energy consuming sector consuming about 44% energy of all energy consumption in Indonesia. According to the Indonesian energy projection, energy consumption of the industrial sector in 2050 will increase five times as much as that in 2010. Therefore Energy Efficiency (EE) of the industry sector is the most important issue to reduce energy usage.

Indonesia formulated the National Energy Conservation Master Plan which contains targets, basic policies, programs and energy conservation measures. The Master Plan is made for five years and could be reviewed annually as necessary. To implement specific EE policies, it is essential to set not only comprehensive targets but

also the targets for each sector/sub-sector. It is highly commended that Indonesia set the specific EE industry sector and sub-sector goals for 2025 in the EE master plan.

A Strategic EE Program for the industry sector was developed to achieve EE targets in the National Energy Conservation Master Plan. This program contained regulation, energy management system, EE best practice application, CO2 emission reduction and Clean Development Mechanism scheme. The program also includes effective issues such as training of energy management and recommendations by audit.

Indonesia has established Government Regulation No. 70 Year 2009 regarding Energy Conservation which contains energy management for large energy users including the appointment of an energy manager and reporting of energy consumption. Energy management and understanding energy consumption of each user is essential to enhance the EE action plan, especially for the industrial sector. Therefore this is a key action to achieve EE goals for the industrial sector and is highly regarded.

Indonesia is one of the major textile producing countries in the world and the textile industry subsector has contributed greatly to the economy. However, the textile subsector faces increasingly tough competition from the view point of energy consumption, productivity and quality. The government understands this situation very well and wishes to maintain and develop the potential continued existence of the textile subsector using funding assistance for the improvement of technology and machinery upgrading. For example, 10% finance for investment of an EE facility is offered by the government to textile companies who can demonstrate investment in an EE facility in their plant (i.e. in terms of energy efficient equipment).

The iron and steel industry subsector promotes the introduction of EE technologies such as preheating, regenerative burners, hot charging and so on. Furthermore the iron and steel sub-sector with encouragement from the Government developed the following EE programs: 1. Energy consumption diagnosis to understand the level of energy consumption, machinery and technology in the national steel industry, 2. Technical guidance formulation to supply specific technical assistance for energy efficiency and CO2 emission reduction, 3. Energy audit to understand the EE potential and actions in the steel industry. Also, it is highly appreciated that the iron and steel subsector is implementing various EE actions to introduce more effective facilities and best practice technology in conjunction with international organizations and through bilateral cooperation such as with Japanese organizations like the National Energy and Industrial Technology Development Organization and the Japan International Co operation Agency and Indonesia-Canada cooperation.

The review team had an opportunity to visit PT South Pacific Viscose (SPV) which is one of the large energy consuming textile companies in Indonesia. SPV has been expanding its production lines and is in the process of constructing a new viscose fiber production line. SPV has sufficient knowledge to implement energy management and promote EE actions. SPV operates their production lines with a well-organized Energy Management System and each energy flow is monitored with appropriate measuring devices. Also the review team highly appreciates that construction to increase productivity has been done in accordance with energy audit results and SPV has an EE program which collects effective EE measures from employees.

4.2. Recommendations

Recommendation 18 *Continue to build energy manager's capacity to develop energy saving plans, energy reporting, financial plans addressed to the company's board of directors regarding concepts such as retrofitting and process change to reduce energy consumption.*

Appointment of an energy manager, who has comprehensive knowledge and skills regarding EE action to each user company, is imperative to enhance effective EE implementation in each company. Therefore it is very important to keep people at energy management level and increase the adequate number of energy managers for promoting EE management of each company.

Recommendation 19 *Continue the capacity building of energy auditors and consider creating energy audit guidelines to improve the quality of the energy audit results.*

Effective EE actions should be implemented in accordance with the optimum energy audit results. Therefore, it is important to keep and improve the quality of energy audits for promoting effective EE action.

Recommendation 20 *Encourage large energy users to report energy data and follow the progress (of Law No.70 2009). It is also important to spread EE regulation information among company employees.*

To implement EE actions in the industry sector, it is important to let companies know their state of energy consumption and the significance of EE. To achieve this, consideration is needed on how to make companies implement reporting of energy consumption and how to enhance employees' motivation to implement EE actions.

Recommendation 21 *The government should provide information on the international best practice technologies within all energy consuming sectors.*

Because EE activities in Indonesia are reaching the international level through the effort of all its sectors, it is almost time to enhance knowledge of international EE technologies and best practices for promoting further EE activities and effective energy audits, especially in the industrial sector.

For example, PT South Pacific Viscose has a program to collect EE suggestions from employees. This program is an excellent way to promote EE company by company and can be stepped up by conducting competitions and award programs among employees to foster creative ideas.

B. Government Policy Regulations and Energy Management in Industry

The Review Team believes that industry in Indonesia is so dynamic, as it hosts a several number of energy intensive industries such as iron and steel, pulp and paper, chemical, cement, petrochemical, textile, ceramic, food and beverages, among others. These industries shared the biggest shares of the country's energy consumption as shown in Table 9.

Table 9: Potential Target Energy Consumption by Demand Sector (2011-2025, MMBFOE)

SECTOR	2011*	2015*	2020*	2025**
1. Industrial	390,4	527,4	730,7	952,3
2. Transport	266,2	326,6	440,3	578,3
3. Household	83,8	132,1	173,0	242,5
4. Commercial	35,8	30,0	37,0	69,9
Total	776,2	1016,0	1381,0	1843,0

Source: Ministry of Industry / *- Short to Medium Term Plan Target; ** - Long-Term Plan Target

In the Review Team's opinion, energy efficiency and conservation in Indonesia is still at an early stage. Energy related conservation policies have been issued by the central government particularly Presidential Decree No. 5 series of 2006 which directed the government to exert efforts to ensure security of energy supply of the country, followed by the ratification of Energy Law No. 30 series of 2007, particularly Article 25 on the conservation of Energy and which has also been the legal basis for the creation of the National Energy Council, and finally the enactment of Government Regulation No. 70 series of 2009 which institutionalizes Energy Conservation across energy demand sectors.

Awareness Raising

It was noted by the Review Team that many industries have a low appreciation on the significance and impact of energy efficiency and conservation within their company, whilst a majority may not have the knowledge about the existence of the proper authority who implements energy conservation programs at the national level. As such, the lack of information and dissemination mechanism in the industry sector by the government negates the proper establishment of an Energy Management System within a company to comply with government mandatory and regulative provisions of the law. The Review team further believes that more often than not, many companies would choose to invest in the expansion of a program than to improve production facility process performance. Also, if given the choice a Company is more likely to only consider implementing efficiency measures if it requires no investment to low or minimal investment. Therefore proper regulation and information dissemination is needed in the management of funds provided as a part of EE promotion. Accordingly, some industrial facilities implement energy conservation at their own initiative, however, it was observed by the Review Team that there was an absence of dramatic energy savings due to hesitancy on the part of the company's management to implement such measures because it is a question of affordability and the individual company's internal financing program, the lack of knowledge on energy efficient technologies, or the shallow understanding and acceptance of an ESCO performance contracting concept, among others.

Energy Audit under Partnership Program on Energy Conservation

The Review Team came across three agencies of the government that conduct energy auditing, these are; the MEMR, MOI, and the State Owned PT. Energy Management. The Energy Audit services is subsidized by the government as a strategy to entice energy intensive industries to implement and invest in energy efficiency and conservation measures and projects based on the recommendations stated in the energy audit report. The Law is not specific on who conducts the audit and states that energy audits can be done by an external auditor or internal energy auditor. It is in the opinion of the Review Team however, that such recommendations may lose its value and become ineffective due to the absence of deeper commitment by the company as the audit is a free service.

Likewise, it is apparent that energy audit service is very much dominated by the government rather than by the private energy service providers, but even then, the level of penetration to reach significant numbers of industrial companies for such services seems low.

Industry Programs and Target Energy Saving

The Review Team learned that the Ministry of Industry's optimistic target potential energy savings was set at between 10-30% in 2025, as shown in Table 2, in parallel with the overall national energy policy goal of increasing the utilization of coal in power generation for the same period. By and large, the enforcement of incentives and penalty clause provisions of appropriate energy conservation laws are already in-place but enforcement is not prominent due to insufficient information dissemination awareness campaign programs from the government.

Table 10: Potential Target Energy Saving

Sector	Potential Energy Saving (%)	Target Energy Saving (by end of 2025)	Percent Share by Industry Type based on Final Energy Demand Consumption	Total Target Energy Saving (by end of 2025)
Industry	10 – 30%	17%	41%	6.9%
Commercial	10 – 30%	15%	5%	0.7%
Transportation	15 – 35%	20%	5%	7.4%
Household	15 – 30%	15%	37%	2.0%
Others	25%	0%	4%	0.0%
TOTAL			100%	17.0%

Source: Ministry of Energy and Mineral Resources, Background Information, page 20

It is in the opinion of the Review Team that the development of a comprehensive strategic national energy efficiency and conservation master plan by the MEMR is a good move to determine appropriate programs vis-à-vis target energy savings forecast on a short-term, medium-term to long-term basis for the industry sector and for other demand sectors as well. Other concerned government agencies seem to not have proper coordination as each entity have had its own plans and programs, data collection and monitoring system mechanism, among others. The exchange of data and information to measure the magnitude of success for review and improvements of existing policies are limited and as highlighted before much needed.

Loan Financing Windows for Efficiency Projects

The Review Team believes that there is big potential for energy conservation projects across the industrial sector however the financial loan window for efficiency projects seems to not be available. The absence of inadequate knowledge of commercial banks on this new concept of business opportunities puts on hold government initiatives for successful program implementation. A government intervention to promote and demonstrate loan packages for energy efficiency projects through State Owned banks is worth considering as it can prove to be a good example for other banks, including commercial banks. Other tools and mechanisms to address financial loan requirements may be explored such as the promotion of the concept of energy performance contract by the Energy Service Providers (ESP) or Energy Service Company (ESCO).

Site Visit: PT. South Pacific Viscose

As mentioned earlier, the Review Team visited P.T. South Pacific Viscose (SPV) which is located in Purwakarta, West Java, Indonesia. There was a short introduction about SPV after which the tour of various production line facilities followed.

The company has been a producer of viscose staple fibers and sodium sulphate since 1982. The initial fiber production capacity rose from 120,000 to 150,000 tons per annum with a corresponding sodium sulphate production capacity of 90,000 tons per annum. In April 2010, it officially operated its fourth production line costing USD 150 million in investment, wherein it increased total annual production capacity up to 220,000 tons of viscose fibers for textile and nonwovens applications. A debottlenecking program started along with the regular operation of line four and raised total production capacity by another 18,000 tons to 238,000 tons per year whilst production capacity for sodium sulphate increasing to approximately 120,000 tonnes per annum. During the visit, it was reported that SPV shall again go for another round of production line expansions with the construction of line 5 that shall increase fiber production capacity by 80,000 tons per year, which increases SPV's total production capacity to 325,000 tons per year by the end of 2012, when it is expected to be put on stream for operation.

The company operates 365 days a year and consists of several linear processing steps, such as: steeping, shredding, xanthation, dissolving, filtering, ripening, degassing, spinning (wet), stretching, cutting, washing and finishing wherein the rayon (filament yarns) materials have been packed in bales to be protected from dampness and dirt by a polyolefine film and these raw materials have been transferred to the yarn spinning mills for their final process application for apparel making, home furnishing, industrial uses, and for hygiene products. In the

operation of its production process system, the company relies mainly on electricity from the grid and from on its own-electricity generation (20.5 MW power plant) and process steam to transform the viscose materials to the final rayon materials. In the production of steam, the boiler is fed with solid waste materials and solid sludge produced during the production processing. The gas recovered during the process is likewise used in the production process as an input energy, thereby increasing energy self sufficiency by 40% as reported during the meeting.

In spite of internal energy self sufficiency, the SPV's management was still looking at methods and solutions to bring down the specific consumption of the product (rayon) per unit energy used. Accordingly, having no internal/formal energy conservation group the designated department conducts energy audits to measure and verify various energy consuming loads and systems to identify opportunities for energy conservation and saving. The SPV's management provides support to various energy efficiency and conservation project suggestions submitted by its employees. SPV has a policy where it encourages employees to make suggestions relating to energy efficiency. However, identified projects must bear two year payback period to be acceptable for implementation. Successful projects initiated by any Supervisor and its staff receive incentives from management as an acknowledgement and recognition of their effort in helping the company to ensure its market competitiveness in view of the increasing energy prices.

The Review Team learned that SPV is open for any outside intervention so long that it will help the company manage its energy utilization efficiently and judiciously. Any ESCO is welcome and can forge an agreement relating to the project performance contracting principle. Also, the Team came to know about MEMR regulation to submit periodic energy consumption reports however SPV does not have any knowledge of such government compliance requirement or many other applicable policies on energy efficiency and conservation. The review team however was notified that select staff members had recently attended a government workshop. This raises the issue of the effectiveness of such workshops and that thorough evaluation of such workshops be conducted even through simple methods such as the provision of evaluation sheets at the end of the workshops.

4.2.b Recommendations

Recommendation 22: *The government should make large information, education and communication campaigns across demand sectors, particularly those from the energy intensive industrial establishments to be able to educate the sector on matters that require government compliance for better energy management.*

The government should launch promotional campaigns introducing or communicating the prescribed government Presidential directives such as: rules and regulation on energy efficiency and conservation; the requirement for the appointment of energy manager; the monitoring, evaluation and analysis of periodical reports on energy consumption and energy conservation programs; the promotion of energy efficient technologies and energy conservation best practices; the establishment of sectoral energy consumption benchmark and energy indices; the setting-up of an energy management system within the company, and the promotion of regular energy audit; to mention a few.

Recommendation 23: *The government in cooperation with the private Energy Service Provider (ESP) must promote energy audit services and their recommendations as the first key step for energy conservation in the industrial sector.*

If this is done successfully there will be a wider reach across various industries where the government resources may be limited to sustain such services in the long run due to budgetary constraints. Through co operation with a private ESP such services in the private sector in whole or in part would create dynamic business opportunities in energy efficiency and conservation for stakeholders in both the government, civil societies, suppliers and vendors, banking institutions, industry associations, professional associations, etc.

Recommendation 24: *Given that the industrial sector is a large energy consuming sector, policies targeted at energy efficiency and long term energy supply security should be handled and coordinated by a central agency such as the MEMR.*

It is in the opinion of the Review Team that MEMR must be the central coordination office for Energy Efficiency and Conservation on matters of policy development and implementation, repository of energy consumption data, and the formulation of strategies and target setting for the development of the National Energy Efficiency and Conservation Plan for the Industrial Sector (Master Plan). All other concerned Ministries must only provide support and assistance relative to their core functions and mandates.

Recommendation 25: *The Review Team suggests the emphasis of the relevance of the financial sector in providing financing opportunities for EE projects; this includes State Owned or private financial institutions.*

The presence of a financial window for energy efficiency and conservation projects for the industrial sector and for other demand sectors, may accelerate the proliferation of energy efficient technologies in the country; with a large chance of improving the industry's productivity while saving a lot of energy and costs for themselves and the country in general. There is also an opportunity amongst the financial institutions, industry, energy service providers, and energy efficient technology suppliers and distributors, notwithstanding the effect of creating jobs for Indonesians as a result of government intervention. The government through the MEMR must exert efforts to promote a financing program for energy efficiency and conservation projects in the industrial sector.

Recommendation 26: *In the short-term plan, the MEMR must consider the endorsement of imported Energy Saving Capital Equipment or pioneering energy efficient technologies and products for use by the Industry through the Ministry of Finance through tax incentives.*

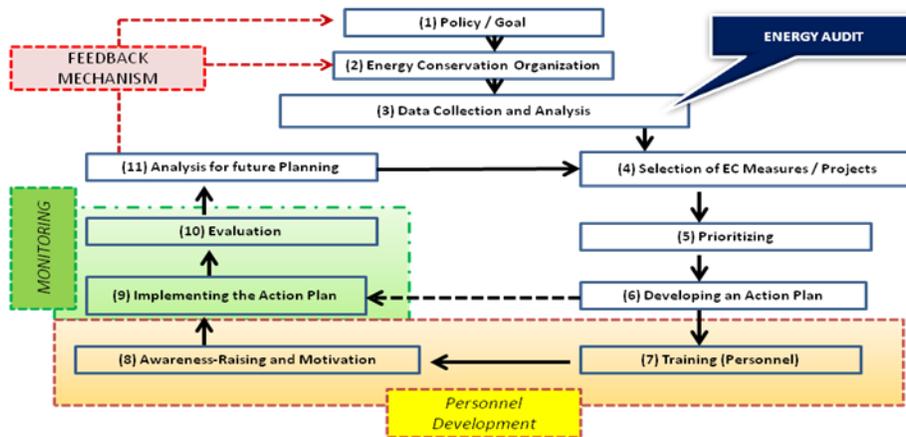
The Review Team believes that such kind of arrangement would help accelerate the promotion of energy efficiency and conservation in the industrial sector.

Recommendation 27: *With the government lacking the necessary resources (financial and manpower), the government must consider strengthening its ties under a "Voluntary Program" with its stakeholders such as NGOs, Professional Associations, environmental advocacy groups, Information agency of the government, and other private entities; to become a partner in delivering the needed services to industry.*

Such services may include:: the conduct of Basic Energy Management Training Courses for industry employees; the publication of Industry’s Best Practices through a Private Information agency or through print media at no cost to the government; and, the establishment of a National Recognition Energy Efficiency Award Program for industry, a Technical Evaluation Committee (TEC) could be established and composed of appropriate government ministries and private companies to be chaired by the Directorate General of MEMR and or its designated representative.

1. **Recommendation 28** SPV is part of one of the most energy intensive industries in Indonesia which necessitates assistance from the government through MEMR. The government should extend the above mentioned recommendations to SPV as well and focus on assistance with energy management within a company and on the evaluation of workshops held, participation at workshops can be encouraged through a National Efficiency Award program that recognizes and acknowledges companies efforts in reducing their energy consumption through improved energy consumption performance supported by energy efficiency projects and actual energy saved. The government must prescribe to SPV and to other similar energy intensive industries an ideal Energy Management System (EMS) where there will be the presence of key step approaches for energy management standards as shown in Figure 21 below.

Figure 21: Energy Management System Key Approaches



5. POLICY MEASURES – ELECTRICITY SECTOR

5.1. Critique

Power Development Plan

The state owned electric company – PLN is implementing a power development plan of notable importance. The plan for 2011 to 2020 expects rapid substantial addition of new electricity generating capacity totaling 50732 MW; construction of a transmission line, 45798 km in total length; and substation capacity addition of 117383 MVA.

The plan will all but eliminate oil use in electricity generation; introduce LNG receiving terminals, which would facilitate the option of LNG imports, for supply to power plants in major demand centers; the generation capacity addition will include 11625 MW of new and renewable energy power plants, mostly geothermal and hydroelectric power plants; furthermore, the plan will reduce power transmission and distribution losses. The generation capacity addition expects to include a series of super-critical; and ultra-super critical coal steam power plants, in the latter part of the plan.

Power generation road map

PLN is implementing a “*Power Generation Road Map*” for 2010 – 2020 to be carried out in three phases for two categories: Technology Use, and Technology Development. The road map identifies:

Technical energy efficiency improvements for power plants, by:

- Condition based maintenance
- Reengineering, upgrading, and up-rating
- Introduce high thermal efficiency power plant; including super critical, and ultra super critical steam power plant

Thermal efficiency improvement and energy reduction is extended by:

- Improving fuel quality
- Increasing power plant typical economies of scale specifically, for gas turbine 240 MW; coal steam power plant 800 MW; super-critical coal steam power plant 1000 MW
- Conversion of gas turbine to combined cycle power plant
- Use of specific technology such as: multiple start-stop heat recovery steam generator, coal gasification

Power system operation:

- Peak shaving measures that will include pumped-storage hydropower plants in the near future

Consumer programs:

- Energy saving program in industry and commercial buildings; pre paid meters; response to time of use tariff

PLN is also implementing a “*Transmission and Distribution Roadmap*” for 2010 to 2020 to reduce transmission and distribution network losses.

Plant level measures

Generation Business Units (GBUs) of PLN subsidiaries are implementing a Efficiency Drive Program (EDP). The EDP endeavors to maintain heat rate; optimize operation pattern; optimize on maintenance; minimize own use; innovate in operation; improve in personal capabilities. EDP initiatives have produced numerous meaningful technical energy efficiency improvements, by specific plant level measures.

At plant level, thermal power plants need to comply with the Ministry of Environment’s program called PROPER which evaluates environmental management performance in industry, including power plants. The PROPER program classifies environmental management performance into a category ranging from Black for the worst case, to Red, Blue, Green and Gold for the highest level. PLN thermal power plants achieve the Blue category. The program includes evaluation of use of natural resources, including energy.

Energy efficiency by internal capacity

The Review Team appreciates PLN’s power development plan and programs that emphasize technical improvements and technological change in power generation and power systems operation to gain higher energy efficiency levels and energy use reduction; and the expected structural change in primary energy supply and generation mix. The overall program would better position the company to energy challenges in the near future and increase its competitiveness.

Considering current and future electricity production, the technologies to be introduced, the vastness of PLN’s electricity supply coverage area, and requirement of personnel with specialized proficiency to manage and operate the units of electricity supply; the Review Team proposes PLN make continuing and enhanced internal capacity building efforts in operation and maintenance of power plants and power systems with special emphasis on energy efficiency and conservation.

Creation of proficient personnel should be central in promoting energy efficiency and conservation in PLN's planning and programs. As required by Law, PLN need to formally appoint energy managers, which should come from internal operational circles, to lead the program. The Review Team is confident that the energy manager and energy team would be well-versed in their specialized field and can exceed expectations to carry-out energy audit as mandated by the Law, and implement identified improvement measures. External engineering expertise may nonetheless be required in specifying detailed technical specifications and plans for large investments in energy efficiency.

When electricity is heavily subsidized, as is the case in Indonesia, the undertaking of large energy efficiency investments would be challenging for the electricity utility. On the other hand, when funding is freed by removal of subsidies it could be allocated, should the government so choose, as a government loan to the electricity sector to invest in energy efficiency and derive national benefit.

Energy efficiency targets in the corporate plan

Considering the special nature of the electricity sector and the Law, the Review Team proposes that the government mandate PLN to formally establish energy efficiency improvement targets in electricity generation and in other potential areas of energy saving; besides the well established transmission and distribution loss reduction target, for endorsement by the regulator of the electricity sector.

The combined energy efficiency and conservation target declaration should be stated in PLN's power development plan, the electricity supply master plan – RUPTL. The statement in the RUPTL would be the corporate plan and management should be responsible for its accomplishment. The RUPTL is by regulatory process endorsed by the Minister of Energy and Mineral Resources.

5.2. Recommendations

Recommendation 29: *With regard to current achievements and challenges in the future, PLN should maintain frequent training on energy efficiency and conservation; establish energy manager qualifications – to power industry specifications for personnel in power generation, in particular; and exchange of experience in implementing Efficiency Drive Program.*

Well qualified personnel will guarantee the introduction and maintenance of energy efficiency policies and projects within the company.

Recommendation 30: *PLN should formally establish an energy manager and energy team in its units to execute energy audits and establish energy efficiency and conservation targets and programs for approval by management.*

The establishment of such a group helps centralize the auditing and target setting function of the company, helping it to streamline policy setting and implementation within the company.

Recommendation 31: *The Review Team considers that PLN should formally declare energy reduction targets and thermal efficiency targets for power generation as part of the combined energy efficiency and conservation target in electric supply, stated in the electricity supply master plan – RUPTL.*

Energy reduction targets and thermal efficiency targets in power generation should be one of the criteria for assessment of the company's performance and the direct responsibility of management.

6. POLICY MEASURES – COMMERCIAL AND RESIDENTIAL SECTOR

6.1. Critique

In 2010, the commercial and residential sector accounted for 15.9% of the total final energy consumption 710 MBOE in Indonesia, with the share of each sub-sectors being: commercial 31.3 MBOE (4.4%), and residential 81.7 MBOE (11.5%). The commercial and residential sector's final energy consumption was ranked third after the

industrial sector (44%) and the transport sector (36%). By 2015, the total final energy consumption is predicted to be 1016 million BOE, with the sector split as follows: commercial 30 million and residential 131.1 million. In terms of electricity, the electrification ratio in 2010 was 67.15%, 32.85% of households do not yet have access to electricity, the targeted electrification ratio is expected to reach 70.4% in 2011 and 80% by 2014.

According to the Government Regulation No. 70 series of 2009 regarding Energy Conservation, national energy conservation is the responsibility of the government, regional government, regency/city government, enterprises, and the community. The Ministry of Energy and Mineral Resources (MEMR) is an institution that became the *focal point* for the implementation of energy conservation in Indonesia, the Directorate of Energy Conservation within the MEMR plays the role of implementation and coordination of the National Energy Conservation Program. The Review Team finds that the responsibility of energy conservation and energy efficiency is only clarified in principle, but not clear in implementation in specific sectors. In the commercial and residential sectors, the main function of the Ministry of Public Works in the national energy conservation program is described to realize real energy conservation in facilities and infrastructure and integrate it with comfort, safety and airworthiness; along with this it is responsible for setting standards for energy conservation in buildings. The Ministry should play a more active role in energy conservation and energy efficiency improvement in the commercial and residential sectors, as the role of the Ministry of Public Works seems limited.

Commercial sub-sector

In Indonesia, the single climate zone is applied to all regions, there are several national standards for energy efficiency in buildings, the details are as follows, SNI 03-6389-2000: Energy Conservation in Building Envelope, clarified that overall thermal transfer value (OTTV) should be less than or equal to 45 Watt/m², which has been used to control building energy contributed by the envelop design. SNI 03-6390-2000: Energy Conservation of Air Condition System in Building set the minimum efficiency of unitary air system equipment or package unit operated by electric. SNI 03-6197-2000: Energy Conservation of Lighting System in Building suggested average lighting level, colour rendering and colour temperature by room function and the maximum electric power for lighting by location. SNI 03-6196-2000: Energy Audit Procedure in Building is also one of the standards in the sector. Jakarta city government is also currently preparing a green building code. These standards are however separated from each other, the building energy code which could consider all related factors in buildings appears to be lacking. Under the Directorate General of New Renewable Energy and Energy Conservation (DGNREEC) the guidelines of energy efficient building design are being developed and will be accompanied by software which will assist professionals in designing and constructing energy efficient buildings. The software can also generate a simulation and performance evaluation of existing buildings.

Regarding the energy efficiency policies in buildings, the government has issued various policies and regulations, such as: Law No. 28 year of 2002 regarding Building; Law No. 30 year of 2007 regarding Energy; Government regulation No. 70 year of 2009 regarding Energy Conservation; Standard of competency for energy managers in building sector, etc. With the issuance of Law No. 30 year of 2007 regarding Energy, energy conservation programs have a strong legal foundation. In accordance with the law, energy users with energy consumption of 6000 tonnes of oil equivalent per year in buildings as well as industries should conduct energy management programs and activities i.e.: appointing an energy manager, preparing a energy conservation program, conducting energy audit and implementing its recommendation, and reporting energy conservation planning and measures to the government. The mandatory application of energy management for large energy users will be implemented step by step.

The Indonesian government has engaged in several practices to promote energy use in commercial buildings through education and training, green building movement promoting energy efficiency etc. A capacity building program for energy management and energy auditors has been developed and aims to train energy managers and auditors in the commercial sector as well as industrial sector. Since 2006, the new building and existing building green rating tools for green buildings has been introduced to Indonesia, of which the criteria is related to appropriate site development, energy efficiency and conservation, water conservation, material resource and cycle, indoor health and comfort, and building environment management. Energy efficiency and conservation is the main factor in this rating system. Although the development of green buildings so far is voluntary, highly efficient green

building commercial showcases have been built; one example of this is the office building of Ministry of Public Works. The performance of green buildings demonstrate great energy conservation potential in the building sector, saving 10% of energy consumption for new commercial buildings with good performance (for example the energy efficiency index of office building in Jakarta in 2010 was 250 kWh/m²/year), and the potential to save 30% of energy consumption for existing commercial buildings. According to the experience of green buildings in Indonesia, the additional investment would be almost 11% of total investment in buildings. In Indonesia, existing buildings accounted for 98% of total buildings, while new buildings possess a share of 2%. Large-scale public buildings tend to be highly energy intensive but with the high potential of energy savings. The review team finds both challenges and opportunity for EE and green building adoption in Indonesia. The barriers mainly come from lack of confidence, experience, public awareness, demand and financial support especially due to limited supply of accredited professionals and lack of knowledge about the environment, social, and economic risk of inefficient conventional building. Opportunity presents itself in the fact that most buildings are still inefficient, increasing demand from the market throughout country, government initiative in supporting regulation and standards, capacity building, institutional strengthening and financial support.

The Review Team finds the Ministry of Energy and Mineral Resources also have achieved great progress on energy data collection and monitoring, but data on energy consumption is still limited, and as of now not completely available in the building sector. To support the analysis and research, accurate and detailed data collection in buildings should be focused on.

The Residential sub-sector

Although the share of final energy consumption in the Indonesian residential sector was only 11.5% in 2010, the energy consumption will be increase as economic development and income increase. According to estimates, the share of final energy consumption in the residential sector in 2015 will be larger compared to the level in 2010 under the business as usual scenario. In 2025, energy demand in the residential sector will be three times the 2010 level and continuing to increase. However it appears that the energy performance in residential buildings is not regulated and not promoted through voluntary energy codes. Not considering the energy-use performance of residential buildings will have a significant implication on their energy use. Residential buildings with poor energy-use performances will remain for many years due to the long life span of the buildings.

Behaviour of occupants is another important factor that impacts the energy performance of buildings. In Indonesia, the concept of the “Energy Saving Competition for Households” is currently under preparation and planning which aims to demonstrate how the residential sector can reduce its energy consumption while still functioning optimally.

6.2. Recommendations

Recommendation 32 *The responsibility or role for energy efficiency and energy conservation (EE & C) in the commercial and residential sectors should be clearly defined. The Review Team proposes that the Ministry of Public Works, as the Ministry responsible for EE&C in the building sector (including the commercial and residential sectors), should participate in the Review Team’s proposed structure within the government whose members are from relevant ministries that implement national energy conservation programs to foster cooperation with other relevant ministries, especially the MEMR, the ministry responsible for the success of EE&C in Indonesia.*

Design and construction are key stages for buildings to control energy efficiency. The activities of the Ministry of Public Works are highly related to the implementation of building energy efficiency standards. There should be a primary focus on building energy efficiency standards or code compliance supervision concentrating on two milestones the design approval stage and the building commissioning, and acceptance stage.

Recommendation 33 *Develop energy building codes and building EE&C regulations for commercial building, including regulatory compliance and enforcement processes.*

Building energy codes are a very useful tool to control energy efficiency of buildings as other economies have experienced. The government might use building energy efficiency standards prepared to complement building energy codes. Meanwhile, regulations are needed to ensure compliance with the building energy codes. The

mandatory codes could be developed and implemented on a local level in the first stage, like Jakarta city, then expand to other regions, finally to nationwide.

Recommendation 34 *Emphasize on energy management of large-scale public and government buildings. Enhance the deployment of the monitoring and control system in energy intensive buildings. Adopt cost-effective measures to promote the energy performance in existing buildings.*

The government should lead to improve energy efficiency in office buildings. Commercial buildings, particularly large-scale commercial buildings are usually energy intensive; in these buildings there is great potential to save energy. Since Indonesia is now developing the monitoring and control system for office buildings, which is necessary for implementation of energy conservation measures through proper energy management, the next step should be to deploy the mature monitoring and control system to many more commercial buildings, then the information of energy consumption at real time could be available. Most of the existing buildings are inefficient, major renovation could significantly reduce the energy consumption, but financing is one of the barriers, so cost-effective measures would provide a practical solution.

Recommendation 35 *Encourage the development of Green Buildings. Develop the rating and labelling system. Enhance the demonstration of Green Buildings, especially in government buildings. Meanwhile provide financial support and enhance the capacity building of related players.*

Green building with advanced energy efficiency features is the direction of the future, which means energy saving, water saving, material saving, and a healthy and comfortable building and environment. In many other economies, the development of green buildings is considered as an effective measure to greatly contribute to energy saving and GHG emission reduction in the building sector, also as a chance to promote the improvement of science and technology and create growth in the national economy.

Recommendation 36 *Enhance the foundation of EE&C in the building sector, including energy data collection and analysis, an energy saving potential study, etc.*

Data is the basis of analysis, monitoring and design of policy. The Indonesian Government should allocate more resources to lay the foundation for the improvement of energy performance in buildings.

Recommendation 37 *Develop building EE&C regulations or building energy codes for residential buildings, based on life cycle cost effective energy efficient measures. Enhance the implementation of these regulations.*

Incorporating EE&C requirements in building codes is a critical and urgent opportunity to minimize future building energy consumption in a climate which places heavy demands on occupant comfort and building energy systems.

Recommendation 38 *Improve the EE&C awareness of public, encourage the behaviour of energy saving through displays at shopping malls, schools and handing out of pamphlets at public gatherings or places.*

Behavior change of household members, from poor daily habits to more energy efficient behavior, could provide the opportunity to save energy.

7. APPLIANCES AND EQUIPMENT

7.1. Critique

Certification

The Review Team appreciates mandatory labelling of compact florescent lamps – CFL in 2011 and plans for energy labelling of other appliances and devices in the future. With regard to Ministerial Regulation No.06/2011 regarding Applying Energy Saving Label for Self Ballasted Lamp, the Review Team noted that the statement of compliance (Declaration of Conformity) is issued by the manufacturer or importer. Under the usual standardization practice, conformity is issued by an independent accredited certification agency/ institution, when such agency is available.

The role of the certification agency includes verification that testing procedures performed by the testing laboratory conform to the requirements of the standard's test procedure. Certification by an accredited agency is

the basic principle towards mutual recognition agreement (MRA) of product certification in free trade, which is being endeavoured by APEC.

Labelling

There are two basic types of labelling systems:

- a. Comparative labelling
- b. Endorsement labelling

Comparative labelling uses the star rating system; the Stars inform the product rank in the market, say, 1 Star denotes that the products' energy efficiency is the worst in the market indicating that there are other more efficient products in the market. Since it is a comparative (ranking) system, the Star labelling system would be unrealistic for the case where all or most products get the highest rank Stars.

An endorsement labelling does not have a Star rating, its purpose is to inform consumers that the product meets or exceeds minimum energy efficiency standards. The endorsement labelling system is the most straight forward means to inform on standard compliance.

In the case of the energy labelling for CFL in Indonesia; while the labelling system uses Star rating, it is not comparative labelling, the Stars denote absolute energy efficiency level; higher Star rating denotes higher efficiency. The system importantly does not indicate whether products of the lowest Star qualify minimum energy efficiency standards if any, or whether low energy efficiency products, that do not qualify minimum standards, are in fact available or permitted in the market.

Minimum energy performance standard

Indonesia notably has SNI energy performance testing standards (EPTS) for at least 9 electrical appliances and equipment. The Review Team understands that Indonesia is considering implementing the minimum energy performance standard (MEPS). Implementation of MEPS should consider harmonization with regional MEPS of APEC economies and be established gradually. MEPS would establish high energy efficiency standards in a dynamic process taking into consideration the most recent advances in energy efficient technologies. The Government should establish MEPS as a *norm* that is applied nationwide, compliance to standard should be regulated.

The concept of standardization is notably different to the concept established by Law, where producers of energy devices and equipment will be given *incentives* for implementing energy conservation and for their role in reducing energy consumption.

Standardization should at least be based on an accredited testing laboratory and accredited certification agency at the national level, however laboratory and certification agency should strive for international accreditation. Crucially, standardization should mean prohibiting products that do not qualify minimum standards in this case energy efficiency standards, from entering the market, enforced by the Ministry of Trade.

7.2. Recommendations

Recommendation 39 *Certification of conformity for the purpose of standards and labelling by an independent accredited certification agency/institution should be considered.*

This will ensure a fair and transparent labelling system.

Recommendation 40 *Endorsement labelling for certain products should be considered.*

The gradual implementation of labelling of certain products will ensure the smooth transition of the economy to the labelling system, giving the public time to adapt and understand such a system.

Recommendation 41 *Plans to implement minimum energy performance standard (MEPS) should be realized.*

A MEPS system will ensure the implementation of a minimum energy performance standard which will help Indonesia realize its energy efficiency and conservation goals.

8. EDUCATION AND ENERGY EFFICIENCY RELATED RESEARCH AND DEVELOPMENT

8.1. Critique

The Review Team was impressed by the investment in research and development activities as well as the policies and actions undertaken by the Indonesian Government to improve energy efficiency education. Research and development activity faces severe resources constraints especially in terms of the number of researchers involved (only five) but is in line with government policy and is conducted by the Research & Development Center for Electricity Technology, New-Renewable Energy, and Energy Conservation under the, Research and Development Agency for Energy and Mineral Resources, under the Ministry of Energy and Mineral Resources, Rep. of Indonesia.

Currently the R&D centre is working on around five research and development projects, they include; energy efficiency modelling, energy efficiency of household appliances, a monitoring and control system for commercial and office buildings, the use of biomass waste in mini boilers, and the development of a lab specialising in energy efficiency labelling.

The use of information gathered from surveys and energy audits in long term modelling of energy efficiency is a very good way to forecast predicted energy consumption in the future and start to formulate policies to deal with these changes in consumption and efficiency.

The government has small scale programs in place that investigate the energy efficiency of certain household appliances such as irons and rice cookers in preparation for an energy efficiency labelling program (Government Regulation on Energy Efficiency No 70 year 2009 / PP 70 tahun 2009). Plans are in place to expand this program to include refrigerators and air conditioners once a laboratory specifically for such research by the government is built (preparations are in place), as currently all work is being conducted in a lab at the University of Indonesia.

According to the Minister of Energy and Mineral Resources regulation No.0031/2005, monitoring of energy consumption in the office and in commercial buildings is the first step towards energy conservation implementation. Therefore much research work is being conducted on an energy monitoring and control system in office and commercial buildings.

It was very encouraging to see the establishment of a training centre on energy efficiency and conservation in Jakarta with training courses offered to energy managers and local citizens. Under Presidential Decree No. 70/2009 regarding Energy Conservation all companies that consume over 6000 kt of energy are required to appoint an energy manager, said energy managers are required to undergo training relating to energy efficiency practices and energy conservation at the training centre.

The Center is currently preparing education and training courses for energy managers and energy auditors that will be structured based on the requirements and qualification as elucidated in Ministerial Regulations regarding Competency Standard for Energy Managers in the Industry Sector, and similarly, Competency Standard for Energy Managers in Building Sector.

Training courses offer education on the following aspects:

- Training of Trainers in Utilizing Hydro Potential; Held in 7 Provinces; Participants: 140
- Training of Trainers in Management of Micro Hydropower Plants; Held in 7 Provinces; Participants: 140
- Training of Managers, Operators and Maintenance Personnel of Micro Hydropower Plants; Held in 5 Provinces; Participants: 730
- Training of Managers, Operators and Maintenance Personnel of Solar Power Systems; Held in 1 Province, Bali; Participants: 15
- Training of Managers, Operators and Maintenance Personnel of Wind Power Plants Held in 3 Provinces; Participants: 30

Individual courses on offer by the Center in Jakarta for 2011 include:

- Applied econometrics in energy economics
- Introductory course on integrated energy planning and LEAP modelling
- Regional electric power planning and forecasting to increase use of NRE
- Economic analysis in utilizing NRE
- Regional energy planning
- Formulating electricity tariff
- Energy conservation in buildings
- Energy audit in buildings
- Energy manager
- Developing rural electrification
- Biomass power plant
- Biomass gasification for power generation
- Utilizing shallow geothermal energy for non power generation uses
- Feasibility study of micro hydro power plant
- Training of trainers on biogas
- Wind power plant
- Community development
- Management and monitoring near environmental impact of power plant
- Operation worthiness assessment of diesel power plants
- Operation worthiness assessment of micro hydro power plants
- Operation worthiness assessment of coal power plants

There are many more energy related courses that are offered by the Education and Training Center of the MEMR. While attendees of the courses in past were mostly from government and regional governments, participants from industry are now increasing. The Center is also involved in international programs. It has held training courses of ASEAN, and training courses under government bilateral programs with Denmark, the Netherlands, Italy, Japan, and Korea.

Between 2007-2011 there has been a significant increase in participants from the government, participants from industry and commercial sectors have also increased but are at quite a low number compared to the government.

An example of a best practice Energy Manager case can be seen in Japan, details as follows;

- A factory which consumes more than 3,000 kilo-litter crude oil equivalent energy (heat, fuels and electricity combined) per year is labelled as a “Type 1 Designated Energy Management Factory”.

- Type 1 Designated Energy Management Factories which belong to the following industries: coke manufacturing, power supply, gas supply and heat supply, must designate a stipulated number of energy managers according to the annual energy consumption as shown below.

- Less than 100,000 kilo-litter one
- Over 100,000 kilo-litter two

- Type 1 Designated Energy Management Factories which belong to other industries must designate a stipulated number of energy managers according to the annual energy consumption as shown below.

- Less than 20,000 kilo-litter one
- From 20,000 to less than 50,000 two
- From 50,000 to less than 100,000 three
- Over 100,000 four

- A factory which consumes 1,500 to 3,000 kilo-litres of crude oil equivalent energy per year is designated as a “Type 2 Energy Management Factory”. The Type 2 Designated Energy Management Factory must assign a “Type 2 Energy Manager.”

The qualifications of a type 1 energy manager includes; experience in a business related to energy conservation for more than three years, and the passing of an examination hosted by the Japan Energy Conservation Centre. For a type 2 manager a course regarding energy conservation must be completed.

As can be seen Japan has a very well thought out case for different levels and required number of energy managers, as per the situation in varying organisations, this can thus be used as a guide by Indonesia when formulating policies relating to energy managers.

9. RECOMMENDATIONS

Recommendation 42 *The research and development unit, under the Ministry of Energy Efficiency and Conservation should collaborate extensively with local Indonesian Universities and academics and even look at expanding such collaboration with the introduction of energy efficiency/conservation related degree programs.*

Currently the only collaboration between the R&D unit and local universities seems to be the use of the University of Indonesia laboratory. By collaborating with universities and academics the R&D unit can expand its knowledge on the concept of energy efficiency through drawing on the technical and research expertise of local academics. In turn local universities can benefit through working with the government and receiving funding for energy efficiency programs and may be able to assist the government in the implementation of such programs.

In order to increase local universities, technical colleges, and academics capabilities with regards to knowledge of and application of energy efficiency related products and concepts, the Indonesian Government might want to consider the introduction of either a separate degree program or stream within a degree program relating to this (i.e. an Engineering degree with a major or minor in energy efficiency or conservation). Through the introduction of such academic program/s university students will develop the appropriate skills to apply energy efficiency technologies and in future will be able to assist the R&D unit with research, either as students or as academics if they choose to further pursue this course of study. One example of such a program is the major in Renewable Energy and Energy Efficiency offered within the Electro-Mechanical Engineering Technology program at the Cincinnati State Technical and Community College, in the United States of America. Building such expertise within universities could lead to the establishment of a Centre for Energy Technology like at the University of Adelaide in Australia, which could lead to profound collaboration opportunities with the R&D unit and lead to significant results in the realisation of energy efficiency and conservation in Indonesia.

Recommendation 43 *Collaboration between the research and development unit and industry could see an expansion of research and development projects and lead to good energy efficiency solutions. International collaboration could see the same results.*

Many industries have their own research and development units within their companies, through collaborating with the companies, the R&D unit could expand their current research programs and use the expertise of the companies to enhance their projects and work together to determine effective methods for energy efficiency. In order to attract industry to become involved in such collaboration, the government can offer incentives such as tax breaks to companies who take part. Continued engagement with industry will foster industry leadership to achieve technology development goals, particularly for technologies that have strong future potential but are currently unable to attract the required investment. The government can encourage greater investment by removing some of the financial risks involved with investing in R&D by increasing the range of incentives available.

By collaborating with organisations such as APEC and ASEAN on energy efficiency and energy conservation, the research and development unit would benefit from the years of experience of many

other economies in the region who are also working on the area of energy efficiency. Through working together and sharing international best practise information, Indonesia might be able to use some of the technologies or concepts developed in other countries so that work is not repeated and resources can be used to develop other forms of technologies and concepts.]

Recommendation 44 *Seeking of sustainable government funds for research and development.*

Whilst the Review Team understand that financial assistance is limited, it is important to consider allocating a fixed amount of the annual government budget as a percentage of GDP for the research and development unit as financial assistance is crucial in continuing research efforts in energy efficiency. Over a time period in the medium to long term development plan of Indonesia it would be a good idea to look at the progress of the unit and consider set increases in funding annually. We understand that currently it is increased by 5% annually but this doesn't seem to be an official amount, therefore the consideration and statement of an official amount would provide extra support and encouragement to the R&D unit.

Recommendation 45 *The development of a formal Energy Efficiency R&D plan within National Research Council and monitoring system to clearly state objectives and goals of projects and evaluate their success.*

A clear plan detailing the goals and objectives of energy efficiency R&D projects as well as the funding allocated to these programs would be highly beneficial to all those involved and other government officials who are interested in these issues, i.e. the Ministry of Industry, Ministry of Housing, etc. Because of the possible interest and involvement of other Ministries it might be a good idea to have such a plan within the framework of the National Research Council. In addition to this as the project is being carried out it is important to evaluate the success of the project over certain time periods, a plan will be useful in this effort as it should set out milestones and performance indicators, thus evaluation can be done by checking the progress of each step of the project against these milestones and indicators.

Recommendation 46 *It is vital that there are more training centres across Indonesia so that people living across the country are able to access training.*

Currently there seems to be only one training centre in Indonesia, located in Jakarta. Due to possible transportation issues in order to educate people across the country on energy efficiency issues it is important that training centres be built or allocated across the country so that knowledge is easily and fairly accessible to all. In addition to this under current Indonesian law all companies that consume over 6000 kt of energy are required to have an energy manager, companies that are not located in Jakarta will therefore have to send energy manager candidates to Jakarta for the training, this could be a burden for companies who may need these workers close to the company premises in case of an emergency and may not be willing to pay for the accommodation and transport costs for their staff who are required to take the training. Therefore in the initial stages of the development of training centres, the Indonesian Government may want to consider building such centres in areas where most medium-large

industries are located before expanding to other areas so that even non-energy managers are able to receive training.

Recommendation 47 *As the energy manager program evolves it may be necessary to consider different levels of energy managers and the specific qualifications they will need.*

As mentioned in the findings of this chapter the establishment of an energy manager is a very good idea and ensures companies are aware and making significant efforts in introducing energy efficient practices. Currently the role of energy manager only requires one training course, as a company develops further and more energy intensive practices are introduced it may be necessary that energy managers be trained so that they are equipped to deal with such challenges, therefore further and ongoing training will be required. In addition to this due to further development in energy consumption and energy efficiency practices energy managers with different qualifications may be required to be in charge, i.e. employees with more professional backgrounds or qualifications (i.e. engineering) will need to take the helm of certain operations and therefore need to be granted higher energy manager status and be provided the necessary ongoing training for this role.

Recommendation 48 *It is vital that much consideration and careful planning of syllabuses for training courses continue and that thought put into courses that build on previous courses.*

Currently Indonesia provides its citizens with clear cut courses that require an examination to determine a pass or fail mark. As mentioned in the findings section of this chapter it is noted that this is a very good practise. However, it is important that consideration be given to courses that build on previous courses (not just stand alone, once-off courses) so that trainees are able to consolidate and update their knowledge on a regular basis.

Recommendation 49 *It would be very helpful to have basic energy efficiency and energy conservation educational courses at primary and high school level as well as at university level.*

Such training courses would develop behavioural changes at a young age itself this can also have flow on effects within households, e.g. children passing on this knowledge to parents.

In Chinese Taipei, under the Environmental Education Act, personnel of government agencies (including the Executive Yuan) and schools must undertake four hours of study in the area of energy efficiency each year. Within the education system, energy conservation and environmental protection are now part of the curriculum. Students are informed about ways to save energy to encourage behaviour change within the home. As students progress through the education system, the curriculum evolves from providing a basic understanding of the issues to a deeper knowledge about technology and the development of professional skills and R&D capabilities. Industry and non-government agencies have been providing support to students that want to pursue a career in this field.

Recommendation 50 *It is critical that there are well developed training programs and clear accreditation avenues for energy auditors.*

Energy auditors need to be very well versed on their task so that the information that comes from these audits are worthwhile and can be beneficial to policy makers when formulating policy. Currently there doesn't seem to be an established training program for auditors in place, nor is there a clear independent accreditation avenue for energy auditors. The Review Team understands that the Indonesian Government is working with DANIDA to establish a training program for energy auditors, it is critical that such a program is well thought out and established as soon as possible and brought to the attention of all energy auditors across Indonesia and that the program is consistent across the country. It is also vital that an accreditation organisation for the role of energy manager is established and a clear examination or evaluation process is formulated for such an accreditation agency and again that consistency across the nation is determined.

APPENDIX A: PEER REVIEW TEAM MEMBERS

- Mr. Kenji KOBAYASHI, Peer Review Team Leader, President, Asia Pacific Energy Research Centre, Japan (APERC)
- Mr. Ikuhiro SUMI, Senior Policy Advisor, International Affairs Division, Agency for Natural Resources and Energy (ANRE), Ministry of Economy, Trade and Industry (METI), Japan
- Mr. Artemio P. Habitan, OIC-Division Chief, Energy Efficiency and Conservation Division, Energy Utilization Management Bureau, Department of Energy (DOE), Philippines
- Mr. Jianguo Zhang, Associate Professor, Energy Efficiency Centre, Energy Research Institute, National Development and Reform Commission (ERI/NDRC), China
- Mr. Tran Thanh Lien, Team Leader, Asia Pacific Energy Research Centre, Japan (APERC)
- Mr. Mardrianto Kadri, Senior Researcher, Asia Pacific Energy Research Centre, Japan (APERC)
- Miss. Gayathiri Bragatheswaran, Researcher, Asia Pacific Energy Research Centre, Japan (APERC)

APPENDIX B: ORGANISATIONS AND OFFICIALS CONSULTED

Ministry of Energy and Mineral Resources (MEMR)

Directorate General of New Renewable Energy and Energy Conservation

Dr. Kardaya Warnika, Director General of New Renewable Energy and Energy Conservation

Ms. Maryam Ayuni, Director for Energy Conservation

Ms. Indarti, Deputy Director for Energy Efficiency Supervision

Ms. Andriah Feby Misna, Deputy Director for Energy Conservation Technical Assistance and Cooperation

Mr. Harris, Deputy Director for Implementation of Clean and Efficient Technology

Mr. Edi Sartono, Deputy Director for Energy Use Program Development

Data and Information Centre (PUSDATIN), MEMR

Ms. Athena Falahti, Deputy Head of Centre

Research and Development Centre for Electricity Technology, New Renewable Energy and Energy Conservation, MEMR

Ms. Endang Lestari, Head of Centre, MEMR

Education and Training Centre for Electricity, New and Renewable Energy, and Energy Conservation, MEMR

Ms. Endang Widayati, Deputy Head of Centre, MEMR

Energy Efficiency Clearing House Indonesia (EECHI)

Ms. Melany Tedja, Co-Team Leader – EINCOPS

The National Energy Council

Secretariat General National Energy Council

Dr. Novian Moezahar Thaib, Secretary General

Ms. Farida Zed, Head of Bureau

National Energy Council Members

Prof. Mukhtasor, Phd, Council Member

Prof. Dr. Herman Agustiawan, Council Member

Dr. Herman Darnel Ibrahim, Council Member

Ministry of Industry

Ms. Shinta D. Siratit, Head of Energy Assessment Division

Ms. Flory Daryanti, Deputy Director

State Electricity Company – PLN

Mr. Nasri Sebayang, Director - PLN

PT Energy Management Indonesia

Mr. Gannet Pontjowinoto, President Director

Indonesia Textile Association (API)

Mr. Syaiful Bahri, Member – Board of Directors of the Association

Indonesia Supporting Companies Association for Energy Conservation (APKENINDO)

Mr. Banu Anang Priyanto, Secretary General

Green Building Council Indonesia

Mr. Rana Yusuf Nasir, Director of Rating and Technology

PT South Pacific Viscose (SPV)

Mr. Wolfram Kalt, President Director

Mr. Saleel R. Nayak, Vice President

APPENDIX C: DISTRIBUTION OF ENERGY SAVING POTENTIAL

Establishing Energy Saving Target for the economic sectors that is based on Energy Saving Potential should be based on good information on how energy saving potential is distributed, particularly when the spread of potential saving is quite broad.

Energy saving targets in 2025: the economic sectors

Sector	Energy Saving Potential	Energy Saving Target in 2025	Share in Final Energy Consumption	Energy Saving Target in 2025
Industry	10% - 30 %	17 %	41%	6.9%
Commercial	10% -30%	15%	5%	0.7%
Transport	15% -35 %	20%	5%	7.4%
Residential	15% - 30%	15%	37%	2.0%
Others	15% - 30 %	0%	4%	0.0%
Total			100%	17.0%

Explanation:

If for example, energy saving potential in the industrial sector is 10% to 30% and is distributed as shown in Figure 1; in this case, to establish an Energy Saving Target of 17 % could be unrealistic since most of the energy saving potential in industry is within the 10% to 17% range, as shown in the distribution curve below.

There are other possible distribution forms as shown in Appendix Figure 2 and Figure 3. Narrow energy savings potential distribution such as Figure 3 requires greater precision in setting Energy Savings Targets.

Appendix Figure 1: Distribution of energy saving potential in industry sector [example]

Number of industries

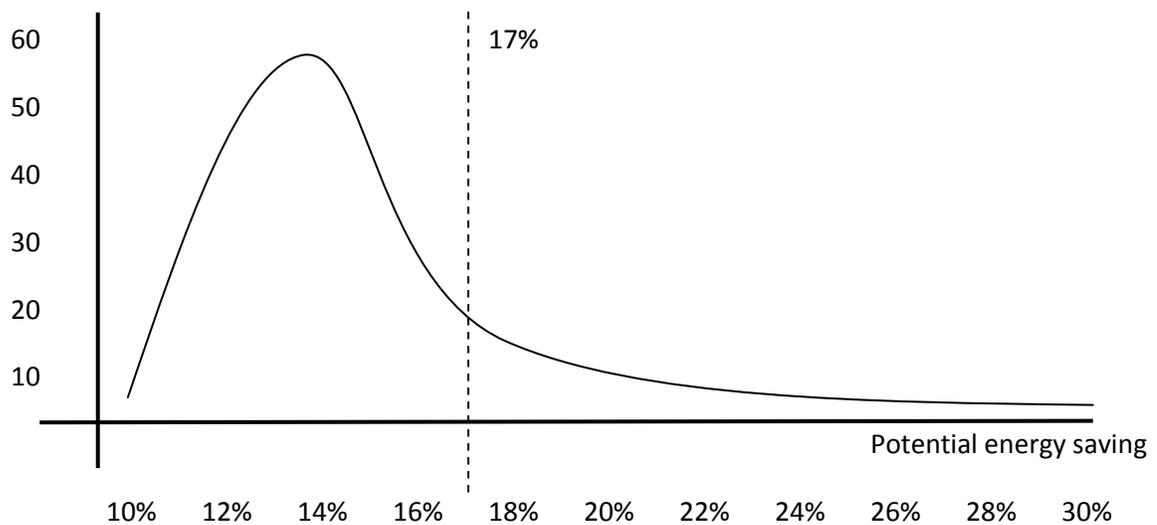


Figure 2: Distribution of potential energy saving in sector: Underestimating

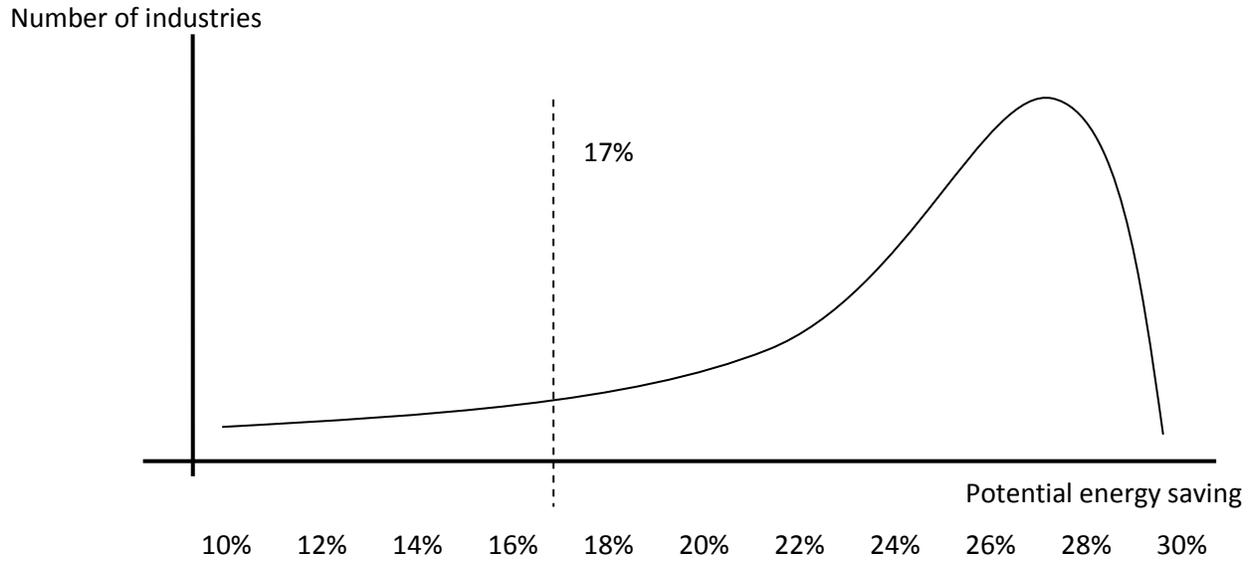
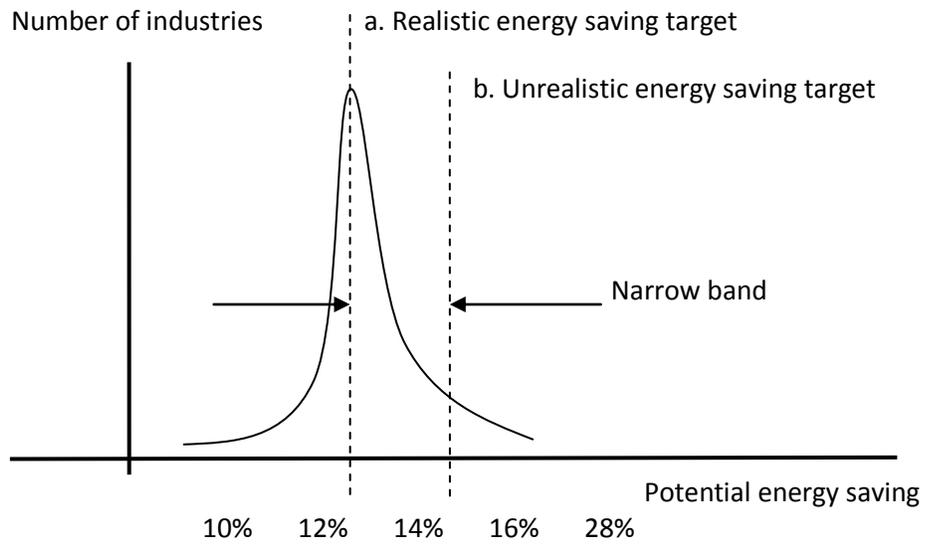


Figure 3: Distribution of potential energy saving in sector: The narrow distribution



In this regard, understanding the distribution of potential energy savings is useful in setting relevant Energy Saving Targets.

APPENDIX D: REFERENCES

1. APEC, *Peer Review on Energy Efficiency in Chinese Taipei*, Final Report November 2010, Report for the APEC Energy Working Group
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