Prospects of Energy Efficiency and Conservation In Indonesia.

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Indonesian Energy Conservation & Efficiency Society

WHAT IS *IECES* ?

- IECES is a forum for energy stakeholders in Indonesia to discuss and promote energy efficiency and conservation in the framework of achieving the national energy security and resilience.
- IECES, formally established in November 2014, is consolidating the ECE activities conducted earlier by Indonesia Energy Saving Communication Forum since the 2001, to put it in the broader context of sustainable development
- IECES is in "partnership" with the government and engaged in the area of development of policies and regulations related to ECE.
- IECES activities are primarily focused on the demand side of the energy economics
- IECES membership comprise individuals, institutions, companies, associations, and organizations, all who share the concerns of the current situation of inefficient use of energy resources by all sector of the economy, and committed to improving the overall energy productivity in the national economy.

Major Activities

- IECES engages in various activities related to energy efficiency and conservation in collaboration with the government, industries and business, educational institutions and like-minded organizations.
- IECES Activities include
  - Conducting seminar, workshops, focused group discussion (FGD), national and international conference and exhibitions on issues related to ECE
  - Capacity building in the area of energy management, energy audit, and energy saving technology and solutions, and societal awareness building

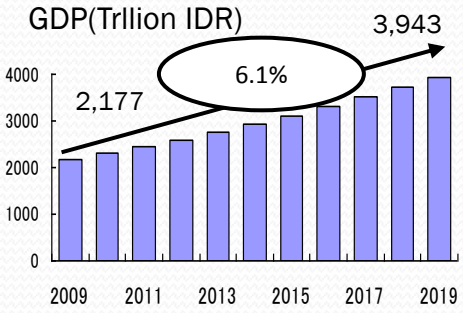
INDONESIA ENERGY LANDSCAPE

The Republic of Indonesia

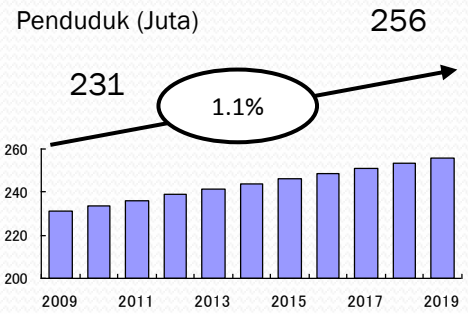
- About 17 thousands islands (5.2% =922 islands inhabited)
- About 5,271 km from West to East and 2,210km from North to South
- Development in the West is much faster than in the East
- GDP 2014 USD 888.5 b ; Income /capita 2014 : USD 3,469 ; Avg.Growth 5.5% (2006-2014)
- Indonesia is currently a G-20 Group Countries member

INCREASING ENERGY NEEDS

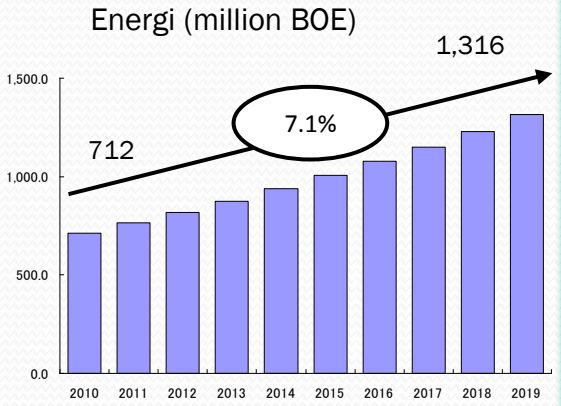
Economic Growth



Population Gtowth

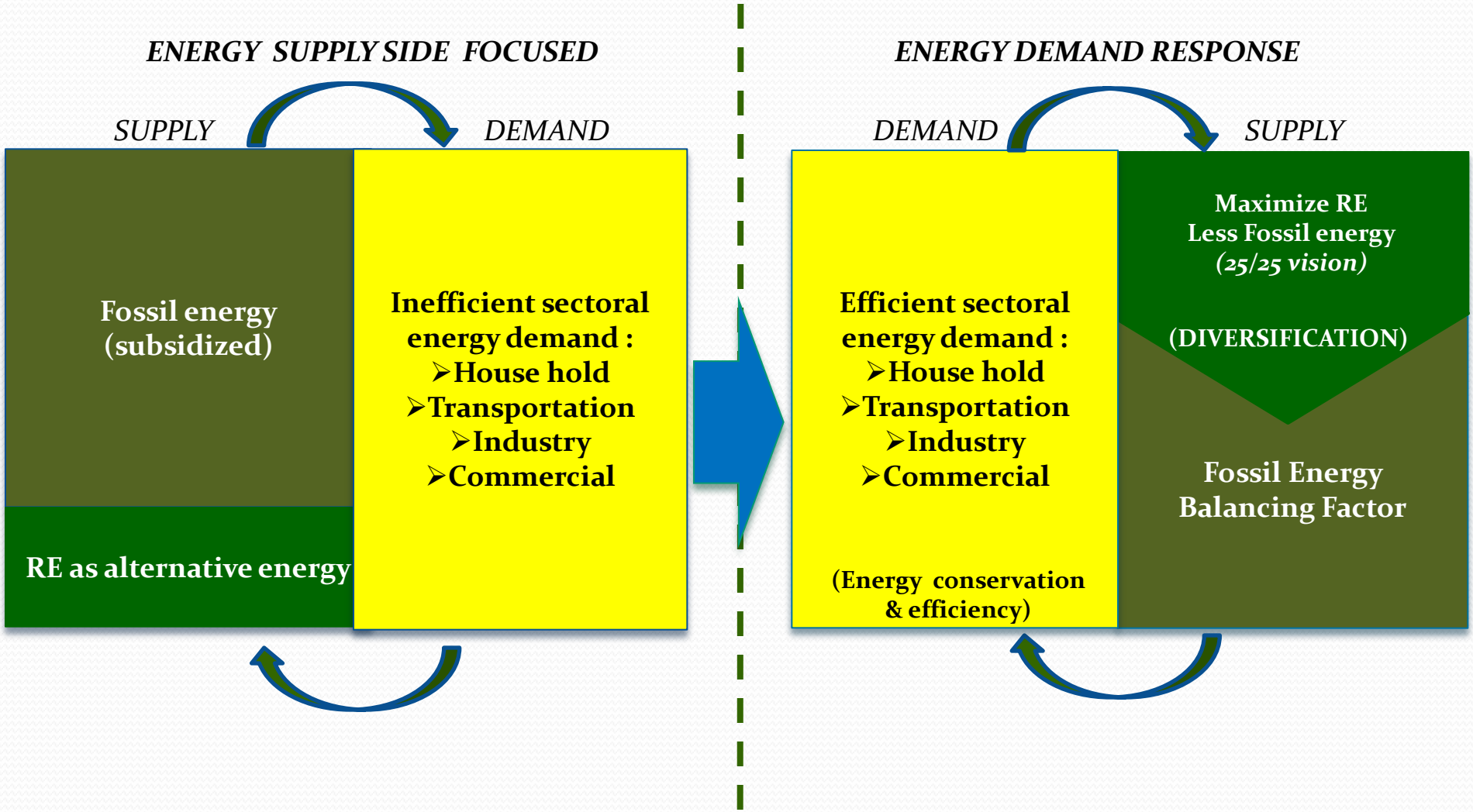


Energy Needs

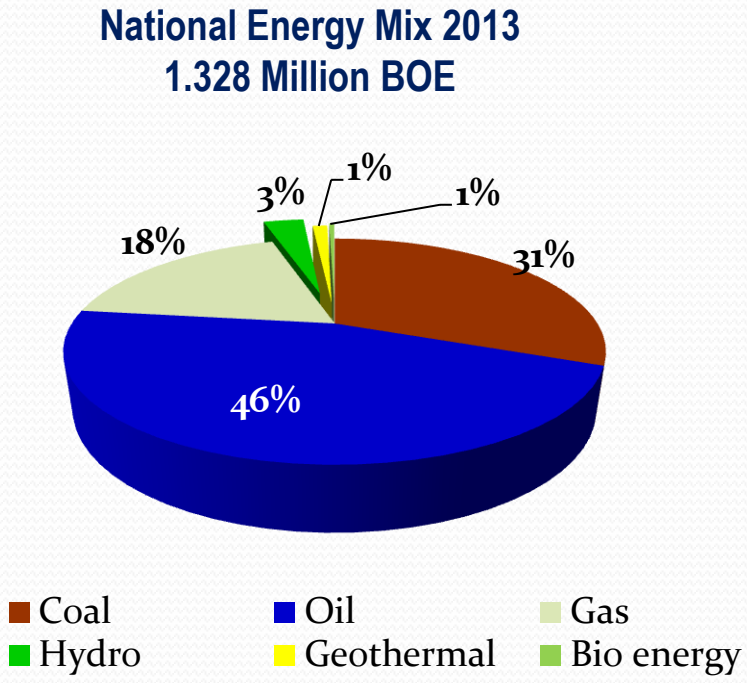


Source EBTKE and KEN 2014

Change of Paradigm – National Energy Policy and Management



NATIONAL ENERGY CONSUMPTIONS FOSSIL ENERGY DOMINATION)



No	Energy Type	(Million BOE)
1	Coal	411
2	Oil	612
3	Gas	243
4	Hydro	43
5	Geothermal	15
6	Bio energy	5
TOTAL		1.328

Non Fossil Energy Share < 8%

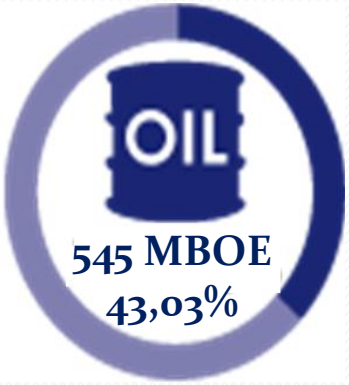
Target : 23% by 2025

Average High Energy Intensity
Low Energy Efficiency Efforts

Primary Energy Supply

Year 2014

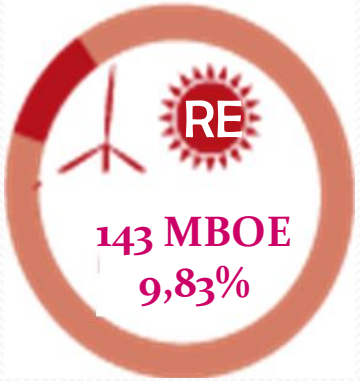
Total Primary Energy Supply : 1457 MBOE



Import:
324 MBOE
(59,51%)

Import (LPG):
31 MBOE
(11,32%)

Import :
11 MBOE
(2,14%)



Incl biofuel

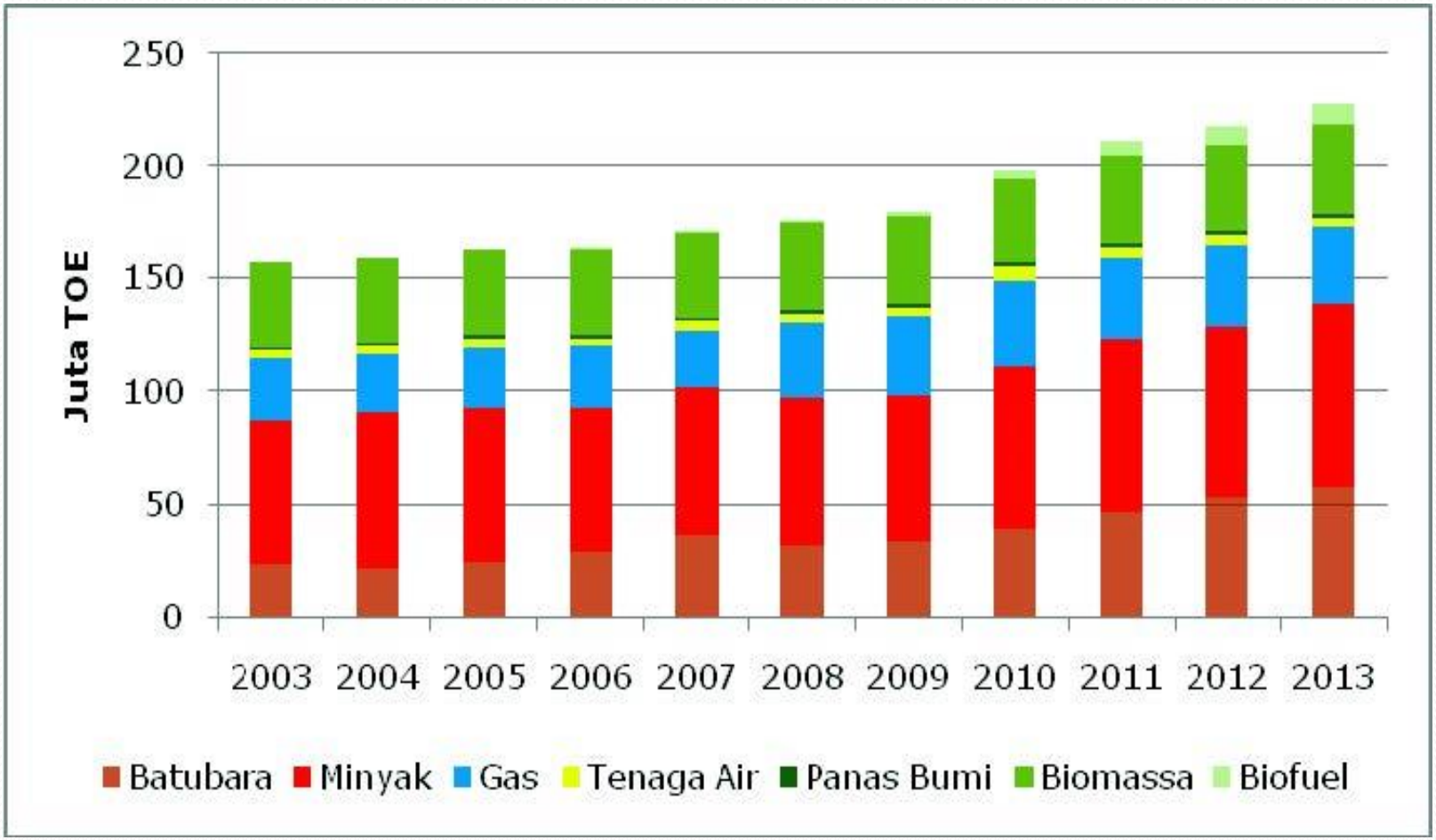
- >90% Fossil
- < 10% RE

25 % of Energy Supply met by Import

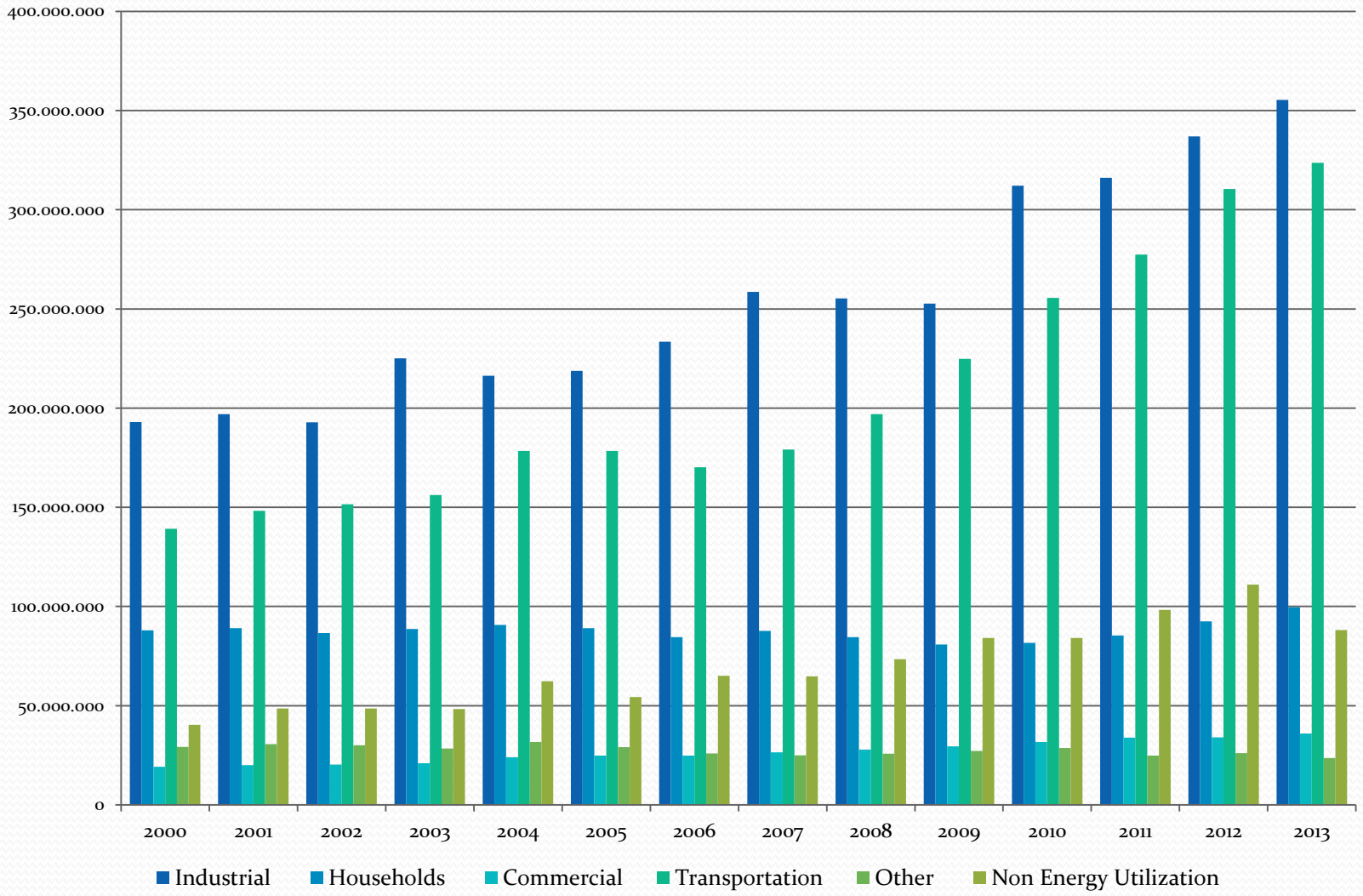
Total Import 365 MBOE

Export :
- Oil : 143 MBOE
- Gas (LNG+NG) : 211 MBOE
- Coal : 1604 MBOE

Primary Energy Supply Development



Commercial Energy Consumption (Excluding Biomass)



Primary Energy Mix Development

(a) Skenario BaU

Jenis Energi	2013	2020	2025	2030	2035	2045	2050
Batubara	28%	35%	36%	38%	40%	40%	41%
Gas	22%	21%	21%	21%	21%	22%	21%
Minyak	43%	33%	30%	28%	27%	27%	28%
EBT	8%	11%	13%	13%	12%	11%	10%
Total	100%	100%	100%	100%	100%	100%	100%

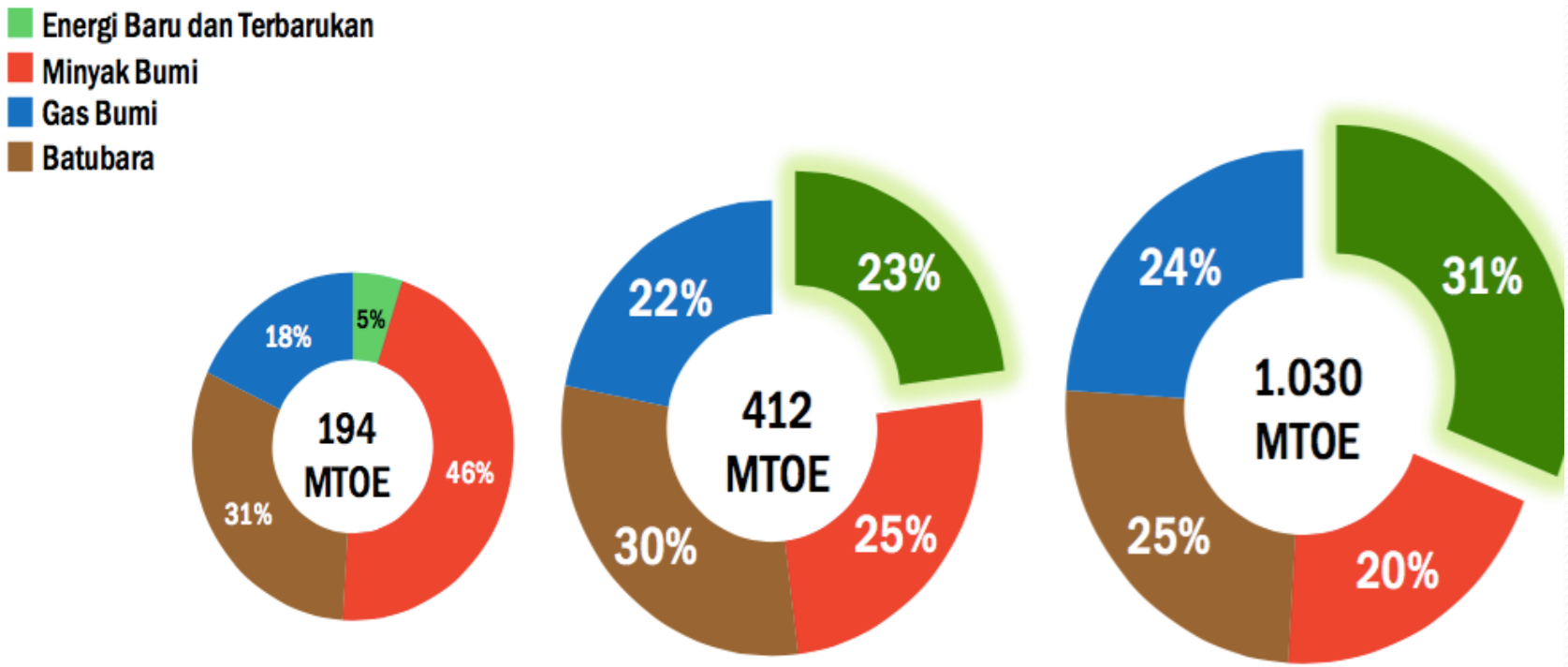
(b) Skenario KEN

Jenis Energi	2013	2020	2025	2030	2035	2045	2050
Batubara	28%	30%	30%	30%	29%	26%	25%
Gas	22%	23%	22%	23%	23%	25%	24%
Minyak	43%	29%	24%	22%	21%	20%	20%
EBT	8%	19%	23%	25%	27%	29%	31%
Total	100%	100%	100%	100%	100%	100%	100%

Energy Intensity

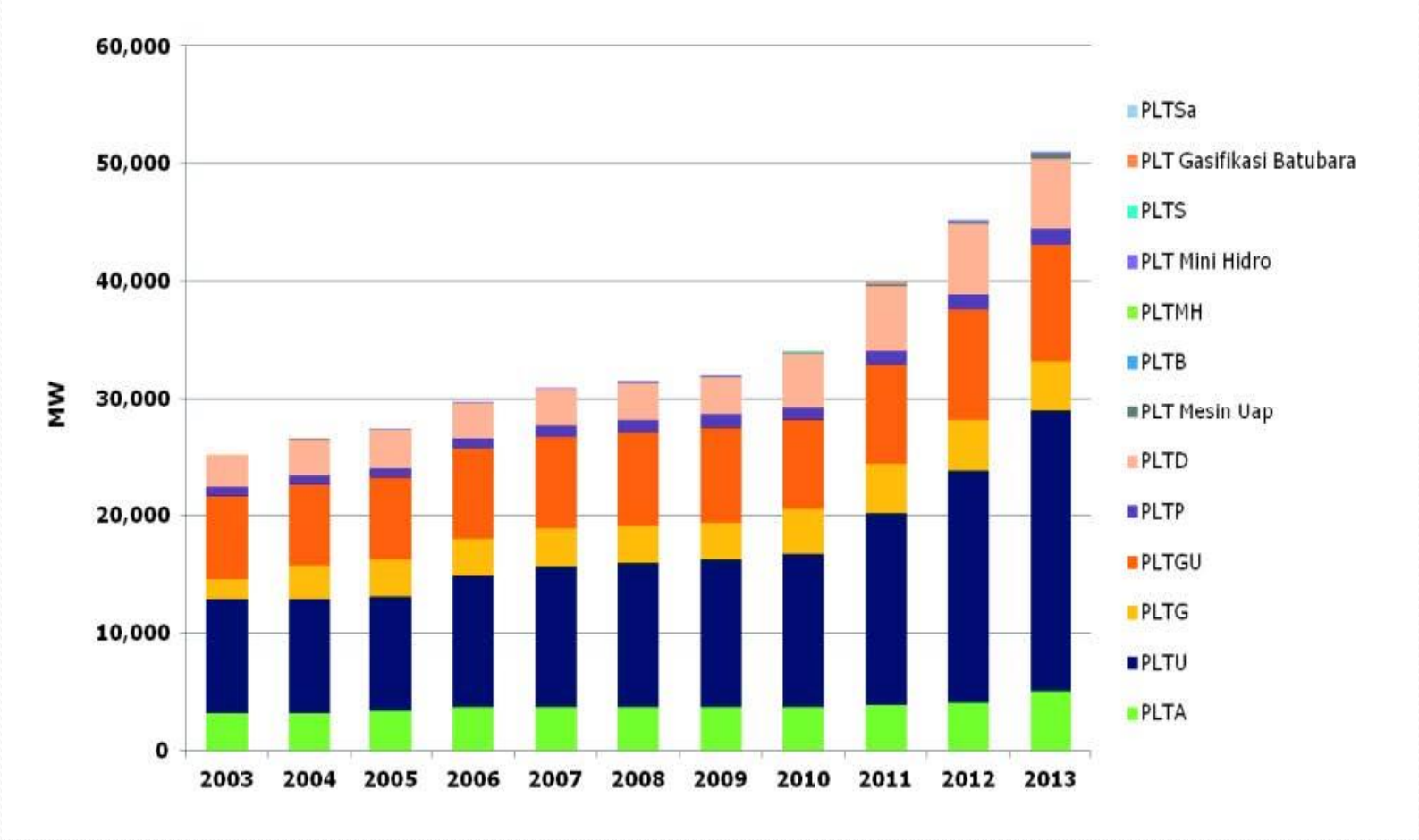
Target: Reduce Energy Intensity 1% p.a

Primary Energy and Power Development

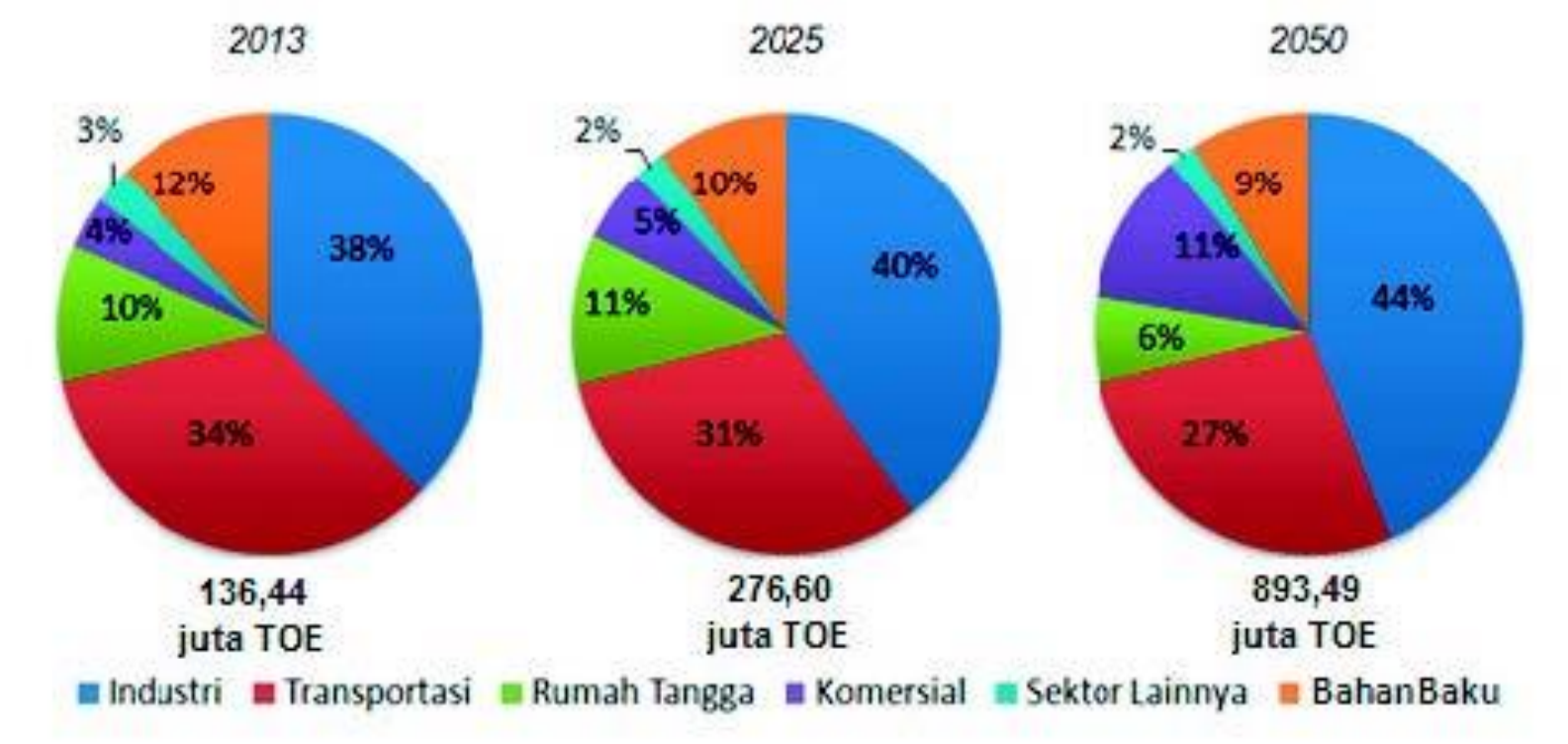


	Saat ini	2025	2050
Total Pembangkit Listrik	51 GW	137 GW	448 GW
Pembangkit EBT	9,6 GW (19%)	46 GW (34%)	172 GW (38%)

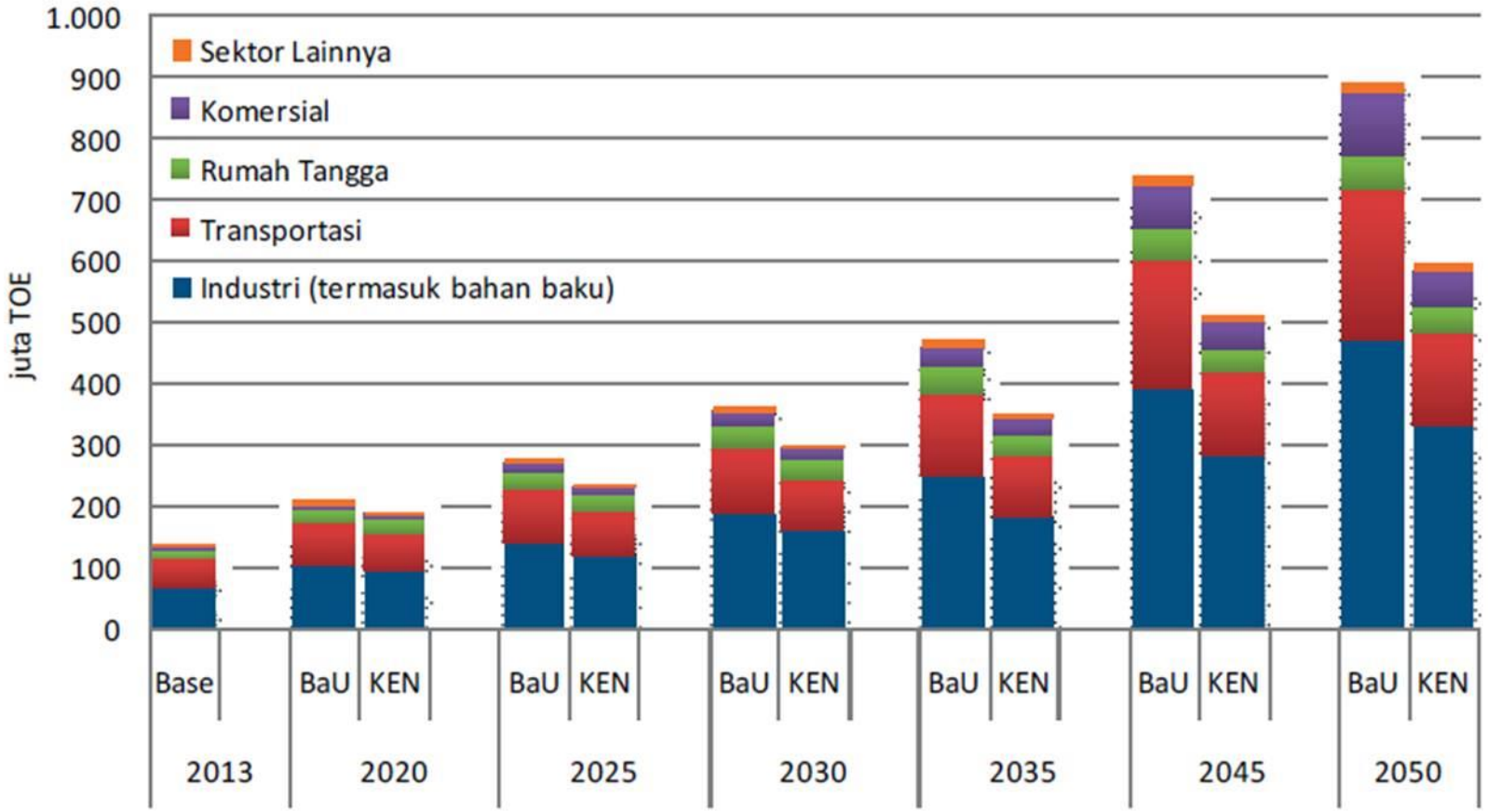
Installed Power Capacity By Sort of Primary Energy



Final Energy Need By Sector (BAU)



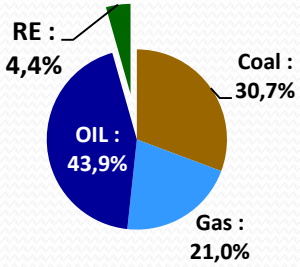
ENERGY CONSUMPTION SCENARIO

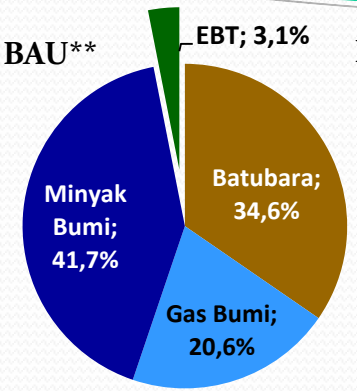


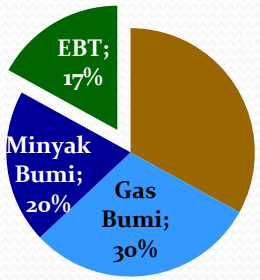
ENERGY CONSERVATION AND EFFICIENCY POTENTIALS

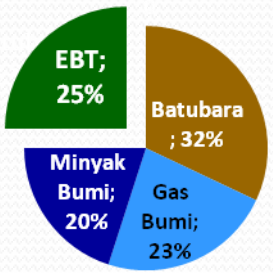
STATUS OF PRIMARY ENERGY SUPPLIES AND *ECE* POTENTIALS

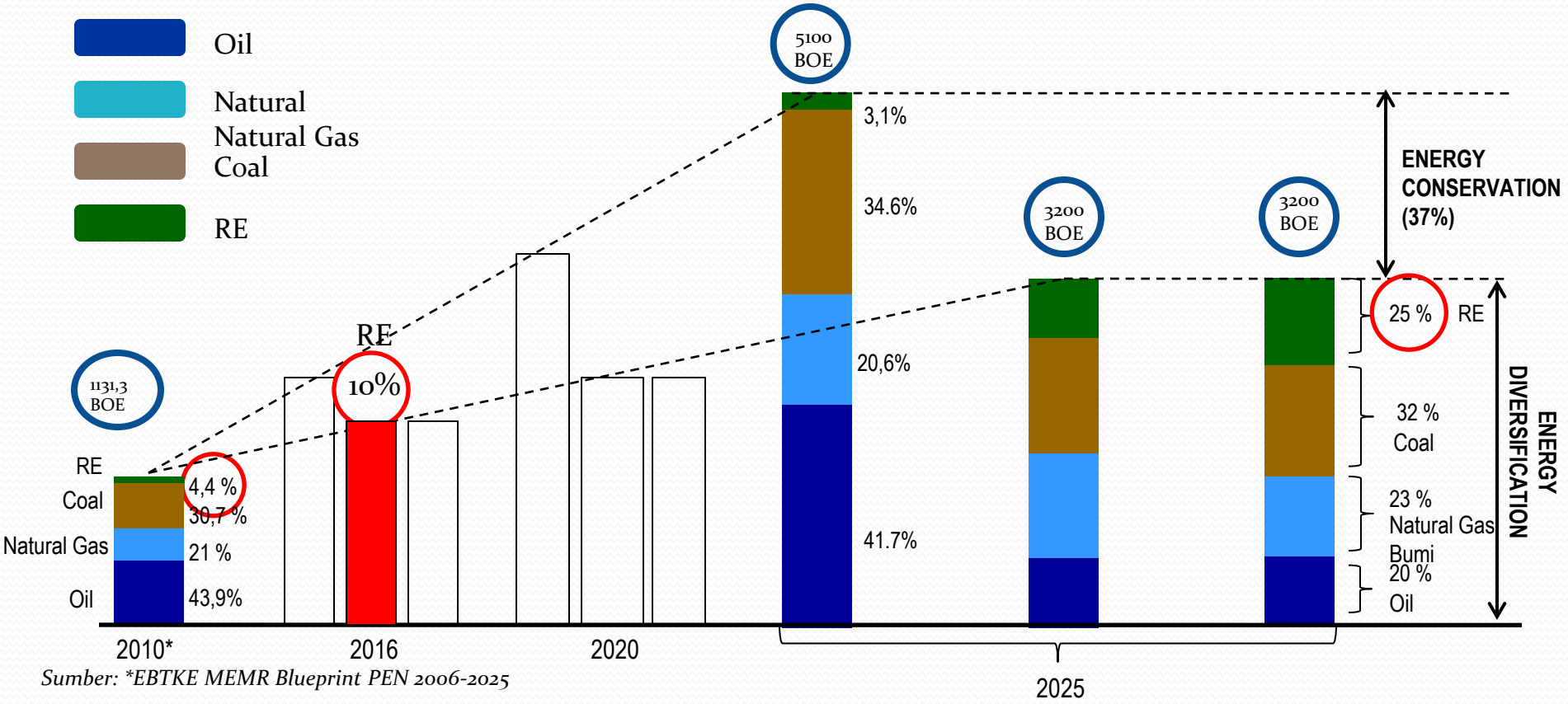
CURRENT STATUS





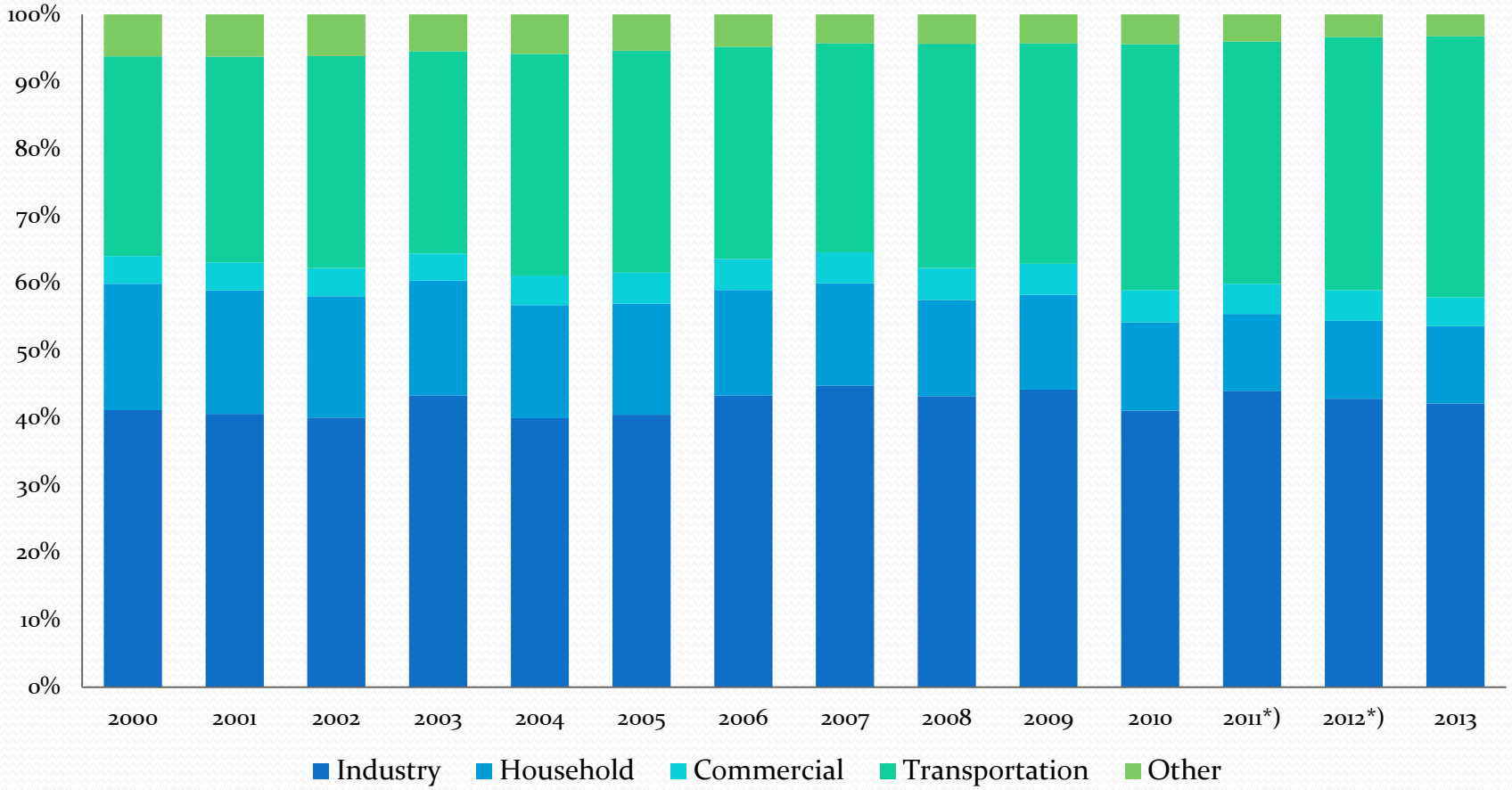




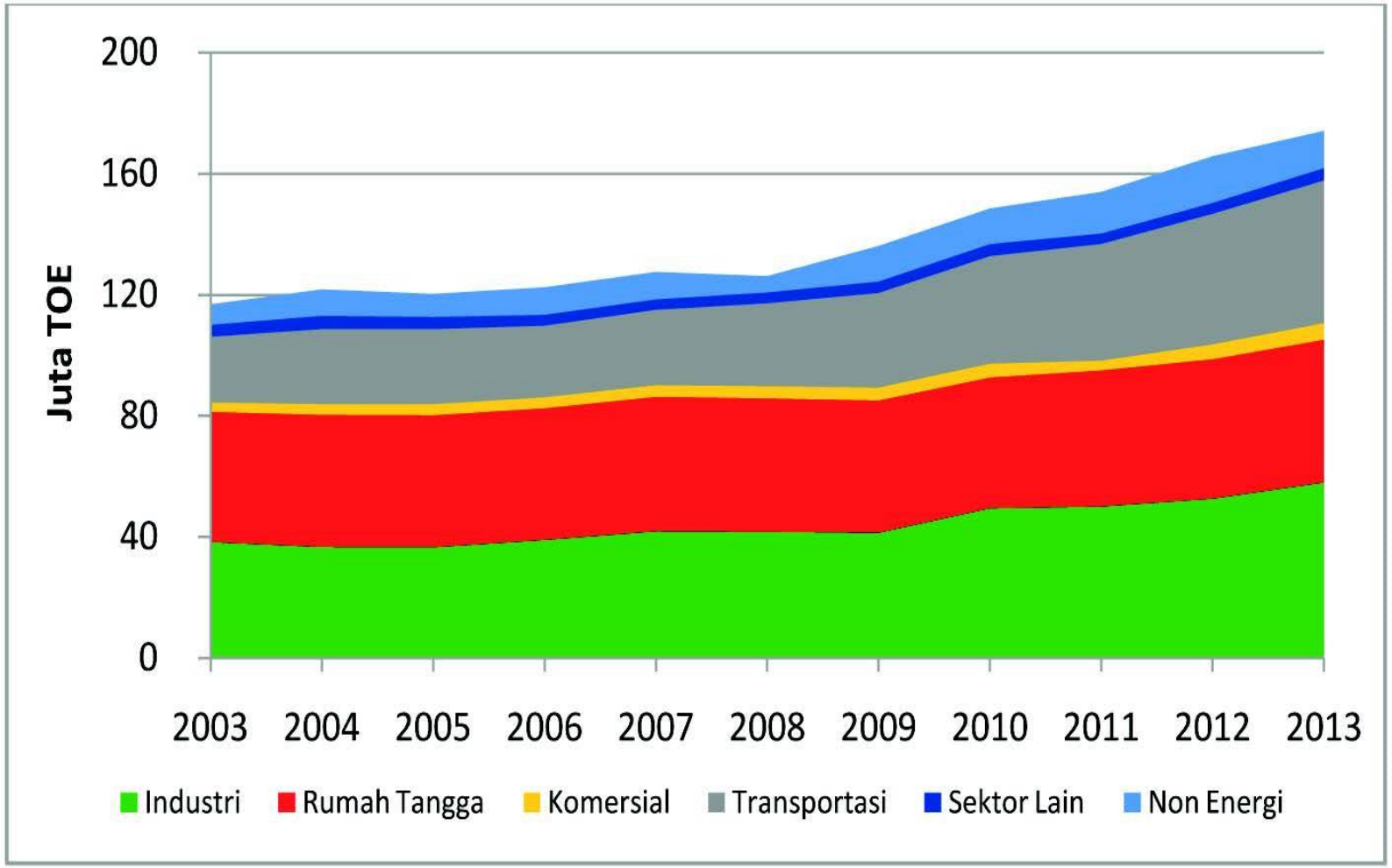


*Sumber: *EBTKE MEMR Blueprint PEN 2006-2025*

Share of Final Energy Consumption by Sector



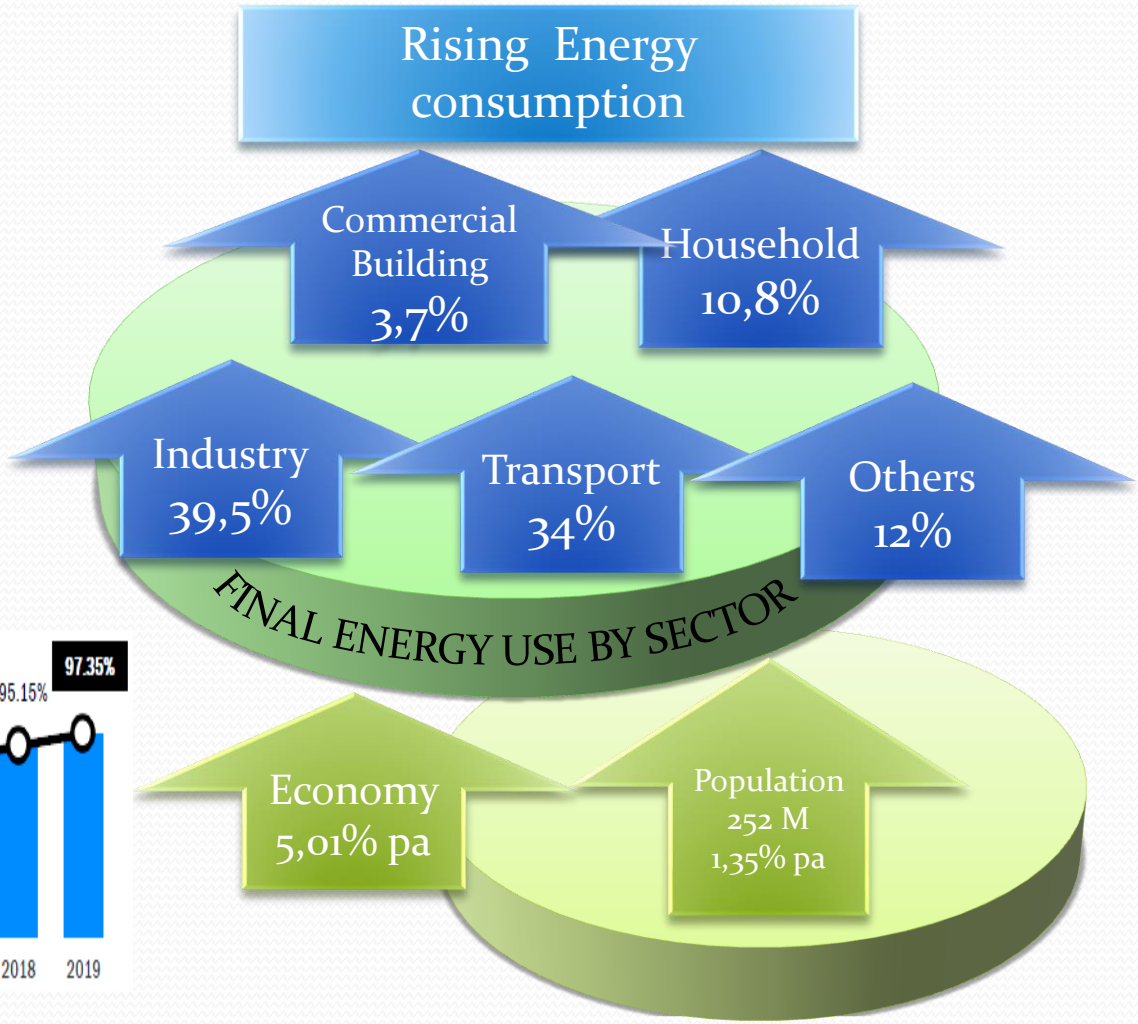
National Energy Consumption By Sector

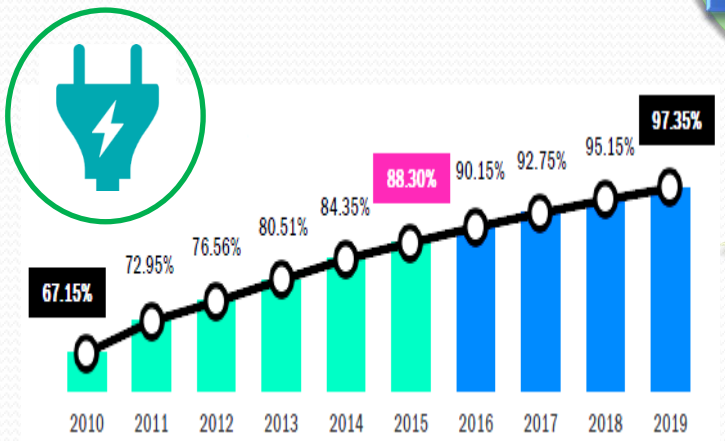


Final Energy Consumption Year 2014

Total Final Energy : 983 MBOE

Growth: 8,5%





Electrification Ratio :

88,3%

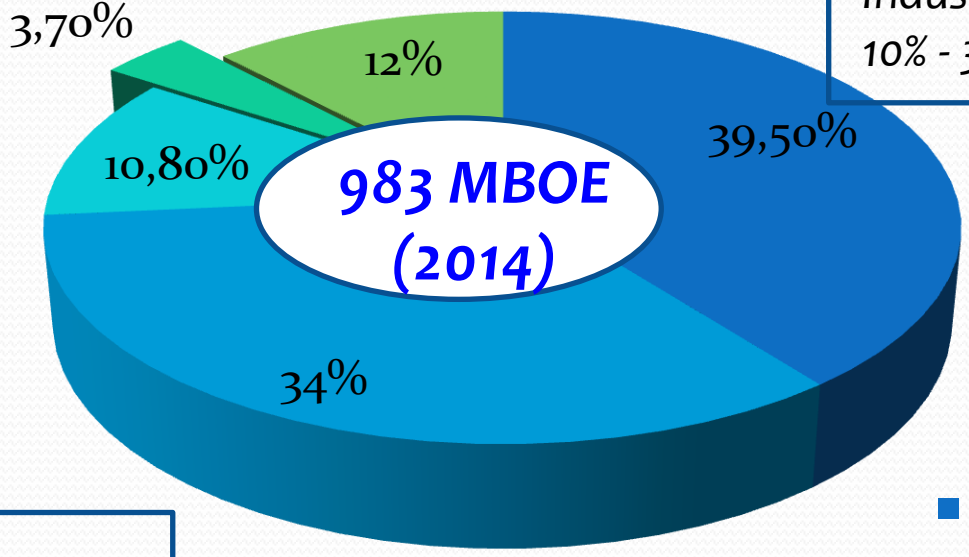
Energy Saving Potential

Commercial Building
10% - 30%

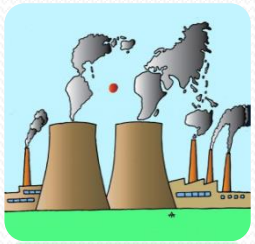
Household
15% - 30%

Transportation
15% - 35%

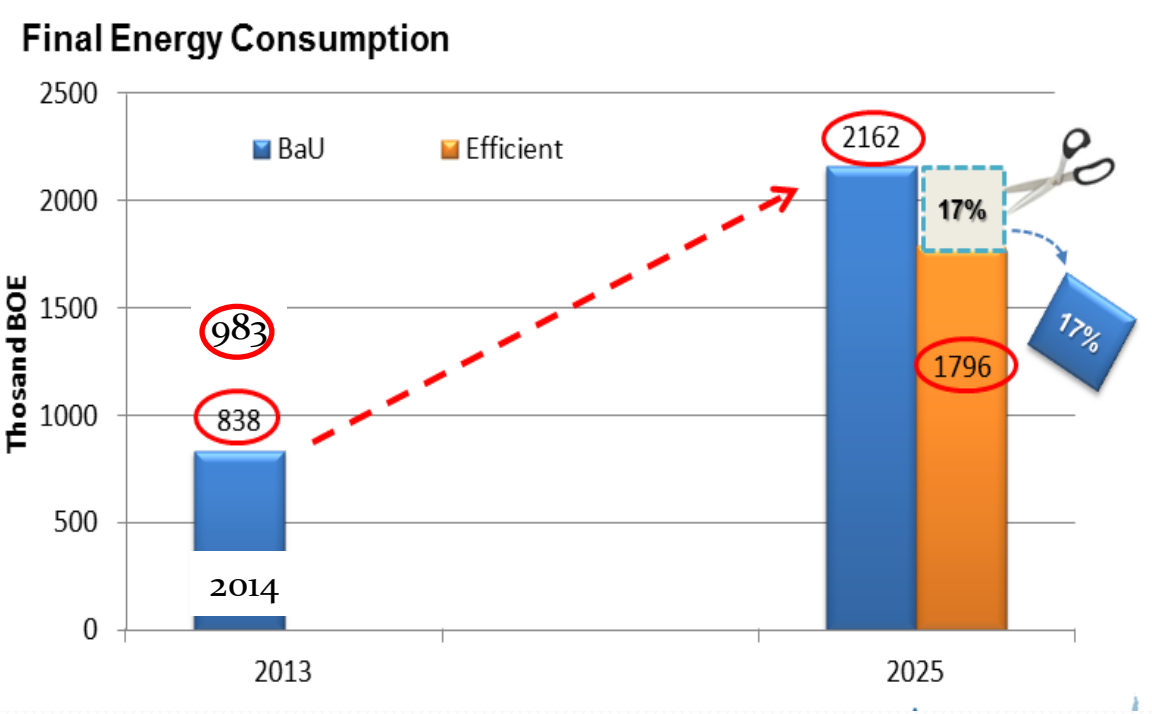
Final Energy Consumption



Industry
10% - 30%



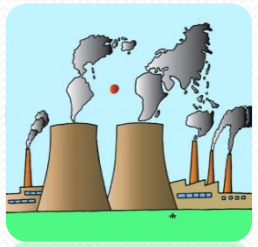
TARGET OF ENERGY SAVING 2025



Energy Efficiency Target :

- Primary Energy-GDP elasticity < 1.0 by 2025;
- Reduce Energy-GDP Intensity 1% annually;
- Final energy saving 17% on 2025;

Energy Saving Potential



Industry
10% - 30%

Commercial Building
10% - 30%

Transportation
15% - 35%

Household
15% - 30%

HIGH POTENTIALS FOR ENERGY SAVING

Sector	Energy Consumption by Sector Year 2013*) (Miliion BOE)	Energy Saving Potential	Energy Saving Target by Sector (2025)
Industry	355 (42%)	10 – 30%	17%
Transportation	324 (39%)	15 – 35%	20%
Household	100 (12%)	15 – 30%	15%
Comercial Building	36 (4%)	10 – 30%	15%
Other	23 (3%)	25%	-

Optimizing EE Efforts will save the economy USD **60 billions** by 2025 (McKinsey Study 2014)

High Potential Savings on:

- Air Conditioning Systems
- Lightings
- Industrial Process & Equipm
- Electrical Appliances
- Transportation and Logistics
- Power Smart Grid Systems

At:

- No Cost
- Low Cost
- Medium Cost
- High Cost

Over USD 800 mill worth of savings based on Energy Audit on around 500 mixed objects (209-2014)

ENERGY SAVING MEASURES (Excluding Transportation)

Low Cost Measures: (Households and Homes)

- Improve housekeeping leading to behavior change in energy use.
- Apply of Automatic Switch.
- Replace lamps with energy efficient CFL and LED
- Improve power connection /electrical installation (homes)
- Apply smart/passive design (optimizing natural day light)

Medium and High Cost Measures: (Industries & Commercial Buildings)

- Replace or refurbish Chillers
- Use more efficient hydrocarbon refrigerant
- Replace conventional with electronic ballast.
- Install Variable Speed Drive/VSD in pump and fan.
- Improve Power Connection /electrical installation (Business)
- Implement Co-Generation (Waste heat for absorption chiller)
- Replace old with new energy efficient equipment's
- Adjust Office Operating hour to take advantage of seasonal changes

PRIORITIES

- Reducing and gradually eliminating energy subsidy for fuel and electricity;
- Formulating apropriate EE policies and regulations that will drive:
  - Energy efficiency standard and label for appliances (MEP)
  - Energy efficiency standard for commercial building (Building Energy Code);
  - EE incentives and disincentives scheme;
  - Proper Energy management;
  - Energy efficiency guidelines;
- Establishing Effective Funding mechanism for EE Projects and efforts
  - Capacity building for financial institutions, including learning on “live projects”
  - Facilitate and support the establishment ESCO’s
  - Provide energy audit and *Investment Grade Audit* (by ESCO’s)
- Capacity Building:
  - Capacity building and training for policy makers, financial institution;
  - Capacity building and technical training for professionals leading to Competency Certification (Energy Auditors, Managers, and Engineers)
  - Capacity building for ESCO startups

ENERGY CONSERVATION POLICY

ENERGY CONSERVATION REGULATIONS

- **1982** ⇨ **Presidential Instruction No. 9 Year 1982 on Energy Conservation**
- **1991** ⇨ **Presidential Decree No. 43 Year 1991 on Energy Conservation**
- **1995** ⇨ **National Master Plan of Energy Conservation 2005**
- **2002** ⇨ **Law No. 28 Year 2002 on Building**
- **2005** ⇨ **Presidential Instruction No. 10 Year 2005 on Energy Efficiency, Ministerial of Energy and Mineral Resources Regulation No. 0031 Year 2005 on Procedure of Energy Efficiency Implementation**
- **2006** ⇨ **Presidential Regulation No. 5 Year 2006 on National Energy Policy**
- **2007** ⇨ **Law No. 30 Year 2007 on Energy**
- **2008** ⇨ **Presidential Instruction No. 12/2008 on Energy and Water Efficiency**
- **2009** ⇨ **Government Regulation No.70/2009 on Energy Conservation**
- **2015** ⇨ **Government Regulation No. 79/2014 The National Energy Plan ***
- **2014** ⇨ **Energy Efficiency Master Plan 2016 -2025 (in process)**

* Targeting 15% Building Energy Saving by 2020

National Energy Policy (GR 79/2014)

GR No. 79 Year 2014

Main Policy

- Securing Availability of Energy for National needs
- Prioritized Energy Development
- Optimizing National Energy Resources
- Building National Energy Reserves

Supporting Policy

- Energy Conservation, Energy Efficiency and Diversification
- Environment and Safety
- Energy Prices, Subsidies and Incentives of Energy
- Infrastructure, Energy access, and Energy Industries
- Research, Development and Application of Efficient Energy Technology
- Institutional Funding

Target Energy Mix 2025:

Oil
25%
~ 96 MTOE

Gas
22%
~ 76,75 MTOE

Coal
30%
~ 113,45 MTOE

RE
23%
~ 84,15 MTOE

EE
Elastisity <1
Intensity -1% p.a

Government Regulation No.70/2009
On Energy Conservation

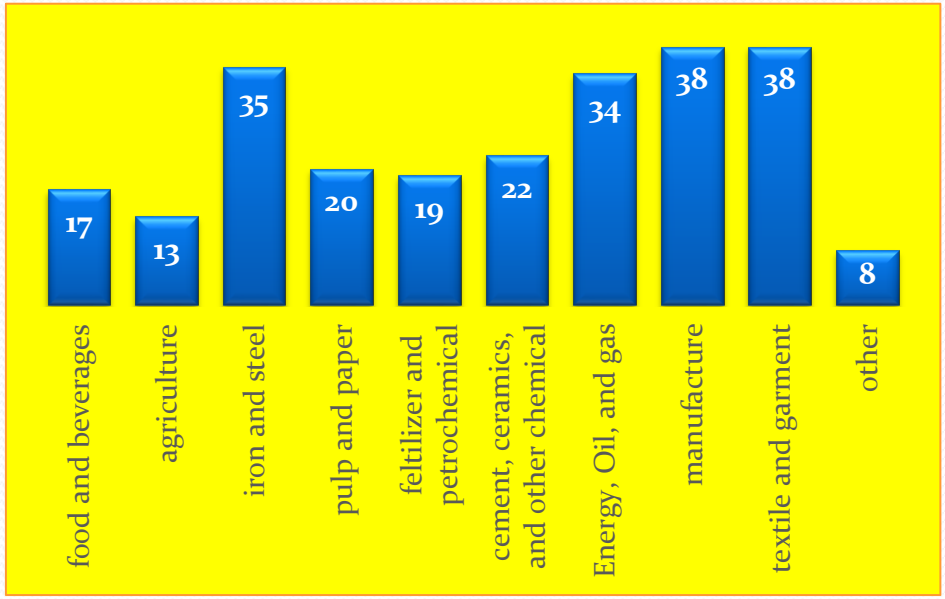
CONTENT

1. **Responsibility**
   - **Government :** Formulating policy, enhancing capacity building, etc
   - **Private sector :**
     - ✓ Energy conservation measures
     - ✓ Energy efficient technology
     - ✓ Produce service and production output efficiently
   - **Public/Community :** Conduct energy conservation program
2. **Implementation of Energy Conservation**
   - **Energy Conservation :**
     - ✓ Energy supply
     - ✓ Energy utilization
     - ✓ Conservation of energy resources
     - ✓ Energy efficiency
3. **Standard and Labeling**
   - Implementing energy efficiency standard and labeling
4. **Facilitation, Incentive and Disincentive**
   - **Facilitation**
   - **Incentive**
   - **Disincentive**
     - Mandatory Energy Audit and Management for Big Energy Users
     - Energy Conservation Programs
5. **Direction and Supervision**
   - Capacity Building,
   - Energy efficiency and Energy Saving Campaign
   - Boost R&D efforts on Energy Efficient /Saving Technology

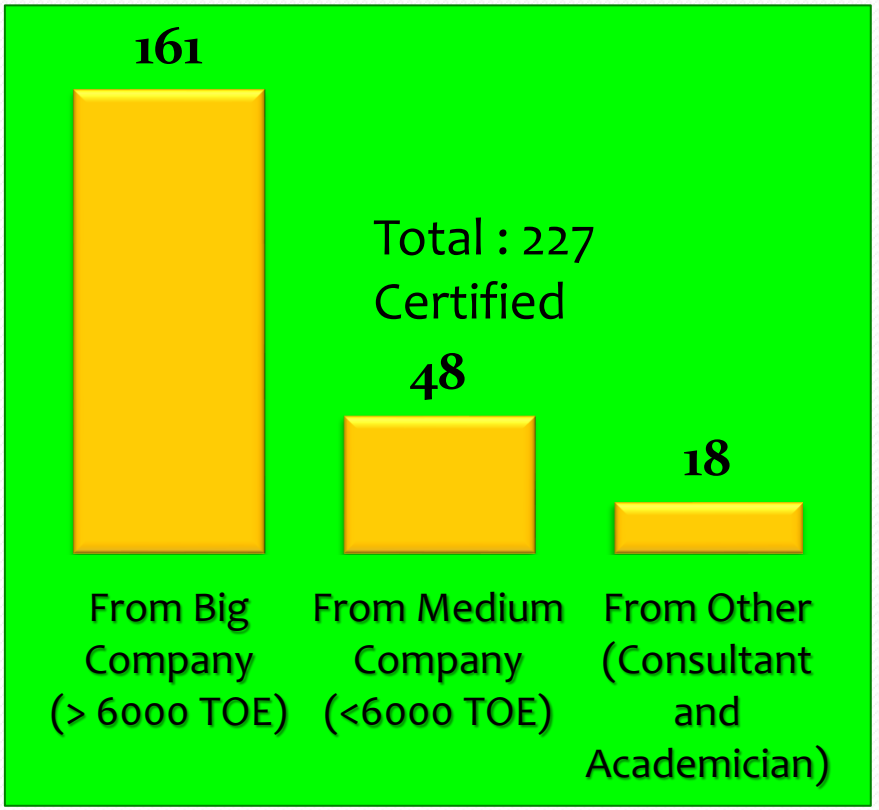
Companies that have Energy Managers

Based on goverment regulation No. 70/ 2009 on Energy Conservation: Companies consuming energy ≥ 6000 TOE per year should have Energy Manager

244 companies should have energy manager



Status of Certified Energy Manager (February 2016)



SUMMARY OF ECE PROGRAMS 2015-2025

POLICIES/REGULATIONS

- Formulate policies / regulations on energy conservation

PPP PROGRAMS

- Massive Energy Audits
- Investment Grade Audit (IGA).

ESTABLISH STANDARDS (SNI based on ISO 50001)

- Implementation of ISO 50001: Energy Management Systems in Industry with the assistance of national experts;
- Implementation of energy management mandatory for large consumers using 6,000 TOE or more / year

IMPROVE PUBLIC AWARENESS

- Conduct seminars / workshops, advertising, brochures, newsletters etc.
- Implement Energy Saving Competition at the national level, and participate in the ASEAN Energy Award for building and energy management
- Award Energy Efficiency Champions
- Conduct energy education programs for Elementary and Secondary Schools

DEPLOY LOW ENERGY STREET LIGHTINGS

- Development of Smart Street Lighting at least in 22 selected cities

FINANCIAL SUPPORTS

- ESCO Development;
- Guiding and engaging financial institutions
- Creating incentive/disincentive schemes
- EE Pilot projects

MONITORING CO2 EMISSION

- Target of CO2 emission by 2020: 30 Million Ton CO_2

STANDARD & LABEL

- Implementation of MEPS/ Labelling for appliance (CFL, AC, Refrigerator, Electric Fan, Rice Cooker, Motor, Electr Ballast, Washing Machine, Water Pump, etc;
- Establishing *Building Energy Code*

OVERALL TARGET

1. Reducing energy intensity by 1% per year and energy elasticity less than 1 in 2025
2. Reducing CO2 Emission: 30 million ton by 2020.

DEVELOPING ENERGY MANAGER & ENERGY AUDITOR

- Certification of Energy Managers and Energy Auditors by Competency Certification Bodies

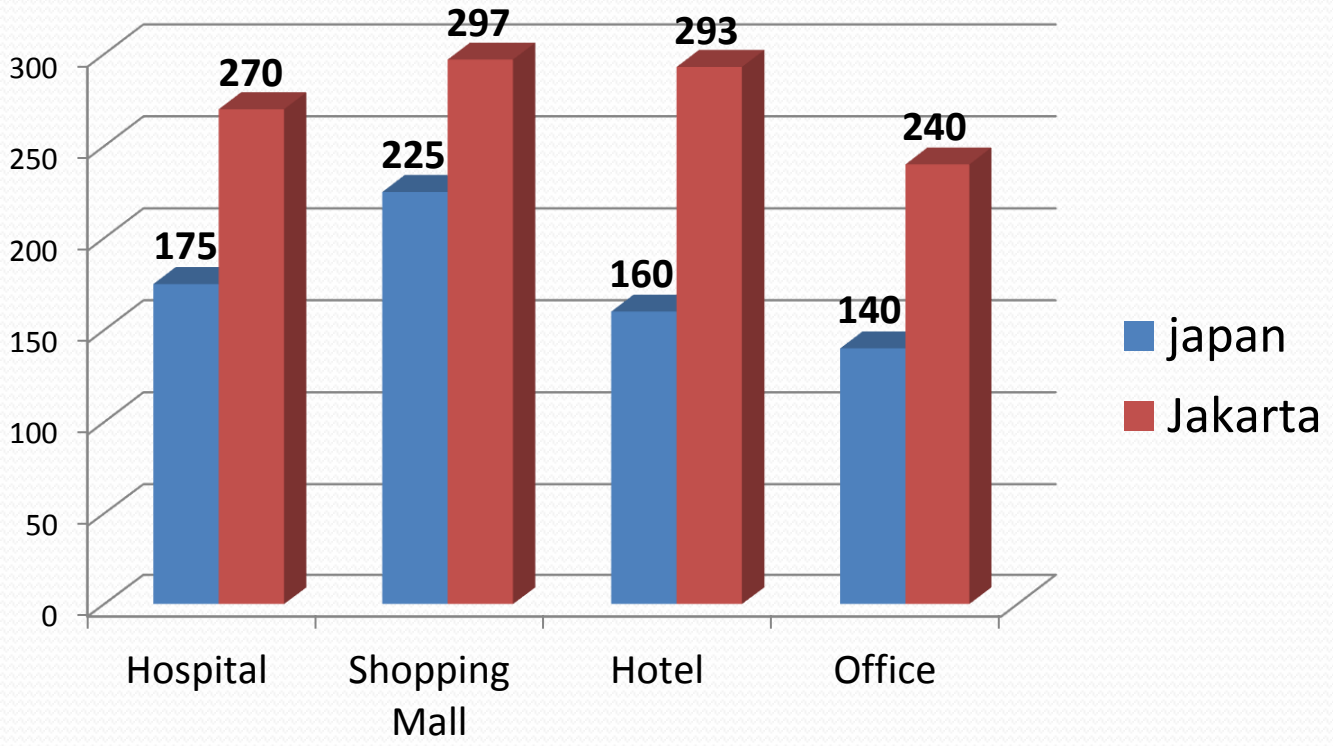
ENERGY EFFICIENCY IN BUILDINGS

EE Market Potentials (Buildings)
A Case Study

PROJECTED NUMBER OF NEW BUILDING - JAKARTA					
Market Potential Assumptions	**Apartment**	**Office**	**Hotel**	**Mall**	**Hospital**
2015	45	19	10	10	9
2016	22	20	11	11	10
2017	18	22	12	12	11
2018	15	24	13	13	12
2019	15	26	14	14	13
2020	15	28	15	15	14
2021	15	30	16	16	15
Total	**145**	**169**	**91**	**89**	**84**

Source : IFC Study 2011

Buildings' Energy Efficiency Index (KWH/m2/year)



Source : IFC Study 2011 . JICA Study 2009

Assumed Goal of 15% Energy Saving in Buildings

		Avg Annual Change	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Floor area m2	Existing buildings		100	105.0	110.3	115.8	121.6	127.6	134.0	140.7	147.7	155.1	162.9
	New buildings	5%	5	5.3	5.5	5.8	6.1	6.4	6.7	7.0	7.4	7.8	8.1
	TOTAL AREA		**105**	**110.3**	**115.8**	**121.6**	**127.6**	**134.0**	**140.7**	**147.7**	**155.1**	**162.9**	**171.0**
Penetration Rate to Previous Year	Existing buildings		10%	12%	14%	17%	20%	22%	26%	30%	35%	40%	45%
	New buildings		15%	18.7%	22.4%	28.0%	33.6%	37.3%	44.7%	52.1%	61.4%	70.7%	80%
Saving vs 2015	Existing buildings		-11%	-12.2%	-13.3%	-15.0%	-16.8%	-17.9%	-20.2%	-22.5%	-25.4%	-28.3%	-31.2%
	New buildings		-35%	-35.9%	-36.7%	-38.0%	-39.3%	-40.1%	-41.9%	-43.6%	-45.7%	-47.9%	-50%
EEI (kwh/m2)	Existing buildings	-10%	250	246.4	245.3	243.6	241.6	240.1	236.8	233.1	227.8	221.7	214.9
	New buildings	-15%	200	186.6	183.5	178.7	173.6	170.1	162.6	154.6	143.8	132.3	120.0
	TOTAL EEI		**248**	**243.5**	**242.4**	**240.5**	**238.4**	**236.8**	**233.3**	**229.4**	**223.8**	**217.4**	**210.4**
TOTAL ENERGY REDUCTION vs 2015			**0.0%**	**1.7%**	**2.1%**	**2.9%**	**3.7%**	**4.4%**	**5.8%**	**7.4%**	**9.6%**	**12.2%**	**15.0%**

Assumed Conditions for Achieving a 15% Energy Saving

NEW BUILDING :

- Penetration Rate : growth from 15% to 80% within 10 years
- Individual saving : growth from 35% to 50% within 10 years

EXISTING BUILDING :

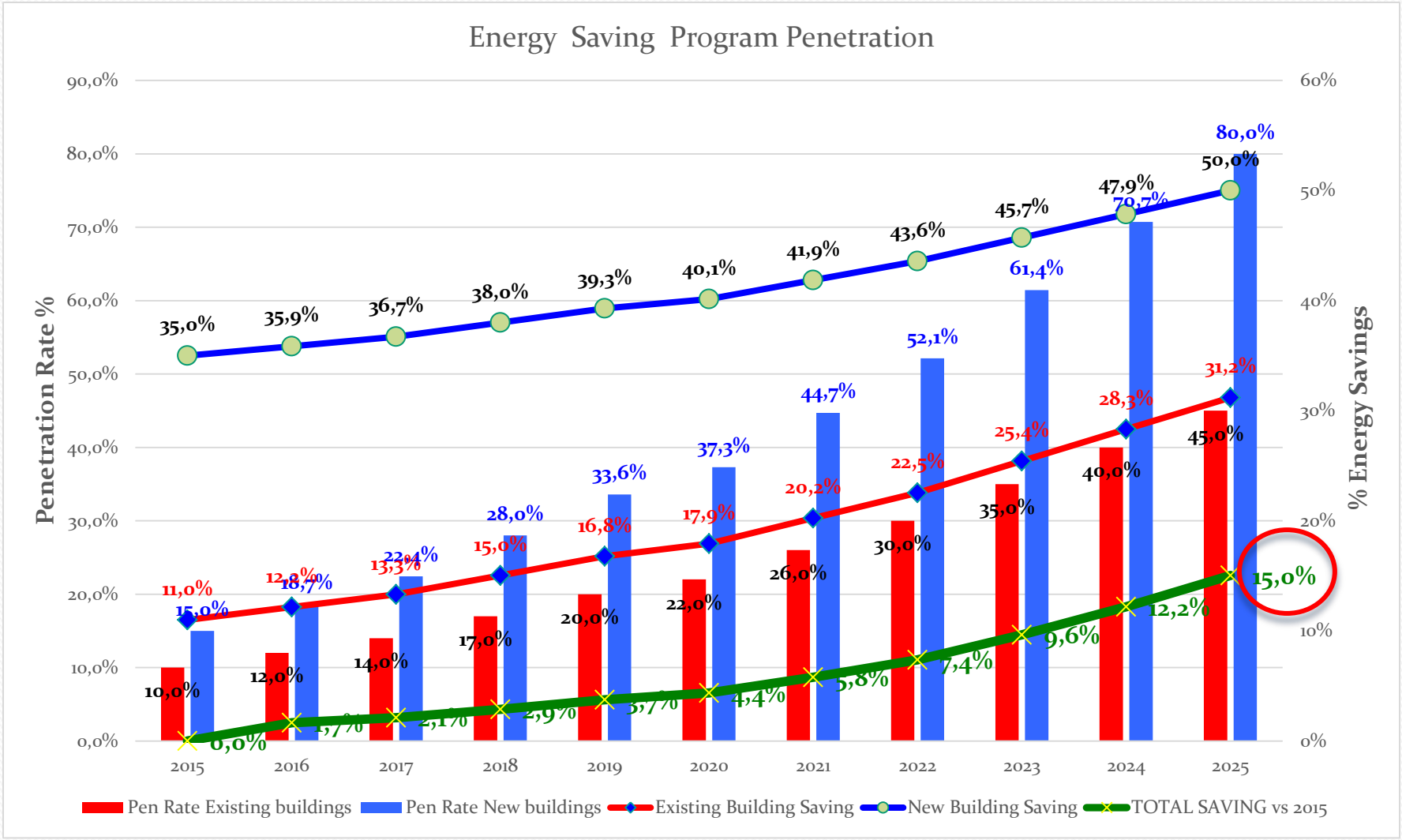
- Penetration Rate : growth from 10% to 45% within 10 years
- Individual saving : growth from 11.2% to 31.2% within 10 years

IMPORTANT POINTS :

- Not easy to achieve national target even the goals is “only” 15%
- Need a serious and focus effort to achieve this energy saving by :

“DEEP and LARGE EFFICIENCY MEASURES ”

Roadmap to Achieving Assumed 15% Energy Saving in Buildings



Achieving EE target of 15% by 2025 :

- "**Deep & Large Energy Efficiency**" can only be achieved with strong and consistent measures :
  - Not enough only by "voluntary" basis
  - Not enough only by doing "socialization"
  - Should be done by applying a regulation on mandatory basis with law enforcement i.e. ***Building Energy Code***
  - Incentive and disincentive scheme
  - Government intervention become an absolute factor with mandatory scenario and incentive policy
  - Require development of *database on energy consumption*
- To focus on existing building (not only New Building) → **ESCO** role is quite important.

Energy Efficient Buildings Lab 2.0 *

*Lab 2.0 is an on-going Initiative /Program initiated by

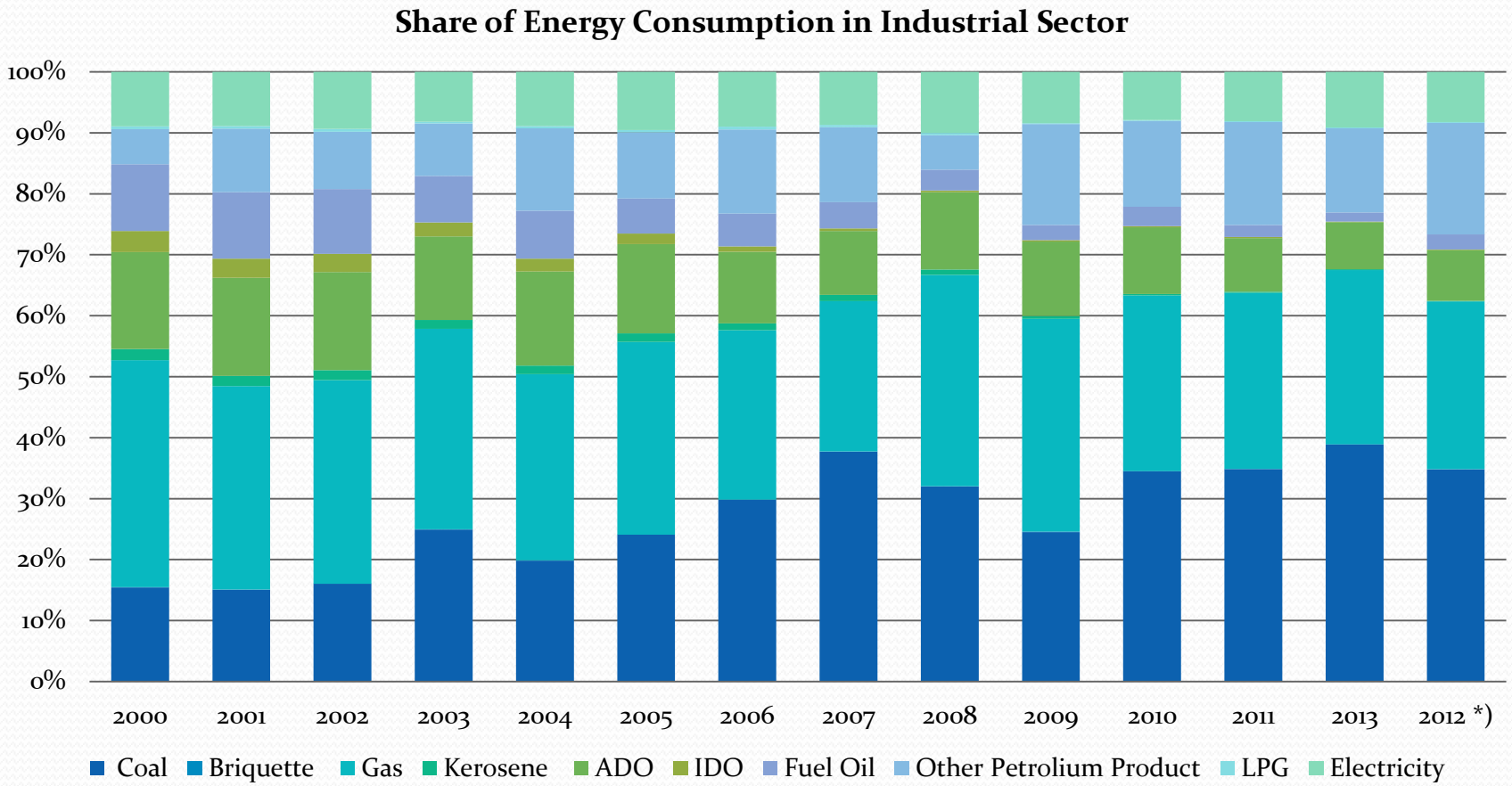
- Raising awareness and understanding of the multiple benefits of energy efficiency in buildings
- Workforce capacity – Training and Skills Improvements
- Financing for energy efficiency solutions
- Development/ improvement of Policy and regulation

Partners of the EEB lab Jakarta

Lafarge Indonesia	BOMA Indonesia
GBC Indonesia	Otoritas Jasa Keuangan
ICLEI	BCSD Indonesia
Universitas Indonesia	APKENINDO
NaramaMandiri	BPPT (research institution)
UNEP SBCI	ENGIE
UNEP (Bangkok)	Synergy Efficiency Solutions
MASKEEI	Independent Consultant
Real Estate Indonesia (REI)	WBCSD

ECE IN INDUSTRIES

Share of Energy Consumption in Industrial Sector



EE Opportunities in Industries

- Low cost and Medium Costs Projects
- Medium and High Cost EE investment : e.g. CHP Cogenerations, WHRG in Energy intensive industry
- EE improvement (process) : e.g. high efficiency boilers, preheaters, etc.
- Energy Management and Control Systems

ROLES OF ESCO

Services

EE Improvements

- Heating
- Electricity
- Refrigeration
- Water
- Compressed air
- Operations

Results

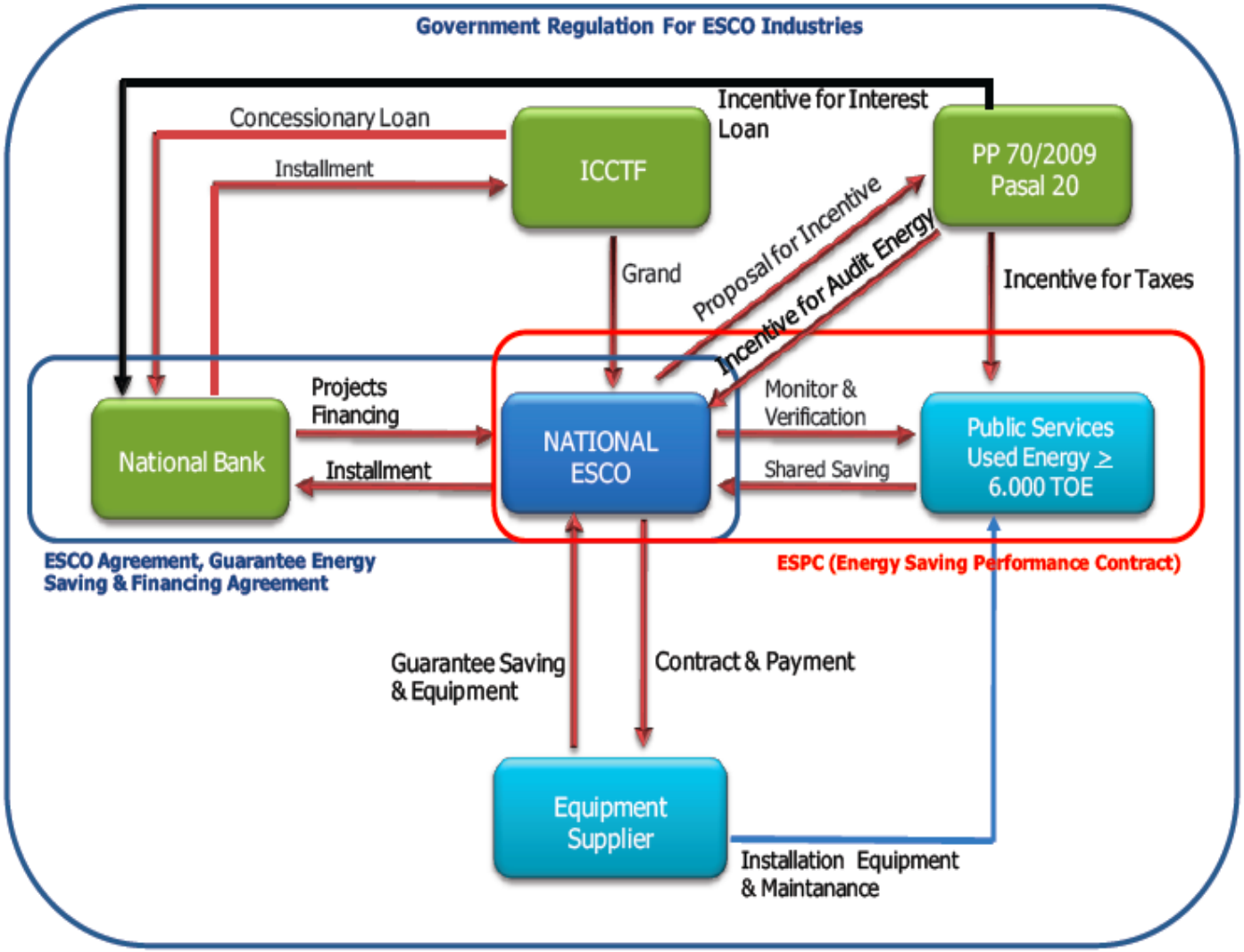
Applied Technology:

- Building automation and control
- Heating, refrigeration
- Ventilation, air conditioning
- Water treatment
- Lighting
- Cogeneration
- Power Quality

ESCO Development and Support by Government

- *Potential Market:* USD 1.4 – 9.7 billion per year
  (*Source: ReEx Capital Study, 2010*)
- *ESCO Regulation is imminently to be issued*
- Capacity Building on EE&C for Financial institution;
- Capacity Building for strengthening local ESCO's
- *Investment Grade Audit (IGA) for 10 industries (textile, steel, chemical) have been done as candidate for ESCO pilot project (potential saving 112 GWh per year)*
- Planned 4 IGA's for food and beverage industry and commercial buildings in 2016 with support by government
- There are currently 17 local ESCO's ready to do business;

Proposed Regulations on ESCO



Source : PT EMI (Persero)

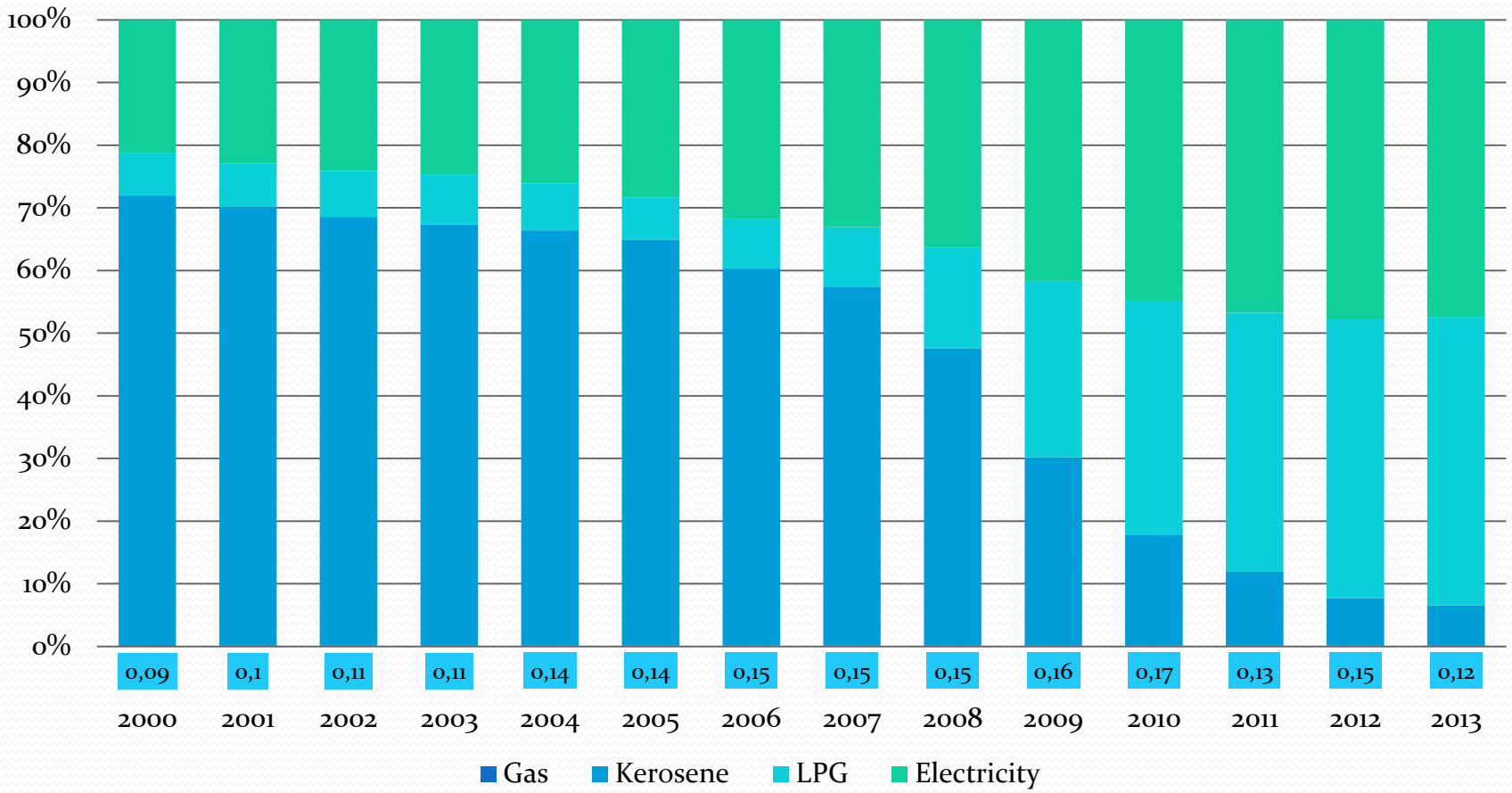
Specific Challenges to EE Projects in *Industries*

- Lack of Knowledge of how to improve efficiency in operations

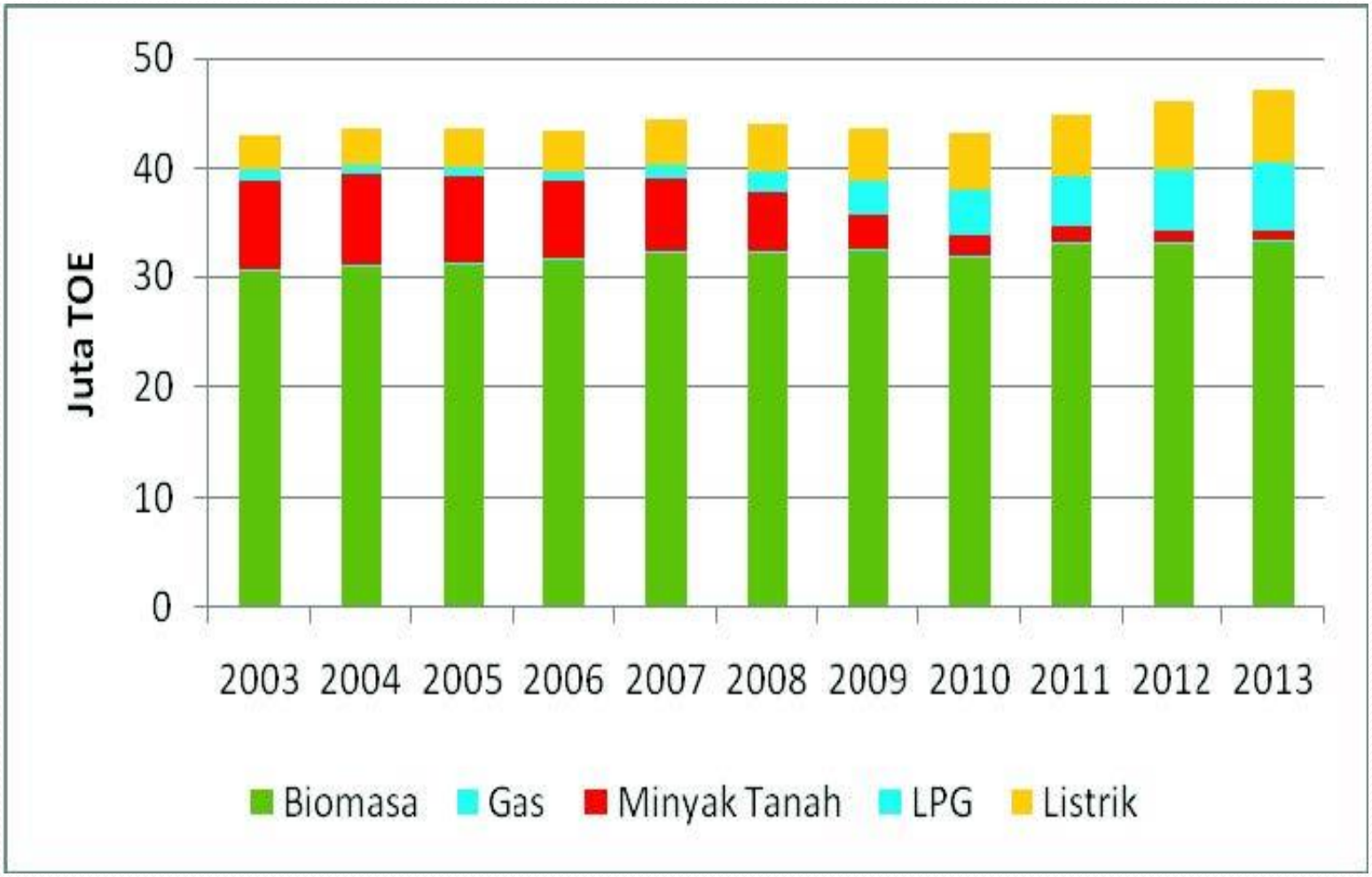
  The concepts of Performance Contracting are relatively new to many commercial and industrial energy users in Indonesia
- Poor Reporting Systems →Limited Information : *Meters, Monitoring, EMS*
- Inefficient and inflexible Procurement Systems
- Lacking Financial Support Infrastructures : *Project Finance , Dedicated Funds, Supportive Regulation*
- Relatively High Interest rates (improvement underway)

ENERGY SAVING IN HOUSEHOLDS

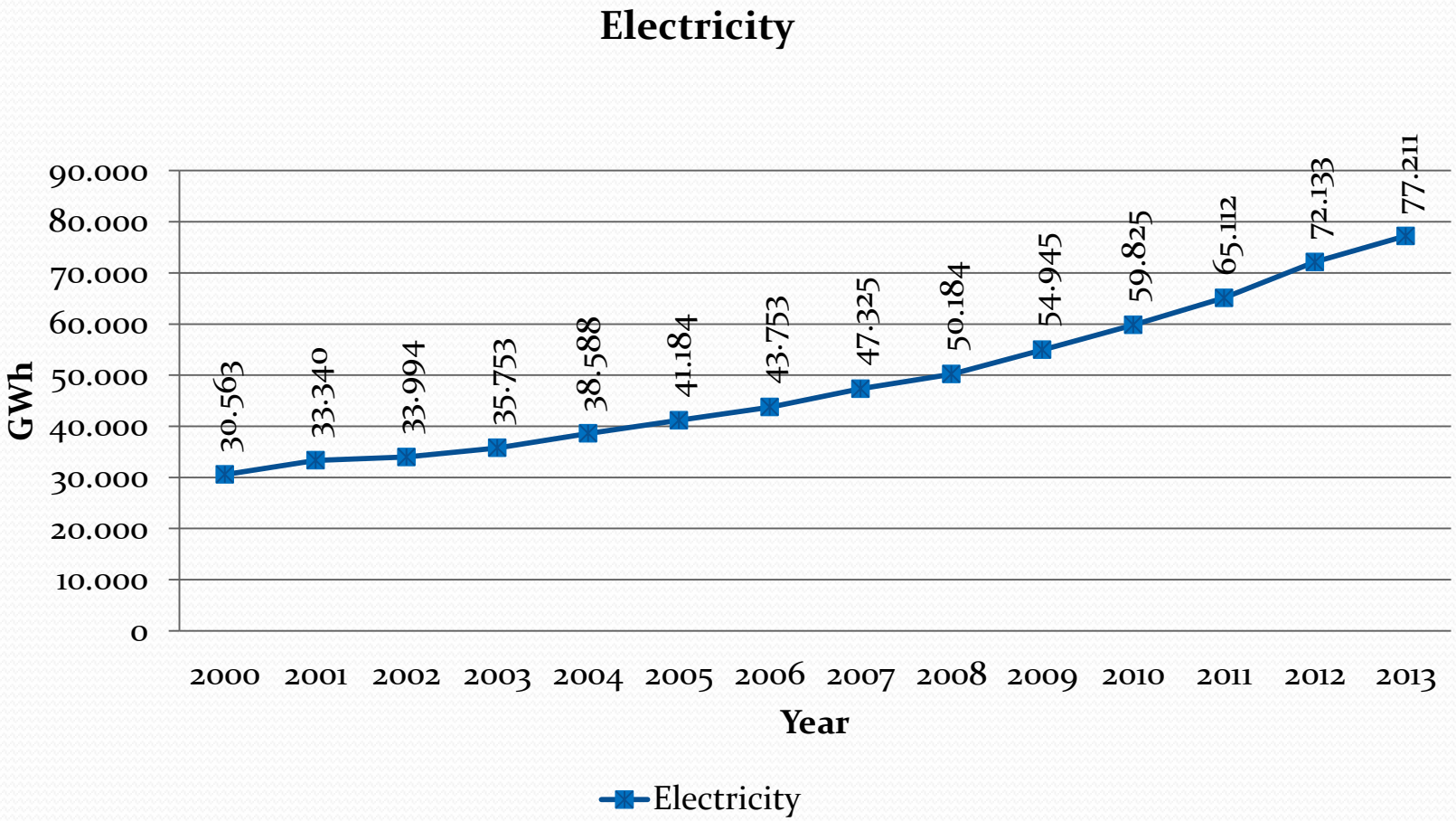
Share of Energy Consumption in Household Sector
(Excluding Biomass)



Household Energy Consumptions by Sort of Final Energy
(Including Biomass)



Energy Consumption in Household Sector



Energy Saving Potentials In Household Sector

Prospective Applications

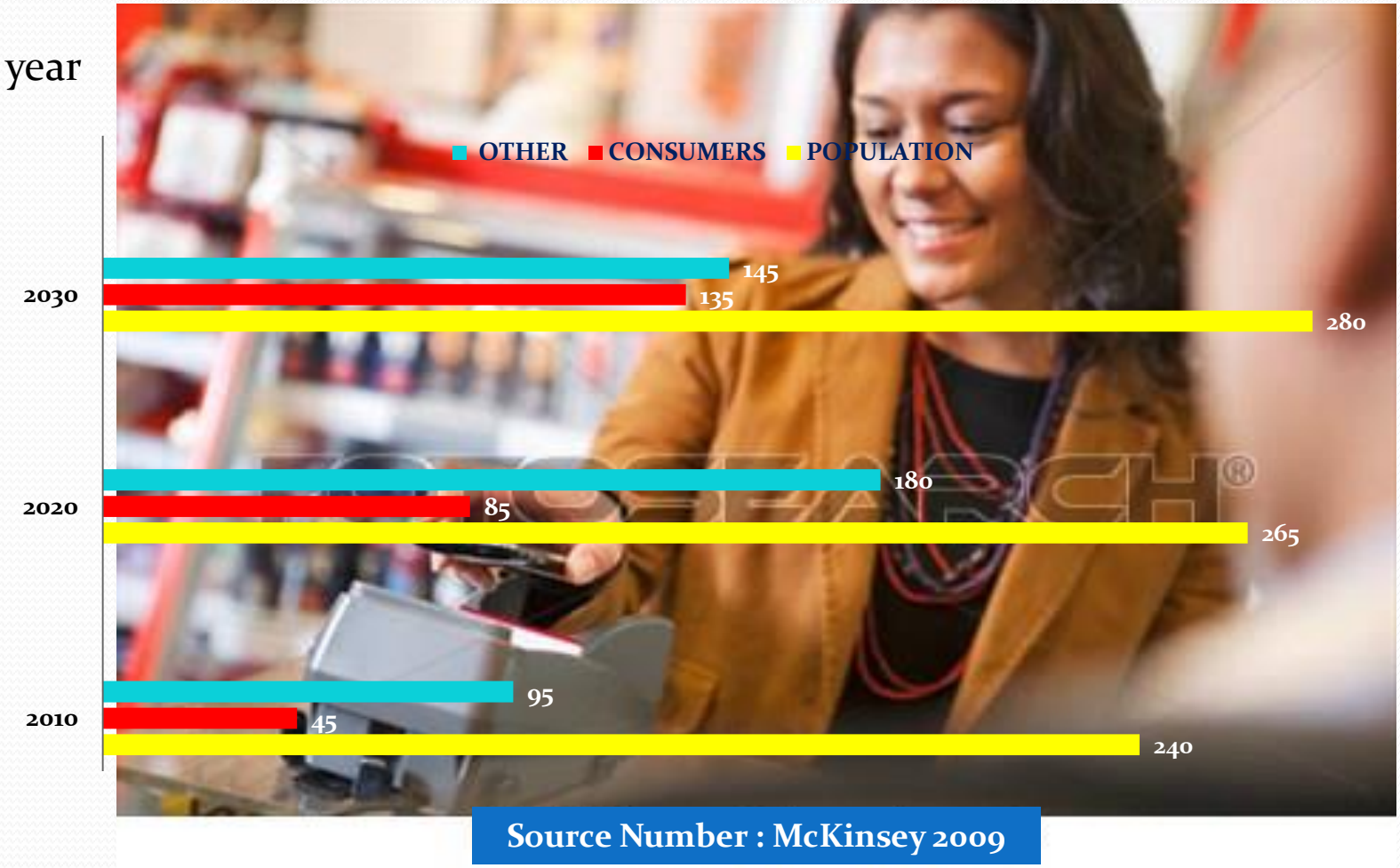
- Lightings System
- Use Energy Efficient (Electronic) Appliances
- Smart Homes Systems and IOT applications
- Design /Architectural Approach

Measures to be taken

- Improving awareness leading to change of behavior
- Energy Consumers Capacity building

Indonesian Consumers Market Potentials

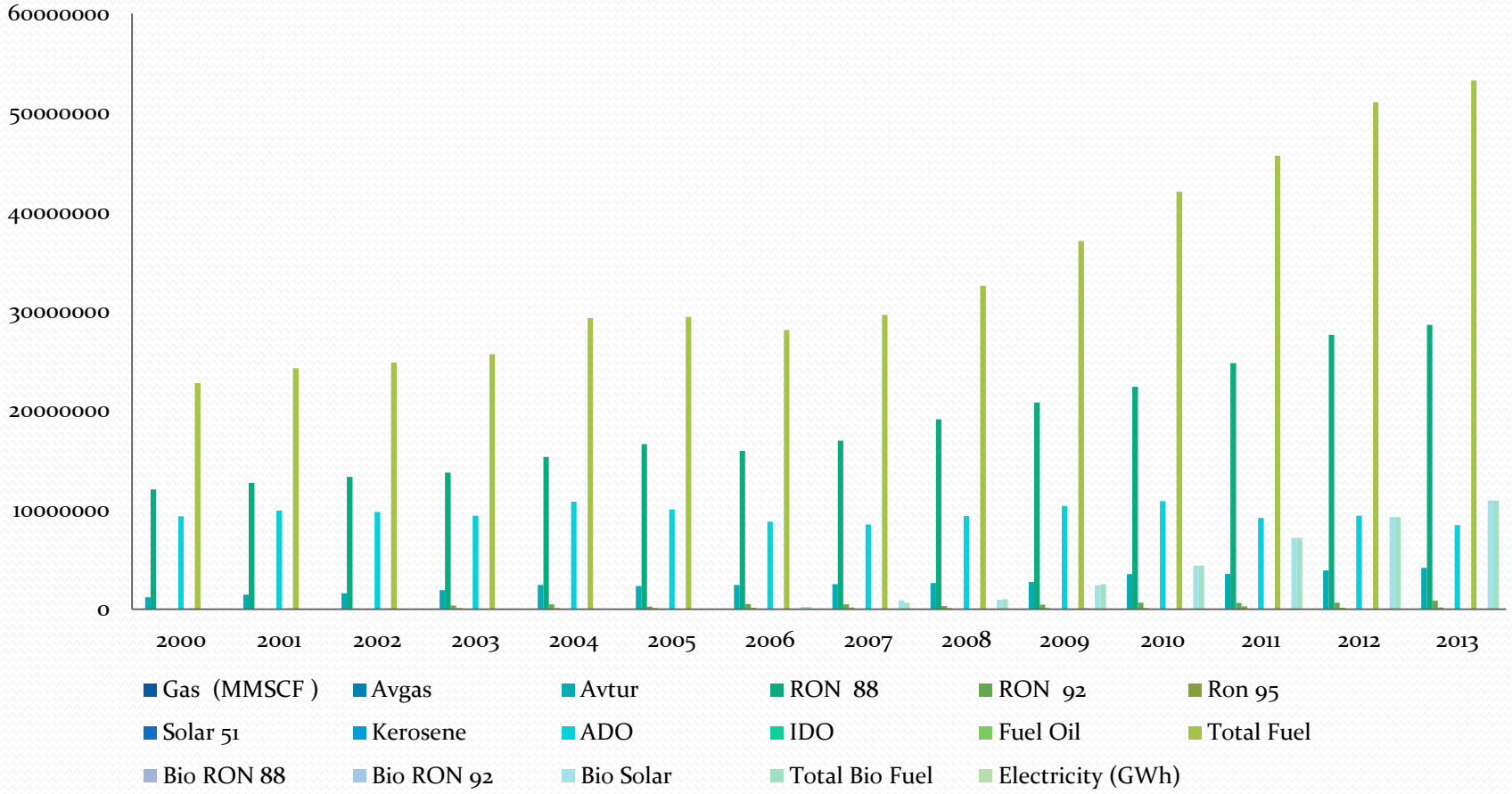
GDP Rank : 7 **Skilled Labor : 55 Mill** **Urban Pop: 74%** **Market :USD 500 bill**



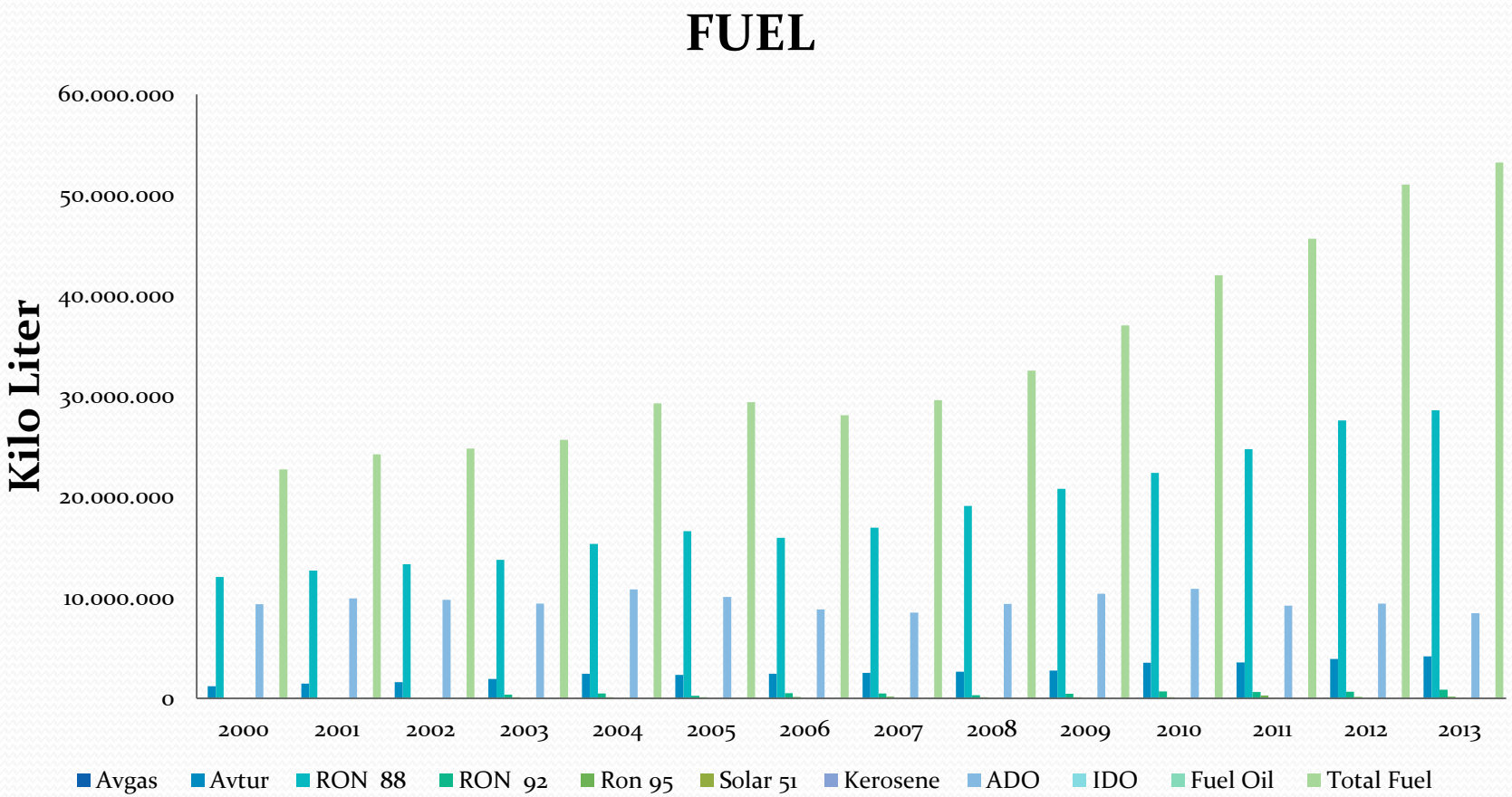
Source Number : McKinsey 2009

ENERGY EFFICIENCY IN TRANSPORTATION

Energy Consumption in Transportation Sector (In applicable unit)



Energy Consumption in Transportation Sector



EE Challenges in Transportation

- Private vehicle Ownerships is continuously rising due to low services of public transportation systems, which lead to big energy consumptions in transportation sector due to road congestions in major cities
- The Role of Rail Transportation systems have been neglected for years and only recently the government starts to build new lines and improve existing services to improve energy efficiency and to reduce GHG emission from the sector.
- Government is only recently making significant efforts to improve physical infrastructure which will potentially make the transportation systems better contribute to making the national economy more efficient.
- Geographical landscape and mostly old and inefficient marine transportation means need significant overhaul
- Clear fuel efficiency policy needs to be established to improve the sector's contribution to the energy saving efforts;

Some Significant Prospects

- Marine Transport Fleet and Infrastructure
- Hybrid and Smart Electrical Vehicles
- E-mobility
- Road and Traffic Management Systems
- Overhaul of aging land transportation fleet/Conversion of Oil Fuel into Natural Gas
- Logistics Management Systems
- Fuel Efficiency Control System
- Smart Cities Development

SOME EE MEASURES APPLIED

ECE Improvement Campaigns

Raising Awareness

Campaign in Mass Media

Behaviour Change

Incentif & regulation

Stakeholder Engagement

Reach out the regions

Promote Champions

Actions

Incentive & Regulation

Energy Manager & Auditor

MEPS and Labeling

Award Energy C&E

Energy efficiency standards and labels

1) Minister Regulation 18/2014 Energy Efficiency Label for CFL
2) Minister Regulation 7/2015 MEPS and Label for AC

CFL

CFL

- Regulation have been effective mandatory since 2015;
- Demand 320 million/year
- Since March: 70.5 million CFL are already applying

Label	Volume
1 star	913.000
2 stars	29.610.000
3 stars	5.580.000
4 stars	34.412.721
TOTAL	70.515.721

Aircon

Air Conditioning

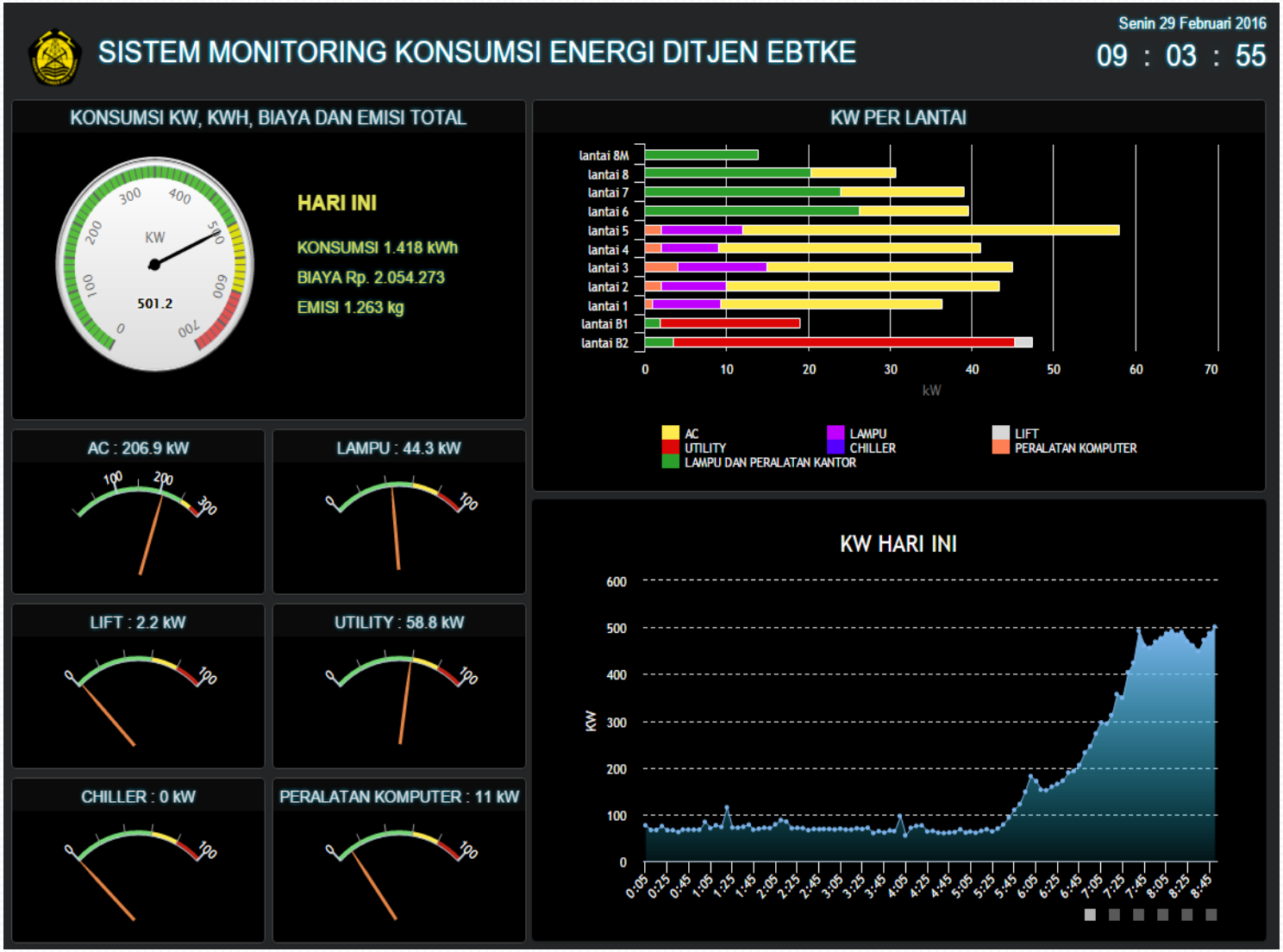
- Demand 2.5 million/year
- Regulation will be effective mandatory on August 2016
- MEPS : EER 8.53
- Technical guidance

Labels

On-going:

- Refrigerator
- Electronic Ballast
- Electric Fan
- Rice Cooker
- TV
- Washing Machine
- Water pump

introducing On-line EMS for Buildings



http://203.189.88.202:90/ebtke/

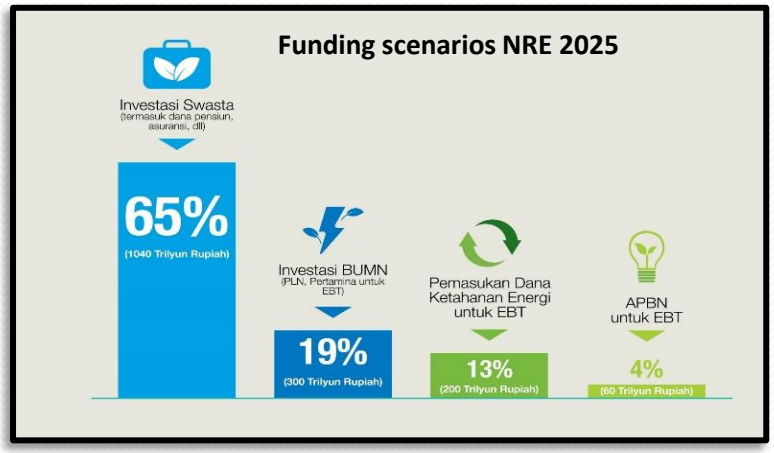
Overall Challenges of ECE Projects in Indonesia

- Relatively low energy cost due to endured subsidies over 4 decades *(bulk of subsidies removed since 2015, remaining subsidies to the very poor)*
- Lack of domestic industry's capability to produce efficiency technology – *(No incentive/pressure to saving energy)*
- Weak law enforcement or lack of incentive /dis-incentive on policies/regulations *(improvements underway)*
- Lack of human resources capability in the field of ECE *(improvements are underway but needs to be accelerated)*
- Lack of financial support mechanism (project finance, tax incentive, loans at preferential interest rate, insurance coverage)- low understanding among local banks on ECE bankability (*improvement measures are underway)*
- Lack of public awareness on ECE potentials (national campaign on energy saving will be launched in April 2016)
- ESCO potentials are as yet to be proven *(supportive government regulations underway)*
- Weak National Database and lacking baseline data *(improvement underway*)

ECE AND RENEWABLE ENERGY

Accelerating Development of RE

1. **Indonesia imports 800 thousand barrels per day , yet** around **300 GW RE** potential **only 3% of it is currently utilized.**
2. **Law 30/2007 on Energy mandates** optimization of **renewable energy in the framework of** energy diversification strategy. **RE development needs to be accelerated in the next 10 years to achieve 23% of the total energy mix by 2025 (PP 79/201).**
3. **IDR 1300-1600 trillion investment is needed to improve renewable energy power capacity to 46 GW (**8 GW currently installed) by 2025 (RUEN)**..**
4. **Around 15 % of total house holds, primarily in rural area, have limited or no access at all to electricity** RE is the most viable path toward improving rural electrification
5. Renewable Energy development in rural area must involve local community as much as possible and empower them to ensure the systems installed are sustainable.



Import 800 thsnd Barrel/day

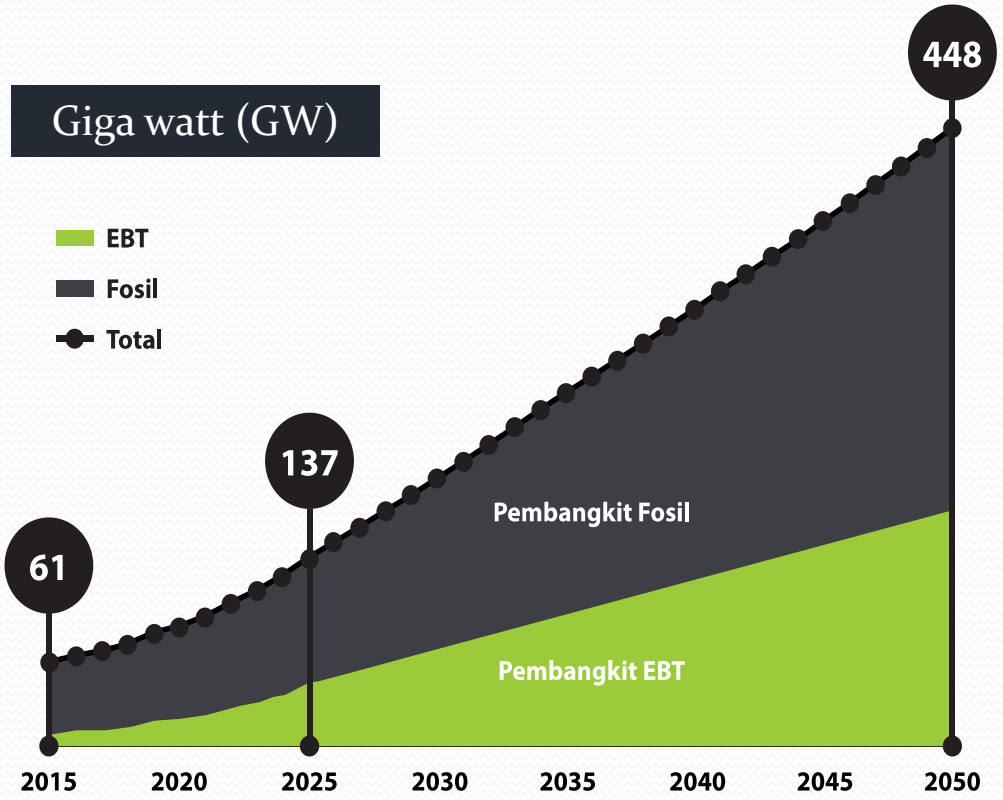
23% NRE – 2025 Energy diversification

23% EBT – 2025 46 GW 1600 T IDR

12.659 needs electricity

Technology and capacity building

NRE Electricity Generation

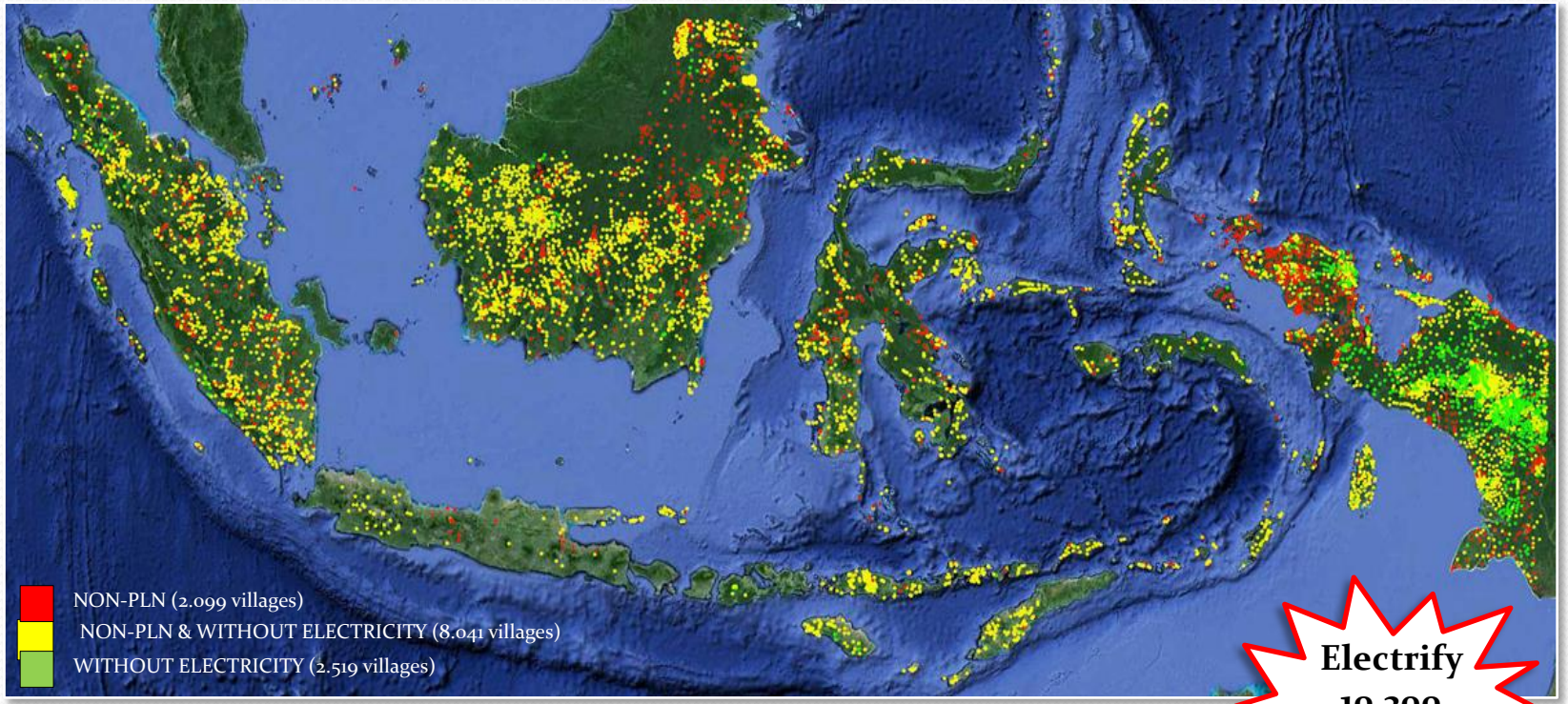


- The bulk of GHG emissions from the energy sector are from electricity generation followed by transportation
- increasing electricity demand poses big challenges along with the efforts of reducing GHG emission
- The current plan is to increase renewable energy (NRE) based power from respectively 15% in 2015 to 23% in 2025 and 38% in 2050 from total power capacity
- More efficient and cleaner technology are required

Generation from	2015	2016	2017	2018	2019	2020	2025	2030	2040	2050
NRE	9,6	12,2	13,4	15,3	18,6	21,1	46,3	71,4	121,5	171,6
Fossil	51,3	53,5	56,0	58,7	63,6	65,7	90,4	122,5	195,1	**276,2**
TOTAL	**60,9**	**65,7**	**69,4**	**73,9**	**82,1**	**86,7**	**136,7**	**193,8**	**316,6**	**447,8**

NRE FOR RURAL VILLAGES

Improve electrification ratio to 97% by 2019 (86% in 2015)



Electrify 10.300 villages

2016 — 2017 — 2018 — 2019

Phase 1

- Establish Project Management Unit (PMU) PETDES.
- Establishing PETDES financial and implementation
- Establishing transparent standards for development implementation, procurement and construction phase.
- Establish special unit of the Utility dealing with RE

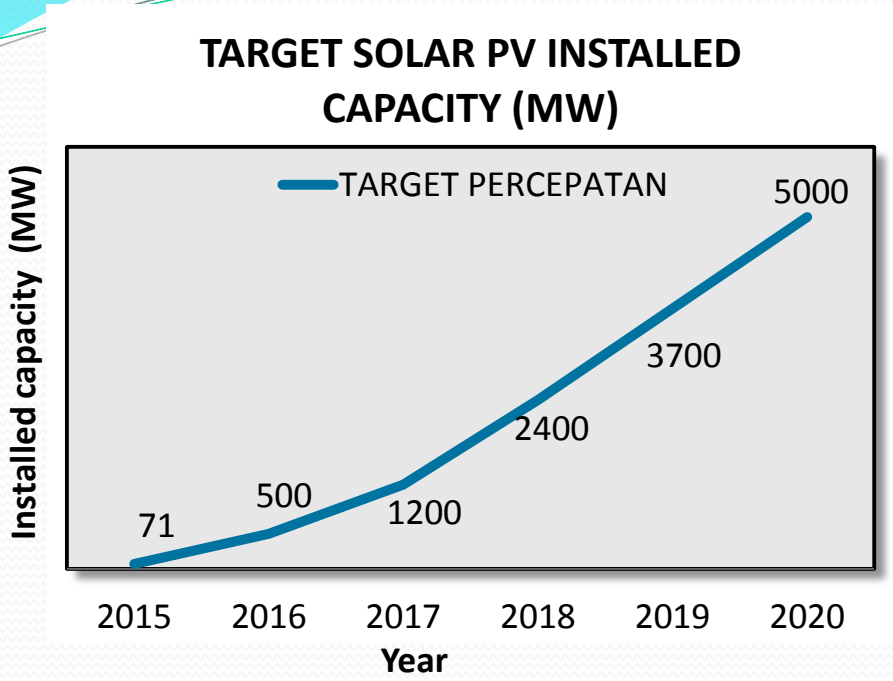
Phase 2

- Evaluation phase 1
- Operation and maintenance phase 1
- Facilitation of technology innovation and development
- Conducting capacity building at village level

Phase 3

- Evaluation phase 2
- Operation and maintenance phase 2
- Building capacity to support maintainance of facilites
- Development of management units at village level

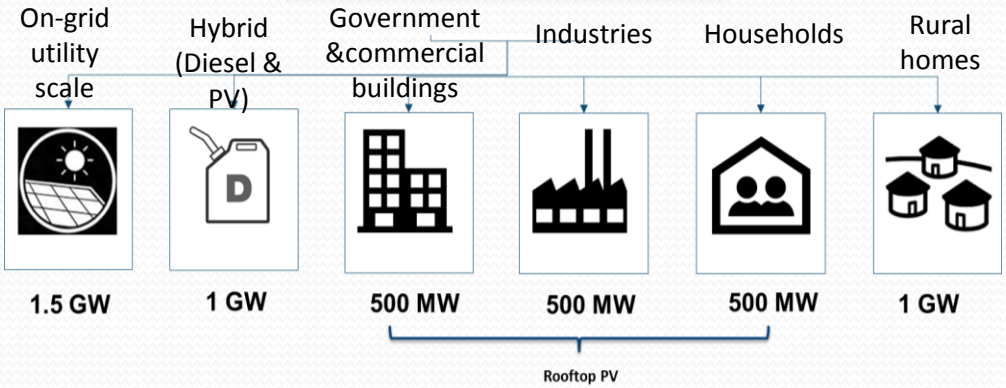
SOLAR ENERGY DEVELOPMENT



STRATEGY TO ACHIVE 5000 MW

1. Partnership with OJK and 10 provincial government
2. Development of rural electrification program with NRE (PETDES). Targeting 10.300 villages till 2019
3. First Quota of 500 MW development in 2016
4. Allocation of subsidy budget and tarrif for Solar PV
5. Establish effective regulation on hybrid PV, On Grid and Rooftop PV
6. Establish measurable standards of successful implementation.

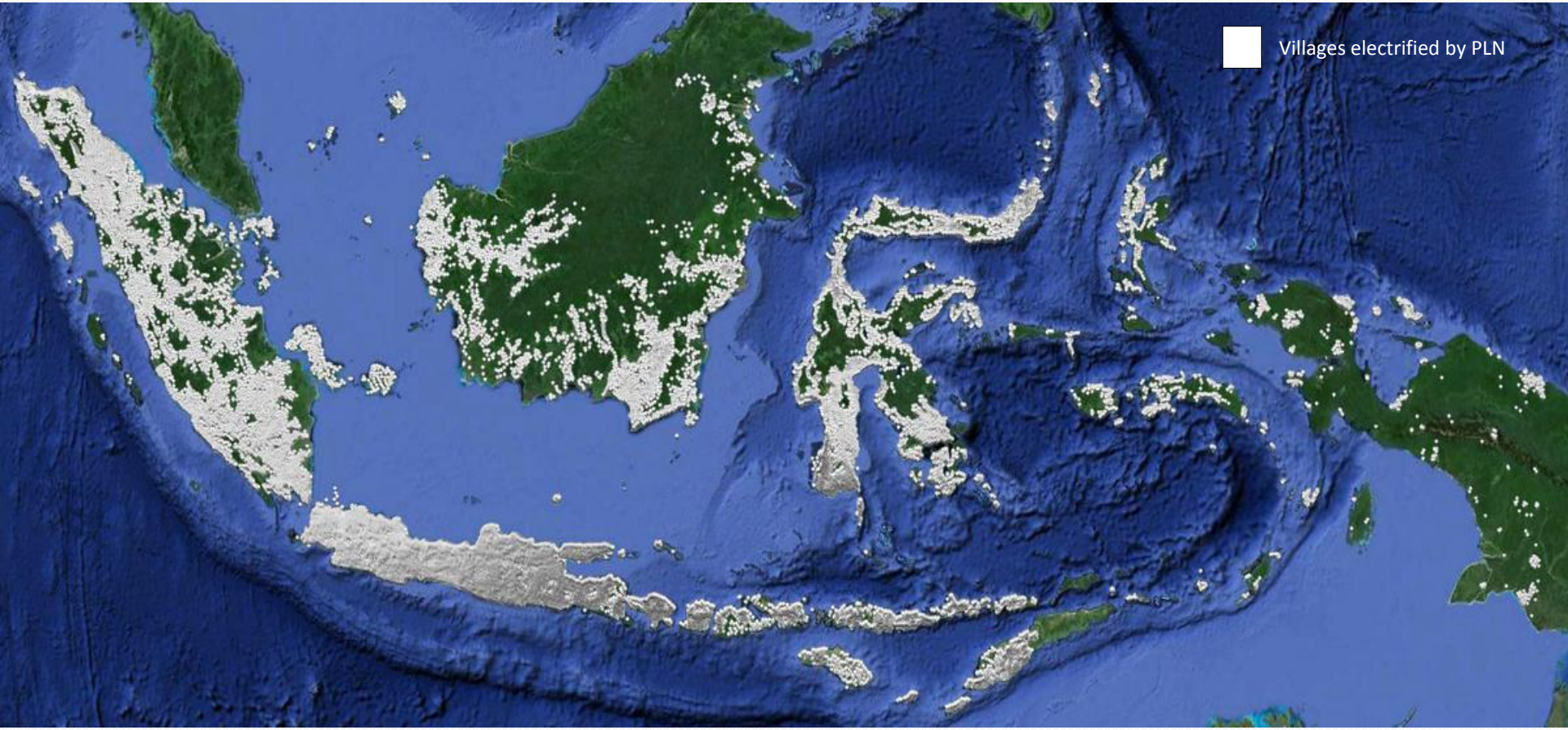
Planned distribution 5000 MW



SOME ENERGY CHALLENGES AND STRATEGIC ISSUES

National Electrification Challenges

As of now, only 86% of Indonesian households have access to the National Grid

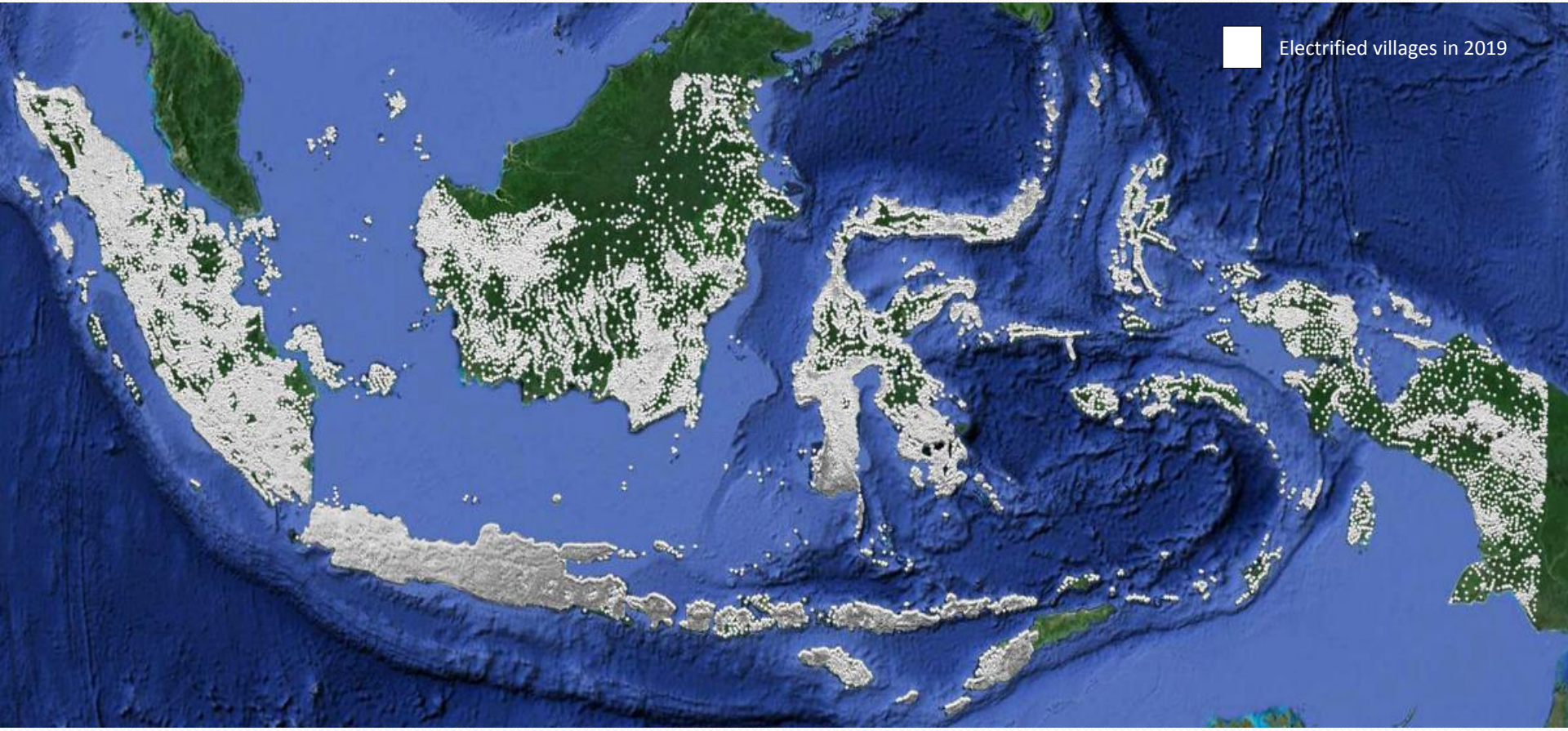


Energy Efficiency in relatively well electrified regions will help ease pressure to build additional capacities in these region in favor of extending electrification in the Eastern regions

Source: *Pendataan Potensi Desa/Kelurahan 2014*, Badan Pusat Statistik

Program “Indonesia Terang” (Bright Indonesia) 2019

Increase electrification from 86% to 97% in 2019



The national electrification ratio improvement needs to go along with the energy efficien and conservation measures

Prioritized Provinces in Eastern Indonesia

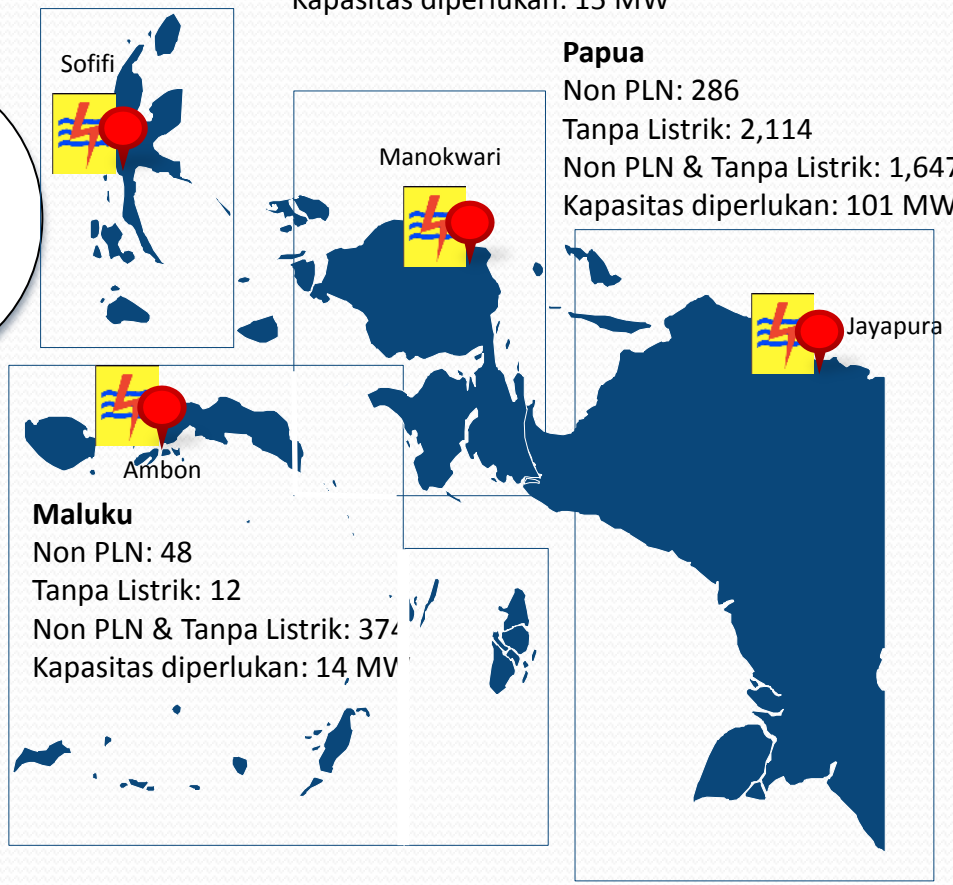
- 6.926 out of 10.300 villages in 6 Eastern Provinces will be 100% electrified by 2019
  Total capacities to install will be 180 MW
- Average consumption 0.6 kWh/household

67%

Maluku Utara
Non PLN: 285
Tanpa Listrik: 51
Non PLN & Tanpa Listrik: 312
Kapasitas diperlukan: 13 MW

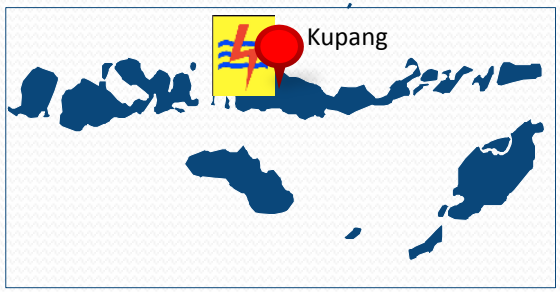
Papua Barat
Non PLN: 510
Tanpa Listrik: 262
Non PLN & Tanpa Listrik: 352
Kapasitas diperlukan: 15 MW

Papua
Non PLN: 286
Tanpa Listrik: 2,114
Non PLN & Tanpa Listrik: 1,647
Kapasitas diperlukan: 101 MW



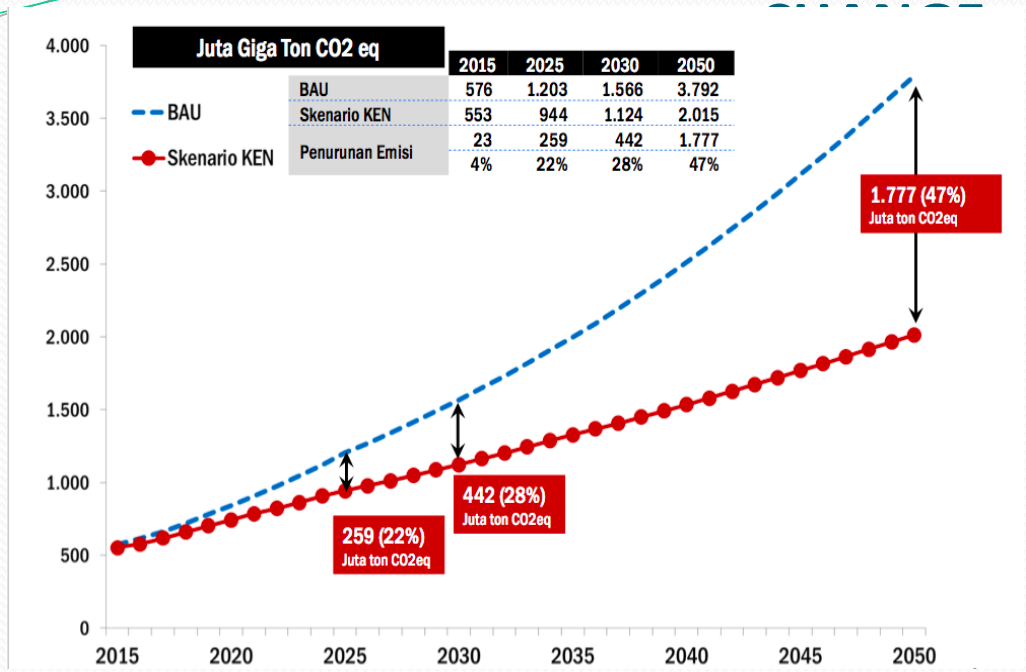
Maluku
Non PLN: 48
Tanpa Listrik: 12
Non PLN & Tanpa Listrik: 37
Kapasitas diperlukan: 14 MV

NTT
Non PLN: 21
Tanpa Listrik: 20
Non PLN & Tanpa Listrik: 605
Kapasitas diperlukan: 35 MW



NTB
Non PLN: 2
Tanpa Listrik: 3
Non PLN & Tanpa Listrik: 22
Kapasitas diperlukan: 2 MW

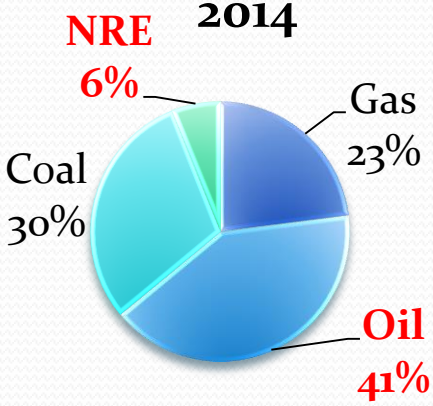
REDUCING IMPACTS OF FOSSILS ENERGY USE ON CLIMATE



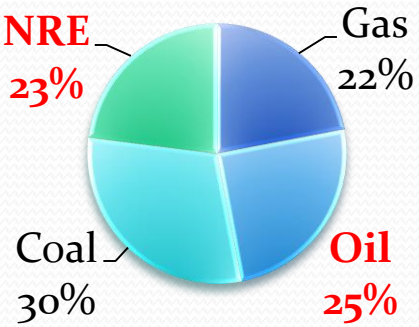
CONTRIBUTION OF ENERGY SECTOR IN EMISSION REDUCTION

1. Transfer fuel subsidy to other productive sectors
2. Increase use of clean energy sources to 23-25 % of national energy consumption by 2025
3. Processing waste into energy source

National Energy Mix 2014

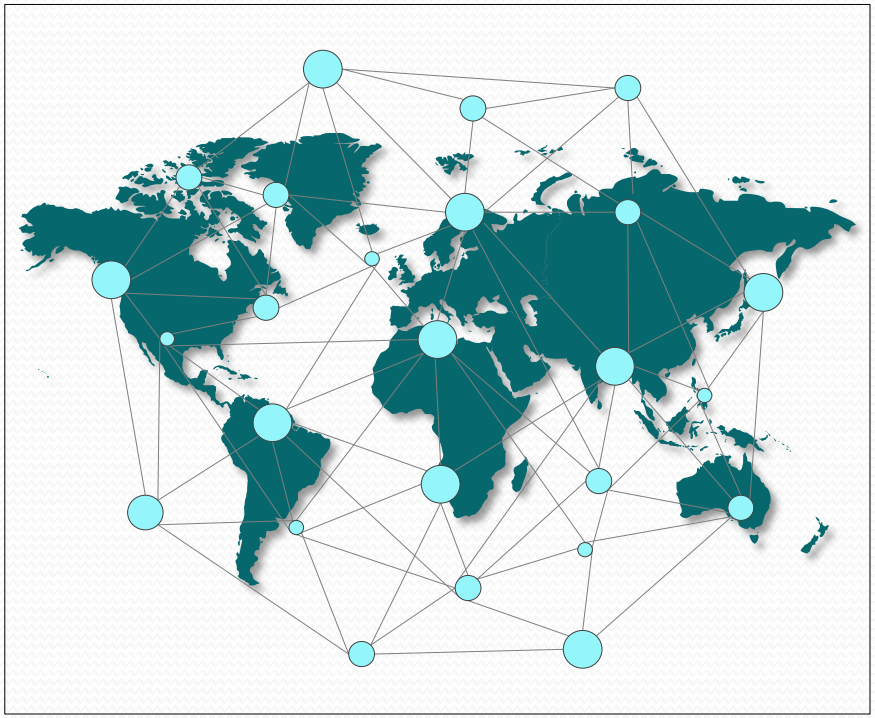


National Energy Mix Target 2025



ENHANCING CLEAN ENERGY R&D EFFORTS

Indonesia adopt the global initiative of improving technology and creating innovations to deploy clean energy . This initiative was announced at COP21 in Paris



Clean Energy Technology Innovation

- Double speed clean energy research and development efforts
- Transparent international collaboration and exchange information required by R&D.
- Multilateral agreement needed to reduce or eliminate market barriers for clean energy related goods and services.
- Build capacity worldwide to harmonize technical standards provision and maintenance of clean energy systems.

Proposed Energy Security and Resilience Fund

LEGAL PLATFORM:

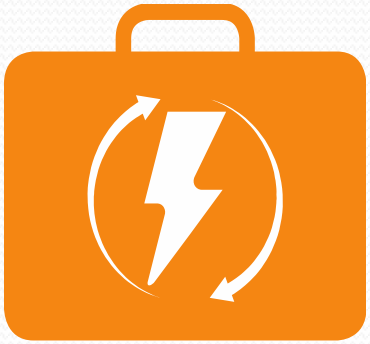
- **Law No, 30/2007 on Energy**
- **Government Regulation No. 79/2014 on The National Policy**
- ***Proposed* Government Regulation on Energy Security and Resilience**

FUNDING SOURCES

- FOSSIL ENERGY EXPLOITATION PREMIUM
- PREMIUM FOR FOSSIL ENERGY USAGE
- TAX/LEVIES FROM NON-RENEWABLES PRODUCTIION
- GRANTS AND AIDS (CLIMATE FUNDS?)

: CLEAN ENERGY FOCUSED

: FOSSIL ENERGY BALANCE



ESRF

FUND DEPLOYMENTS

- RE DEVELOPMENTS IN REMOTE REGIONS
- ENERGY SUPPLY DIVERSIFICATION
- NRE DEVELOPMENT STIMULUS
- ENERGY CONSERVATION
- CAPACITY BULIDING PROJECTS INCLUDING DEDICATED R&D
- STRATEGIC ENERGY RESERVE
- FUEL PRICE STABILITATION FUND

Economic Impacts of 35,000 MW Program

Investment : 72.9 Billion USD**

291 power plants

732 transmission lines
(75,000 set tower)

1,375 unit
Substations

301,300 km aluminum conductor
2,600 set trafo's
3.5 million tons steel

Employment
Direct: 650,000
Indirect : 3 million

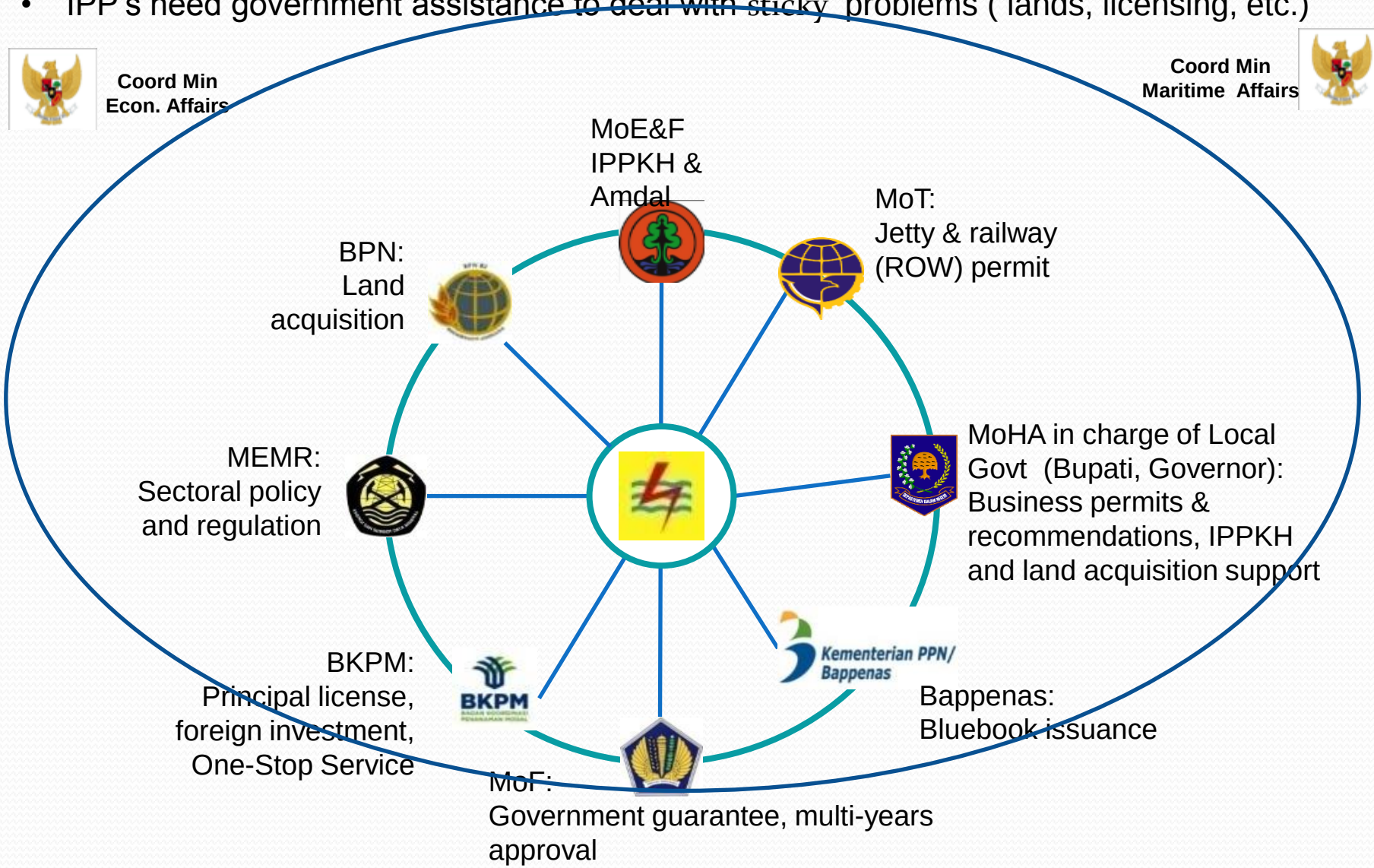
Local Industry
~40% from investment
(~29.2 Billion USD)

Power Sector
Opportunity of Deploying energy efficient technology in the power sector

* Estimate
** excl. land, Interest During Construction (IDC) and taxes

BUT……. TO ACHIEVE THE TARGET SUCCESSFULLY REQUIRES MULTI-STAKEHOLDERS COLLABORATION & COORDINATION

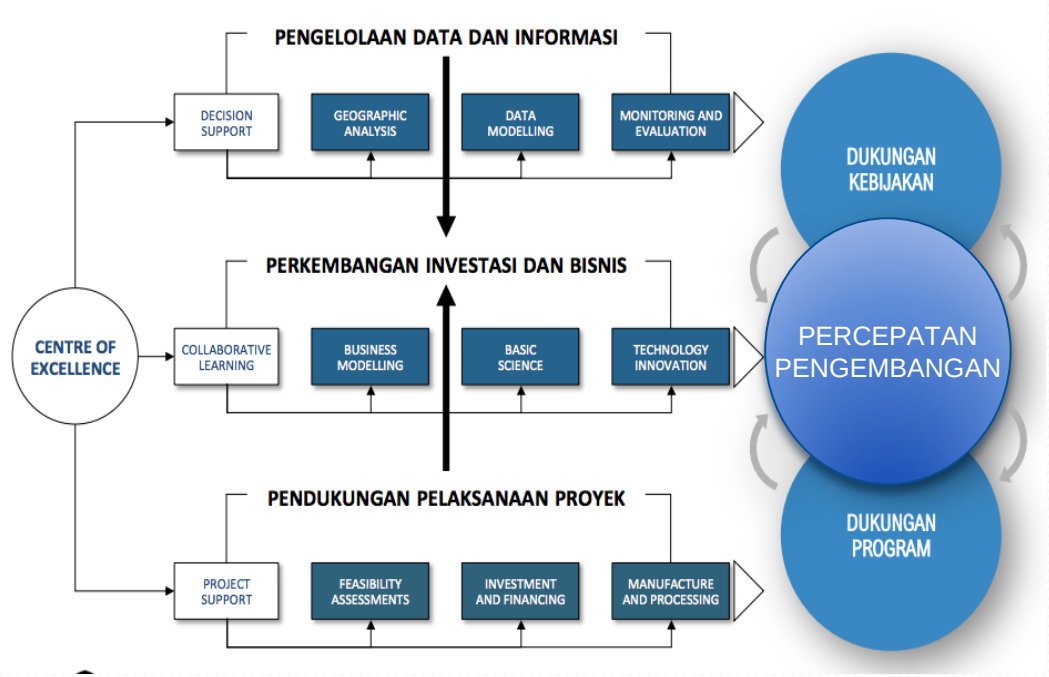
- Cross - sectoral collaboration is required to help achieve the target
- IPP's need government assistance to deal with sticky problems (lands, licensing, etc.)

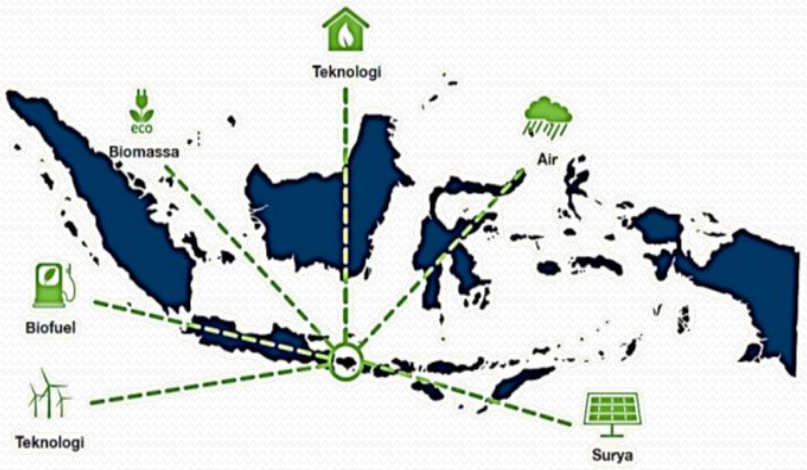


Establishing Bali Center of Excellence for Clean Energy (BCOE)

Integrated center of Activities for Research and Development and Clean Energy Technology Deployment and Investment Facilitation

- CE Tech Diffusion and Adaptation
- HR Capacity Building
- Investment Facilitation
- Innovation
- International Collaboratio





Conclusion

- Indonesia is one of the large emerging economy with potentials to become one of the 10 (ten)world's biggest economy by mid this century.
- There are big opportunities in ECE in Indonesia in all sectors of the significantly growing economy and in Clean Energy Developments anticipating the relatively quick depletion of fossil energy resources
- Government is generally more committed to support EE and energy saving projects and measures along with clean energy development
- Prospects of ECE in Industries and (primarily existing) buildings need professional ESCO's supported by government regulations and by the national financial sector.
- Prospects of ECE in (new) buildings require nationally mandatory Building Code that should be followed by all stakeholders
- Energy Efficiency /Saving projects likely require *deep and large* measures
- Lacking base-line data to measure the target accomplishments of programs and monitoring mechanism that will guard the program performances must be resolved with national efforts open to international collaborations.

Thank You