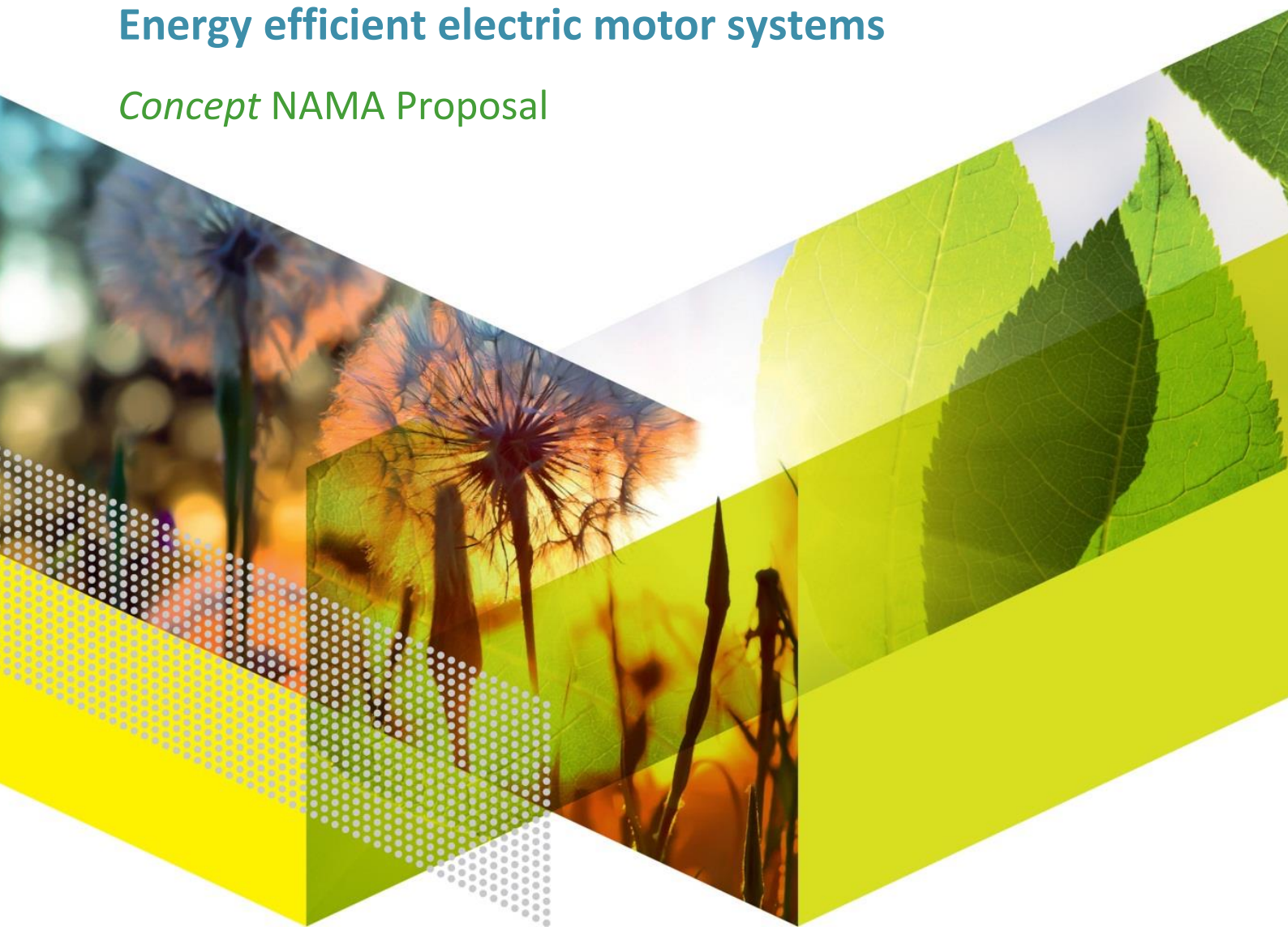


Indonesia NAMA

Energy efficient electric motor systems

Concept NAMA Proposal



May 2016



Abbreviations

BAU	Business as usual
DO	Delivering Organisation (for the NAMA)
EE	Energy Efficiency
ECN	Energy research Centre of the Netherlands
ESDM	Ministry of Energy and Mineral Resources , Indonesia
FEC	Financial expert committee
FC	Financial Component (of the NAMA)
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IGA	Investment Grade Audit
MEA	Metropolitan Electricity Authority
MoF	Ministry of Finance, Indonesia
MoI	Ministry of Industry, Indonesia
NAMA	Nationally Appropriate Mitigation Action
NSP	NAMA Support Project (for the NAMA)
NSU	NAMA Support Unit
SC	NAMA Steering Committee
SME	Small and Medium Enterprises
TA	Technical Assistance (trainings to commercial banks EE projects)
TAC	Technical Advisory Committee
TC	Technical Component (of the NAMA)
TOC	Theory Of Change (of the NAMA)

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1. General Information on the NAMA Support Project

1.1 Project data

Project title:	Energy efficient electric motor systems in Indonesia
Official Submitter of the NAMA Support Project:	Directorate of Energy Conservation (EBTKE), in the Ministry of Energy and Mineral Resources (ESDM)
Country of implementation:	Indonesia
Estimated timeframe for project appraisal:	Q3 2016
Project implementation start (indicative):	Q3 2016
Project implementation termination (indicative):	2026 (10 years)
NAMA Support Project volume (USD):	33.557.500
Sectoral focus:	Energy Efficiency
Project type:	Type B: Financial cooperation project with technical assistance component during implementation
Emission reduction credits:	No

1.2 National ministry 1

Directorate General of New Renewable Energy and Energy Conservation (Direktorat Jenderal Energi Baru Terbarukan dan Konservasi Energi; EBTKE), in the Ministry of Energy and Mineral Resources (Kementerian Energi dan Sumber Daya Mineral; ESDM),

Jalan Pegangsaan Timur No.1,

Menteng, Daerah Khusus Ibukota Jakarta, Indonesia

+62 21 39830077

<http://www.ebtke.esdm.go.id/>

1.3 Other ministries to form the Steering Committee

National ministry 2

Ministry of Industry (Kementerian Perindustrian)

Jl. Jendral Gatot Subroto Kavling 52-53,

Kuningan Timur, Kecamatan Setiabudi, Jakarta Selatan

+62 21 5255509

<http://www.kemenperin.go.id/>

National ministry 3

Fiscal Policy Agency (Badan Kebijakan Fiskal; BKF) in Ministry of Finance (Kementerian Keuangan)

Gd. R.M. Notohamiprodjo, Jl. Dr Wahidin Raya No.1

10710 Jakarta Pusat, Indonesia

+62 21 3483 3486

<http://www.fiskal.kemenkeu.go.id/>

1.4 Delivery Organisation financial components (FC)

To be confirmed. This organisation will work closely together with the Financial Expert Committee. Two possible partners would be UNIDO and ADB, due to their experience with trainings in EE project investments with bank employees.

1.5 Delivery Organisation technical components (TC)

A number of options are being considered based on organisations with a history of development cooperation on EE in Indonesia; including: GIZ, UNIDO, DANIDA and ECN.

1.6 Implementing Partner(s)

Besides the organisations mentioned in the next section, 'Cooperation Structure', an important role for GIZ and UNIDO is foreseen, due to their long presence in Indonesia and their previous and/or present activities that link to several elements of this NAMA. In addition, ECN can provide analytical services to the NAMA Support Unit. We foresee as well an important role for international experts on efficient electric motors and investment grade audits.

1.7 Cooperation Structure

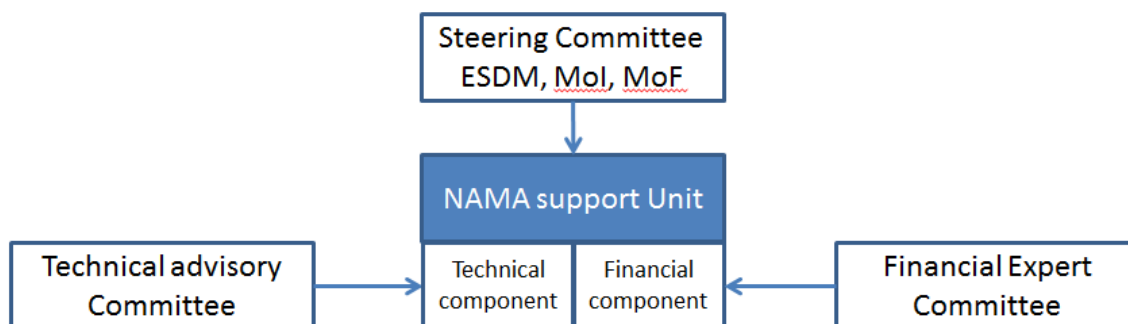


Figure 1: Proposed NAMA structure

The Steering Committee will consist of representatives of the three relevant national ministries and the funder, with ESDM taking the overall lead.

A NAMA Support Unit is set up, which include representatives of the three key national ministries, ESDM, MoI and MoF, as well as implementing partners and other stakeholders, e.g. relevant industrial associations and banks. This Unit is responsible for initiating, designing, implementing and monitoring the outputs and activities of the technical- and financial component. The NSU will have 3-5 permanent staff from the technical and financial delivery organisations, to provide advisory services to various groups of stakeholders and to coordinate the activities in the NAMA.

Every month this NSU comes together to discuss the progress and to delegate necessary tasks and responsibilities in order to make the below happen. The Unit will be advised on the technical components by the Technical Advisory Committee, existing out of the Working Group which has provided guidance during the development of the present MEPS and during the project that has led to this NAMA.

The NSU will as well start-up a Financial Expert Committee to be advised on the Financial Component of section 4. This committee will be led by the MoF and includes commercial Banks, UNIDO and possibly ADB, who already have given trainings to bank employees concerning EE investment.

2. Project Concept

2.1 Brief description

The NAMA Support Project (henceforth ‘NSP’) will implement measures that incentivise adoption of efficient electric motor systems in the industry and commercial sectors in Indonesia, to achieve substantial electricity and emission reductions. It will build on the soon to be introduced minimum energy performance standard (MEPS) for electric motors. That regulation focuses on the motor component only and sets relatively basic minimum levels of efficiency to be achieved. This NSP broadens the scope to electric motor driven systems, which includes, besides the energy efficient electric motor (EEEM) itself, driven efficient equipment as pumps, compressors and fans, and regulatory equipment as Variable Speed Drive’s (VSD’s). This wider scope allows much larger energy savings, by more than an order of magnitude, to be achieved (Table 1).

- Electric motors are responsible for 75% of the industrial electricity consumption and 65% of that within the commercial sector. Many electric motors in Indonesia are older or lower efficiency designs.
- The proposed MEPS at an introductory IE1 level will save less than 1% of motor electricity consumption.
- Twenty to thirty times larger savings can be achieved by broadening the scope to electric motor *driven systems*, which includes the surrounding equipment such as pumps, compressors and fans, as well as Variable Speed Drives (VSDs).
- To reduce energy consumption from ‘motor systems’ it is necessary to do more than just MEPS
- Based on experience in other countries and comparison to Indonesia, three main actions are proposed in this NSP:
 - Pillar 1: Strengthen motor MEPS [targets motors only]
 - Pillar 2: Expand and improve existing regulation 70/2009 [targets systems]
 - Pillar 3: Add voluntary agreements for certain sub-sectors [targets systems]

PILLAR 1	PILLAR 2	PILLAR 3
STRENGTHEN MOTOR MEPS	EXPAND AND INCREASE EFFECTIVENESS OF REGULATION 70/2009	VOLUNTARY AGREEMENT PROGRAMME
Increase the level of the planned Minimum Energy Performance Standard (MEPS) for electric motors from IE1 to IE4 over time. All motors sold within the country will need to comply.	Increase the scope and effectiveness of the current regulation. Currently requires large energy users implement a ‘soft’ form of energy management system (EMS).	Start a voluntary agreement programme with pilot sub-sectors. Industry associations negotiate energy saving targets with government. Assistance and incentives will be provided to help meet those targets

- Incentives such as grants and tax reductions are found to be the most feasible approach in the short term to offer financial assistance to companies.
- Supporting activities such as training, awareness raising and establishing a stakeholder platform will also be required and are elaborated in this NSP.

The last column of Table 1 shows the final impact, compared to the current proposed MEPS. The table shows the impact of improved policies, to reduce the electricity consumption of electric motor systems. A number of the proposed measures/pillars (for example Pillar 2 and 3) will also generate savings from other uses of

energy (not only motor systems). Therefore, although motors consume 65 to 75% of industrial and commercial electricity, one cannot separate the impact of this NSP from the broader energy use in these sectors. It is therefore anticipated that the overall effect will be larger than the calculations in Table 1 (which shows motor system impacts only), but this has not been calculated.

Yearly effect in 2025; combined industrial and commercial sector	MEPS IE1 (current proposed policy)	PILLAR 1 (i.e. MEPS IE4 compared to IE1)	Full system approach with PILLAR 1, 2 & 3 (i.e. compared to IE1 only)
Electricity savings, % of total	0,7%	Up to 7 times larger	Up to 25 times larger
Electricity savings, mln BOE	0.5		
Electricity savings (TWh)	0.9		
Electricity savings industrial and commercial sector (mln USD)	60		
Governmental subsidy and production savings (mln USD) ¹	36		
Related GHG emission reduction (Mton)	0,8		
Economy: direct investment equipment (mln USD) ²	190	1,3 times larger	10 times larger
Employment: incremental installation workforce (man-year) ³	326	Equivalent	15 times larger

Table 1 Impact of pillars 1, 2 and 3⁴

¹ There are two contribution to this number. First of all the governmental electricity subsidy savings of 18 million USD. Calculated with subsidies 2014 taken from PLN statistics (540 IDR/kWh), taking into account that the Indonesian government for the first time did not give subsidy to large scale industry in 2014. Since subsidies will be reduced overtime further, this is not a correct figure for the future, although it shows the large magnitude of governmental savings. The second contribution is the savings of 17 million USD due to the difference between average production costs and electricity tariffs (250 IDR/kWh). These savings will come back in section 7.1, 'Funding requirements from the donor'.

² Cost effective investment with a maximum pay-pack time of three years. Purchasing additional equipment for the system approach is relatively less cost-effective compared to changing an electric motor only. An electric motor can pay itself back within a few months, for the additional equipment we have accepted a simple pay-back period of maximum 3 years. Important to understand is that after these three years, during the remaining part of the technical lifetime of the (additional) equipment, the company will fully benefit from the (additional) yearly energy savings.

³ Only related to external engineers needed to install relatively larger equipment. Additional employment not calculated yet, can be expected within the trading sector and with e.g. auditing companies. TECO, the only remaining local manufacturer of electric motors, needs to be supported to improve its production quality to avoid job losses. The previous motor manufacturing experience in the country with the other two motor companies ABB and Tatung, could potentially be rejuvenated if the NAMA would be successful in enforcing equipment standards (MEPS). This potential could result in an enormous economic boost to this present niche sector.

⁴ Data collected from several sections from the mid-term report and related to the specific goal of this NSP, i.e. to reach the largest companies responsible for 80% of the total sectoral energy consumption.

Savings due to avoided additional power plants

Future savings are not only related to power production costs through the public utility, but also avoided investment in generation facilities. In Figure 5 the electricity demand in 2030 (the expected year all retrofits could have taken place) is lowered by 25,2 mln BOE, or 41,1 TWh. This is roughly equivalent to the power generation of 6 to 7 GW of new coal power plant capacity depending on yearly operational hours. Coal is considered here to calculate a practical avoided investment cost as it represents the largest share of new capacity planned by the public utility PLN over the coming decade.

How much 'avoided investment for new generation capacity' does this represent? Interviews with coal IPP power plant developers suggests figures of 1.2 million USD (e.g. for Chinese construction) to 2 million (Europe and USA construction) of investment cost per MW of installed capacity. Taking an average figure **it is calculated that the avoided investment is approximately 10 to 11 billion USD.**

The avoided GHG emissions of these avoided power plants are part of the 'Related GHG emission reduction', mentioned in Table 1, but calculated based on aggregate estimate future grid emissions factors.

This NSP is the result of approximately 12 months of development, including numerous bilateral interviews, diverse stakeholder workshops and independent expert advice. Much of that process is documented in a report that has been published by ECN who provided support to the process⁵.

2.2 Starting situation and embeddedness

The broader context for energy efficiency efforts in Indonesia is set by overarching energy and climate mitigation strategies.

Energy Strategy

The National Energy Policy (KEN; enacted in 2014 under regulation 79/2014) requires that the share of renewable energy in the primary energy consumption increases to 23% in 2025 from an estimated 6% today. To reach the targets, the use of gas is expected to more than double, use of coal would triple, and renewables should grow more than eleven-fold within ten years. In parallel, significant improvements in energy efficiency are required in order to meet these targets – roughly 40% below BAU projections. Within ESDM this is reflected in the National Energy Conservation Master Plan, entitled RIKEN, as a target to reduce energy intensity by around 1 percent/year, on average, until 2025.

Climate Strategy

In 2009 Indonesia announced that it aimed to reduce its GHG emissions by 26% relative to business as usual levels by 2020, and possibly up to 41% with international support. This ambition was further elaborated in the National Action Plan for Mitigation (RAN-GRK). The RAN-GRK allocated the majority of emission reductions to the land-use sector, but included some relatively limited activities around renewables and energy efficiency. In September 2015, the government of Indonesia published its INDC, in which it announced the intention to reduce GHG emissions by 29% relative to business as usual in 2030 unconditionally, and possibly up to 41% with international support (Gol, 2015).

Specific policy context

There are also a number of planned, current and piloted measures/incentives that are specific to electric motor driven systems and the energy use of industrial and commercial customers.

Planned: MEPS

A MEPS simply sets a minimum standard for a certain appliance or component in terms of energy use. For motors this is commonly based on a so-called 'IE' number that determines how efficient a certain motor is.

⁵ This background information can be found on a project website of ECN: www.ecn.nl/projects/ee-motors-indonesia/

For a number of years, Indonesia has been preparing to introduce Minimum Energy Performance Standards (MEPS) for electric motors, regulating what type of motors are allowed to be sold in the country. However, analysis shows that the benefits of introducing MEPS will be modest, when this is the sole measure to reduce energy use from electric motor systems. Introducing MEPS at the first level of IE1 in Indonesia will give less than 1% energy savings compared to BAU.

Current: Regulation 70/2009

Besides this intended MEPS, relevant for the starting situation is Regulation No. 70/2009 on Energy Conservation. This regulation is formulated to require larger energy consumers to conduct ‘energy management’, of which audits are one element. That regulation requires these firms to appoint an energy manager, formulate an energy conservation programme, conduct periodic audits with recommendations and report on energy use to ESDM. These are strong starting points for energy management in Indonesia, but are not as strict as good practice for energy management systems would dictate. It is also unclear how this regulation is enforced or how impacts are monitored. Interviewees felt that impacts were likely to be marginal and that not all firms were reporting energy use in a way that could encourage conservation.

Piloted: Voluntary Agreements (VA’s)

In Indonesia, voluntary energy savings and conservation measures have been communicated with energy intensive industries such as the fertilizer, cement, pulp and paper and steel industries. The experience from interviewees suggested that these processes had been slow, particularly in reference to the cement industry in Indonesia which had spent many years coming to agreement on a set of voluntary targets for efficiency improvement. At the same time, that experience shows that such agreements may be possible with the right stakeholders and combination of incentives and regulations.

Current/Planned: Incentives

Financial incentives can help to make firms more interested in these activities, improve the viability of some investments and provide support to understand efficiency savings. Incentive programmes in Indonesia potentially relevant to EEMS are currently in a nascent stage or not directly focused on these technologies (Figure 2). As a point of reference, the situation was compared to similar EE focused incentive programmes found in the Netherlands. That comparison found that budgets in Indonesia to support EE programmes are very small. In the Netherlands, the budget for providing tax incentives exceeds 200 million USD a year, whereas the Indonesian budget for providing similarly targeted grants to private firms is estimated to be less than 500 thousand USD a year. This sets the starting point of the design of this NSP and is considered further in sections 4 (Specific part – Financial; component) and section 7 (Expected Budget).

EE incentives	Available?	In preparation?	EE motors?	EMDS?	Effective?
Tax incentives	No	Yes, Regulation No. 70/2009	Yes	Maybe?	-
Grants	Yes, Mol regulation	Yes, new Mol regulation	Yes	Not specifically	No, small budgets (IDR 5 – 50 bln ~ USD 360 k – 3.6 mln)
Energy price increase/ subsidies	Yes	Maybe?	Not specifically	Not specifically	Yes, more awareness
Fines	No	Yes, Regulation No. 70/2009	Not specifically	Not specifically	-
Loan instruments	Yes, credit lines from IFIs	Yes, on-going efforts	Not specifically	Not specifically	No, not used for EE
Equity instruments	No	No	-	-	-
Guarantee instruments	No	?	-	-	-
Other penalties (non-financial)	No	Yes, Regulation No. 70/2009	Not specifically	Not specifically	-
TA	Yes	UNIDO program for banks	Not specifically	Not specifically	Promising

Figure 2: Overview of existing financing incentives Indonesia (TA=Technical Assistant to commercial banks)

Figure 2 also refers to efforts to develop an Energy Efficiency Financing Scheme (EEFS), currently planned as

a loan instrument but under discussion. This is an ongoing initiative of the MoF and ESDM that is expected to become operational over a longer time frame but could potentially support this NSP in the future.

Current: Supporting activities

There are many important activities, apart from incentives, that can support the pillars described above. In this NAMA we will build-, and expand upon existing initiatives:

- Providing access to trainings in Energy Management Systems (EMS), such as ISO 500001, and training energy auditors, as done by UNIDO and HAKE already. This should help achieving output S3 and S4, as mentioned in section 3.2:
 - there is a growing market of high-quality audit companies.
 - industrial and commercial companies have access to high-quality EMS trainings.
- Providing access to trainings in Energy Management Systems (EMS), such as ISO 500001, as done by UNIDO, HAKE and ADB already. This helps achieving output S4, as mentioned in section 3.2:
 - industrial and commercial companies have access to high-quality EMS trainings.

More information on relevant present and past technical programmes will follow in section 2.8.

2.3 Barriers for mitigation investments

Investments in electric motor driven systems are in many cases profitable and pay themselves easily back within 3 years' time. Typically the purchase price of an electric motor is very small compared to the total lifetime costs; in the order of 2% of lifetime costs, at 4000 running hours a year.

However, just as in many other countries, a number of barriers prevent these economically rational investments from being made in Indonesia. These barriers include of lack of awareness, investment decisions based on purchase costs and a large stock of old replacement motors. More specifically related to Indonesia, are barriers that relate to subsidized electricity prices, the import of low-cost unregulated motors from China, oversizing during design by intent and negligence, maintenance policies that stress motor rewinding over replacement, the desire to maintain output of industrial production lines, and challenges of regulatory enforcement. See (Sipma et al, 2015) section 5.3 'Identified existing barrier to meet objectives' for more details.

To overcome these issues, policies that target complete systems, should supplement MEPS. Best practices of other countries show that, besides MEPS, the following elements can be part of a successful approach targeting several stakeholders:

1. Voluntary agreements with industry (government action)
2. Raising awareness and providing information (government action)
3. Financial incentives (government action)
4. Energy audit programmes (shared government, enterprise action)
5. Energy management programmes; that e.g. include a company motor policies (enterprise action)

These tools do not work independently from each other, but are highly complementary. The interaction between these instrument, and the way they strengthen each other is important to assess, just as the interaction with the different stakeholders. A study of the above best practices, versus their appropriateness and applicability for the Indonesian context, forms the basis for the design of this NSP.

2.4 Theory of Change of the overall NSP

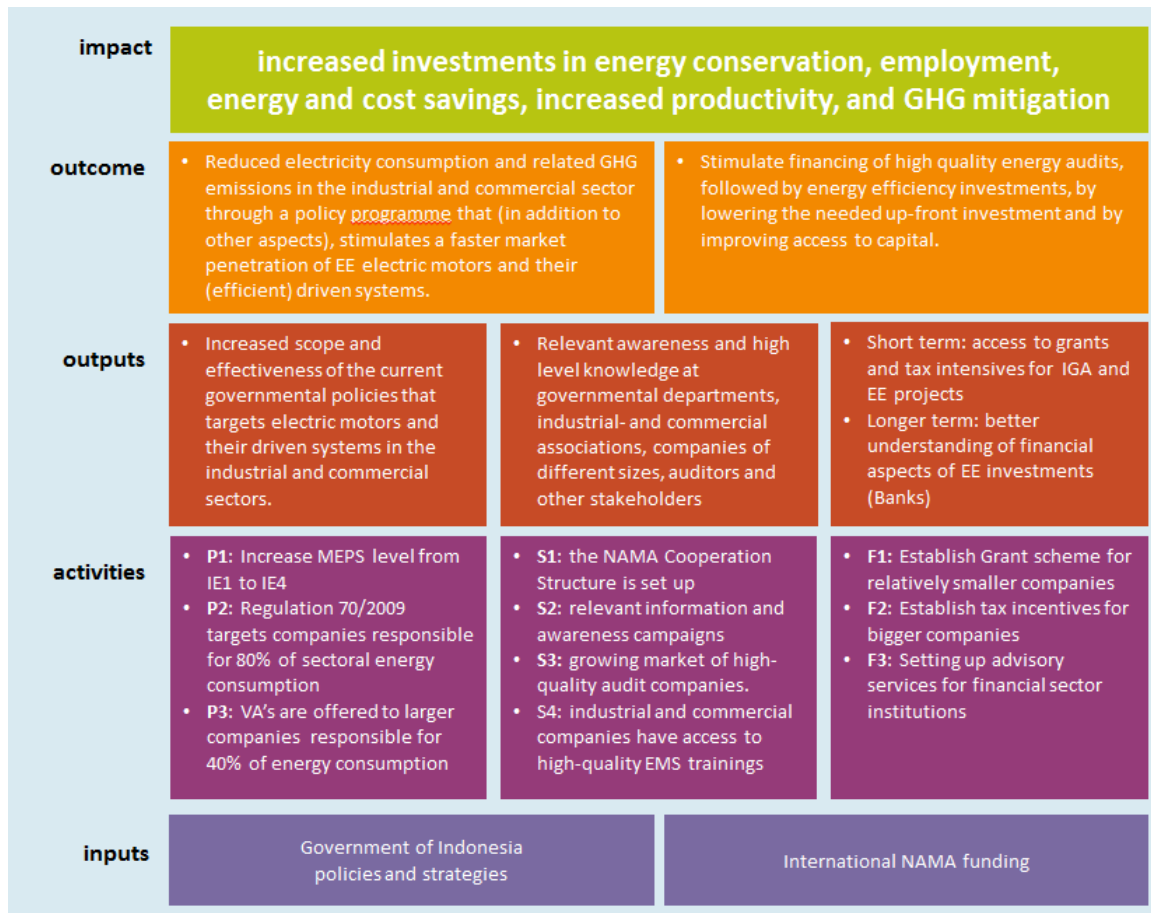


Figure 3: Theory of change for the NAMA Support Project

2.5 Impacts

In the absence of intervention, energy consumption from electric driven motor systems is expected to rise by more than a factor of three in the coming two decades based on conservative growth assumptions and in line with observations of Indonesian energy demand (Figure 4).

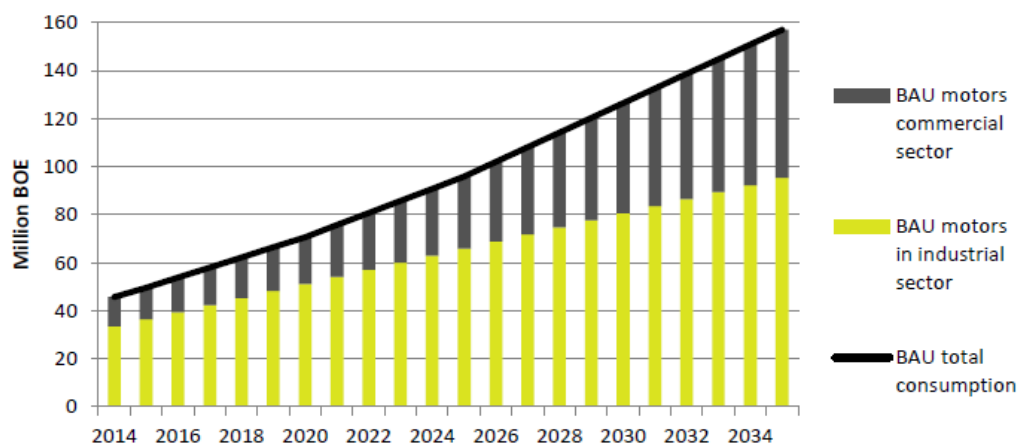


Figure 4: BAU electricity consumption of electric motors (taken from mid-term report)

As shown in Figure 3, the NSP is designed to increase investments in energy efficient electric motor systems and in energy conservation in general, leading to electricity savings and associated GHG mitigation. From a public and private perspective, there are positive outcomes related to increased productivity, increased employment and electricity subsidy savings for the government and energy cost savings for companies. The quantifications of these effects have been presented in Table 1. (Sipma et al, 2015) gives the background calculations, which are summarised below distinguished by each pillar.

Impact Pillar 1 alone: MEPS at IE4 compared to IE1

If MEPS would be introduced at IE4 in place of IE1, the electricity savings and GHG-emission reduction would be 7 times higher (5.1%). In reality Indonesia would only improve its MEPS level to IE4 over a longer period of time, so this 7 times increase would only be realised over very long time frames. As a reference, most countries are at the moment at IE2; from 2011 onwards, some countries went to IE3.

Impact Pillar 1, 2 and 3: Full system approach

If a change to motor systems can be achieved, for example, by implementing the three proposed pillars, the electricity savings compared to BAU would be up to 30 times higher compared to the current minimum level of MEPS proposed. This is because regulation 70/2009 covers entire motor driven systems, and not just motors, which is all that MEPS includes. Since we aim at reaching the largest companies, responsible for 80% of the total electricity consumption, we expect the total theoretical electricity savings from the proposed 'systems' approach to be up to 25 times more than a MEPS at IE1 level only. In such a scenario, 10 time more direct investment is needed and 15 time more engineer to install the equipment.

Additional impact Pillar 3: Introduction of VA's

This part of the programme does not necessarily increase the effect of the mandatory regulation 70/2009. A well designed regulation that requires firms to implement high quality EMS and report on can already deliver large energy savings. However the challenge with a regulation such as 70/2009, which does not contain firm targets, is that it is difficult to estimate what level of savings will ultimately be achieved by enforcing the policy. There is a risk that actions may not be identified through the EMS, or that they are not implemented due to various barriers. VA's can help to ensure that energy saving targets are reached and that industries are ambitious in their activities.

The other impacts of VA's will be:

- (1) capacity building of employees (understanding the concept and importance of EE), knowledge sharing of firms through associations
- (2) firms having in place a motor policy and energy management system
- (3) firms having in place monitoring, evaluation and reporting processes

Since regulation 70/2009 and VA's target energy efficiency in the industrial and commercial sector in general, there will be additional savings beyond specifically electric motor-systems, not calculated in this NAMA. Since we propose to offer VA's to the largest share of companies, responsible for 40% of the total energy consumption, half of the calculated impact of Table 1 will be more strongly 'secured' by VA's.

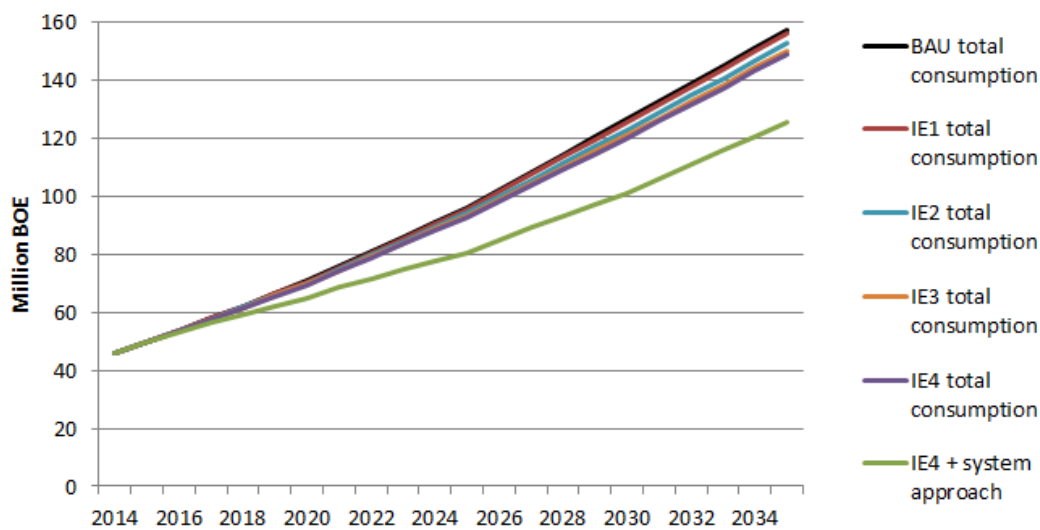


Figure 5: Effect of broadening the scope towards energy efficient electric motors driven systems; taken from mid-term report (Sipma et al, 2015)

Another representation of the impact is given in Figure 5. The upper line represents the BAU scenario of Figure 4; the lines that follow represent the effect of MEPS at several IE-levels, until we reach the largest effect when broadening the scope towards energy efficient electric motor driven systems (EE-EMDS).

(Quantitative) impact of the NAMA activities⁶

In 10 years' time; investments in high-quality audits and energy efficient electric motor driven systems have been scaled up drastically through a complementary policy programme.

1. Through an information and awareness campaign, at least the small, medium and large size companies, but preferably including the micro scale companies, are aware of the below policy programme. Around 2015, it is estimated that there will be 75,6 million companies in Indonesia from which 98.8% is micro scale, leaving 880,000 of a larger scale.
2. The government has raised the MEPS for electric motors from IE1 to at least IE4, which means an MEPS amendment every 3 years during the next 10 years⁷.
3. There are 2,000 energy auditors, capable of performing investment grade audits
4. The government runs a policy programme under regulation 70/2009 whereby the largest companies, responsible for 80% of the total sectoral energy consumption, are obliged to perform an investment grade audit and are encouraged to invest in EE projects, with e.g. a pay-back time of 3 years' time. Possibly this embraces 50.000 medium and large scale companies within the industrial sector and an unknown number of companies within the commercial sector. Calculating these numbers more accurately will be a key step of this NSP. At the end of the NAMA (10 years from now), a policy will have been put in place to check compliance of these companies and at least 10.000 companies have been

⁶ See sections 3 and 4 for technical and financial activities

⁷ During the development of the NSP, the Excel tool 'Pay-back Period EE Electric Motors' has been designed; a tool to calculate the pay-back period of purchasing a more energy efficient (EE) electric motor. When analyzing many different situations (motor capacity versus running hours a year versus electricity tariffs), a MEPS at IE3 or even IE4 is more cost-effective than IE2 or IE1. The tool can be downloaded from our [project website](#).

checked by trained governmental employees, enforcing the regulation. This includes the setup (or expansion) of a governmental department responsible for implementing, enforcing and monitoring the policy.

5. At least 10,000 of the medium scale companies have received a grant for related EE measures from the expected incentive programme⁸. Most likely this is in association with their involvement with Pillar 2.
6. The government, together with commercial and industrial associations, runs a complementary VA programme for the largest companies, responsible for 40% of the total sectoral energy consumption. Possibly this embraces 10.000 large scale companies within the industrial sector and an unknown number of companies within the commercial sector. Calculating these numbers more accurately is part of this NSP.
7. At least 2,000 of the big size companies have applied for tax-incentives⁹. This related probably to VA's, Pillar 3.
8. 10 banks have been trained on energy efficiency projects and incorporated them within their portfolio.

2.6 Outcome (overarching project goal)

As mentioned in Figure 3, the overarching goal is to reduce electricity consumption and related GHG emissions in the industrial and commercial sector in Indonesia, through a policy programme that (in addition to other aspects), stimulates a faster market penetration of energy efficient electric motors (EEEM's) and their (efficient) driven systems. This will support the government in its commitment to energy efficiency until 2025 and meeting the KEN.

Besides the technical/policy elements of the three pillars mentioned under section 2.1, this will be realized by stimulating high quality energy audits, followed by energy efficiency investments, by lowering the needed up-front investment and by improving access to capital. In the short term the focus lies with public grants and tax Incentives, and in the longer term, other approaches could be considered.

Not directly mentioned within these direct outcomes, but important as well, is the middle part of **Figure 3** under 'outputs', referring to the government providing information to-, and trainings of several stakeholders. The latter includes auditors being capable of performing so-called Investment Grade Audit (IGA) and trained employees of enterprises working together with these auditors and implementing rigorous Energy Management Systems (EMS).

Catalysation and replication are at the core of the NSP. The focus lies with supporting the market penetration of energy efficient electric motors and their driven systems into the industrial and commercial sector. But, as explained in section 2.1, since electric motors systems are responsible for such a high share of electricity consumption, this NAMA will have an impact beyond motors and will stimulate energy efficiency initiatives in general. The supporting (financial) strategies makes sure that the short term (government grants and tax incentives, trainings of enterprises and commercial bank employees) catalyse the longer term (certified auditors, implemented EMS, appropriate commercial bank portfolio).

⁸ Grant could e.g. be offered for an electric motor with a higher efficiency then set by the MEPS at that moment. Taking into account the previous footnote, it should in theory be easy to convince the company of the additional financial benefits, through e.g. an investment grade audit, or even through an effective awareness campaign.

⁹ Tax incentives e.g. be offered for an electric motor with a higher efficiency then set by the MEPS at that moment (as done in the Netherlands [through the EIA](#)).

2.7 Intervention strategy and intended synergies between FC/TC

This NAMA focusses on the previously mentioned existing policy tools and will increase the scope, and therefore the effectiveness of these initiatives. In this NSP, they are labelled as ‘three pillars’, as shown in Figure 6.

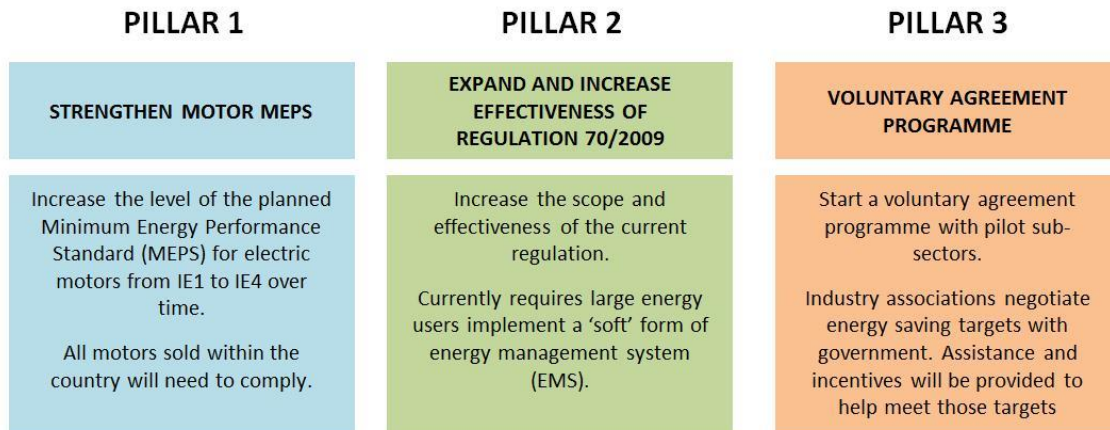


Figure 6: Three pillars of the EE motor driven system policy framework

In section 2.2 the starting situation has been explained. This section expands on this towards the intervention strategy.

Pillar 1: Strengthen motor MEPS

Pillar 1 proposes that the level of the planned MEPS for electric motors is increased over time from IE1 to IE4. It also proposes in parallel that the scope is widened to include smaller sized motors.

Pillar 2: Expand and improve existing regulation 70/2009

The present regulation 70/2009 targets the biggest companies that consume more than 6000 TOE. It requires them to implement a ‘soft’ form of Energy Management System (EMS), which can help to identify energy savings and report on these. There are no penalties for companies that don’t comply and the regulation is currently in the process of being implemented.

Pillar 2 proposes to lower the threshold level over time to such a level, that it will cover 80% of the total sectoral energy consumption. With section 4.3 in (Sipma et al, 2015), we estimate that 2% of the largest companies in terms of number of employees within the industrial sector is responsible for 80% of the electricity consumption. This would be around 50.000 companies in the year 2010 (and could be a factor 1.4 more in 2025). Within the commercial sector we take 5% as a very first guess. This, as a rough proxy for energy use¹⁰. These figures will be refined together with ESDM and the Mol.

¹⁰ This is a very rough and first estimation, and will be calculated more accurately with activity P21 (see section 3.2). As a reference: in the Netherlands around 10% of the larger industrial companies and 20% of the largest commercial companies, are responsible for more than 80% of their sectoral gas- and electricity consumption. In Indonesia though, there are many more ‘micro scale businesses’, defined as business with 1 to 4 employees. In the Netherlands, micro scale covers almost 89% of total enterprises, whereas in Indonesia, according to (USAID, 2012), this would be 99,99%. At the same time, the biggest companies in Indonesia, are much larger in terms of employees, compared to the Netherlands. Therefore, we think that relatively less of the largest companies are responsible for relatively a larger share of their sectoral energy consumption. See Table 2 as well.

At the same time, it is proposed that regulation 70/2009 will be improved to require a stricter form of EMS (for example one that meets international standards such as ISO 50001) as well as have penalties introduced over time for non-complying firms.

Pillar 3: Add voluntary agreements for certain sub-sectors

Pillar 3 proposes to add Voluntary Agreements (VAs). As discussed above, regulation 70/2009 only requires firms to implement EMS and report on their progress, it does not set any targets. VAs can be used with certain sub-sectors to negotiate targets together and agree on what support the industry will need to achieve those targets. A VA gives the government more certainty about what level of savings will be achieved and it can give the industry more input on targets (as well as additional incentives to help them achieve the targets).

Pillar 3 proposes that a VA will be offered to the largest companies that are responsible for 40% of the total energy consumption. Being part of a VA, the governments provides the company with certain benefits, like support with trainings, auditing, energy programming and implementation activities. Industrial and commercial associations are part of the implementation and monitoring process. Associations negotiate energy saving targets and activities with the government.

As part of the VA, a company has the obligation to, among others:

1. Agree with an energy saving target, company wise and sector wise
2. Implement a motor policy
3. Perform a high-quality energy audit, e.g. following the standard ISO 50002 or a-like
4. Train staff on energy management practices, following the standard ISO 50001 or a-like
5. Implement a high-quality energy management system (EMS) using own staff and external expertise
6. Monitor and verify the progress
7. Report the progress on a yearly base to their association

The above are examples and should be discussed and agreed upon between associations and the government in the stakeholder platform. VAs are still relatively new in Indonesia. It is therefore proposed to test the hypothetical design of a VA with one interested sub-sector. Previous discussions have identified APRESINDO, the footwear industry association, as having a strong interest in these ideas due to the large energy efficiency demands that their client ask from them.

Table 2 shows that the ‘big scale businesses’ in Indonesia only comprised 0,01% of total enterprises (USAID, 2012), whereas in the Netherlands, this would be 0,5%. In fact, there are more of these large scale companies in the Netherlands, then in Indonesia. As a reference; in the Netherlands, within the industrial sector, around 1500, often large scale companies, have been offered a VA. These companies are responsible for around 20% of the industrial energy consumption.

	Netherlands 2016	Netherlands 2016	Netherlands 2016	Indonesia 2010	Indonesia 2010	Indonesia as a factor of NL
Scale	number of employees each enterprise	number of enterprises	% of total	number of enterprises	% of total	Factor number of enterprises
Micro	1-4 employees	1.302.138	88,7%	53.209.540	98,85%	41
Small	5-19 employees	134.403	9%	575.966	1,07%	4,3
Medium	20-99 employees	24.615	2%	43.063	0,08%	1,7
Large	>100 employees	7.090	0,5%	5.383	0,01%	0,8
Total	all	1.468.245	100%	53.833.952	100%	37

Table 2 Share of business scale in Indonesia and the Netherlands

Incentives

Incentives can help to make firms more interested in these activities, improve the viability of some investments and provide support to understand efficiency savings. Incentives can be financial, such as grants or tax reductions, or non-financial, such as technical assistance or audits. Different incentives can also be appropriate depending on how large a company is.

EE incentives	SMALL ENERGY USERS (SME'S)	BIG ENERGY USERS (> 3,000 TOE / YEAR?)	REASON?
Tax incentives	X	✓	Complex to implement, so only big companies
Grants	✓	X	Easy to implement but not needed from financial perspective
Energy price increase/ subsidies	✓	✓	Effective
Fines	X	X	Difficult to implement for SMEs
Loan instruments	X	✓	- Complex to implement, so only big companies - Also useful for ESCOs
Equity instruments	X	X	Only useful for ESCOs
Guarantee instruments	✓	✓	- Efficient - Also for SMEs. Can be implemented by banks
Other penalties (non-financial)	X	✓	Difficult to implement for SMEs
TA	✓	✓	Also aim at trading companies/ equipment sellers

Figure 7: Comparison of financial incentives for his NSP

For small companies grants are proposed, as these are easier for them to apply for and the government to administer in larger numbers. For bigger companies tax incentives are proposed instead. This will speed up the implementation of energy efficiency measures. Other types of incentives can also be considered, for example when taking part in a VA-scheme, a firm can be rewarded by receiving a slightly lower energy tariff or avoiding a tariff increase.

Once, investments in EE grow, and government, industrial and commercial companies, and financial institutions gain more experience, the government could focus on (stimulating) the development of more efficient incentives such as loan and guarantee instruments. To prepare for this, an advisory service is established for banks to access expert technical advice (TA) regarding EE project investment.

Supporting activities

There are many important activities, apart from incentives, that can support the pillars described above. In this NSP, the government will run information and awareness campaigns, in cooperation with industrial associations. The NAMA Support Unit will make sure Investment Grade Audits are available and employees of enterprises are provided access to trainings in Energy Management Systems (EMS), such as ISO 50001, being able working together with professional auditors.

STRUCTURE

Beyond the scope of this section, but important to understand this NAMA, it would be good to understand how the previous elements work together in practice. Therefore, a basic structure is shown in **Figure 8**. MEPS is a mandatory policy tool for all companies, focusing on electric motors. Regulation 70/2009 is a mandatory policy tool for the relatively larger companies, and would help to target not only motors, but also their driven systems, as well as other energy consuming components. Under the third pillar, the government, together with industrial associations, sets up VA's that focus on a specific industrial or commercial sector; e.g. the footwear industry. Members of associations are offered to join a VA. These are probably often the largest companies, but all companies are welcome, as long as they are a member of an association.

Under VAs, companies have access to several forms of (financial) incentives and receive practical support from the government, through their association. The individual reports are processed by the association and

combined into a branch-specific report. This branch-report is offered to the government, who places this report on-line in the public domain. The association discusses the outcome of the individual monitoring reports with the relevant companies. Depending on the outcome, a company can be asked to leave the VA; if so, the company moves back to the 70/2009 regulation.

For the monitoring, reporting and verification (MRV) obligations of companies within a VA, the government will need to design and implement an (on-line) system. This can be designed, discussed and reviewed together with associations, in the stakeholder platform. The basic building blocks of such a system are already in place for the reporting on regulation 70/2009.

If regulation 70/2009 is enhanced as proposed, then the government would implement compliance checks. The effect of regulation 70/2009 is monitored by the government as well and results are made public on a yearly base.

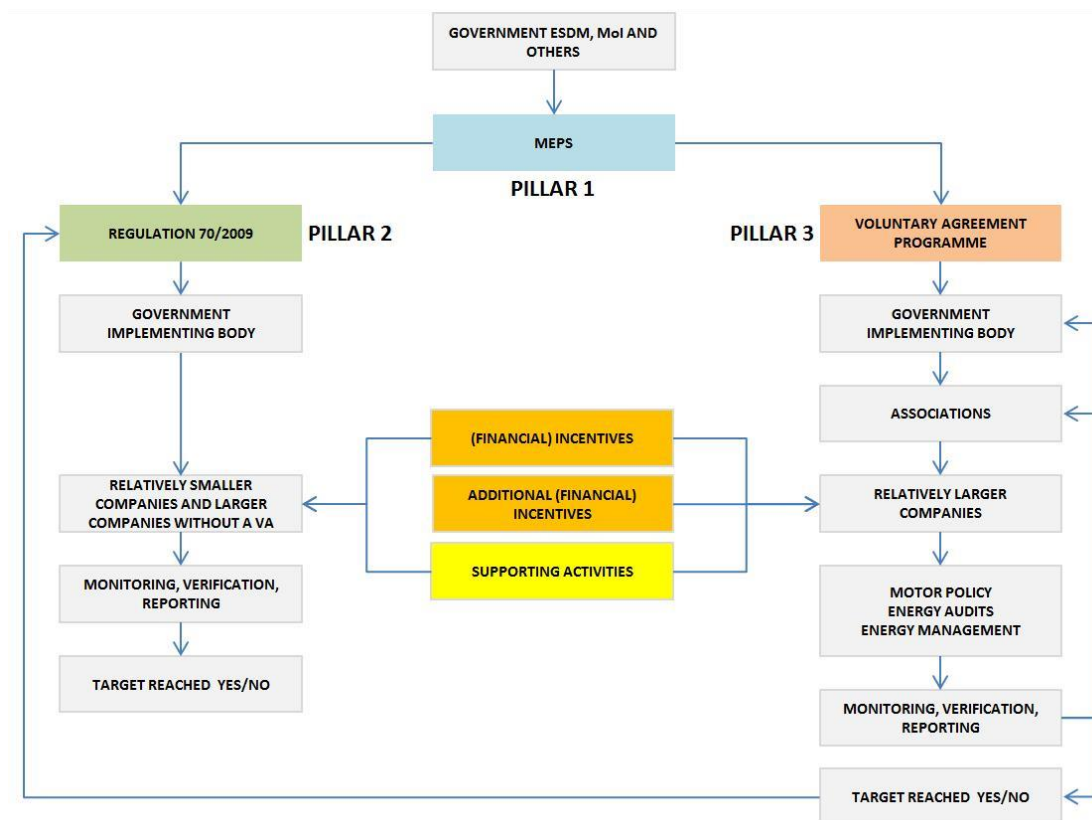


Figure 8: the NSP activities visualized in practical terms

2.8 Synergies and linkages with relevant projects in the country

Section 5.6 of the mid-term report describes 'Identified existing policies and activities' that are relevant for this NAMA. Besides the main governmental initiatives, already mentioned in section 2.2, there have been numerous other supporting programmes from governmental departments and from several organisations, including the Asian Development Bank, GIZ and UNIDO. All of these organisations have been consulted in the course of developing this NSP. It is observed that there has been little coordination between activities which have been undertaken so far. The aim of this NSP has been to build on that experience.

Besides these more technical orientated initiatives and programmes, there where, or are existing financial incentives. These already have been mentioned under section 2.2. Especially the UNIDO trainings (TA) to increase the capacity of financial institutions to understand EE is an important aspect to build upon.

3. Specific Part - Technical Component (TC)

3.1 Outcome (project component)

The overarching goal can be seen as the outcome of the TC and is to reduce electricity consumption and related GHG emissions in the industrial and commercial sector in Indonesia, through a policy programme that (in addition to other aspects), stimulates a faster market penetration of energy efficient electric motors (EEEM's) and their (efficient) driven systems. The TC needs the support of the FC to be successful.

3.2 Outputs and planned activities (project component)

See the Gantt chart (Figure 10) for the planning of the following outputs and activities.

activities	Pillar 1 (P1)	Supporting Activity 1 (S1)	Financial Component (F1-F3)
	<ul style="list-style-type: none"> P1: Increase MEPS level from IE1 to IE4 P2: Regulation 70/2009 targets companies responsible for 80% of sectoral energy consumption P3: VA's are offered to larger companies responsible for 40% of energy consumption 	<ul style="list-style-type: none"> S1: the NAMA Cooperation Structure is set up S2: relevant information and awareness campaigns S3: growing market of high-quality audit companies. S4: industrial and commercial companies have access to high-quality EMS trainings 	<ul style="list-style-type: none"> F1: Establish Grant scheme for relatively smaller companies F2: Establish tax incentives for bigger companies F3: Setting up advisory services for financial sector institutions

Figure 9: Summary of technical component activities ('P' for pillar and S for supporting) and financial component activities

Output supporting activity S1: the NAMA Cooperation Structure, as mentioned in section 1.7, is established.

Output Pillar P1: the level of the implemented MEPS for electric motors have been increased from E1 to IE4. The scope is widened to include smaller sized motors.

Output Pillar P2: the threshold level of regulation 70/2009 has been lowered to include companies, that together are responsible for 80% of the total industrial and commercial energy consumption.

Output Pillar P3: through their associations, VA's have been offered to and set up with the largest companies, that together are responsible for 40% of the total industrial and commercial energy consumption.

Output supporting activity S2: the government runs relevant information and awareness campaigns, in cooperation with industrial associations.

Output supporting activity S3: there is a growing market of high-quality audit companies.

Output supporting activity S4: industrial and commercial companies have access to high-quality EMS trainings.

Activity S1: the Steering Committee sets up supporting NAMA entities

- S11: ESDM forms the Steering Committee (SC) together with Mol and MoF
- S12: The Steering Committee forms the NAMA Support Unit (NSU) by inviting relevant stakeholders
- S13: The NAMA Support Unit invites the previous MEPS Working Group to form the Technical Advisory Committee (TAC)
- S14: The NAMA Support Unit forms the Financial Expert Committee (FEC)

This NSP doesn't look in detail beyond the scope of setting up a NAMA Support Unit by the Steering Committee (S1). The precise/detailed activities associated with Outputs P1, P2, P3, S2, S3 and S4 will be planned by the Unit. The below activities are therefore described at a relatively high level.

Activity P1: increasing the implemented MEPS for electric motors from E1 to IE4 and widening the scope to include smaller sized motors.

- P1: This involves (1) discussing and consulting with the Technical Advisory Committee, (2) Calculate the costs and net-benefits to firms of enacting higher MEPS standards, (3) Conduct meetings with key stakeholders to discuss feasible timing for strengthening and enforcement, (4) Prepare a roadmap to stronger performance standards in line with international standards, (5) amending, implementing and enforcing the MEPS for electric motors in line with planned enforcement for current proposed MEPS. A possible roadmap, based on experiences observed elsewhere, could be that in 2018 the MEPS has been increased to IE2 and includes smaller sized motors, in 2020 to IE3, and in 2023 to IE4 (P1). See the Gant chart for a representation.

Activity P2: lowering the threshold level of regulation 70/2009

- P21: By combining (1) energy consumption by size of enterprise (Sipma et al, 2015) and (2) BPS statistics for Indonesian enterprises in by size, calculate for each sub-sector the number of largest enterprises, responsible for 40% and 80% of total industrial and commercial energy consumption (calc).
- P22: the threshold level of regulation 70/2009 is revised downwards to cover the largest firms responsible for 80% of electricity consumption during the next three years. This involves (1) writing a recommendation based on P21, (2) discussing and consulting with the Technical Advisory Committee, (3) Assess the domestic resources needed to administer an expanded regulation, (4) Agree on proposed revised standards of Energy Management System (EMS) to include in a revised regulation based on international standards (e.g. ISO 50001), (5) Agree a proposed enforcement mechanism / penalty with ESDM and Ministry of Industry and (6) amending, implementing and enforcing regulation 70/2009. It is anticipated that after 8 years afterwards, the expanded regulation could have reached the larger size enterprises that together are responsible for 80% of the total industrial and commercial energy consumption (P22). See the Gant chart for a representation.

Activity P3: VA's have been set up through associations with the largest enterprises, responsible for 40% of total energy consumption

- P31: within two years' time, the first VA's has been set up with an industrial association and their members. (1) Establish working group to pilot voluntary agreements with a large industry sub-sector (proposed as the footwear association (APRISINDO)), (2) Agree on targets with the industry association and the proposed level of financial/technical support, (3) establish a monitoring, reporting and evaluation system that can run in parallel to the above regulation 70/2009.
- P32: the experience of this first VA will be used to set up VA's with the largest enterprises, responsible for 40% of total energy consumption. After 5 years' time, VA's are signed and implementation/monitoring has begun¹¹.

Activity S2: the government runs relevant information and awareness campaigns, in cooperation with industrial associations.

¹¹ As a reference: in the Netherlands around 1,500 enterprises have a VA. Companies with a VA in the industrial sector are together responsible for 20% of the sectoral energy consumption.

- Specific activities will be decided by the NAMA Support Unit (I&A)

Activity S3: there is a growing market of high-quality audit companies.

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) defines four levels of audits (PNNL, 2016);

- level 0; benchmarking
 - level 1: walk-through audit
 - level 2: detailed energy audit:
 - level 3: investment-grade audit; a detailed analysis of capital-intensive modifications focusing on potential costly Energy Conservation Opportunities (ECOs), requiring rigorous engineering study. Note that ISO 50002 on energy audits describes a similar ‘type 3’ (ISO, 2016).
- Within the existing structure, set up by HAKE and UNIDO, develop together with International experts, high-quality audit companies, capable of performing investment-grade audits, at the above described level 3. Specific activities will be decided by the NAMA Support Unit
 - By 2025, in the order of 500 auditors are capable of performing investment grade-audits (see Gannt chart)¹².

Activity S4: access to high-quality EMS trainings.

Expand and increase the effectiveness of the existing structure set up by UNIDO, using International experts, in offering high-quality EMS trainings to companies, based on ISO 50001. Make sure there is a link between S3 and S4; audited companies need trained employees to realize energy efficiency in a sustainable way. Specific activities will be decided by the NAMA Support Unit.

- S41: The first companies with a VA will have a high quality EMS, implemented by ISO 50001 trained staff members, probably supported by an external auditor
- S42: All companies with a VA have a high quality EMS, implemented by ISO 50001 trained staff members, probably supported by an external auditor. By 2025, companies with no VA, but falling under regulation 70/2009, will have implemented a high quality EMS in accordance with the expanded regulation.

¹² Note that in section 5.4.3 of Sipma et al. (2015), it has been mentioned that in 2 years’ time, 39 energy auditors and 84 energy managers have been trained by a governmental programme. They would have audited hundreds of companies. This needs to accelerate drastically and the quality of the auditors should be reviewed to meet the criteria of investment grade audits. As well a monitoring systems needs to be set up in order to follow the impact. Qualified auditors need to be linked with the ‘advisory service’, activity F3 of section 4, to train commercial banks on the impact of EE projects.

As a reference:

- In the Netherlands, due to EU-rules, companies with more than 250 employees have to perform an energy audit *mandatory*, if they don’t already have a VA. The rule applies to 6000 companies; see **Table 2** as well.
- If there would be 500 auditors in Indonesia and if 100.000 industrial and commercial companies would be part of Pillar 2 (see section 2.7) and would ask for an high-quality energy audit, then each auditor would needs to do around 200 companies. If the time horizon of this NAMA is 10 years, then this would be 20 companies a year.

			Technical Component													
			Support Unit				MEPS	70/2009			VA's		I&A	Audit	EMS training	
year #	year	Q	S11	S12	S13	S14	P1	P21	P22	P31	P32	S2	S3	S41	S42	
0	2016	1														
		2														
		3	SC													
		4		NSU	TAC	FEC										
1	2017	1					P1	Calc	P22	VA1		I&A	20			
		2					P1		P22	VA1		I&A	40			
		3					P1		P22	VA1		I&A	60			
		4					P1		P22	VA1		I&A	90	→ EMS1		
2	2018	1					IE2				VA's	I&A	120		EMS	
		2					P1				VA's	I&A	150		EMS	
		3					P1				VA's	I&A	180		EMS	
		4					P1				VA's	I&A	220		EMS	
3	2019	1					P1				VA's	I&A	260		EMS	
		2					P1				VA's	I&A	300		EMS	
		3					P1				VA's	I&A	340		EMS	
		4					P1				VA's	I&A	390		EMS	
4	2020	1					IE3				VA's	I&A	440		EMS	
		2					P1				VA's	I&A	490		EMS	
		3					P1				VA's	I&A	500		EMS	
		4					P1				VA's	I&A			EMS	
5	2021	1					P1				VA's	I&A			EMS	
		2					P1				VA's	I&A			EMS	
		3					P1				VA's	I&A			EMS	
		4					P1				VA's	I&A			EMS	
6	2022	1					P1				40%	I&A		→	40%	
		2					P1									
		3					P1									
		4					P1									
7	2023	1					IE4									
		2														
		3														
		4														
8	2024	1														
		2														
		3														
		4														
9	2025	1														
		2														
		3														
		4														
10	2026	1					IE5?		80%				500	→	80%	
		2														

Figure 10: Gantt chart Technical component

3.3 Target group

Public Sector: The Government of Indonesia can see increased market penetration of energy efficient electric motors, contributing to energy savings and a reduction of greenhouse gas emissions. Additional energy savings will be realized since most elements of this NAMA stimulate other energy efficient measures than only electric motors.

Industrial and commercial sector: companies will benefit from cost-effective energy savings

Employment will be directly affected at several sectors; e.g. auditors, engineers and sales people.

3.4 Stakeholders

Key stakeholders include:

- MoI, ESDM and MoF are essential governmental departments for the implementation of the NAMA and form together the Steering Committee. The steering committee will coordinate the involvement of all key stakeholders.
- Industrial and commercial associations are needed to discuss and agree upon energy saving targets for their members, stimulating capacity building, awareness and sharing information.
- The previous MEPS working group, that will form the Advisory Committee, consists out of many stakeholder, as motor manufacturers, importers/wholesalers, equipment retailers, NGO's.

3.5 Assumptions, risks and risk assessment

S1. Setting up a NAMA Support Unit by the Steering Committee

Key assumption is that ESDM, MoI and MoF are forming the Steering Committee under the leadership of ESDM. The risk is that this doesn't happen due to challenges in cooperation between ministerial agencies. This risk is classified as medium and has been mitigated by seeking agreement from each ministry on this NSP and the proposed approach.

P1: increasing the MEPS-level for electric motors to IE4

Key assumption is that over time the government of Indonesia agrees with increasing the MEPS level towards IE2, IE3 and IE4. The risk that this doesn't happen is classified as low, since there are only three countries in this world with a present MEPS as IE1, including Indonesia. The risk that there will be a delay compared to the planning in this NAMA is higher and cannot be mitigated.

P2: Lower the threshold level of regulation 70/2009 for the largest firms, responsible for 80% of total energy consumption

Key assumption is that stakeholders agree to lower the threshold level of 70/2009 and increase the rigour of the required EMS. The risk that this doesn't happen is classified as medium. The risk is mitigated as it requires an expansion of existing regulations, not a new formulation and will be requested/approved by the steering committee representing both MoI and ESDM.

P3: VA's have been set up through associations with the largest enterprises, responsible for 40% of total energy consumption.

Key assumption is that associations will have sufficient representation of their members to be able to agree upon VA's with the government, instead of following the mandatory 70/2009 regulation. The risk that this doesn't happen is classified as low in the main sub-sectors being considered for VA's. The risk can be mitigated by making sure that (1) the MEPS and regulation 70/2009 are firmly enforced and (2) the supporting activities S2, S3 and S4 are well performed.

S3: there is a growing market of high-quality audit companies

Key assumption is that the market will grow if given the right support. The risk that this doesn't happen is classified as medium. The risk is mitigated by making use of the existing structure put in place by UNIDO and HAKE, and, especially in the beginning, by adding international technical support. There is evidence to show

that external experts did perform energy audits very well within larger industrial companies. Locally these engineers were not available.

S4: access to high-quality EMS trainings

Key assumption is that high-quality EMS trainings will be available. The risk that this doesn't happen is classified as low, since UNIDO already has put in place a structure with ISO 50001 trainings and have shown willingness to expand this program if supported.

4. Specific Part - Financial Component

4.1 Outcome (project component)

The outcome of the financial component is to stimulate financing of (1) high quality energy audits, followed by (2) energy efficiency investments in general, which could include investments in energy efficient electric motors (EEEM) and their driven systems, as pumps, fans and compressors. This will be done by lowering the needed up-front investment and by improving access to capital. Systems could include investments in energy efficient electric motors (EEEM) and their driven systems, as pumps, fans and compressors.

For small companies, from which a substantial share will not be part of a VA, grants schemes are recommended. For bigger companies tax incentives are more appropriate to be applied instead. Continuing the current policies of decreasing electricity subsidies is recommendable in general. This will speed up the implementation of energy efficiency measures. There may also be an opportunity to firms taking part in a VA-scheme to be incentivized by giving participating companies a slightly lower energy tariff or freezing tariff increases for a period of time.

Once, investments in EE grow, and government, industrial and commercial companies, and financial institutions gain more experience, the government could focus on (stimulating) the development of more efficient incentives such as loan and guarantee instruments.

The efforts to develop an Energy Efficiency Financing Scheme (EEFS) at this stage are encouraged but it is recommended to implement grant schemes in parallel. Such combined efforts could match very well, also because the EEFS is expected to take more time to become operational.

This NAMA focusses on grant schemes and tax incentives. The other financial products could parallel be implemented by the Indonesia government. In order to support this parallel process, an advisory service will be established.

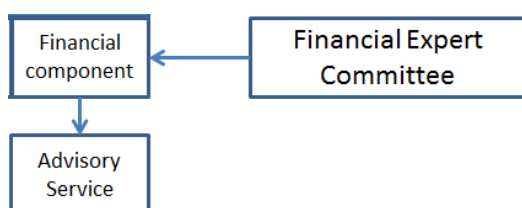
4.2 Outputs and planned activities (project component)

Output supporting activity S1: in section 3 it is already mentioned that the NAMA Support Unit will start-up a Financial Expert Committee to be advised on the Financial Component of this section. This committee will be led by the MoF and includes the financial regulator OJK, representatives of engaged commercial banks and UNIDO, who already has given trainings to bank employees concerning EE investments.

Output F1: a grant scheme is developed for smaller companies. This can be used for the Investment Grade Audits mentioned under the Technical Component (TC) in section 3, and for the subsequently identified investments in EE. A grant scheme is established whereby 10,000 small-scale grants have been issued by 2020. By the year of 2026, all companies under regulation 70/2009 have access to some form of financial incentives, possibly a grant, but possibly as well organized through a commercial bank (see output F3).

Output F2: tax incentives are present for bigger companies; up to 2,000 of the larger companies that have a VA are able to apply for tax incentives by the year 2020. By the year of 2026, all companies with a VA have access the some form of financial incentives, possibly tax incentives, but possibly as well organized through a commercial bank (see output F3).

Output F3: an advisory service is established for 10 banks to access expert advice regarding EE project investment. In 2020 these banks have expanded their portfolio to finance EE projects.



Planned activities F1: establish a Grant scheme

- The Financial Expert Committee will design a Grant scheme to finance Investment Grade Audits (IGA's) and investments in EE afterwards, making use of existing financing structures and initiatives. Some broad activities could be:
 - Standard application procedures and approval processes are developed. This includes a list of energy efficient equipment, that is eligible for a grant application. Related to energy efficient electric motors, this probably would be a motors with a higher efficiency than mandatory set by the implemented MEPS. If the MEPS is set at IE1; then a grant could be given for IE2 motors. Note that IE2 is often more cost effective anyway, as well without a grant. Therefore a good awareness and information campaign is necessary (activity S2).
 - A monitoring system will be developed to assess the quality of an IGA. Minimum quality criteria for IGAs are developed and auditors not conforming to these criteria will be disbarred from participating in the grant scheme in the future.
 - Seminars are given and marketing material produced to raise awareness of the possibility of accessing grants.

Planned activity F2: implement a financial structure that supports tax incentives

- F21: The Financial Expert Committee will, together with BKF in the MoF design the structure that supports tax incentives. Some broad activities could be:
 - Establish qualification criteria of EE investment including electric motors for tax reductions and accelerated depreciation.
 - Set up administration unit to set up application procedures, process applications and approvals
 - Monitoring and evaluating that the tax incentives are having the desired impact(s)
 - Organise training for companies that have agreed upon a VA with the government to enable them to apply for tax incentives

Planned activity F3: setting up advisory services for commercial banks

- The Financial Expert Committee will, together with commercial banks, establish an advisory service.
- This service will develop training session for banks to learn about EE business models and the actual (as opposed to perceived) risks involved in lending to energy efficiency projects. The existing UNIDO training material is the starting point for this.
- High quality energy audit companies and/or experts are contracted to provide ad hoc advice to banks.
- 1-day training sessions are organised to improve skills on how to assess and screen energy efficiency projects.

See the Gantt chart for the planning of the above activities and the interaction with the activities of the Technical Component.

			Technical Component													Financial Component			
			Support Unit				MEPS	70/2009		VA's		I&A	Audit	EMS training		Grant	Loan	Adv	
year #	year	Q	S11	S12	S13	S14	P1	P21	P22	P31	P32	S2	S3	S41	S42	F1	F2	F3	
0	2016	1																	
		2																	
		3	SC																
		4		NSU	TAC	FEC													
1	2017	1					P1	Calc	P22	VA1		I&A	20			F1	F2	F3	
		2					P1		P22	VA1		I&A	40			F1	F2	F3	
		3					P1		P22	VA1		I&A	60			F1	F2	F3	
		4					P1		P22	VA1		I&A	90	→EMS1←		F1	F2	F3	
2	2018	1					IE2					VA's	I&A	120		EMS	F1	F2	F3
		2					P1					VA's	I&A	150		EMS	F1	F2	F3
		3					P1					VA's	I&A	180		EMS	F1	F2	F3
		4					P1					VA's	I&A	220		EMS	F1	F2	F3
3	2019	1					P1					VA's	I&A	260		EMS	F1	F2	F3
		2					P1					VA's	I&A	300		EMS	F1	F2	F3
		3					P1					VA's	I&A	340		EMS	F1	F2	F3
		4					P1					VA's	I&A	390		EMS	F1	F2	F3
4	2020	1					IE3					VA's	I&A	440		EMS	10.000	2.000	10
		2					P1					VA's	I&A	490		EMS	F1	F2	
		3					P1					VA's	I&A	500		EMS	F1	F2	
		4					P1					VA's	I&A			EMS	F1	F2	
5	2021	1					P1					VA's	I&A			EMS	F1	F2	
		2					P1					VA's	I&A			EMS	F1	F2	
		3					P1					VA's	I&A			EMS	F1	F2	
		4					P1					VA's	I&A			EMS	F1	F2	
6	2022	1					P1					40%	I&A		→40%←	F1		40%	
		2					P1												
		3					P1												
		4					P1												
7	2023	1					IE4												
		2																	
		3																	
		4																	
8	2024	1																	
		2																	
		3																	
		4																	
9	2025	1																	
		2																	
		3																	
		4																	
10	2026	1					IE5?		80%				500	→	80%←	80%			
		2																	

Figure 11: Gantt chart; Financial Component added

4.3 Target group

Primary target group: companies that are involved in implementation of EE measures benefit by being able to use grant facility and tax reduction for EE projects, helping them overcome the financial barrier of a lack of access to capital. These actors can also benefit financial incentives to undertake IGAs in order to identify bankable projects.

Secondary target group: by using the advisory services, commercial banks will be able to better assess energy efficiency project proposals and thus expand their portfolios. This will help financial institutions to development more efficient incentives such as loan and guarantee instruments on the longer term.

4.4 Stakeholders

- Key stakeholders include: MoF , UNIDO, OJK, commercial banks
- The Steering Committee for signing the MoU
- The Financial Expert Committee for coordinating the process and for setting up the Advisory Service

4.5 Assumptions, risks and risk assessment

Grants and tax incentives

- Key assumption is that structures for grant- and tax incentives will be successfully implemented. The risk obviously is that this doesn't happen.
- This risk is classified not as high, but as medium, since similar schemes are already available for small grants to the textile industry (though not for EE measures) and there is experience with tax deductions and accelerated depreciation for industrial equipment (as well as renewable energy technologies).
- This risk can be further mitigated using external experts, experienced in this topic, and able to network between the relevant governmental departments, together with the NAMA Support Unit.

Advisory services

- Key assumption is that the advisory service is able to work with commercial banks to reduce perceived risks involved in lending to energy efficiency projects are overestimated. The risk obviously is that commercial banks do not develop the necessary experience and familiarity with these projects and that lending is not scaled up.
- This risk is classified not as high but as medium, since UNIDO has already experienced positive results and feedback from bank loan officer and staff training.
- This risk can be mitigated by maintaining close contact with the commercial banks to understand the banks' risk appetite and potentially, in the longer term, but working with a form of credit guarantee product if required (though this is not desirable versus capacity building).

4.6 Financial support mechanism

The NSP will stimulate financing of high quality energy audits, the purchase of energy efficient electric motors and energy efficiency projects in general by providing grants and tax incentives to enterprises. In the longer term it also encourages banks to provide lending to energy efficiency projects. During a workshop in December 2015 with key stakeholders and representatives from industrial associations and their members, these financial tools have been identified as most suitable within the present Indonesian context.

- Investment Grade Audits are crucial in developing energy use baselines that are sufficiently detailed to enable a company to monitor the energy savings of EE investments afterwards. An IGA requires expert knowledge and up front capital investment. Due to the high upfront costs customers can be reluctant to invest in an IGA. A grant scheme will ease this financial burden to the customer and stimulate more IGAs leading to an increase in EE investments.
- The grant scheme and tax reduction incentives aims to leverage additional private finance by building a track record for good quality energy audits and demonstrating the value in undertaking them to the customer. Private customers are then stimulated to invest in IGAs without grant assistance.
- Only high quality IGAs will be eligible for grants and the IGA itself will be monitored and verified independently for quality control purposes. Energy auditors will be required to prove that they have the necessary skills to perform the IGA during the grant approval process. Any energy auditor that perform audits that are not of investment grade quality will be excluded from accessing the grant scheme in future.
- Grants will cover 50% of the up-front costs of an IGA at the early stages while gradually phasing out during the second phase of the NS.

Access to advisory services (commercial banks)

- The objective is to improve the commercial banks' knowledge and energy efficiency investments in general and on EE business cases. Banks often perceive the risks of investing in energy efficiency projects as high due to reasons such as a lack of understanding of EE project investments and the related business case and the uncertainty over future revenue streams from the cost savings achieved from EE. The advisory service will provide expert advice from experienced professionals from the energy audit and broader EE sector.
- The lack of knowledge or awareness about the technical aspects of EE projects and energy audits at the banks can limit their capacity to identify and fairly assess investment opportunities in EE projects. Trainings and advisory services will serve to strengthen the bank's capacity to perform these tasks and develop a healthy loan portfolio for EE projects.

5. Project Ambition

5.1 Potential for transformational change

Innovation: The NSP does not adopt an innovative approach to reducing emissions in terms of technologies and policy measures; the concepts of e.g. MEPS and VA's are present in many other countries. This said, from the Indonesian perspective, this indeed is innovative; especially the introduction of VA's with industrial associations playing a crucial role in negotiating ambitious energy savings targets in return for support.

Private sector: The NAMA is a predominantly private sector focused intervention; the majority of the actors are from the private sector and the role of the public sector is to help bring commercial banks, private customers (i.e. industry and building owners) and others (auditors and possibly commercial ESCOs) together. This said, in the short term, government has a key role in the provision of incentives as grants and tax-reductions. But in the longer term, the NAMA empowers commercial energy auditors, it makes energy conservation opportunities visible and available to customers, and it takes away barriers that have thus far inhibited commercial banks from engaging in financially interesting propositions that reduce energy consumption and contribute to low-carbon development.

Impact: The NAMA improves the capacity and quality of energy auditors, bank employees, companies, and even individuals from industrial- and commercial associations and from governmental institutes by providing training and advisory. It as well supports the introduction of standards and certification (MEPS, investment grade auditors; ISO 50001). It shows the commercial banking sector how to identify and assess interesting energy savings projects for financing, and introduces a new actor (an advisory service) to make the market more reliable, transparent and competitive.

Replicability: the strategy followed in Indonesia that has led to this NAMA can readily be adopted in a different country that is interested to look for energy savings in industry. From a technical aspect, in terms of development of the NSP, we refer especially to two aspects:

1. The quantification of the impact as mentioned under section 2.5 is done through a combination of a bottom-up and top-down analyses; which could be done in another country as well to fill the kind of data gap that is common in similar contexts.
2. From a qualitative perspective, this NSP gives input to the strategy for a National Policy Framework for electric motor systems. A strategy like this, has been developed in countries before. A few sources have collected best practices observed in other countries and turned them into useful Policy Guidelines, which have been consulted in developing this NSP. One example are the EMSA Motor policy guides¹³. These guidelines can be used to start analyzing the situation in another country.

Scaling up: As said in section 2.1; since electric motors systems are responsible for 75% of the industrial electricity consumption and 65% of that within the commercial sector, one cannot separate the impact of this NAMA from the broader Indonesian approach to improve energy efficiency in these sectors in general, disregarding what type of energy consuming system we are talking about. Since many of these 'other opportunities' are cost effective as well. Availability of financially attractive opportunities is therefore not the bottleneck; once energy auditors and commercial banks have established a firm basis and level of professionalism regarding EE projects, the market for energy efficiency investment can be expected to grow substantially.

¹³ <https://www.motorsystems.org/policy-publications>

5.2 Sustainable development co-benefits

There are many benefits for Indonesia in terms of pursuing

1. **Energy access and growth** (high): Indonesia has ambitious plans for increasing generation capacity in the coming decade as well as increasing levels of electrification. Increased energy conservation will reduce pressure on national electricity production and contribute to these goals.
2. **Subsidy reduction (high)**: the public utility receives approximately 40-50% of its revenue in the form of a direct subsidy from the Government of Indonesia, largely due to regulated tariffs that don't allow for full cost recovery (though this situation is changing). Reducing demand from industry would contribute significantly to reducing this subsidy in the longer term.
3. **Cost competitiveness** (high): reducing energy costs increases productivity of Indonesian industries, makes companies more competitive and resilient to external economic market pressures, and increases employment security. The importance of this is paramount: in the past decades the Indonesia economy has been affected by the (global and regional) economic crisis, and further ASEAN integration will require focus on cost competitiveness.
4. **Environmental sustainability** (high): reducing energy demand reduces the need for additional (fossil) energy supply.
5. **Employment** (medium): according to Table 1, around 5000 man-years are needed for installation of EE equipment. This is estimated to continue for about 20 years, until all old equipment has been changed by EE equipment. Activity S3 of section 3.1 adds 2000 energy auditors to this. For a country as large as Indonesia, this is a modest workforce; but this does not include yet other types of needed labour, as e.g. within the trading sector.

5.3 Financial ambition

Scaling up private sector investment into energy efficiency is at the core of the NSP. The NSP provides opportunities for companies (energy end-users) operating in Indonesia, to design and implement energy efficiency projects in the industry and commercial buildings sectors, together with energy auditors. We estimate that over a period of 20 years, up to USD 2 billion per year of investment can be stimulated as a result of the NSP¹⁴. This only relates to electric motor driven systems and will probably be larger, due to the amplifying effect mentioned under 'scaling up', in section 5.1.

We expect financial contributions from the private sector in the form of investments in energy efficient equipment which will be supported by governmental grants and tax-incentives in the short term and by access to capital through commercial banks on the longer term.

The NSP anticipates a substantial financial contribution from the budget of the Government of Indonesia in terms of forgone revenues due to tax reductions associated with VA's with larger firms. This has not been quantified at this stage of the NSP development but will be a task for the Financial Expert Committee. The NSP foresees the potential for other donors to provide financial contributions. It is too early to decide at this stage, but attracting other donors might be desirable in order to implement the NSP.

5.4 Mitigation ambition

Approach

Saving potentials and emission reductions are calculated using a top-down and a bottom-up approach. For the top-down approach statistics of sectoral electricity consumption are used. For the bottom-up approach import data for electric motors are used. It is concluded that the top-down and bottom-up results more or

¹⁴ See table 7 of Sipma et al. (2015), that represents the multiplier of '10 times larger' in Table 1 under section 2.1.

less coincide for the year 2014, as shown in the below **Table 3**. This gives confidence around the reliability of calculated savings potential.

Industrial plus commercial sector	million BOE usage 2014	TWh usage 2014	Total electric motor stock; medium and large size (pieces)	Average efficiency
Bottom-up approach (2014): import data Solvindo	47	77	3,100,000	88%
Top-down approach (2014): Indonesian statistics	46	75		
Compare with world (2006): according to IEA (2011)	3,624	5,900	230,600,000	87% - 93%
Indonesia 2014 as % from world 2006	1.3%	1.3%	1.3%	

Table 3: Electricity consumption medium- and large size electric motors, bottom-up and top-down approach

GHG emissions baseline

Several sources are used to construct a business as usual scenario for the electricity demand of medium and large size electric motors until 2035¹⁵, as shown in Figure 4 of section 2.1. This figure can be transferred into the below Figure 12, giving the related yearly CO₂ emissions in Mton CO₂ for this BAU scenario. This represents the CO₂ emissions for the needed electricity generation by PLN (Indonesian public utility). For this conversion, CO₂ emission data released by PLN has been used. The average number for Indonesia of the year 2015 has been applied, which is 0.867 ton CO₂eqv/MWh. Note that this will not be a constant factor over time, and will change slightly with a different fuel mix and a changing share of renewable electricity production.

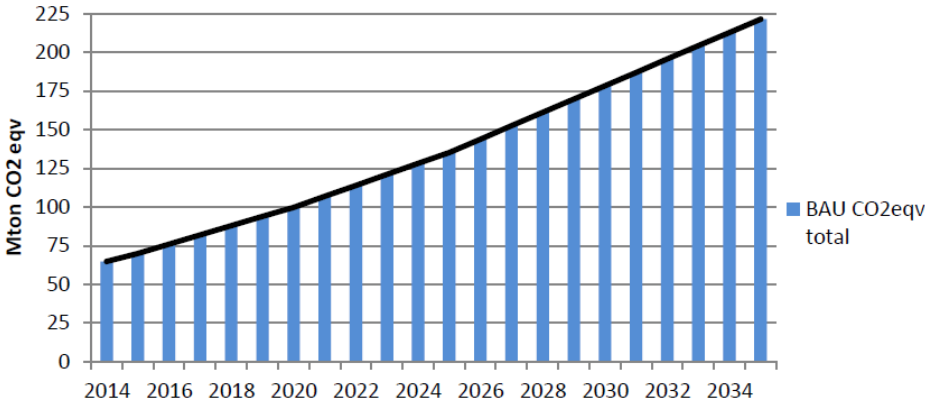


Figure 12: BAU related CO₂ emission; electric motors in the industrial and commercial sector

¹⁵ We expect that the present (old) electric motor stock can be replaced by the year 2035; taking into account the technical and/or economical lifetime of electric motors of different capacities.

Mitigation potential

The mitigation potential in terms of reduced electricity consumption, related to the BAU scenario, already was visualized in **Figure 5** of section 2.5. The below **Figure 13** shows the related CO₂ equivalent emission when a MEPS at a certain IE-class is introduced, and when the system approach is added, on top of IE4.

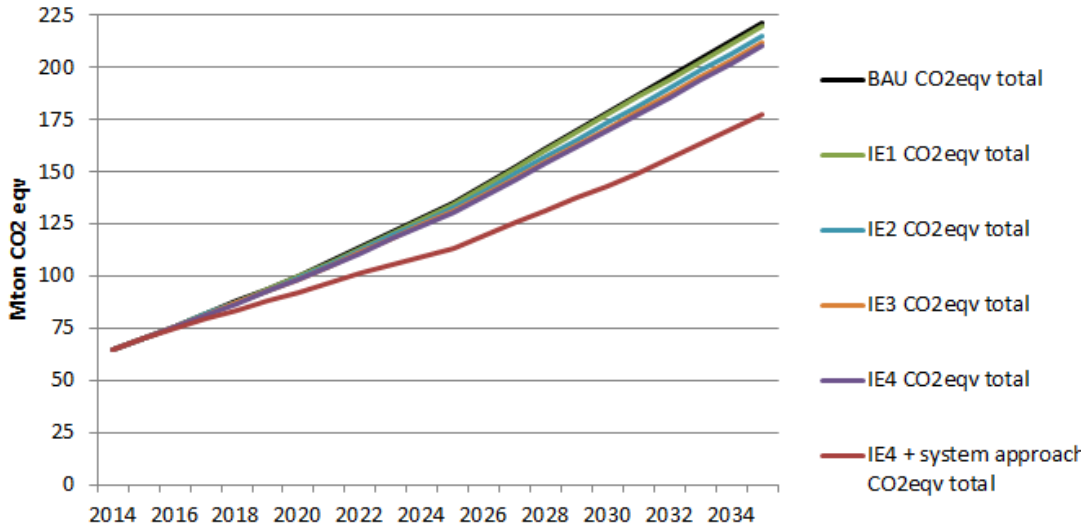


Figure 13: Emission reduction of MEPS IE-class and the system approach

Table 4 finally, gives for each scenario the potentials in numbers. In the bottom part of the table, first cumulative effects in 2035 are given for electricity savings, avoided CO₂ emissions, financial savings of the electricity bill for the industrial and commercial sectors and avoided governmental subsidies on electricity. In the last part of the table, this cumulative effect is turned into an average yearly effect by simply dividing the previous number by 20 years. The system level policy approach described in this NSP would quadruple the effects of a MEPS-only program.

Motor efficiency class	International coding	Market share and savings for chosen MEPS IE-class					
		Present share	MEPS on IE1	MEPS on IE2	MEPS on IE3	MEPS on IE4	MEPS and EE-EMDS
Super premium	IE4	0,3%	0,3%	0,3%	0,3%	100%	100%
Premium	IE3	1,5%	2%	2%	100%	0%	0%
High	IE2	3,3%	3%	98%	0%	0%	0%
Standard	IE1	56,1%	95%	0%	0%	0%	0%
Below Standard	IE0	38,7%	0%	0%	0%	0%	0%
Total share:		100%	100%	100%	100%	100%	100%
% sector savings MEPS IE-target		0%	0,7%	2,9%	4,4%	5,1%	20%
Cumulative results 2015-2035 (20 years)							
Cumulative savings sector 2035 (mln BOE)		-	10	44	66	78	321
Cumulative savings sector 2035 (TWh)		-	17	71	108	126	523
Cumulative avoided CO2 emissions sector 2035 (Mton)		-	15	62	93	110	454
Cumulative savings sector 2035 electricity mln USD		-	1.198	4.995	7.554	8.870	36.706
Cumulative savings governmental subsidies 2035 mln USD		-	713	2.973	4.496	5.279	21.847
Average results a year 2015-2035							
Average yearly savings sector until (mln BOE)		-	0,5	2,2	3,3	3,9	16,1
Average yearly savings sector (TWh)		-	0,9	3,6	5,4	6,3	26,2
Average yearly avoided CO2 emissions sector (Mton)		-	0,7	3,1	4,7	5,5	22,7
Average yearly savings sector 2035 electricity mln USD		-	60	250	378	443	1.835
Average yearly savings governmental subsidies mln USD		-	36	149	225	264	1.092

Table 4: Cumulative and yearly average effects of MEPS IE-targets and EMDS

Conclusions:

- Implementing the MEPS at level IE1 will until 2035 result in an average yearly electricity saving of 0.9 TWh. This relates to 0.7 avoided Mton of CO2.
- If from the first moment MEPS would be at level IE4 and the system approach would be part of the implemented policy, these numbers can be multiplied by a factor 30¹⁶.
- Taking into account the system approach, will increase the savings potential with an additional 15%-point *on top of introducing MEPS*.
- Probably the effects will be larger, since the system approach as described in this NAMA, reaches further then only electric motor driven systems

Mitigation potential by sector

- The four industries with the highest savings potential for energy efficient electric motor systems are iron and steel, complemented with textile and clothing, food and beverage and cement
- The commercial sector *as a whole*, has about the same savings potential as compared to all medium and large size enterprises within the industrial sector.

Mitigation potential of other fuels

All calculations so far, were based on the amount of electricity, delivered by PLN. But in Indonesia, enterprises generate their own electricity as well. From calculations we can conclude that on top of the electricity delivered by PLN, enterprises on average produce 25% more electricity by themselves. When we

¹⁶ In section 2.1, a factor of 25 has been mentioned instead, since Pillar 2 focusses on reaching the larger companies, responsible for 80% of the total electricity consumption.

take this into account, calculated energy savings potential so far (in absolute terms), will have been underestimated. The additional effect for avoided GHG emissions when following a MEPS programme will be more difficult to calculate, since for this we should take into account the mix of fuel used.

Relate the mitigation potential

As mentioned earlier, in September 2015, the government of Indonesia published its INDC, in which it announced the intention to reduce GHG emissions by 29% relative to business as usual in 2030 unconditionally, and possibly up to 41% with international support. That is broken down into an equivalent target of 253 MtCO₂e per year in 2030 from the energy sector. This suggests that the NSP, when implemented, could contribute 14% of the energy sector GHG mitigation that is targeted.¹⁷

6. Monitoring and Evaluation

Monitoring and Evaluation (M&E) of emissions is in theory relatively simple for Pillar 3, since companies that join a VA should monitor, evaluate and report to their related association. Associations combine the company results into a sectoral result, published on-line by the government. This obviously implicates that the NSU will make sure a reporting system is set up for this.

Monitoring and Evaluation (M&E) of Pillar 2 (70/2009) would be built around an existing online reporting tool that ESDM is currently rolling out with firms falling under the mandate of the current legislation. This would be extended to include additional firms in line with the planned lowering of the threshold. Pillar 1 (MEPS) is a matter of controlling the import of electric motors and would be monitored by the appropriate agency within the department of trade. This will be incidentally implemented in line with current plans to introduce a MEPS at IE1 level and would not need to be expanded for this NSP.

Finance and project M&E will be carried out within the NSP by the NSU following the M&E framework of the *donor*. The NSU will provide a preliminary and final M&E plan, bi-annual reports, a project review and a final project evaluation. A detailed M&E system will be established during the appraisal phase of the NSP. The expected costs of the M&E activities are yet to be determined.

¹⁷ According to Figure 5 the CO₂ emission due to electricity consumption of electric motor systems in the industrial and commercial sector is 178,4 MtCO₂e in 2030. The related electricity consumption is shown in Figure 4. to Figure 5 shows as well that this could be reduced to 142,7 MtCO₂e in 2030, following this NAMA. This difference of 35,7 MtCO₂e, would be 14% of the national target as described above.

7. Expected Budget and Financing Structure (in USD)

7.1 NSP Implementation: Overall financing contributions USD

	FC-Component	TC-Component	FC + TC Component	FC + TC, % of total
Personnel	75.000	6.562.500	6.637.500	4%
External Services		1.920.000	1920000	1%
Grants	100.401.878		100.401.878	66%
Tax-incentives	43.984.429		43.984.429	29%
Total	144.461.307	8.482.500	152.943.807	100%

7.2 NSP Implementation: Funding requirements from the donor USD

- The donor will cover all personal costs
- The donor will cover Grants meant for Investment Grade Audits (25% of total reservation for Grants); the remaining part comes from the financial savings of the Indonesian government, as mentioned under section 2.1
- Tax-incentives will be covered by the Indonesian government

	FC-Component	TC-Component	FC + TC Component	FC + TC, % of total
Personnel	75.000	6.562.500	6.637.500	20%
External Services		1.920.000	1920000	6%
Grants	25.000.000		25.000.000	74%
Tax-incentives			0	0%
Total	25.075.000	8.482.500	33.557.500	100%
Total as % of overall financial contribution	17%	100%	22%	

8. Other financial aspects

8.1 Justification for donor support

The Indonesian government has long recognised and dedicated public support for improving energy efficiency as a key part of energy and climate policy. Although considerable progress has been made in the past decades, there are still financial and non-financial barriers that hinder the uptake of energy efficiency in industry and the commercial sector. This NAMA combines on the one hand expansion and increased stringency of existing legislation, and on the other new policy tools such as VA's in order to achieve increased energy savings. External support will be required to stimulate the design, testing, and implementation of these interventions. Moreover, expertise is currently unavailable and international public support is needed to share the costs and lower the risk in order to proof the feasibility of these new instruments.

8.2 Concept for the phase-out of support

It is planned that this the supported aspects of this NSP will not require ongoing international contributions. Technical assistance to establish the technical, supporting and financial activities will be required in the short to medium term, and in directly contributing to the functioning of grant schemes for IGAs. In the longer term the aim of the NSP is to increase familiarity with the measures being promoted, create a functional market for these services/technologies and to reduce the reliance on grant financing. Some aspects of domestic contributions, for example around tax reductions and accelerated depreciation are expected to be continued over a longer horizon in support of the planned VA's.

Contact information

The development of this NSP has been assisted by ECN with the support of the Climate and Development Knowledge Network (CDKN). The project partner for that assistance has been the Directorate of Energy Conservation within ESDM.

The ECN contact point for this NSP is Mr. Jeffrey Sipma (sipma@ecn.nl).

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