



ISLAMIC REPUBLIC OF AFGHANISTAN



MINISTRY OF ENERGY AND WATER

AFGHANISTAN ENERGY EFFICIENCY POLICY

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Ministry of Energy and Water

Approved By Sector Responsible Authorities

Ministry / Agency	Name of Minister/Director	Signature
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FOREWORD

Afghanistan is building its energy sector to provide the back bone for its socio-economic development. Integrating energy efficiency practices to reduce losses across entire range of energy value chain starting from mining and extraction, transformation, transmission and distribution and end use sectors must become a priority for Afghanistan for long term sustainability of resources and providing access to clean energy for everyone. Energy efficiency in Afghanistan is regarded as an embryonic subject matter presently for policy makers as well as wider population, resulting in various levels of challenges in bringing about necessary changes in social and institutional landscape to carry out policy reforms related to energy efficiency.

This energy efficiency policy is a timely initiative that provides a direction to energy efficiency activities in the country by utilizing the collective strength and interdependencies of several stakeholders and government departments. It endeavours to achieve this by creating an enabling environment for the development of the energy efficiency sector in Afghanistan in short term, and facilitate private investment led energy efficiency market in long term

The salient features of the Afghanistan Energy Efficiency Policy are:

1. It specifies clear goals, objective, strategies and targets to initiate and implement programs and projects applicable to the energy efficiency sector in Afghanistan
2. Within the strategic intent of improving energy efficiency across all sectors, the policy takes a note of importance of public sector demonstrating leadership in adopting energy efficiency practices.
3. It highlights the important role a government has in making energy efficiency practices a mainstream choice for businesses & households through awareness raising, making knowledge accessible, creating regulatory drivers and design of proper financial signals.
4. The Policy mentions the institutional arrangement for its implementation, mechanisms to finance energy efficiency policy and resulting activities as well as the promotion activities which can be used to create awareness and engage stakeholders.
5. It provides guiding principles for executing and managing the energy efficiency activities as a whole, as well as within individual ministries, departments and representatives from private industry
6. The strategic intents and related policy actions have been prioritized for their implementation at short term (TERM 1) and long term (TERM 2) basis, on the basis of its effectiveness and ease to implement
7. A monitoring and evaluation framework has been provided to evaluate effectiveness of institutions engaged in delivering works resulting from this policy, both at program level, as well at policy level.

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The AEEP has been drafted in a collaborative manner. Various ministries, organizations and their representatives have been consulted and are duly acknowledged here for their support, guidance and valuable inputs throughout the process of development of this national policy.

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ABBREVIATIONS

ACCI	Afghanistan Chamber of Commerce and Industries
AEEC	Afghanistan Energy Efficiency Codes for Building
AEEP	Afghanistan Energy Efficiency Policy
AGBDS	Afghanistan Green Building Design Standards
AISA	Afghanistan Investment Support Agency
ANEP	Afghanistan National Energy Policy
ANSA	Afghan National Standards Authority
BAT	Best Available Technology
CDM	Clean Development Mechanism
CSO	Central Statistics Organization
DABS	Da Afghanistan Breshna Sherkat
DfID	Department for International Development
DoE	Department of Education
EE	Energy Efficiency
ESCO	Energy Service Companies
GoIRA	Government of Islamic Republic of Afghanistan
HIDs	High Intensity Discharge
ICE	Inter-Ministerial Commission for Energy
IT	Information Technology
LEDs	Light Emitting Diodes
MAIL	Ministry of Agriculture, Irrigation and Livestock
MEPS	Minimum Energy Performance Standards
MER	Monitoring, Evaluating and Reporting
MEW	Ministry of Energy and Water
MoF	Ministry of Finance
MoIC	Ministry of Information & Culture
MoRA	Ministry of Hajj and Religious Affairs
MRRD	Ministry of Rural Rehabilitation and Development
MoUD	Ministry of Urban Development
NEPA	National Environmental Policy Act
NLA	Net Lettable Area
OEE	Office of Energy Efficiency
QS	Quality Standards
RED	Renewable Energy Department
REN	Renewable Energy
RET	Renewable Energy Technologies
SMEs	Small and Medium Enterprises
T&D	Transmission & Distribution
TCO	Total cost of Ownership
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

Over the last decade, Afghanistan has made significant reconstruction efforts at all levels of the energy supply chain, in particular, the electricity sector. However, energy access continues to be an imposing challenge for the government. While Afghanistan is building up its domestic generation capacity, it becomes imperative to integrate energy efficiency principles within Afghanistan's energy policy landscape in order to best utilize the scarce energy resources, and reduce costs in the long term.

The Ministry of Energy and Water (MEW), as one of the key ministries to plan and direct the development of energy sector in Afghanistan, has now prepared the Afghanistan Energy Efficiency Policy (AEEP) which aims to provide direction to the energy efficiency activities in the country.

The scope of AEEP covers all sectors on the energy value chain being extraction, transformation, transmission and distribution and end use. The AEEP will be implemented in two terms, TERM1 and TERM 2, to achieve its strategic and policy goals. TERM 1 (2017 – 2020) will work to create enabling environment for the establishment of an energy efficiency industry in Afghanistan. TERM 2 (2021-2032) will be working to enable transition of the energy efficiency industry from a government led activity to a private investment led marketplace.

The Office of Energy Efficiency (OEE), proposed to be created within the Ministry of Environment and Water (MEW), will have primary responsibility for strategizing, planning, budgeting and coordinating the implementation of AEEP. A committee headed by deputy minister of MEW and comprising of relevant stakeholders will be responsible of creating OEE. The OEE will work with a range of public and private sector representative institutions to achieve its objectives and will develop into an independent decision making authority on EE in the long term.

Salient features of the Policy are:

1. The objective of the policy is to adopt an integrated approach to harness all resources on the supply side while applying good demand side management practices in all energy consuming sectors.
2. The policy sets targets for reducing losses in extraction, generation, transmission & distribution and end use and promotes identification and adoption of energy efficiency opportunities across all sectors of the economy through awareness creation and capacity building
3. It seeks leadership from the public sector to adopt energy efficiency practices by setting measurable targets across a range of activities and operations.
4. It advocates for the government to provide resources for business leadership to enable them embrace and lead energy efficiency objectives.
5. The policy encourages households and small to medium enterprises businesses to reduce costs by improving access to energy efficiency projects through technology and financing.
6. It seeks to strengthen consumer awareness in order to empower them make informed choices for energy efficient purchasing.

- 7. It supports setting up minimum and acceptable standards across a range of options – minimum energy performance scheme for appliances, energy efficiency rating schemes for buildings, minimum renewable energy integration targets for new developments - with the help of legislations.**
- 8. Policy acknowledges the need to create knowledge base and standards to support development of high quality of energy technologies and modern energy efficiency industry**
- 9. It encourages use of renewable energy as generation and demand side management as well as fuel diversification option**
- 10. It uses existing partnership platforms with other countries to exchange energy efficiency ideas, projects, finance and innovation**
- 11. It lays the foundation for setting up “basket-funds” for EE projects which would evolve into a dedicated EE financing institution in TERM 2 of the policy implementation.**
- 12. It recognizes the importance of institutional strengthening and possible reorganization, including setting up of new institution for strategizing, planning, budgeting and coordinating the implementation.**

1.0 CONTEXT AND BACKGROUND

1.1 Context

1. Afghanistan is currently experiencing an economic growth rate of sub 2% per annum, and expected to continue moving north¹. The country also continues to experience a consistently healthy population growth of approximately 3% per annum over the last few years². The combined effect of its population and economic growth is putting an upward pressure on annual energy demand, and is expected to continue in the coming years.
2. Even as Afghanistan is rich in energy resources, years of political instability has led to under investment in creation of infrastructure required for extraction, refinement, generation, transmission and distribution of energy services. These assets are critical in delivering a nation's objective of creating an equal opportunity, stable and prosperous society. As an outcome of this historic instability, the nation has been facing chronic challenges in providing energy access to all of its citizens, as well as developing its own energy security.
3. Over the last decade, Afghanistan has made significant reconstruction efforts at all levels of the energy supply chain, in particular, the electricity sector. As a consequence, electricity now reaches 30% population in 2016, compared to only 7% population in 2007, an increase of 23% in almost a decade³. This change has been a direct result of the reforms carried out by the federal government, which has prioritized providing energy supply to every user as one of its national objectives.
4. Even with such impressive results, energy access continues to be an imposing challenge for the government. Afghanistan has one of the lowest per capita electricity consumption in the world and it is mostly attributed to unavailability of both electricity and reliable electricity to a large number of Afghan populations. Moreover, only around a third of the Afghan population has access to electricity of which a majority stays in the urban areas. Kabul alone accounting for 80% of the connected load.
5. Also to note is Afghanistan's energy end use distribution, which is quite unique in global context. While industries account for a majority share in world's energy end use statistics in 2014, this spot is occupied by residential sector (73%) in Afghanistan. It is indicative of an economy, where with favorable global and internal conditions, high rate of growth can be achieved thus a corresponding increase in demand for energy. Energy efficiency, thus becomes a priority focus area for policy makers to reduce pressure on scarce energy resources.
6. The rural communities, which account for about 73% of the total population⁴, are still in the process of getting connected to the grid. This energy access wedge between urban and rural communities is further exacerbated by unavailability of clean fuel in the rural areas. According to the available statistics, more than 97% of the rural population use solid fuels (i.e. firewood, dung cakes, crop residues) for combustion to meet their cooking and space heating needs, usually in inefficient devices⁵. This practice creates adverse outcomes for health of rural communes, in particular, women and children.

¹ <https://www.adb.org/countries/afghanistan/economy>

² <http://www.worldometers.info/world-population/afghanistan-population/>

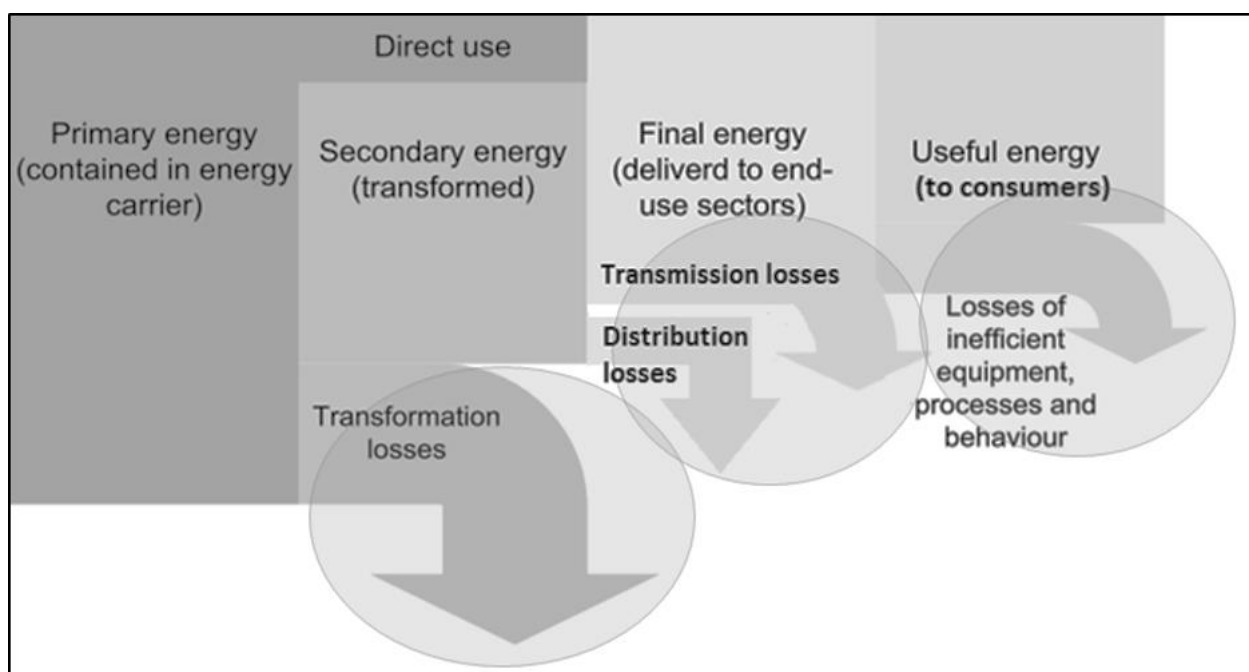
³ http://ethw.org/Electricity_Supply_in_Afghanistan

⁴ <http://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=AF>

⁵ https://www-cif.climateinvestmentfunds.org/sites/default/files/meeting-documents/afghanistan_eoi_0.pdf

7. The energy access challenge also emanates from the situation that Afghanistan is still building up its domestic generation capacity. Currently, it is heavily reliant on electricity imports, which is as high as 60% of the total installed capacity⁶. This brings home another issue of concern for Afghanistan in the form of energy security, which also stretches to other primary energy sources including oil and gas.
8. In 2014, nearly 97% of the country's oil needs were imported⁷. Lack of investments in gas production and transmission infrastructure has restricted development of identified gas reserves. On other hand, large scale construction activity and increasing number of transport vehicles in Afghanistan is resulting in an increase in demand of petroleum products. As an example, 13.7 motor vehicles per 1000 people were added to Afghanistan roads in the years between 2006 and 2011 creating additional demand for barrels of oil in that period⁸.
9. Given the above set of circumstances, investment in increasing the number of power stations, oil and gas extraction, transmission and distribution networks certainly becomes a high priority activity for Afghanistan. However, energy acquisition and distribution being a scarce and costly resource, it becomes equally important to minimize losses at each step of the energy supply chain, starting from production, distribution to end use at consumer level. It therefore becomes imperative to integrate energy efficiency principles within Afghanistan's energy policy landscape.

Energy value chain



Losses occur during energy transformation, transmission distribution and at end consumer use level. The strategic intent of an energy policy is to reduce these losses across entire energy value chain, using technical, procedural and behavioral interventions

10. Energy efficiency is about doing more for less. Each unit of energy which is saved by efficient use translates into a unit of energy not required to be produced. The flow on effects are reduction in carbon emissions, outdoor and indoor pollution and at a larger scale, avoidance of building new power

⁶ <http://red-mew.gov.af/red/index.php/login> assessed August 2016 & Energy Sector Status Summary Report Q2 2016- MoEC/ICE

⁷ <https://www.adb.org/sites/default/files/linked-documents/47282-001-ssa.pdf>

⁸ <https://knoema.com/atlas/Afghanistan/topics/Transportation/Road-transport/Motor-vehicles-per-1000-people>, Motor vehicles include cars, buses, and freight vehicles but do not include two-wheelers. Population refers to midyear population in the year

stations or fuel extraction and refining to cater to additional demand created by inefficient use. Therefore, energy efficiency becomes an important piece in addressing energy access and energy security challenges.

11. Energy efficiency signifies around 40 percent of the GHG reduction potential globally that can be realized⁹. Many nations have put emphasis on energy efficiency measures to stimulate their faltering economies. One of the objectives of Sustainable Energy for All (SE4ALL) - to double the global rate of improvement of energy efficiency – also reflects the global agenda of tapping energy efficiency market. Enhancing energy efficiency was one of the major focal point of the Paris climate agreement made in December 2015.
12. Adoption of energy efficiency measures and practices such as enforcement of building energy codes, mandatory minimum energy performance standards for appliances, taxes incentive and penalties to encourage use of energy efficient appliances, motor vehicles, energy efficient lighting in domestic, commercial, industrial and transport sectors have shown to reduce the intensity of energy demand without compromising on socio-economic growth. For instance, U.S. economic output expanded more than three times since 1970 while demand for energy grew only 50%¹⁰. According to IEA, total worldwide outlay in EE was USD 221 billion in 2015, an increase of 6% from 2014¹¹. The efficiency gains have been greatly led by policy and there are huge potential lying in regions where policy is absent or inadequate.
13. The National Energy Policy of Afghanistan and Afghanistan Renewable Energy Policy advocates energy efficiency to be integrated at all level of project cycle to maximize its benefits. Nationally Appropriate Mitigation Actions (NAMAs), which focuses on reducing emissions and contributing to sustainable development, has also listed EE as one of the main priorities. It recommended establishment of institutional framework, drafting of policy and guidelines, identification of low cost and high return options for implementation of energy efficiency and target of meeting 100 GWh saving.

1.2 Background

Energy efficiency as an area of focus has been a relatively new concept in Afghanistan. Currently, Energy Efficiency (EE) Unit within the Ministry of Energy and Water coordinates and implements energy efficiency works. A few of the significant milestones marking important developments in progression of energy efficiency as a mainstream activity in the country has been discussed below.

1. **Background Paper on Energy Efficiency (2012):** The energy efficiency background paper (2012) was perhaps the first such study done to identify energy saving potential in Afghanistan. Scope of this paper was limited to demand side electrical energy efficiency. The overall approach towards integrating energy efficiency within Afghanistan's energy landscape was proposed in three distinct terms, including, short term (1-3 years), long term (3-5 years) and continued reforms (5+ years). In the short term, the priority was to undertake energy saving projects which reliable and already available., while in the longer term, institutional reforms would be undertaken to develop an investor friendly marketplace. The paper examined a number of potential technical and policy solutions for improving demand side efficiency in the country, further shortlisted into seven programs to be

⁹ Energy efficiency: A compelling global resource - McKinsey & Company

¹⁰ *The History of Energy Efficiency*, Alliance Commission on National Energy Efficiency Policy, January 2013

¹¹<http://www.livemint.com/Industry/ReZqqB9J6GcRtVJ7yGjV9O/Progress-made-in-increasing-energy-efficiency-IEA-report.html>

implemented as priority, and included the following: Awareness campaign, Urban re-lamping program to replace incandescent based lighting with CFL, dissemination of solar water heater, Load management, large electric motor efficiency programs, improving building envelop performance and development of Afghan energy services industry.

Suggestions for longer term reforms included setting electricity pricing and tariffs to encourage actions to save energy, capacity building of institutions and industry, nationwide improvement in power quality, norms and standards for household appliances, data collection processes for monitoring and evaluation of projects, and financing mechanisms, incentives, legislations and regulations,

2. **Energy Audits:** Energy audit surveys were conducted at 12 of the government run facilities across Kabul (8), Nangarhar (3), and Herat (1) in the year of 2011. These audits included collection of energy consumption data from the buildings, recommend measures to reduce energy consumption and provide financial analysis of the measures based on energy savings. These projects have been conducted as “demonstration” projects in the country. The main objective of the demonstration projects was to set up a system through which people and utilities can see tangible results from efficient use of electricity and define the degree of possible potentials savings for future intervention. Some of the typical recommendations which were cross cutting for the 11 facilities included:
 - Replacement of Incandescent bulbs with CFLs
 - Replacement of CFLs with LEDs
 - Replacement of Fluorescent lights with lower power rated fluorescent lights
 - Halogen/Mercury Vapor lamp with LEDs
 - Use of energy efficient Variable Refrigerant Flow Air-conditioning units
 - Replacement of Higher Capacity Air-conditioners with lower capacity Air-conditioners
 - Replacement of electric water heaters/boilers with solar water heaters/boilers
 - Electromagnetic chokes with electronic chokes
 - Training and capacity building of building maintenance staff
3. **Readiness Survey:** In 2016, a review of the existing energy efficiency policy landscape was done in Afghanistan, with a view to identify potential gaps in effective promotion of energy efficiency and present next steps to create an energy efficiency policy for focused development of this area. The exercise involved one to one survey and consultations with respondents from government, household, commercial and industry. The output of this work identified lack of awareness and high cost of energy efficient products as main barriers in adoption of energy efficiency practices. Motivating factors as cited by the respondent to be considered in a future policy included personal responsibility and financial saving as the key drivers for change. Support was sought from the government in education and awareness, tighter regulations, access to qualified advice and availability of grants to support projects.
4. **Stakeholder Consultation:** It was also observed that despite recent efforts, development of energy efficiency sector in the country is yet to commence on a noticeable scale. Outcomes from stakeholder consultations identified energy efficiency an embryonic subject matter for policy makers as well as wider population, resulting in various levels of challenges in bringing about necessary changes in social and institutional landscape to push through the energy efficiency reforms.

Some of the challenges that have constrained this change include lack of institutional capacity to implement energy efficiency activities, inadequate systems and processes to capture data which

prohibits measuring and evaluation of energy efficiency interventions, development of energy management tools such as intensity indicators or accounting of country's energy balance. Other important gaps were identified in form of lack of budgetary support; well-defined roles and responsibilities for ministries and departments and poor awareness level among general public & institutions.

5. **Review of six EE Policies:** Through a desktop research of energy efficiency policies from six countries (Australia, China, Germany, India, Pakistan, Kazakhstan), it was observed that some of the features of a well working framework include promotion and adoption of energy efficiency across sectors through various institutions and measures. Establishment of energy efficiency agency was acknowledged in almost all the policies as a necessary instrument to foster the implementation of EE policies.

Regulations like energy labeling and standards have proven effective in lowering energy consumption of specific appliances and equipment and to speed up the diffusion of energy-efficient equipment in the market. Economic incentives aimed at encouraging investments in energy efficient equipment, buildings and processes by reducing the upfront cost, either directly (financial incentives like subsidies, low interest loans) or indirectly (fiscal incentives like tax reduction) have been introduced in almost all EE policies.

Due to constraints on government budgets, policies recommended involvement of the private sector in supporting investments in energy efficiency, through energy service companies (ESCOs) and energy utilities. Energy-savings obligations are an innovative measure in which energy companies have a legal obligation to undertake energy-efficiency activities with their customers. However, a strong institutional setup was required to achieve the participation of private investors in energy efficiency market.

6. Taking the above into account, a concept paper on Afghanistan energy efficiency sector was prepared. This paper recommended development of a national energy efficiency policy which would include political and regulatory measures; financial support mechanism; awareness creation and technical education for capacity building; creation of market conditions and low-risk business environment to overcome the barriers and create favorable regulatory and institutional environment for uptake of EE in Afghanistan.
7. The Afghanistan Energy Efficiency Policy (AEEP) 2016 is an outcome of a consultative process which includes government and private sector. The policy is aimed at providing direction to the energy efficiency activities in the country. It envisions achieving this through utilizing the collective strength and interdependencies of several stakeholders and government departments by creating an enabling environment for the development of the energy efficiency sector in Afghanistan. The drafting of the AEEP is authorized by the Presidential Decree.

2.0 ENERGY SAVING POTENTIAL

1. A list of possible energy efficiency activities applicable to Afghanistan’s context and their respective energy saving potential is provided in this section. This list is based on desktop research of publications from several countries including India, France, Thailand, Tajikistan and a 2014 report on World Energy Investment Outlook from the International Energy Association (IEA).
2. Listing of energy efficiency opportunities is primarily concentrated on areas of the economy using electricity as the energy source; however, observations have also been made for energy efficiency opportunities in other sectors which may not use electricity, for example, agriculture, on high level estimates.
3. The list is intended to be used as a guide to further investigate and prioritize implementation of energy saving activities specific to Afghanistan for each of the involved sectors. As the energy saving opportunities and associated savings are indicative and based on desktop research, the actual values may vary once the activities have been implemented.

2.1 End use/Demand side energy consumption

4. In reference to the electricity end use in Afghanistan, it is important to recognize that after years of instability, the country is currently undergoing significant reconstruction exercise. Among other important programs, efforts to provide access to electricity to every section of population in Afghanistan are currently underway.
5. Currently, electricity access is mostly available to urban consumers. For example, the Kabul metropolitan area alone accounts for about 80% of the connected load in the country. This also highlights the urban versus rural divide the country faces in addressing the energy access challenge.
6. Most of the residential energy goes towards heating and cooling a house, followed by appliances, and lighting. Even as the above data may not be exactly applicable to Afghanistan, it does give a rough indication of the areas where energy is usually consumed.
7. The energy efficiency opportunities which are typically present in household sector are listed in the table below. These opportunities have been categorized as per the energy end use of the household sector. The energy efficiency potential improvement has been suggested relative to the baseline technology, whereby, the baseline technology represents the existing inefficient measure.

Energy Efficiency Opportunities in household sector

Category	Technology/Measure	Efficiency Improvement Potential
Lighting Baseline Technology	Incandescent, Halogen based, T8 Fluorescent	Baseline
Lighting Alternatives	Upgrade to CFL Technology	Up to 25%
	Upgrade to T5 Fluorescent tubes	Up to 20%
	Upgrade to LED technology	up to 40%

Category	Technology/Measure	Efficiency Improvement Potential
	Sky lighting	up to 100%
	Sensor and timer controls	Add 5% - 20%
Space Cooling Baseline Technology	Air conditioner	Baseline
Space cooling Alternatives	Air source heat pump	up to 50%
	Advanced air heat pump	up to 70%
Space Cooling Baseline Technology	Ceiling Fans	Baseline
Space cooling Alternatives	High efficiency ceiling fans	up to 20%
Space Heating Baseline Technology	Electric radiators	Baseline
Space Heating Alternative Technology	Electric heat pump	up to 50%
	Biomass fired heater	Fuel Switch
Insulation Baseline Technology	No insulation	Baseline
Insulation Alternative Technology	Loft Insulation	up to 25%
	Floor insulation	up to 15%
	Double glazing windows	up to 15%
	Solid wall insulation	up to 20%
Whitegood Appliances	Least efficient appliance	Baseline
	Efficient appliance	up to 50%
	BAT appliance	up to 70%

8. Public building is the next largest sector with 11% of total demand side electricity consumption. Many of its end uses of electricity are likely to be very similar to the household energy consumption, although on a larger scale. Therefore, the energy efficiency opportunities available for this sector is likely to be very similar to the ones identified for residential sector in the above table. Energy measures which are specific to the public building sector are provided below and are in addition to the measures suggested in Table.

Energy Efficiency Opportunities in Public building sector (in addition to the household sector)

Category	Technology/Measure	Efficiency Improvement Potential
Street Lighting Baseline Technology	Mercury Vapor, T8 Fluorescent	Baseline
Street Lighting Alternatives	Upgrade to CFL Technology	Up to 25%
	Upgrade to LED technology	up to 40%
	Stand-alone solar and battery based street light systems	Fuel Switch

Category	Technology/Measure	Efficiency Improvement Potential
	Sensor and timer controls	Add 5% - 20%
Street Lighting Baseline Technology	Metal Halide, High Pressure Sodium (HID lamps)	Baseline
Street Lighting Alternatives	New generation HID lamps	up to 20%
	Sensor and timer controls	Add 5% - 20%
New design	Lowering pole height to 8 meters will enable using LED lights	Up to 50%
Space Conditioning Baseline Technology	Fixed air volume HVAC	Baseline
Space Conditioning Alternative Technology	Variable air volume HVAC	up to 50%
	Building Management System	up to 25%
	Variable refrigerant volume space conditioning	up to 30%
	Variable frequency drives on air handling units	up to 30%
Space Heating Baseline Technology	Old Boilers – Coal, oil or inefficient models	Baseline
	Condensing Boilers	up to 20%

9. Commercial sector is the third largest end electricity consumer with about 11% of the total. The opportunities identified for the residential and public building sector would cover a majority of potential energy efficiency opportunities.
10. Industries are a fast growing sector in Afghanistan. Industries being diverse and complicated systems tend to have energy efficiency opportunities which are very specific to each industry type. However, there are several energy efficiency opportunities which cut across a range of industry facilities, within several processes of an industry. A selection of these opportunities commonly found in each of the processes with energy saving opportunities closer to 8% is provided in the table below.

Energy Efficiency Opportunities in Industry (Cross sectoral)

Industry Process	Process Step	Efficiency Improvement measures	Efficiency Improvement Potential
Boilers / Steam systems	Steam Piping	Improve steam traps and maintain steam traps	8%
		Repair leaks	3%
		Insulation measures	7%
	Boilers	Boiler maintenance	10%
		Vapor recompression	10%
		Flash and Return condensate heat recovery	5% - 10%
'Furnaces / Process Heater	Furnace	Efficient design burners (e.g. low NOx)	12%

Industry Process	Process Step	Efficiency Improvement measures	Efficiency Improvement Potential
		Flue gas heat recovery	13%
		Reducing wall heat and radiation losses	5% - 10%
		Improved process controls (e.g. air-to-fuel ratio)	6.0%
Cooling and refrigeration	Refrigeration	Systems optimization	8.0%
		Improved process measuring and control	5.0%
		Improved insulation	5.0%
Motor-driven equipment	Pumps	Isolate flow paths to non-essential equipment	10.0%
		Use of pressure switches	5.0%
		Predictive maintenance	9.0%
		Trim or change impeller to match output	15.0%
		Remove sediment/scale buildup	7.0%
		Install variable speed drive	15.0%
		More efficient pump	15.0%
	Fan	Isolate flow paths non-essential or non-operating equipment	8.0%
		Correct poor airflow conditions at fan inlets and outlets	5.0%
		Install variable speed drive	20.0%
		Replace oversized fans with more efficient type	11.0%
	Compressed Air Systems	Fix leaks, adjust compressor controls, establish ongoing plan	15.0%
		Shut-off idle equipment, engineered nozzles	8.0%
		Eliminate inappropriate compressed air uses	13.0%
		Eliminate artificial demand with pressure optimization/control	7.0%
		Install sequencer	8.0%
		Variable speed drive	15.0%
		Size replacement compressor to meet demand	13.0%

Industry Process	Process Step	Efficiency Improvement measures	Efficiency Improvement Potential
Overall system	Overall system	Preventative maintenance	5% - 15%

11. Other energy end use sectors which have not been accounted in the electricity end use profile include transportation and agriculture. Suggested energy efficiency opportunities for the transportation sectors have been discussed below.
12. Energy efficiency in transportation sector can be achieved broadly through three ways. These include improvement in energy efficiency of motor vehicles, improvement by shifting the modes of travel or goods transport and improvement by travel demand management.
13. The later two are largely achieved through strategic level interventions, such as deployment of mass transit systems, use of a mix of transport modes to move people and freight, transport planning integrated with land use planning and measures like congestion tax to alter user behavior to name a few. These are typically result of a long term planning process and can be carried out at the stages of developing blueprints for land use and transport planning for a city or province.
14. In Afghanistan’s context, improving energy efficiency of motor vehicle may be an opportunity which can be achieved in the short term. A list of such opportunities is provided in the following table. This list is focused on achieving energy efficiency through technical improvements which may be possible within new vehicles. Some opportunities, such as low resistance tire and automatic start and stop function can be a retrofit to older vehicles.
15. As data for type of fuels and end use of energy within the transportation sector is not available, an assumption was made that petrol and diesel are the most used forms of transport fuel, and a majority of this fuel is consumed within the road transport sector, including freight and passenger vehicle. Railways, flight, defense vehicle and water based transport has been excluded from the list of suggestion for the energy efficiency activities. These can be added at a later stage as the knowledge and understanding of the aforementioned sector increases with improved data collection.

Energy Efficiency Opportunities in Transport sector (Passenger vehicle)

Process category	Efficiency Measure	Efficiency Improvement Potential
Petrol and diesel IC engines	Direct injection	15.0%
	Variable valve actuation and lift	13.0%
	Tyres: low rolling resistance	4.0%
	Light weighting (Aluminium)	4.0%
	Start and stop	3.0%
Petrol Hybrid Engines	full hybrid - electric drive	33.1%
(Measures additional to the petrol IC engines)	Direct injection	7.0%

Process category	Efficiency Measure	Efficiency Improvement Potential
Diesel Hybrid Engines	full hybrid - electric drive	31%
(Measures additional to the diesel IC engines)	Advanced combustion technologies	4.0%

Energy Efficiency Opportunities in Transport sector (Freight Trucks)

Transport Means	Process category	Efficiency Measure	Efficiency Improvement Potential
Heavy Freight Trucks (HFT)	Intelligent transport systems (ITS) and Information/communication technologies (ITC)	Driver Support Systems	5%
	Vehicle	Single wide tyres	5.0%
	Drive train	Automated manual transmission	5.0%
	ITS / ICT	Vehicle platooning	4.0%
	Engine	Pneumatic booster – air hybrid	4.0%
	Vehicle	Light-weight materials	3.5%
	Engine	Bottoming cycles/waste heat recovery (e.g. organic Rankine)	3.5%
	Vehicle	Low rolling resistance tyres	2.0%
Medium Freight Trucks (MFT)	Engine	Start/stop automatic	8.0%
	ITS / ICT	Driver support systems	6.0%
	Engine	Smart alternator, battery sensor, electric accessory drive	5.0%
	Drive train	Automated manual transmission	5.0%
	Vehicle	Light-weight materials	4.0%

Note: some of the recommendations from HFTs are applicable to LFTs as well and hence not been included to avoid repetition.

16. Within the agriculture sector, diesel and electricity use is assumed as major sources of energy consumption. Observing the nature of agriculture in similarly placed economies, it is likely that the energy end use in this sector is dominated by pumping equipment, motor driven farm machinery, and utility vehicles such as the farm tractors.

17. As like the transport sector, a list of suggestions for energy efficiency activities for agricultural sector is provided below. These suggestions will expand and improve at a later iteration of the policy as knowledge and understanding of the agriculture sector increases with improved data collection.

Energy Efficiency Opportunities in Agriculture sector

Category	Technology/Measure	Efficiency Improvement Potential
Pumping Baseline Technology	Old inefficient pumps	Reference
Pumping Alternatives	Upgrade to energy efficient pumps	Up to 35%
	Change motors to energy efficient versions	up to 5%
	Stand-alone solar PV based pumping systems	Fuel Switch

18. Indirect methods of reducing upstream energy use by reducing consumption of resources on farm have not been included. An example of this would be reducing use of chemical fertilizer in the fields to collectively reduce the demand on imports/manufacturing, thereby reducing upstream energy consumption within the economy.

2.2 Electricity transformation/generation side

19. Opportunities for energy efficiency in the electricity generation/transformation segment are typically challenging for the existing power plants as they are technically limited due a complex inter-related design, operation and maintenance issues, including technology choice, loading constraints and fuel availability. Moreover, about 60% of Afghanistan’s electricity demand is catered by imports, thus limiting the opportunities to make changes in the power generator fleet.
20. However, as the energy generation sector matures overtime, and at some stage into the future, data on current efficiency levels are available, legislative or market based incentives can be provided to generation asset operators to bring the power generation fleet closer towards best practice efficiency levels. Studies have demonstrated that even small increments in energy conversion efficiency of the generation technology can yield large number of savings over its life. As an example, the following table illustrates savings in fuel and pollution reductions by only a 0.1% improvement in generation efficiency¹².

Effect of marginal efficiency improvement in generation assets

Specifics	Unit	Fuel type			
		Hard Coal	Lignite	Oil	Gas CC

¹² Eurelectric, 2003, “Efficiency in Electricity Generation”, Source: <http://www.eurelectric.org/Download/Download.aspx?DocumentID=13549>., Accessed 2/09/2016

Rated Capacity	MW _{elec}	800	900	500	300
Existing efficiency	%	42%	40%	44%	57%
Improved efficiency	%	42.1%	40.1%	44.1%	57.1%
Savings in fuel consumption	Tonnes/annum	3,382	19,400	200	331
Reduction in CO ₂ emissions	Tonnes/annum	8,938	16,800	800	790

Note: Saving were also achieved in emissions for other hazardous pollutants, including NO_x, sulfur, ashes and dust.

21. In the above scenario and at current stage of developments, improving energy efficiency in generation side is usually more effective as a strategic asset acquisition and management paradigm. In this case, strategic planning is done around end of life replacement of existing generation assets. At the time of designing and procurement of new energy generation assets, an informed choice of best available technology (BAT) at the time becomes a critical decision issue.
22. Even as the upfront cost of procuring the BAT may appear to be on higher side as compared to the vintage models, a life cycle cost analysis should be done before making a decision. An approximation of potential improvement in energy efficiency of electricity generation assets from using BAT at the time of replacing an end of life asset is provided as follows¹³.

Potential efficiency opportunity by replacing assets with BAT at end of life

Category	Technology	Vintage Efficiency 2007	BAT Efficiency 2030	Efficiency Improvement Potential
Coal	Pulverized Coal Combustion	47%	54%	7%
Gas	Combined Cycle Gas Turbine	58%	65%	7%

23. As climate change agreements come into force around the world, and transition to a clean energy generation continues to become a priority, renewable energy and storage system are increasingly becoming core considerations in creation of new power generation assets. As an example, In the year 2015, renewable sources (i.e., biomass, geothermal, hydropower, solar, wind) accounted for almost two-thirds (63.85 percent) of the 16,485 MW of new electrical generation placed in service in the United States¹⁴.
24. In this case, energy efficiency in renewable based generation becomes an important topic of consideration. However, energy efficiency in renewable energy technologies tend to have a range of drivers for efficiency, and for dominant technologies such as wind farms or solar PV, fuel costs or CO₂

¹³ Joint Research Centre of the European Commission, 2012, "Analysis of energy saving potentials in energy generation: Final results: Source:

<https://setis.ec.europa.eu/sites/default/files/reports/Analysis-of-energy-saving-potentials-in-energy-generation.pdf> , Accessed 2/09/2016

¹⁴ <http://www.renewableenergyworld.com/articles/2016/02/renewables-provides-two-thirds-of-new-us-generating-capacity-in-2015-3-500-times-more-than-coal.html>

pollution is not an item of concern, this area is excluded from the scope of further investigation on energy efficiency.

2.3 Electricity transmission/distribution side

25. As per the available data, the transmission and distribution line losses in Afghanistan’s electricity sector are in the order of ~ 23%¹⁵. The world average is in the order of 9.5% and generally recognized efficiency standards are usually between 6 % - 8%.
26. Therefore, the potentials for reducing electricity transmissions and distribution losses could be estimated to 15%. The following activities are usually undertaken to reduce losses in the T&D system.

Potential efficiency opportunity in T & D

Category	Technology/Measure	Efficiency Improvement Potential ¹⁶
Transmission	Re-conductoring	30-70%
	Transition to High Voltage Direct Current Transmission for long distance lines	10-20%
	Controlling Power Flow through Flexible Alternating Current Transmission System (FACTS)	50%
Distribution	Load Management	8-20%

¹⁵ Tahirzada, Z. 2005, Status of Energy Efficiency in Afghanistan, Presentation for Energy Efficiency Conference, Kathmandu, Nepal. Source: energyefficiency.gov.np/uploads/1_11_zabiullah__1449805762.pdf

¹⁶ Opportunities for Energy Efficiency Improvements in the U.S. Electricity Transmission and Distribution System (April 2015) prepared by OAK RIDGE NATIONAL LABORATORY

3.0 SCOPE, VISION AND GOALS

3.1 Scope

1. The scope of AEEP covers all sectors on the energy value chain being extraction, transformation, transmission and distribution and end use.
2. It covers all sectors of the economy to promote energy efficiency being households, commercial, government, industrial, transportation, agriculture and mining sectors of Afghanistan
3. It provides overarching goals, strategic responses and policy tools to incentivize reducing energy consumption across multiple sectors in Afghanistan.
4. It also specifies a list of potential actions for generation and supply side (transmission and distribution) energy efficiency which can be investigated by relevant agencies
5. It covers all forms of fuels used in Afghanistan's economy including electricity, coal, wood, petroleum products and gives recommendation on making a shift to cleaner fuel/clean technologies
6. It offers a framework for balancing the interests of consumer, while at the same time, gives a rational basis for deciding government interventions and priorities
7. It guides the planning of key ministries and departments in the context of energy efficiency. These are - MEW, ICE, DABS, ANSA, CSO, MRRD, MoUD, MAIL, NEPA & others

3.2 Vision

The Vision of AEEP is enshrined in the Vision of Afghanistan - *A society of hope and prosperity based on strong, private sector led economy, social equity and environmental sustainability*. The vision statements of AEEP has been listed below

1. **Energy Security:** Reduce Afghanistan's dependence on imported energy,
2. **Energy Productivity:** Optimal utilization of available energy resources by minimizing wastage,
3. **Energy Access:** Converting wasted energy to usable energy to bring more populations within reach of energy services,
4. **Sustainable Growth Pathway:** Foster a development pathway with a mix of low energy intensity (or high energy efficiency) and renewable energy

Improving energy efficiency of economy is fundamental to addressing the challenges of energy access, security of energy supplies, improving economic productivity and creating economic transformation, innovation and growth aligned with sustainability principles. The objectives of AEEP, in the above context, are to ensure efficient utilization of the energy resources in all possible manners and to adopt an integrated approach to harness all resources on the supply side while applying good demand side management practices in all energy consuming sectors in order to realize the vision. AEEP will provide tools and guidance for development, implementation, monitoring and continuous improvement of energy efficiency sector in Afghanistan.

3.3 Overarching Goals

- 1. Improve energy efficiency across all sectors of economy, government, businesses and households, by setting targets for reducing losses in extraction, generation, transmission & distribution and end use.**
- 2. Promote identification and adoption of energy efficiency opportunities across all sectors of the economy through awareness creation and capacity building.**
- 3. Enable implementation and financing of energy efficiency measures across all end use sectors using both regulatory and market principles.**
- 4. Ensure energy products and services offered in Afghanistan meet desired quality standards as it transitions towards an energy efficiency based economy**
- 5. Use energy efficiency to address cross cutting issues including climate change, clean energy, energy access and energy security and health and productivity outcomes, in particular to rural areas.**
- 6. Foster international cooperation, particularly with countries in the region having similar socio-cultural milieu for cross learning, promotion of energy efficiency as a product and service industry and driving innovation for jobs and growth.**

The framework for Afghanistan Energy Efficiency Policy is presented below. Specific overarching goals, strategies and resulting policy tools of AEEP to meet the said objectives are presented in detail in the next section.

FRAMEWORK FOR AFGHANISTAN ENERGY EFFICIENCY POLICY

VISION	<p><i>Energy Security: Reduce Afghanistan's dependence on imported energy</i></p> <p><i>Energy Productivity: Optimal utilization of available energy resources by minimizing wastage</i></p> <p><i>Energy Access: Converting wasted energy to usable energy</i></p> <p><i>Sustainable Growth Pathway: Foster a development pathway with a mix of low energy intensity and renewable energy</i></p>								
OBJECTIVES	<p><i>To ensure efficient utilization of the energy resources in all possible manners</i></p> <p><i>To adopt an integrated approach to harness all resources on the supply side while applying good demand side management practices</i></p> <p><i>To provide tools and guidance for development, implementation, monitoring and continuous improvement of energy efficiency sector</i></p>								
GOALS	1. Improve energy efficiency across all sectors	2. Promote identification and adoption	3. Enable implementation and financing	4. Ensure quality standards	5. Use EE to address cross cutting issues	6. Foster international cooperation			
STRATEGIES & ACTIONS	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; vertical-align: top; padding: 5px;"> <p>1. Greening of building sector</p> <ul style="list-style-type: none"> • Enforce AEEC in all new buildings • Introduce green building rating systems • Energy efficient lighting in public & private buildings • Retrofitting of old buildings <p>2. Public lighting</p> <ul style="list-style-type: none"> • Use LEDs or low energy HIDs in public lighting • Solar powered lights in areas of good solar access <p>3. Appliances & equipment</p> <ul style="list-style-type: none"> • Energy performance standards • Energy efficiency labelling <p>4. Transport sector</p> <ul style="list-style-type: none"> • Vehicle labelling • Alternative fuel vehicles <p>5. 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Laws and Regulations</p> <ul style="list-style-type: none"> • Regulation for creating EE industry in Afghanistan • Set up minimum and acceptable standards • Create financial & fiscal measures • Introduce EE certificate, cap and trade scheme </td> <td style="width: 33%; vertical-align: top; padding: 5px;"> <p>10. Energy service companies</p> <ul style="list-style-type: none"> • Government backed guarantees for ESCOs to improve access to finance • Creation of dedicated government backed financing body • Standardisation of contract procedures and M&V procedures • Accreditation of ESCOS to ensure quality assurance <p>11. Knowledge base and standards</p> <ul style="list-style-type: none"> • Create standards for product specifications • Create standards for energy audit • Create standards for testing & measurement • Introduce EE as subject in school & university curriculum • Develop manuals & guidelines • Build capacities through workshops, demonstration etc. <p>12. 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4.0 STRATEGIES AND POLICY ACTIONS

The overarching goals are supported with the way of strategies which provide a high level pathway to achieve these goals. The strategies have been designed to improve EE across sectors and address the barriers to the uptake of energy efficiency measures and technologies. The strategies are further supported with policy tools which provide action level details required for realization of strategy. The strategies and actions have been listed below:

4.1 Greening of building sector

Buildings account for about 93% of all electrical energy in Afghanistan and a significant share of greenhouse gas emissions. The building sector covers a varied set of end use activities, which have different energy use effects. As the country develops, energy demand from the building sector will continue to increase. Thus, energy efficiency in building sector is especially significant owing to rapid new construction with opportunities to utilize efficient materials and best practices.

The policy proposes to set performance targets on new and old public & private buildings. The goals are set on a TERM 1 timeframe, and will require creation of legal and institutional framework to deliver on these changes. The specific actions are as follows:

- **Enforce Afghanistan Energy Efficiency Codes for Building (AEEC) in all new buildings:** Building Code sets requirements for the energy performance of buildings. New buildings designed and constructed on recommended measures of AEEC will save significant amounts of money over a building's life. Afghanistan energy efficiency codes for buildings (AEEC) must be aggressively enforced for the new constructions to follow best practices. The policy sets a target of
 - 100% of all new construction above 2000m² of NLA, both for private and public sector, will be required to be rated under AEEC.
- **Introduce green building rating systems:** Green rating system provides a scale to measure the sustainability standard of building's design, construction and operation. Through each criteria and sub criteria, rating system evaluates the performances of the building and award rating. Buyers favor energy efficient buildings which guarantee reduced life cycle costs.
 - Introduce an operational building rating system suitable for all classes of buildings within Afghanistan.
 - 100% of all buildings in use above 1000m² of NLA, both for private and public sector, will be required to be rated under green building rating system.
- **Energy efficient lighting in public and private buildings:** All public buildings can realize significant cost savings and reduced energy use by choosing energy efficient lighting. Making the switch to energy efficient lighting is a good way to get started on becoming more energy-efficient, since it typically has such a short payback period. The policy has put a target of
 - 100% of incandescent, halogen and old generation fluorescent based lighting to be phased out and replaced with LEDs or other best available technology in homes and other buildings.
- **Retrofitting of old buildings:** Since many households, private offices, factories and public building have been constructed in earlier times and typically contain inefficient appliances, building envelop as well

as technologies, it is beneficial for the owners of these buildings to retrofit them with newer and more efficient appliances and technologies, and where feasible, building envelop and insulation. While government owned buildings tend to be easier and more practical to enforce to undertake a retrofit project, it is suggested that commercial, residential and industrial building owners shall also be encouraged to undertake energy efficiency improvements in their buildings by way of financial incentives. Policy proposes a target for retrofit buildings as follows:

- 30% of NLA of government buildings, including factories built on or before 2016 must have had energy efficiency upgrades
- 30% of NLA of private buildings, including factories built on or before 2016 must have voluntarily undergone energy efficiency upgrades

4.2 Public lighting

The potential for energy savings from making public lighting more energy efficient can be substantial and relatively simpler to achieve. Public lighting may account for as high as 30% - 50% of the overall energy expenditure of a municipality, depending on asset base. Adoption & promotion of best available technologies like LEDs/HIDs or solar powered lights for public lighting could also help, apart from reduction in electricity, break down barriers for adoption of energy efficient lighting in other sectors. The policy suggests following targets:

- Energy efficiency of public lighting assets further improved from 2016 levels with use of best available technologies such as the LEDs or low energy HID.
- 50% of the public lighting assets in areas with good solar access to be powered with solar energy

4.3 Appliances & equipment

Energy consumed by residential appliances and industrial and commercial equipment is a major source of greenhouse gas emissions globally. The Strategy includes a range of measures aimed at increasing the energy efficiency of appliances used in the residential, commercial and industrial sectors. Following action items have been proposed under this strategy:

- Energy performance standards are the most widely used measures globally to reduce energy use and greenhouse gas emissions from appliances and equipment. Minimum Energy Performance Standards (MEPS) provide consumer protection in a higher energy price context by ensuring that inefficient appliances are not available in the market. The policy sets the following target:
 - 100% of all new appliances and equipment manufactured or imported in Afghanistan to meet minimum energy performance and quality standards
- Energy efficiency labelling assists consumers by providing information, allowing them to make coherent choices having regard to likely life cycle costs. It acts as an incentive for manufacturers to set apart from their competitors and promote introduction of new and efficient versions. The following target has been set:
 - 100% of all new appliances and equipment manufactured or imported in Afghanistan to meet energy efficiency labelling

4.4 Transport sector

Most of the oil in Afghanistan is imported, which exposes the country to unstable international oil prices. Deployment of advanced technologies and alternative fuel vehicles can reduce use of imported oil resources in transport sector. Measures to improve energy efficiency in transport contribute not only to a decrease in fuel consumption, but also to the reduction in CO₂ emissions. The policy intends to introduce following action items for this strategy:

- Vehicle labelling helps customers to understand and compare vehicle choices on the basis of fuel economy and CO₂ emission level displayed on vehicles. This enables consumers to view the features of other vehicles that they might not have otherwise considered. The policy puts the following target:
 - 100% of all new vehicles manufactured or imported in Afghanistan to meet green labeling requirement based on kgCO₂/km performance.
 - The efficiency of light and heavy vehicles entering the fleet has further improved from 2016 levels.
- Alternative fuel vehicles: Options for alternative fuel vehicles - from electric cars to natural gas-powered buses and trucks that run on biodiesel - are increasingly becoming available. Increasing the fleet of alternative fuel vehicles in the Afghanistan economy will help reduce oil imports and also reduce pollution. The following target have been set under this action
 - 10% of all new light and heavy vehicles entering the fleet must be based on EV and alternative fuel technology

4.5 Generation, transmission and distribution of electricity

Electricity and gas networks play a key role in the achievement of sustainable development. It is therefore equally important, like the demand side sectors, to incorporate energy efficiency in network design and operations of the existing and new power generation fleet in Afghanistan. The policy recommends following targets to drive the operations of generator feet and T&D network towards more energy efficient outcomes, based on the existing scenario.

- 100% of power plants to monitor and report on their operating efficiency performance.
- 100% of power plants to meet the efficiency standards observed in average high efficiency performing power generation assets.
- The transmission and distribution losses in government run energy T&D assets to get in step with global best practices from 2016 levels. Currently it is around 28% with an aim to reduce to 10% in 2032.

4.6 Mining, oil & gas extraction

Mining and extraction industries tend to be the most energy use intensive sectors within an economy. They also tend to be the most complex to manage as they come with a range of technologies which are applied based on specific needs of a mining or extraction process, geology and technique. However, a number of technologies used within the processing stages can be made more efficient with help of low-cost measures, optimization of production processes, and reliability of electric power supply. Taking the above into account, the policy suggests the following:

- 100% of all process operations and equipment built before 2016 retrofitted with efficient motors, pumps, compressor, turbines and heat recovery systems.
- 100% of new purchased or leased vehicle fleet to meet fuel efficiency standards
- 10% of new purchased or leased fleet vehicles to have automated driverless systems for optimized fuel efficiency

4.7 Supporting Businesses, Enterprises & Commercial Establishments

Participation of private sector is critical in ensuring success of new markets and programs such as the energy efficiency, and in cases like those similar to current status of Afghanistan, government leadership is deemed critical in starting and catalyzing a new market. A mix of incentives, knowledge and price signals are often used to guide development of the energy efficiency industry. As the market mature with help of consistent and good quality information, reliable projects and verifiable savings, the government's role as a regulator and enforcer takes centre stage. The following policy measures are suggested to be used in Afghanistan to initiate and promote energy efficiency choices in private industry.

- Subsidize distribution of technologies with high energy savings, energy security outcomes, for example – LED lights, insulation products, solar hot water systems, star rated air-conditioners, space heaters and solar PV systems
- Provide smart meters and trusted information to reduce energy use at consumer level
- Design energy tariff schemes which influence consumer behaviors to switch to more energy efficient practices.
- Work with public sector and private sector financial institutions to provide loans for energy upgrades or solar PV system installation as part of home and business loans
- Subsidize access to energy auditors and green building practitioners at zero or low cost to uncover opportunities
- Provide low interest loans, subsidies to implement energy efficiency, alternative fuels and renewable generation opportunities.
- Start voluntary energy and carbon disclosure schemes for organizations which are in top 50 energy consuming organizations in Afghanistan.
- Provide financial and fiscal incentives for organisations to encourage retrofitting of old buildings to improve energy efficiency and construction of new buildings to be rated under Afghanistan Green Building Design Standards
- Create knowledge sharing platforms for SMEs, transport, agriculture and other sectors to raise awareness and vision
- Build management capability, including in SMEs, through training and certification courses to identify and exploit opportunities to ensure energy efficiency good practice is reflected in mainstream business planning.
- Initiate green awards to recognize and celebrate efforts, and encourage industry engagement

4.8 Consumer awareness

Empowering consumers with information and knowledge on various aspects of energy efficiency practices including tools, procedures, and benefits is likely to have a long term impact on them accepting and supporting an energy efficiency campaign. Resulting changes in behavior of end user of energy in form of energy conservation, lifestyle, awareness, low-cost actions, and small investments can lead to 5% to 10% in energy savings at a household or workplace level. Following measures will be used to educate public on the subject and choices of energy efficiency:

- Information campaigns at places of national and international importance including religious institutions can be implemented with an objective of demonstrating integration of energy efficiency and its related benefits to create awareness of energy efficiency practices & technologies and also to implement energy efficiency at such locations
- Regional information centre located at non-government organizations and consumer/ industry associations can serve as focal points for disseminating information on energy efficiency as well as renewable energy to various target groups - from the general public to small and medium-sized enterprises and policy makers
- Guidance documents providing information and guidance to help consumers identify energy efficiency opportunities in their processes & equipment and also provide relevant details to implement basic energy efficiency measures can be disseminated among general public, SMEs, Government & commercial institutions.
- Public campaign through television programs and newspaper advertisements to reach out to home owners, the public sector and commercial enterprises propagating energy efficiency benefits and encouraging energy saving behavior. The objectives are to induce a change in the users' behavior by creating awareness of energy use and interest in its reduction
- Energy Efficiency Information Website can be established and maintained through office of energy efficiency (OEE) which will have comprehensive information on incentives and policies that support energy efficiency in Afghanistan, case studies of successful implementation, information on manufacturer of energy efficient equipment and guidance documents on energy efficient technologies & practices.
- Publicize the results of implemented EE projects through mass media like television, newspaper to create awareness among general public. This can be achieved by integrating communication plan within the project planning stage, where the project proponent will be lead for creating awareness about their own project.
- Introduce total cost of ownership (TCO) as evaluation criteria in government procurement processes, and encourage private sector to adopt it as well. The TCO factors in operational costs as well as capital costs when investing in assets – the longer term energy savings may be worth a slightly higher upfront cost.

4.9 Laws and Regulations

Success of an energy efficiency program is highly dependent on the legal and regulatory drivers which are present in the country. They provide the first incentives for individuals and organizations to act as well as respond to energy efficiency expectations in terms of penalties, fines and other regulatory or reporting requirements. It is typically followed by creation of a market for products and services which help individuals

or organizations meet their compliance needs, as well as save costs on energy use. The following steps are suggested to take Afghanistan to the next step on the energy efficiency program.

- Draft and finalize a regulation which provides a legal framework to initiate and support creation of an energy efficiency industry in Afghanistan.
- Set up minimum and acceptable standards across a range of options – minimum energy performance scheme for appliances, energy efficiency rating schemes for buildings, minimum renewable energy integration targets for new developments - with the help of legislations.
- Create fiscal and financial measures in form of tax breaks, penalties, low interest loans, lease to provide access to finance for households, government and commercial sectors.
- Prepare ground for introducing market based energy efficiency certificate cap and trade scheme into TERM 2 by setting up institutional framework for data acquisition, monitoring and reporting, user friendly format for energy bills, system to ease financial transactions or incentives and penalties

4.10 Energy service companies - ESCO

ESCO or Energy Service Company is a term used to describe a commercial company providing a wide range of energy related services including design and implementation of energy efficiency projects, sourcing of best tariff plans for customers in a privatized energy market. It acts as a project developer for implementing energy conservation measures and shoulder the technical and performance risks associated with a project. The company's return is directly linked to the actual energy cost savings. While ESCOs are not a policy instrument per se, but they are similar to policy tools and an important medium to capture energy efficiency potentials and overcome a number of market barriers. Various factors such as enforcement of building codes, consumer awareness, mandatory energy audits and reporting has enabled the development of a successful ESCO industry. The following action items, based on literature review of enabling factors in other similarly placed economies, have been proposed for development of ESCOs:

- Government backed guarantees for ESCOs to improve access to finance for the energy efficiency projects. The guarantees can help ESCO secure funds from domestic financial institutions, or multilateral financing agencies. Other financial support mechanisms may include partial risk guarantees, loan loss reserve funds, special purpose funds or interest credits.
- Creation of dedicated government backed financing body for creating basket funds pooling resources from various channels and used to finance projects dedicated to energy efficiency. As the ESCO industry matures and the commercial banks are able and willing to engage ESCOs, public loans or funds should be phased out to avoid wastage of government subsidies on projects which can be financed by private sector.
- Standardisation of contract procedures and measurement and verification procedures to alleviate the concerns of end-users and the financing community regarding reliability of ESCOs. Standardisation also improves time and cost effectiveness, and promotes competition and transparency (such as in Germany). Standard contracts can increase the trust of customers, especially in the public sector, and thereby their willingness to engage with ESCO.
- Accreditation of ESCOS to ensure quality assurance and building trust in the minds of the consumer regarding their reliability and competence. This system is currently in place in the countries with a large

number of ESCOs (e.g. accreditation system by the US ESCO association, NAESCO or the Chinese ESCO association).

4.11 Knowledge base and standards

Lack of good quality trusted information; standardized source of advice and availability of quality products in the market is one of the key barriers to energy efficiency take up. To overcome this barrier, it is recommended that the following steps are undertaken as starting point to create and establish a trusted body of knowledge which will help in initiating and energy efficiency industry. These knowledge bases can be periodically reviewed and improved upon as the understanding of energy efficiency grows with experience.

- Create standards for product specifications based on IEC standards but localized to Afghanistan needs.
- Create standards for energy audit and renewable energy based on ISO standards but localized to Afghanistan needs.
- Create test standards and measurement protocols for appliances and equipment aligned with international standards, to assist performance comparisons and benchmarking for products.
- Create knowledge base and skills for the new energy efficiency industry by introduce school and university level curriculum and apprenticeships and exchange programs.
- Develop manuals, guidelines for adopting advanced technologies and proven energy efficiency practices across various sectors
- Build capacity of manufacturers, importers and customs to interpret, understand and make decisions on the basis of available standards through the means of workshops, publications and best practice demonstration.

4.12 Efficient energy for rural communities

In the rural economy, domestic household sector is the most prominent energy consumer, followed by the agricultural sector. Lack of access to cleaner fuels in rural areas has led to a process of combusting solid fuels in inefficient devices to meet space heating and cooking needs. Improved cook stoves instead of traditional biomass cook stoves can ensure efficiency in the use of traditional fuels and also reduce smoke emission and health hazards. Following actions are being proposed:

- Subsidize distribution of energy efficient biomass cooking stoves and heaters in rural communities where distributing modern clean fuels like LPG is unfeasible.
- Incentivize use of renewable energy devices through means of low interest loans and subsidies for various end use productive loads such solar PV agricultural pumping and drying systems, Solar PV refrigeration, lighting and fan systems for shops in rural areas.
- Source international funds to invest in research and development of rural specific technologies such as renewable energy based minigrid systems for electricity and fuel, including, solar PV, micro hydro, biogas based technologies.

4.13 Renewable energy

Energy efficiency and renewable energy are inextricably linked in pursuit of a future with sustainable growth with clean energy. Lower energy demand from measures to accelerate energy efficiency contributes to increasing the share of renewable energy in generation mix, assuming that renewable energy use will continue to grow. The combination of energy efficiency and renewable energy deployment creates a synergy for increasing both the renewable energy share and annual improvements in energy intensity, which collectively reduces the growth in total primary energy supply (TPES), a great outcome for any country which is highly dependent of imports of energy. For the above reasons, the policy recommends the following.

- **Recognize and promote use of renewable energy such as Solar PV, Solar thermal, Wind turbines, Hydro, Bio energy (RE) technologies in centralized, distributed and decentralized generation mode as per the Renewable Energy Policy**
- **Incentivize use of renewable energy devices for various end use applications such as lighting and fan systems, agricultural pumping systems, refrigeration systems.**
- **Promote use of biofuels as alternative to reduce consumption of traditional fossil based transport fuels, thereby reducing their demand.**
- **Develop capacity of households, government and industry to make decisions by creating knowledge products on demonstrating interlinkages of RE and EE**

4.14 International Co-operation

International cooperation refers to a group of actions and/or resources exchanged between different countries according to their own interests and strategies. Engaging existing partnership for cooperation through trade & investment, technology cooperation and capacity building would ensure development of energy efficiency sector in Afghanistan. Specific actions under this strategy are:

- **Lead or facilitate seminars, conclaves, conferences and trade exhibitions of energy efficiency knowledge, products and services**
- **Utilize existing networking events to promote trade and investment opportunity in Afghanistan energy efficiency sector. Examples include services, training and capacity building and manufacturing.**
- **Create mechanisms for international partnerships and collaborative opportunities among domestic stakeholder groups for collective learning and development and transfer of knowledge and technology through the means of international chairs, colloquiums and workshops.**

5.0 IMPLEMENTATION STRATEGY

5.1 Overview

- 1. The AEEP will be implemented in two terms, TERM1 and TERM 2, to achieve its strategic and policy goals.**
- 2. TERM 1 (2017 – 2020) will work to create enabling environment for the establishment of an energy efficiency industry in Afghanistan. This will be achieved by creating institutions, systems and processes, and establishing partnerships and collaborations across a range of government and private industry stakeholders to effectively implement the AEEP. The energy efficiency industry in TERM 1 will be government led.**
- 3. TERM 2 (2021-2032) will be working to enable transition of the energy efficiency industry from a government led activity to a private investment led marketplace. This will be achieved by gradually removing barriers by creating strong legislative framework, skill base, standards, information and fungible marketplace for private investors.**

5.2 Institutional Systems

- 1. An apex regulatory body, the Office of Energy Efficiency (OEE), is proposed to be created within the Ministry of Environment and Water (MEW). The OEE will have primary responsibility for strategizing, planning, budgeting and coordinating the implementation of AEEP.**
- 2. A committee headed by deputy minister of MEW and comprising of relevant stakeholders will have the responsibility of creating OEE. It will comprise of individuals having appropriate background and training suited for the job and should demonstrate leadership and professionalism in their day to day activities.**
- 3. The objectives of the proposed OEE include, but are not limited to the following, and are expected to develop further as the knowledge and understanding of energy efficiency sector builds up in Afghanistan.**
 - a) Formulating and facilitating national programs and action plans that are well suited to the targeted economic sectors for implementation of energy efficiency policy guidelines.**
 - b) Establishing terms of reference for coordination between relevant government and private stakeholders and ministries and serve as the information house on energy efficiency.**
 - c) Work with stakeholders to developing system and processes for monitoring effective implementation of energy efficiency policies.**
 - d) Engaging, supporting, working and influencing a wide range of stakeholders, including public and private organizations with energy efficiency responsibilities with means of information, financing, and capacity building.**
 - e) Conceiving training modules and national level certification scheme for energy managers and energy auditors.**

- f) Facilitating technical training, awareness generation and capacity building of stakeholders across both government and non-government organizations.
 - g) Promotion of energy efficiency among general public about national programs and action plans, energy efficiency measures and their effects.
 - h) Source funding opportunities working with international aid agencies and development financing institutions.
4. Presently, there are a range of institutions working in different capacities in the energy efficiency sector, and in most cases, pursuing the aforementioned objectives. Their efforts are largely fragmented and OEE will consolidate these efforts by providing leadership, resources and direction to the efforts.
 5. The OEE will work with a range of public and private sector representative institutions to achieve its objectives. It will allocate responsibilities to the partner institutions based on their established strengths in area of energy efficiency, informed by consultative planning and decision making process.
 6. These institutions will report to the OEE on an annual basis on policy targets and progress as agreed between the stakeholders. It is also recommended that these institutions congregate annually in some form of organizational leadership team meetings, to facilitate building of understanding, confidence, transparency and hence a team culture between them. This is important for overall development of an effective organizational culture, conducive to large scale change.
 7. A list of potential government and private industry institutions which are envisaged to work with the OEE is provided in the following table. The institutions have been listed per their existing core deliverables, and their value addition capacity to assist OEE in delivering critical pieces of works for successful implementation of energy efficiency policy.

Institutional Coordination

S.no	Institution	Required leadership in delivering EE policy
1.	OEE (proposed)	<ul style="list-style-type: none"> • Coordinate activities of relevant government departments to deliver on the agenda of energy efficiency policy
2.	ACCI	<ul style="list-style-type: none"> • Promoting energy efficiency objectives in private sector • Organising demonstration projects in private sector
3.	AISA	<ul style="list-style-type: none"> • Promoting and attracting investments in EE sector
4.	ANSA	<ul style="list-style-type: none"> • Development of minimum energy performance standards for appliances and equipment
5.	Banking Institutions	<ul style="list-style-type: none"> • Work with OEE to introduce financing tools and options for a range of EE activities

8. The OEE will be supported by way of grants from central government and multilateral funding agencies in short term to cover administrative expenses and initiate programs and activities. In the

6.	CSO	<ul style="list-style-type: none"> Establishment of an effective system for acquisition, tracking and reporting of energy based data from various economic sectors
7.	DABS	<ul style="list-style-type: none"> Support implementation of EE measures in distribution and supply side of electricity
8.	Department of Education	<ul style="list-style-type: none"> Establishment of Energy Efficiency Skill Development Scheme and updating of university level curriculum to include courses on energy efficiency
9.	Donor community	<ul style="list-style-type: none"> Support implementation different action items in the EE Policy
10.	ICE	<ul style="list-style-type: none"> Data analysis of energy use data for energy efficiency benchmarking, tracking and reporting
11.	MAIL	<ul style="list-style-type: none"> Support OEE in implementing energy efficiency measures in agriculture pump sets
12.	MEW	<ul style="list-style-type: none"> Support the establishment of independent entity for energy efficiency sector in Afghanistan and promote EE in energy projects
13.	Ministry of Finance	<ul style="list-style-type: none"> Organise and manage funds for EE sector
14.	Ministry of Information and Culture	<ul style="list-style-type: none"> Promote energy efficiency campaigns and awareness programmes through public media and other means
15.	Ministry of Religious Affairs	<ul style="list-style-type: none"> Introduce Mosques as pioneers for EE by participating in projects and programs related to energy reduction
16.	MRRD	<ul style="list-style-type: none"> Support incorporation of energy efficiency measures in their rural energy projects and energy efficiency awareness through CDCs
17.	MoUD	<ul style="list-style-type: none"> Enforcement of Afghanistan building codes; promoting energy efficiency in government and household buildings
18.	Municipalities	<ul style="list-style-type: none"> Introduce EE in all services, planning and decision making
19.	NEPA	<ul style="list-style-type: none"> Enforce air quality standards in order to promote cleaner fuels/clean technologies for all end- use sectors including transport

long term, it is recommended that the energy efficiency office is allowed to raise revenue through a range of options including tariffs, taxes, penalties or other financial tools.

5.3 Financing Mechanism

1. The OEE is proposed to be empowered with a financial wing, which will have the function of sourcing and consolidating funds from both internally from government resources and externally from donor or development institution financing. For these purposes, the funds will be managed through mechanism of basket funds which will provide the foundation block for setting up a dedicated energy efficiency financing institution in longer term, which could even be merged with the renewable energy financing body. Donor funds could be tied to specific program within the “basket funds” to give some flexibility and accommodate the preferences of donors.
2. International funds can be sourced in essentially in three forms: Low interest debt (Soft loans), Equity or Grant money. In Afghanistan’s context, soft loan and grant money are most suitable form of international funding to raise revenue. Funding can be sourced from a variety of international financial institutions such as the Asian Development Bank, Islamic Development Bank, World Bank, Global Environmental Facility or Bilateral agencies such as USAID, DFID, GTZ or the BMZ.
3. Internally, the OEE will need to use existing government machinery to raise funds through fiscal mechanisms such as pollution/green taxes, custom duties, tariffs on inefficient equipment. This activity will be important in setting up the incentive and disincentive networks within the economy to influence consumer behaviour towards energy efficiency practices.
4. The funds raised by the OEE will be used by the means of various financial instruments, which will assist in creation of a government led energy efficiency industry in TERM 1, while transitioning into a market led industry in TERM 2. The government led initiative in TERM 1 will be created with the help of the following financial instruments:
 - a. Direct Subsidies, either completely or partly funded to introduce new technologies to the users such as the LED lights, energy efficient cooking stoves, and heating/cooling technologies. As the markets become more mature and self-sustaining, the subsidy levels decrease over time or they are replaced with market-based instruments.
 - b. Grants or co-financing can be provided to both government and non-government bodies, private organizations and entrepreneurs to perform activities related to:
 - Promotional campaigns for more efficient uses of energy,
 - Education and training programs for professionals performing tasks related to energy efficiency improvement,
 - Financial aid for the preparation of energy audits and related project documentation including investment studies,
 - Financial aid for energy efficiency improvement projects.
 - c. Low interest loans (Soft loans), where grants or co-financing is not available, especially for SMEs or large industries to undertake investment studies and energy efficiency improvement projects.
 - d. Competitive co-financing can be provided for technology demonstration and deployment of new and innovative technology which are not yet a commercially attractive investment compared to available and proven alternatives. The goal is to demonstrate the project’s features and scalability to make it an attractive investment choice for private financiers.

- e. **Green lease can be provided to resolve challenge faced by tenant and owner of a property in terms of investing in improving energy efficiency of a property. Energy efficiency loans can be issued to the 'building' instead of tenant or the owner. The loan is guaranteed by the local or state government and loan repayments are collected by the government in form scheduled property taxes and paid to the investment body, in this case OEE.**
 - f. **Tax breaks can be provided through reducing import duties/VAT on energy efficient equipment which will encourage inflow of efficient equipment in the market.**
5. **Additionally, as energy efficiency projects facilitate the adaptation and mitigation measures of climate change, they are eligible for benefitting from several funds dedicated for such purposes. One such example is the Green Climate Fund (GCF). Even as income from a GCF approved project is not likely to be a key investment driver, it is capable of acting as a catalyst in increasing return on investment, thus providing projects more credibility and facilitating the securing of funds from financial institutions.**
 6. **There are other climate related funds also available. For this purpose, all implementing agencies of energy efficiency projects, both in public and private sector, will explore receiving of climate funds to increase the viability of their projects during design and development stage itself.**
 7. **In TERM 2, the OEE can emphasize of developing electricity or gas markets backed by regulations, as seen in developed countries like Australia or Germany. The key to success of this market is strong regulations, data collection, reporting and advanced IT based information exchange networks, which is the area of focus of TERM 1 of this policy.**
 8. **In a market based scheme, an energy efficiency regulation body imposes targets on electricity distribution companies, large energy consumers, or electricity retailers to buy certain amount of energy efficiency certificates from marketplace. Failing to do so attracts penalty charges from government, which is high enough to discourage such action.**
 9. **These energy efficiency certificates are created by designated consumer groups such as households, commercial or industrial users saving energy by undertaking energy efficiency projects. Each of the certificates typically represents a savings of 1kwh, or 1 unit of energy. The energy efficiency opportunity is typically identified and implemented by an energy services company (ESCO), who also handles the certificate creation and sale process on behalf of consumers.**

6.0 MONITORING & EVALUATION FRAMEWORK

1. Monitoring and evaluation framework for energy efficiency policy is proposed to be developed on the both program and policy levels. It is intended that the framework at policy level would measure statistical changes resulting from energy efficiency improvements applied through the policy. A program level framework is intended to measure the effectiveness of institutions which will be working with the OEE to deliver high level program and strategies to implement policies.
2. Collection, maintenance and improvement of energy statistics is a complex and reiterative task, but it needs to be started immediately. It is recommended that steps are taken to initiate data collection for the following list of energy efficiency indicators as a minimum to monitor statistical changes resulting from energy efficiency improvements applied through the policy. The list will be reviewed at the end of TERM 1 with a view to further improve and focus the process as knowledge, understanding and experience of stakeholders grow with implementation of policy.

List of indicators for policy level measurement and evaluation framework

Measurable	Indicators	Definition	Formula	Type of data required to be collected
1. Total reduction in energy intensity at the national level	Change in Primary energy intensity (ktoe/USD)	Total primary energy intensity is the ratio between the gross inland consumption of energy resources and Gross Domestic Product (GDP) calculated for a calendar year	$\frac{TPE}{GDP}$	<ul style="list-style-type: none"> • TPE: Total Primary Energy Supply before & after • GDP: Gross Domestic Product before & after
	Change in Final Energy Intensity (ktoe/USD)	Total final energy intensity is the ratio between the gross inland consumption of final energy and Gross Domestic Product (GDP) calculated for a calendar year	$\frac{TFE}{GDP}$	<ul style="list-style-type: none"> • TFE: Total Final Energy Supply before & after • GDP: Gross Domestic Product before & after
2. Energy performance of Public buildings	Non-electricity energy use intensity of public buildings adjusted for climatic conditions	Total non-electricity energy consumed by public buildings in a year divided by total number of employees in full time equivalent in that year multiplied by ratio of	$\frac{NEC(i)}{EM} \times \frac{MDD}{ADD}$	<ul style="list-style-type: none"> • NEC(i): Non-electricity energy consumption of Institutions in analyzed year

Measurable	Indicators	Definition	Formula	Type of data required to be collected
	(toe/ employee in full time equivalent) OR (toe/Net Lettable Area in m ²)	mean and actual heating degree days		<ul style="list-style-type: none"> MDD & ADD: Mean and actual heating degree days EM: Number of FTE employees in analyzed year or Net lettable area
	Electricity consumption intensity of institutional sector (kWh/ employee in full time equivalent) AND (kWh/Net Lettable Area in m ²)	Total electric energy consumed by public buildings in a year divided by total number of employees in full time equivalent in that year	$\frac{EC(i)}{EM}$	<ul style="list-style-type: none"> EC (i): Electricity energy consumption of institutions in analyzed year EM: Number of operating institutions in analyzed year or Net lettable area
3. Energy performance of Residential buildings	Non-electricity energy use intensity of household buildings adjusted for climatic conditions (toe/dwelling)	Total non-electricity energy consumed by household buildings in a year divided by total number of permanently occupied dwellings in that year multiplied by ratio of mean and actual heating degree days	$\frac{NEC(h)}{D} \times \frac{MDD}{ADD}$	<ul style="list-style-type: none"> NEC (h): Non-electricity energy consumption of households in analyzed year MDD & ADD: Mean and actual heating degree days D: Number of permanently occupied dwellings in analyzed year
	Electricity consumption	Total electric energy consumed by household buildings in a year divided by total number	$\frac{EC(h)}{D}$	<ul style="list-style-type: none"> EC (h): Electricity energy consumption

Measurable	Indicators	Definition	Formula	Type of data required to be collected
	intensity of households (kWh/ dwelling)	of permanently occupied dwellings in that year		of households in analyzed year <ul style="list-style-type: none"> D: Number of permanently occupied dwellings in analyzed year
4. Energy performance of Industrial units	Energy consumption of industrial subsectors per unit of production (toe/unit of production)	Total energy consumed by industrial sub-sector in analyzed year divided by industrial production index of same industry sub-sector (selected) in the same year	$\frac{EC (ind)}{IPI}$	<ul style="list-style-type: none"> EC (ind): Energy consumption of industrial sub-sector in analysed year IPI: Industrial production index of industry sub-sector (selected) in analysed year
5. Energy savings in transport sector	Energy consumption intensity of road vehicles (toe/car equivalent)	Ratio of energy consumption of road vehicles (cars, trucks and light vehicles, motorcycles, buses) in an analyzed year and stock of road vehicles in car equivalent in that same year	$\frac{ERV}{SRV}$	<ul style="list-style-type: none"> ERV: Energy consumption of road vehicles (cars, trucks and light vehicles, motorcycles, buses) in analysed year SRV: Stock of road vehicles in car equivalent in analysed year <p>1 truck or light vehicle = 4 cars equivalent</p> <p>1 bus = 15 car equivalent</p> <p>1 motorcycle = 0.15 car equivalent</p>

3. As regards program level indicators, the following list has been compiled based on the anticipated programs which various institutions may undertake to implement energy efficiency policy. It is recommended that these indicators are embedded in the annual planning and reporting framework of relevant institutions. The indicators will assist OEE evaluate progress and effectiveness of its programs and allocate resources accordingly. The list will be reviewed at the end of TERM 1 with a view to further improve and focus the process as knowledge, understanding and experience of stakeholders grow with implementation of AEEP.

List of indicators for program level measurement and evaluation framework

Policy Goals	Indicators	Lead Data Collecting Institution
Improve energy efficiency across all sectors of economy, government, businesses and households, by setting targets for reducing losses in extraction, generation, transmission & distribution and end use	<ul style="list-style-type: none"> • % of pre-2016 government, private and industries buildings undergone energy audit 	MoUD
	<ul style="list-style-type: none"> • % of pre-2016 government, private and industries buildings undergone energy efficiency upgrade 	MoUD
	<ul style="list-style-type: none"> • % of new buildings > 2000m² rated under AEEC 	MoUD
	<ul style="list-style-type: none"> • % of buildings with halogen and incandescent bulbs phased out 	MoUD, Municipalities
	<ul style="list-style-type: none"> • % municipalities with 100% LED or high efficiency HID streetlight 	Municipalities
	<ul style="list-style-type: none"> • % of public lighting assets powered with solar lights 	Municipalities
	<ul style="list-style-type: none"> • % of industry and consumer stakeholders aware of Energy labels including energy star, minimum energy performance standard (MEPS) and quality standard (QS) 	CSO, ICE
	<ul style="list-style-type: none"> • Number of appliance classes (e.g. Whitegoods, Lighting, HVAC) included under energy star MEPS and QS 	ANSA
	<ul style="list-style-type: none"> • % of manufactured and imported appliances under approved classes rated under energy star, MEPS and QS 	ANSA
	<ul style="list-style-type: none"> • % of new vehicles manufactured and imported vehicles rated for green vehicle labelling standard across all industry sectors 	MoTCA
<ul style="list-style-type: none"> • % of new light and heavy (separately) vehicles based EV, regenerative braking and other 	MoTCA	

Policy Goals	Indicators	Lead Data Collecting Institution
	<ul style="list-style-type: none"> • <i>alternative technologies entering fleet under all industry sectors</i> 	tbd ¹⁷
	<ul style="list-style-type: none"> • <i>% of average efficiency improvement in all classes of vehicles from 2016 baseline under all industry sectors</i> 	tbd
	<ul style="list-style-type: none"> • <i>% gap in T&D losses as compared to world best practice</i> 	DABS
	<ul style="list-style-type: none"> • <i>% of power plants operating within 5% of world best practice operating efficiency</i> 	MEW
	<ul style="list-style-type: none"> • <i>% of mining and extraction process operations and equipment built before 2016 retrofitted with energy saving upgrades</i> 	Ministry of Mines & petroleum
	<ul style="list-style-type: none"> • <i>Number of subsidized energy audits commissioned</i> 	tbd
	<ul style="list-style-type: none"> • <i>Number of financial and fiscal incentive schemes active for undertaking energy efficiency retrofits, AGBDS ratings, solar PV installations and other schemes for business and households</i> 	MoF
	<ul style="list-style-type: none"> • <i>Number of top 50 energy consumers undertaking voluntary carbon and energy disclosure</i> 	CSO
	<ul style="list-style-type: none"> • <i>Number of industry seminars, capacity building trainings, informative media, publication and green awards funded or organized</i> 	tbd
	<ul style="list-style-type: none"> • <i>% of households and commercial enterprises penetrated through subsidized distribution of energy saving technologies</i> 	DABS
Promote identification and adoption of energy efficiency opportunities across all sectors of the economy through awareness creation and capacity building	<ul style="list-style-type: none"> • <i>% of population which are aware and which are using energy labelling, educational and empowerment campaigns, information through websites and different media to make energy saving choices.</i> 	tbd
	<ul style="list-style-type: none"> • <i>% of total procurement departments using total cost of ownership in evaluation process for purchasing energy related products/service</i> 	tbd
Enable implementation and financing of energy efficiency	<ul style="list-style-type: none"> • <i>Drafting and finalization of legal framework for energy efficiency</i> 	tbd

¹⁷ To be decided

Policy Goals	Indicators	Lead Data Collecting Institution
measures across all end use sectors using both regulatory and market principles	<ul style="list-style-type: none"> Amount of funding sourced from internal and external resources to fund energy efficiency policy 	MoF
	<ul style="list-style-type: none"> Number of consultations done with various stakeholder groups to form a position on taxing 	tbd
Ensure energy products and services offered in Afghanistan meet desired quality standards as it transitions towards an energy efficiency based economy	<ul style="list-style-type: none"> Number of standards created for energy audits, solar PV design and other technologies in line with international standards 	ANSA
	<ul style="list-style-type: none"> Number of test standards and measurement protocols for appliances aligned with international standards 	ANSA
	<ul style="list-style-type: none"> Number of capacity building technical training manuals, workshops, courses, international exchange programs developed for a range of stakeholders and audiences across all sectors. (Including but not limited to schools, manufacturers, importers, technical staff, management) 	ICE
Use energy efficiency to address cross cutting issues including climate change, clean energy, energy access, energy security and health and productivity outcomes, in particular to rural areas	<ul style="list-style-type: none"> % of rural households provided with subsidized energy efficient biomass stoves and heating system 	MRRD
	<ul style="list-style-type: none"> % of rural cottage industries and farmers provided with subsidized solar PV based productive loads 	MRRD
	<ul style="list-style-type: none"> % of rural cottage industries and farmers provided with low interest loans for EE 	MRRD
	<ul style="list-style-type: none"> Number of R&D or operational projects set in village for renewable energy based minigrid 	MRRD
Foster international cooperation, particularly with countries in the region having similar socio-cultural milieu for cross learning, promotion of energy efficiency as a product and service industry and driving	<ul style="list-style-type: none"> Number of seminars, conclaves, conferences and trade exhibitions organized 	tbd
	<ul style="list-style-type: none"> Number of research, market and regulatory presentations from Afghanistan in international and regional events 	tbd

Policy Goals	Indicators	Lead Data Collecting Institution
innovation for jobs and growth	<ul style="list-style-type: none"> <li data-bbox="611 311 1219 450">• <i>Number of innovative and new technologies introduced in Afghanistan as a result of its exposure to international chairs, colloquiums and workshops</i> 	tbd

GLOSSARY

Primary Energy	An energy form found in nature that has not been subjected to any conversion or transformation process. It can be non-renewable or renewable such as crude oil, coal, natural gas, solar energy, wind energy, biomass etc.
Secondary Energy	It describes all sources of energy that result from the conversion of primary energy sources and generally termed energy carriers
Final Energy	It accounts for secondary energy distributed to end use consumers from the generating plant and comprises products such as charcoal, coke, natural gas, gasoline, and electricity, among others.
Useful Energy	It corresponds to the energy realistically made available to the user in terms of the services delivered through end-user equipment and expressed in terms of mechanical power, lighting, heat generation, and travel mileage.
Energy Value Chain	The energy value chain is a sequence of production activities which begins with exploration and production of the primary energy for the subsequent processing, transportation, distribution and use. The more developed the value chain, the greater the benefits can be achieved through the improvements in energy efficiency.
Per capita electricity consumption	It refers to average electricity consumption per person within a population and estimated by dividing total electricity consumption by country's total population.
GDP	It is the monetary value of all the finished goods and services produced within a country's borders in a specific time period. Put simply, GDP is a broad measurement of a nation's overall economic activity
Net Lettable Area	The total area of all floors within the internal finished surfaces of permanent walls excluding areas such as stairs, toilets, lift shafts and motor rooms, escalators, lobbies, public space and areas set aside for the provision of facilities or services.
Energy Service Company (ESCOs)	It is a commercial company providing a broad range of energy solutions including designs and implementation of energy savings projects. It acts as a project developer for implementing energy conservation measures and shoulder the technical and performance risks associated with a project. The company's return is directly linked to the actual energy cost savings.