
Policy options to inform mandates of renewable energy agencies in federal context

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Executive Summary

This report provides policy options to help define mandates of Alternative Energy Promotion Centre (AEPC) in the context of transition of Nepal into a federal state as well as organisational positioning within Ministry of Energy, Water Resources and Industry (MoEWRI). This study is based on the analysis of the constitutional provisions, new Act on Local Governance, policies and regulations relevant for Renewable Energy¹ (RE) and analysis of major functions that drives the sector. The study has carried out in-depth analysis of the new development in mandates of other key actors in RE sector. Political economy analysis was carried out to understand the interests and incentives of key actors/agencies identified in RE sector, and how they interact among themselves for the sector progress. Consultations with local governments and other key agencies were conducted to understand their interests, incentives, plans and existing activities in RE sector. Finally, modalities to drive RE sector agenda are proposed to support institutional reform efforts.

RE is one of the key choices of the Government of Nepal (GoN) to provide the energy access to the energy deprived people. RE also has a potential to contribute to energy security as well as diversifying sources of energy in the country. The Constitution and Local Government Operation Act (LGOA) has also recognised importance of RE and considered it as a central development priority.

AEPC has been working as the apex nodal agency for promotion and development of RE technologies in Nepal, since its establishment in 1996. It has been promoting mini/micro hydropower plants (MHPs), solar home systems, solar mini-grids, wind power systems, biogas, solar thermals and improved biomass cook-stoves in order to ensure access to modern energy in remote areas. AEPC also sees productive energy use as a mean to attain sustainability of decentralised systems. The core strength of AEPC lies in its institutional knowledge and practices in RE development that it has accumulated over past two decades. After promulgation of the Constitution of Nepal, the local level governments are now responsible for implementing RE and other local level development projects. However, based on our comprehensive analysis of functions and statutory functional responsibilities, other significant sectoral needs exist and AEPC as a federal agency could contribute under residual power of Federal Government. Through the latest revision of formation order, AEPC has now been mandated for energy efficiency, implementing carbon related projects and working with provincial and local governments for their capacity building in implementing alternative energy projects at the local level.

¹ Traditionally renewable energy has been referred as alternative energy in Nepal which is primarily small-scale renewable energy that includes Micro hydropower (up to 100 kW), solar thermal and photovoltaic electricity, wind, bio-energy (biogas, solid biomass, gasifier and biofuel). Usually, Mini hydropower up to 1 MW is also included in this definition. There are also efforts to include small hydropower up to 10 MW. Hydropower greater than 10 MW is considered as mainstream power supply.

While AEPC is one of the main actors in RE sector, there are other major actors who have prominent roles in development of the sector. The key actors and agencies are grouped as political/ constitutional bodies, private sector, development partners, United Nations (UN) agencies and other international agencies, media and civil societies including user groups. Actor mapping of the RE sector in terms of interests, incentives has been framed around legal responsibilities, global commitments, access to and/or control over resources, political influence, etc. Even though AEPC is now under the umbrella of MoEWRI, more influential organisations within the ministry like Nepal Electricity Authority (NEA) and Department of Electricity Development (DoED) will garner higher attention. As RE sector in Nepal is still comparatively small (with respect to large hydropower projects), it is imperative that AEPC will require significant efforts to create interest and value within the MoEWRI. The local governments have showed high interest and the incentive of fulfilling their political commitments and people's agenda also motivates them in promoting the sector.

Systemic analysis of functions was carried out to identify the need for institutional arrangements especially in the RE development and support in defining the scope of AEPC in the new governance system. Functions and sub-functions under different government domain are identified including some further breakdowns in the form of sub-functions that will be needed to accomplish short and medium to long term goals. The major sectoral functions identified that are spread over various organisations at different level for RE development are: (i) Legislative, policy, programme and plan; (ii) Regulation; (iii) Standards and measurements; (iv) Promotion, development and uses; (v) Resource mobilisation including foreign grants and loans; (vi) Research and development; and (vii) Other provisions relevant to RE that includes health policies, standards, sustainable use of environmental resources, etc.

Within these functions, AEPC will need to re-align its efforts to develop itself into Centre of Excellence, a principal agency promoting socio-economic, economic development and environmental goals. AEPC will also need to upscale its interest from traditional focus on meeting rural household energy needs with small systems to larger systems such as large solar mini grids, large biogas, mini-hydro systems, etc. to attain economies of scale and include semi-urban and urban areas within its scope.

The long term goal of AEPC could be in line with the following three key goals:

- Socio-economic goal: Inclusive and cost-effective supply of affordable and quality energy access for the improved living conditions in the area inaccessible from grid.
- Economic development: Mainstreaming RE through commercialisation and awareness (knowledge dissemination).

- Environmental goal: Environment protection (reduced dependence on traditional energy and imported fossil fuels as well as contributing to climate change adaptation and mitigation²).

The key roles of AEPC could be to lead sector-growth, facilitation and coordination, technical support and capacity development of sector actors. Lead sector-growth and facilitation and coordination are responsibilities of the organisation at federal level (AEPC), which are of long-term nature, and will need to be initiated, facilitated/implemented and monitored continuously. It is important that AEPC focuses on advocacy for coherent policies, equitable energy access and quality assurance. Supporting federal government for resource mobilisation is another avenue where AEPC's experience will be fruitful. Technical support and capacity development of sector actors are responsibilities of federal level (AEPC) for now, which will gradually decrease and be ultimately transferred to the organisations at province level. AEPC could support provincial and local governments in establishing institutional arrangements including policy supports and capacity development for mainstreaming RE in meeting energy needs for consumptive as well as productive purposes.

The proposed institutional modality options comprised of four key areas of delivery are depicted in the Box 1.

Box 1: Proposed Institutional Modality Options

Deliverable 1 - Lead sector-growth

- i. Championing the sector through advocacy and coordination for policy coherence and equitable energy access,
- ii. Develop national level RE plans and programmes,
- iii. Quality assurance through development of standards of technology, construction/ installation and operation including safety standards
- iv. R&D and pilot projects, National level special projects
- v. Establish and manage knowledge centre

Deliverable 2 - Facilitation and coordination

- i. Implementing framework for donor involvement in RE in Nepal,
- ii. Facilitate for fulfilling international commitments relevant to RE
- iii. Mobilisation of resource from government, development partners and global funding opportunities

Deliverable 3 - Technical Support

- iv. Policy and planning supports to federal, provincial and local government to deliver on national RE sector goals, regulation of sector
- v. Technical supports to provincial and local governments, private sector and R&D institutions for exploration, design and development of RE at the local level

² Mitigation is achieved through substitution by environmentally friendly energy as well as efficient use and behavioural change.

Deliverable 4 - Capacity development of sector actors

- i. Establish and development capacity of RE units of provincial and local government organization
- ii. Capacity development of other identified sector actors/ Stakeholders

Based on the political economy analysis, policy analysis and consultations with key actors, four major delivery modalities are identified and seen appropriate as basis for institutional reform.

1. **Policy, Planning and Quality Assurance Supports:** Policy, planning and quality assurance supports are required for Deliverables 1, 2 and 3. As institutional continuity is important in this activity, the first option could be to develop internal capacity of AEPC's existing planning and monitoring unit to perform this function. However, as a second option, the unit may outsource appropriate jobs to relevant organisations. Options at the provincial level for this functional support will be same as that of the federal level.
2. **Knowledge Management, R&D and Technology Deployment Supports:** In order to achieve Deliverables 1 and 3, i.e. establishing AEPC as the Centre of Excellence, institutional modality for knowledge management, research and development (R&D) and technology deployment is required at the federal level. One of the options at the federal level would be to establish a Knowledge Management Centre (KMC) from existing technology promotion division and outsource pilot projects and research projects. The KMC may opt to implement some of research project on its own by expanding the KMC into "Knowledge and Research Centre" as a second option. Technology deployments would be outsourced in both options. Similar options of institutional development in smaller scale at provincial level could be conceptualised in the long run to cater to local knowledge and research needs.
3. **Capacity Development Supports:** Establishing own training centre for capacity development within the Centre of Excellence at a federal and provincial level would be a key option. However, to make institution efficient, a small unit which manages outsourcing of capacity development activities could be a second option.
4. **Resource Mobilisation Supports:** Currently there are three avenues of possible financial resources that can be tapped – i) Government allocation from internally generated sources, ii) Grants and Loans from external sources including development partners and multi-lateral agencies, and iii) Global climate and carbon funds. Technical and financial support through Central Renewable Energy Fund (CREF) is seen as an option in close coordination with relevant units of AEPC. Some of the activities could be outsourced to service providers. At provincial level, outsourcing to regional service providers is seen as efficient way to deliver.

Institutionally, this study likes to conclude, based on our analysis and consultations with key stakeholders, that a dedicated institution for RE Sector development at federal

level is envisaged as essential. A need for gradual development of similar organisation or integration of the functions within existing structure at the provincial level seems vital to effectively achieve sector development goals. At local level, starting with capacity development of the existing technical unit, based on scope for RE development, a separate unit may become appropriate in the medium to long-term future.

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List of abbreviations

| | |
|--------|--|
| APEC | Alternative Energy Promotion Centre |
| BFI | Bank and Financial Institution |
| CBO | Community Based Organisation |
| CREF | Central Renewable Energy Fund |
| CSO | Civil Society Organisation |
| DEEU | District Energy and Environment Unit |
| DFID | Department for International Development |
| DoED | Department of Electricity Development |
| FY | Fiscal Year |
| GoN | Government of Nepal |
| IPP | Independent Power Producer |
| IRD | Inland Revenue Department |
| kW | Kilowatt |
| LGOA | Local Government Operation Act |
| LPG | Liquefied Petroleum Gas |
| MHP | Micro Hydropower Plant |
| MoEWRI | Ministry of Energy, Water Resource and Irrigation |
| MoF | Ministry of Finance |
| MoFAGA | Ministry of Federal Affairs and General Administration |
| MoFE | Ministry of Forest and Environment |
| MoICS | Ministry of Industries, Commerce and Supplies |
| MoPID | Ministry of Physical Infrastructure and Development |
| MW | Megawatt |
| NBSM | Nepal Bureau of Standards and Metrology |
| NCRO | Nepal Copyright Registrar's Office |
| NDC | Nationally Determined Contribution |
| NEA | Nepal Electricity Authority |
| NERC | National Electricity Regulatory Commission |

| | |
|----------|--|
| NGO | Non-government Organisation |
| NNRFC | National Natural Resources and Fiscal Commission |
| NPC | National Planning Commission |
| NPR | Nepalese Rupees |
| NRB | Nepal Rastra Bank |
| NREF | National Renewable Energy Framework |
| NRREP | National Rural and Renewable Energy Programme |
| PIF | Policy and Institutions Facility |
| PDA | Power Development Agreement |
| PPA | Power Purchase Agreement |
| PEA | Power Exchange Agreement |
| PTA | Power Trade Agreement |
| PV | Photovoltaic |
| O&M | Operation and Maintenance |
| RE | Renewable Energy |
| RES | Renewable Energy Systems |
| RETS | Renewable Energy Testing Station |
| RSC | Regional Service Centre |
| R&D | Research and Development |
| SC | Steering Committee |
| SDG | Sustainable Development Goal |
| SEforAll | Sustainable Energy For All |
| SOD | Strategic Organisational Development |
| SOP | Standard Operating Procedures |

1 Background

Renewable energy³ (RE) is one of the key priorities of the Government of Nepal (GoN) for reaching the energy access to the energy-deprived people. The GoN has developed and endorsed Rural Energy Policy (2006), Subsidy Policy for RE (2016), and Subsidy Delivery Mechanism for RE (2016) to promote the sector. All these policies are targeted to increase access of RE service for the rural households. The GoN has recently endorsed 'National Renewable Energy Framework', which aims to continue the integrated approach and coordinate the activities in the sector across all stakeholders.

The white paper titled "Present Situation and Future Roadmap of Energy, Water Resources and Irrigation Sector" published by the Ministry of Energy, Water Resources and Irrigation (MoEWRI) (2018) is a roadmap to increase access to RE. The white paper realises the importance of RE to make sustainable, reliable, accessible, quality and clean energy available to all. It also discusses use of RE to fulfil the energy demand of the country including energy security and energy independence.

The Constitution of Nepal (2015) has incorporated federalism as the foundation of Nepal's political governance system and established a federal, provincial, and local level governmental structure. The local level governments have been delegated with responsibilities for implementing RE and other local level development projects. The Constitution and Local Government Operation Act (LGOA) has also given importance to RE as a central development priority. Article 51 of the Constitution of Nepal highlights generating and developing RE as an important means of ensuring efficient, reliable, and affordable energy supply and its proper use for the fulfilment of the basic needs of citizens.

In the changed context, Policy & Institutions Facility (PIF) was invited to conduct a study exploring what needs to be done by the GoN (MoEWRI), and in particular Alternative Energy Promotion Centre (AEPC), to promote RE services. This study is relevant in the current context where there are changes in the mandate and function of actors and agencies. Another challenge is also to overcome uncertainties and bring clarity on AEPC while they are drafting a RE Promotion Act and other agencies should re-organise themselves in supporting the local government in implementing the mandate.

³ Traditionally renewable energy has been referred as alternative energy in Nepal which is primarily small-scale renewable energy that includes Micro hydropower (up to 100 kW), solar thermal and photovoltaic electricity, wind, bio-energy (biogas, solid biomass, gasifier and biofuel). Usually, Mini hydropower up to 1 MW is also included in this definition. There are also efforts to include small hydropower up to 10 MW. Hydropower greater than 10 MW is considered as mainstream power supply. This paper uses renewable energy in place of alternative energy with meaning remaining same.

2 Objectives and rationale

The major objective of this work is to develop policy options that clearly define mandates of AEPC (as Centre of Excellence) and other relevant agencies to support RE services in federal context. The specific objectives are:

- To analyse the changed function and mandates and structure of AEPC/ MoEWRI and other relevant agencies as defined in constitution including federalised state structure in driving RE.
- To identify policy options that identifies modalities for AEPC for supporting local government in implementing their authorities on RE.

To prepare detail implementation modality, and institutional reforms options needed to implement AEPC's authorities on RE.

3 Research Methodology

The study utilises primary as well as secondary information sources. In-depth review of existing documents on RE services in Nepal has been carried out. Conversational interviews with key informants, consultation meetings with private sector and discussions at local as well as provincial level has supported in validating the information and shaping the study report.

This study is based on the analysis of the constitutional provisions, new Act on local governance, policies and regulations relevant for RE and analysis of major functions that drives the sector. The study has comprehensively analysed the changes and new development in terms of mandate of other key actors in RE sector along with that of AEPC. Political economy analysis was carried out to understand the interests and incentives of identified key actors/ agencies in RE sector, and how they interact among themselves for the sector progress. Consultations with local governments and other key agencies were conducted to understand their interests, incentives, plans and existing activities in RE sector. Finally, modalities to drive RE sector agenda are proposed to support institutional reform efforts.

4 Findings of the Review Paper

4.1 Relevance of Renewable Energy Development

Having access and means to use energy in an efficient way is the key to improving quality of life as it will positively impact on availability of efficient and quality services for health, education and other social and commercial activities. The anticipated rural economic growth depends on higher productivity which cannot be realised without appropriate, adequate and affordable access to energy. Energy demands for consumptive and productive uses occur at local level which can be met through various means of supply. Large centralised generation and distribution systems can be more cost effective due to economies of scale but meeting needs of sparse and remote communities will be beyond the means of expansion of centralised system due to extreme upfront cost. In many instances, distributed and off-grid systems using RE resource at local and provincial level could prove socially and economically attractive as it brings energy services at a faster pace. RE technologies have been providing accesses to electricity as well as modern energy, particularly in remote areas while also supporting in local economic development in the area through its productive uses.

More than 55 MW of electricity generation projects such as micro hydropower plants (MHPs) and other off-grid electricity systems (mainly solar photovoltaic) have been installed⁴. Similarly, over 1.26 household energy systems such as biogas and improved cook-stoves have been installed till 2018⁵. Supports from development partners have played substantial role in augmenting the development of Nepal's off-grid RE. Given limited progress in recent years in extending the national grid, off-grid renewable energy systems (RES) are seen as a key means of reaching the rural population. As such, both the GoN and development partners have been putting substantial efforts into expanding the deployment of RE technologies also to meet international and national commitments such as Sustainable Development Goals (SDGs), Nationally Determined Contribution (NDC), White Paper, etc.

In the current federal context, there is a high political commitment for promotion of RE, as analysed from political manifesto of large parties, which consisted of commitments for universal energy access. Promotion of RE technologies has also been specifically mentioned in order to achieve the commitment. However, RE has not been recognised as mainstream issue yet by the political parties and understanding on RE stills needs to be increased⁶.

During the discussions with local governments, they expressed interest in promoting and developing RE technologies. Few have even started collecting information in their areas. Yet the local governments do not have a proper Act or modalities to encourage

⁴ AEPC, 2018

⁵ AEPC, 2018

⁶ Based on consultations

promotion and regulate quality of RE in local level. This void clearly calls for need to support local governments in fulfilling their mandates for promoting alternative energy as given by the constitution.

4.2 Government Priorities for Renewable Energy Development

4.2.1 White Paper

The White Paper titled “Current Status and Future Course of Energy, Hydropower and Irrigation Sector” issued on May 2018 by the MoEWRI is a roadmap for fulfilling national energy demand and achieving energy access with time bound plans. It aims to increase access to renewable and alternative energy to fulfil energy demand of the country and make sustainable, reliable, quality and clean energy available to all and promote productive and social use of energy services.

Some of the key commitments relevant for AEPC mandate to RE development and implementation in the national context are:

- Promote roof top solar with net metering provisions as a part of “Harek ghar Urja ghar” (Every house Energy house) programme
- Capacity development supports to all three levels of government by preparing reference templates for policy, acts, rules, for RE development
- Provision of necessary structural arrangements to manage future issues related to the use and sharing of natural resource benefits that may arise between the Federal-Province, Province-Province and the local-local levels under federal structure
- Research and capacity building activities in the field of RE
- Technical assistance in policy making and planning, technology transfer for RE development and expansion
- Establish AEPC as a Centre of Excellence
- Mainstream gender equality and social inclusion in RE projects and programmes
- Preparation of distribution master plan for each province

Considering these commitments, a dedicated institution for RE sector development at federal level is deemed necessary, including providing support to federal ministry MoEWRI to achieve these goals. This institution could play a key role in capacity development supports of Province and local governments for RE development. Similar organisation at provincial level and working unit at local level or integration at provincial government will also be required to implement their respective mandates. Also, there is a strong basis for AEPC to continue engaging in research and capacity building activities in RE because of its past experience and strength.

4.2.2 Budget

The budget of Fiscal Year (FY) 2018/19 has emphasised on development and expansion of hydroelectricity and all types of RE to provide clean energy to all Nepali household within the coming three years and to avail electricity to all households as per demand within the next five years. The period of 2018-2028 is marked as Energy Decade year -- an important step is towards the use of RE for social and productive uses. Solar and wind energy led irrigation and drinking water projects are highlighted in order to fulfil drinking water and irrigation demand.

NPR 5 billion is allocated this FY for use of hydro-electricity, solar power, wind energy and other RE to ensure access to modern and renewable energy for all. Further, NPR 500 million is allocated to subsidise installation of bio-gas plants in 2,000 poor households in Terai-Madhesh and hilly areas. Subsidies are provisioned for both urban and commercial bio-gas plant installation.

This year's budget has given special focus on strengthening of local governments towards achieving overall development, in addition to collaboration with provincial government. Rural electrification is emphasized to be implemented in collaboration with the Nepal Government, local Government and concerned community. Subsidies are also provisioned to micro hydro projects and renewable energy production initiated by cooperatives and local communities in collaboration with the local government.

Complimentary grants are provisioned for local governments from the federal government for RE development such as wind, solar and household wastes. Under the revenue-sharing scheme, the provinces and local governments have received a total budget of NPR 60.42 billion and NPR 53.82 billion, respectively from the federal divisible fund, which includes budget for RE development at local level.

These positive efforts will require supports in developing policies, plans and designing programs to implement RE related work at all levels of government. Similarly, National Natural Resources and Fiscal Commission (NNRFC) may require advisory support for transferring conditional and special grant funds to local level for RE development. The federal agency like AEPC could help NNRFC by developing the technical parameters on the basis of which transfer of funds can be made. Though, the subsidy delivery for RE project has been transferred to the local government, they need support for developing legal instruments to mobilise these resources. Furthermore, coordination is required between National Planning Commission (NPC) and ministries for developing RE related plans and policies while MoEWRI will require technical and logistic support to lead coordination within the energy sector. A federal agency like AEPC could be designated to manage these tasks.

4.2.3 Plans & Policies

14th Periodic Plan and 15th Plan Concept Paper

The 14th periodic plan aimed to reduce dependence on traditional energy and imported fossil fuels while emphasising the promotion and development of RE to contribute in

the social and economic development of the country. Solar energy, micro & small hydropower, wind power, biofuel, research and capacity development programs are highly prioritised. An enabling environment for investment by financial institutions is expected to be created. Mobilisation of internal and external resources, including those received through carbon trading, is also planned for the promotion and development of RE.

The 14th plan aimed to address climate change and sustainable development issues together with energy security and green economy. The plan aspired to electrify additional 9% of population using renewable sources through installing 16 MW of solar, 11 MW of micro/ mini hydro and 1 MW of wind power systems. The 14th plan also aimed to promote 0.2 million units of biogas digester and 1.065 million units of ICS. The plan envisaged that additional 18,000 employments will be generated through establishment of 2,500 new enterprises and 15,500 income generating activities through use of RE.

The plan identified few major problems regarding RE sector, such as: huge subsidy requirement for deployment of RE due to poverty, especially in the hinterlands; high up-front cost of RE equipment and materials including difficulty in transportation to remote areas; lack of adequate technical human resources at local level; mismatch of demand and supply of RE; underutilisation of RE services after arrival of the national grid; and unavailability of easy access of credits to people. However, there are opportunities in the sector, highlighted through increasing interest of various development partners, increasing demand for solar energy by the consumers, increasing engagement of financial institutions and private sector, among others.

The 14th plan had plans to increase capacity of energy units at district level to handle all aspects of alternative energy projects, from promotion to plan formulation and implementation to monitoring and evaluation. As the mandate is now shifted to local governments, the 15th periodic plan is expected to delve more into this.

The 15th Plan concept paper is being prepared to contribute to a long term Vision Concept Paper 2100. The paper has considered Solar and other clean energies as enablers for overall development of the country and green economy as drivers of transformation. Considering the importance given to RE in the recent plans, existence of AEPC at federal level is essential to support federal institutions like NPC and ministries in setting targets for electricity access, clean cooking and productive use of energy. This support may be of the long term nature.

Biomass Energy Strategy 2017

Biomass Energy Strategy was endorsed in January 2017 to promote biomass energy as reliable, affordable and sustainable energy resource to address the increasing energy demand of Nepal. The objectives of strategy are to:

- Contribute to energy supply and energy security by generating energy through management of agriculture forest residues and organic wastes from municipal urban and industrial areas;

- Support employment and income generation through entrepreneurship development in biomass energy;
- Reduce existing dependency on imported energy through effective, efficient production and utilization of biomass energy;
- Ensure necessary capacity building, promotion and technology transfer for the production and commercialization of biomass energy through utilization of biomass energy from the municipal and industrial wastes; and forest, agriculture and animal residues;
- Utilise the gas produced from waste management site (landfill) to generate energy.

The strategy clearly mentions that appropriate contributions are required from the government, private sector and beneficiaries/ consumers in order to make the production and utilization of biomass energy reliable and sustainable. Furthermore, the strategy also pinpoints requirement of contributions from different stakeholders to provide financial and technical assistance and easy loan for the production and utilization of modern, affordable and efficient technologies.

AEPC will require coordinating and facilitating at local, provincial and federal level to revise existing laws within the energy, forest, solid waste and agriculture sectors to be biomass energy friendly. AEPC can also support local and provincial governments in developing and implementing energy efficiency standards for biomass energy. In order to implement energy efficiency standards, technical and financial supports are also necessary for capacity building of testing stations at the federal level.

Nationally Determined Contribution (NDC) 2016

The first NDC of Nepal, submitted in response to the decisions of the Conference of the Parties to the United Nations (UN) Framework Convention on Climate Change, has also focused on the promotion of RE and energy efficiency for adaptation and mitigation of climate change. Nepal is committed to SDG goals, SDG 7 in particular, for providing clean energy access to all. The RE and energy efficiency related goals mentioned in the NDC are:

- By 2050, Nepal will achieve 80% electrification through RE sources having appropriate energy mix. Nepal will also reduce its dependency on fossil fuels by 50%.
- By 2020, Nepal intends to expand its energy mix focusing on renewables by 20% and diversifying its energy consumption pattern to more industrial and commercial sectors.
- By 2020, Nepal aims to increase the share of electric vehicle up to 20% from 2010 level.
- By 2050, Nepal will decrease its dependency on fossils in the transport sector by 50% through effective mass public transport means while promoting energy efficient and electrical vehicles.

AEPC can be an appropriate agency at the federal level for monitoring achievement of NDC supporting Ministry of Forests and Environment (MoFE). Data and information from local and provincial governments will also be needed for analysis, for which AEPC can play a facilitating role.

4.3 Actors and Agencies

Based on examination of existing roles within the sector and through stakeholder consultations, key actors and agencies are identified in the changed governance context. The changes in their key role in RE development and incentives to promote RE have also been analysed. The key actors/ agencies are grouped into political and constitutional bodies, private sector, development partners, UN agencies and other international agencies, civil societies including user groups, media, academic institutions and banks and financial institutions (BFIs) besides AEPC.

The figure 1 below depicts the placement of existing as well as new key actors and agencies in four different quadrants based on their key roles in RE development and their incentives to promote RE services. Key roles are based on the duties and mandates of the agencies while incentives are framed around access to/control over resources and political influence.

AEPC and Central Renewable Energy Fund (CREF) have major as well as increased role and high incentive to work for RE development. Other high incentive and key role actors are bilateral and multilateral development partners, UN and other international agencies that have global commitments to work for RE development. Two major agencies with increased role and high incentive are local governments and MoEWRI. Local governments have high role as well as high interest in the context of RE development as mandated by the Constitution. These actors are champions for change and supporters of RE development.

There are three new agencies that will also have evolving role in RE development. They are Provincial governments, NNRFC and Nepal Electricity Regulatory Commission (NERC). Their roles for supporting RE services are still under-development. However, considering their access to resources, they have been placed in different quadrants in the figure 1 below.

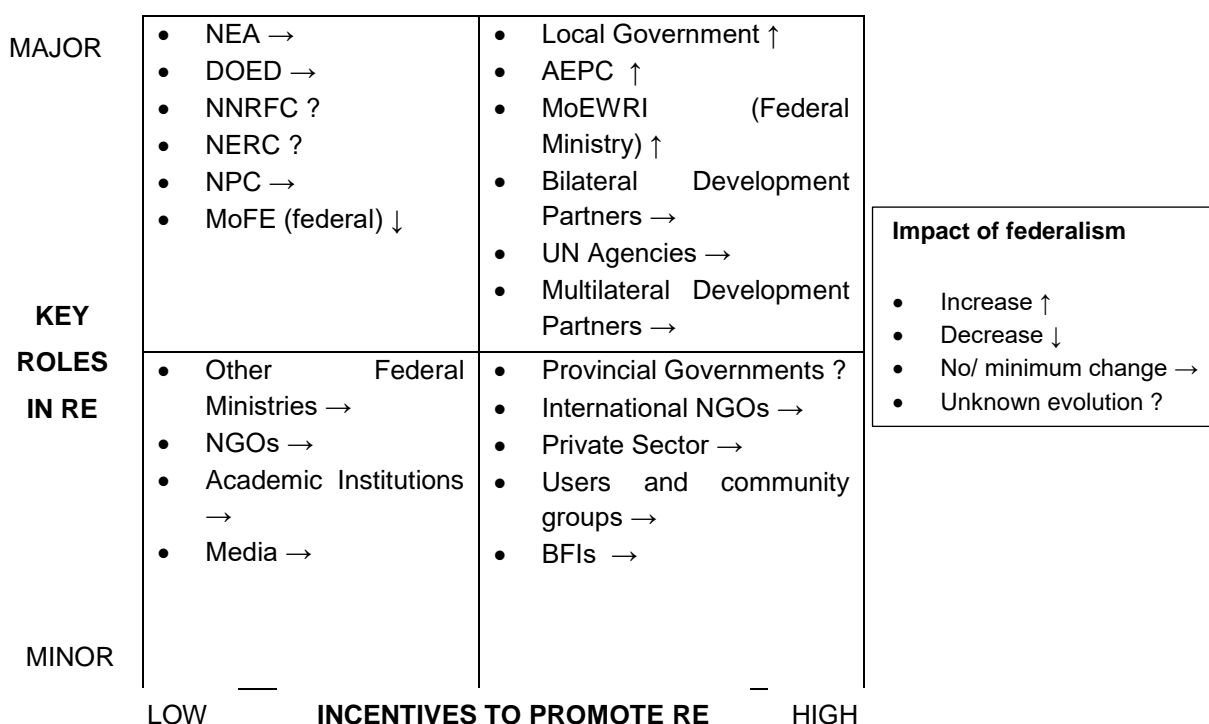
Actors such as NEA, DoED, MoFE and NPC have low incentive but major or evolving roles. They are the influential bodies for large hydropower, transmission and distribution projects and can undermine supports for RE development. This may hinder RE progress; hence they need to be motivated and engaged to bring positive change in the RE space. They are the drivers of change and focus should be given to design interventions and mechanisms that would enable a shift in their incentives for RE development.

Actors such as international NGOs, Private sector, users and community groups and BFIs have high incentive but lesser role. They are the supportive actors for RE

development. Further efforts are needed for collaborate and inform them in order to accelerate and mainstream development of RE sector.

Actors such as other federal ministries, national NGOs, academic institutions and media are not currently central or influential, as they have less role and lower incentive for RE development. Further efforts are needed to create incentives for the actors who have minor roles now as they are potential allies for supporters. They need to foster coalitions with actors having high role and high interest.

Figure 1: Mapping of Actor and Agencies



4.4 Key Sector Issues

Access to modern energy solutions is one of the key Sustainable Development Goals (SDG 7). The energy sector of Nepal, dominated by the traditional sources and hydropower (in terms of modern energy), has issues that need to be tackled for increasing access to modern energy solutions. This also applies for RE sector while defining the systemic bottlenecks and institutional setup to overcome such issues.

One of the key issues is high dependence on biomass sources which still provides around 70% of the total energy⁷. Various studies have concluded that the heavy

⁷ based on data from *Economic Survey: Fiscal Year 2017/2018*

reliance on firewood, animal dung and agriculture residues have induced health issues related to inefficient burning of the solid biomass.

There is also excessive reliance on imported fossil fuels from India. In cooking sector, LPG is used not only in urban areas but also has penetrated in rural areas. Transport sector is fully dependent (99.9%) on petroleum products while industry sector use 100% of imported coal⁸. These uses of fossil fuel are contributing to greenhouse gas emission of the country. The cost of fossil fuel imports is almost at par of that of the total exports of Nepal⁹.

Inadequate power supply systems in terms of generation as well as transmission resulting in load shedding have suppressed increasing electricity demands (peak demand reaching 1508.16 MW on October 19, 2017¹⁰). Recently, NEA has resorted to increase electricity imports from India to curb the load shedding which further aggravates trade deficit with India¹¹. Injection of electricity imported from India, which mainly derived from thermal generation (coal and fossil fuel)¹², makes the national grid electricity of Nepal no more clean. Limited transmission connectivity has restricted independent power producers to invest in hydropower projects due to difficulty in evacuating power from remote sites and inadequate distribution networks have limited the electrification ratio. The diversification in energy sources, distributed generation and their connection to the national grid remain as eminent solutions.

The financial resources for managing energy sector are currently inadequate. National priority in allocation of financial resources in the energy sector are: a) investment for hydropower generation; b) investment for transmission and distribution of electricity; and c) investment for energy access in remote areas through RE. With limited internal financial resources, need of international investment is evident. Development partners have been supporting promotion of RE sector, yet the sector has not attracted considerable private financing as there are no profitable business models in place.

The incoherence in energy policies such as 90% subsidy for community grids which is only for distribution in comparison to only about 50% subsidy to RES puts higher burden for communities. The consumers tend to opt for community grids (if national grid is nearer) or wait for the national grid to arrive¹³. There has been cases where construction of MHPs have been stalled due to arrival of the national grid or community grids (such as in Leguwa Khola MHP 40 kW, Dhankuta – which is recently connected to national grid after substantial effort). This is also a result of lack of regulatory body. The parliament has passed act for National Electricity Regulatory Commission but is

⁸ Adapted from data from *Nepal's Energy Sector Vision 2050 AD*, Consulting services for WECS, CMS P. Ltd.

⁹ based on data from *Economic Survey: Fiscal Year 2017/2018*

¹⁰ From NEA Annual Report 2018

¹¹ From *Economic Survey: Fiscal Year 2017/2018*

¹² From Energy Statistics 2018, Central Statistics Office, Ministry of Statistics and Programme Implementation, Government of India

¹³ Based on discussions at local level

yet to pass the new electricity act. There is very less scope in old electricity act for regulatory purposes, hence the commission is yet to be effective.

4.5 Strength and Opportunities of AEPC

The core strength of AEPC is its institutional knowledge and practices in RE development. AEPC has worked as the nodal agency for developing the sector and mobilising international technical assistance and has accumulated vast knowledge, expertise and developed networks. In the past, AEPC also has experience of working with decentralised structures and mechanisms through District Energy and Environment Units (DEEUs) and Regional Service Centres (RSCs) which gives an advantage for working in current federal structure. Through National Rural and Renewable Energy Programme (NRREP), AEPC has designed and implemented RE programme in sector-wide approach leading the sector and has also developed carbon projects to attract carbon financing. With MoEWRI as line ministry now, AEPC is in a good position for better coordination within the energy sector.

The RE sector is one of the priority sector for Nepal to increase share of people having access to clean energy and also to fulfil the international commitments on RE and energy access, such as SDG7 and SEforAll. Development partners are also supportive in fulfilling these commitments. There is willingness of all three governments to adopt private-sector friendly policies and provisions for RE, making it attractive for private investment. Also, energy efficiency, the new addition, and developing carbon financing projects can bring in opportunities of leveraging funding. With these opportunities in place and the commitment of the GoN reflected in the White Paper, AEPC has the potential to become a credible go-to organisation for RE as a 'Centre of Excellence' and information hub in the federal context.

4.6 Weakness and Challenges of AEPC

Absence of the organisational Act is one of the key challenge and weakness of AEPC. AEPC needs to ensure long-term organisational future with proper legislative instrument for organisational stability, sectoral growth and receiving functional autonomy¹⁴. Though AEPC has highly qualified professionals, inadequate human resources management system has resulted in turnover of staff, especially senior management team. Another weakness of AEPC is lack of capacity to implement efficient subsidy delivery mechanism. This has caused access to subsidy cumbersome for beneficiaries as well as service providers which has been time and again raised in different platforms and also affected to organisational reputation of AEPC. Insufficient engagement with private sectors in RE sector is also one of the weaknesses of AEPC leading to low private financing in the sector, thus relying on public financing only. This

¹⁴ Based on Progress at a glance: A year in review 2017/18, AEPC

can be accounted for low levels of innovation for viable business models by private sector and also lack of private-sector friendly policies in place.

One of the immediate challenges for AEPC is its transfer from Ministry of Environment to MoEWRI. AEPC will require significant efforts to create importance and value within the MoEWRI among the highly demanded and prioritized large hydropower and irrigation projects. With unresolved clarity on working structure of federal, provincial and local level, establishing linkage with provincial and local governments for developing service delivery modalities for RE will be a challenge. Another challenge for AEPC is coordination with NEA to maintain sustainability of off-grid RES and ensure diversification of energy mix. The expansion of the national grid or community grids have affected operation of installed off-grid electricity systems. AEPC will need to negotiate with NEA for their connection to the grid or devise alternative plans for operation of the systems. AEPC will have work on its weaknesses and overcome the challenges to establish itself as the credible “go-to” organisation for RE solutions.

4.7 National Renewable Energy Framework

National Renewable Energy Framework (NREF), approved by AEPC board in 2017, is an umbrella mechanism, jointly owned by the GoN and development partners, and serves to coordinate and track results of various RE initiatives, engage stakeholders and helps mobilise finance. The NREF envisions operating in a flexible and phased manner, building on the success from previous initiatives, in particular NRREP, to create shared ownership and mutual accountability in the context of federal Nepal. Under this framework, development partners are expected to participate with an aim to converge all RE initiatives and deliver through integrated results based approach. The framework thus helps AEPC in streamlining projects and programmes in a coordinated and phase wise manner. The first two years provide a solid foundation prior to piloting and rolling up in the successive phases. NREF, further, aims to accelerate the process of transition from a subsidy centred to a credit-focused model, together with smart subsidy provisions. Supply, demand, governance and finance are major areas of the theory of change in the NREF formulation.

The overall aim of the NREF is to “Enhance productivity and market-enabled expansion of Nepal’s RE sector leading to improved access to energy for all”

Following are the specific objectives:

- **Governance:** Strengthen the policy framework, governance systems, and public institutions needed to foster development of the RE sector in Nepal
- **Demand:** Increase the demand for, access to, and effective use of RE technologies (including grid and off-grid electricity) and services, and micro, small and medium-scale enterprises

- **Supply:** Improve capacity of the players across the supply chain to supply high quality and competitive RE technologies and services in Nepal including supporting the production of high quality technologies/components locally.
- **Financing:** Increase access to finance for RE products and services by buyers and sellers through increased access to credit, strengthened finance mechanisms, and enhanced capacity of lenders.

Additionally, capacity building, knowledge management, gender & social inclusion and monitoring are cross-cutting actions to achieve the above objectives.

Being the focal point of management of NREF, the role of AEPC is very crucial to further coordinate and collaborate with local governments, development partners and related actors. Integrated Results Framework (IRF) is prepared by AEPC to strengthen coordination between government agencies, development partners, private sectors, civil societies and financial institutions, to avoid duplication of efforts and enhance harmonisation. The Steering Committee (SC), as envisioned in the IRF, provides strategic oversight of the framework design, implementation, monitoring and reporting, and hence steers the institutionalisation process of NREF. Furthermore, the role of AEPC can be to facilitate and support platforms for cross-learning and knowledge sharing across programmes and initiatives.

In the current federal context, supports from development partners for RE development is mobilised at federal level, whereas planning and implementation of RE projects is exclusively with the local governments. It requires continued commitments of both development partners and local governments to be guided by this framework and agreeing on mutual accountability. AEPC can have a lead role in resource facilitation.

The Framework is a guiding document and is crucial at this time when federal government, provincial governments and local governments are preparing their energy plans. Progress measuring mechanism needs to be elaborated. Local governments require capacity building supports to enhance their understanding about RE and the NREF. AEPC can support to expand further at the local level to support local government in executing their RE programmes. Interactions with local and province governments have been initiated and support has been initiated by AEPC to prepare their energy plans at the local level. With the emergence of new actors and potential new donors, a clear definition of role and responsibilities of key actors' in relation to the RE development can be drafted to support this framework, including when and how they shall be engaged, where AEPC can support.

5 Renewable Energy Sector Function Analysis

5.1 Sector Development Functions

The renewable energy functions are often linked to each other but not necessarily hierarchical operationally. In other words, they can happen in parallel and sequence can change all the time. The RE sector's overarching goal is to ensure equitable and affordable access to modern energy in the form of electricity and other forms of energy for consumptive and productive use. Following functions and sub-functions under different government domain are identified including some further activities breakdowns that will be needed to accomplished short and medium to long term. Institutionally, a dedicated institution for RE Sector development is envisaged at federal level. A need for development of institutional mechanism of similar organisation at provincial level and working unit at local level is felt based on the consultations.

5.1.1 Legislative, Policy, Programme and Plan

Legislations provides backbone for the sector to function by providing legal basis in terms of defining rules that governs sector actors operation and behaviour and also provide basis for the government to regulate the sector. Through policy, governments elaborate roadmap to develop the sector. Various government programmes specify national goals and strategy to achieve specified goals. It is possible that there may be multiple programmes in the sector targeting different goals but can be steered to create synergy through coordination. Finally, plans are prepared to define periodic details of activity for achieving programme objectives in terms of time-frame and physical, financial and human resource allocations.

The constitution and legislation has specified authorities and responsibility for activities related to legislative, policy, programme and plan to three level of governments and institutions therein. Among others, provision of efficient energy access services is the one that relates to RE sector that can be delivered through various means. The national and global trend in providing energy access has recognised need of private sector to deliver services with government role focussing mainly on regulating and facilitating private sector to ensure equitable access and quality through legislations, policies, programmes and plans.

The sub-functions identified under legislative, policy, programme and plans (summarised table in Annex 1) are:

a) Acts, Rules and Policies:

Scope under this sub function at three government levels based on careful analysis of Constitution of Nepal 2015 as well as other existing relevant legislative arrangements are,

Federal: Prepare overarching acts, rules and policies to ensure coherency and coordination and providing basis for regulatory function at the federal level, mobilising resources for equitable access

Provincial: Prepare relevant Provincial acts, rules and policies - for ensuring balanced development within the province through coordination and mobilising resources including joint implementation modality among different Provinces

Local: Prepare their own acts and prepare relevant rules and policies - For implementation of projects and mobilising resources including joint implementation modality

Function for AEPC: AEPC as a federal agency (expansion based on need and arrangements with Provincial and Local Government) dedicated for RE development will

- i. Support federal government (MoEWRI) to draft necessary Acts, Rules and Policies for sector development
- ii. Provide capacity development supports to Provincial and Local Governments to draft their acts, rules and policies based on need and arrangements with Provincial and Local Government
- iii. Provide technical support by develop templates for acts, rules and policies to support Provincial and local level governments to prepare their legal instruments based on need and arrangements with Provincial and Local Government.

Technical and capacity development supports to Provincial and Local governments are of short to medium term nature whereas support to federal level institutions and coordination for the development and enactments of laws, and formulation of policies will be of long term nature. This is based on revised formation order, draft REPC act and consultations with key actors.

Function of provincial and local level RE agencies/unit within respective administrative structure:

- i. Support respective government's ministries/units to draft necessary Acts, Rules and Policies for sector development
- ii. Provincial government's RE agencies/units to support capacity development supports to local governments in the long run.

These will be on-going task in the long run for Provincial and local level RE agencies/unit.

Functions of other federal level institutions:

- i. NPC to provide macro-level inputs to legislative instruments and guidance for formulating policies
- ii. MoEWRI to own and lead the process in developing legislative instruments and formulating policies. MoEWRI will coordinate with MoFE, Ministry of Federal

Affairs and General Administration (MoFAGA), Ministry of Finance (MoF) and other relevant agencies.

b) Development of Plan, Programmes and Designing Projects

Scope under this sub function at three government levels would be

Federal: Prepare national level plans, programmes and projects (large RE projects) and plans to meet Nepal's international commitments, etc.

Provincial: Prepare province level plans, programmes and projects (size and scope yet to be defined)

Local: Prepare local level plans and project (up to 1 MW hydro and local-level RE)

Function for AEPC: AEPC as a federal dedicated and focal agency for RE development will be taking following functions

- i. Prepare federal level plans and programmes and design national level projects including project identification and development
- ii. Support governments in setting targets for electricity access, clean cooking and productive use of energy
- iii. Capacity development and technical supports to province and local level for preparing plans, programmes and design projects.

Technical and capacity development supports to Provincial and Local governments are of short to medium term nature whereas activities of supporting federal institutions like planning commission, ministries, and coordination will be of long term nature.

Functions of provincial and local level RE agencies/unit within respective administrative structure:

- i. Support respective government's ministries/units to develop plan and programmes including project design at the provincial/local level.
- ii. Provincial government's RE agencies/units to support capacity development supports to local governments in the long run.

These will be on-going task in the long run for Provincial and local level RE agencies / unit.

Functions of other federal level institutions:

- i. NERC regulates large RE electricity projects
- ii. Role of MoF and MoFE will need to be integrated for mobilising climate finance programme and plans
- iii. NPC to look after overall national plan relating to RE
- iv. NERC regulates large RE electricity projects
- v. DoED facilitates large RE electricity projects

c) Coordination and International Commitments

Scope under this sub function at three government levels would be

Federal: Fulfil international commitments in RE sector (SDG7, SEforALL) and ensure Nepal's position in international forum.

Provincial and Local: Contribute to international commitments

Function for AEPC: AEPC as a federal dedicated and focal agency for RE development will be taking following functions

- i. Monitor the progress towards international commitments, collect information from Local and Provincial level, analyse and publish
- ii. Support local government for information collection and analysis,
- iii. Ensure national participation in international forum

This is an on-going function of long term nature.

Functions of provincial and local level RE agencies/unit within respective administrative structure:

- i. Support federal agency (AEPC) in collection and analysis of data, information and participate as necessary.
- ii. Provide necessary technical and logistics supports for the coordination within and outside the sector.

These will be on-going task in the long run for provincial and local level RE agencies/unit.

Functions of other federal level institutions:

- i. MoEWRI takes lead in coordination within the energy sector including MoF as the focal agency for Green Climate Fund and MoFE as the focal agency for Climate Change where AEPC will provide necessary technical and logistic support for RE programmes/projects

5.1.2 Regulation

Sector regulation ensures all actors comply with regulatory provisions and hence contributes to efficient and goal oriented functioning of the sector. A well-defined, functional and efficient regulatory mechanism not only helps good governance in the sector but also promotes sector harmony by easing operations for all relevant actors. An effective regulatory regime will also see that resources are optimally utilised.

The Constitution 2015 and legislation has specified authorities and responsibility for activities related to RE sector regulation at all three level of governance and institutions therein. Private sector will not be able function effectively in the lack of efficient regulatory mechanism; tendency will be to look for short term association in the sector for quick gain at the cost of national harm.

The sub-functions identified under legislative, policy, programme and plans are,

a) License, Registration and Permit

Scope under this sub function at three government levels would be

Federal: Issuing license and permit and register large electricity projects (survey, construction, generation, transmission and distribution)

Provincial: Lack of clarity on issue of license for provincial size projects

Local: Generation license of hydro-project up to one MW, regulation of local level alternative energy systems, regulation of local electricity distribution system and verification of licenses

Function for AEPC: AEPC as a federal dedicated and focal agency for RE development will be taking following functions

- i. Support in preparing rules and regulations for RES
- ii. Assist in managing regulatory information of RES

This is an on-going function long term nature.

Functions of other federal level institutions:

- i. DoED can support local governments for preparing rules and regulations for electricity distribution system
- ii. DoED can support in bringing clarity in licensing for different sized electricity projects

b) Electricity Tariff and Service Fee

Scope under this sub function at three government levels would be

Federal: Regulation of electricity tariff and service fee

Provincial: Support federal government in implementing federal policies

Local: Support federal government in implementing federal policies and Regulation of tariff determination and implementation by RES operators

Function for AEPC: AEPC as a federal RE agency will focus on

- i. Providing supports to relevant federal agencies (MoEWRI, NERC, etc.) for preparing determining tariff guideline and monitoring for RE based electricity and other energy services
- ii. Facilitating information dissemination from federal to Provincial and local level governments on guidelines and policies related to tariff and fees.
- iii. Providing supports to RES operators for tariff analysis and determination

Functions of other federal level institutions:

- i. NERC is mandated for regulation of electricity tariffs
- ii. NEA and other local distribution entities will implement tariff for grid electricity

c) Agreements on Power/ Energy Development, Purchase, Exchange and Trade (PDA/ PPA/ PEA/ PTA)

Scope under this sub function at three government levels would be

Federal: Preparation, negotiation, signing and regulations of agreements

Provincial and Local: Monitoring and support federal government on regulation

Local: Monitoring and support federal government on regulation and regulation of agreements regarding RES

Function for AEPC: AEPC as a federal dedicated and focal agency for RE development will be mainly supporting local government for regulation of agreements on RES at local level

Functions of other federal level institutions:

- i. NERC is mandated for regulation for PPA/ PEA/ PTA.

5.1.3 Standards and Measurements

Having a well-defined standards for RE technology and protocols for measurement relating to standards provide basis for quality assurance and monitoring. Having a national standards contributes to credibility perception of RE as a dependable means for energy access.

The sub-functions identified under standards and measurements are,

a) Specification of Standards and Safety of Technologies and Services

Scope of this sub function at three government levels would be

Federal: Develop and implement national standards and specifications, including safety standards for grid, off-grid and RES

Provincial: Monitoring of implementation of standards

Local: Monitoring of implementation of standards

Function for AEPC: AEPC as a federal dedicated and focal agency for RE development,

- i. Support and facilitate federal government to develop national standards and specifications

- ii. Support Provincial and local government in understanding standards, monitoring and data acquisition

Functions of other federal level institutions:

- i. NBSM approves standards for RES
- ii. NERC can prepare standards for electricity generation, transmission and distribution
- iii. RETS provides testing facility for certification

b) Testing and Measurements

Scope under this sub function at three government levels would be

Federal: Develop and manage protocol for testing and measurement of grid, off-grid and RES

Provincial: Monitoring of implementation of testing and measurement protocols

Local: Support implementation of testing and measurement protocols

Function for AEPC: AEPC as a federal focal agency for RE development

- i. Provides technical and financial supports for capacity building of test stations
- ii. Technical, logistic and financial supports for measurements in the field.

Functions of other federal level institutions:

- i. NBSM approves protocol
- ii. National laboratories, e.g., Renewable Energy Testing Station (RETS), conduct tests and provide certificates

c) Accreditation

Roles relating to accreditation on technical and safety standards at different government level would be

Federal: Award and renew accreditation for RES

Provincial: Ensure implementation of standards

Local: Ensure accreditation certificates for local installations, where applicable

Function for AEPC: AEPC as a focal agency for RE development,

- i. Encourage RE technologies and RE based services to be accredited formally.
- ii. Mobilise necessary resources for awareness on accreditation and make mandatory where possible

Functions of other federal level institutions:

- i. NBSM awards and renew accreditation.

5.1.4 Promotion, Development and Uses

This function includes quality awareness, operation, management and maintenance of electricity distribution systems, management and operation of small hydropower and alternative energy, which are responsibilities of local government.

This is a clear shift in implementation function, which was with AEPC, prior to federalism of the country. However, local government, currently, do not have sufficient capacity and understanding to drive this new shift.

Overlapping of functions exist with respect to RE promotion, development and use. Central level large electricity project development is with Federal government, Province level electricity is with province government, Resource and technology awareness and promotion Subsidy for RE Technologies as per the Local Governance Act 2074.

a) RE and RES Project Development for Electricity Access

Federal:

- i. Prepare national level plans for awareness and promotion of RES for improving energy access and use of energy for productive and social purpose.
- ii. Project identification, PDA, PPA, PEA, PTA for large RE projects for electricity

Provincial:

- i. Coordinate implementation of awareness and promotion of RES by Ministry of Physical Infrastructure Development (MoPID) at Provincial level to look after renewable energy development
- ii. Monitoring and support federal government on implementation of PDA, PPA, PEA, PTA
- iii. Facilitate province level electricity development-MoPID

Local:

- i. Implement awareness and promotion of RES
- ii. Operation and maintenance (O&M) of small hydropower and alternative energy;
- iii. O&M and management of electricity distribution systems

Function for AEPC:

- i. Prepare federal level plans and programmes and design projects for awareness and promotion of RES
- ii. Develop capacity of province and local level for awareness and promotion of RES
- iii. Capacity development supports to Provincial and Local governments for implementing RE projects
- iv. Capacity development supports to private sector

Functions of other federal level institutions:

- i. Large RE projects are facilitated by DoED for PDA, PTA, PEA etc.;
- ii. All electricity projects are regulated by NERC
- iii. In current context -- PPA, transmission and distribution of power by NEA
- iv. Operation, maintenance and management of large RE generating facility by NEA and Independent Power Producers (IPPs) at federal level

b) RE and RES Market Development for Cooking and Thermal Energy Use

Federal: Encourage private sector to establish efficient market for RE fuels and devices for cooking and thermal energy use

Provincial: Encourage private sector to establish efficient market for RE fuels and devices for cooking and thermal energy use

Local: Enable uptake of RES for cooking and thermal use

Function for AEPC:

- i. Capacity development supports to local governments
- ii. Capacity development supports to private sector
- iii. Collaborate with private sector to deploy, install and manage RE installation

c) Productive Use of Energy Including Agriculture and Industrial Applications

Federal: Encourage private sector to establish efficient market and innovative business model for RE application for productive use applications

Provincial: Encourage private sector to establish efficient market and innovative business model for RE application for productive use applications

Local: Implement innovative projects through technical and financial support for uptake of RES for productive uses with help of market actors

Function for AEPC:

- i. Capacity development supports to Provincial and local governments, private sector and BFIs

d) Social Services¹⁵ Uses of RE

Federal: Encourage use of RE for social service uses

Provincial: Encourage use of RE for social service uses

¹⁵ Includes health, education, information communication technology (ICT), street lights, religious and security institutions

Local: Support uptake of RES for social service uses through project development and financial support for the use of RE for social service uses

Function for AEPC:

- i. Capacity development supports to Provincial and Local Governments to design and implement projects for social services use of RE.
- ii. Financial and other technical supports for upscale through private sector and BFIs

e) Use of Energy for Water Supply and Irrigation Services

Federal: Support uptake of RES for large scale water supply and irrigation services

Provincial: Support uptake of RES for Provincial level water supply and irrigation services

Local: Support uptake of RES for water supply and irrigation services through project development and financial support for use of RE for social service uses

Function for AEPC:

- i. Capacity development supports to Provincial and Local Governments to design and implement RE projects for water supply and irrigation.
- ii. Financial and other technical supports for upscale through private sector and BFIs

f) Market Development

Federal and Provincial: Encourage private capital, public private partnership and price monitoring of RES and technology through policy and financial support

Local: Support market development for uptake of RES through project development and financial support for use of RE for social service uses

Function for AEPC:

- i. Support local government to leverage private investment
- ii. Work with provincial and local level governments to implement pilot demonstration projects
- iii. Capacity development of private sector for efficient market development
- iv. Facilitate acquisition of RES technologies from abroad – technology transfer

Functions of other federal and provincial level institutions:

- i. MoF, Nepal Rastra Bank (NRB), Ministry of Industries, Commerce and Supplies (MoICS) at federal level
- ii. MoPID and Provincial finance ministries at province level
- iii. BFIs to participate and provide loans to private sector

g) Enhance Access to Finance

Federal: Provide grants to BFIs to reduce cost of finance; implement favourable monetary policy for financing RES; provide low cost funds to BFIs for enhancing access to finance

Provincial and Local: Leveraging finance through co-financing

Function for AEPC:

- i. Mobilise resources for viability gap funding e.g. challenge fund, subsidy for leveraging finance, result-based financing, etc.
- ii. Capacity development supports to local government, BFIs and private sector for increasing their portfolio for access to finance

Functions of other federal level institutions:

- i. MoF to provide fund
- ii. NRB to channelize fund and provide operational directives
- iii. BFIs to implement

h) Quality Assurance and Monitoring of RES Project Progress

Federal: Provide technical and financial assistance to Provinces and Local governments for collection and analysis of monitoring information and data for policy feed-back

Provincial: Compile monitoring information and data from local level to Provincial level

Local: Inspection and monitoring of progress

Function for AEPC:

- i. Capacity development supports to local governments for quality assurance and monitoring

5.1.5 Resource Mobilisation Including Foreign Grants and Loans

RES require high up-front cost compared to fossil-fuel but its low operating expenditures has potential to more than off-set the high up-front cost in the long-run. For a developing country like Nepal where demand on financial outlay for multiple development priorities is numerous and available financial resources are few, availing adequate financial allocations for RES from its own resources is a challenge. Other internal sources of resources are government budgetary allocation for internal grants and subsidy by the government for which government may mobilise funds from i) Royalty from electricity, water and other natural resources, and ii) Tax, duties and fees, etc. Following are the sub-functions relating to resource mobilisation.

a) Royalty from Electricity, Water and Other Natural Resources

The legislative provides basis for collection of royalty from various natural resources to meet governments operational and development expenditures. Roles relating to generating resources by levying royalty at different level of governments are,

Federal, Provincial and Local: Collection of royalty and distribution as specified by Law

Function for AEPC:

- i. Coordinate with NNRFC for resource distribution
- ii. Capacity development support to province and local governments for royalty management

Functions of other federal level institutions:

- i. MoF allocates the funds with inputs from MoEWRI, MoFE, MoFAGA and other relevant ministries

b) Tax, Duties and Fees

Tax, duties and fees are collected on various commercial activities in the country to finance national expenditures. Certain development activities can be exempted from taxes and duties like RE and other capital investment for commercial and non-commercial activities in the country. Roles relating to collecting taxes and distributing resources at different level of governments are,

Federal: Collection of custom and excise duty on related products, Value added tax, Environment tax (carbon tax), levying service charges and fees

Provincial: Collection of service charge and fee

Local: Collection of Local taxes, Service charge and fee

Function for AEPC:

- i. Prepare guidelines for service charge and fees related to production and supply of small-scale RE
- ii. Facilitate custom, excise and VAT related provisions (exemptions, etc.)

Functions of other federal level institutions:

- i. IRD to collect taxes
- ii. DOED to collect and deposit royalty from hydropower and other electricity projects
- iii. MoF allocates the funds

c) Internal Grants and Subsidy

Through the provisions of constitutional arrangements NNRFC provides basis for resource sharing among Federal, Provincial and Local Governments. Final allocations of resources are made by Ministry of Finance in the form of annual budget and endorsed by the Federal Parliament at Federal Level. In addition, Provincial and Local Governments also prepare their budget for regular administrative and development expenses. As defined by NNRFC and other provisions roles relating to allocating various grants by different governments are,

Federal: Allocate grants to Provincial and Local Governments in the form fiscal equalisation, conditional, complimentary and special for respective purposes

Provincial: Allocate fiscal equalisation grant and conditional grant to local governments

Local: Utilise equalisation, complimentary, conditional and special grants

Function for AEPC:

- i. Prepare subsidy delivery mechanism and disburse subsidy
- ii. Capacity development support to local governments on utilisation of available grants under respective purposes

Functions of other federal level institutions:

- i. NNRFC to provide directives
- ii. MoF to allocate
- iii. Provincial finance ministries to allocate Provincial resources

d) Foreign Grants and Loan Mobilisation

Climate and development concerns have resulted in desirability of minimising use of CO₂ emitting use of fossil fuel worldwide. As a result developed countries not only focus on deployment of RES within their own territory but also support poor nation like Nepal for global deployment of RES. This has created resource commitments from developed countries to implement RE projects in developing country like Nepal. Thus, foreign grants, aids and loans mobilisation are included within this function. Signing agreements with foreign countries and loans from multi-nationals requiring sovereign guarantee is within the exclusive right of federal government. Provincial governments can negotiate and sign agreements with donors and multi-laterals with the consent from federal government. As per the Constitutional and other legislative provisions roles relating to allocating mobilising foreign grants and loans various grants by different governments are,

Federal: Foreign grants, aids and loans mobilisation

Provincial: Foreign grants and assistance mobilisation at province level with consent of federal government and make use of available funds

Local: Utilise the available funds

Function for AEPC:

- i. Identifying potential areas of fund for RE from foreign grants and loans

Functions of other federal level institutions:

- i. MoEWRI facilitate acquisition with help of AEPC
- ii. MoF coordinates channelling of foreign funds and monitors foreign fund flow

e) Climate and Carbon Finance

Multi-lateral efforts have also created global funding for implementing projects that positively impact climate change concerns that are usually referred as climate or carbon funds.

Federal: Access global climate and carbon funds

Provincial: Access global climate and carbon funds with support and consent from Federal Government and utilise climate and carbon funds accessed by Federal Government

Local: Utilise climate and carbon funds accessed by Federal and Provincial Government

Function for AEPC:

- i. As a national implementation entity, facilitate in accessing climate and carbon finance through project development with help of Provincial and local governments
- ii. Develop bankable projects for climate finance.
- iii. Provide technical assistance to Provincial and Local Governments to implement climate and carbon projects

Functions of other federal level institutions:

- i. MoFE authorise and registration of carbon projects
- ii. Ministry of Finance for Green Climate Fund

5.1.6 Research and Development

This includes data provision including records management (Statistics) and various RE technology related research and development (R&D). These are placed within all three levels of government, whereas intellectual property rights including patent rights are under the jurisdiction of Federal government. Energy research is a function concurrent to both federal and province governments that needs an effective linkage with field research and data, again a function under the local government. We describe sub-functions under R&D as follows:

a) Statistics

Federal: Produce RE statistics of Nepal

Provincial: Prepare RE statistics at province level

Local: Data exchange - data inputs to RE statistics

Function for AEPC:

- i. Prepares and publish national RE statistics
- ii. Academic, R&D and other institutions provides inputs to national statistics

b) Research on Renewable Energy Technology Development

Federal: Support R&D on RE technology

Provincial: Facilitate and support R&D on RE technology at province level

Local: Facilitate and support R&D on RE technology at local level

Function for AEPC:

- i. Mobilise resources, monitors and integrates R&D activities in the country
- ii. Pilot projects in collaboration with Provincial and Local Governments as well as Academic, R&D and other institutions
- iii. Engage in R&D of innovative technologies
- iv. Disseminate R&D results

Functions of other federal institutions:

- i. Academic, R&D and other institutions conducts researches and disseminate results

c) Intellectual Property Rights Including Copyrights

Federal: Protect intellectual property rights including copyrights related to products and research for RES. Support Nepal Copyright Registrar's Office (NCRO) to execute their intellectual property rights and copyright functions

Provincial and Local: Support NCRO to execute their intellectual property rights and copyright functions

Function for AEPC:

- i. Promote and encourage intellectual property rights including copyrights related to products and research for RES

Functions of other federal institutions:

- i. NCRO executes intellectual property rights and copyright functions

d) Research on Financing and Implementation Modality

Federal: Support R&D on financing and implementation modality

Provincial: Facilitate and support R&D on financing and implementation modality at province level

Local: Facilitate and support R&D on financing and implementation modality at local level

Function for AEPC:

- i. Mobilise resources financing and implementation modality
- ii. Pilot projects in collaboration with Provincial and Local Governments as well as academic, R&D and other institutions conducts researches
- iii. Disseminate R&D results

Functions of other institutions:

- i. Academic, R&D and other institutions conducts researches and disseminate results

5.1.7 Other Provisions relevant to Renewable Energy

a) Health Policies, Health Standards

Federal: Development of safety standards, Indoor air quality and standards

Provincial and Local: Ensuring implementation of safety standards, Indoor air quality and standards

Function for AEPC:

- i. Support implementation of safety standards, Indoor air quality and standards

Functions of other institutions:

- i. NBSM to develop standards

b) Sustainable Use of Environmental Resources

Federal: Promote and legislate sustainable use of biomass from forest for improving energy access and river catchment land use management for improving energy access and productive use

Provincial and Local: Support federal goals on use of natural resource sustainably.

Function for AEPC:

- i. Promote sustainable use of biomass from forest for improving energy access
- ii. Promote river catchment land use management

- iii. Coordinate with MoFE for sustainable biomass energy

c) CBOs and Cooperative related Matters

All Level: Promote participation in RES development and increasing access to finance

Function for AEPC:

- i. Encourage participation in RES development and increasing access to finance
- ii. Capacity development of CBOs and cooperatives for RES development

5.2 Role for AEPC

The Constitution of Nepal has mandated the local government to implement alternative energy at the local level. Existing provisions in the Constitution and other provisions in legislatures including local governance has been thoroughly analysed. Implementing alternative energy programme is a new requirements for the local governments for which capacity will have to be developed. Apart from capacity development of local government there are other are other multiple functions that needs to be fulfilled in the sector which will be deliberated further in this section. As is the case in any other sector, the issues include broad spectrum – ensuring optimal technology selection, sustainable financing, developing viable business models, and alleviating fiduciary risk¹⁶ are some of them. As stated earlier, a proper organisational re-structuring to carry-out these functions is inevitable.

AEPC has been active in carrying-out RE sector development and therefore is a logical choice to evolve it into a federal key sectoral agency for multiple reasons:

- a) AEPC's experiences of over two decades in implementing multifarious RE development project in terms of technology, modality and funding sources can be considered almost unparalleled with varying degree of success. Such institutional knowledge is enshrined in various processes, modalities, guidelines, information as well as cadre of its human resources. A substantial investment incurred in creating knowledge, practice and resources can be modified and mobilised to cater to sector requirements under new federal context.
- b) Existing AEPC, in its modified/restructured form has a very strong potential to be an efficient delivery of constitutional provisions and international commitments as one-window subsidiary development organization of the federal government.
- c) Being a semi-autonomous organisation, which needs to be further strengthen (stronger legal institutional basis an Act for AEPC, capacity development, etc. provides basis for

¹⁶ Fiduciary risk is over the board rampant phenomena of Nepalese Organisations mainly, government, which needs to be addressed through policy and strong monitoring. We have not elaborated it further

- Being a credible organization to attract development partners (donors) and international supports – attracting resources.
 - Easier access to people/ less-bureaucratic and flexible.
- d) AEPC's track record, as a subsidiary agency of the GoN also includes its works for development of small-scale RE through market development with supports from donors. Its working modality included partnering with private sector and civil society (local NGOs) in creating demand and supply of RE.
- e) AEPC has also been a coordinating agency for small-scale RE initiatives including capacity building at all levels, local government in particular for fulfilling international commitments.

Based on functional analysis, roles that AEPC needs to play for development of RE sector are summarised in Annex 2.

6 Implementation Modality and Institutional Reforms Options

Given the national and global development trend and national interest and relevance, AEPC will need to re-align its efforts to:

- Upscale AEPC's interest from traditional focus on meeting rural household energy needs with small systems to larger systems to attain economies of scale
- Include semi-urban and urban areas in AEPC's scope due to trend of declaring habitats of rural nature as urban/municipalities to maintain scope of work for AEPC and upscale.
- Develop AEPC into a Centre of Excellence

6.1 Centre of Excellence

Centre of excellence, is defined as a principal agency promoting a given goal. The statement (Principal agency with defined goal) invariably demands for organisation's Strategic direction and plan in time horizon. The Strategic Organizational Development (SOD) Plan 2013-22, which is the latest, was approved by the AEPC board in 2014 and is currently implemented by integrating it into its Standard Operating Procedure (SOP). The AEPC sees itself (VISION) as "an institution recognized as a regional/international example of promoting large-scale sustainable use of renewable energy and a national focal point for resource mobilisation". The long term goal of AEPC which is in line with national RE goal distils down to 3 key elements:

- i) **Socio-economic goal:** Inclusive and cost-effective supply of affordable and quality energy access for the improved living conditions in the area inaccessible from grid.
- ii) **Economic development:** Mainstreaming RE through commercialisation and awareness (knowledge dissemination).
- iii) **Environmental goal:** Environment protection (reduced dependence on traditional energy and imported fossil fuels as well as contributing to climate change adaptation and mitigation)

An important part of the "Centre of excellence" will be creating an efficient and accessible knowledge hub where information from within the country and outside the country confluence – data and information depository. Data and information acquisition, analysis on ongoing project and progress, potentials, and demand are important. Global technical and other development information and information out of researches within and outside the country will help in innovating new RE solutions and pipeline of projects. However, making them available easily to the stakeholder including planners and policy makers should be key goal for *the knowledge hub unit* of AEPC. The extent of its involvements in knowledge services should not be limited only

to RE technology alone but also should encompass financing, sustainability, quality assurance as well as policy paradigm of the sector.

In order to establish as a principle agency, AEPC will need to champion above three goal elements effectively. Delivering on above 7 key functions identified and underlying sub-function will help in designing pathway for AEPC to establish as a key principle agency. Establishing its credibility not only through authority bestowed on by the federal government but also ensuring ownership by the sector actors including private sector and civil society, development partners, academia and people in general is equally important. Its success in converting itself into an organisation that is considered inclusive as well as fair and honest by all its stakeholder will take it into a path of centre of excellence.

In short, it will be worthwhile for AEPC to develop itself as an organisation that is looked-upon for its capability to provide solutions to short, medium and long-term issues of the sector -- i.e. it should be a “go-to” organisation for RE solutions.

6.2 Institutional Modalities of AEPC

While the current federal context creates a role that suits well to AEPC, it will require some fundamental changes in the mode of operation internally as well as externally. The Constitutional provisions have empowered local level of governance to decide on its own with regards to the development of “Alternative Energy¹⁷” locally. The local governments will require an arrangement at federal level as well as Provincial level to benefit from technical and financial resources available locally, provincially, nationally and globally -- national and international governmental, non-governmental and international organizations -- to plan and implement RE projects. If properly capacitated and made aware of capabilities and benefits of renewable energies, local governments can also be expected to internal resources as they are also empowered to generate it through local taxes, fees, etc.

The spirit of federalism aspire the provincial governments to take lead in all forms of development activities within the sector. The provincial government institutions are in the process of evolvement which will require supports from the federal government – technical and financial – and time to mobilise resources from various sources to plan, implement and monitor RE projects. Depending upon how RE sector grows, AEPC can opt for various options, including

- a) AEPC at federal level with support to establish transitional office at the province level that would be capacitated to implement Provincial level RE project as well as capable to support Local governments to implement Local government level projects
- b) AEPC only at the federal level with linkages and coordination with Provincial and Local governments

¹⁷ It is assumed that alternative energy for the local government is renewable energy of sizes suitable for local government to implement including biomass stoves.

- c) AEPC at federal level with contact person at the provincial concerned line agencies

The option 'c' would undermine the spirit of the federalisation and will need AEPC to expand horizontally and vertically which may not be an efficient way. The desired sectoral goals will be hard to attain with coordination linkages alone with Provincial and Local governments. Therefore, option 'b' may seem to be desirable politically as it recognises sovereignty of Provincial and Local governments but given the need of the sector and current capacities of Provincial and Local governments this option is not desirable as well. Finally the option 'a' seems to be a balanced approach where AEPC may promote and motivate provincial governments to establish provincial RE agencies for taking the role similar to the federal level role AEPC at the provincial level. It should be envisaged that linkage between federal organisation (AEPC) and provincial RE agencies be developed for synergy and complementing each other. The provincial RE agencies could be developed as a semi-autonomous organisation lie AEPC with strong linkage with AEPC and accountability to the Provincial Government.

6.3 Delivery Modalities

For the past two decades, success of AEPC in implementing RE projects has been based on strong partnership with civil society and donor communities with private sector as its implementation vehicle. To carry the legacy forward, AEPC as a federal level institution will need to continue working with private sector, civil society and donor communities. Laying out framework for involvement for these partners has become even more important under the current complex geo-political environment of multiple governance modalities to avoid unwanted results and give continuity and take the past legacy of AEPC even further. The framework(s) should cover

- a) Development framework for donor supports;
- b) Regulatory framework including quality assurance and monitoring for private sector;
- c) Well-defined and globally accepted roles for civil societies

A comprehensive sector function analysis has identified roles for AEPC in all seven key functions with varying degree of involvements in sub-functions. The identified involvements and their deliverables are divided into following four groups:

Deliverable 1 - Lead sector-growth

- i. Championing the sector through advocacy and coordination for policy coherence and equitable energy access,
- ii. Develop national level RE plans and programmes,
- iii. Quality assurance through development of standards of technology, construction/ installation and operation including safety standards
- iv. R&D and pilot projects, National level special projects
- v. Establish and manage knowledge centre

Deliverable 2 - Facilitation and coordination

- i. Implementing framework for donor involvement in RE in Nepal,
- ii. Facilitate for fulfilling international commitments relevant to RE
- iii. Mobilisation of resource from government, development partners and global funding opportunities

Deliverable 3 - Technical Support

- i. Policy and planning supports to federal, provincial and local government to deliver on national RE sector goals, regulation of sector
- ii. Technical supports to provincial and local governments, private sector and R&D institutions for exploration, design and development of RE at the local level

Deliverable 4 - Capacity development of sector actors

- i. Establish and development capacity of RE units of provincial and local government organisation
- ii. Capacity development of other identified sector actors

Delivery modalities will have to be looked upon with organisational mandates rising out of Constitutional, legislatives and social, economic and political aspirations. Out of four key support deliverables, Deliverables 1 and 2 – lead sector-growth and facilitation and coordination – are responsibility of the organisation at federal level (AEPC). These deliverables are of long-term nature, which need to be initiated, facilitated/implemented and monitored continuously. Deliverable 3 and 4 -- Technical support and capacity development – are responsibilities of federal level (AEPC) for now, which will gradually decrease and be ultimately transferred to the organisations at province level. However, the federal level organisations may also engage in parallel with the province level organisations, selectively based upon situational needs.

6.3.1 Modalities for Policy, Planning and Quality Assurance Supports

Policy, planning and quality assurance supports are the basis for deliverables 1, 2 and 3. The figure 2 below depicts modalities of delivery and institutional options for federal level (long-term) as well as support to provincial/ local level (short to medium term) engagement for AEPC. AEPC will need to redefine existing Planning and Monitoring division (unit) to implement/ facilitate these activities at federal level. AEPC will also need to support the relevant provincial level ministry (MoPID) to start a unit/ section for implementing RE activities.

This unit at AEPC will be engaged at federal level for:

- a) Advocating for coherent policies and equitable energy access
- b) Providing technical assistance for policy, plans and programmes formulation including budget
- c) Coordinating and facilitating implementation of NREF
- d) Mobilising internal and external resources for the sector
- e) Monitoring and coordination of international commitments

- f) Preparing and implementing rules, regulations and guidelines

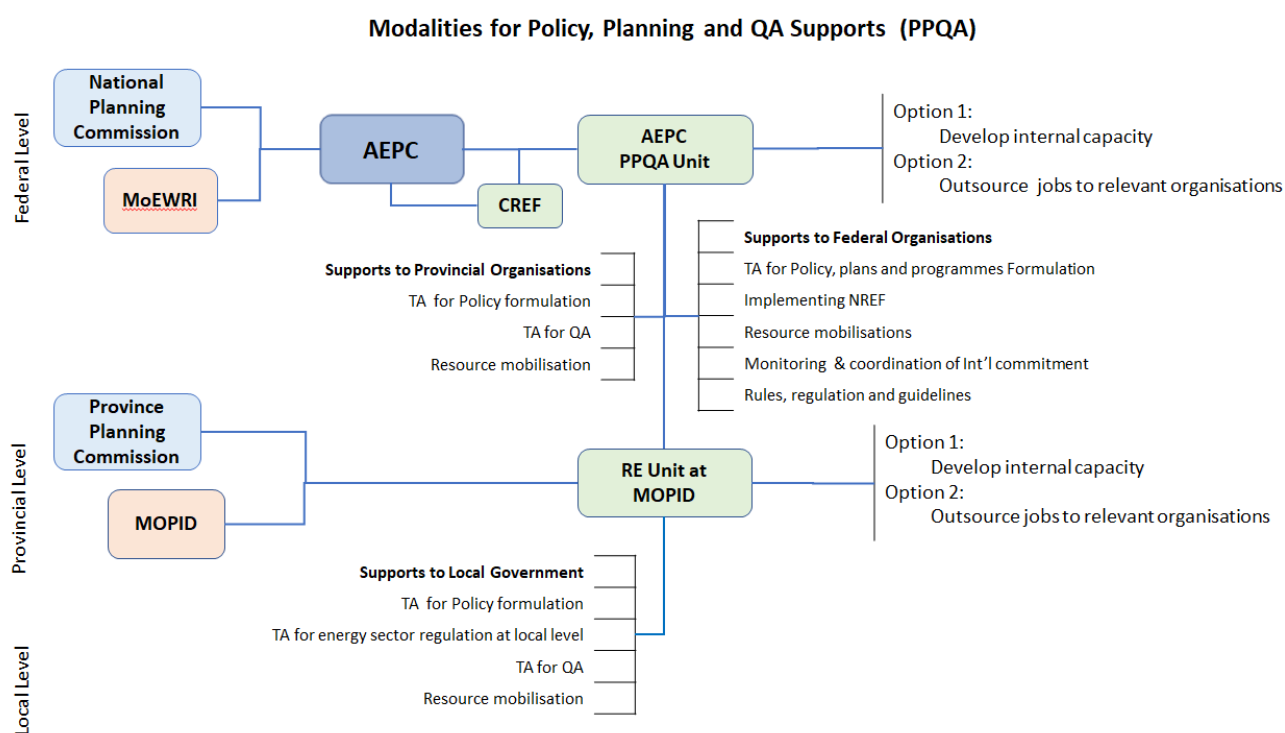
Similarly, this unit will also provide province level organisations with:

- Technical assistance for policy formulation
- Technical assistance for quality assurance
- Resource mobilisation supports

The RE unit at MoPID will provide local governments with:

- Technical assistance for energy sector regulation at local level
- Technical assistance for quality assurance
- Resource mobilisation supports

Figure 2: Modalities for Policy, Planning and Quality Assurance Supports



The institutional options at both federal and provincial level can be:

Option 1 – Developing internal capacity and capacity of MoPID (Provincial Government)

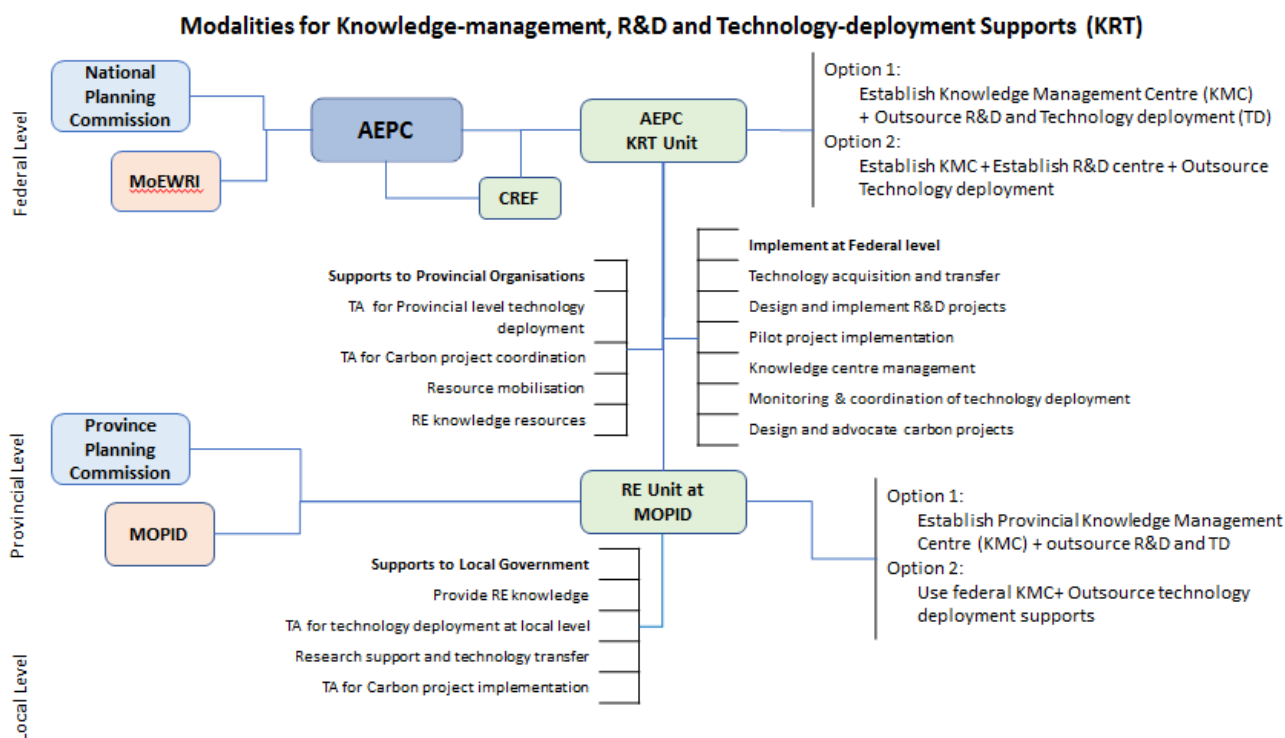
Option 2 – Outsourcing appropriate jobs to relevant organisations

6.3.2 Modalities for Knowledge Management, R&D and Technology Deployment Supports

In order to achieve deliverables 1 and 3, i.e. establishing AEPC as the Centre of Excellence, modalities for knowledge management, R&D and technology deployment

is required. These supports will also include implementation of pilot/ special projects besides providing supports for technology deployment at provincial and local level.

Figure 3: Modalities for Knowledge-management, R&D and Technology-deployment Supports



The figure 3 above shows the modalities for delivery and institutional options for establishing knowledge management centre and technical supports. The existing Technology Promotion Division (unit) will have to be restructured and upgraded to be responsible at federal level for:

- Technology acquisition and transfer
- Designing and implementing R&D projects
- Pilot project implementation
- Knowledge centre management
- Monitoring & coordination of technology deployment
- Designing and advocating carbon projects

This unit will also provide services to provincial level organisation, such as:

- Technical assistance for Provincial level technology deployment
- Technical assistance for Carbon project coordination
- Resource mobilisation
- RE knowledge resources

The RE unit at MoPID will engage with local government for:

- Providing RE knowledge

- b) Providing technical assistance for technology deployment at local level
- c) Research support and technology transfer
- d) Technical assistance for Carbon project implementation

The institutional options at federal level can be:

- Option 1 – Establishing Knowledge Management Centre (KMC) and outsourcing R&D and technology deployment
- Option 2 – Establishing KMC and R&D centre and outsourcing technology deployment

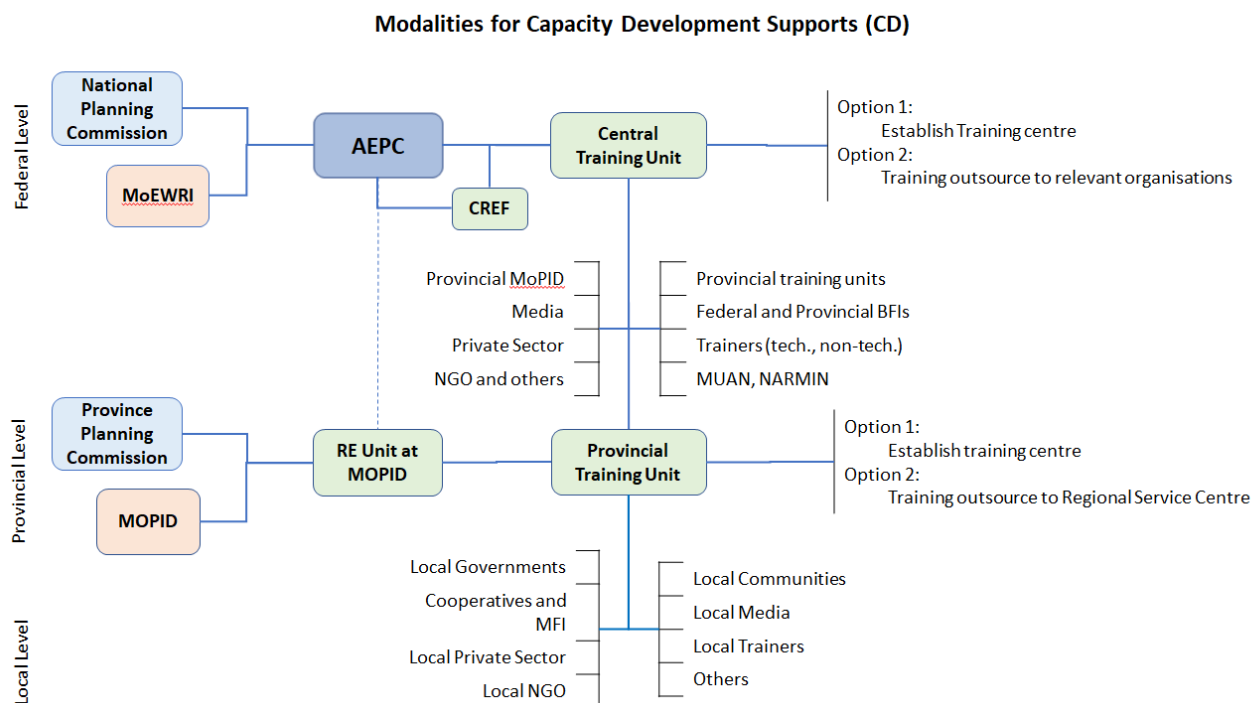
The institutional options at provincial level can be:

- Option 1 – Establishing Knowledge Management Centre (KMC) and outsourcing R&D and technology deployment
- Option 2 – Using KMC and R&D centre at federal level and outsourcing technology deployment

6.3.3 Modalities for Capacity Development Supports

The capacity development supports will help to achieve deliverable 4 by developing capacity of existing as well as new actors. The modalities for delivery and institutional options are shown in figure 4 below.

Figure 4: Modalities for Capacity Development Supports



Restructuring of AEPC will be required and a unit for training at central level need to be established for providing capacity development supports to – Provincial MoPID, media, private sector, NGOs and others, provincial training units, federal and provincial BFIs,

trainers (technical and non-technical) and also associations of municipalities (urban as well as rural).

The provincial training units will provide capacity development supports to – local governments, local cooperatives and microfinance institutions, local private sector, communities, media, trainers and others, as relevant.

The institutional options at federal and provincial level can be:

- Option 1 – Establishing own training centre
- Option 2 – Training outsource to relevant organisations (regional service centres¹⁸)

6.3.4 Modalities for Resource Mobilisation Supports

Currently there are three avenues of possible financial resources that can be tapped – i) Government allocation from internally generated sources, ii) Grants and Loans from external sources including development partners and multi-lateral agencies, and iii) Global climate and carbon funds. Figure 5 below depicts modalities of supports from federal organisations (MoF, MoFE, AEPC, and CREF), external sources (development partners and multi-lateral agencies and global climate and carbon funds). The figure also shows the fund flow mechanisms through CREF for Debt and Grant financing for technology deployment that make use of BFIs at federal, provincial and local levels. The other fund flow mechanism shown in the figure is flow of external and internal funds and technical supports from federal to provincial and local level for various activities relating to mobilisation and utilisation.

The ownership of resource mobilisation lies with the planning unit with supports from CREF, finance unit and other units at AEPC as required. The institutional options at federal level are:

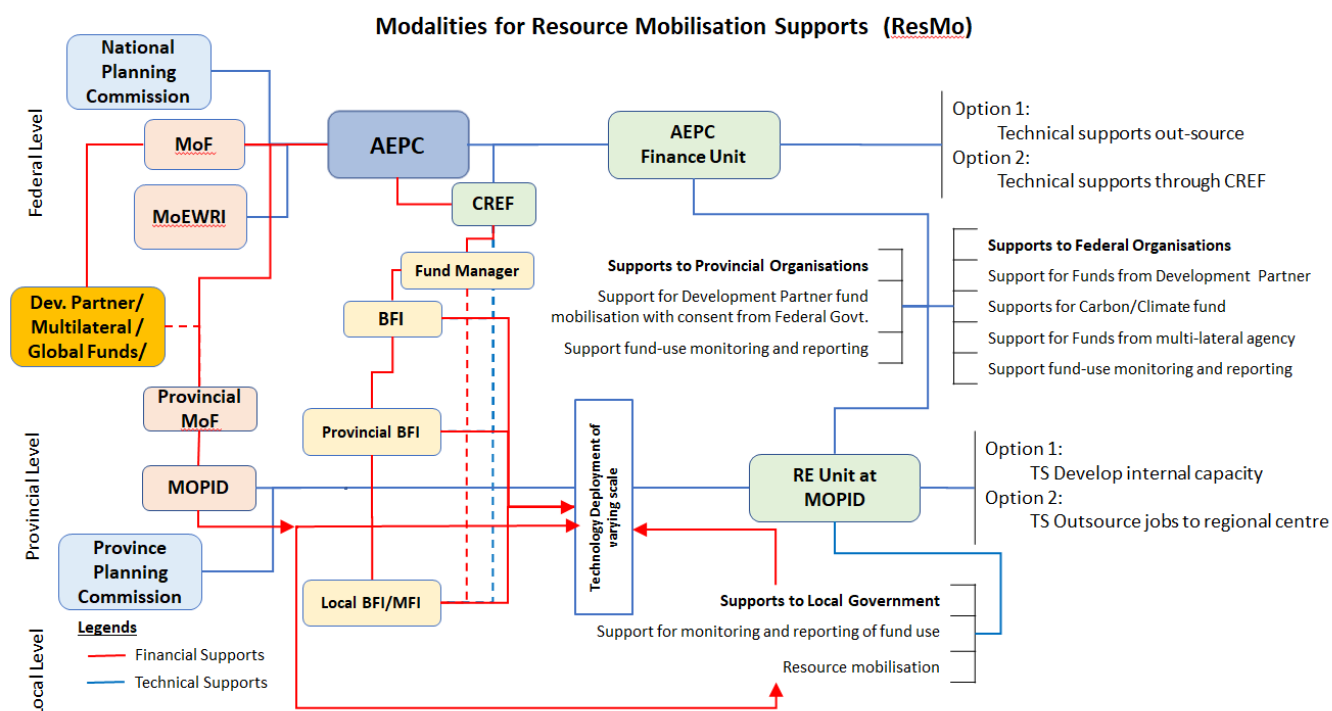
- Option 1 – Outsourcing technical supports and financial support through CREF
- Option 2 – Technical and financial supports through CREF

The institutional options at provincial level are:

- Option 1 – Developing internal capacity for technical supports
- Option 2 – Outsourcing relevant jobs to regional service centre

¹⁸ It can be existing regional service centres or similar organisations who can provide capacity development supports in clusters.

Figure 5: Modalities for Resource Mobilisation Supports



6.4 Time horizon of AEPC's Engagement

The AEPC in short term can have a mission for supporting provincial and local governments to establish institutional arrangements including policy supports and capacity building in mainstreaming RE in meeting energy needs for consumptive as well as productive purposes. In long term, AEPC will lead the sector through advocacy for coherent policies and equitable energy access, resource mobilisation, quality assurance and operation of knowledge centre.

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Annex I: Functions and Roles for Development of RE Sector

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|---|-----------------------------|--|--|--|---|---|
| 1 | Legislative, Policies, programme and Plan | Acts, Rules and Policies | Prepare overarching federal acts, rules and policies - For coherency, basis effective coordination, regulation and mobilisation of resources for equitable energy access | Prepare their own acts and prepare relevant rules and policies - For ensuring balanced development within the province through coordination and mobilising resources including joint implementation modality | Prepare their own acts and prepare relevant rules and policies - For implementation of projects and mobilising resources including joint implementation modality | <p>Support federal government (MoEWRI) to draft necessary Acts, rules and policies for sector development</p> <p>Provide capacity development supports to Provincial and Local Governments to draft their acts, rules and policies</p> <p>Provide technical support by developing templates to support Provincial and Local Governments to prepare their legal instruments</p> <p>Technical and capacity development supports to provincial and local governments of short to medium term in nature whereas support to federal level institutions and coordination for the development and enactments of laws and formulation of policies will be of long term nature</p> | <p>Provincial and local level RE agencies/ units: Support respective government's ministries/ units to draft necessary Acts, rules and policies for sector development</p> <p>Provincial government's RE agencies/ units to provide capacity development supports to local governments in the long run</p> <p>Federal level institutions: NPC to provide macro-level inputs to legislative instruments and guidance for formulating policies</p> <p>MoEWRI to own and lead the process in developing legislative instruments and formulating policies</p> |
| | | Plans/ programmes/ projects | Prepare national level plans, programmes | Prepare province level plans, programmes | Prepare local level plans and project (up to 1 | Prepare federal level plans and programmes and design national level projects including project identification and development. | Provincial and local RE agencies/ units: Support respective government's |

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|----------------|--|--|---|---|--|---|
| | | | and projects (Large RE projects) and plans to meet Nepal's international commitments, etc. | and projects (size and scope yet to be defined) | MW hydro and local-level RE) | <p>Support governments in setting targets for electricity access, clean cooking and productive use of energy</p> <p>Capacity development and technical supports to province and local level for preparing plans, programmes and design projects.</p> | <p>ministries/units to develop plan and programmes including project design at the provincial/ local level.</p> <p>Provincial government's RE agencies/units to support capacity development supports to local governments in the long run.</p> <p>Federal level institutions:</p> <p>NERC regulates large RE electricity projects.</p> <p>DOED facilitates large RE electricity projects.</p> |
| | | Coordination and international commitments | Fulfil international commitments in RE sector (SDG7, SEforALL) and ensure Nepal's position in international forum. | Contribute to international commitments | Contribute to international commitments | <p>Monitor the progress towards international commitments, collect information from local and provincial level, analyse and publish</p> <p>Support local government for information collection and analysis,</p> <p>Ensure national participation in international forum</p> | <p>Provincial and local level RE agencies/ unit :</p> <p>Support federal agency (AEPC) in collection and analysis of information and participate as necessary. Provide necessary technical and logistics supports for the coordination within and outside the sector</p> |

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|----------------|------------------------------------|--|--|--|--|--|
| | | | | | | | Federal level institutions: MoEWRI takes lead in coordination within the energy sector where AEPC will provide necessary technical and logistic support. |
| 2 | Regulation | License, registration and permit | Issuing license and permit and register large electricity projects (survey, construction, generation, transmission and distribution) | Lack of clarity on issue of license for provincial size projects | Generation license of hydro-project up to one MW Regulation of local level RES Regulation of local electricity distribution system Verification of licenses | Support in preparing rules and regulations for RE systems Assist in managing regulatory information of RES | Federal level institutions: DOED can support local governments for preparing rules and regulations for electricity distribution system DOED can support in bringing clarity in licensing for different sized electricity projects |
| | | Electricity tariff and service fee | Electricity tariff and service fee | Support federal government in implementing federal policies | Support federal government in implementing federal policies Regulation of tariff determination and implementation | Providing supports to relevant federal agencies (MoEWRI, NERC, etc.) for preparing tariff guideline and monitoring for RE based electricity and other energy services. Facilitating information dissemination from federal to provincial and local level governments on guidelines and policies related to tariff and fees. | Federal level institutions: NERC is mandated for regulation of electricity tariffs NEA and other distribution companies will implement tariff for grid electricity |

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|----------------------------|---|--|---|---|---|---|
| | | | | | by RES operators | Providing supports to RES operators for tariff analysis and determination. | |
| | | Agreements on Power/ Energy Development , Purchase, Exchange and Trade (PDA/ PPA/ PEA/ PTA) | Regulation of agreements | Monitoring and support federal government on regulation | Monitoring and support federal government on regulation Monitoring and support federal government on regulation and regulation of agreements regarding RES | AEPC as a federal dedicated and focal agency for RE development will be mainly supporting local government for regulation of agreements on RES at local level. | Federal level institutions: NERC is mandated for regulation for PPA/ PEA/ PTA |
| 3 | Standards and Measurements | Specification of standards and safety of Services and Technologies | Develop and implement national standards and specifications, including safety standards for grid, off-grid and RES | Monitoring of implementation of standards | Monitoring of implementation of standards | Support and facilitate federal government to develop national standards and specifications Capacity development of Provincial and Local Government in understanding standards, monitoring and data acquisition | Federal level institutions: NBSM approves standards for RES NERC can prepare standards for electricity generation, transmission and distribution |
| | | Testing and measurement s | Develop and manage protocol for testing and measurement of grid, off-grid and RES | Monitoring of implementation of testing and measurement protocols | Support implementation of testing and measurement protocols | AEPC provides technical and financial supports for capacity building of test stations Technical, logistic and financial supports for measurements in the field. | Federal level institutions: NBSM approves protocol National laboratories e.g. RETS conduct tests and provide certificates. |

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|---------------------------------|--|---|--|---|--|--|
| | | Accreditation | Award and renew accreditation for RES | Ensure implementation of standards | Ensure accreditation certificates for local installations, where applicable | Encourage RE technologies and RE based services to be accredited formally. Mobilise necessary resource for awareness on accreditation and make mandatory where possible. | Federal level institutions: NBSM awards and renew accreditation. |
| 4 | Promotion, Development and Uses | RE and RES project development for electricity access | Prepare national level plans for awareness and promotion of RES for improving energy access And use of energy for productive and social purpose. Project identification, PDA, PPA, PEA, PTA for large RE projects for electricity | Coordinate implementation of awareness and promotion of RES by MoPID Monitoring and support federal government on implementation of PDA, PPA, PEA, PTA Facilitate province level electricity development – MoPID | Implement awareness and promotion of RES O&M of small hydropower and RE; O&M and maintenance of electricity distribution systems | Prepare federal level plans and programmes and design projects for awareness and promotion of RES Develop capacity of province and local level for awareness and promotion of RES Capacity development supports to Provincial and Local Governments Capacity development supports to private sector | Federal level institutions: Large RE projects are facilitated by DoED, regulated by NERC, operation, management and maintenance by NEA and IPPs at federal level Facilitated by MoPID, regulated as per NERC requirements, O&M and management by NEA and IPPs |
| | | RE and RES market development for cooking and thermal energy use | Encourage private sector to establish efficient market for RE fuels and devices for cooking and | Encourage private sector to establish efficient market for RE fuels and devices for cooking and | Enable uptake of RES for cooking and thermal use | Capacity development supports to local governments Capacity development supports to private sector | |

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|----------------|--|---|--|--|--|--------------------------|
| | | | thermal energy use | thermal energy use | | Private sectors deploy, install and manage | |
| | | Productive use of energy including agriculture and industrial applications | Encourage private sector to establish efficient market and innovative business model for RE application for productive use applications | Encourage private sector to establish efficient market and innovative business model for RE application for productive use of energy including agriculture and industrial applications | Implement innovative projects through technical and financial support for uptake of RES for productive uses with help of market actors | Capacity development supports to Provincial and local governments, private sector and BFIs | |
| | | Social services ¹⁹ uses of RE | Encourage use of RE for social service uses | Encourage use of RE for social service uses | Support uptake of RES for social service uses through project development and financial support for use of RE for social service uses | Capacity development supports to provincial and local governments to design and implement RE projects for water supply and irrigation. Financial and other technical supports for upscale through private sector and BFIs | |
| | | Use of energy for water supply and irrigation services | Support uptake of RES for large scale water supply and | Support uptake of RES for Provincial level water supply | Support uptake of RES for water supply and irrigation services | Capacity development supports to Provincial and local Governments to design and implement RE projects for water supply and irrigation. | |

¹⁹ (health, education, information communication technology (ICT), street lights, religious and security institutions)

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|----------------|---------------------------|--|---|---|--|---|
| | | | irrigation services | and irrigation services | through project development and financial supports for use of RE for social service uses. | Financial and other technical supports for upscale through private sector and BFIs. | |
| | | Market development | Encourage private capital, public private partnership and price monitoring of RES and technology through policy and financial support | Encourage private capital, public private partnership and price monitoring of RES and technology through policy and financial support | Support market development for uptake of RES through project development and financial support for use of RE for social service uses. | Support local government to leverage private investment Implement pilot demonstration projects Capacity development of private sector for efficient market development Facilitate acquisition of RES technologies from abroad | Federal level institutions: MoF, NRB, MoICS at federal level MoPID and Provincial finance ministries at province level BFIs to participate and provide loans to private sector. |
| | | Enhance access to finance | Provide grants to BFIs to reduce cost of finance; Implement favourable monetary policy for financing RES; Provide low cost funds to BFIs for enhancing | Leveraging finance through co-financing | Leveraging finance through co-financing | Mobilise resources for viability gap funding e.g. challenge fund, subsidy for leveraging finance, result-based financing Capacity development supports to local government, BFIs and private sector for increasing their portfolio for access to finance. | Federal level institutions: MoF to provide fund NRB to channelize fund and provide operational directives BFIs to implement |

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|--|---|---|--|---|--|---|
| | | | access to finance. | | | | |
| | | Quality assurance and monitoring of RES project progress | Provide technical and financial assistance to Provinces and Local governments for collection and analysis of monitoring information and data for policy feed-back | Compile monitoring information and data from local level to Provincial level | Inspection and monitoring of progress | Capacity development supports to local governments for quality assurance and monitoring. | |
| 5 | Resource mobilisation including foreign grants and loans | Royalty from electricity, water and other natural resources | Collection of royalty and distribution | Collection of royalty | Collection of royalty | Coordinate with NNRFC for resource distribution Capacity development support to province and local governments for royalty management | Federal level institutions: MoF allocates the funds |
| | | Tax, duties and fees | Collection of Customs excise duty on related products, Value added tax, Environment tax (carbon tax), Levying service charge and fees. | Collection of service charge and fee | Collection of local taxes, Service charge and fee | Prepare guidelines for service charge and fees related to production and supply of small-scale RE Facilitate sector development through custom, excise and VAT related provisions | Federal level institutions: IRD to collect taxes DOED to collect and deposit royalty from hydropower and other electricity projects MoF allocates the funds |

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|----------------|--------------------------------------|---|--|--|--|---|
| | | Internal grants and subsidy | Allocate grants to Provincial and Local Governments in the form fiscal equalisation, conditional, complimentary and special for respective purposes | Allocate fiscal equalisation grant and conditional grant to local governments | Utilise equalisation, complimentary, conditional and special grants | <p>Prepare subsidy delivery mechanism and disburse subsidy</p> <p>Capacity development support to local governments on Utilisation of available grants under respective purposes</p> | <p>Federal level institutions:</p> <p>NRFC to provide directives</p> <p>MoF to allocate provincial finance ministries to allocate provincial resources</p> |
| | | Foreign grants and loan mobilisation | Foreign grants, aids and loans mobilisation | Foreign grants and assistance mobilisation at province level with consent of federal government and make use of available funds. | Utilize the available funds | Facilitate acquisition of foreign grants and loans | <p>Federal level institutions:</p> <p>MoF coordinates channeling of foreign funds</p> <p>MoF monitors foreign fund flow</p> |
| | | Climate and carbon finance | Access global climate and carbon funds | Access global climate and carbon funds with supports and consent from federal government and utilise climate and carbon funds accessed by Federal Government | Utilise climate and carbon funds accessed by federal and provincial government | <p>Facilitate in accessing climate and carbon finance through project development with help of Provincial and Local Governments</p> <p>Provide technical assistance to Provincial and Local Governments to implement climate and carbon projects</p> | <p>Federal level institutions:</p> <p>MoFE authorise and registration of carbon projects</p> |

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|--------------------------|---|--|--|--|--|--|
| 6 | Research and Development | Statistics | Produce RE statistics of Nepal | Prepare RE statistics at province level | Data exchange - data inputs to RE statistics | AEPC prepares and publish national RE statistics Academic, R&D and other institutions provides inputs to national statistics | |
| | | Research on RE technology development | Support R&D on RE technology | Facilitate and support R&D on RE technology at province level | Facilitate and support R&D on RE technology at local level | Mobilise resources, monitors and integrates R&D activities in the country Pilot projects in collaboration with Provincial and local governments as well as academic, R&D and other institutions Engage in R&D OF innovative technologies Disseminate R&D results. | Federal level institutions: Academic, R&D and other institutions conducts researches and disseminate results |
| | | Intellectual property rights including copyrights | Protect intellectual property rights including copyrights related to products and research for RES Support NCRO to execute their intellectual property rights | Support NCRO to execute their intellectual property rights and copyright functions | Support NCRO to execute their intellectual property rights and copyright functions | Promote and encourage intellectual property rights including copyrights related to products and research for RES | Federal level institutions: NCRO executes intellectual property rights and copyright functions |

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|---------------------------------|---|---|---|--|---|---|
| | | | and copyright functions | | | | |
| | | Research on financing and implementation modality | Support R&D on financing and implementation modality | Facilitate and support R&D on financing and implementation modality at province level | Facilitate and support R&D on financing and implementation modality at local level | <p>Mobilise resources financing and implementation modality.</p> <p>Pilot projects in collaboration with Provincial and Local Governments as well as academics, R&D and other institutions conducts researches.</p> <p>Disseminate R&D results.</p> | <p>Institutions:</p> <p>Academic, R&D and other institutions conducts researches and disseminate results</p> |
| 7 | Other Provisions relevant to RE | Health policies, health standards | Development of safety standards, Indoor air quality and standards | Ensuring implementation of safety standards, Indoor air quality and standards | Ensuring implementation of safety standards, Indoor air quality and standards | Support implementation of safety standards, Indoor air quality and standards. | Federal institutions: NBSM to develop standards |
| | | Sustainable use of environmental resources | Promote and legislate sustainable use of biomass from forest for improving energy access and river catchment land use management for improving energy access and productive use | Support federal goals on use of natural resource sustainably | Support federal goals on use of natural resource sustainably. | <p>Promote sustainable use of biomass from forest for improving energy access</p> <p>Promote river catchment land use management</p> <p>Coordinate with MoFE for sustainable biomass energy</p> | |

| SN | Major Function | Sub-function | Federal level | Provincial level | Local level | Option for AEPC | Scope for Other agencies |
|----|----------------|--------------------------------------|---|---|---|--|--------------------------|
| | | CBOs and cooperative related matters | Promote participation in RES development and increasing access to finance | Promote participation in RES development and increasing access to finance | Promote participation in RES development and increasing access to finance | Encourage participation in RES development and increasing access to finance Capacity development of CBOs and cooperatives for RES development | |

Annex II: Role for AEPC in Various Sectoral Functions

| Function | Sub-function | Role for AEPC |
|---|--|---|
| Legislative, policy, programme and plan | Acts, Rules and Policies: | <ul style="list-style-type: none"> i. Support federal government (MOEWRI) to draft necessary Acts, Rules and Policies for sector development ii. Lead energy mix planning iii. Advocacy for optimal energy mix with RE iv. Capacity development of Provincial and Local Governments to draft their acts, rules and policies including preparing templates |
| | Development of plan, programmes and designing projects | <ul style="list-style-type: none"> i. Prepare federal level plans and programmes and design national level projects including project identification and development ii. Support governments in setting targets for electricity access, clean cooking and productive use of energy iii. Capacity development and technical supports to province and local level for preparing plans, programmes and design projects. |
| | Coordination and International commitments | <ul style="list-style-type: none"> i. Monitor the progress towards international commitments, collect information from Local and Provincial level, analyse and publish ii. Support local government for information collection and analysis, iii. Ensure national participation in international forums |
| Regulation | License, registration and permit | <ul style="list-style-type: none"> i. Support federal government in preparing rules and regulations for RES ii. Assist in managing regulatory information of alternative energy systems |
| | Electricity tariff and service fee | <ul style="list-style-type: none"> i. Providing supports to relevant federal agencies (MoEWRI, NERC, etc.) for preparing determining tariff guideline and monitoring for RE based electricity and other energy services ii. Facilitating information dissemination from federal, Provincial and local level governments on guidelines and policies related to tariff and fees iii. Providing supports to RES operators for tariff analysis and determination |
| | Agreements (PDA/ PPA/ PEA/ PTA) | <ul style="list-style-type: none"> i. Supporting local government for regulation of agreements on RES at local level |
| Standards and Measurements | Specification of standards and safety of technologies and services | <ul style="list-style-type: none"> i. Support and facilitate federal government to develop national standards and specifications ii. Capacity development of Provincial and local government in understanding standards, monitoring and data acquisition |

| Function | Sub-function | Role for AEPC |
|--|---|---|
| | Testing and measurements | <ul style="list-style-type: none"> i. Provides technical and financial supports for capacity building of test stations ii. Technical, logistic and financial supports for measurements in the field |
| | Accreditation | <ul style="list-style-type: none"> i. Encourage RE technologies and RE based services to be accredited formally ii. Mobilise necessary resources for awareness on accreditation and make mandatory where possible |
| Promotion, Development and Uses | Electricity access project development | <ul style="list-style-type: none"> i. Prepare federal level plans and programmes and design projects for awareness and promotion of RES ii. Develop capacity of province and local government for awareness and promotion of RES iii. Capacity development of Provincial and local governments iv. Capacity development of the private sector |
| | Market development for cooking and thermal use of RE | <ul style="list-style-type: none"> i. Capacity development of local governments ii. Capacity development of private sector iii. Private sectors deploy, install and manage |
| | Productive use of RE | <ul style="list-style-type: none"> i. Capacity development supports to Provincial and Local Governments, private sector and BFIs on agriculture and industrial applications |
| | Social services uses of RE | <ul style="list-style-type: none"> i. Capacity development of Provincial and Local Governments to design and implement projects for social services use of RE. ii. Financial and other technical supports for upscale through private sector and BFIs |
| | Use of energy for water supply and irrigation services | <ul style="list-style-type: none"> i. Capacity development supports to Provincial and Local Governments to design and implement RE projects for water supply and irrigation. ii. Financial and other technical supports for upscale through private sector and BFIs |
| | Market development | <ul style="list-style-type: none"> i. Support local government to leverage private investment ii. Implement pilot demonstration projects iii. Capacity development of private sector for efficient market development iv. Facilitate acquisition of RES technologies from abroad |
| | Enhance access to finance | <ul style="list-style-type: none"> i. Mobilise resources for viability gap funding e.g. challenge fund, subsidy for leveraging finance, result-based financing, etc. ii. Capacity development supports to local government, BFIs and private sector for increasing their portfolio for access to finance |
| | Quality and progress monitoring | <ul style="list-style-type: none"> i. Capacity development supports to local governments for quality assurance and monitoring |
| Resource mobilisation including foreign grants and | Royalty from electricity, water and other natural resources | <ul style="list-style-type: none"> i. Coordinate with NNRF for resource distribution ii. Capacity development support to province and local governments for royalty management |

| Function | Sub-function | Role for AEPC |
|---------------------------|---|---|
| | Tax, duties and fees | <ul style="list-style-type: none"> i. Prepare guidelines for service charge and fees related to production and supply of small-scale RE ii. Facilitate sector development through custom, excise and VAT related provisions |
| | Internal grants and subsidy | <ul style="list-style-type: none"> i. Prepare subsidy delivery mechanism and disburse subsidy ii. Capacity development support to local governments on utilisation of available grants under respective purposes |
| | Foreign grants and loan | <ul style="list-style-type: none"> iii. Identify, facilitate acquisition of foreign grants and loans including preparation of project proposal. |
| | Climate and carbon finance | <ul style="list-style-type: none"> i. As a national implementation entity, facilitate in accessing climate and carbon finance through project development with help of Provincial and Local Governments ii. Develop bankable projects for climate finance iii. Provide technical assistance to Provincial and Local Governments to implement climate and carbon projects |
| R&D in RES | Statistics | <ul style="list-style-type: none"> i. Prepares and publish national RE statistics ii. Academic, R&D and other institutions provides inputs to national statistics |
| | Research on RE technology development | <ul style="list-style-type: none"> i. Mobilise resources, monitors and integrates R&D activities in the country ii. Pilot projects in collaboration with Provincial and Local Governments as well as Academic, R&D and other institutions iii. Engage in R&D of innovative technologies iv. Disseminate R&D results |
| | Intellectual property rights | <ul style="list-style-type: none"> i. Promote and encourage intellectual property rights including copyrights related to products and research for RES |
| | Research on financing and implementation modality | <ul style="list-style-type: none"> i. Mobilise resources financing and implementation modality ii. Pilot projects in collaboration with Provincial and Local Governments as well as academic, R&D and other institutions conducts researches iii. Disseminate R&D results |
| Other relevant Provisions | Health policies, health standards | <ul style="list-style-type: none"> i. Support implementation of standards |
| | Sustainable use of environmental resources | <ul style="list-style-type: none"> i. Promote sustainable use of biomass from forest for improving energy access ii. Promote river catchment land use management iii. Coordinate with MoFE for sustainable biomass energy |
| | CBOs and Cooperative related matters | <ul style="list-style-type: none"> i. Encourage participation in RES development and increasing access to finance ii. Capacity development of CBOs and cooperatives for RES development |

Annex III: Consultation at Federal Level

| Name | Designation | Address |
|------------------------|---|--|
| Nawa Raj Dhakal | Acting Executive Director | Alternative Energy Promotion Centre |
| Dr. Narayan Adhikari | Director | Alternative Energy Promotion Centre |
| Rudra Khanal | Director | Alternative Energy Promotion Centre |
| Mukesh Ghimire | Senior Officer | Alternative Energy Promotion Centre |
| Parbata Bhatta | Senior Officer | Alternative Energy Promotion Centre |
| Prakash Aryal | Senior Officer | Alternative Energy Promotion Centre |
| Rana Bahadur Thapa | Senior Officer | Alternative Energy Promotion Centre |
| Shubha Laxmi Shrestha | Senior Officer | Alternative Energy Promotion Centre |
| Santosh Rai | Engineer | Alternative Energy Promotion Centre |
| Sunder Bahadur Khadka | Energy Officer | Alternative Energy Promotion Centre |
| Satish Gautam | Project Manager | Renewable Energy for Rural Livelihood, Alternative Energy Promotion Centre |
| Ashish Pradhan | | Renewable Energy for Rural Livelihood, Alternative Energy Promotion Centre |
| Muhan Maskey | | Renewable Energy for Rural Livelihood, Alternative Energy Promotion Centre |
| Manu Binod Aryal | CREF Management and Monitoring Specialist (Head of Secretariat) | CREF, NMB Bank |
| Umesh Acharya | Energy Finance Expert | Renewable Energy for Rural Livelihood, Alternative Energy Promotion Centre |
| Manoj Khadka | Energy Advisor | DFID- Nepal |
| Simon Lucas | Team Leader, Inclusive Growth & Resilience Team | DFID- Nepal |
| Rudriksha Rai Parajuli | Livelihoods Advisor | DFID- Nepal |
| Annika Olsson | Economic Advisor | DFID- Nepal |
| Pushkar Manandhar | Energy Specialist | Asian Development Bank |
| Baikuntha Aryal | Secretary | National Natural Resources and Fiscal Commission |
| Khadka Prasad Oli | Hon'ble Member | National Planning Commission, Nepal |
| Shovakanta Paudel | Joint Secretary | Ministry of Industry, Commerce & Supplies |
| Dr. Govind Nepal | Act. Chairperson | Institute for Strategic and Socio-Economic Research |

| | | |
|---|---------------------------|---|
| Guna Raj Dhakal | Chairperson | Renewable Energy Confederation of Nepal |
| Anita Bohara Thapa | Programme Coordinator | GIZ-Energising Development (EnDev) |
| Gyanendra Raj Sharma | Director | Ajummery Bikash Foundation |
| Subarna Kapali | Executive Director | Ajummery Bikash Foundation |
| Narayan Gyawali | Chairperson | National Association of Community Electricity Users Nepal |
| Ram Prasad Dhital | Former Executive Director | Alternative Energy Promotion Center |
| Madhusudhan Adhikari | Renewable Energy Expert | Freelance |
| Dr. Er. Kamal Rijal | Energy Expert | Social Democratic Studies Center |
| Dr. Indira Shakya | Gender And Energy Expert | CRT N |
| <i>Participants of the consultative meeting conducted on Sept 26, 2018 at Practical Action</i> | | |
| Bala Ram Shrestha | Executive Director | BSP-Nepal |
| Krishna Prasad Devkota | Chairperson | Nepal Micro-hydropower Development Association |
| Purna N. Ranjitkar | Executive Director | Solar Energy Manufacturer Association Nepal |
| Kalidas Neupane | | Water and Energy Consulting Association Nepal |
| Sunil Dhakal | | Solar Energy Manufacturer Association Nepal |
| K R Khanal | | Solar Thermal Association Nepal |
| Kiran Gautam | President | Solar Energy Manufacturer Association Nepal |
| Basanta Raj Lamichhane | | Nepal Micro-hydropower Development Association |
| Reesab Raj Acharya | | Nepal Biogas Promotion Association/RECON |

Annex IV: Consultation at Local Level

| Name | Designation | Address |
|-----------------------------|------------------------------|--|
| Ram Sharan Basnet | Honorable Minister | MOPID, Gandaki Province |
| Homnath Poudel | Under Secretary | MOPID, Gandaki Province |
| Dr. Giridhari Sharma Poudel | Vice Chairperson | Province Planning Commission, Gandaki Province |
| Indra R. Poudel | Mayor | Jaimini Municipality, Baglung |
| Lila Rana | Deputy Mayor | Jaimini Municipality, Baglung |
| Ishori P. Sharma | Chief Administrative Officer | Jaimini Municipality, Baglung |
| Chakra Bahadur Thapa | Ward chairperson - 4 | Jaimini Municipality, Baglung |
| Krishna P. Aryal | Ward Member - 6 | Jaimini Municipality, Baglung |
| Dhaka P. Sharma | Account Manager | Jaimini Municipality, Baglung |
| Prem Sharma Paudel | Chairperson | Modi Rural Municipality, Parbat |
| Seti Mahat | Vice Chairperson | Modi Rural Municipality, Parbat |
| Kuman Singh Gurung | Chief Administrative Officer | Modi Rural Municipality, Parbat |
| Srijana Thapa | | DCRDC |
| Gyanendra | | DCRDC |
| Nar Bahadur Pulami | | DCRDC |
| Gyan Bahadur Thapa | | DCRDC |
| Krishna P. Rakhal | | Private Sector |
| Ishwori Gharti | | Private Sector |
| Lekh B. Khadka | | Private Sector |
| Pramod Kumar Thakur | Chief Administrative Officer | Sonma Rural Municipality, Mahottari |
| Saroj Kumar | Planning Officer | Sonma Rural Municipality, Mahottari |
| Prameshwor Thakur | | Sonma Rural Municipality, Mahottari |
| Raj Dev Prasad Yadav | Ward Chairperson, Ward-8 | Sonma Rural Municipality, Mahottari |
| Anil Kumar Yadav | Mayor | Mithila Bihari Municipality, Dhanusha |
| Anita Kumari Sah | Deputy Mayor | Mithila Bihari Municipality, Dhanusha |
| Ranjit Kumar Yadav | Chief Administrative Officer | Mithila Bihari Municipality, Dhanusha |
| Bhoj Raj Aryal | Accountant | Mithila Bihari Municipality, Dhanusha |
| Shyam Yadav | Storekeeper (Na. Su.) | Mithila Bihari Municipality, Dhanusha |
| Guru Dev Yadav | | |
| Brahma Dev Yadav | | Mithila Bihari Municipality, Dhanusha |
| Sandeep Kantha | | REWSSPC |
| Firoj Chaudhary | | REWSSPC |