1A1 Public Electricity and Heat Production

GHG mitigation options	Renewable energy
Target (CO2 reduction)	Project cost reduction with higher efficiency
Drivers	Waste management Value creation for domestic argricultural product Competitive cost, clean energy Zero fuel cost
Capacity gap and barrier	Lack of feedstock and proper management Limitation of feedstock quantity and variaty High import content Limit potential at low wind speed, land ownership, site specific potential Site specific
Technology options and Research questions	**MSW** **Long-term** - Plasma Gasification Technology - Fluidised bed gasification - Slagging Gasification **Short-term** - Fefuse Derived Fuel (RDF) - Combined pyrolysis and gasification technology - Advanced Mass Burn **Current** - Incineration Technology (Direct combustion) - Fermentation, land fill, **Research questions** - How to increase efficiency and reduce cost - Energy recovery from the residual waste - Develop alternative thermal treatment technologies - Advanced flue gas cleaning system to minimise environmental impacts - How to adapt existing tech with different quality of feedstock + pretretment **Bio-energy** **Long-term** - Small modular for distributed system - Parallel and indirect co-firing - Gasification with fuel cell **Short-term** - Wood pellet and Energy Crops power plant - Gasification with steam cycle or engine - BICGT and BIGCC **Current** - Conventional biomass Incineration and Gasification - Combustion and steam cycle - Direct co-firing **Research questions** - How to increase efficiency and reduce feedstock - How to reduce cost along the whole supply chain - How to find new feedstock - How to improve feedstock characteristics by pre-treatment and upgrading technologies **Solar (Utilities)** **Long-term** - Perovskite, Tandem Solar Cells, Full spectrum solar cell and integration with smart grid and demand response **Short-term** Dye sensitized, Organic PV and integration with micro-mini grid **Current** - Crystaline silicon (c-Si) - mono, poly-crystalline - Non crystaline silion: Amorphus PV, Thin film (TF) **Research questions** - How to increase efficiency and reduce cost - How to increase performance ratios and decrease degradation rates - How to reduce Si and silver consumption - How to develop specific PV materials for building integration, and other specific supports - How to reduce content, e. g. electronic component, non-PV component **Wind** **Long-term** - Low-speed Offshore wind turbine - Floating Foundation **Short-term** - Low-speed Offshore wind turbine - Fixed Foundation - Low-speed Onshore wind turbine with advanced rotors (smart materials and stronger, lighter materials) **Current** - Onshore wind turbine **Research questions** - How to increase the height of the tower, the length of the blades and the power capacity - How to design rotors for lower wind speeds - How to reduce cost of investment and components - How to achieving better performance and reliability - How to improve aerodynamic models - How to integrate with others, islands **Hydro** **Long-term** - Run-of-the-river plants (no reservoirs) - Seawater PSP in conjunction with offshore resources (wind power, marine power) **Short-term** - Low-head and kinetic flow turbines for use in canals, pipes and rivers - Variable-speed pump turbines for private-sector-participation (PSP) projects **Current** - Large dams with reservoirs - Pumped storage hydropower (PSP) - Micro Hydro Power **Research questions** - How to improve turbine efficiency and environmental performance - How Impact on migratory species and biodiversity - How to expanded scope of hydropower to include multi-purpose benefits - How can it changes in extreme events (floods and droughts) - How to reduce capital expenditures and operation and maintenance costs
Current technology support	**Renewable energy:** - NSTDA: R&D activities on energy Solar PV + Funding for RE technology - TRF, NRCT: R&D funding - ENCON fund: R&D funding on EE & RE - DEDE (R&D activities, Funding, Training center and project implementation for RE) - EGAT RE Development Division (R&D activities and project developement for all types of RE)
Resources	**Policy and Regulation:** - Restructure power industries and planning methodologies corresponding to smart grid and the growing of RE market (e.g. Integrated Resource Planning, Distributed generation) - Identify key components of potentially domestic production for each technologies and provide privilaeges, e.g. tax incentives, BOI and etc for domestic firms with in-house R&D to build up the demand of innovative products. **Institution:** - Set up centers of excellences for government agencies and research universities in each single technology, and linkage with the utilities and power producer businesses, e.g. Outcome Delivery Unit (ODU). - Establish independent agency, to certify standard of smart grid devices including on-and-off grid RE technologies. **Financial support:** - Cluster national R&D budget and funding according to priorities - Encourage R&D agencies to apply for international funding - Establish low carbon funds and develop mechanism of in-and-out flow principle, e.g. carbon tax collection to support R&D of clean technologies. **Capacity building:** - Strengthen international relations and research network to enhance R&D activities, e.g. training, exchange programes, research projects and etc at all level. - Develope accessible database for experts, publications, patents and intellectual properties.
References	**Renewable energy (Solar, Wind, Hydro, Bio-energy, MSW)** DEDE/ERI - Thailand Solar Roadmap Initiatives NEA - Solid Waste Management Technology Roadmap IEA - Bioenergy for Heat and Power IEA - Solar Photovoltaic Energy IEA - Wind energy SEAI - Wind Energy Roadmap IEA - Hydropower IRENA - Hydropower Technology Brief