

1A4 Other sectors (Energy Consumption in Residential, Commercial, Agricultural sectors)

GHG mitigation options	Renewable energy			
Target	Maximize efficiency with cost reduction			
Drivers	Value creation for domestic agricultural product	Zero fuel cost	Zero fuel cost	
Capacity gap and barrier	Limitation of feedstock quantity and variety	High import content	Lack of incentive	
Technology options and Research questions	<p>Bio energy</p> <p>Long-term</p> <ul style="list-style-type: none"> - Small scale gasification - Efficient small-scale co-generation <p>Short-term</p> <ul style="list-style-type: none"> - New fuel, e.g. Briquettes, Activated carbon - Biogas from food waste <p>Current</p> <ul style="list-style-type: none"> - Basic cookstoves or three-stone fires (Open fire), Brazier (wood, charcoal and agricultural residues) <p>Research questions</p> <ul style="list-style-type: none"> - What is new feedstock and portion of mixing for biomass and biogas - How to increase efficiency and reduce cost - How to reduce the biomass needed to provide a unit of heat - How to improve conversion efficiencies and achieve production costs competitive with existing technologies - How to utilize bio-feedstock for optimal solution including energy and non-energy applications 	<p>Solar PV for building and housing</p> <p>Long-term</p> <ul style="list-style-type: none"> - Advanced technology, e.g. Tandem Solar Cells, Full spectrum solar cell - Integrated building material, e.g. PV roof tiles, wall, glasses and etc. <p>Short-term</p> <ul style="list-style-type: none"> - New technology of PVs, e.g. Dye sensitized, Organic PV - Integrated material, e.g. PV roof tiles <p>Current</p> <ul style="list-style-type: none"> - Typical PVs installed on roofs, e.g. Crystalline silicon (c-Si), Thin film (TF) <p>Research questions</p> <ul style="list-style-type: none"> - How to increase efficiency, reduce cost, decrease degradation rate of PVs - What is new material for PV to replace Si and silver demand - How to develop specific PV materials for building and housing integration, e.g. roofs, tiles, wall, road and other specific supports 	<p>Solar heat</p> <p>Long-term</p> <ul style="list-style-type: none"> - Glazed and unglazed air collectors - Compound parabolic concentrator (CPC) - Solar thermal bowl collectors - Solar heating combined with heat pumps or with biomass boilers <p>Short-term</p> <ul style="list-style-type: none"> - Parabolic trough solar collector - Advanced flat-plate collectors - Unglazed water collectors - Thermally driven chillers - Photovoltaic/solar thermal hybrid (PV-T) collectors - Solar cooker <p>Current</p> <ul style="list-style-type: none"> - Flat-plate collectors (FPC), Evacuated tube collectors (ETC) and Tracking system <p>Research questions</p> <ul style="list-style-type: none"> - How to reduce cost, enhance performance, increase thermal COP and durability of solar thermal system - How to develop and standardise system integration for solar heat in commercial scale - How to increase local component of the system 	
Current technology support	<p>Bio-energy</p> <ul style="list-style-type: none"> - DEDE: R&D and training for Bio-energy use in household - ENCON fund, TRF, NRCT: R&D funding 	<p>Solar PV for building</p> <ul style="list-style-type: none"> - NSTDA: R&D activities on Solar PV - DEDE: R&D and training for Solar PV - SCG - ENCON fund, TRF, NRCT: R&D funding 	<p>Bio-energy</p> <ul style="list-style-type: none"> - DEDE: R&D and training for Solar heat - ENCON fund, TRF, NRCT: R&D funding 	
Resources	<p>Policy and Regulation:</p> <ul style="list-style-type: none"> - Make clear policy and action for green building promotion esp. design and construction of new building. - Identify key components of potentially domestic production for each technologies and provide privlaeages, e.g. tax incentives, BOI and etc for domestic firms with in-house R&D to build up the demand of innovative products. 	<p>Institution:</p> <ul style="list-style-type: none"> - Set up centers of excellences for government agencies and research universities in each single technology, and linkage with housing and project developers, electric appliance venders, alternative fuel businesses. 	<p>Financial support:</p> <ul style="list-style-type: none"> - 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. 	<p>Capacity building:</p> <ul style="list-style-type: none"> - Strengthen international relations and research network to enhance R&D activities, e.g. training, exchange programmes, research projects and etc at all level. - Develop accessible database for experts, publications, patents and intellectual properties.
References	<p>Renewable energy</p> <p>IEA - Technology Roadmap: Solar Heating and Cooling</p> <p>IEA - Technology Roadmap: Bioenergy for Heat and Power</p>			