CP 6

CONCEPT PAPER

for KIER-CanmetENERGY Joint Prject

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Title	Self Sufficient Heat Pump (SSHP) Trigeneration Technology			
Description	● Barriers: - No "heat piped" solar PVT-Geo CO_2 heat pump trigeneration (Power,Cooling and Heating) for global market and world best technology of GHG reduction clean energy purpose have yet developed . - No "all electric based and all gas based self sufficeint" Solar-Geo based hybrid trigeneration technology and optimization method for a specific site and building application have yet developed. - No "scale-up method and model for larger applications" due to the lack of SISO(System Integration and System Optimization) technology have yet developed. - No self sufficient "CO2 direct expansion heat pump" and local renewable clean energy prediction model and local energy trading technology for low energy building application have yet developed. ● Strategies: - A systematic integration and optimization(SISO) methods rather than unit technology have been introduced from IEA EBC Annex54 "Micro Generation" and will be shared from the Operation Agency-Dr Entchev. KIER leads all electric and Canmet leads all gas based SSHP technology. - Optimization technology by GAMS(General Algebraic Modeling System) will be shared from CanmetENERGY(MOU 170808, KIER-CanmetENERGY) and his team. - SSHP(Self Sufficient Heat Pump) know-how (unit test bench technology transfer and improvement) will be discussed monthly skype meeting as done before more than 10 years for the optimum scale-up (1 to 2 RT) models and solutions for any site and building types. - CanmetENERGY and their IEA EBC and HPP expert members having the know-how will support the local IP, SCI paper and technology transfer through this research cooperation based on the previous joint project protocols already done for FC-GHP and PVT-GHP project since 2011. - CanmetENERGY's Local clean energy prediction RETscreen know-how will be transferred and the related national topics such as Energy One Korea (South and North Korea) program and local trading energy bank system model experience will be transferred.			
Outcomes*	● New concept design of "Solar Geo Coupled CO2 Heat Pipe Direct Expansion Heat Pump Technology" (3kWe Power, 6kWt Cooling, 9kWt Heating). ● New concept design of 1) all electric and 2) all gas based CO2 Direct Expansion(DX) heat piped GSHP(6 kWt Cooling, 9 kWt Heating) unit module. ● New concept design of heat pipe PVT (3 kWe Power) unit module and system to reduce the system power consumption without fan and pump. ● New concept design of a scale-up (multiple unit trigeneration capacity) model for a larger demand with GAMS optimization technology. ● New concept design of local energy prediction model(RESTCreen) and local energy sharing/ trading model(block chain-P2P model-energy bank system model). ● 1 IP(local) and 1 SCI paper/year and 1 technical transfer/1 national project funding try/year			