Development of an Optimization Model for the Community-Scale Biomass Power Plant (CSBPP) based on GAMS-BeWhere model framework in the Eastern Economic Corridor (EEC) region, THAILAND


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INTRODUCTION

- Distributed energy generation enables grassroots people to access to clean energy and increase income to region community by participating and having ownership.
- Biomass supply is one of the most important issues for continuous plant operation. Systematic supply chain management must be done considering availability and logistics, seasonality, quality, and cost.
- BeWhere is a techno-economic engineering model for renewable energy systems optimization framework which is used for a case study of CSBPP in EEC region, Thailand as illustrated in Fig.1. It identifies the localization, size and technology of the renewable energy system that should be applied in a specific renewable energy community-based power from the region for the region.
- The objective is to develop decision-support tool and a linear mixed integer programming model to determine the optimal geographic locations and sizes of CSBPP using the EEC region as a case study.

METHODS

- Priority Setting at regional level used a set of criteria in conjunction with a system transformation approach.
- The conceptual automated GIS-based Multicriteria Decision Analysis Method (MCDM) is used as input data for total cost parameters in the optimization model for supply chain configuration and Spatial techno-economic optimization model “BeWhere” (www.iiasa.ac.at/models-and-data/bewhere) as illustrated in Fig.2.

RESULTS

- The spatial decision support and optimization model (www.iiasa.ac.at/bewhere) will be instrumental to calculate the techno-economic and environmental benefits of substituting conventional with renewable energy. Furthermore, it can be easily applied systematically to other regions confronted with similar challenges.
- Policy recommendations should focus not only on aligning energy regulation and governance incentive schemes to promote distributed generation, but also on data science-based energy platforms, capacity building, cost optimization and services innovation model to support the participation of local governments, community cooperatives, and private businesses in regional power production.