태양광에너지 중심의 신재생에너지 기술경제학 모델링 연구

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The technical-economic study of solar PV and renewable energy

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An energy modeling analysis method currently has been considered as a new approach for energy policy research, because the importance of renewable energy use has been emphasized more and more. This study used RETScreen model as a clean energy decision making methodology for adaptation to climate change and elimination of various pollutions. This modeling method includes five step standard analysis; energy model, cost analysis, GHG analysis, financial analysis, and sensitivity & risk analysis and it also assesses both conventional and modern energy sources and technologies.

This methodology for the photovoltaic(PV) energy modeling is used to evaluate the energy production, financial performance and GHG emissions reduction of photovoltaic projects. In addition, the PV application systems are classified into three basic applications; On-grid system, Off-grid system and water pumping system.

This study assesses the renewable energy techno-economic modeling method with the feasibility analysis result of 10 MW PV power plant in Abu Dhabi in United Arab Emirates. Furthermore this study stresses the importance of renewable energy model research by applying to domestic PV power plant which is now in preparation.

Key words : RETscreen, Energy modeling(에너지 모형), Solar PV(태양광, 태양열), Renewable energy(신재생 에너지)

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전과정을 고려한 에너지 자원별 전력생산의 온실가스 배출량과 비용의 상관관계 분석

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Life cycle analysis on correlation relationship between GHG emission and cost of electricity generation system for energy resources

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In this work, we analyzed correlations between life-cycle greenhouse gas (GHG) emissions and life-cycle cost of energy resources. Energy resources studied in this paper include coal, natural gas, nuclear power, hydropower, geothermal energy, wind power, solar thermal energy, and solar photovoltaic energy, and all of them are used to generate electricity. We calculated the mean values, ranges of maximum minus minimum values, and ranges of 90% confidence interval of life-cycle GHG emissions and life-cycle cost of each energy resource. Based on the values, we plotted them in two dimensional graphs to analyze a relationship and characteristics between GHG emissions and cost. Besides, to analyze the technical maturity, the GHG emissions and the range of minimum and maximum values were compared to each other. For the electric generation, energy resources are largely inverse proportional to the GHG emission and the corresponding cost.

Key words : Life cycle assessmemt(전과정평가), Greenhouse gas emissions (전과정 온실가스 배출), Cost(비용), Electricity generation(전력생산), correlation relationship(상관관계)

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