Cansu Birgen

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Personal information:

Cansu completed her Bachelor 's degree in Chemical Engineering at the Middle East Technical University, Turkey. She focused on renewable energy and sustainable technical systems during her Industrial Ecology Master's Programme. In the first year, she studied in the Netherlands (TU Delft/Leiden University) and participated in the design challenge for entrepreneurship in TU Delft. The project involved preparing a business plan including risk, operations & financial assessment for prototype implementation of a desalination system (based on Ocean Thermal Energy Conversion) in Curacao island for the client Bluerise BV.

In the second year, she continued her studies in Sweden (Chalmers University of Technology). She did her thesis in collaboration with Göteborg Energi and Chalmers, and the topic was Liquefied Synthetic Natural Gas from Woody Biomass - Investigation of Cryogenic Technique for Gas Upgrading. After completing her master's degree, she moved back to Turkey. Currently, she is investigating opportunities to contribute to sustainable development via scientific and technological solutions, and working for environmental organizations.

Title of thesis: Liquefied Synthetic Natural Gas from Woody Biomass - Investigation of Cryogenic Technique for Gas Upgrading

Abstract:

Biomass-based liquefied natural gas (bio-LNG) produced by liquefying synthetic natural gas (bio-SNG) is a valuable renewable fuel as it has high energy density and transportability. Cryogenic technology is a promising option for integration of the gas upgrading and liquefaction systems with the main biomass gasification and methane synthesis plant. This thesis investigates the feasibility of this technology for future commercial bio-SNG production plants based on indirect gasification technology, similar to that adopted by Göteborg Energi for the GoBiGas project. Simulation program Aspen Plus and pinch analysis tool Pro_Pi are used to compare conventional gas cleaning and liquefaction technology and cryogenic technology. The cryogenic unit achieves the targeted product specifications and capacity, and the calculated performance is comparable to published data for commercial cryogenic units in terms of specific power demand and methane loss. The results show that the integrated plant with cryogenic technology has a higher power requirement than the plant with conventional technology. Cryogenic technology is still under development, therefore there is a high potential for performance improvement by application of energy efficiency measures. In addition, high purity liquid CO_2 is produced at very low temperature as a by-product which could generate additional revenue.