An economic and environmental assessment of long distance transport alternatives of stranded energy from an OTEC installation

Andrew Blohm and Dr. Elisabeth Gilmore
University of Maryland, College Park, MD 20742

Ocean thermal energy conversion technology (OTEC) takes advantage of the temperature differential between surface and subsurface water in order to generate electricity. The best ocean resources tend to be located far from shore, such that electricity cables are not economical. Instead, alternative bulk energy carriers are proposed to deliver the stranded energy to markets. Here, we compare the private costs and air emissions from the production and transportation of potential energy carrier alternatives with the costs of existing onshore production alternatives. First, we screen a wide range of bulk energy carriers along several dimensions including the transformational technology requirements on the platform, the available transportation alternatives to shore, the capacity of onshore receiving facilities, and the market potential. From this analysis, we identify liquid hydrogen, ammonia, methanol, and urea, as the most likely bulk energy carriers. For each alternative, we estimate the cost of the delivery pathway and compare it to the market price for that carrier. Since many of these technologies are still in development, we also consider the uncertainties surrounding each of the pathways to establish optimal delivery options. Based upon the private costs alone, each of the bulk energy carriers produced on an OTEC platform would be unable to compete with the onshore alternatives. However, we find that several of the transportation pathways may be competitive with onshore production if we include the social costs associated with the air emissions, such as a potential carbon tax.