

TECHNICAL SUMMARY

STUDY TITLE: Study to Revise and Update Market Simulation Model

REPORT TITLE(S): Consumer Surplus and Energy Substitutes for OCS Oil and Gas Production: The 2017 Revised Market Simulation Model (MarketSim) Model Description

Revised Offshore Environmental Cost Model (OECM) and Market Simulation Model (MarketSim) User Guides

CONTRACT NUMBER: GS-10F-0093K

SPONSORING OCS REGION: Headquarters

APPLICABLE PLANNING AREAS: All Planning Areas

FISCAL YEARS OF PROJECT FUNDING: 2016

COMPLETION DATE OF REPORT: 2017

COSTS:	FY 2016	\$44,606
	FY 2017	\$34,027

CUMULATIVE PROJECT COST: \$78,633

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PRINCIPAL INVESTIGATORS: Not applicable

KEY WORDS: economic model, energy markets, energy model, gas, oil.

BACKGROUND: The Bureau of Ocean Energy Management (BOEM) is responsible for managing energy and mineral resources on the Outer Continental Shelf (OCS) of the United States. The OCS extends from the edge of each state's waters (generally 3 miles offshore) to the edge of the U.S. Exclusive Economic Zone (approximately 200 miles offshore). The OCS Lands Act requires that BOEM prepare and keep in place a 5-year schedule of proposed OCS lease sales that defines as specifically as possible the size, timing, and location of the OCS territory to be offered for lease. It takes two to three years to complete the cycle of public comment, internal analysis, and Secretarial decision making required to develop each new Five Year Program.

As a part of the Five Year Program decision process, BOEM conducts a cost-benefit, or "net benefits," analysis of the social value of production and related activities anticipated from the program proposal (or,

for the initial analysis, the social value of the potential activities associated with the unleased, undiscovered, economically recoverable oil and gas resources in each OCS planning area). This analysis examines the quantifiable net benefits to society associated with OCS oil and natural gas production relative to the accompanying costs. The analysis has three basic components: Net Economic Value, Net Environmental and Social Costs, and Consumer Surplus Benefits. Estimates of the third of these components are produced by the Market Simulation Model (MarketSim).

MarketSim is an Excel-based model that estimates the substitutions for oil and gas production that would occur in the absence of sales for each of the program areas. MarketSim provides two sets of outputs:

1. A simulated response of the energy markets to a decision not to implement a new Five Year Program, i.e., the "No Action Alternative" in the Programmatic Environmental Impact Statement (PEIS). This is represented by the combination of increased oil and gas imports, increased domestic onshore oil and gas production, switching to other energy sources, and reduced energy consumption that is likely to occur in the absence of the Five Year Program.
2. Estimates of the consumer surplus benefits of OCS oil and/or gas production anticipated to occur as a result of the new Five Year Program.

OBJECTIVES: The purpose of this project is to refine MarketSim (1) to reflect the recent lifting of the ban on U.S. petroleum exports; (2) to allow for the specification of both onshore and offshore oil and gas production in Alaska; (3) to incorporate the outputs from the most recent specialized NEMS run into MarketSim; and (4) to implement various changes to the model interface to make the model more user-friendly and to facilitate updates of the model's baseline data.

DESCRIPTION: SC&A and Industrial Economics made several changes to MarketSim for this project. These changes included the following:

- Incorporated the estimation of crude oil exports and refined petroleum product exports into MarketSim's balancing equations. This involved modification of the demand categories in the model, the specification of additional demand elasticities, and the specification of additional adjustment rates. Post-processing calculations were also added to parse export estimates into exports of OCS oil and exports of non-OCS oil.
- Revised MarketSim so that the specification of oil and gas production in Alaska differentiates between onshore production and offshore production.
- Updated MarketSim with the most recent baseline projection from the Energy Information Administration's NEMS model.
- Updated select elasticity values in the model to reflect data from the most recent baseline projection from NEMS.
- Modified the model to simplify the process of making model updates. Specific changes in this regard include: (1) automated the clearing of existing baseline data from the model, (2) automated the extrapolation of the baseline forecast beyond the time horizon in the NEMS forecast, and (3) incorporated guidance on data updates into the model itself.

SIGNIFICANT CONCLUSIONS: The refinements made to MarketSim represented important improvements to the model. These improvements allow the model to assess petroleum export impacts more rigorously and to simulate production activity in Alaska in greater detail. In addition, updating the baseline forecast in the model is now a more straightforward process.

STUDY RESULTS: The focus of this project was the development of refinements to MarketSim. The update to the model did not generate any analytic results *per se*, though BOEM will generate results when it uses the revised model to assess the impacts of the Five Year Program.

STUDY PRODUCTS:

Models	Industrial Economics, Inc. Market Simulation Model, April 26, 2017.
Reports	Industrial Economics, Inc. 2017. Consumer Surplus and Energy Substitutes for OCS Oil and Gas Production: The 2017 Revised Market Simulation Model (MarketSim) Model Description. U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-039. Industrial Economics, Inc. 2017. Revised Offshore Environmental Cost Model (OECM) and Market Simulation Model (MarketSim) User Guides. U.S. Department of the Interior, Bureau of Ocean Energy Management.
Memoranda	Jason Price and David Metz, Industrial Economics. Task 2B/2C Separate Onshore and Offshore Production in Alaska and Update MarketSim Baseline Data and Associated Elasticities, memorandum to Kristen Strellec, U.S. Department of the Interior, Bureau of Ocean Energy Management, August 30, 2016. Jason Price, Industrial Economics, and Dr. Stephen P.A. Brown, University of Nevada at Las Vegas. Task 2A: Approach for Incorporating Petroleum Exports into MarketSim Equilibration Equations, memorandum to Kristen Strellec and William Anderson, U.S. Department of the Interior, Bureau of Ocean Energy Management, February 19, 2017.