

Statistical Challenges for Development of Analytic Tools for Energy Information

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Disclaimer

- This is a working document prepared by the Energy Information Administration (EIA) in order to solicit advice and comment on statistical matters from the National Institute of Statistical Sciences. This topic will be discussed at NISS Affiliates 2007 Annual meeting on April 26 and 27, 2007.

Purpose of Presentation

- To introduce the Applied Methodology Student Research Program EIA is establishing with NISS
- To describe selected research projects
- To obtain feedback on our approach

Overview

- NISS-EIA Applied Methodology Research program
 - Goal
 - Application procedure
- Examples of Research projects

NISS-EIA Applied Methodology Research program

- Purpose:
 - To engage statistical sciences students in specific research questions that are important to EIA programs.

Support Options

- Students may apply either
 - for full-time summer support
 - for research support during the academic year as either a full or partial stipend
 - as a cooperative arrangement that would provide research access to sensitive microdata.

Applicant qualifications

- Graduate students in statistical science disciplines - statistics, operations research, economics, etc - together with their faculty mentors
 - identify a research area proposed by EIA
 - define research objectives in conjunction with EIA staff preparatory to submitting a full proposal.
- Awards based on the strength of the applications (renewable based on accomplishments and approved future plans).

Research Projects

- EIA will prepare one page summary descriptions for key projects
 - Methodology
 - Data
 - Research questions
 - EIA contact

Goal: give details to enhance student research interest, but keep it short

Examples of Research Projects

1. Development and testing of alternative editing and imputation methods for EIA establishment surveys.
2. Combined Heat and Power Plant Fuel Allocation Methodology
3. Biodiesel Production & Distribution
4. Potential use of cointegration analysis in EIA projection models.
5. Research using RECS, CBECS data

Project 1: Editing & Imputation

- Development and testing of alternative editing and imputation methods for EIA establishment surveys.
 - Can new model-based or other approaches to micro data editing and imputation improve the accuracy of EIA's micro data?

Project 1: Editing & Imputation

- EIA will provide data sets for analysis. The research project has two parts:
 1. Study at least three alternative imputation techniques:
 - Should be appropriate for large-scale statistical production systems.
 2. Empirically test the proposed methods:
 - Evaluate their accuracy relative to each other and to the methods currently used by EIA.

Project 2: Combined Heat and Power Plants Fuel allocation methodology

- Review current and past Electric Power Division (EPD) approaches taken to this problem
- Review literature on allocation methods and issues.
- Recommend a new methodology for performing the allocation, as well as respondent level data that would be needed. (may not collect allocated data/may use model).

Project 3: Biodiesel Production

- Section 206(d) of the Energy Policy Act of 2005 requires:
 - *an inventory of renewable fuels available for consumers*
 - *a projection of future inventories of renewable fuels based on the incentives provided in this section.*
- Project includes biodiesel production issues such as:
 - How biodiesel is currently produced
 - Who the major producers are
 - Fuel quality issues producers could face
 - Blends produced and shipped

Project 3: Biodiesel Distribution

- Describe biodiesel distributors
- How does biodiesel enter the petroleum supply chain?
- What blends do blenders/wholesalers distribute?
- Provide documentable sample prices for biodiesel over past 24 months

Project 4: Cointegration analysis in EIA projection models

- Are there cointegration relationships between energy price series (oil, gas, coal, electricity, etc.).
- How can EIA adapt its short and/or medium term models to accommodate these relationships?

Project 4: Cointegration analysis in EIA projection models

1. fitting cointegration models to energy (possibly related non-energy) price series to establish long term and short term price relationships
 - **determine whether these have changed over time**
- Advantages and disadvantages of including trend terms and other economic variables or commodities
 - **Frequency of data - daily, weekly, monthly, annual**

Project 4: Cointegration analysis in EIA projection models

2. Advising EIA concerning how identified relationships should be used in EIA's short and midterm models to enhance their projection capabilities.
 - Researcher will have to develop sufficient understanding of EIA models to recommend how the findings could be incorporated into the short term and midterm models.

Project 5: Social Science Research uses CBECS and RECS

- Commercial Building Energy Consumption Survey (CBECS)
- Residential Energy Consumption Survey (RECS)
- EIA has public use data sets that should be used in preliminary analysis
- Researchers are request access to micro data to answer specific questions

Other Research topics

- Using the Internet to Collect and Online Edit Data From Establishments
- Survey Design for Establishment Surveys
- Macroeconomic Linkages to a Linear Programming Formulation of World Energy Markets
- Forecast Models for Early Estimates
- Analysis of Energy Data using EIA Data Bases

Other Research topics

- Cognitive research for survey processes, data presentation, and Web enhancement
- Questionnaire design
- Improving coverage and response rates
- Innovative approaches to improving data on energy-use sectors

Thank you

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