

PACKAGE ID - 000784IB48600 PC-MARKAL (MUSS)

KWIC TITLE - Energy Systems Optimization Model and User's
Support System

AUTHORS - Goldstein, G.A.
Brookhaven National Lab., Upton, NY (United States)

LIMITATION CODE -UNL **AUDIENCE CODE** - UNL

COMPLETION DATE - 09/17/1993 **PUBLICATION DATE** - 04/01/1991

DESCRIPTION - PC-MARKAL is an energy systems optimization model used to examine alternate futures for development of energy systems depending upon environmental and/or policy constraints. The model is generally used to identify and prioritize the most cost-effective options to realizing desired policy goals. It guides decision makers at the national, regional, and community level. MUSS is a database management system employing standard user interface techniques (e.g. pop-up menus, on-line help, dialog boxes) to oversee all aspects of working with the PC-MARKAL energy systems optimization model. It manages the input data, control model execution, and accepts reporting tables back on-line for post optimization analysis of the results.

PACKAGE CONTENTS - Media Directory; Software Abstract; BNL-46319; BNL-51701; Media Includes Source Code, Executables, Sample Problem Input and Output;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 3 3.5 Diskettes

METHOD OF SOLUTION - In PC-MARKAL Linear Programming is used as the solution to solve the actual model. The individual models are generated according to extensive user provided data which describes a particular energy system. The concept employed for describing the structure of the energy system is a Reference Energy System network. The data is provided as Classes, lists of like entities in the model, and Tables, the particular numbers characterizing each individual entity in the model. MUSS employs procedural programming techniques to manage a relational database. It also provides a seamless interface to the modeling software which controls model execution and reporting.

COMPUTER - IBM PC 486

OPERATING SYSTEMS - DOS 3.3 or higher

PROGRAMMING LANGUAGES - OMNI (PC-MARKAL), Clipper Summer 87 (MUSS)

SOFTWARE LIMITATIONS - For PC-MARKAL OMNI requires that a minimum of 4Mb of Expanded memory are available. For larger models more

PACKAGE ID - 000784IB48600 PC-MARKAL (MUSS)

SOFTWARE LIMITATIONS - (CONT) memory is needed, with 16 Mb recommended. MUSS runs in DOS conventional memory and requires a minimum available memory of about 550K.

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - PC-MARKAL incorporates a set of batch and command files which facilitate running the model. The command files and input data are most often prepared using the MARKAL User's Support System (MUSS). Besides standard reports written to the hard disk for each run, results can be imported into MUSS for cross-case comparison of results by means of color graphics. MUSS is aware of the input data format requirements as specified in the User's Guide for MARKAL, and takes advantage of this knowledge to provide features to facilitate the maintenance and correctness of the data. It also provides scenario management, a seamless model execution interface, and finger-tip graphics to assist with the analysis of results. A high degree of feedback is provided from the user's input data to simplify working with the MARKAL model and help ensure that the energy system is properly described.

RELATED SOFTWARE - The OMNI modeling software and a linear programming optimizer are required. In addition, PKZIP is used in some batch files as part of the standard system and data and data backup procedures. MUSS relies heavily on two software packages. One is a library of user interface routines first developed at the International Atomic Energy Agency in Vienna, Austria. Most of the routines in the library are programmed in Clipper 87, with a few C modules interspersed. All the graphics are produced by means of Pinnacle Publishing Inc.'s dGE graphics library. Clipper Summer 87 is used to compile the source code and the BLINKER linker is used to produce the final execute models. In addition, PKZIP is used in some batch files as part of the standard system and data backup procedures. None of these are provided with this package. However, a fully resolved executable module is.

OTHER PROG/OPER SYS INFO - PC-MARKAL is written in the OMNI modeling language. The language is a proprietary product of Haverly Systems Inc. OMNI must be installed to execute the PC-MARKAL matrix generator and report writer code. The model is solved using a commercially available linear programming optimization model that is interfaced with OMNI. The interface is necessary in order for the PC-MARKAL reports to be produced from the solution. HSLP, provided with OMNI by Haverly Systems Inc., and XPRESS-MP for DASH Associated are the most often used solvers. PC-MARKAL requires that enough, depending upon model size, expanded memory be available. The modeling software and utilities require about 3Mb of hard disk space. Temporary files created during model execution and solving can require up to 10Mb of free disk space. Each run will require about an additional 1Mb of disk space. MUSS will take advantage of a RAMDRIVE or virtual disk if one is installed by the user to speed

PACKAGE ID - 000784IB48600 PC-MARKAL (MUSS)

OTHER PROG/OPER SYS INFO - (CONT) some operations. Hard disk space requirements will grow according to the number of scenarios and runs maintained. Depending upon the size of the MARKAL model between 250K and 1Mb is required per scenario/run.

HARDWARE REQS - Though the software will operate on lesser platforms, a 486 IBM-compatible personal computer with 4Mb of RAM and 3Mb of free hard disk space is a minimum recommendation. A more viable system would have 16Mb of RAM and at least 300Mb of hard disk space to cover the requirements of both PC-MARKAL and MUSS.

TIME REQUIREMENTS - The time required to run the model is heavily a function of model size. A typical 5000 row model will take 10 minutes to 1.5 hours to run depending on the version of OMNI, the optimizer and whether or not a previous model solution is used as a starting of the current run.

REFERENCES - G.A. Goldstein, PC-MARKAL and the MARKAL User's Support System (MUSS) User's Guide, BNL-46319, April 1991; L.G. Fishbone, G. Giesen, G. Goldstein, H.A. Hymmen, K.J. Stocks, H. Vos, D. Wilde, R. Zolcher, C. Balzer, and Harold Abilock, User's Guide for MARKAL (BNL/KFA Version 2.0) A Multi-Period, Linear-Programming Model for Energy Systems Analysis, BNL-51701, July 1, 1983.

ABSTRACT STATUS - Released AS-IS February 24, 1995.

SUBJECT CLASS CODE - TMR

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
P CODES
LINEAR PROGRAMMING
DATA BASE MANAGEMENT
COMPARATIVE EVALUATIONS
ENERGY MODELS
ENERGY POLICY
ENVIRONMENTAL IMPACTS
OPTIMIZATION
ENERGY SYSTEMS

EDB SUBJECT CATEGORIES -
990200 290100

SPONSOR - EPA

PACKAGE TYPE - AS - IS