Using ANSWER-TIMES to create a miniature multi-region TIMES model

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Overview

◆ Create miniature single-region TIMES model from scratch
◆ Use bulk-copying facilities to replicate single-region model in several other regions
◆ Specify trade between regions
◆ Specify rule-based user constraint
◆ Status of ANSWER-TIMES
◆ Where to from here?
◆ Benefits of ANSWER-TIMES
◆ Acknowledgments
Thought for the day

“Nothing is particularly hard if you divide it into small jobs”
Henry Ford

“Provided that you focus on the small jobs one at a time”
(instead of allowing yourself to feel overwhelmed by the number of small jobs to be done)
Ken Noble

Create miniature single-region TIMES model from scratch - 1

◆ Nine TimeSlices (apart from ANNUAL)

◆ Seven Commodities
  ➢ OIL, NGAS
  ➢ DSL, GSL, ELC
  ➢ RHEAT, TCAR (demands)

◆ Nine Processes
  ➢ MIN_OIL, MIN_NGAS (extraction)
  ➢ OILREFIN, ECCGT
  ➢ RHEATELC, RHEATGAS (DMDs for RHEAT)
  ➢ TCAR-DSL, TCAR-GSL, TCAR-ELC (DMDs for TCAR)
Create miniature single-region TIMES model from scratch - 2

New form to allow specification of I/O Commodities, PCG

Use bulk-copying facilities to replicate single-region model in several other regions

- **Create new Regions**
  - Specify Global tab parameters
- **Bulk-copy TimeSlices**
  - Copy Season TimeSlices first, then DayNite TimeSlices
- **Bulk-copy Commodities**
- **Bulk-copy Commodity Groups**
- **Bulk-copy Processes**
Specify trade between regions - 1

New TradeProcess Tab (no Region column in Items listview)

Specify trade between regions - 2

New form to allow specification of Trade Process
Specify Rule-based User Constraint - 1

*Electric car at least 10% of automobile transport demand*

1. **Define TechFilter ALLTRN_DMD to select all automobile transport DMDs**

Specify Rule-based User Constraint - 2

2. **Define Rule-based User Constraint, using UCRULE_ACT and TechFilter ALLTRN_DMD**
Specify Rule-based User Constraint - 3

3. Resolve Rule-based Constraint
(to check we got it right)

Status of ANSWER-TIMES - 1

- Majority of standard TIMES Sets and Parameters in latest v2.3.6 TIMES GAMS code recognized
  - Also some VDA extension parameters supported (ACT_EFF, FLO_EMIS, NCAP_AFC, NCAP_CEH, PRC_RESID)
  - Will enhance to support advanced TIMES model variants, if there appears to be a demand
- ANSWER-TIMES representation of “internal”, “external” regions and trade links has been refined
- All Home Screen functions already working
  - Except for some Import TIMES GAMS DD loose ends
- “Run Model” for single/multiple regions is fully operational for standard TIMES
Status of ANSWER-TIMES - 2

◆ “Import Results” is fully operational
  ➢ TIMES GAMS code that produces ANT file for ANSWER-TIMES import needs to be enhanced to create aggregate results for import

◆ Most Data Screen functions are fully operational
  ➢ New/Copy/Delete/Edit Item, Add Row, Direct Cell Edit, Text Tip, etc

◆ Process tab facilities enhanced to better handle special needs of TIMES, with new form to specify I/O commodities, PCG
  ➢ Including auto-generation of some associated TIMES Sets and Parameters
  ➢ Technology (Process) Items Filters facility available
  ➢ A few loose ends to be attended to

Status of ANSWER-TIMES - 3

◆ RES graphics mechanism has been adjusted to cater for trade links between regions

◆ All types of TIMES User Constraints are handled
  ➢ Special _GLOBAL region handles cross-region constraints
  ➢ Rule-based Constraints facility available

◆ New TradeProcess tab to handle IRE Processes in TIMES, with new form incorporating Trade Matrix specification of trade
  ➢ A few loose ends to be attended to

◆ Right now 10 character Item name limit
  ➢ A few hours’ work to allow >10 character Item names

◆ Further tailoring of ANSWER-TIMES database re domains for parameters desirable (only IREs for IRE_* parameters, etc)
Where to from here? - 1

- **ANSWER-TIMES available July 2007 for evaluation by interested parties (ETSAP Partners, existing ANSWER-MARKAL clients)**
  - Including preliminary documentation of TIMES-specific facilities
  - Most facilities already documented in ANSWER-MARKAL User Manual

- **Extensive testing is essential!!**
  - Will aim to quickly fix bugs that are detected

- **As part of refining “Import TIMES GAMS DD” facility, during July will load any existing TIMES GAMS DDs that I’m provided with into ANSWER-TIMES and check integrity of what’s been loaded**

Where to from here? - 2

- **Create ANSWER-TIMES User Manual - using ANSWER-MARKAL User Manual as starting point**
  - For many facilities, just replace ANSWER-MARKAL screen snapshots by corresponding ANSWER-TIMES screen snapshots

- **Enhance to support advanced TIMES model variants, if there appears to be a demand**

- **Develop ANSWER-TIMES “smart” spreadsheets, if there appears to be a demand**

- **Collaborate with ETSAP TIMES experts to construct ANSWER-TIMES training databases**
Benefits of ANSWER-TIMES

◆ **For those familiar with ANSWER-MARKAL, easy to approach TIMES within the same interface paradigm**
  - Can focus on TIMES aspects and not have to be concerned with interface aspects

◆ **For new users, ANSWER has a gentle learning curve**
  - Beneficial in promoting use of TIMES, perhaps especially within universities
  - Particular interest in constructing ANSWER-TIMES training databases to demonstrate important TIMES features

◆ **New ANSWER features will become available for both TIMES and MARKAL**

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