

# **ANSWER-TIMES v6.6.1 Update**

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ANSWER Energy Modeling Software

# Summary of ANSWER-TIMES v6.6.1 Enhancements - 1

- ◆ ***Supports most parameters in latest ETSAP TIMES GAMS code v3.0.3***
  - Previously was running against (ANSWER-aware) TIMES GAMS code v2.9.0
- ◆ ***In particular, new Model Variant Specification facility supports following TIMES Extensions with no user intervention needed in \*.GEN file:***
  - Elastic Demand
  - Climate
  - Damage (LP & NLP)
  - Discrete Capacity Investment
  - Endogenous Technology Learning (ETL)
  - MACRO (experimental)
  - Stochastic (Tradeoff/Sensitivity Analysis?)
  - Fixing Initial Periods (FIXBOH)
  - Time-Stepped Solve

# Summary of ANSWER-TIMES v6.6.1 Enhancements - 2

- ◆ *Also supports following TIMES Objective Function options with no user intervention needed in \*.GEN file:*
  - OBJ being set to one of AUTO, STD, MOD, ALT, LIN
  - Beginning of year, middle of year, end of year discounting
- ◆ *Support for N (non-binding) limit type in TIMES parameters*
  - ETSAP TIMES GAMS code is making increasing use of N limit type
  - Previously ANSWER-TIMES provided support for only LO, FX, UP bound types
- ◆ *v6.6.1 ANSWER-TIMES EXE incorporates new automated facility for updating system tables in existing database from the Template database*
  - More powerful and flexible than previous “File, Update System Tables from Excel” facility
- ◆ *“File, Increase Scenario and Case Name Length” facility allows user to increase Scenario, Case Name Lengths to either 12 or 16 characters*
  - Databases created by "File, New Database" facility will now have default Scenario and Case Name Length of 12 characters

# Summary of ANSWER-TIMES v6.6.1 Enhancements - 3

- ◆ *New subsetting facility on Parameter tab allows user to subset Data Parameters displayed to just those that are specific to a particular TIMES Extension (so, e.g. display just Damage Parameters)*
- ◆ *Multi-select of Cases for Delete Case in the Cases listview (bottom LH quadrant of Home Screen)*
- ◆ *Demonstration ANSWER-TIMES database with non-BASE scenarios providing user with concrete examples of Data Parameters and Model Variant specifications needed for following TIMES Extensions*
  - *Elastic Demand, Damage (LP and NLP), Discrete Capacity Investment, Endogenous Technology Learning (ETL), Stochastic, Fixing Initial Periods (FIXBOH), Time-Stepped Solve*
- ◆ *Word documents “TIMES xxxx Extension in ANSWER-TIMES” (where xxxx = Elastic Demand, Damage etc) detail use of ANSWER-TIMES for each of the above TIMES Extensions*

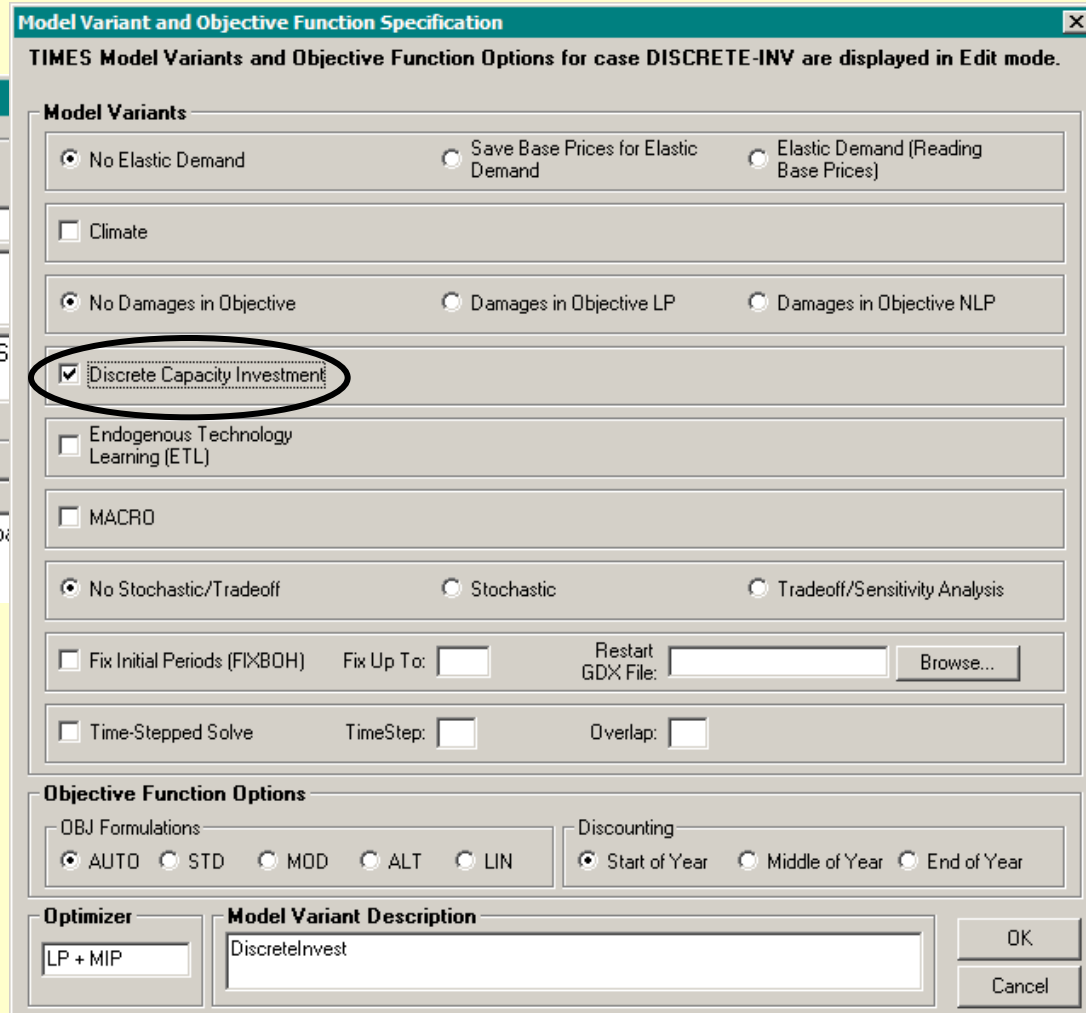
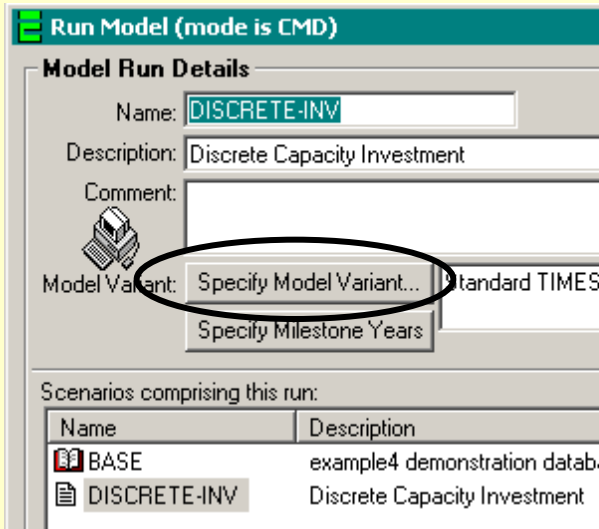
# Details of ANSWER-TIMES v6.6.1 Enhancements - 1

- ◆ *Supports most parameters in latest ETSAP TIMES GAMS code v3.0.3, including the following recently added parameters:*

Data Parameter	Data Parameter Description
ACT_CUM	Bound on cumulative process activity
FLO_CUM	Bound on cumulative process flow
G_OFFTHD	Threshold for OFF ranges
NCAP_CLAG-IN (a)	Lagtime of a commodity after new capacity ready - input
NCAP_CLAG-OUT (a)	Lagtime of a commodity after new capacity ready - output
UC_CUMACT	Coefficient for cumulative process activity
UC_CUMCOMNET (b)	Coefficient for cumulative commodity net
UC_CUMCOMPRD (b)	Coefficient for cumulative commodity production
UC_CUMFLO	Coefficient for cumulative process flow
UC_TIME	Multiplier of time in model periods (years)

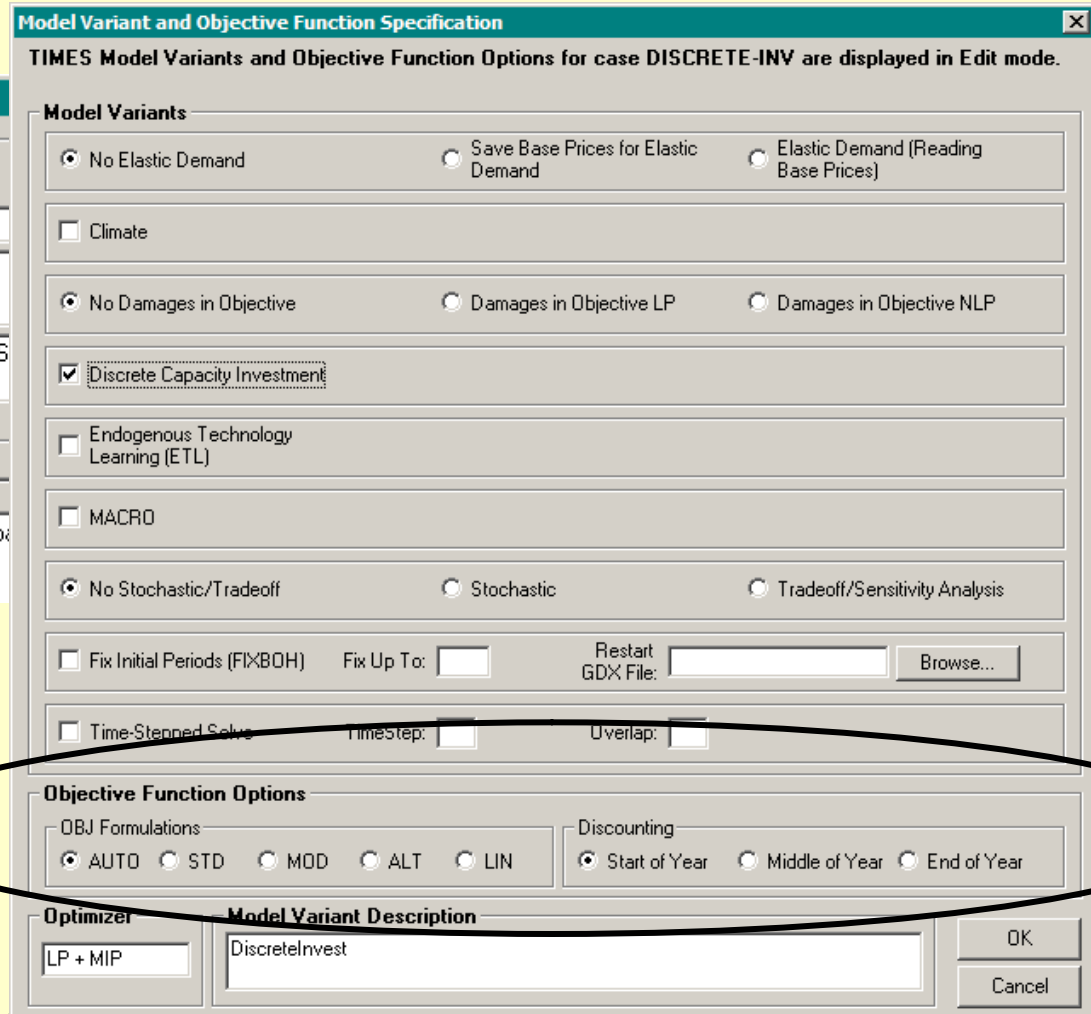
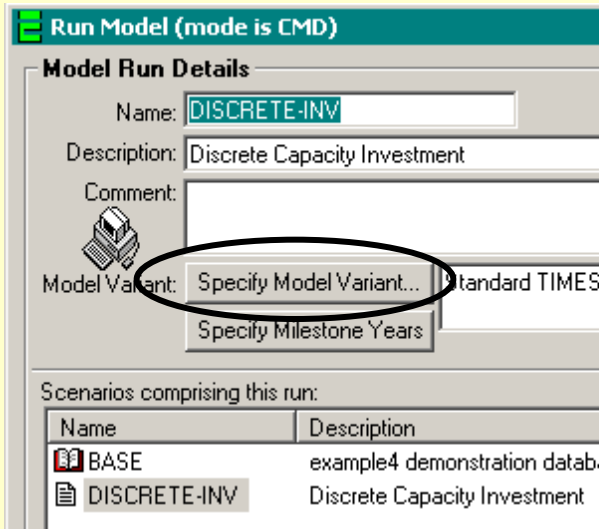
# Details of ANSWER-TIMES v6.6.1 Enhancements - 2

- ◆ *New Model Variant Specification facility supports most TIMES Extensions with no user intervention needed in \*.GEN file:*



# Details of ANSWER-TIMES v6.6.1 Enhancements - 3

- ◆ *New Model Variant Specification facility supports TIMES Objective Function options with no user intervention needed in \*.GEN file:*



# Details of ANSWER-TIMES v6.6.1 Enhancements - 4

## ◆ Support for N (non-binding) limit type in TIMES parameters

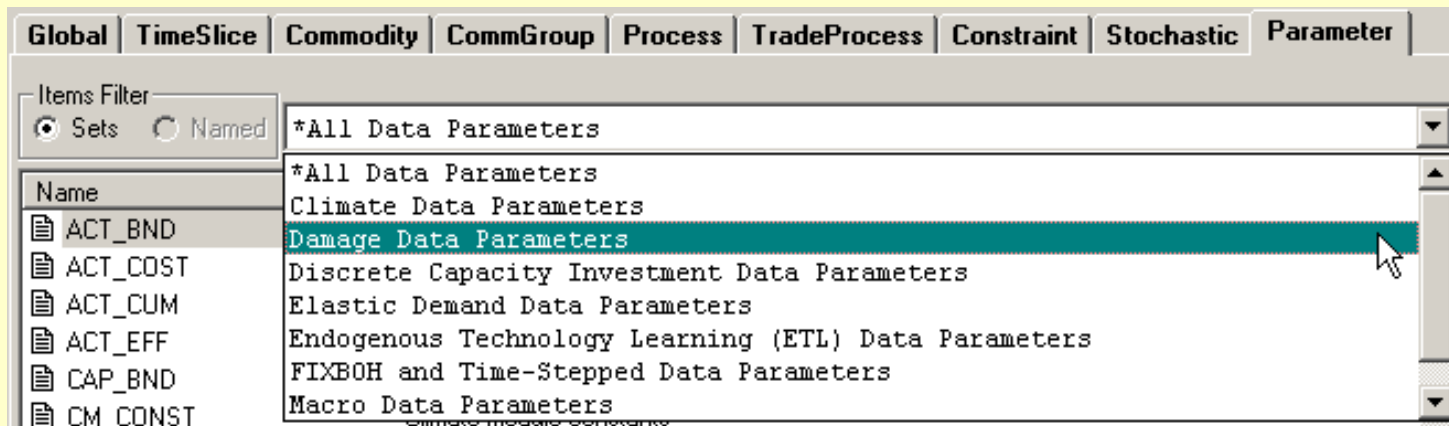
- ANSWER-TIMES uses NB (non-binding) as an alias for N
- ANSWER-aware TIMES GAMS code converts NB used in ANSWER to N that TIMES GAMS code recognizes

	Scenario	Parameter		Region	Process	Year	Year	Limit	Value	
Add	BASE	ACT_CUM	▼	? REG	▼	2000	▼	2050	▼	
									FX LO NB UP	



# Details of ANSWER-TIMES v6.6.1 Enhancements - 5

- ◆ **New subsetting facility on Parameter tab allows user to subset Parameters displayed to just those that are specific to a particular TIMES Extension**



The screenshot shows the software interface with the 'Parameter' tab selected. The 'Items Filter' dropdown is set to 'Sets' and is filtered to 'Damage Data Parameters'. The table below lists the parameters:

Name	Description	Status
DAM_BQTY	Base quantity of emissions	M
DAM_COST	Marginal damage cost of emissions	M
DAM_ELAST	Elasticity of damage cost	M
DAM_STEP	Step number for emissions up to base	M
DAM_TQTY	Base quantity of emissions by year	
DAM_TVOC	Variance of emissions by year	
DAM_VOC	Variance of emissions	M
S_DAM_COST	Marginal damage cost of emissions - stochastic	

# Details of ANSWER-TIMES v6.6.1 Enhancements - 6

## ◆ New Stochastic tab for handling of TIMES Stochastic Extension

Global | TimeSlice | Commodity | CommGroup | Process | TradeProcess | Constraint | **Stochastic** | Parameter

Items Filter:  Sets  Named \*All Stochastic Items (STOC) Sets Filter... Named Filter...

Name	Region	Description	Status
S2	_GLOBAL	Stage 2	SM
S3	_GLOBAL	Stage 3	SM
SW1-01	_GLOBAL	Stage 1, sub-state 01	SM
SW2-01	_GLOBAL	Stage 2, sub-state 01	SM
SW2-02	_GLOBAL	Stage 2, sub-state 02	SM
SW2-03	_GLOBAL	Stage 2, sub-state 03	SM
SW3-01	_GLOBAL	Stage 3, sub-state 01	SM
SW3-02	_GLOBAL	Stage 3, sub-state 02	S
SW4-01	_GLOBAL	Stage 4, sub-state 01	SM

Item Management  
Current Stochastic Item: SW3-01 Sets?  
New... Copy... Delete Edit...  
Select All Items Move... RES

Subset Parameters: \*0 Stochastic TS, TID data ?

	Scenario	Parameter	Region	Item1	Item2	Tim	Limit	Stochastic	I/E	1990	2000	2010	2015	2020	2035	2050	2065	2080
M	STOC5STG	S_COM_PROJ	? REG	-	TX	-	-	SW3-01	0				1.0700					
Add	STOC5STG		? ?															

	Scenario	Parameter	Region	Item1	Commodit	Item3	Yea	Limit	Stochastic	Value
M	STOC5STG	SW_SPROB	? _GLOBAL	-	-	-	-	-	SW3-01	0.6000
M	STOC5STG	SW_SUBS	? _GLOBAL	-	-	-	-	-	SW3-01	2
Add	STOC5STG		? ?							

# Details of ANSWER-TIMES v6.6.1 Enhancements - 7

- ◆ *In ANSWER-TIMES, 3 different categories of Stochastic Items, with fixed Name and Description conventions:*
  - **Stages (named S1 to S9)**
  - **Stage-Substate Pairs (named SW1-01 to SW9-64)**
  - **States of World (named SW01-SW64)**

**New Stochastic Item in scenario STOC5STG**

Enter Name for the new Stochastic Item (S1 to S9 for STAGE, SW1-01 to SW9-64 for SWPAIR, W01 to W64 for SOW). Description and Set Memberships will be auto-generated from Name. Optionally enter Comment. After clicking OK, specify parameter data as appropriate.

**Item Information**

Scenario: STOC5STG Stochastic Data for section 5.5 five-stage stochastic model in TIMES-

Name, Desc: | \_GLOBAL

**Set Memberships and Units** | **Comment**

**Set Memberships**

- Stochastic Item (STOC)
  - Stage (STAGE)
  - Stage-Substate Pair (SWPAIR)
  - State of World (SOW)

Additional Characterization

# Acknowledgments

- ◆ *Antti Lehtila, VTT Energy Finland, for his continued generous assistance*
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