

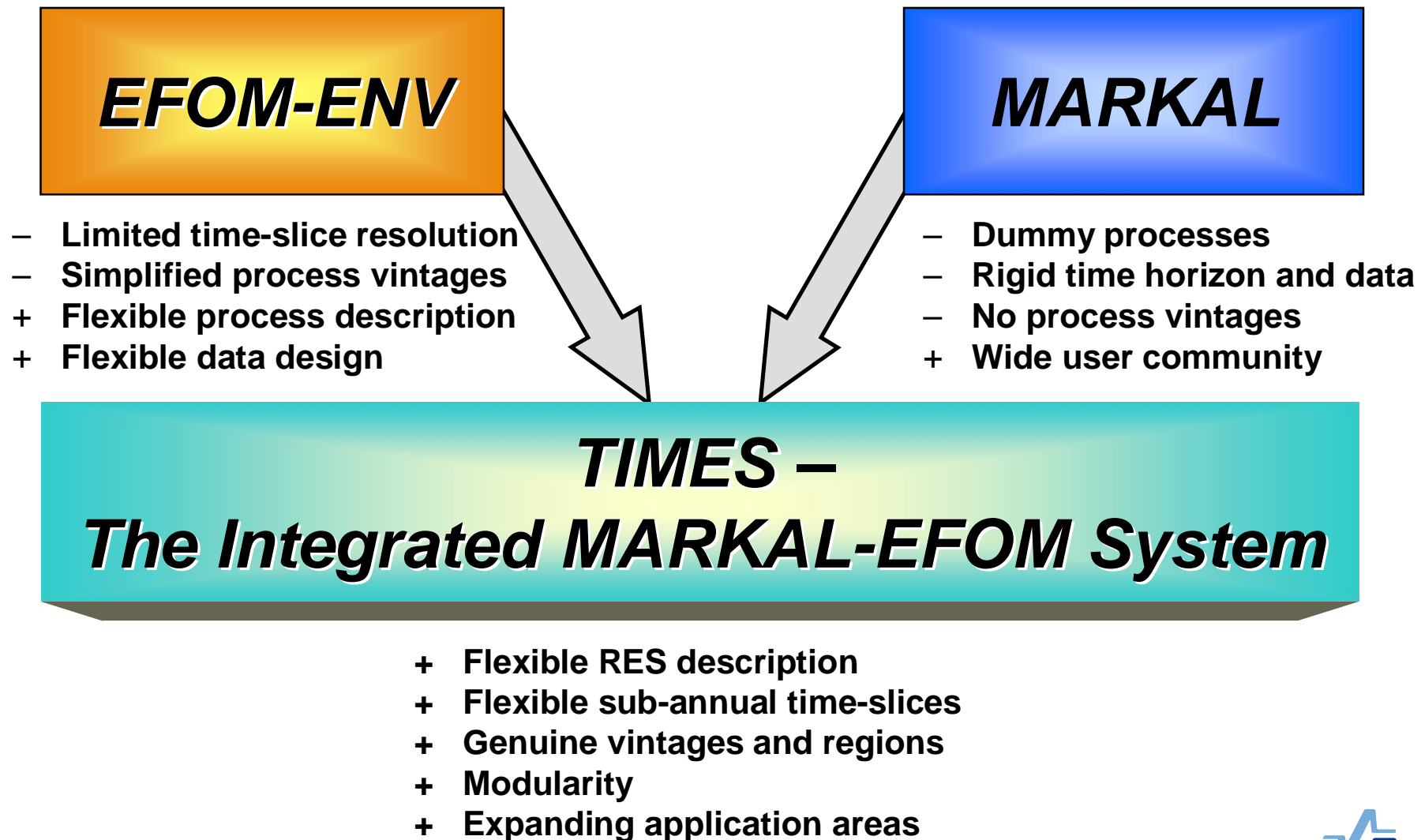
Notes on the Use of TIMES at VTT

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Background

- † **TIMES was taken into use at VTT in 2000-2002**
- † **Detailed national EFOM model converted to TIMES**
- † **No full TIMES user shell was available:**
 - | VEDA-FE has been available from ~2003, but without complete TIMES support
 - | ANSWER-TIMES has been available from ~2001, but initially with many limitations
- † **Own user shell development carried out at VTT**
- † **Shell never finished into a distributable product**

Goals of TIMES development

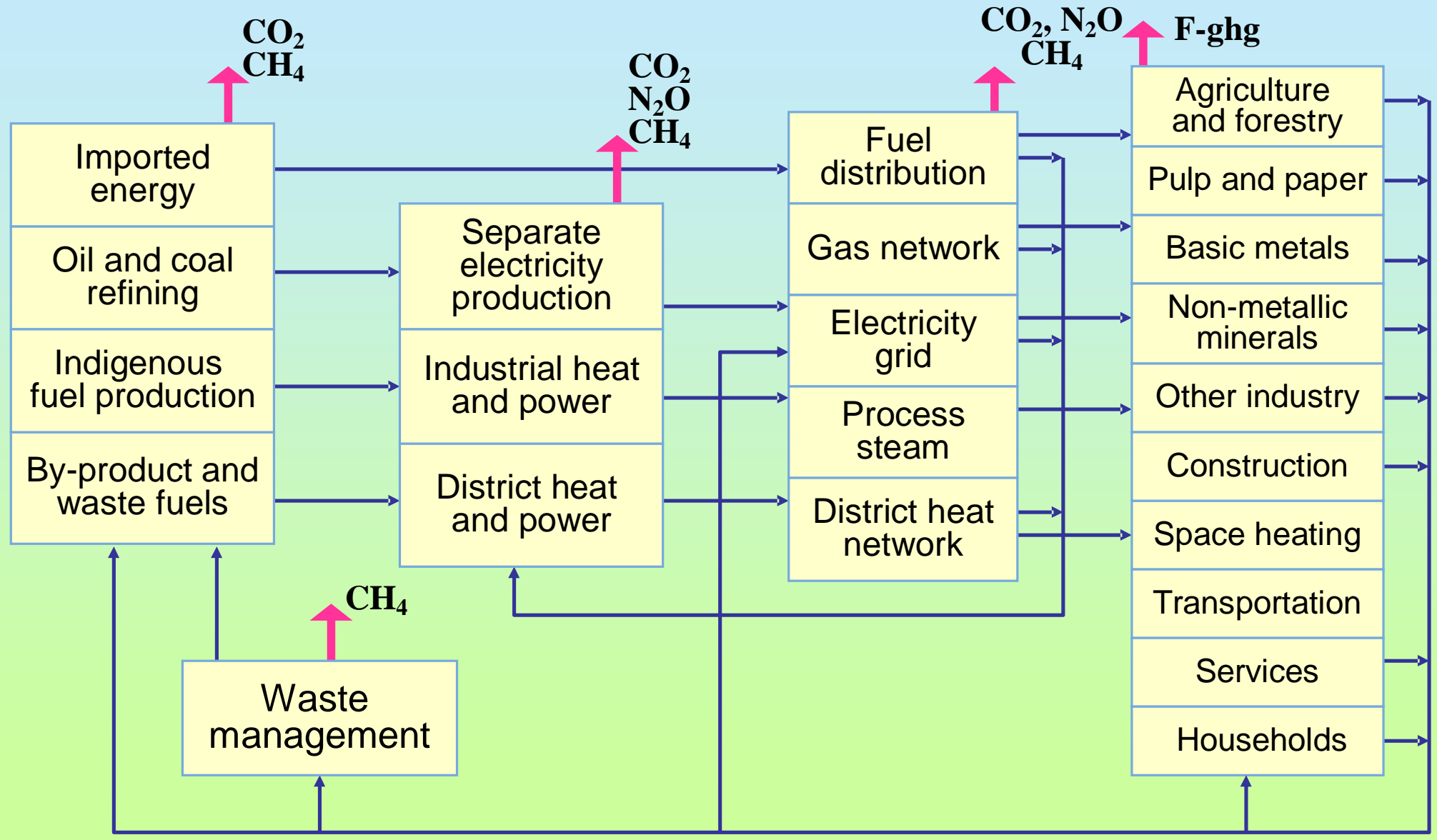


Fuel supply and conversion

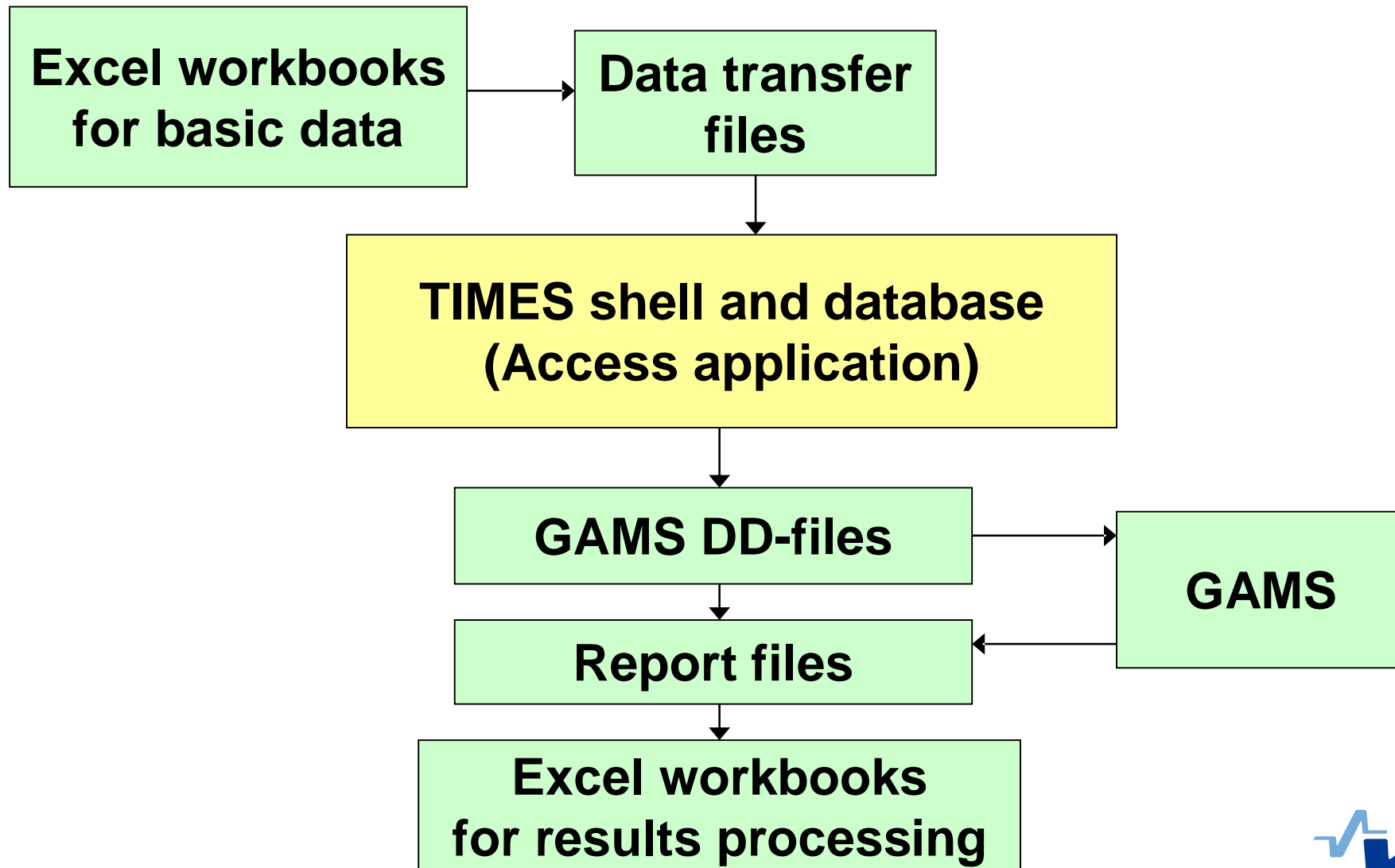
Intermediate energy conversion

Energy distribution

Demand sectors and distributed generation



Overall approach of the VTT shell



Approach of the Access shell

- t **Relational database structure**
- t **Supports all TIMES attributes (data driven); extensible**
- t **Flexible data years**
- t **Efficient management of scenario data**
- t **Data mostly not edited inside shell, but bulk imported from Excel worksheets**
- t **Consistency checks when importing**
- t **Unit conversions automatically made by the shell**
- t **Advanced scenario management with priorities**
- t **No rule-based attribute generation implemented**

MainItem
_ _ X

TIMES AT VTT

Global	Region	Process	Commodity	CommGroup	UConstraint	Parameter							
Select	Rename	<input type="checkbox"/>	Description	TS Level	SubSet	Type	SubType	Add	Copy	InGrp			
E3FBC-PL	E3FBC-PL		CHP FBC, large	DAYNITE	VINTAGED	ENECON	CHP	Del	Paste	OutGr			

Process Parameters — Region: FIN COPY: CHP FBC, large:FLO_RATE BASE

Parameter	Entity	ComG1	ComG2	Slice	Bound	Scenario	Unit	Per	Qty	Intext	CE	Year1	Value1
NCAP_AF	-			ANNUA	UP	BASE			0	-D-	<input type="checkbox"/>	2000	0.85
NCAP_TLIFE	-			ANNUA	—	BASE	YEAR		0	-D-	<input type="checkbox"/>	2000	25
NCAP_COST	-			ANNUA	—	BASE	FM97	KW	0	2000	<input type="checkbox"/>	2000	2160
NCAP_FOM	-			ANNUA	—	BASE	FM97	KW	0	2000	<input type="checkbox"/>	2000	98
ACT_COST	-			ANNUA	—	BASE	FM97	MWH	0	-D-	<input type="checkbox"/>	2000	5.2
FLO_COST	-		FOH2D--	ANNUA	—	BASE	FM99	MWH	0	-D-	<input type="checkbox"/>	2000	8.93
FLO_COST	-		FPMLD--	ANNUA	—	BASE	FM99	MWH	0	-D-	<input type="checkbox"/>	2000	0.41
FLO_COST	-		FCO1D--	ANNUA	—	BASE	FM99	MWH	0	-D-	<input type="checkbox"/>	2000	2.88
FLO_DELIV	-		FCO1D--	ANNUA	—	BASE	FM99	MWH	0	-D-	<input type="checkbox"/>	2000	0.6
FLO_DELIV	-		RWCHD--	ANNUA	—	BASE	FM99	MWH	0	-D-	<input type="checkbox"/>	2000	5
FLO_RATE	ANNUAL	FOH2D--	DMAINACT	ANNUA	FX	BASE			0	-D-	<input type="checkbox"/>	2000	0.892
FLO_RATE	ANNUAL	FPMLD--	DMAINACT	ANNUA	FX	BASE			0	-D-	<input type="checkbox"/>	2000	0.861
FLO_RATE	ANNUAL	FCO1D--	DMAINACT	ANNUA	FX	BASE			0	-D-	<input type="checkbox"/>	2000	0.87
FLO_RATE	ANNUAL	RRF1D--	DMAINACT	ANNUA	FX	BASE			0	-D-	<input type="checkbox"/>	2000	0.845
FLO_RATE	ANNUAL	RWCHD--	DMAINACT	ANNUA	FX	BASE			0	-D-	<input type="checkbox"/>	2000	0.857
FLO_RATE	DAYNITE	DECTWH	EDL-UPS	ANNUA	UP	BASE			0	-D-	<input type="checkbox"/>	2000	0.125
FLO_RATE	DAYNITE	DMAINACT	EDL-UPS	ANNUA	UP	BASE			0	-D-	<input checked="" type="checkbox"/>	1995	0.33
FLO_RATE	DAYNITE	DMAINACT	DMAINACT	ANNUA	FX	BASE			0	-D-	<input type="checkbox"/>	1995	-0.015

Record: 17 of 49 (Filtered)

Process Topology: Paste IOP

Commodity	Region	InOut	Activity
RWCHD--	FIN	IN	<input type="checkbox"/>
RRF1D--	FIN	IN	<input type="checkbox"/>
FCO1D--	FIN	IN	<input type="checkbox"/>
FPMLD--	FIN	IN	<input type="checkbox"/>
FOH2D--	FIN	IN	<input type="checkbox"/>
DMAINACT	FIN	OUT	<input checked="" type="checkbox"/>
DECTWH	FIN	OUT	<input type="checkbox"/>
EDL-UPS	FIN	OUT	<input type="checkbox"/>
HLT3-UP	FIN	OUT	<input type="checkbox"/>
*			<input type="checkbox"/>

3: E3FBC-PL: FLO_RATE, Scenario BASE

Year	Value	Figure
1995	0.33	3.3000E-01
2000	0.341	3.4100E-01
2010	0.349	3.4900E-01
2020	0.357	3.5700E-01
2030	0.368	3.6800E-01
2050	0.386	3.8600E-01
*	0	0.0000E+00

Record: 76 of 221 (Filtered)

CaseMain : Form

TIMES AT VTT

Cases | Scenarios

CaseName	Description	BaseYear	BoH	EoH	Solve	Solver	RunDate
▶ BASELINE	Baseline scenario for Test Version	2000	2000	2030	<input checked="" type="checkbox"/>	MINOS	13/06/02 10:30
BOOST	Boosted technology development	1990	1990	2010	<input type="checkbox"/>	MINOS	13/06/02 09:47
HIFUTAX	High fuel taxes scenario	2000	2000	2030	<input checked="" type="checkbox"/>	MINOS	12/06/02 20:13
NEXTCASE	Speculative Futures	1990	1990	2010	<input type="checkbox"/>	PCX	
*		2000	2000	2020	<input checked="" type="checkbox"/>	PCX	

Record: 1 of 4 (Filtered)

Scenarios for Case:

Priority	Parameter	Item	Bound	Scenario
▶ 1	--ALL--	-	N	BASE
2	NCAP_COST	-	N	BOOST
2	FLO_BYB	-	N	TIGHT
3	COM_TAXNET	-	N	TWO
3	UC_FLO	EMISSIONS	N	TIGHT
* 0	--ALL--	-	N	BASE

Record: 1 of 5 (Filtered)

Current Case: BASELINE

Working Folder: E:\TIMESVTT

Name of dd-File: SAMPLE

Use CaseName for Parameter file:

Debug: Edit Run file:

Listing: Restart previous:

Milestone Years:

Year
▶ 2005
2010
2015
2020
2025
* 0

Dump Sets

Dump Parameters

RUN Case



TIMES extensions at VTT

- † **Several new attributes introduced**
 - | FLO_RATE – generalized process flow constraint attribute;
 - | ACT_EFF – streamlined efficiency attribute (now in VEDA);
 - | NCAP_AFCS – commodity dependent availabilities (now in VEDA);
 - | PRC_RESID – residual capacities (now in VEDA);
 - | FLO_DECAY – first order decay equations;
 - | Custom 'metadata' parameters; etc.
- † **Option for modified objective function:
"Linear evolution" approach**
- † **Simplified vintaging options**
 - | Activity-based and approximated vintaging
- † **Automated tax and emissions modeling via metadata**

Conclusions

- † **TIMES is a powerful and flexible model generator but requires an efficient user shell for data management**
- † **A basic user shell has been developed at VTT**
 - | No further development currently planned
 - | Should eventually be fully replaced by VEDA-FE / ANSWER / ?
 - | Has some very useful features:
 - | Automatic unit conversions
 - | Flexible scenario management
- † **Many extensions to the model generator implemented at VTT**
- † **Using a common ETSAP user shell and model generator is desirable**