The path towards the calibration of the extracted region: the example of Italy

F. Gracceva, U. Ciorba, G.C. Tosato and M. Gargiulo

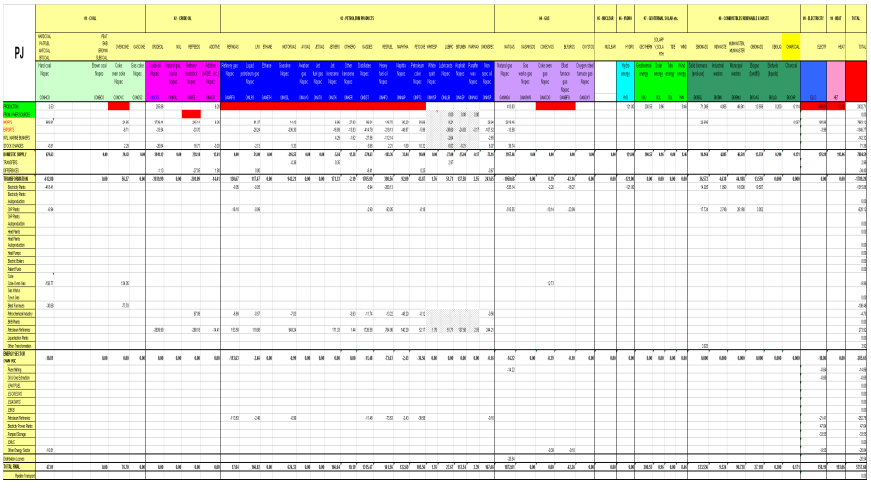
The path towards the calibration of the extracted region: the example of Italy

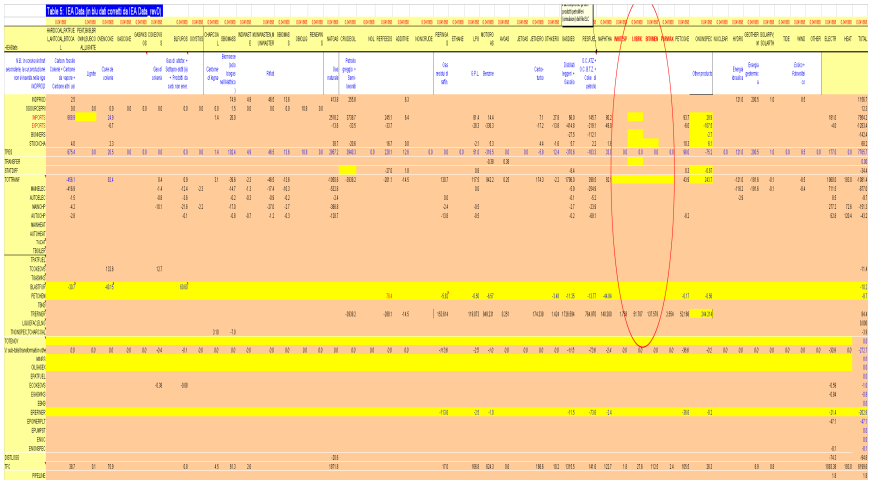
- Preliminary steps: bugfix errors in country extraction
- Cleaning up the model
- (Dummy imports)
- New files
- Data improvement / RES revision

The path towards the calibration of the extracted region: the example of Italy

- **Preliminary steps: bugfix errors in country extraction**
  - UPS_IEA Data
  - ELC
  - RES/TRA
  - IND
- Cleaning up the model
- (Dummy imports)
- New files
- Data improvement / RES revision

PRELIMINARY STEP (1): Reconstruction of IEA national energy balance

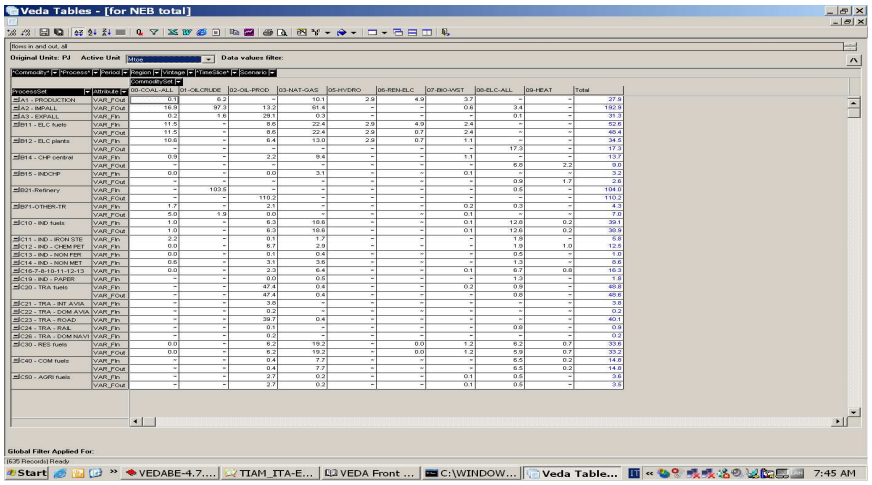




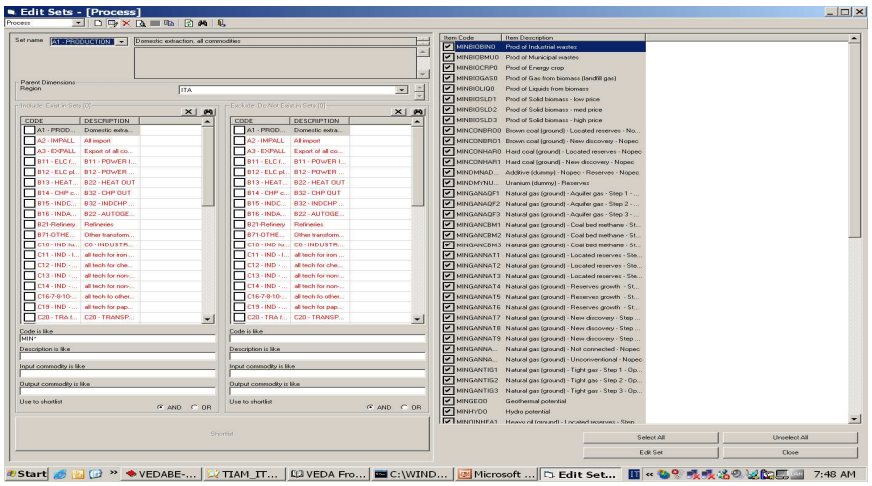
PRELIMINARY STEP (1): Reconstruction of IEA national energy balance

RESIDENZIALE			
Description	BEN	IEA	Sigle delle commodities
NATGAS	803	786	GASNGA
GASWKSGS			GASGWG
COKEOVGS			GASCOG
GASDIES	136	151	OILDST
RESFUEL	1	10	OILHFO
CRUDEOIL	1		OILCRD
OTHKERO		1	OILKER
MOTORGAS			OILGSL
ONONSPEC			OILNSP
HARDCOAL,PATFUEL,ANTCOAL,BITCOAL	0	0	COAHCO
PEAT,BKB,BROWN,SUBCOAL,LIGNITE			COABCO
OVENCOKE			COAOVC
LPG	67	95	OILLPG
SBIOMASS	47	47	BIOBSL
CHARCOAL	4	4	BIOCHR
GBIOMASS,OBIOLIQ			BIOGAS
MUNWASTEN,MUNWASTER			BIOBMU
INDWASTE			BIOBIN
ELECTR	241	241	ELC
HEAT			HET
GEOTHERM			GEO
SOLARPV,SOLARTH		1	SOL
TOTAL	1300	1336	

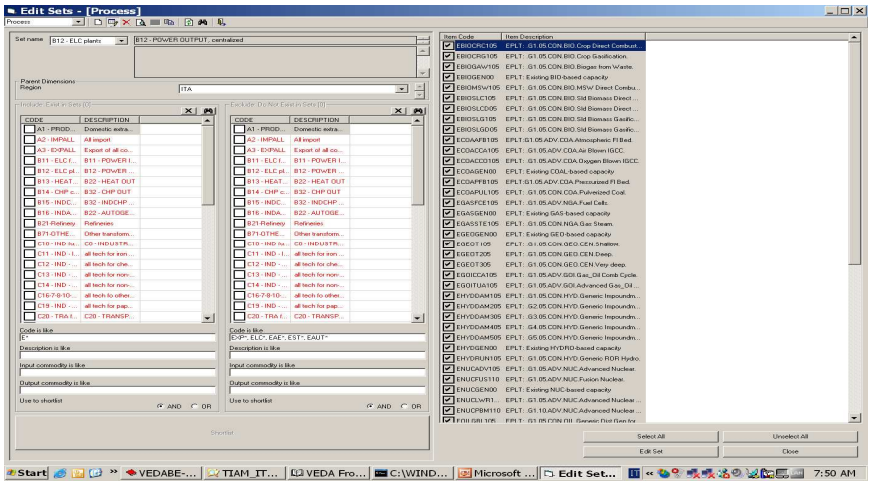
PRELIMINARY STEP (2): BE table for NEB



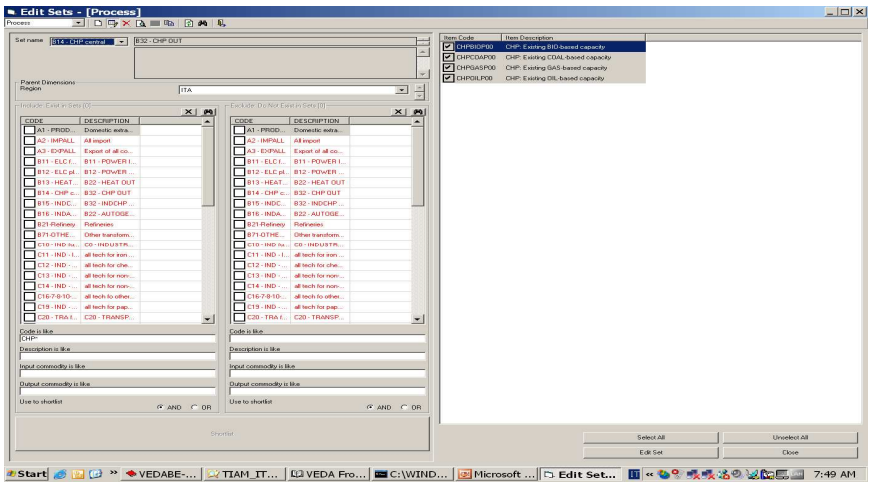
PRELIMINARY STEP (2): BE table for NEB



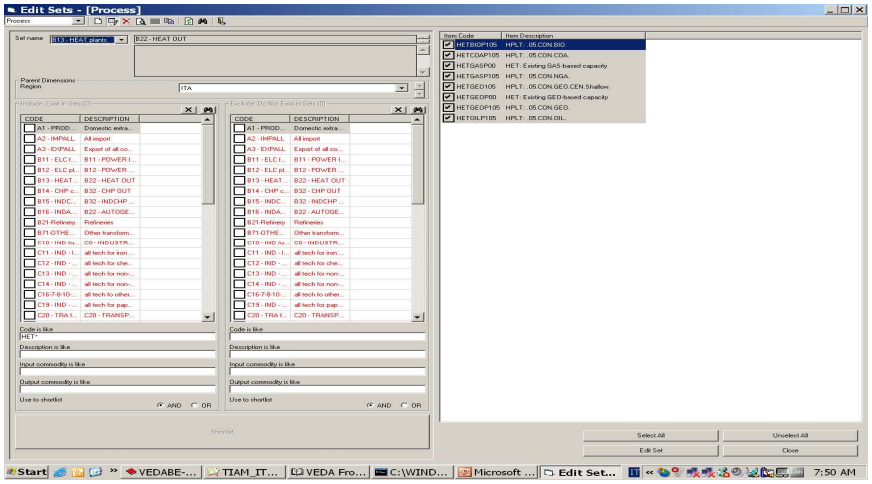
PRELIMINARY STEP (2): BE table for NEB



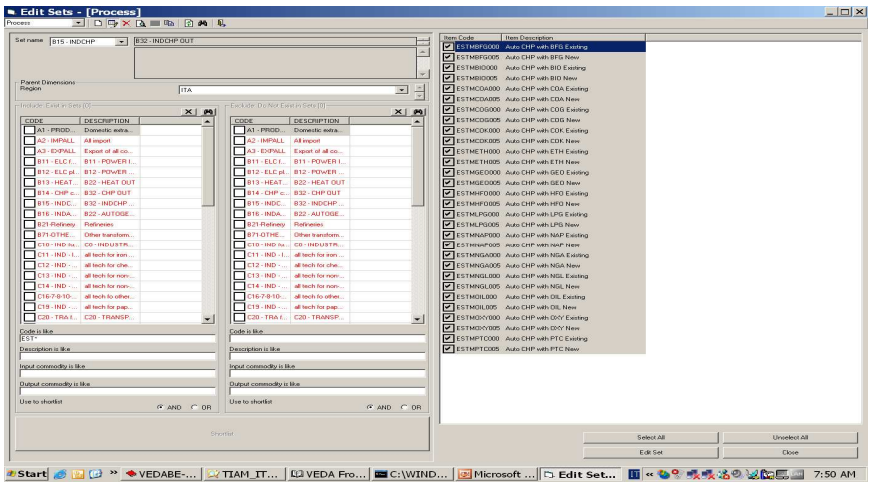
PRELIMINARY STEP (2): BE table for NEB



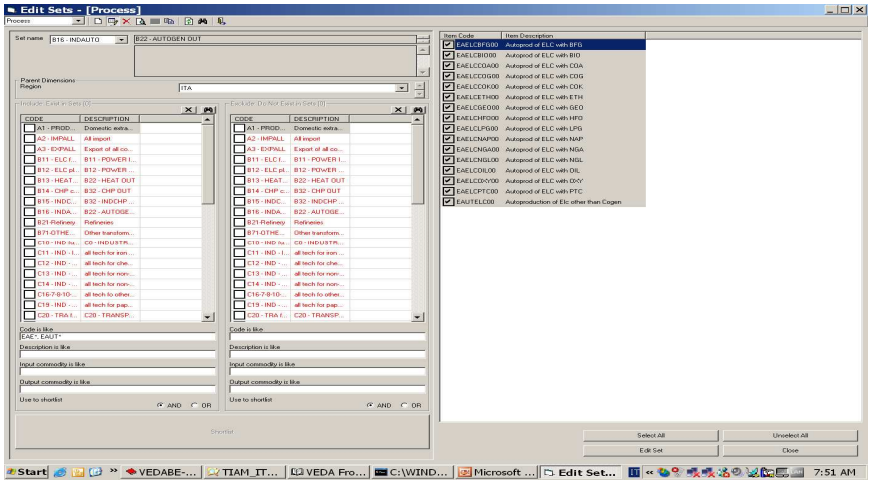
PRELIMINARY STEP (2): BE table for NEB

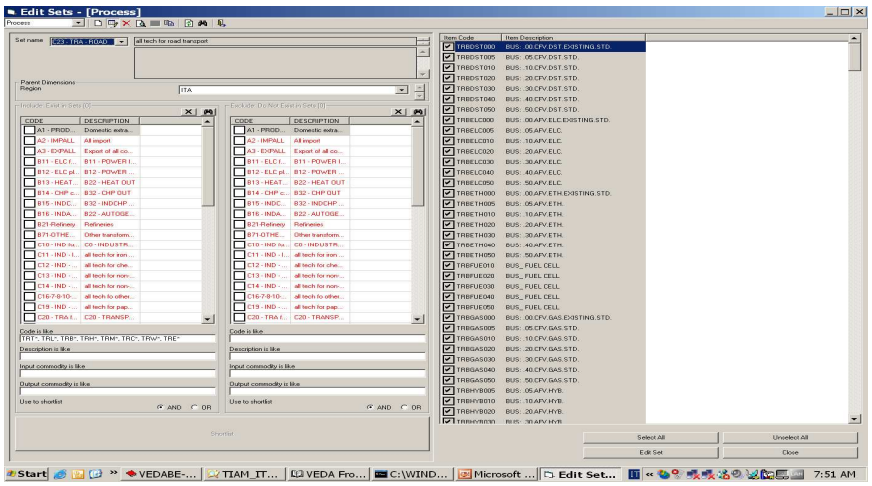


PRELIMINARY STEP (2): BE table for NEB



PRELIMINARY STEP (2): BE table for NEB

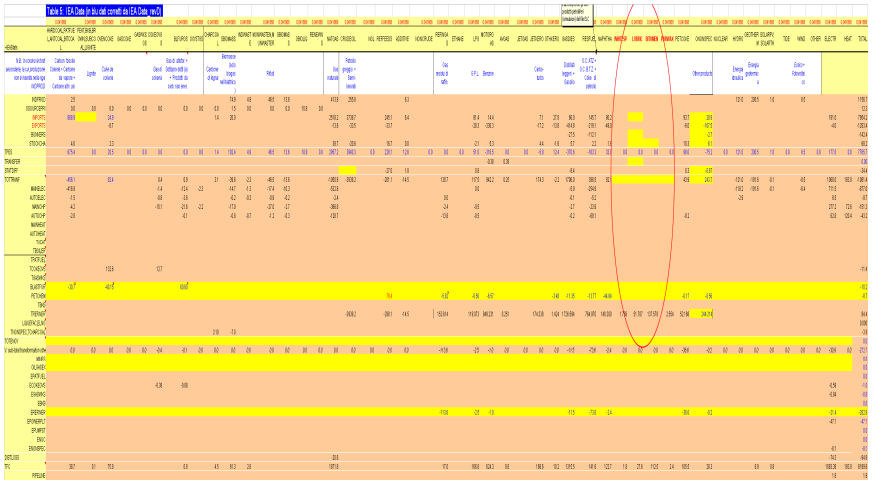




Cleaning up the model

- **Preliminary steps: bugfix errors in country extraction**
- **Cleaning up the model**
  - Trade
  - (GLB region)
  - Scenario files (see list by Marise)
- **(Dummy imports)**
- **New files**
- **Data improvement / RES revision**

Reduction of (not useful) model complexity: commodities



Cleaning up the model: trade

~TradeLinks

ELCC	EEU	GLB	WEU	ITA
EEU				
GLB				
WEU				
ITA				

~TradeLinks

OILDST	EEU	GLB	WEU	ITA
EEU				
GLB				
WEU				
ITA				

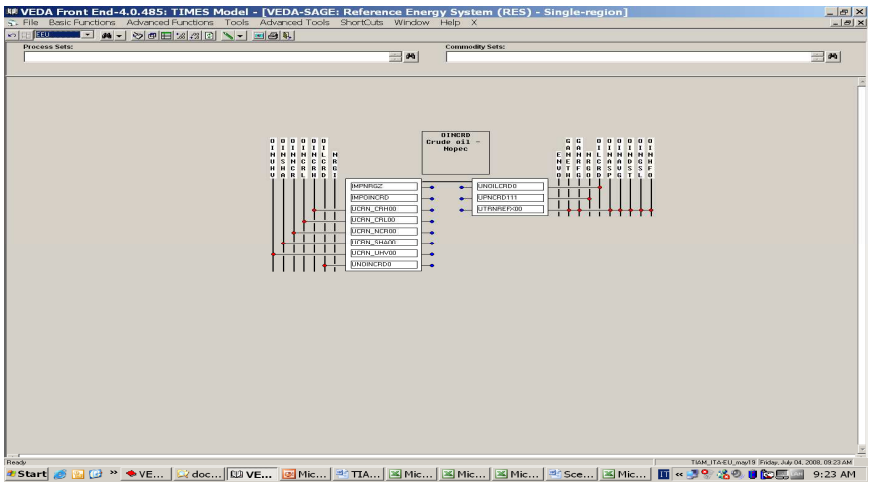
~TradeLinks

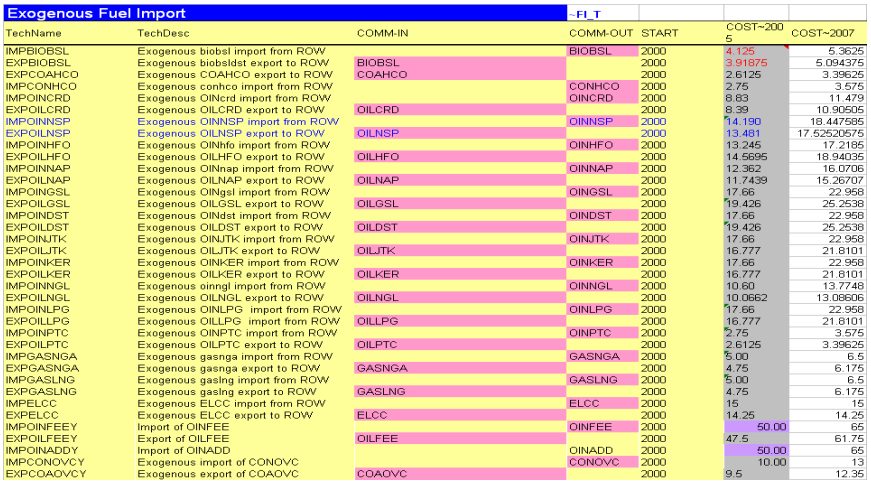
TOTCO2	EEU	GLB	WEU	ITA
EEU		1		
GLB				
WEU		1		
ITA		1		

Cleaning up the model

Files	Definition	Base*	Sce
C:\VEDA\VEDA_Models\<name_database> Databases	Storage of databases by VEDA_FE	Na	na
C:\VEDA\VEDA_Models\<name_database> Databases SubRES_TMPL			
SubRes_AltFuel SubRes_AltFuel_Trans	New alternative fuel technologies for transport	√	
SUBRES_B-NewTechs SUBRES_B-NewTechs_Trans	New technology repository	√	
SubRes_CH4measuresC SubRes_CH4measuresC_Trans	CH4 mitigation options	√**	
SUBRES_Hydrogen SUBRES_Hydrogen_Trans	Hydrogen technologies	√	
SubRes_N2Omeasures SubRes_N2Omeasures_Trans	N2O mitigation options	√**	
SUBRES_NonCO2gases SUBRES_NonCO2gases_Trans	Non CO2 emissions	√**	
SUBRES_SequestrationB SUBRES_SequestrationB_Trans	CO2 capture and sequestration options		√***
C:\VEDA\VEDA_Models\<name_database> Databases SubRES_TMPL SuppXLS			
Demand Base_Drivers Dem_ABoc+series	Macro-economic drivers, allocation of drivers to demands, elasticities of demands to the drivers	√	
Trades ScenTrade_TRADE	Trade description (costs and bounds)	√	
UConstraints ScenUC_INDShares2005	Energy shares for petrochemical industry Share of purchased electricity in industry	√	
BASE_Qdata	Cost regionalization	√	
Scen_B_BASEextra	Modifications of data included in Templates and SubRES files	√	
Scen_B_Extraction	Fossil resources and extraction (IER's review).	√	
Scen_ELC-UC Scen_IND-UC Scen_TRA-UC	User's constraints****	√	
Scen_ELC-MaxCoal	Limit of the share of coal power plants in fossil power plants		√
Scen_ClimParameters	Climate parameters for the climate module	√	

- **Preliminary steps: bugfix errors in country extraction**
- **Cleaning up the model**
- **(Dummy imports)**
- **New files**
  - SubRes_Import: exogenous import
  - Scen_Import_BND: bounds on exogenous import
  - Scen_DemProj_ITA: “home made” demand projections alternative to the one automatically generated
- **Data improvement / RES revision**





Exogenous Fuel Import			FI_T			
TechName	TechDesc	COMM-IN	COMM-OUT	START	COST~2005	COST~2007
IMPBIOBSL	Exogenous biobsl import from ROW		BIOBSL	2000	4.125	5.3625
EXPBIOBSL	Exogenous biobsldst export to ROW	BIOBSL		2000	3.91875	5.094375
EXPCOAHCO	Exogenous COAHCO export to ROW	COAHCO		2000	2.6125	3.39625
IMPCONHCO	Exogenous conhco import from ROW		CONHCO	2000	2.75	3.575
IMPOINCRD	Exogenous OINcrd import from ROW		OINCRD	2000	8.83	11.479
EXPOILCRD	Exogenous OILCRD export to ROW	OILCRD		2000	8.39	10.90505
IMPOINNSP	Exogenous OINNSP import from ROW		OINNSP	2000	14.190	18.447585
EXPOILNSP	Exogenous OILNSP export to ROW	OILNSP		2000	13.481	17.52520575
IMPOINHFO	Exogenous OINhfo import from ROW		OINHFO	2000	13.245	17.2185
EXPOILHFO	Exogenous OILHFO export to ROW	OILHFO		2000	14.5695	18.94035
IMPOINNAP	Exogenous OINnap import from ROW		OINNAP	2000	12.362	16.0706
EXPOILNAP	Exogenous OILNAP export to ROW	OILNAP		2000	11.7439	15.26707
IMPOINGSL	Exogenous OINgsl import from ROW		OINGSL	2000	17.66	22.958
EXPOILGSL	Exogenous OILGSL export to ROW	OILGSL		2000	19.426	25.2538
IMPOINDST	Exogenous OINdst import from ROW		OINDST	2000	17.66	22.958
EXPOILDST	Exogenous OILDST export to ROW	OILDST		2000	19.426	25.2538
IMPOINJTK	Exogenous OINJTK import from ROW		OINJTK	2000	17.66	22.958
EXPOILJTK	Exogenous OILJTK export to ROW	OILJTK		2000	16.777	21.8101
IMPOINKER	Exogenous OINKER import from ROW		OINKER	2000	17.66	22.958
EXPOILKER	Exogenous OILKER export to ROW	OILKER		2000	16.777	21.8101
IMPOINNGL	Exogenous oinngl import from ROW		OINNGL	2000	10.60	13.7748
EXPOILNGL	Exogenous OILNGL export to ROW	OILNGL		2000	10.0662	13.08606
IMPOINLPG	Exogenous OINLPG import from ROW		OINLPG	2000	17.66	22.958
EXPOILLPG	Exogenous OILLPG import from ROW	OILLPG		2000	16.777	21.8101
IMPOINPTC	Exogenous OINPTC import from ROW		OINPTC	2000	2.75	3.575
EXPOILPTC	Exogenous OILPTC export to ROW	OILPTC		2000	2.6125	3.39625
IMPGASNGA	Exogenous gasnga import from ROW		GASNGA	2000	5.00	6.5
EXPGASNGA	Exogenous gasnga export to ROW	GASNGA		2000	4.75	6.175
IMPGASLNG	Exogenous gaslng import from ROW		GASLNG	2000	5.00	6.5
EXPGASLNG	Exogenous gaslng export to ROW	GASLNG		2000	4.75	6.175
IMPELCC	Exogenous ELCC import from ROW		ELCC	2000	15	15
EXPELCC	Exogenous ELCC export to ROW	ELCC		2000	14.25	14.25
IMPOINFEEY	Import of OINFEE		OINFEE	2000	50.00	65
EXPOILFEEY	Export of OILFEE	OILFEE		2000	47.5	61.75
IMPOINADDY	Import of OINADD		OINADD	2000	50.00	65
IMPCONOVCY	Exogenous import of CONOVC		CONOVC	2000	10.00	13
EXPCOAOVCY	Exogenous export of COAOVC	COAOVC		2000	9.5	12.35

- **Preliminary steps: bugfix errors in country extraction**
- **Cleaning up the model**
- **(Dummy imports)**
- **New files**
- **Data improvement / RES revision**
  - UPS (refinery, resources, absolute bounds)
  - ELC
  - RES/TRA
  - IND

Data improvement / RES revision

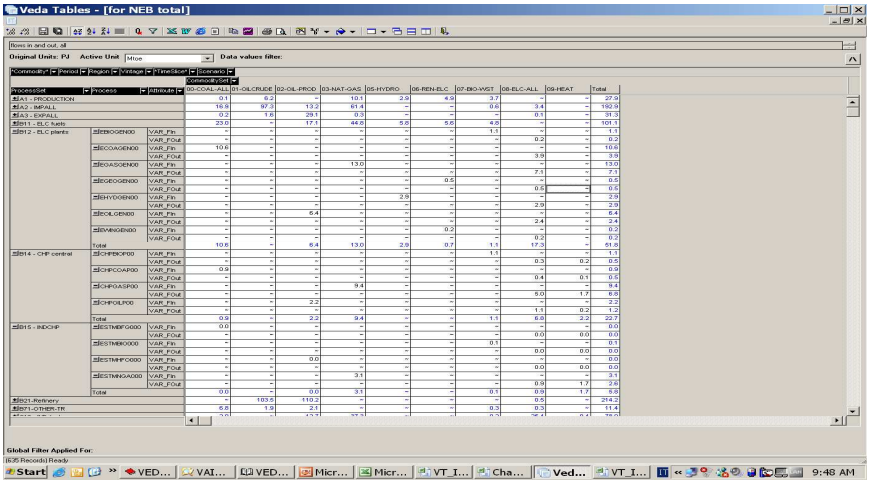
Fuels split by end-use (Fractional Shares)

	Space Heating CH	Space Cooling CC	Water Heating CHW	Lighting CLA	Cooking CCK	Refrigeration CRF	Electric Office Equipment COE	Commercial Other COT	Total
Natural Gas	0.750	0.120	0.090		0.040				1.000
Distallate	0.820	0.080	0.100						1.000
Heavy Oil	1.000								1.000
Kerosene									
Coal-Commercial									
LPG	0.670		0.250		0.080				1.000
Biomass	0.940				0.060				1.000
Electricity	0.121	0.126	0.045	0.325	0.009	0.070	0.154	0.150	1.000
Heat									
Geothermal									
Solar									

Fuels split by end-use (Absolute Values)

	Space Heating CH	Space Cooling CC	Water Heating CHW	Lighting CLA	Cooking CCK	Refrigeration CRF	Electric Office Equipment COE	Commercial Other COT	Total	
Natural Gas	230.71	36.91	27.69		12.30				307.62	46%
Distallate	23.51	2.29	2.87						28.67	4%
Heavy Oil	8.75								8.75	1%
Kerosene										
Coal-Commercial										
LPG (called propane in nrc)	17.22		6.43		2.06				25.70	4%
Biomass	1.97				0.13				2.10	0%
Electricity	34.94	36.38	12.99	93.83	2.60	20.21	44.46	43.31	288.72	44%
Heat										
Geothermal										
Solar										
Total	317.10	75.59	49.97	93.83	17.09	20.21	44.46	43.31	661.56	100%
Share of total	47.93%	11.43%	7.55%	14.18%	2.58%	3.05%	6.72%	6.55%	100.00%	

Data improvement / RES revision



Data improvement / RES revision

Table 6 : Aggregation (CHP)

	Input	Output (elec)	ruput (heat)	EFF elc output/input	EFF heat output/input	quota ELC / HEAT	Refinery ratio of CHP input (see UPS template)	Non-Refinery ratio of CHP input
INDNGA	128.70	36.89	68.23	0.29	1.85		0.00	1.00
INDLPG	0.50	0.15	0.25	0.29	1.67		1.00	0.00
INDNGL	0.00	0.00	0.00	0.00	0.00		1.00	0.00
INDCOA	0.00	0.00	0.00	0.00	0.00		0.00	1.00
INDCOK	0.00	0.00	0.00	0.00	0.00		0.00	1.00
INDCOG	0.00	0.00	0.00	0.00	0.28		0.00	1.00
INDBFG	0.08	0.05	0.01	0.56	0.17		0.00	1.00
INDOXY	0.00	0.00	0.00	0.00	0.00		0.00	1.00
INDHFO	69.12	17.27	41.56	0.25	2.41		0.99	0.01
INDOIL	0.21	0.09	0.07	0.43	0.77		1.00	0.00
INDETH	13.77	3.21	7.20	0.23	2.25		1.00	0.00
INDNAP	0.00	0.00	0.00	0.00	0.00		1.00	0.00
INDPTC	8.16	4.08	0.24	0.50	0.06		1.00	0.00
INDBIO	2.97	0.44	1.33	0.15	3.06		0.00	1.00
INDGEO	0.00	0.00	0.00	0.00	0.00		0.00	1.00
total	223.53	62.17	118.89	0.28	1.91			
	5.34	1.48	2.84					
			1.74	<<< Heat da CHP in ELC				
			4.57	<<< Heat totale bilancio IEA (4.61), per ipotesi tutto all'industria				
			0.80	<<< Calore consumato nel civile, per ipotesi (coerente con AIRU) aggiuntivo rispetto al bilancio IEA				

Table 6b: Aggregation NON-REFINERY CHP

	Input	Output (elec)	Ouput (heat)
INDNGA	128.70	36.89	68.23
INDLPG	0.00	0.00	0.00
INDNGL	0.00	0.00	0.00
INDCOA	0.00	0.00	0.00
INDCOK	0.00	0.00	0.00
INDCOG	0.00	0.00	0.00
INDBFG	0.08	0.05	0.01
INDOXY	0.00	0.00	0.00
INDHFO	0.69	0.17	0.42
INDOIL	0.00	0.00	0.00
INDETH	0.00	0.00	0.00
INDNAP	0.00	0.00	0.00
INDPTC	0.00	0.00	0.00
INDBIO	2.97	0.44	1.33
INDGEO	0.00	0.00	0.00
total	132.45	37.55	69.98
	3.16	0.90	1.67

Data improvement / RES revision

Table 7 : Breakout of Heat output by industry (Fractional Shares)

INDSTM	
IRONSTL	0.04
NONFERR	0.00
CHEMICAL	0.16
PAPERPRO	0.20
NONMET	0.06
N:OTHER	0.13
NECHEM	0.00
REFINERY	0.411
Total	1.000

0.589 % non raffineria

Table 8a: Breakout of all Heat output by industry (Absolute numbers)

INDSTM	**PRODUCTION**	**CONSUMPTION**	
IRONSTL	4.76	9.8	
NONFERR	0.00	0.0	
CHEMICAL	19.02	39.2	
PAPERPRO	23.79	49.0	
NONMET	7.13	14.7	
N:OTHER	15.30	31.5	
NECHEM	0.00	0.0	
REFINERY	48.90	49.9	
Total	118.89	193.01	
tot prod - raffineria	69.98	144.11	<<< CONSUMI INDUSTRIALI NON DI RAFFINERIA

Table 11c : CHP in refinery

	Input	Output (elec)	Ouput (heat)	REH (elc/het)	EFF heat	Output (heat) Total	Input Total	EFF total	Input for Heat autoconsumed	Input Total	EFF (only ELC)	EFF total
UPSNGA	0.0000	0.0000	0.0000	1.0000	0.80	0.0000	0.0000	0.800	0.00	0.0000	0.400	0.800
UPSRPP	76.8064	21.2671	41.4509	0.5131	0.80	41.4509	128.6201	0.488	51.81	76.8064	0.277	0.817
UPSRPG	14.2770	3.3534	7.4505	0.4501	0.80	7.4505	23.5901	0.458	9.31	14.2770	0.235	0.757
UPSCOA	0.0000	0.0000	0.0000	1.0000	0.80	0.0000	0.0000	0.800	0.00	0.0000	0.400	0.800
total	91.08	24.62	48.90			48.90	152.21	0.483		91.08		