

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

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## **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



Table 1: Global energy and CO2 data		Energy		CO2		Energy		CO2		Energy		CO2		Energy		CO2		Energy		CO2		Energy		CO2		
Year	Region	Energy	CO2	Energy	CO2	Energy	CO2	Energy	CO2	Energy	CO2	Energy	CO2	Energy	CO2	Energy	CO2	Energy	CO2	Energy	CO2	Energy	CO2	Energy	CO2	
2010	World	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	
2011	World	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	
2012	World	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
2013	World	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
2014	World	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
2015	World	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
2016	World	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
2017	World	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
2018	World	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
2019	World	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
2020	World	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000

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

Description	RESIDENZIALE		Sigle delle commodities
	BEN	IEA	
NATGAS	803	786	GASNGA
GASWKGSGS			GASGWG
COKEOVGSGS			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

Veda Tables - [for NEB total]

Global Filter Applied For: (BSPROD3) Items

Process	Unit	CO2-CONC	CO-CALC	CO-OIL-PROD	CO-NAT-GAS	CO-SYNGAS	CO-FINSEL	CO-BIO-MSW	CO-SEL-CALL	CO-HEAT	Total
A1-PRODUCTION	VAR_F04	0.1	0.2	-	10.1	2.9	4.9	3.7	-	-	27.9
A2-IMPALL	VAR_F04	15.9	37.3	13.3	52.4	-	-	0.6	3.4	-	119.9
A3-EXPALL	VAR_F04	0.2	1.6	28.1	0.3	-	-	0.1	-	-	30.3
B01-ELC-HEAT	VAR_F04	11.5	-	8.5	22.4	2.9	0.7	2.4	-	-	46.4
B02-ELC-HEAT	VAR_F04	10.6	-	4.4	13.2	2.9	0.7	1.1	-	-	32.9
B03-ELC-HEAT	VAR_F04	-	-	-	-	-	-	-	17.3	-	17.3
B04-COP-GEN	VAR_F04	0.9	-	2.2	9.4	-	-	-	1.1	-	13.7
B05-IND-CHP	VAR_F04	0.9	-	0.0	3.1	-	-	-	0.6	3.2	7.8
B07-IND-CHP	VAR_F04	-	-	-	-	-	-	-	0.1	-	0.1
B07-IND-CHP	VAR_F04	-	103.5	-	-	-	-	-	0.9	1.7	15.3
B07-IND-CHP	VAR_F04	-	-	110.2	-	-	-	-	0.1	-	110.3
B07-IND-CHP	VAR_F04	-	-	-	-	-	-	-	0.0	-	0.0
B07-IND-CHP	VAR_F04	-	-	-	-	-	-	-	0.1	0.2	0.3
B10-IND-HEAT	VAR_F04	1.7	-	2.3	-	-	-	-	0.0	-	4.0
B10-IND-HEAT	VAR_F04	1.0	-	4.3	18.8	-	-	0.1	12.6	0.0	36.8
B10-IND-HEAT	VAR_F04	1.0	-	0.3	18.8	-	-	0.1	12.6	0.0	33.3
C11-IND-NON-FIN	VAR_F04	0.0	-	0.1	1.7	-	-	-	1.9	0.0	3.6
C12-IND-NON-FIN	VAR_F04	0.0	-	0.1	2.0	-	-	-	1.0	0.0	3.0
C13-IND-NON-FIN	VAR_F04	0.0	-	0.1	0.4	-	-	-	0.5	-	1.0
C14-IND-NON-FIN	VAR_F04	0.0	-	3.1	3.9	-	-	-	1.3	-	8.3
C16-7-8-10-11-12-13	VAR_F04	0.0	-	2.9	6.4	-	-	0.1	6.7	6.6	16.3
C19-IND-NON-FIN	VAR_F04	-	-	0.0	0.0	-	-	-	-	-	0.0
C20-TRA-HEAT	VAR_F04	-	-	47.4	0.4	-	-	0.2	0.8	-	48.8
C20-TRA-HEAT	VAR_F04	-	-	47.4	0.4	-	-	-	-	-	48.2
C21-TRA-BT-AVA	VAR_F04	-	-	3.9	-	-	-	-	-	-	3.9
C22-TRA-DOM-AVA	VAR_F04	-	-	0.2	-	-	-	-	-	-	0.2
C23-TRA-ROAD	VAR_F04	-	-	29.7	0.4	-	-	-	-	-	30.1
C24-TRA-ROAD	VAR_F04	-	-	0.1	-	-	-	-	0.8	-	0.9
C26-TRA-DOM-AVA	VAR_F04	-	-	0.2	-	-	-	-	-	-	0.2
C27-TRA-HEAT	VAR_F04	0.0	-	9.2	19.2	-	0.0	1.2	6.2	9.7	36.3
C28-TRA-HEAT	VAR_F04	0.0	-	8.2	19.2	-	0.0	1.2	6.9	9.7	35.2
C29-TRA-HEAT	VAR_F04	-	-	0.4	7.2	-	-	-	0.5	0.2	8.3
C29-TRA-HEAT	VAR_F04	-	-	0.4	7.2	-	-	-	6.5	0.2	14.3
C30-TRA-HEAT	VAR_F04	-	-	2.1	6.2	-	-	0.1	6.5	-	14.9
C30-TRA-HEAT	VAR_F04	-	-	2.7	0.2	-	-	0.1	0.1	-	3.1

## PRELIMINARY STEP (2): BE table for NEB

Edit Sets - [Process]

Process: A1-PRODUCTION

Global Filter Applied For: (BSPROD3) Items

CODE	DESCRIPTION	CODE	DESCRIPTION
A1-PROD	Domestic meth.	A1-PROD	Domestic meth.
A2-IMPALL	All import	A2-IMPALL	All import
A3-EXPALL	Export of all co.	A3-EXPALL	Export of all co.
B11-ELC-HEAT	B11-POWER L.	B11-ELC-HEAT	B11-POWER L.
B12-ELC-HEAT	B12-POWER L.	B12-ELC-HEAT	B12-POWER L.
B13-HEAT	B22-HEAT OUT	B13-HEAT	B22-HEAT OUT
B14-COP-GEN	B22-COP OUT	B14-COP-GEN	B22-COP OUT
B15-IND-CHP	B22-IND-CHP	B15-IND-CHP	B22-IND-CHP
B16-IND-AUTO	B22-AUTO	B16-IND-AUTO	B22-AUTO
B17-IND-CHP	Heat pumps	B17-IND-CHP	Heat pumps
B17-IND-CHP	Other transfers	B17-IND-CHP	Other transfers
C10-IND-NON-FIN	CO-INDUSTRIAL	C10-IND-NON-FIN	CO-INDUSTRIAL
C11-IND-NON-FIN	all tech for non-fin.	C11-IND-NON-FIN	all tech for non-fin.
C12-IND-NON-FIN	all tech for non-fin.	C12-IND-NON-FIN	all tech for non-fin.
C13-IND-NON-FIN	all tech for non-fin.	C13-IND-NON-FIN	all tech for non-fin.
C14-IND-NON-FIN	all tech for non-fin.	C14-IND-NON-FIN	all tech for non-fin.
C16-7-8-10-11-12-13	all tech for non-fin.	C16-7-8-10-11-12-13	all tech for non-fin.
C19-IND-NON-FIN	all tech for non-fin.	C19-IND-NON-FIN	all tech for non-fin.
C20-TRA-HEAT	CO2-Transport	C20-TRA-HEAT	CO2-Transport

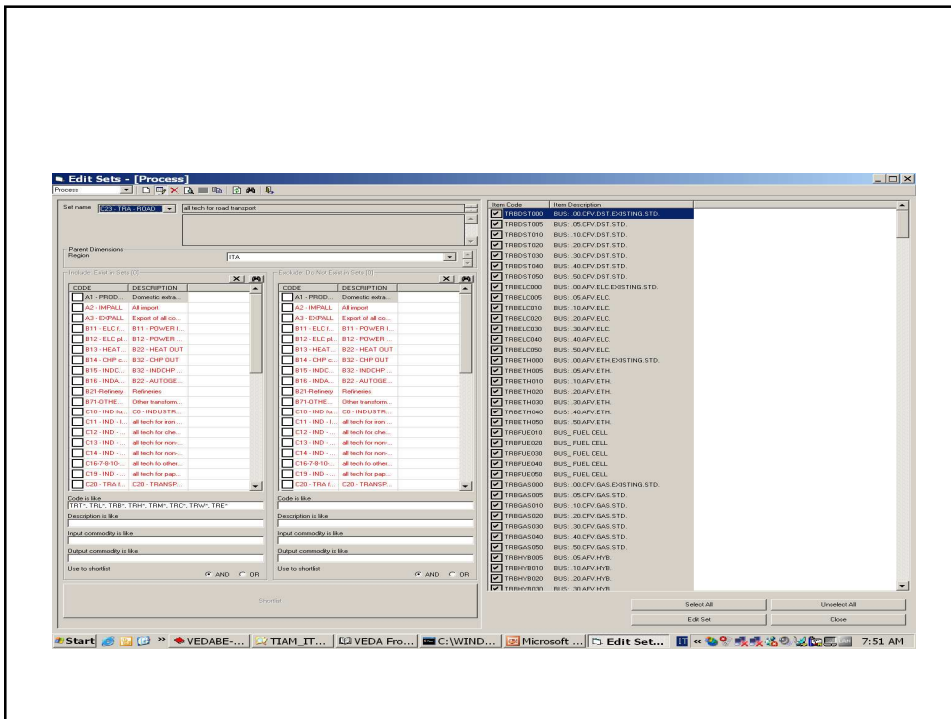
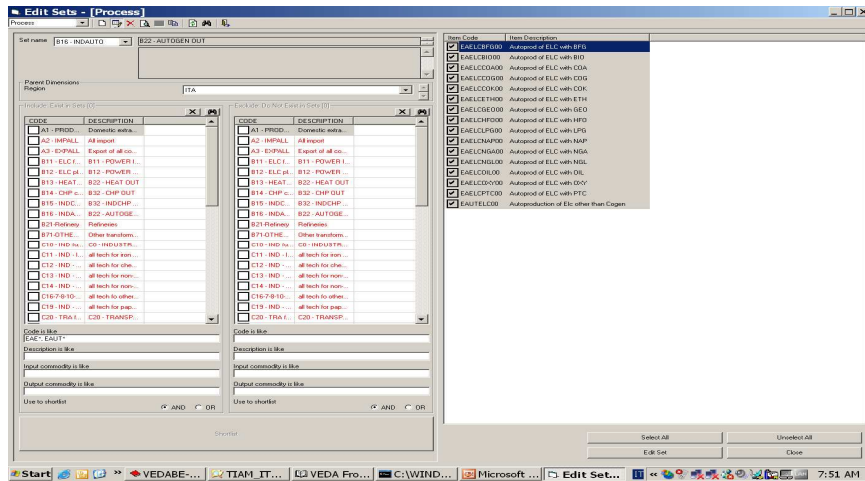
Item List:

- MINGBI0000: Pool of Solid biomass - High price
- MINGBI0001: Pool of Solid biomass - High price
- MINGBI0002: Pool of Solid biomass - High price
- MINGBI0003: Pool of Solid biomass - High price
- MINGBI0004: Pool of Solid biomass - High price
- MINGBI0005: Pool of Solid biomass - High price
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- MINGBI0043: Pool of Solid biomass - High price
- MINGBI0044: Pool of Solid biomass - High price
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- MINGBI0097: Pool of Solid biomass - High price
- MINGBI0098: Pool of Solid biomass - High price
- MINGBI0099: Pool of Solid biomass - High price
- MINGBI0100: Pool of Solid biomass - High price





## PRELIMINARY STEP (2): BE table for NEB





## 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				

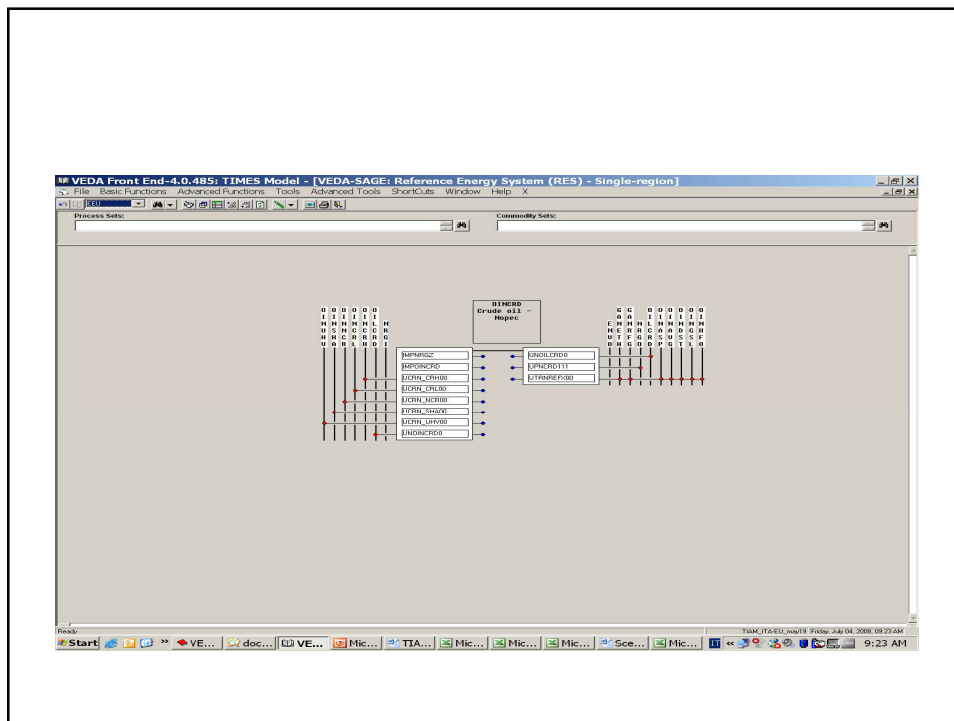
~TradeLinks

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

## Cleaning up the model

Files	Definition	Base*	See
CIVEDA/VEDA_Models/name_database-	Storage of databases by VEDA_ITE	Na	Na
CIVEDA/VEDA_Models/name_database-	Databases		
SubRES_TMPL			
SubRes_AFuel_Trans	New alternative fuel technologies for transport	✓	
SUBRES_BNewTechs	New technology repository	✓	
SUBRES_BNewTrans_Trans			
SubRes_CH4measuresC	CH4 mitigation options	✓	
SubRes_CH4measuresC_Trans			
SUBRES_Hydrogen	Hydrogen technologies	✓	
SUBRES_Hydrogen_Trans			
SubRes_NCOmeasures	N2O mitigation options	✓	
SubRes_NCOmeasures_Trans			
SUBRES_NonCO2gases	Non CO2 emissions	✓	
SUBRES_NonCO2gases_Trans			
SUBRES_SequestrationB	CO2 capture and sequestration options	✓	
SUBRES_SequestrationB_Trans			
CIVEDA/VEDA_Models/name_database-	Supplies		
SubRES_TMPL			
Demand	Macro-economic drivers, allocation of drivers to demands, elasticities of demands to the drivers	✓	
Base_Drivers			
Dem_Absorbers			
Trades	Trade description (costs and bounds)	✓	
ScenTask_TRADE			
UCConstraints	Energy shares for petrochemical industry	✓	
ScenAC_NCSHares2005	Share of purchased electricity in industry	✓	
BASE_Gdata	Cost regularization	✓	
Scen_B_BASEEvents	Modifications of data included in Templates and SUBRES files	✓	
Scen_B_Extraction	Fossil resources and extraction (IER's review)	✓	
Scen_B_LC			
Scen_BDLC	User's constraints****	✓	
Scen_TRAAC			
Scen_BLC			
Scen_BLCtoCoal	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				- F I T		
TechName	TechDesc	COMM-IN	COMM-OUT	START	COST-2005	COST-2007
IMPBIOSL	Exogenous biosl import from ROW		BIOSL	2000	4.125	5.3625
EXPBIOSL	Exogenous biosldst export to ROW	BIOSL		2000	3.81875	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
EXPOLICRD	Exogenous OILCRD export to ROW	OILCRD		2000	8.39	10.9095
IMPOINNSP	Exogenous OINNSP import from ROW		OINNSP	2000	14.130	18.447595
EXPOLNSP	Exogenous OILNSP export to ROW	OILNSP		2000	13.481	17.52520575
IMPOINHFO	Exogenous OINHfo import from ROW		OINHFO	2000	13.245	17.2185
EXPOLHFO	Exogenous OILHFO export to ROW	OILHFO		2000	14.5695	18.94035
IMPOINAP	Exogenous OINnap import from ROW		OINNAP	2000	12.362	16.0706
EXPOLNAP	Exogenous OILNAP export to ROW	OILNAP		2000	11.7439	15.26707
IMPOINGSL	Exogenous OINgel import from ROW		OINGSL	2000	17.66	22.958
EXPOLGSL	Exogenous OILGSL export to ROW	OILGSL		2000	19.426	25.2538
IMPOINDST	Exogenous OINDst import from ROW		OINDST	2000	17.66	22.958
EXPOLDST	Exogenous OILDST export to ROW	OILDST		2000	19.426	25.2538
IMPOINTK	Exogenous OINUTK import from ROW		OINUTK	2000	17.66	22.958
EXPOLITK	Exogenous OILITK export to ROW	OILITK		2000	15.777	21.8101
IMPOINKER	Exogenous OINKER import from ROW		OINKER	2000	17.66	22.958
EXPOLKER	Exogenous OILKER export to ROW	OILKER		2000	16.777	21.8101
IMPOINGL	Exogenous OINgl import from ROW		OINGL	2000	10.60	13.7748
EXPOLNGL	Exogenous OILNGL export to ROW	OILNGL		2000	10.0662	13.08636
IMPOINLPG	Exogenous OINLPG import from ROW		OINLPG	2000	17.66	22.958
EXPOLLPG	Exogenous OILLPG import from ROW	OILLPG		2000	16.777	21.8101
IMPOINPTC	Exogenous OINPTC import from ROW		OINPTC	2000	2.75	3.575
EXPOLPTC	Exogenous OILPTC export to ROW	OILPTC		2000	2.6125	3.39625
IMPASNGA	Exogenous gasnga import from ROW		GASNGA	2000	5.00	6.5
EXPASNGA	Exogenous gasnga export to ROW	GASNGA		2000	4.75	6.175
IMPASLNG	Exogenous gaslng import from ROW		GASLNG	2000	5.00	6.5
EXPASLNG	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
EXPOLFEEY	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

Table 6 : Aggregation (CHP)										Table 6b: Aggregation NON-REFINERY CHP									
										quota ELC / HEAT									
										Retriref ratio of CHP input (see UPS template)									
										Non-Refinery ratio of CHP input									
										EFF elc output/input									
										EFF heat output/input									
										Input Output (elec) Output (heat)									
INDNGA	128.70	36.89	68.23	0.29	1.85	0.00	1.00	1.00	1.00	INDNGA	128.70	36.89	68.23	0.00	0.00	0.00	1.00	1.00	1.00
INDLPG	0.00	0.15	0.25	0.29	1.67	0.00	1.00	0.00	0.00	INDLPG	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
INDNGL	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	INDNGL	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
INDCOA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	INDCOA	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
INDCOK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	INDCOK	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
INDCOG	0.00	0.00	0.00	0.00	0.26	0.00	0.00	1.00	0.00	INDCOG	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
INDBFG	0.08	0.05	0.01	0.56	0.17	0.00	0.00	1.00	0.00	INDBFG	0.08	0.05	0.01	0.00	0.00	0.00	1.00	1.00	1.00
INDOXY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	INDOXY	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
INDHFO	68.12	17.27	41.56	0.25	2.41	0.98	0.01	0.00	0.00	INDHFO	68.12	17.27	41.56	0.00	0.00	0.00	0.00	0.00	0.00
INDOIL	0.21	0.09	0.07	0.43	0.77	1.00	0.00	0.00	0.00	INDOIL	0.21	0.09	0.07	0.00	0.00	0.00	0.00	0.00	0.00
INDETH	13.77	3.21	7.20	0.23	2.25	1.00	0.00	0.00	0.00	INDETH	13.77	3.21	7.20	0.00	0.00	0.00	0.00	0.00	0.00
INDNAP	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	INDNAP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INDPTC	8.16	4.08	0.24	0.50	0.06	1.00	0.00	0.00	0.00	INDPTC	8.16	4.08	0.24	0.00	0.00	0.00	0.00	0.00	0.00
INDBIO	2.97	0.44	1.33	0.15	3.06	0.00	1.00	0.00	0.00	INDBIO	2.97	0.44	1.33	0.00	0.00	0.00	0.00	0.00	0.00
INDGEO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	INDGEO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
total	223.53	62.17	118.89	0.28	1.91					total	132.45	37.55	69.98						
	5.34	1.48	2.84								3.16	0.80	1.67						
				1.74															
				4.57															
				0.80															

1.74 <<< Heat da CHP in ELC  
4.57 <<< Heat totale bilancio EA (4.57), per ipotesi tutto all'industria  
0.80 <<< Calore consumato nel chile, per ipotesi (coerente con ARU) aggiuntivo rispetto al bilancio EA

## 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	
\OTHER	0.13	
NECHEM	0.06	
REFINERY	0.41	0.589 % non raffineria
Total	1.00	

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	23.78	49.0
NONMET	7.13	14.7
\OTHER	15.30	31.5
NECHEM	6.00	0.0
REFINERY	49.99	49.9
Total	118.89	193.01
(of prod - refinery)	69.98	144.11 <<< CONSUM INDUSTRIAL NON DI RAFFINERIA

Table 11c : CHP in refinery

	Input	Output (elec)	Output (heat)	REH (elc/heat)	EFF heat	Output (heat) Total	Input Total	EFF total	Input for Heat autoconsum ed	Input Total	EFF (only ELC)	EFF total
UPSRA	0.0000	0.0000	0.0000	1.0000	0.80	0.0000	0.0000	0.800	0.00	0.0000	0.400	0.800
UPSRRP	76.8064	21.2671	41.4509	0.5131	0.80	41.4509	128.6201	0.408	51.81	76.8064	0.277	0.817
UPSRRP	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		