



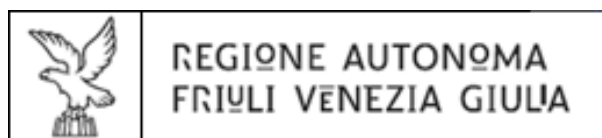
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Introduction of Regional Energy Concepts

ENERGY TRANSFER POTENTIAL ASSESSMENT AND PLANNING REPORT

PP12 Friuli Venezia Giulia Region

Action 3.3.2



publicity

- public
- internet
- print
- non public

Date March 31st 2014

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This project is implemented through the
CENTRAL EUROPE Programme co-financed by the ERDF



EUROPEAN UNION
EUROPEAN REGIONAL
DEVELOPMENT FUND

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1. Regional electricity network and distribution

The national electricity network is made up of three main elements:

- generating power plants,
- electric power transmission lines to electrical substations close to demand centres,
- electricity distributors to end users.

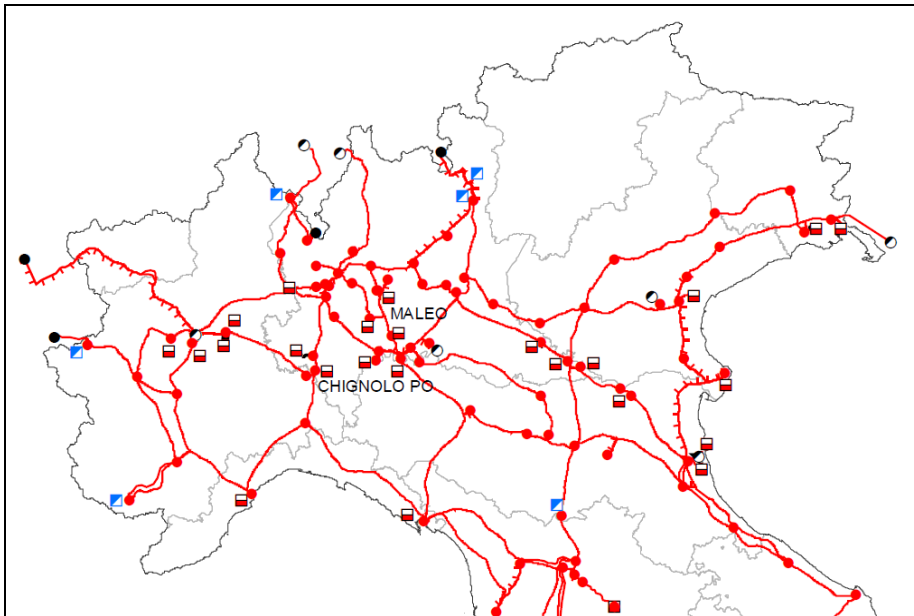
In Italy Terna is the company in charge of electricity transmission all over the territory. Terna manages **high-voltage transmission** lines (380 kV - 220 kV - 150 kV) to transmit electric power over relatively long distances, usually from a central generating station to main substations. The transmission network is made up of 63.500 km of lines. Beyond managing the transmission lines, Terna balances out electricity offer and demand all over the year and every day, dispatching electricity according to this balance.

The final step is represented by the distribution of electricity to final end users at medium and low voltage. A network of distribution operators operate at regional level where regional grids branch from national grids to deliver power to industrial, commercial and domestic users at medium and low voltage. In the Friuli Venezia Giulia Region there are 163 km of 320kV lines and 241 km of 220 kV lines that belong to the national transmission network and are managed by TERNA. In the region the main 380 kV lines cross over the territory from the West to the East through the town of Redipuglia. From the electrical station of Planais a North – South 380 kV line goes through Udine, then Westwards through Pordenone and then heads out of the Italian territory.

The neighbouring country Slovenia is connected to the Friuli Venezia Giulia Region, through the 380 kV line from Redipuglia (IT) and Divaccia (Slovenia) and through a 220 kV line from Padriciano (IT) to Divaccia (Slovenia).

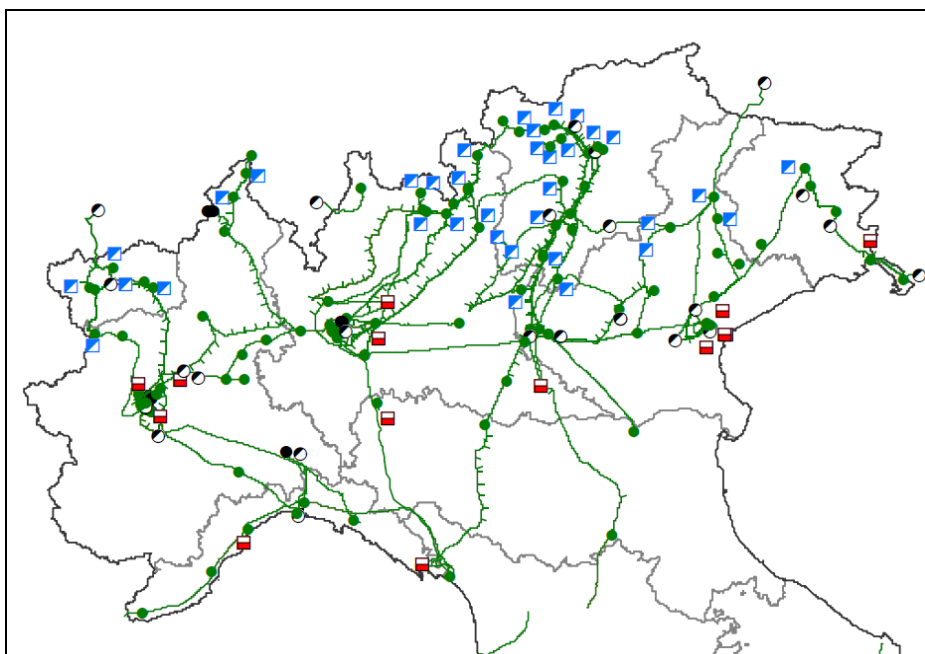
Figures 1,2, 3 and 4 show the distribution of high voltage lines in the North of Italy and a detailed plan of transmission lines in the Friuli Venezia Giulia region.

Figure 1. Electricity network (380 kV) in the North of Italy in 2012



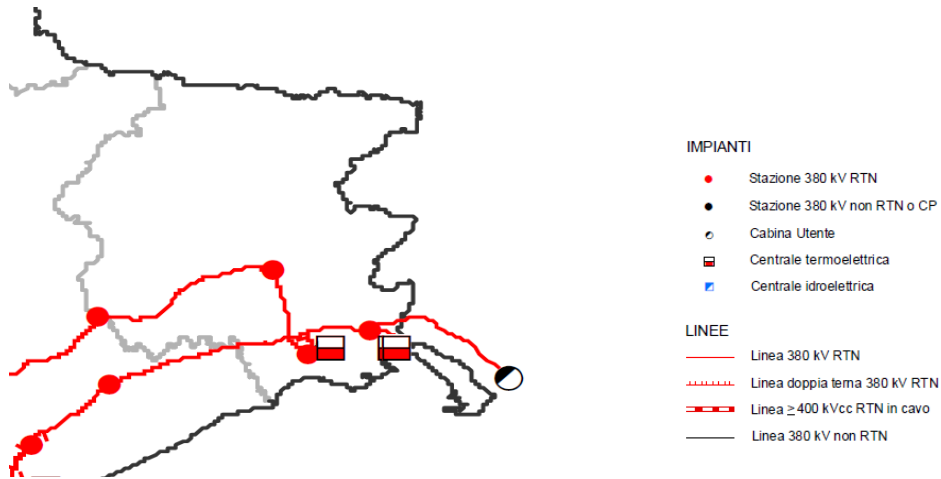
Source: Terna

Figure 2. Electricity network (220kV) in the North of Italy in 2012



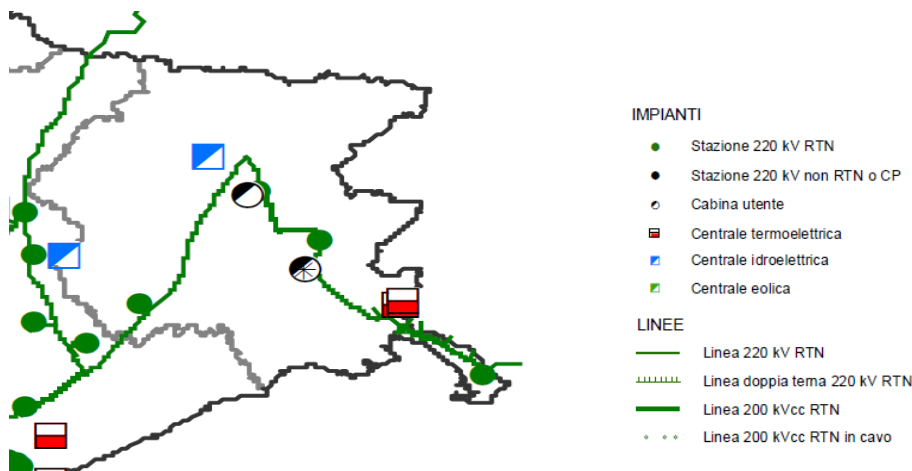
Source: Terna 2012

Figure 3. High voltage electricity network (380 kV) in the Friuli Venezia Giulia in 2012



Source: Terna 2012

Figure 4. High voltage electricity network (220 kV) in the Friuli Venezia Giulia in 2012



Source: Terna 2012

1.1. Electricity distributors

The main electricity distributors operating at the local level are the following operators:

- IRIS operating in the municipality of Gorizia;
- The multiutility company AcegasAps operating in the Municipality of Trieste, with about 140.000 final end users and a grid of 1.400 km
- Electricity producer and distributor SECAB that provides energy to the Municipalities of Paluzza, Ravascletto, Cercivento, Treppo Carnico, Ligosullo and Sutrio
- The hydropower company “Valcanale” operating in the Municipality of Tarvisio
- The hydropower company of Forni di Sopra operating in the Municipality of Forni di Sopra;
- ENEL S.p.A. operating all over the territory

In the future new electricity power lines connecting the Region to Slovenia and Austria will be implemented including an expansion of the 220 kV line, 132 kV are in the pipeline, under and evaluation process and are briefly described:

- powerline Wurmlach (Austria) – Somplago (Italy) - 220 KV proposed by ALPE ADRIA ENERGIA S.p.A.;
- powerline Wurmlach (Austria) – Somplago (Italy) - 220 KV proposed by Burgo S.p.A. and Energetic Source S.p.A.
- powerline Mauthen (Austria) - Paluzza (Italy) - 132 KV proposed by ALPEN ADRIA ENERGY LINE S.p.A
- powerline Vrtojba (Slovenia) – Redipuglia (Italy) - 110 KV proposed by ACEGAS S.p.A., Enel Produzione S.p.A., Trafigura Italia s.r.l.;
- powerline Dekani (Slovenia) – Zaule (Italy) - 110 KV proposed by ACEGAS S.p.A., Enel Produzione S.p.A., Trafigura Italia s.r.l.;
- powerline from the Slovenian border (Gorizia) – Redipuglia - 110-132 KV proposed by – KB S.p.A.

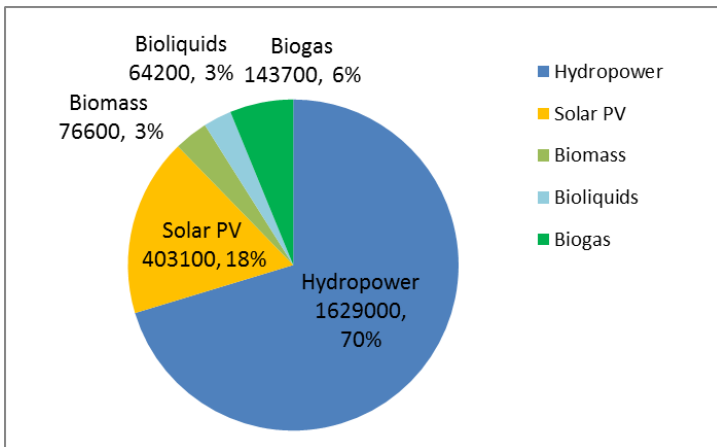
2. Energy balance and potential RES excess

2.1. Analysis of data

The current overall energy consumption outstripped energy demand in 2012. Detailed data are available with regard of electricity demand and offer and are shown in Table 1.

The overall electricity demand in 2012 amounted to 10.033 GWh while RES-E offer was 2616 GWh , matching as much as 26% of electricity demand. The breakdown of RES-E production in 2012 is shown in Figure 5.

Figure 5. Share of RES-E production in MWh in Friuli Venezia Giulia (2012)



Source: GSE 2012

The overall electricity demand trend is shown in Table 1. From 1973 to 2008 electricity demand rose steadily, while in 2009 as a result of the economic crisis dropped and it bounced back again in 2010-2011. In 2012 energy demand outstripped energy offer by 430 GWh, therefore resulting in an electricity deficit. Among RES-E generation from hydropower amounted to 70% of RES-E production, followed by Solar PV (18%) and bioenergy (12%).

Table 1. The electricity balance trend from 1973 to 2012 in the Friuli Venezia Giulia Region

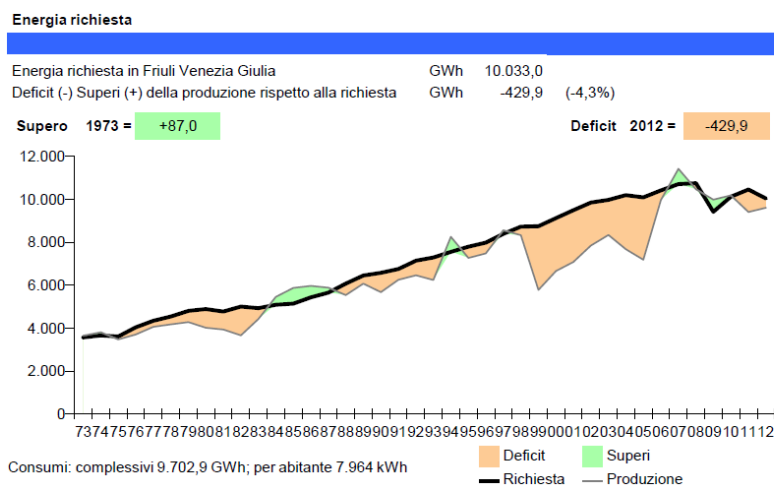
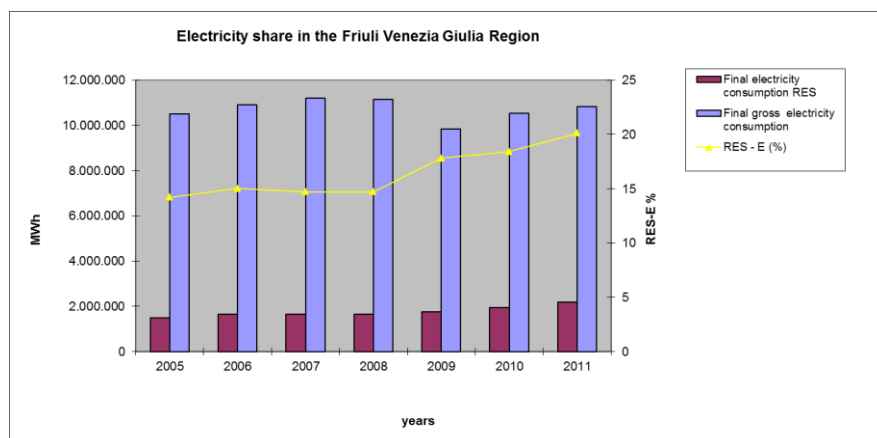


Table 2. RES-E generation, RES-E consumption and overall final electricity consumption from 2009 to 2012

RES-E generation	2009 (GWh)	2010 (GWh)	2011(GWh)	2012 (GWh)
Solar PV	18	44	246,1	403,1
Hydropower	2109	2035	1832	1628,8
Biomass and bioliquids	124	229	189,6	140,8
Biogas	7	12	50,8	143,7
Total RES-E generation	2258	2320	2318,5	2316,5
Total RES –E consumption	1.749	1940,4	2174,5	-
Total final electricity consumption	9.839	10529,5	10820,7	-
Share of RES-E Consumption on final consumption	17,8	18,4%	20,1	-

Source: GSE 2009,2010,2011,2012

Figure 6. Trend of overall electricity consumption from 2005 to 2011



Source: Terna

2.2 Available regional excess of renewable energy

Solar PV production increased sharply in the last years and in 2012 amounted to 403 GWh, although it is still well below matching electricity demand. In fact it contributes on average to 4% of electricity demand (2012). As a result at the moment there is not an excess of production available for potential transfer.

Over the future if there will be an increase of production from Solar PV and RES, the overall existing high power lines grids can load the excess of production. However in some cases low and medium voltage grids should be adjusted in order to be able to distribute locally generated RES.

3. Electricity and RES demand and offer from neighbouring regions

The overall electricity imports and exports are managed at central level from the Minister of Economic Development and Terna who is in charge of electricity transmission. Therefore it is rather difficult to assess the potential of energy and RES offer and demand at regional level.

By and large in Italy electricity policies and balance of offer and demand involve also price management and they take into account the price of electricity in the neighboring regions as well.

As a result imports and exports are driven not only by sheer electricity deficit or surplus but price trends and electricity market. Some of the main energy exporters to Italy (France and Switzerland) produce electricity from nuclear plants that contribute to keep lower electricity prices and imports to Italy.

As Table 3 shows in 2012 there was an electricity deficit by 43.103 GWh. The main exporters and importers are shown in Table 3. Among the neighboring countries Austria and Slovenia export energy to Italy passing through the Friuli Venezia Giulia that effectively act as an energy corridor.

In the last 40 years as la Regione Friuli Venezia Giulia underwent electricity surplus on an annual basis, that resulted in the region being a net importer of electricity from the neighboring countries Slovenia and Austria.

Table 3. Electricity exports and imports in Italy -2012

	Energia elettrica importata in Italia da						Energia elettrica esportata dall'Italia in						Saldo degli scambi
	Francia	Svizzera	Austria	Slovenia	Grecia	Totale	Francia	Svizzera	Austria	Slovenia	Grecia	Totale	
GWh													2012
gennaio	1.368,2	2.453,2	89,9	306,0	170,5	4.387,7	119,4	16,6	4,4	13,1	43,7	197,2	+4.190,4
febbraio	874,9	1.993,7	97,8	243,7	66,8	3.276,7	199,7	33,2	0,2	10,3	131,8	375,2	+2.901,5
marzo	1.429,3	2.624,2	88,9	380,6	201,3	4.724,3	74,5	10,2	0,2	3,8	38,1	126,8	+4.597,5
aprile	1.111,4	2.031,1	81,3	330,3	304,4	3.858,4	86,1	56,1	3,4	13,1	1,7	160,4	+3.698,0
maggio	1.094,3	1.780,6	79,8	345,5	182,8	3.483,0	54,9	121,5	0,8	8,9	4,5	190,7	+3.292,3
giugno	1.023,4	1.914,0	112,5	307,3	159,9	3.517,0	86,6	126,2	0,2	6,4	12,2	231,6	+3.285,5
luglio	767,8	2.080,8	119,3	236,8	218,0	3.422,7	91,2	88,0	0,4	8,9	44,7	233,1	+3.189,6
agosto	594,1	1.205,1	57,5	157,3	223,7	2.237,7	121,1	115,1	10,2	28,4	34,9	309,8	+1.927,9
settembre	662,4	2.028,0	109,8	304,2	206,0	3.310,4	137,0	13,8	..	6,4	13,1	170,3	+3.140,1
ottobre	1.283,5	2.632,3	108,2	452,0	193,3	4.669,3	68,0	7,3	0,0	3,3	0,5	79,2	+4.590,1
novembre	1.273,2	2.504,8	113,1	419,7	303,7	4.614,5	67,3	13,8	0,3	3,4	1,2	86,0	+4.528,6
dicembre	1.095,7	2.049,6	88,2	366,0	306,4	3.905,9	102,2	27,9	3,4	10,3	0,2	144,0	+3.761,9
anno	12.578,2	25.297,3	1.146,0	3.849,4	2.536,7	45.407,6	1.208,0	629,9	23,4	116,3	326,7	2.304,3	+43.103,4

Figure 7. Electricity import and export from Slovenia to Italy in 2012: Annual trend

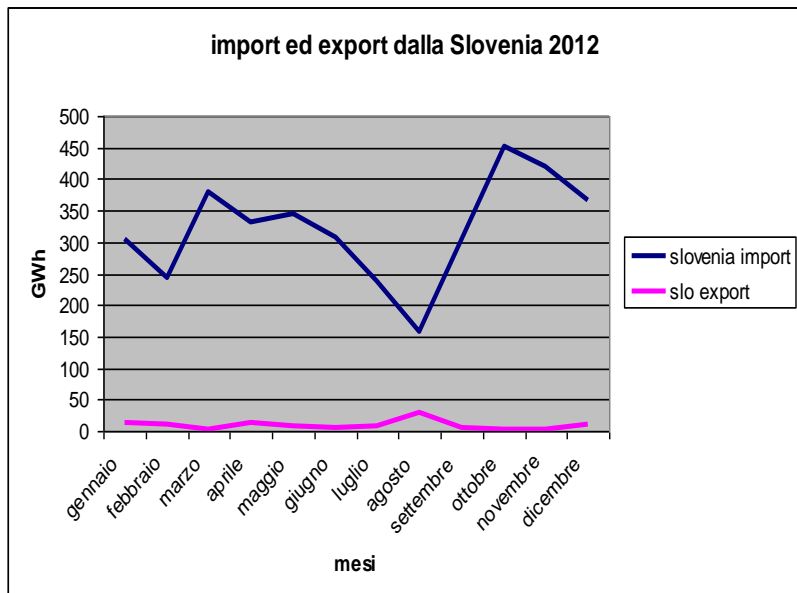
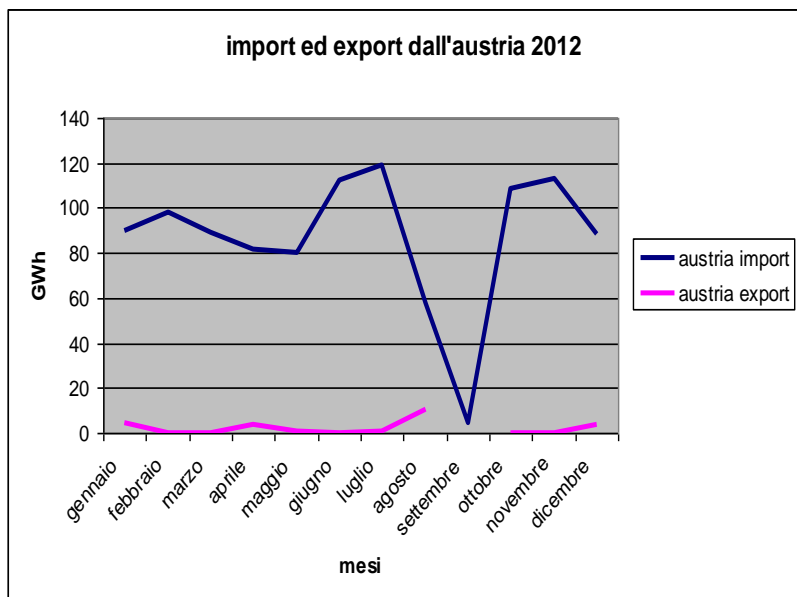


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