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L'ascesa delle fonti rinnovabili in Italia: un'analisi dell'onerosità e della sostenibilità economica degli obiettivi europei

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XII Congresso Nazionale C(RIA)F, Perugia 30 – 31 Marzo, 2012



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Outline

- I. Sviluppo FER
- II. Assetto istituzionale - regolatorio
- III. Alcuni effetti collaterali
- IV. Onerosità obiettivi Europei e loro sostenibilità via mercato
- V. Conclusioni

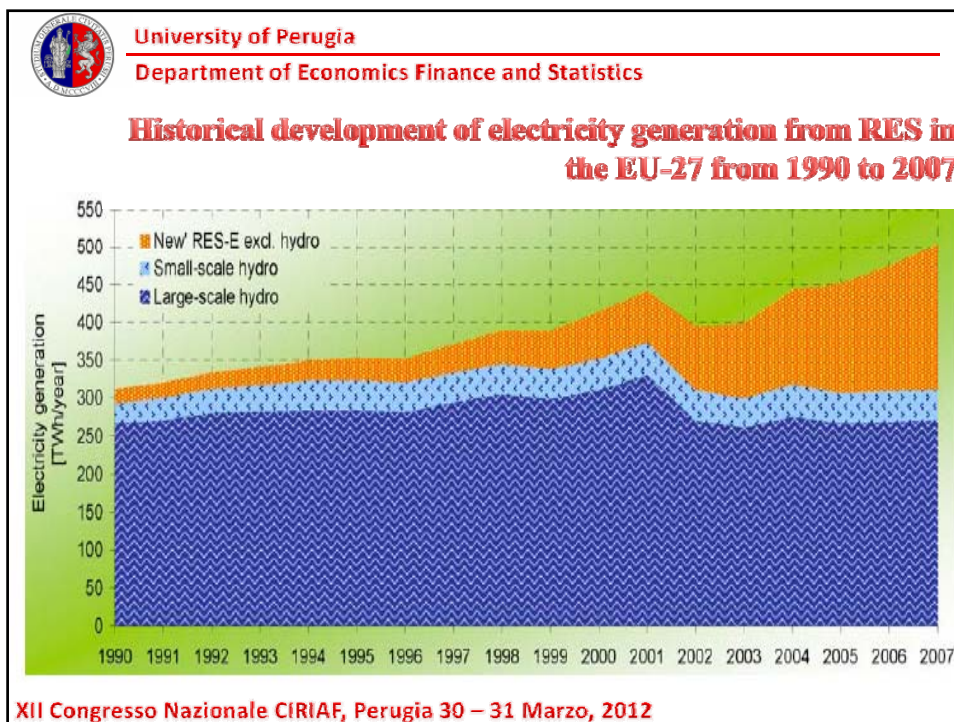
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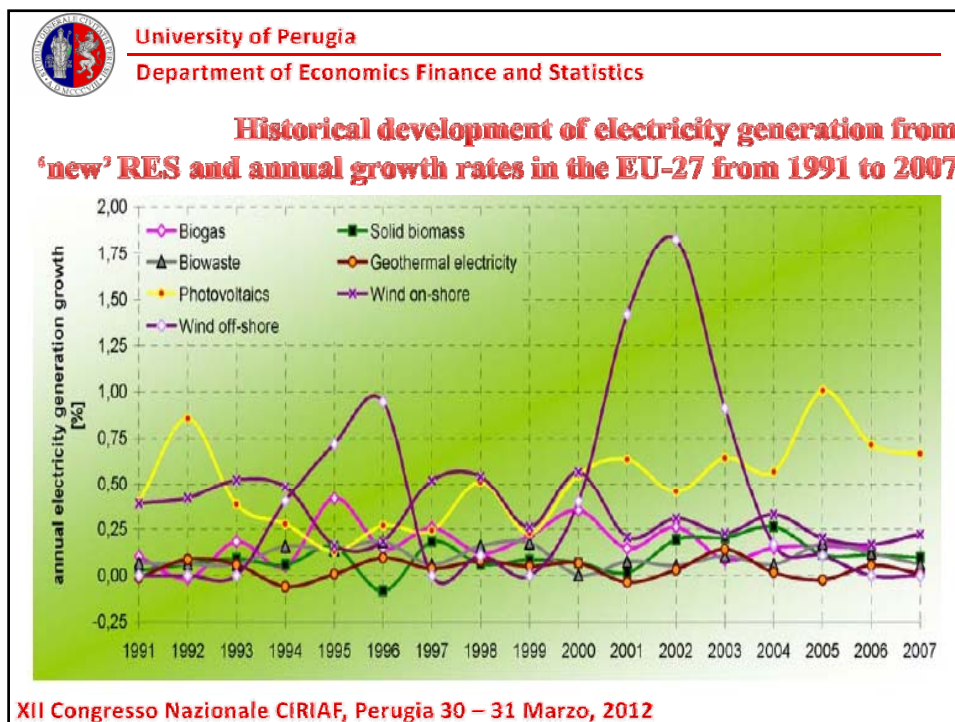
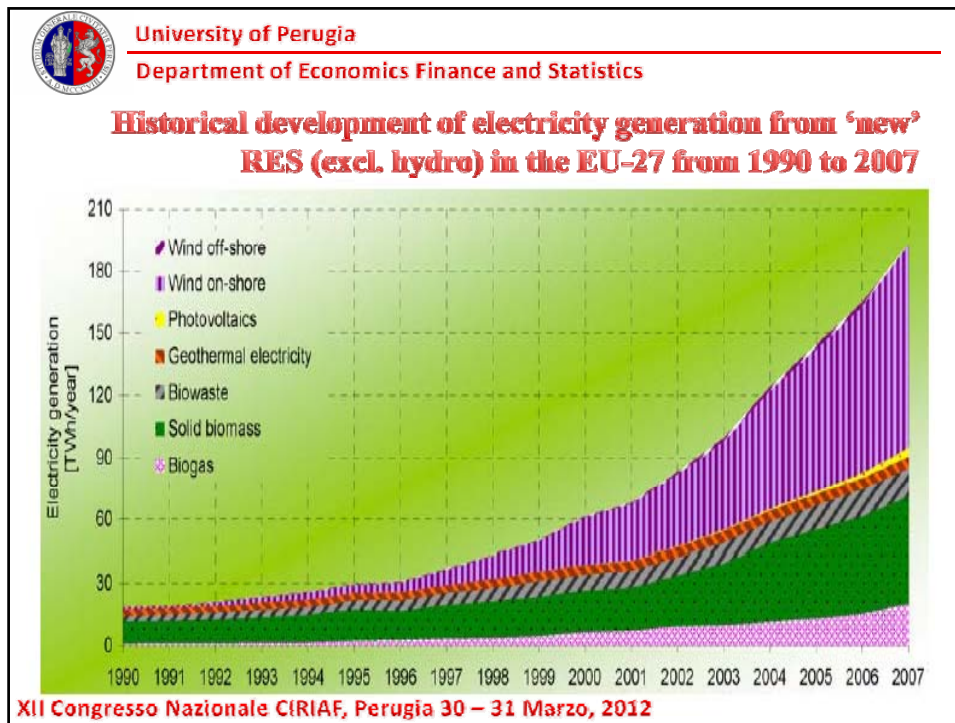

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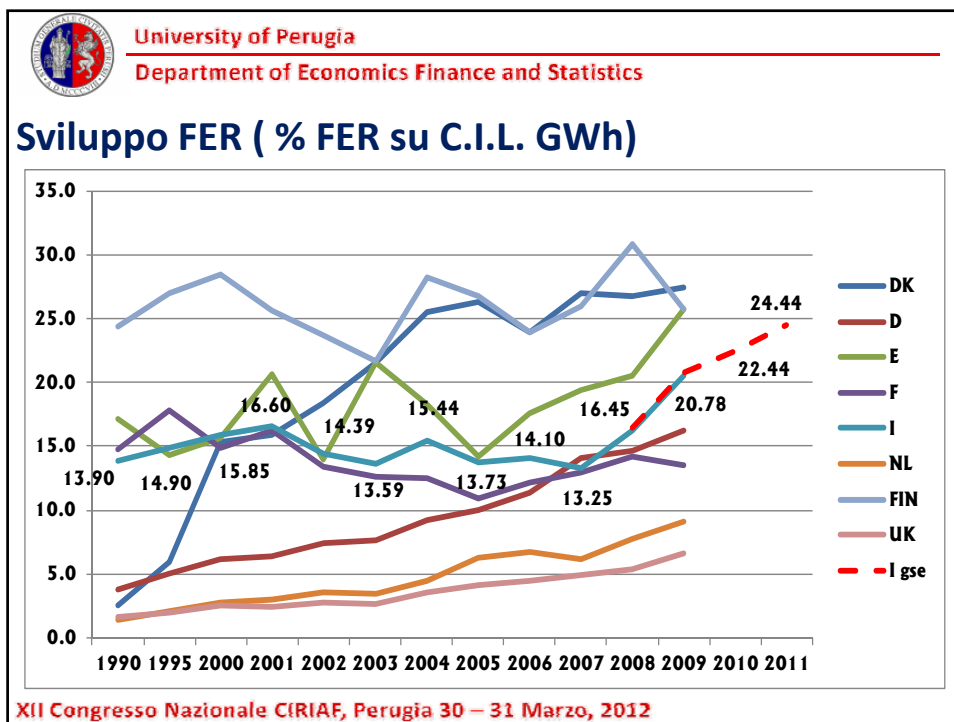
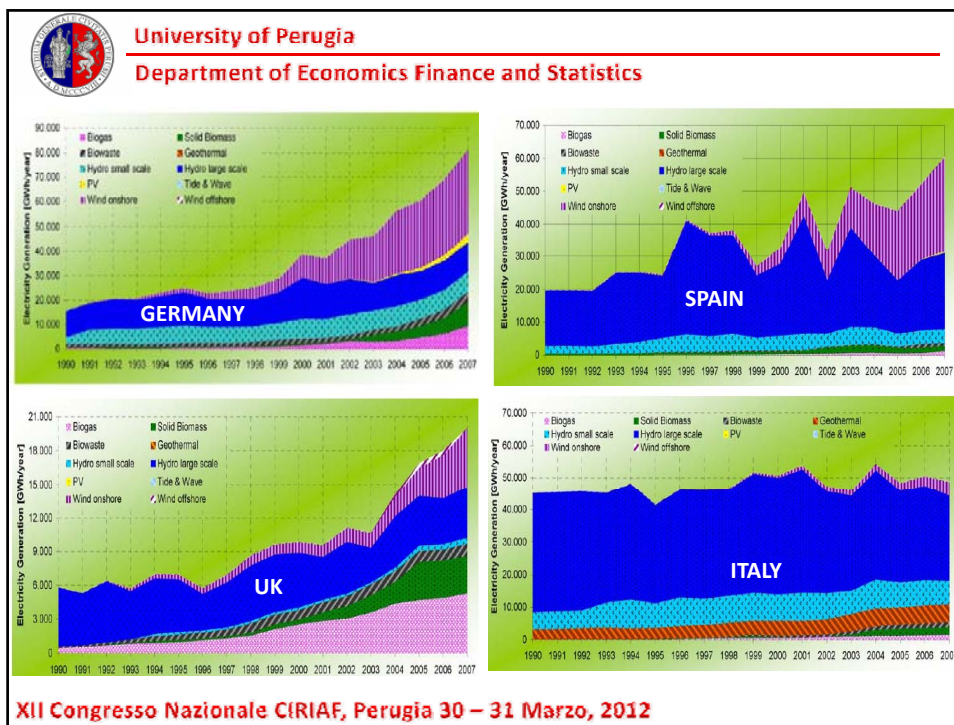
Sviluppo FER

UNO SGUARDO SULL'EUROPA

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..... e l'Italia?

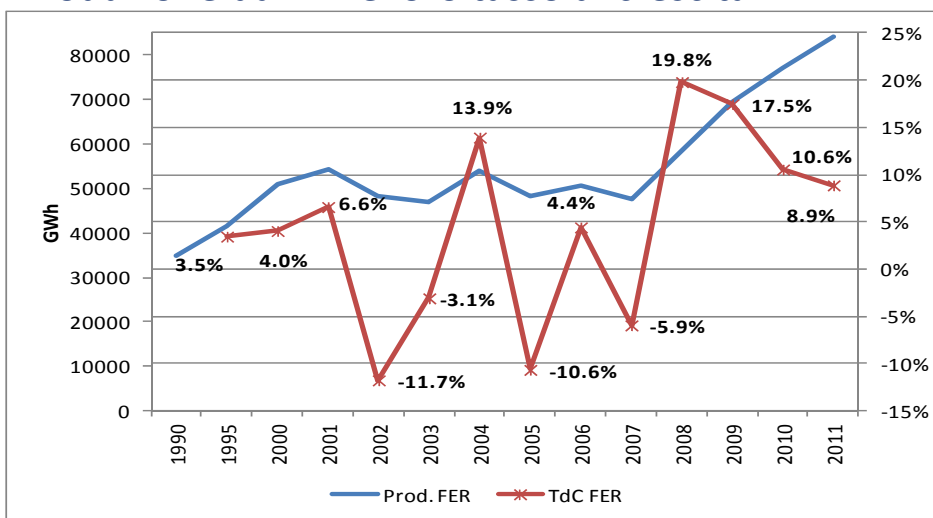
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Produzione da FER e loro tasso di crescita



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Composizione FER (Italia) I

Produzione Lorda (GWh)				
Fonte	2008	2009	2010	2011
Idraulica	41623	49137	51117	46350
Eolica	4861	6543	9126	10140
Solare	193	676	1906	10730
Geotermica	5520	5342	5376	5650
Bioenergie	5966	7557	9440	11320
Totale FER	58164	69255	76964	84109
Consumo				
Interno Lordo CIL (GWh)	353560	333296	342933	344152
FER/CIL	16.45%	20.78%	22.44%	24.44%

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Composizione FER (Italia) II

Produzione Lorda (GWh)				
Fonte	2008	2009	2010	2011
Idraulica	71.6%	71.0%	66.4%	55.1%
Eolica	8.4%	9.4%	11.9%	12.1%
Solare	0.3%	1.0%	2.5%	12.8%
Geotermica	9.5%	7.7%	7.0%	6.7%
Bioenergie	10.3%	10.9%	12.3%	13.5%
Totale FER	100.0%	100.0%	100.0%	100.0%

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Evidentemente la crescita delle Rinnovabili in Italia è consistente ed è concentrata nell'ultimo triennio

Tasso medio crescita produzione 2008-2011 > 12% annuo

2011 la maggior parte dell'energia rinnovabile, (55%) è idraulica ma è il minimo storico

Riduzione dell'apporto idraulico compensato dalle "Nuove Rinnovabili" (Eo – FV – Bio) passate in un triennio dal 19% al 38%.

FV è aumentato di un fattore 50

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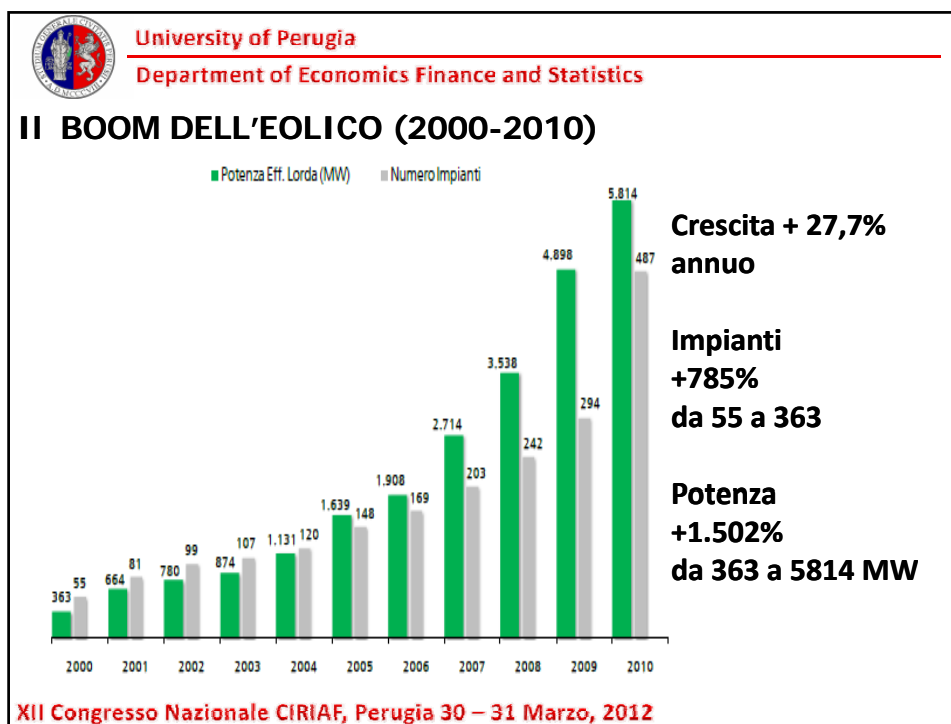



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EOLICO

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EOLICO al 2011 e PREVISIONI 2012

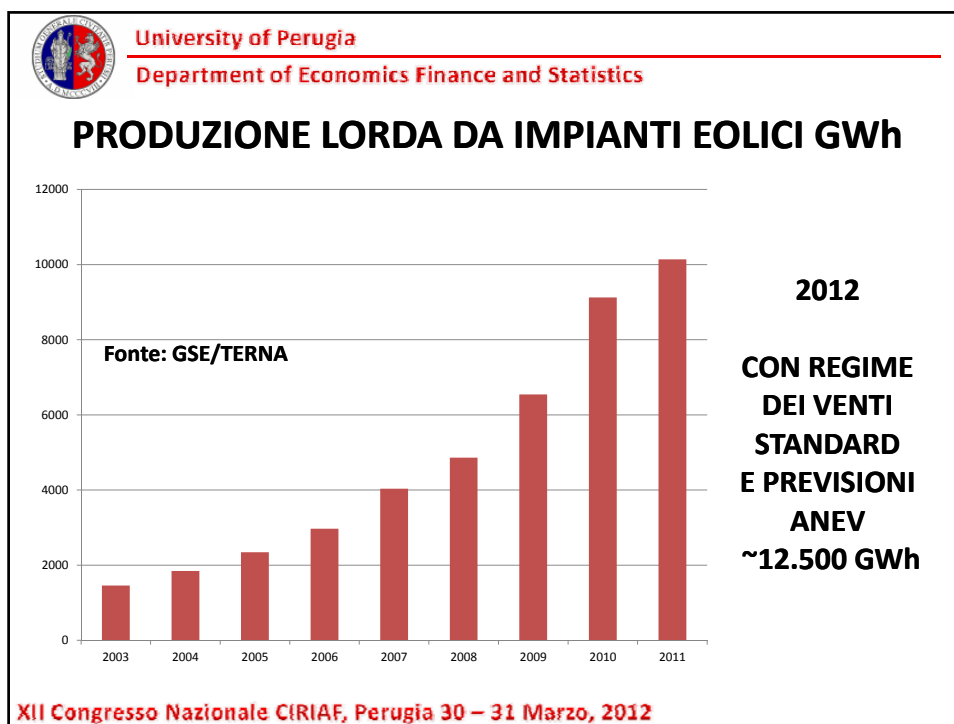
Installato nel 2011: 950 MW, previsione 2012: 990 MW

Regione	Installato al 2011		Potenziale al 2020		Crescita rispetto al 2010	kW/ab	kW/km ²
	Aerogeneratori		MW *	Occupati **			
	MW	N°					
Sicilia	1677	1398	1900	7537	15.70%	0.332	0.065
Puglia	1366	1042	2070	11714	6.20%	0.334	0.071
Campania	1062	928	1915	8738	30.40%	0.182	0.078
Sardegna	948	689	1750	6334	40.70%	0.567	0.039
Calabria	745	417	1250	4484	26.40%	0.371	0.049
Molise	399	318	635	2289	7.40%	1,247	0.09
Basilicata	302	259	760	2675	8.20%	0.513	0.03
Abruzzo	225	279	900	3166	0.00%	0.168	0.021
Lazio	51	36	900	3741	466.70%	0.009	0.003
Toscana	45	30	600	2114	0.00%	0.012	0.002
Liguria	25	31	280	1061	19.00%	0.015	0.005
Emilia Romagna	16	26	200	771	0.00%	0.004	0.001
Umbria	2	2	1090	3868	0.00%	0.002	0
Altre	16	8	1750	7518	0.00%	0.001	0
Offshore	0	0	200	1	0.00%	0	0
Totale	6878	5463	16200	66001	18.60%	0.114	0.023

* Studio ANEV ** Studio UIL - ANEV

Previsioni 2012 confermano stabilizzazione installato annuo fra 900-1000 MW

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FOTOVOLTAICO

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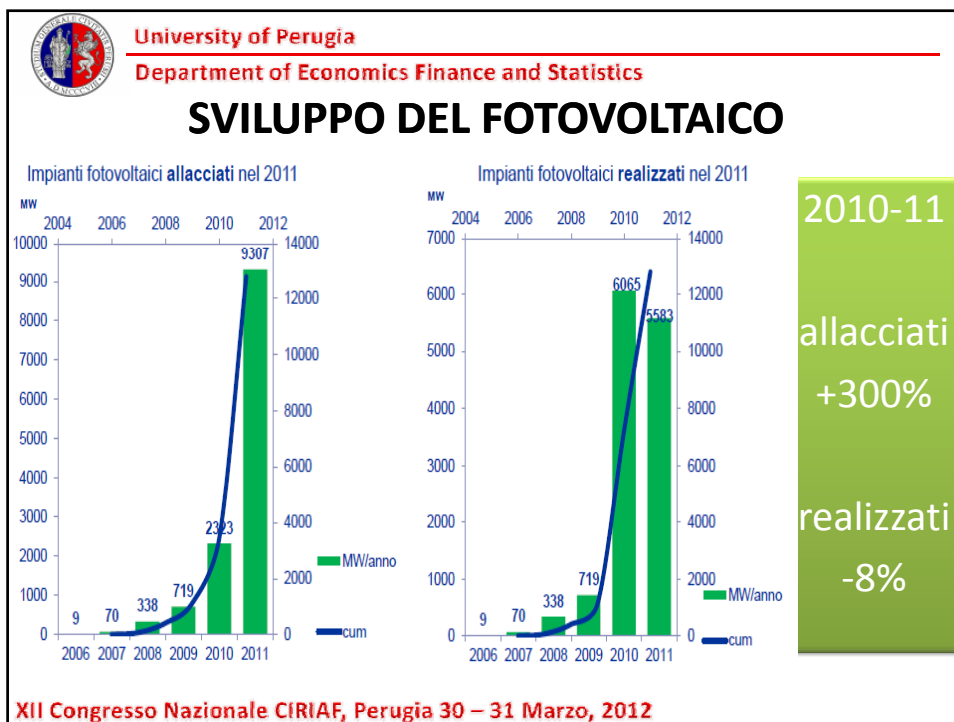
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TOTALE DEI RISULTATI DEL CONTO ENERGIA
(PRIMO, SECONDO, TERZO E QUARTO CONTO ENERGIA)

RIPARTIZIONE PER REGIONE E CLASSE DI POTENZA DEGLI IMPIANTI IN ESERCIZIO
(aggiornamento al 31 GENNAIO 2012)

REGIONE	CLASSE 1: 1 kW ≤ P ≤ 3 kW		CLASSE 2: 3 kW < P ≤ 20 kW		CLASSE 3: 20 kW < P ≤ 200 kW		CLASSE 4: 200 kW < P ≤ 1000 kW		CLASSE 5: 1000 kW < P ≤ 5000 kW		CLASSE 6: P > 5000 kW		TOTALE	
	Numero	Potenza (kW)	Numero	Potenza (kW)	Numero	Potenza (kW)	Numero	Potenza (kW)	Numero	Potenza (kW)	Numero	Potenza (kW)	Numero	Potenza (kW)
PUGLIA	7.036	19.584	12.598	96.717	1.625	112.968	1.617	1.419.855	54	167.776	38	369.017	22.968	2.185.896
LOMBARDIA	17.921	49.107	23.666	188.818	6.010	481.491	885	488.921	55	97.503	2	11.884	48.539	1.317.724
EMILIA ROMAGNA	11.359	29.859	14.799	125.616	3.924	313.131	798	501.967	134	247.292	4	48.656	31.018	1.266.922
VENETO	13.300	36.654	27.048	195.506	4.013	322.065	662	386.064	41	64.649	13	154.859	45.077	1.159.797
PIEMONTE	7.679	21.076	12.466	112.726	3.059	246.343	779	468.340	91	197.672	4	25.730	24.078	1.071.887
LAZIO	6.536	17.551	10.023	73.526	909	70.839	297	186.010	90	240.803	30	277.409	17.885	866.138
SICILIA	6.388	17.989	11.691	88.957	1.125	86.960	385	281.465	73	208.085	21	176.423	19.683	859.879
MARCHE	4.120	11.124	5.551	47.192	1.560	130.432	738	467.380	48	108.948	3	20.898	12.020	785.973
TOSCANA	6.553	17.637	9.071	76.757	1.512	124.024	288	178.967	25	43.798	3	26.596	17.452	467.779
ABRUZZO	1.744	4.842	4.826	41.432	740	61.662	313	225.455	50	105.161	2	11.851	7.675	450.402
SARDEGNA	5.749	16.179	8.195	59.602	467	36.674	142	83.815	53	126.433	9	80.106	14.615	402.809
CAMPANIA	2.936	8.237	5.991	45.368	647	50.176	155	94.177	40	105.215	8	68.832	9.777	372.006
UMBRIA	3.103	8.733	3.817	31.334	803	56.887	262	178.476	20	43.203	-	-	8.005	316.633
TRENTINO ALTO ADIGE	5.749	16.268	6.998	72.487	1.883	131.269	168	73.681	2	3.490	-	-	14.800	297.196
FRIULI VENEZIA GIULIA	4.481	12.535	11.395	81.087	1.256	92.843	96	56.335	13	30.377	3	21.728	17.244	294.904
CALABRIA	2.550	7.233	5.484	43.799	492	36.649	157	84.258	24	50.631	2	13.177	8.709	235.748
BASILICATA	970	2.745	1.773	16.776	679	40.242	242	151.638	3	4.828	1	5.216	3.668	221.445
MOLISE	320	903	1.016	8.927	171	12.793	73	56.480	10	31.186	1	6.500	1.591	116.788
LIGURIA	1.373	3.570	1.561	12.083	203	15.895	33	17.462	3	4.167	-	-	3.173	53.177
VALLE D'AOSTA	337	926	654	5.923	68	5.212	2	1.440	-	-	-	-	1.061	13.501
Totale ITALIA	110.204	302.732	178.623	1.424.636	31.146	2.428.555	8.092	5.402.186	829	1.881.216	144	1.318.880	329.038	12.758.204

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PRODUZIONE LORDA IMPIANTI FOTOVOLTAICI (GWh)

Anno	Produzione	Rispetto ad anno precedente
2008	193	395%
2009	676	251%
2010	1906	181%
2011	10730	463%

Fonte: GSE

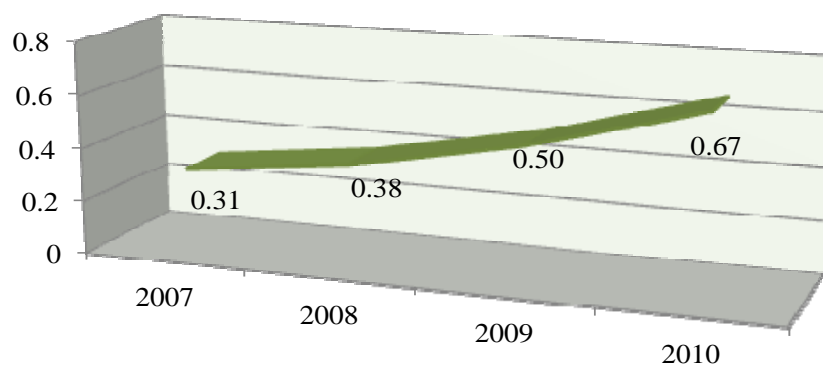
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APPORTO ALLA POTENZA FV TOTALE D'IMPIANTI > 200 KW



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- **CONTRIBUTO DEGLI IMPIANTI "INDUSTRIALI" ALLA CRESCITA DELLA POTENZA FV TOTALE È EVIDENTE (2011 70% ca DELLA POTENZA CUMULATA)**
- **IL CONTRIBUTO PIÙ RILEVANTE VIENE PERÒ DAGLI IMPIANTI >1 MW : DA 0% NEL 2007 A 22% DEL TOTALE NEL 2010**
- **IL BLOCCO SUI TERRENI AGRICOLI DOVREBBE RALLENTARE IN MISURA RILEVANTE IL TREND STORICO**

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PREVISIONI POTENZA FV INSTALLATA NEL 2012

- **GIFI: 2.800 MW**
- **ASSOSOLARE: 2.500 – 3.000 MW**

PREVISIONI PRODUZIONE 2012: ~ 18.600 GWh

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BIOENERGIE

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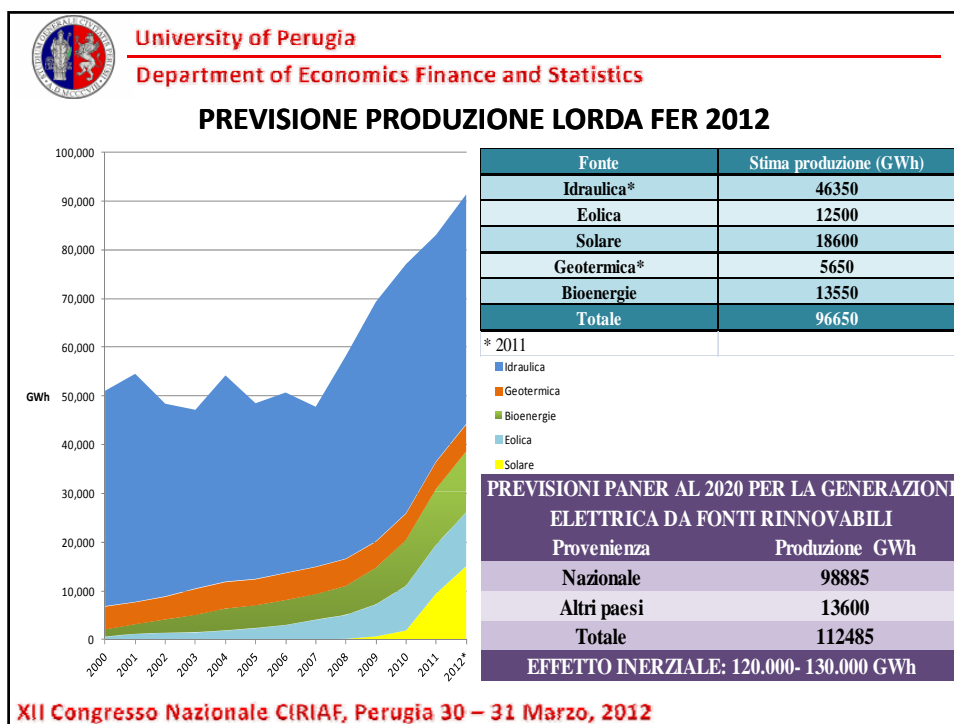
PRODUZIONE BIOENERGIE (GWh)

Anni di riferimento	Variazione percentuale produzione
2011/2008	21.40%
2011/2009	20.20%
2011/2010	20.00%

PREVISIONE 2012: 13.550 GWh

Fonte: GSE

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Assetto Istituzionale Regolatorio

UNA COMPARAZIONE EUROPEA

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Financing mechanism

We grouped national financing mechanism in four categories:

- *general taxes;*
- *specific non-tax levies in electricity bills;*
- *possible pass-through to end-users of costs borne by the Distributor/Supplier via a specific surcharge in bills;*
- *possible pass-through into the wholesale electricity price of costs borne by the Generator or the Supplier without a specific surcharge in bills.*

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Overview of ways of financing RES electricity support schemes, 2009

Member State	General taxes	Non-taxes levies (e.g. PSOs)	Specific surcharge shown in electricity bill	Pass-through into electricity price	Other
Austria			√		
Belgium		√	√		Distribution tariff
Czech Republic			√		
Estonia					Network tariff
Finland	√				
France		√			
Germany			√		
Great Britain				√	
Hungary			√		
Ireland		√			
Italy		√		√	
Lithuania		√			
Luxembourg	√	√			
Malta					Retail electricity tariff
Norway	√	√			
Poland				√	
Portugal ²		√			
Spain ³		√			
Sweden				√	

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Member State	Wind onshore	Wind offshore	Hydro (mainly small scale)	Geothermal	Solar PV	Biomass, Biogas and Waste, others
Austria ⁷	Feed-in tariff		Feed-in tariff	Feed-in tariff	Feed-in tariff	Feed-in tariff
Belgium	GC	GC ⁸	GC		GC	GC
Czech Rep.	Feed-in tariff Feed-in-premium		Feed-in tariff Feed-in-premium		Feed-in tariff Feed-in-premium	Feed-in tariff Feed-in-premium
Denmark ⁹	Feed-in-premium	Feed-in tariff				Feed-in-premium
France ¹⁰	Feed-in tariff Call for tenders		Feed-in tariff	Feed-in tariff	Feed-in tariff Call for tenders	Feed-in tariff Call for tenders (biomass)
Germany	Feed-in tariff	Feed-in tariff	Feed-in tariff	Feed-in tariff	Feed-in tariff	Feed-in tariff
Great Britain	GC	GC	GC		GC	GC
Italy	Feed-in tariff GC		Feed-in tariff GC	Feed-in tariff GC	Feed-in premium GC	Feed-in tariff GC
Hungary	Feed-in tariff		Feed-in tariff			Feed-in tariff
Lithuania	Feed-in tariff		Feed-in tariff		Feed-in tariff	Feed-in tariff
Luxembourg	Feed-in tariff Feed-in-premium		Feed-in tariff Feed-in-premium		Feed-in tariff Feed-in-premium	Feed-in tariff Feed-in-premium
Norway	Investment grants ¹¹					

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Member State	Wind onshore	Wind offshore	Hydro (mainly small scale)	Geothermal	Solar PV	Biomass, Biogas and Waste, others
Portugal	Feed-in tariff		Feed-in tariff		Feed-in tariff	Feed-in tariff
Spain ¹²	Feed-in tariff Feed-in-premium	Feed-in tariff Feed-in-premium	Feed-in tariff Feed-in-premium	Feed-in tariff Feed-in-premium	Feed-in tariff	Feed-in tariff Feed-in-premium
Sweden	GC	GC	GC	GC	GC	GC
The Netherlands	Feed-in tariff Feed-in-premium	Feed-in tariff	Feed-in tariff		Feed-in tariff Feed-in-premium ¹³	Feed-in tariff

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Electricity volumes receiving RES support, 2009

Member State	Electricity receiving RES-support (GWh)	Total gross electricity production (Eurostat) (GWh)	Share of electricity receiving RES-support (%)
Austria	5,148	68,804	7.5%
Belgium	4,581	90,783	5.0%
Czech Republic	3,270	82,240	4.0%
Denmark	9,420	36,205	26.0%
France	15,090	542,390	2.8%
Germany	75,053	533,240	14.1%
Great Britain	20,373	375,663	5.4%
Hungary	2,127	35,999	5.9%
Italy	25,608	289,914	8.8%
Lithuania	628	14,251	4.4%
Luxembourg	140	3,841	3.6%
Norway	1,611	130,607	1.2%
Portugal	10,436	38,033	27.4%
Spain	79,122	276,399	28.6%
Sweden	15,570	137,198	11.3%
The Netherlands	8,715	112,231	7.8%

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Total expenditures of RES electricity support schemes, 2009

Member State	RES-electricity support expenditure (million euro)	Gross electricity consumption ¹⁴ (Eurostat) (GWh)	RES-electricity support per unit of gross electricity consumed (€/MWh)
Austria ¹⁵	307	69,584	4.42
Belgium	489	88,949	5.50
Czech Republic	150	68,595	2.19
Denmark	294	36,541	8.05
France ¹⁶	556	516,455	1.08
Germany	5,618	520,968	10.78
Great Britain ¹⁷	1,250	378,523	3.30
Hungary	83	41,515	2.00
Italy ¹⁸	2,638	334,363	7.89
Lithuania	25	11,318	2.25
Luxembourg	16	7,259	2.27
Portugal	528	42,809	12.33
Spain	6,035	268,297	22.49
Sweden	478	141,884	3.37
The Netherlands	639	117,119	5.46

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RES support levels broken down by main technology, 2009

Member State	Weighted average support level (on electricity supported) by technology (€/MWh)					Total (€/MWh)
	Wind onshore	Wind offshore	Hydro	Geothermal	Solar PV	
Austria ¹⁹	31.05		5.05	80.45	523.55	59.71
Belgium	95.28	107.00 ²⁰	48.71		465.39	106.79
Czech Republic	30.47		22.56		464.32	45.91
Denmark	33.90	25.55				31.21
France	41.48		19.46	31.50	449.97	36.83
Germany	19.14	81.07	9.64	129.79	411.04	74.85
Great Britain	58.78	76.38	58.87		62.59 ²¹	61.34
Hungary	44.67		40.98			39.07
Italy	77.66		82.03	80.48	432.70	103.00
Lithuania	41.99		30.41		408.10	40.53
Luxembourg	27.98		97.65		525.18	117.97
Portugal	49.11		42.86		282.81	50.57
Spain	42.58		42.78		429.37	76.27
Sweden	30.71		30.71		30.71	30.71
The Netherlands	64.77	84.21	91.49		119.81	73.37
Minimum support	19.14	25.55	5.05	31.50	30.71	30.71
Maximum support	95.28	107.00	91.49	129.79	525.18	117.97

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Alcuni effetti collaterali

PREZZI

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DETERMINANTI PREZZI

Sul lato dell'offerta:

- *diversa efficienza nella produzione;*
- *diversa efficienza nella regolazione e nelle tariffe;*
- *presenza o meno di potere di mercato;*
- *diverso peso della fiscalità.*

Sul lato della domanda:

- *diverse preferenze dei consumatori;*
- *diversi prezzi dei prodotti sostituti.*

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Differenziali di P in UE

- a) *Caratteristiche della domanda: le preferenze dei consumatori (divise per categorie) sono abbastanza simili.*
- b) *Bene domanda rigida: in Paesi con livelli di reddito simile, è ragionevole aspettarsi che le caratteristiche delle diverse domande nazionali siano omogenee*



NO

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Differenziali di P in UE

Principali indiziati sono gli elementi che caratterizzano l'offerta

- a) Differenze sussistono nonostante le politiche di convergenza messe in atto da UE*
- b) Non Esiste mercato Europeo ma esistono mercati regionali (NordPool, integrazione D,F,B,NL) e mercati nazionali (Italia)*

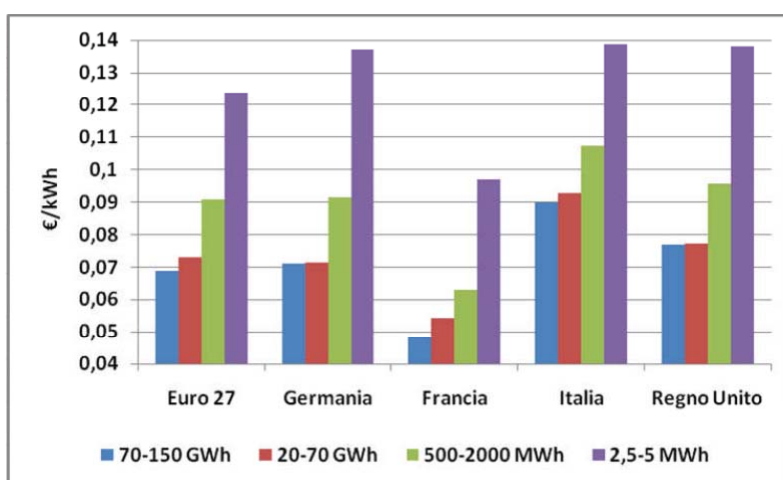
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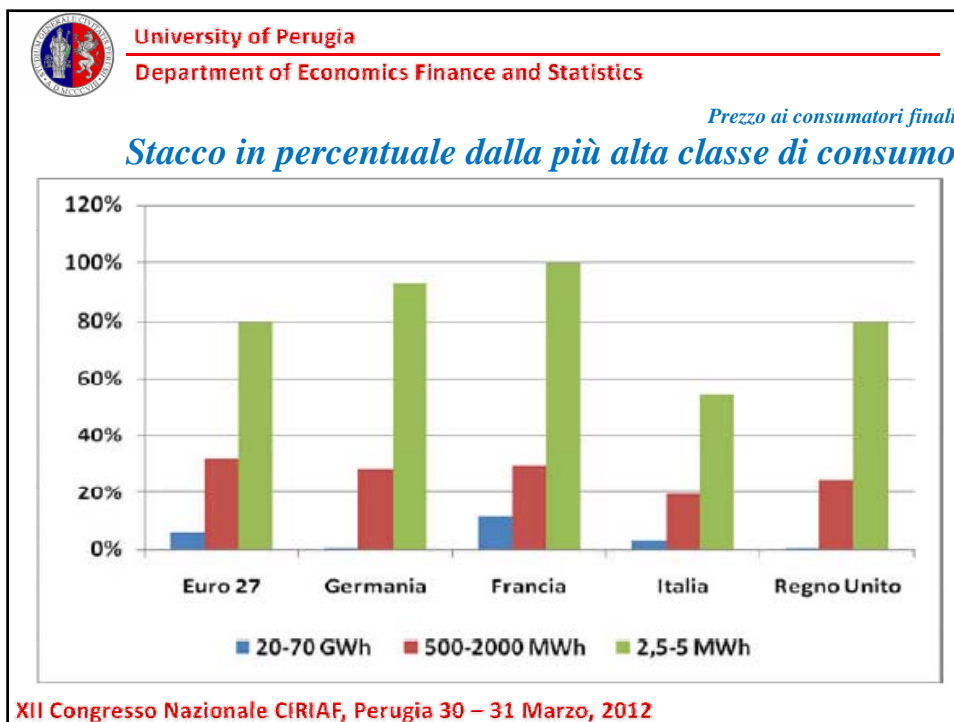
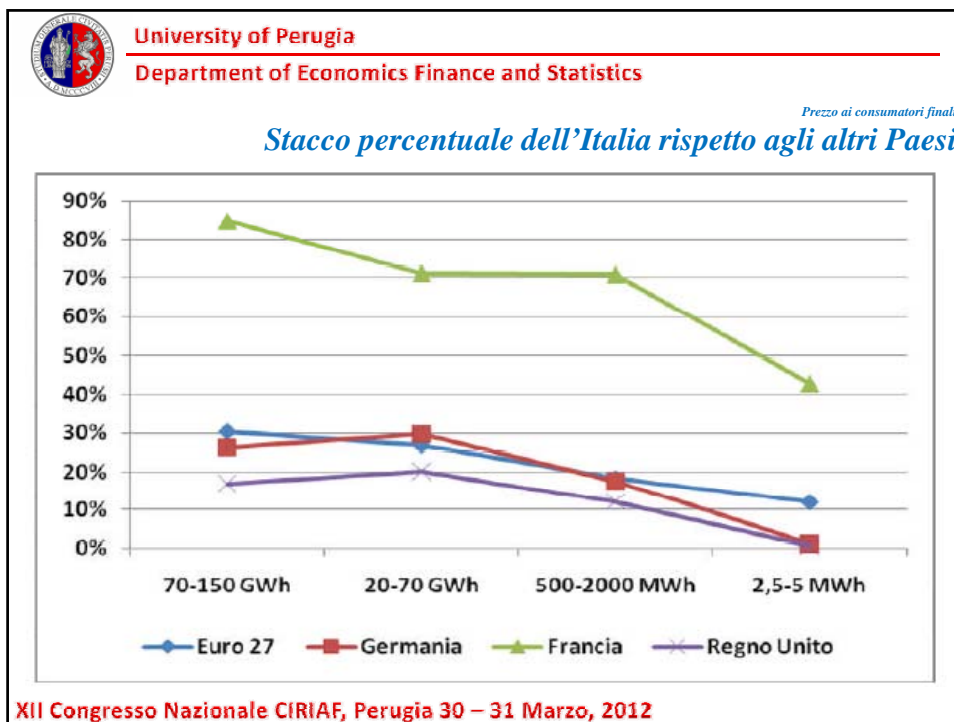
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Prezzo ai consumatori finali



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Differenziali di P in UE

- a) Prezzi italiani siano più alti di quelli europei*
- b) Prezzi ai consumatori più piccoli sono sostanzialmente in linea con quelli tedeschi e inglesi*
- c) Grandi utilizzatori di energia, al netto delle imposte, riescono a ottenere prezzi più favorevoli rispetto ai prezzi italiani*
- d) La forbice prezzo più alto e prezzo più basso in Italia 50% ca. Più contenuta rispetto alla forbice degli altri Paesi.*

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Borse

Anno 2010

Paese	€/MWh
Germania	44,49
Francia	47,50
Regno Unito	44,72
Italia	64,12

I Semestre 2011

Paese	€/MWh
Germania	52,72
Francia	51,01
Regno Unito	49,69
Italia	67,39

Quale confrontabilità?

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Differenze Borse Europee

- a) Scambi (TWh) I e D ca. 200; UK 53; F 19*
- b) Consumi Lordi (TWh) : I 340 D 620 UK 513 F 384*
- c) In F e UK il prezzo all'ingrosso origina soprattutto da transazioni OTC e contratti bilaterali*
- d) Più comparabili D e I*

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- a) P italiano più alto del 44%*
 - b) Ma prezzi finali italiani, in media, sono più alti di quelli tedeschi “solamente” del 20%
28%*
- ?????
- c) Spiegazione 1: prezzo dell'energia elettrica scambiata nella borsa italiana incorpora anche il costo dell'acquisto di Certificati Verdi*

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Borse senza CV

Costo d'acquisto CV -proporzionalmente al valore della quota d'obbligo annuale- è di ca. 5,1 €/MWh per il 2010 e in 5,4 €/MWh per il 2011

Impatta sui valori di borsa per circa l'8%.

*Anno 2010**I Semestre 2011*

Paese	€/MWh	Paese	€/MWh
Germania	44,49	Germania	52,72
Italia (senza CV)	59,02	Italia (senza CV)	61,99

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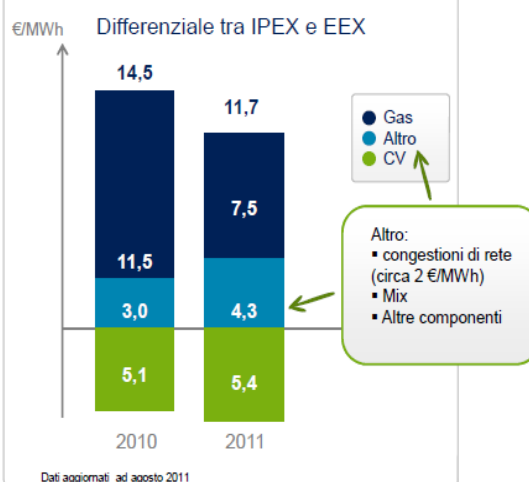
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Per poter confrontare il prezzo IPEX e EEX occorre sottrarre il Certificato Verde (CV) che è una specificità del mercato elettrico italiano (circa 5 €/MWh)

Il differenziale è sostanzialmente attribuibile al maggior costo del gas italiano

Il resto della differenza (circa 3 €/MWh) include gli effetti delle congestioni di rete (circa 2 €/MWh), dell'effetto mix e di altri fattori

Il mix ha un impatto assolutamente trascurabile



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Obiettivi Europei: onerosità e loro sostenibilità via mercato

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Il Costo delle FER e sostenibilità via mercato

- a) *In Italy, there has been a recent debate on the actual cost of renewable energy*
- b) *One favourite “mantra” is that in Italy, the cost of electricity is significantly higher than in other European countries and that one of the possible culprits of higher electricity prices is component A3 of Italian electricity bills*
- c) *But component A3 revenue provides only a rough approximation of what consumers have spent on the promotion of renewables because it also includes several types of tax burdens, only some of which support RES development*
- d) *Component A3 overestimates the actual support provided to renewable energy sources*

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- e) *In 2010, for example, if we consider all fee items in Italian electricity bills, the total amount was €5,808 million, while component A3 amounted to 3,970 million €, of which only 2,756 million € (69%) supported renewable energy*
- f) *This means that in 2010, the mean additional cost due to renewable energy sources was between 1.4 and 2.5 €/per month per household.*

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Component A3 by different types of clients (2007)

Features	Low voltage		Medium voltage		High Voltage			
	Household uses	Other final uses						
Power (KW)	3	3	10	100	500	1,000	3,000	10,000
Use (h/year)	880	1,167	1,200	1,500	2,000	2,500	2,500	3,500
Annual consumption (MWh/year)	2.64	3.5	12	150	1,000	2,500	7,500	35,000
Average rate A3 c€/kWh)	0.73	0.75	1.21	0.93	0.75	0.74	0.68	0.67
Monthly expenditure (€month)	1.60	2.20	12	116	627	1,545	4,236	19,481
<i>only RES</i>	0.95	1.30	7	69	370	913	2,502	11,507
Tax levy (million €)	630		1,228		1,192		279	
Total (million €)					3,329			

Source: our elaboration on GSE - Gestore Servizi Energetici (Italian electricity services operator) - data

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Ma che rapporto c'è tra obiettivi europei e preferenze e attitudini dei consumatori ???

Vediamo un confronto tra alcuni paesi

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GERMANY

Grosche and Schroeder (2012) found that in Germany:

"... the possible financial scope to support renewable fuels is basically exhausted".

Indeed, the maximum chargeable levy, with a share of 30% of RES, is 2.37 c€/kWh, but unfortunately, the actual levy of c€ 2.04/kWh, with 18% of RES, is very close to the maximum.

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UK

Batley et al. (2001) 34% of respondents declared that they were willing to pay an additional 16.6% of their actual expenditures to have electricity from RES; according to the authors, this effort is insufficient to achieve the national target of 10% energy production from RES.

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ITALIA

Bollino [2009] finds that Italian households support paying 30% of the annual cost of the national target.


Bigerna Polinori (2012)

Using the median WTP, amounts lie between 34% and 67% of the respective national target

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Policy implications										
Models		LBM			Int. Reg. (median)			Int. Reg. (mean)		
		(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
WTP	€	3.23	3.63	4.15	5.05	7.06	9.95	12.16	15.95	24.14
Annual electric bill	Nr.	6								
Households	Nr.	21,810,676								
Total annual WTP	Mill €	423	475	543	661	924	1,302	1,591	2,087	3,159
Annual subsidy cost	Mill €									
	<i>All clients</i>	3,500								
	<i>Low voltage</i>	1,953								
Market sustainability of RES	%									
	<i>All clients</i>	12.1	13.6	15.5	18.9	26.4	37.2	45.47	59.64	90.26
	<i>Low voltage</i>	21.6	24.3	27.8	33.8	47.3	66.7	81.46	106.9	161.7

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Quanto sono consistenti queste stime ?										
a) In 2007, the electric bill of an typical Italian household was approximately 70.5 €, this means that for estimated "mean WTPs" representing from 17.2% to 34.2% of the bill, that is a considerable cost [91.30 and 181.25 \$ yearly]										
b) In a recent study in Spain, Hanemann et al. [2011] found more supportive results (29.91€/month) at the end of 2009; in other words, in the period at the height of the financial crisis.										
c) Goett et al. 2000 (U.S) 98.44 \$ yearly										
d) Batlel et al. 2001 (UK) 95.20 \$ yearly										

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Conclusioni

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Meno del 50% del prezzo dell'energia per il cliente finale è riconducibile alla componente "produzione".

Poiché il differenziale del prezzo dell'energia elettrica all'ingrosso tra Italia ed Europa (IPEX vs. EEX) si è ridotto al 17% (circa 9 €/MWh) – sostanzialmente attribuibile al maggior prezzo del gas in Italia –
se ne deduce che



l'insieme delle altre componenti tariffarie (oneri di sistema e attività regolate) in Italia è superiore di circa il 30% rispetto all'Europa.

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Inoltre le nostre analisi confermano che:

- a) **There is a broad consensus for the development of renewable energies.**
- b) **Second, uncertainty plays a crucial role, accounting for 1.5 billion € using the mean WTP obtained by the parametric models. However, a conservative estimate of the economic value of the uncertainty is 640 million €, a sum equal to approximately 20% of the annual cost of the national target.**
- c) **The analysis of the A3 burden shows that the actual additional cost to consumers due to the support of renewable energy is less than the WTPs obtained in our models. This finding means that a further margin could exist in the Italian context**

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