



Electric Vehicles CO2 emissions in Italy

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Summary

- EV emission claims
- Current methods unsatisfactory
- The marginal calculation
- Results
- Conclusions

EV claims

- *«EV are Zero Emissions on the road ...*
- *... but emit in the plant»*
- *«Emissions can be estimated on energy mix»*
- *«Emissions during car manufacturing are not so fundamental»*
- *«EV can be used to even the energy requirement peak...*
- *... through intelligent charging schemes...*
- *... or Vehicle to grid «*
- *«EV can become beneficial to society if fed by renewable»*



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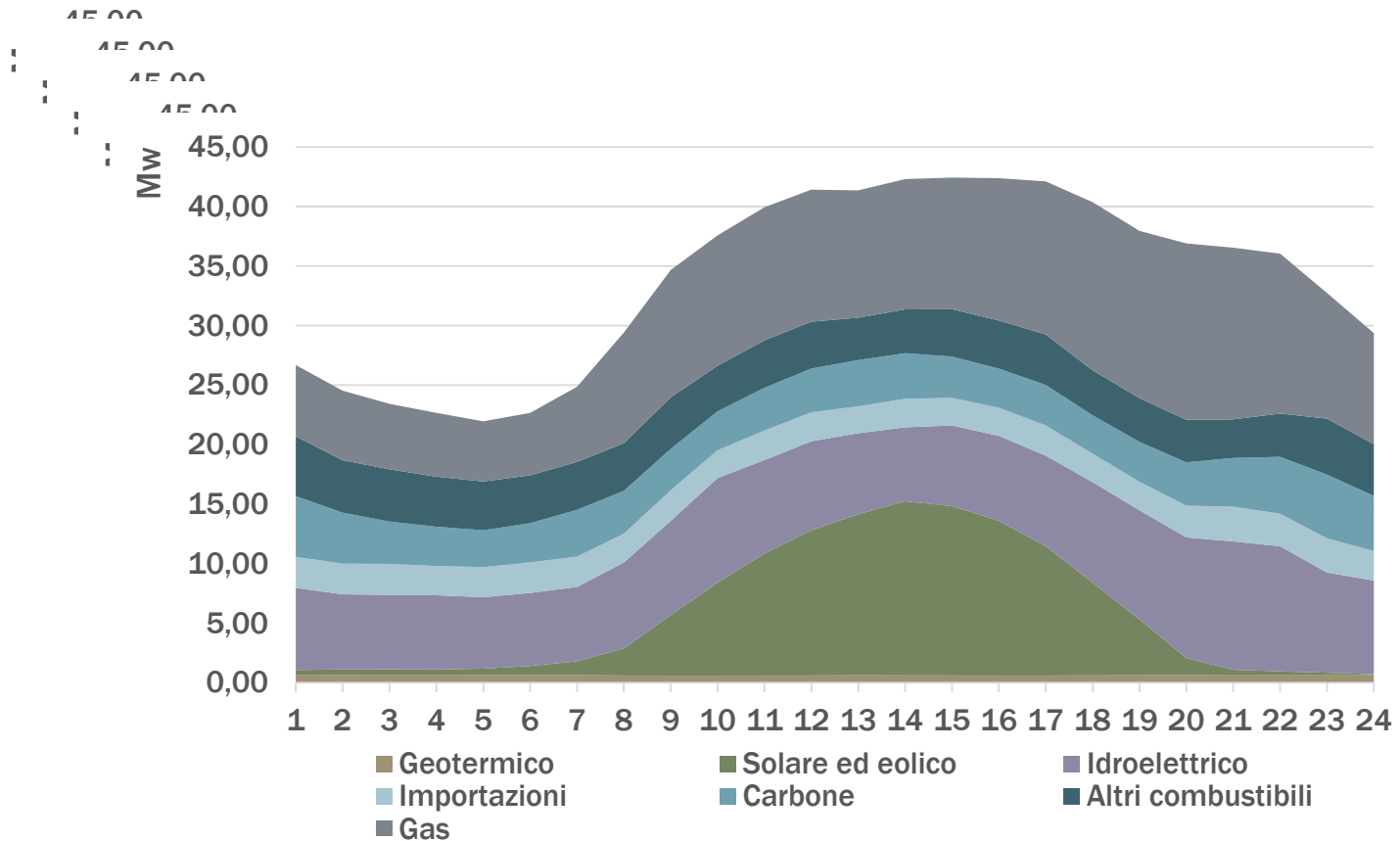
EV emissions: results and methods

Source	Technical					Regulatory	
	Marg. nature	Vehicle prod.	Recharge efficiency	Grid losses	Time pattern	Capping on energy production	Regulation 443
Menga e Ceraolo (2008)	No	No	No	yes	no	No	No
Perujo e Ciuffo (2009)	No	No	yes	yes	no	No	No
M. Benini et al. (2010)	yes	No	No	No	No	yes	No
Wilson (2013)	No	70 g/km	No	yes	No	No	No
Rusich e Danielis (2013)	No	No	No	No	no	No	No

Summary

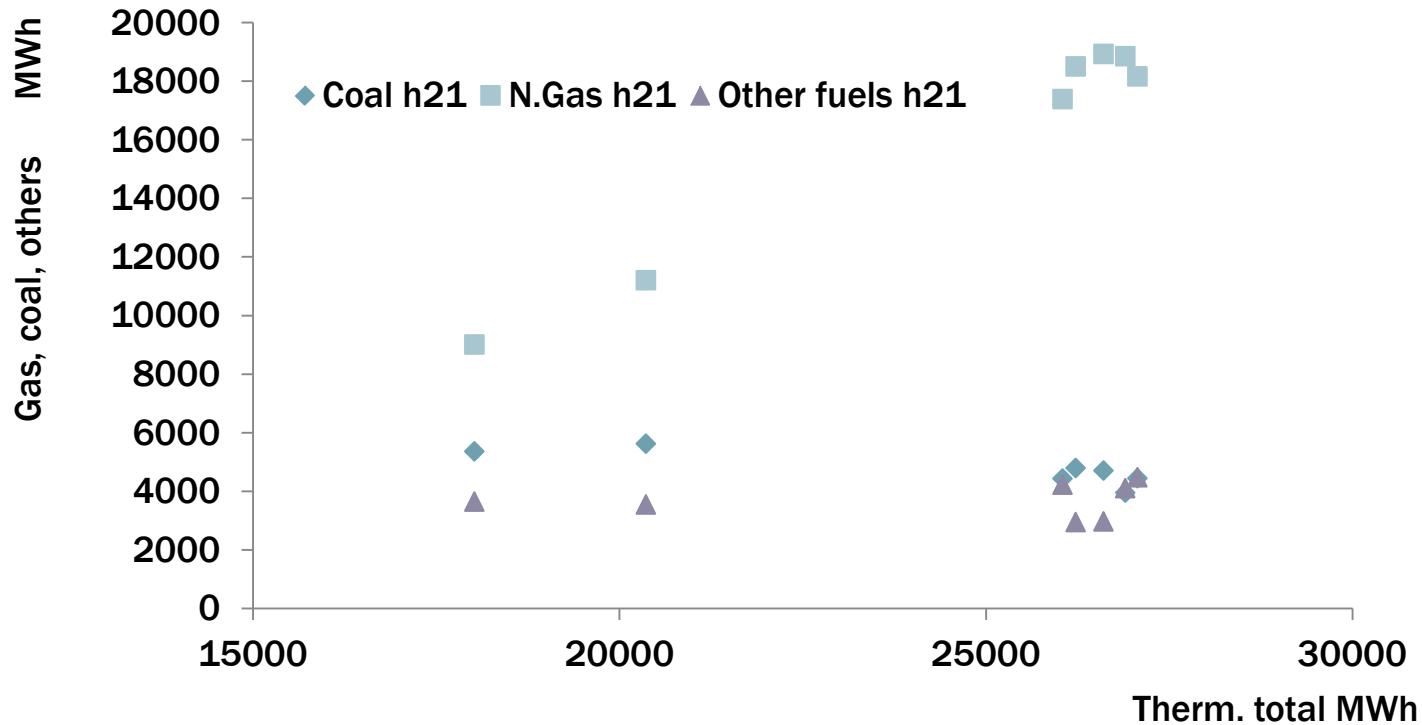
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Estimation method



Elaborazione dati TERNA e GSE del mese di giugno 2014

Estimation method 2



- Fossil fuel technologies response to demand variation (9:00 PM) 48th week



Estimation method 3

Periodo
caldo

Agosto

Periodo
temperato

Periodo
freddo

24
ore

24
ore

24
ore

24
ore

24
ore

24
ore

24
ore

24
ore

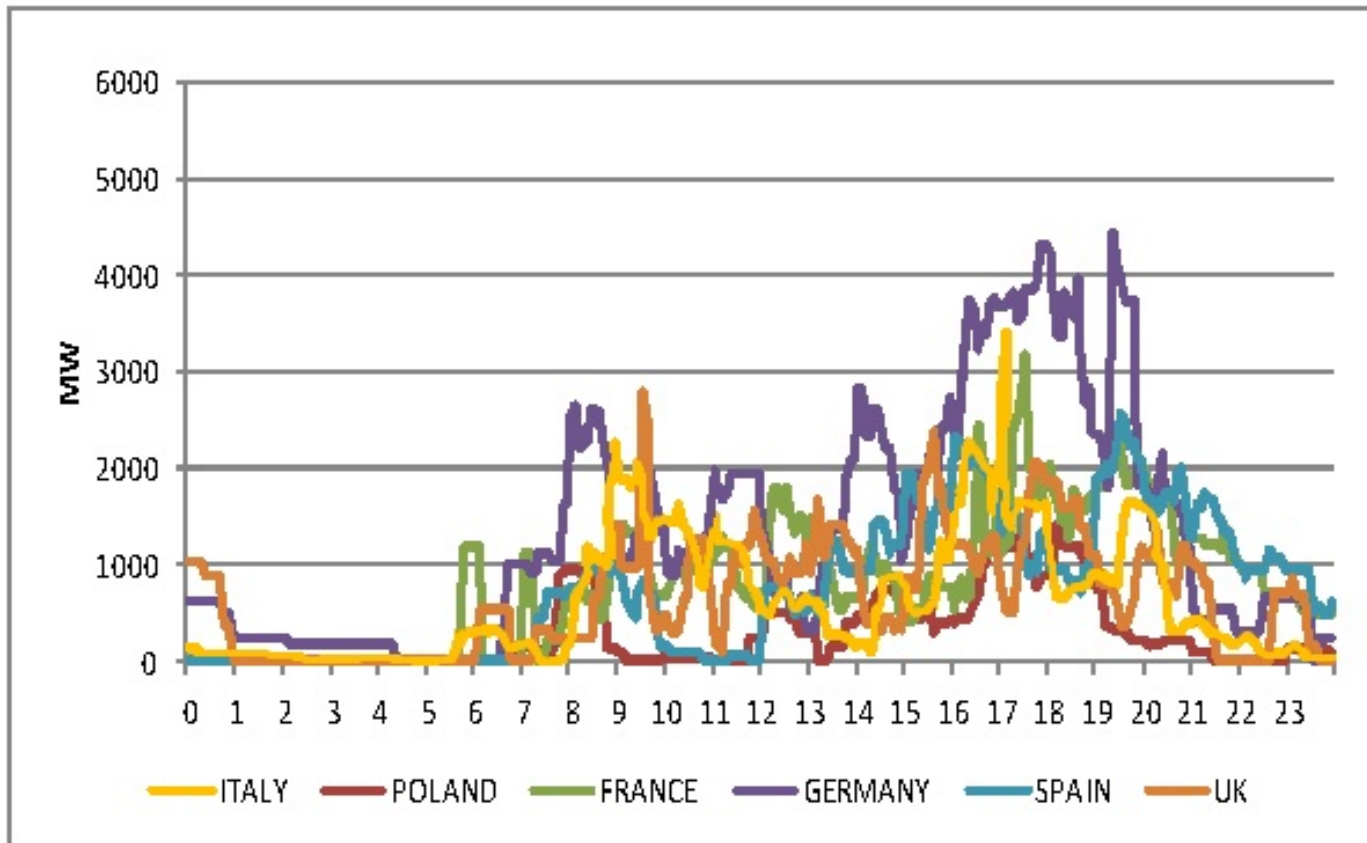
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Hourly profile of EV reload



**EVs
increase
the peak**

Pasaoglu, G., et al. 2013, *Projections for Electric Vehicle Load Profiles in Europe Based on Travel Survey Data.*

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 - Average emissions
 - Scheme
 - The future
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Emissioni

g CO2e/km	Sett. 24	Sett. 31	Sett. 37	Sett. 48
Feriali	96,2	98	93,2	94,4
Sabato	96,8	98	92,7	94,3
Domenica	96,7	98,3	92,6	94,6

94 g/km

Summary

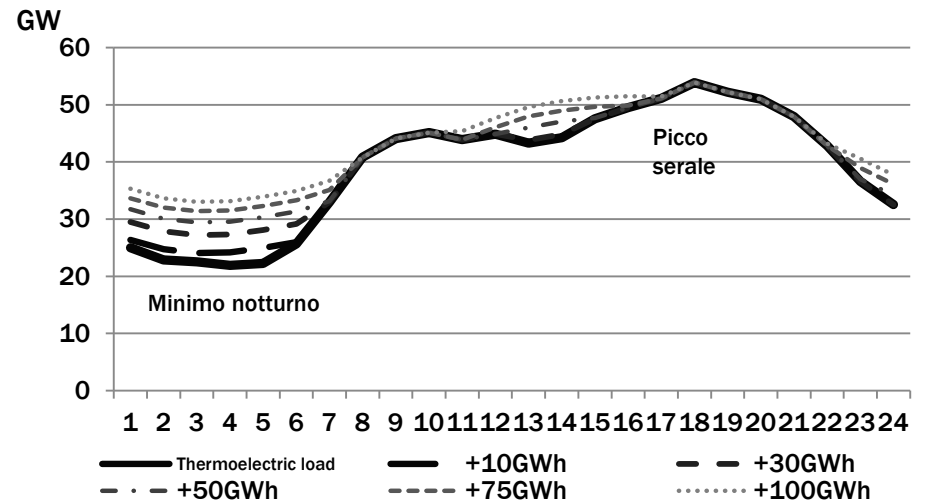
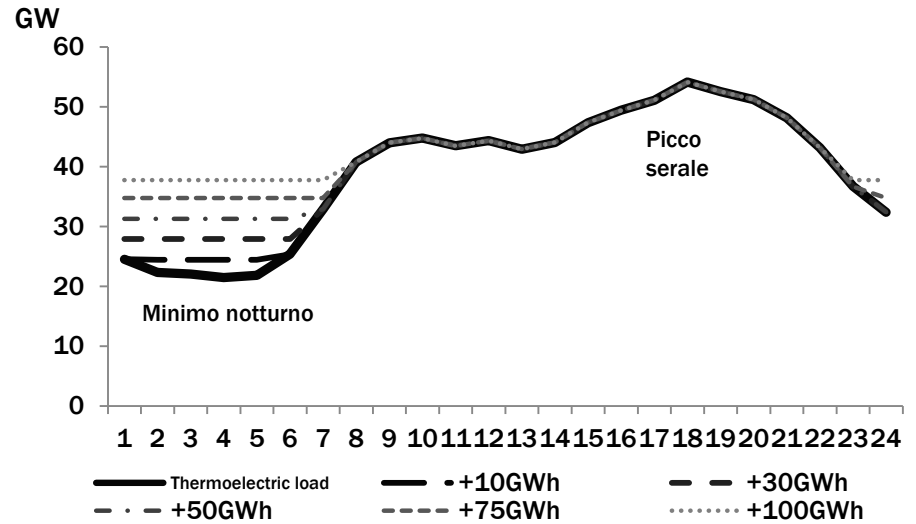
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Schemi di ricarica

Valley-filling

V2G:
50 % di deperdizione

Smooth



Schemi aumentano le emissioni

g CO2e/km	settimana 24			settimana 21			settimana 37			settimana 48		
	feriali	Sabato	Domenica	feriali	Sabato	Domenica	feriali	Sabato	Domenica	feriali	Sabato	Domenica
Non regolato	96,2	96,8	96,7	98	98	98,3	93,2	92,7	92,6	94,4	94,3	94,6
Valley-filling	100,1	98,5	97,6	99,8	100,2	99,6	101,4	95,6	94	106	103,1	100,8
Smooth	99,5	98,7	98,1	100,2	100,3	99,9	98,7	96,3	95,6	105,9	100,9	99,8

Uncoordinated: 94 gco2e/km
 Valley filling: 102.3 gco2e/km
 Smooth: 101,7 gco2e/km

■ Schemi aumentano

- costi sociali
- costi privati

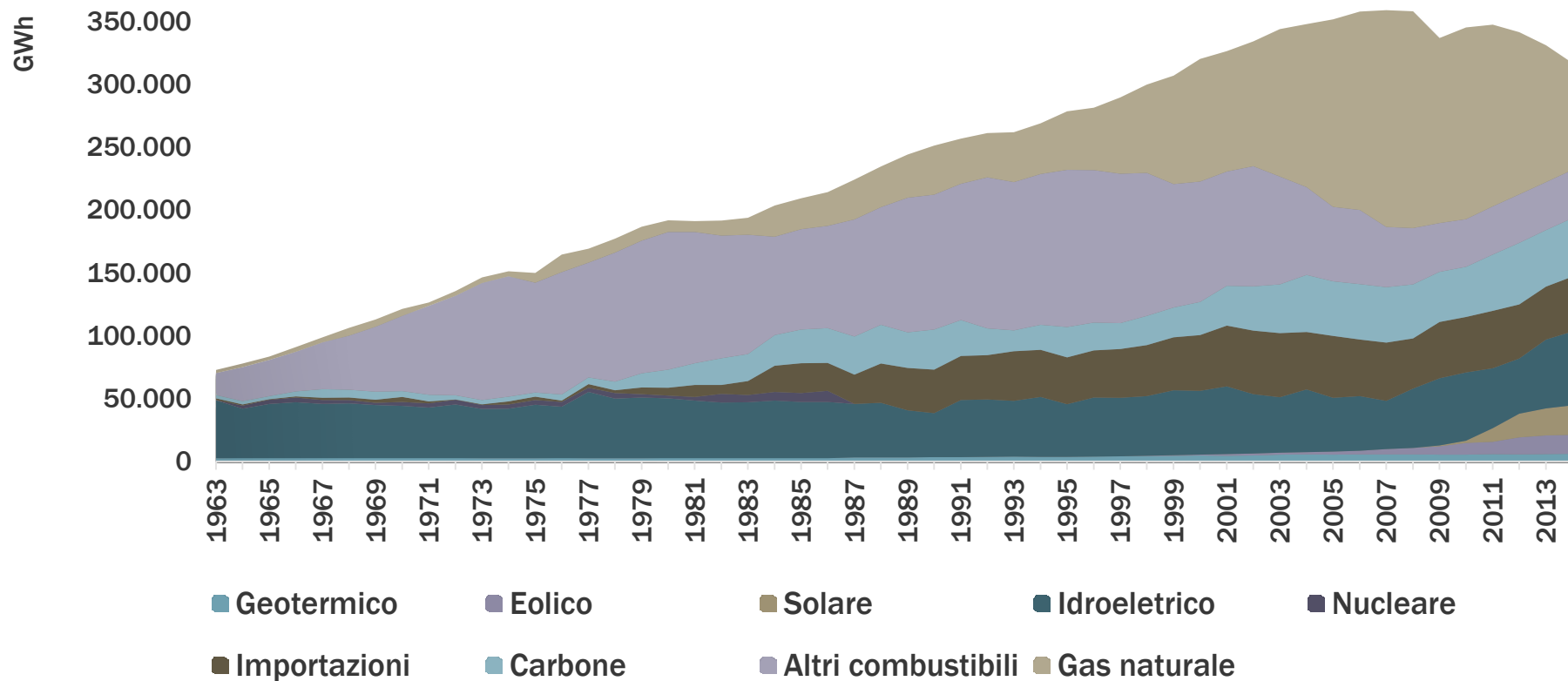
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Prospettive



■ Gas

- Forte capacità installata
- Bassi tassi di utilizzo
- Moderati costi di attivazione / disattivazione

■ Rinnovabili (40% di energia elettrica prodotta)

- Non rispondono a variazione della domanda

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EV emissions

g CO₂e/km	Conventional view	
Tailpipe emissions	0	
Energy generation	55-65*	
Vehicle manufacturing	Negl.	
Total	40-100	

☑ most significant results

☑** due to the *Regulation* (EC) No 443/2009 and the European Energy Trade System

Frequent claims

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