



ACCADEMIA NAZIONALE DEI LINCEI
CENTRO LINCEO INTERDISCIPLINARE «BENIAMINO SEGRE»
Riflessioni sulle Considerazioni Finali
del Governatore della Banca d'Italia
21 giugno 2022

Prospettive di sicurezza degli approvvigionamenti e diversificazione energetica

Prof. Carlo Andrea Bollino
University of Perugia, Perugia
University Luiss Guido Carli, Rome,



PARTE 1 LO SCENARIO MONDIALE



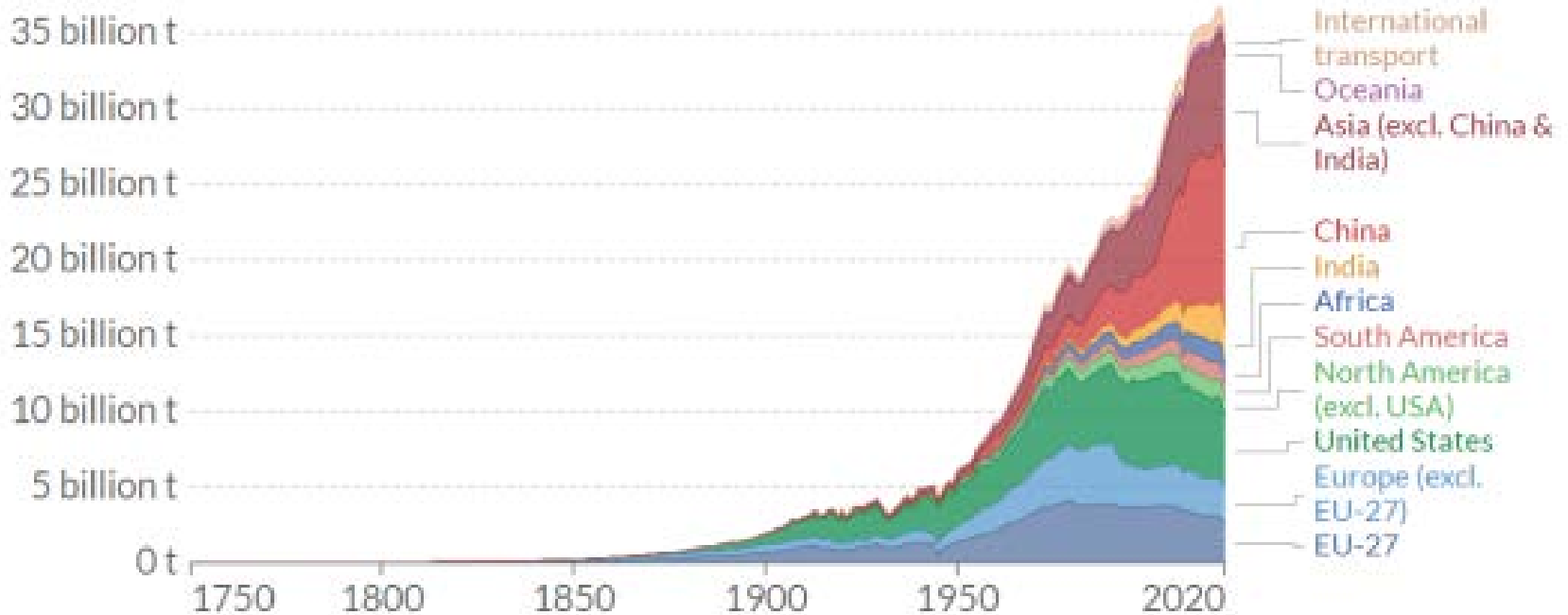
Renewable energy



Annual CO₂ emissions from fossil fuels, by world region

Our World in Data

Add region Relative



Source: Global Carbon Project

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY

Note: This measures CO₂ emissions from fossil fuels and cement production only – land use change is not included.

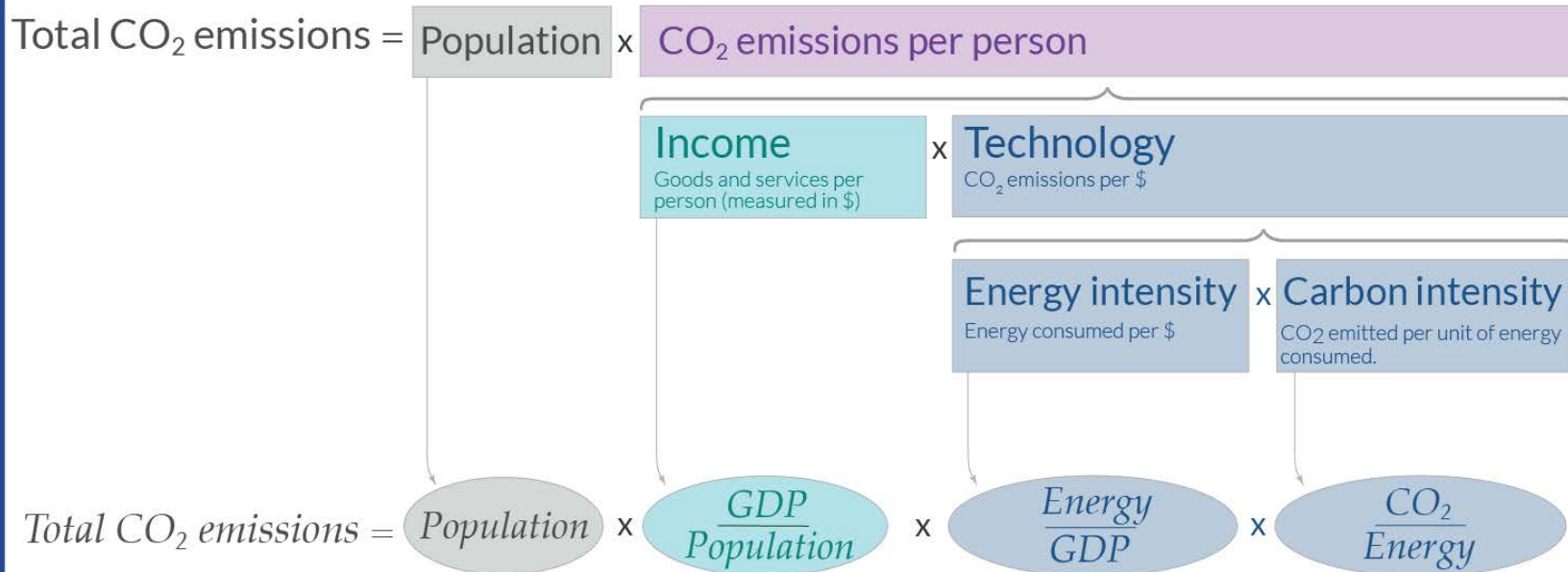
*Charterist differences (included in the CO₂ dataset) are not included here.



Renewable energy



THE KAYA IDENTITY



↓ energy intensity by:

- Improving energy efficiency
- Switching to less intensive industries

↓ carbon intensity by:

- Switching to renewable energy
- Switching to nuclear energy
- Substituting gas for coal (partial)
- Capturing & storing fossil CO₂ (CCS)

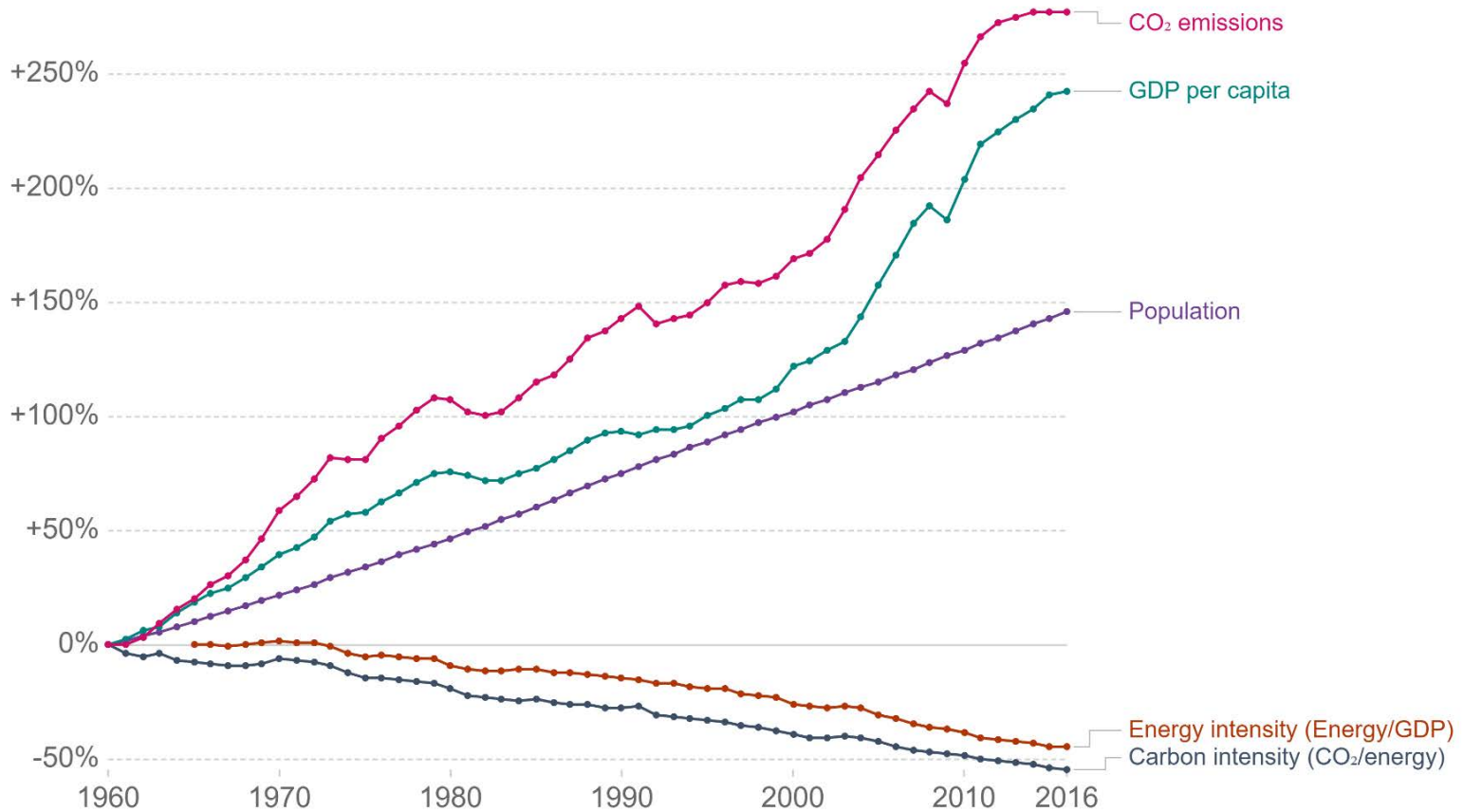


THE KAYA IDENTITY in 2016

Kaya Identity: drivers of CO₂ emissions, World

Percentage change in the four parameters of the Kaya Identity, which determine total CO₂ emissions.

Our World in Data



Source: Our World in Data based on Global Carbon Project; UN; BP; World Bank; Maddison Project Database
 Note: GDP per capita is measured in 2011 international-\$ (PPP). This adjusts for inflation and cross-country price differences.
 OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY



Renewable energy

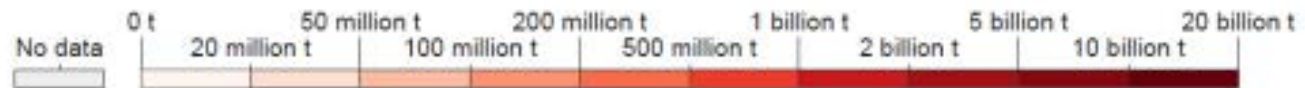
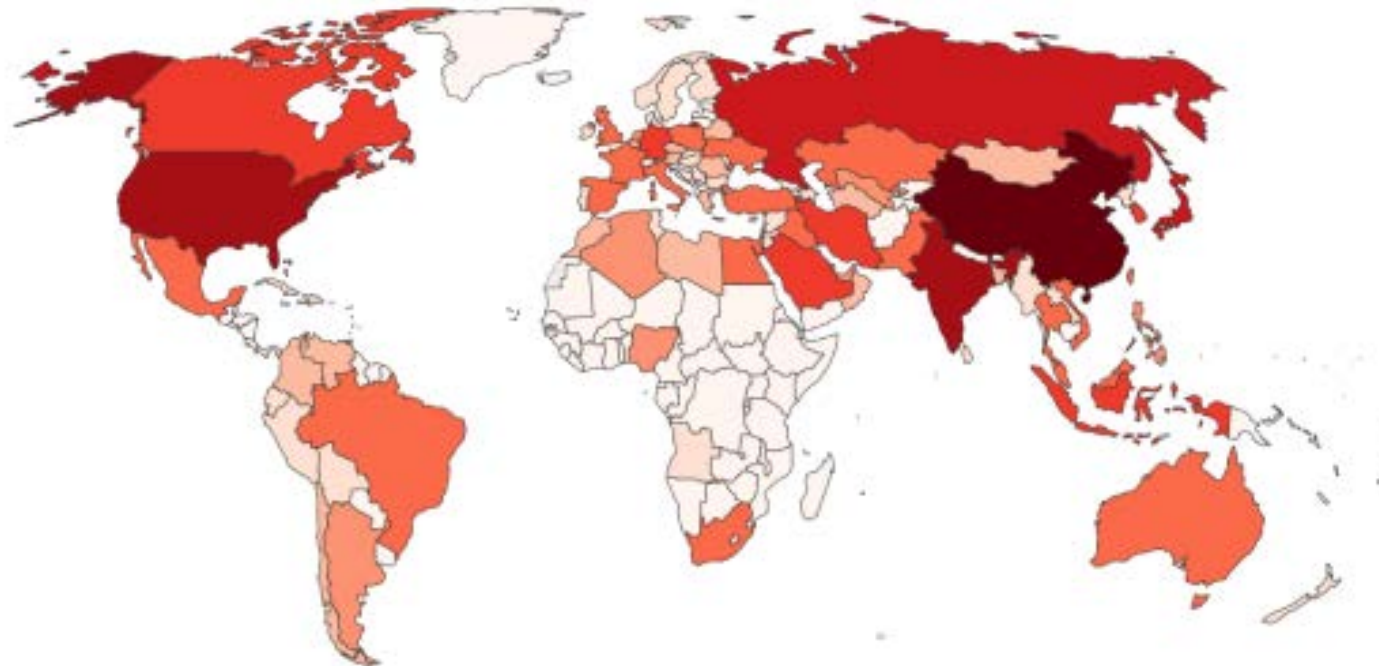


CO2 Emissions in 2020

Annual CO2 emissions, 2020

Carbon dioxide (CO₂) emissions from the burning of fossil fuels for energy and cement production. Land use change is not included.

Our World In Data



Source: Global Carbon Project

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY



Renewable energy

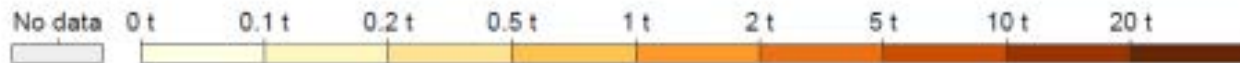
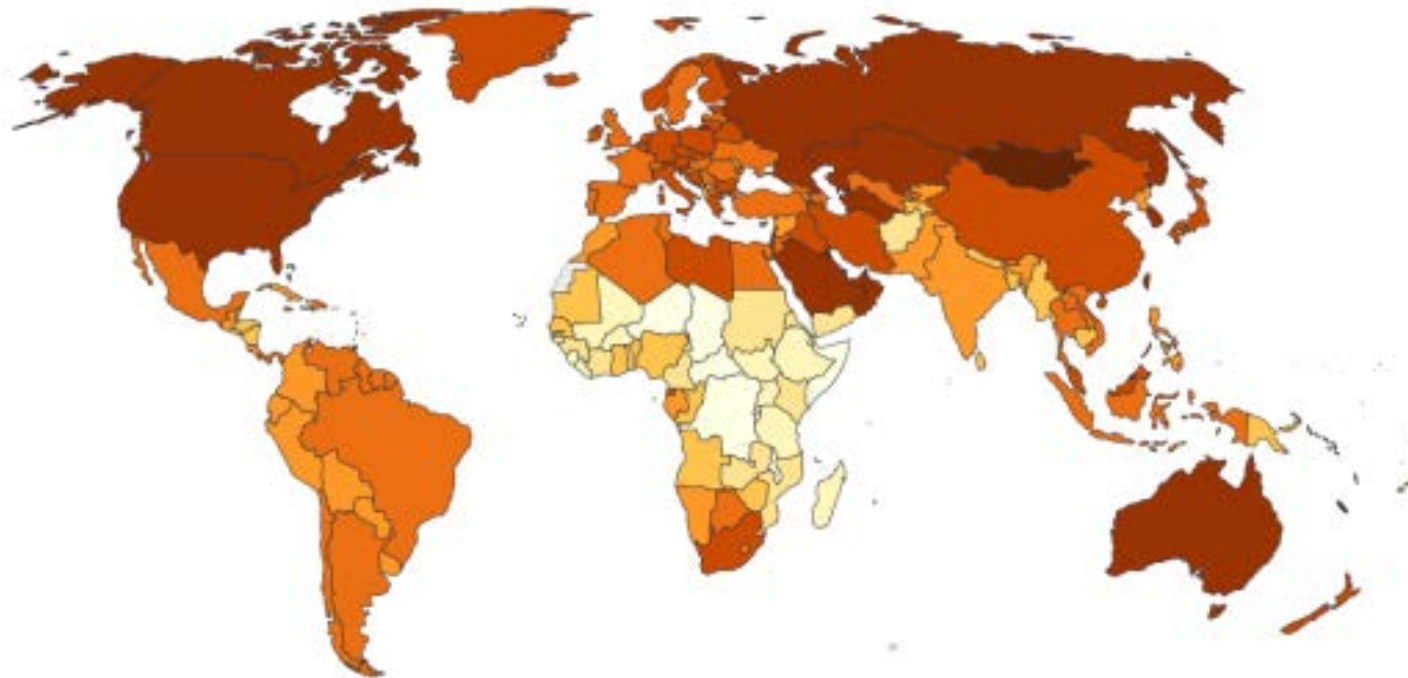


CO2 Emissions per capita in 2020

Per capita CO2 emissions, 2020

Carbon dioxide (CO₂) emissions from the burning of fossil fuels for energy and cement production. Land use change is not included.

Our World
In Data



Source: Our World in Data based on the Global Carbon Project

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

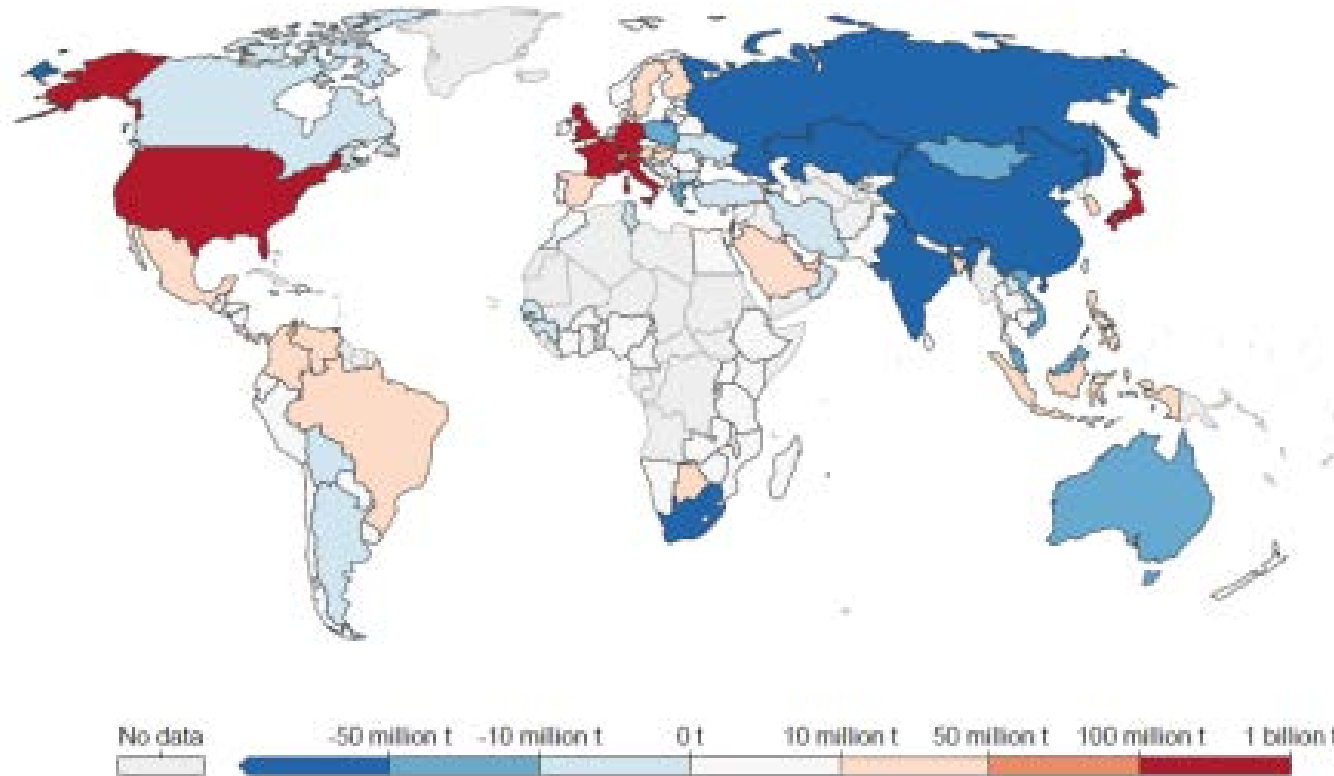


Trade determined CO2 Emissions

CO2 emissions embedded in global trade, 2019

Carbon dioxide (CO₂) emissions embedded in trade, measured as the net import-export balance in tonnes of CO₂ per year. Positive values (red) represent net importers of CO₂ (i.e. "100 million" would mean a country was a net importer of 100 million tonnes of CO₂ in a given year). Negative values (blue) represent net exporters of CO₂.

Our World in Data



Source: Our World in Data based on the Global Carbon Project

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

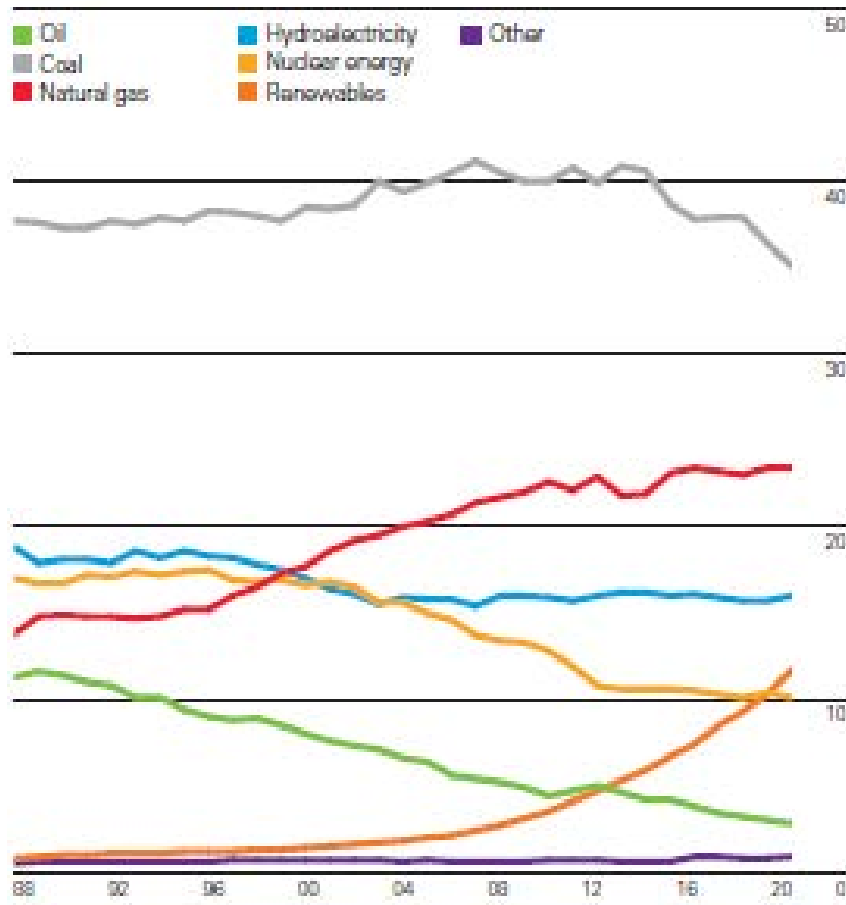


Renewable energy – data and facts



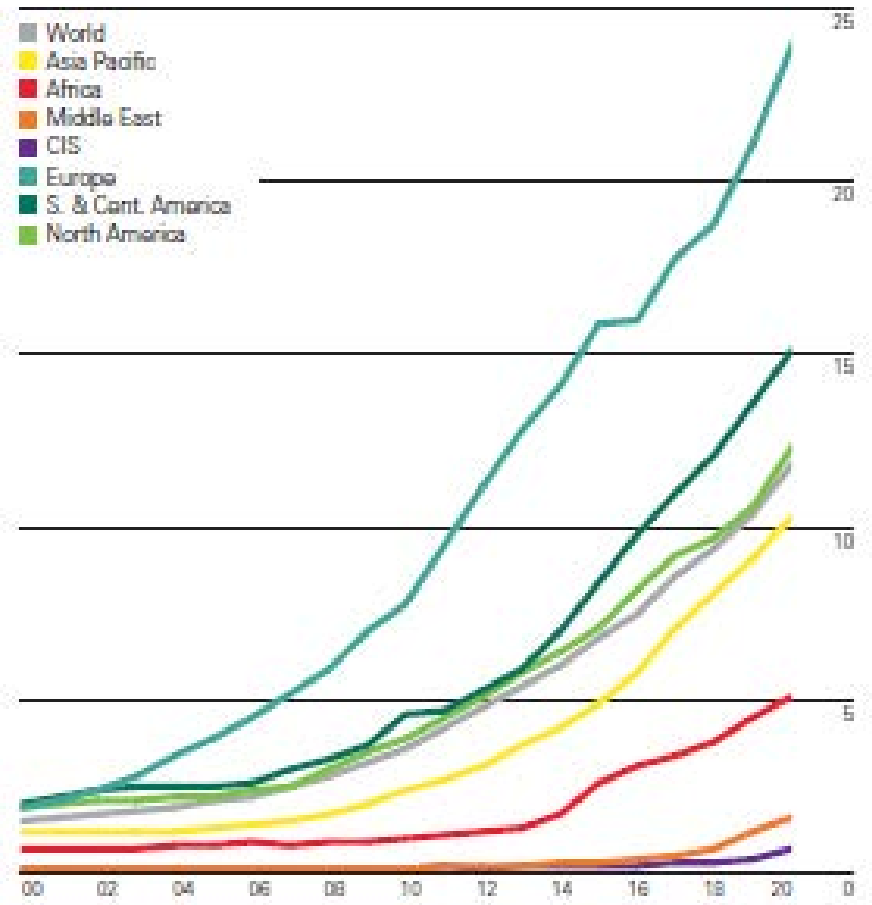
Share of global electricity generation by fuel

Percentage



Renewables share of power generation by region

Percentage





PARTE 2 SICUREZZA ITALIA

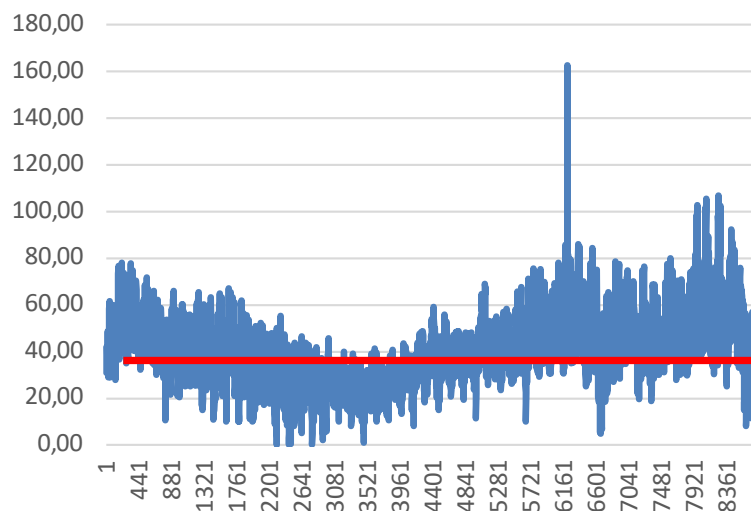


MERCATO ELETTRICO ANNO 2020

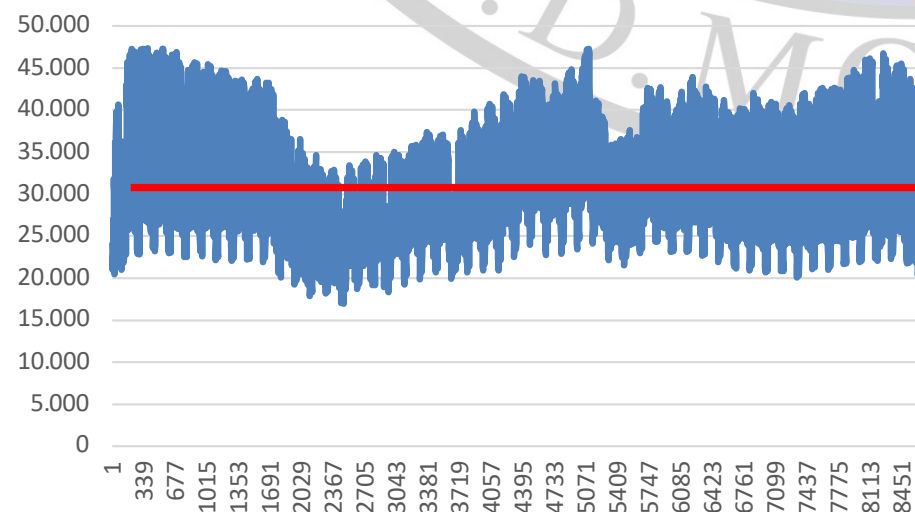
PREZZO MEDIO **38.92** EURO/MWh

QUANTITA' MEDIA 31.9 GWh TOT 280.179 TWh

PUN 2020



QUANTITA' Totale Italia 2020





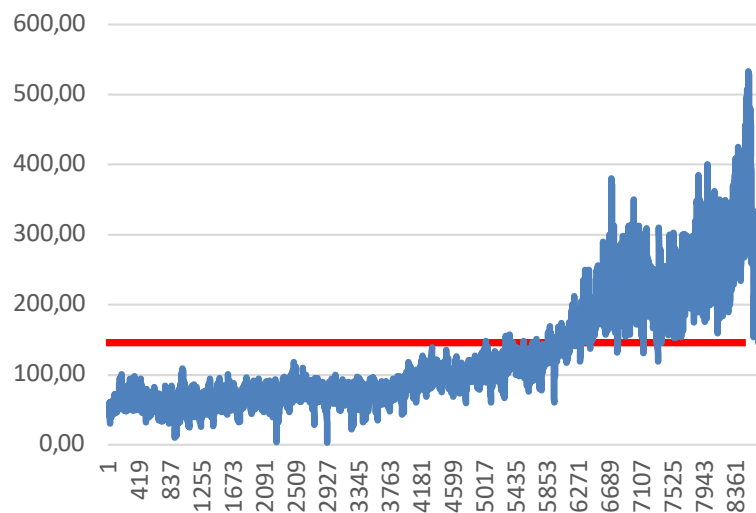
MERCATO ELETTRICO ANNO 2021

PREZZO MEDIO **125.4** EURO/MWh

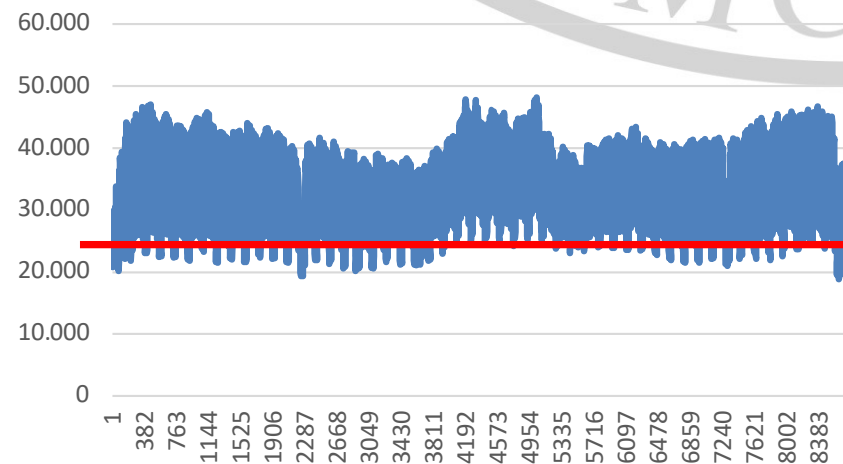
QUANTITA' MEDIA 33.1 GWh TOT 290.4 TWh

COSTO TOT 36.4 mld EURO = 3 mld EURO/ MESE

PUN 2021



Quantita' Totale Italia 2021





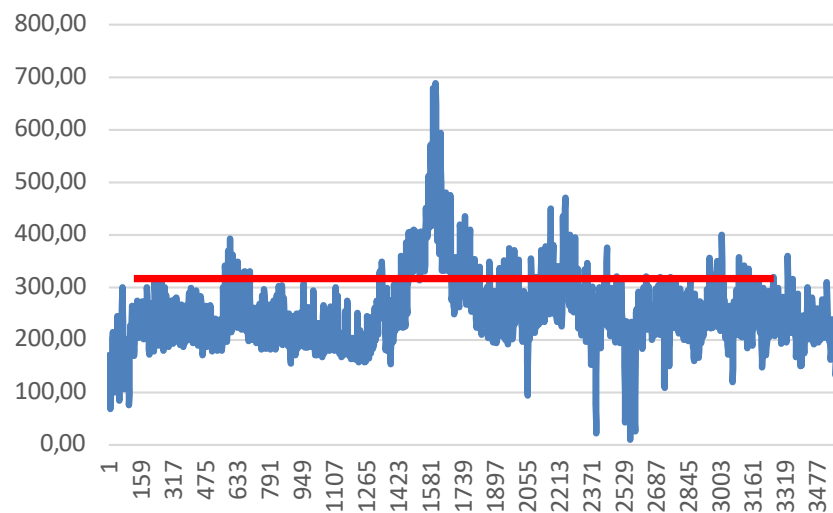
MERCATO ELETTRICO ANNO 2022 – 5 mesi

PREZZO MEDIO **244.6** EURO/MWh

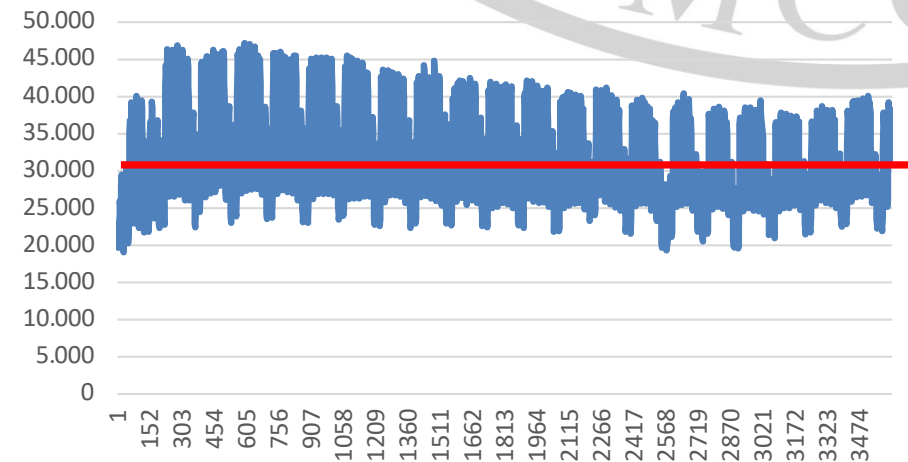
QUANTITA' MEDIA 32.8 GWh TOT 119.1TWh

COSTO TOT 29.03 mld EURO = 5.8 mld EURO/ MESE

PUN GEN MAG 2022



QUANTITA' Totale Italia
Gen MAg 2022

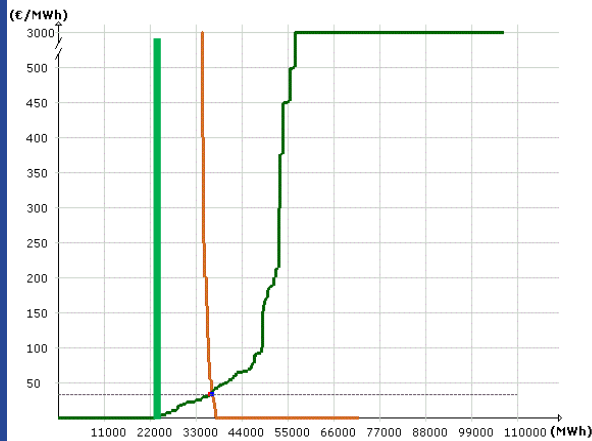




MERCATO ELETTRICO ANNI 2020 2021 2022 LE FONTI RINNOVABILI (FER) SONO CIRCA IL 40% DELL'OFFERTA

Market Zone: CNOR; CSUD; NORD; SIC1; SUD; AUST; CORS; FRAN; GREC; ROSN; SLOV; SVIZ; MALT; MONT

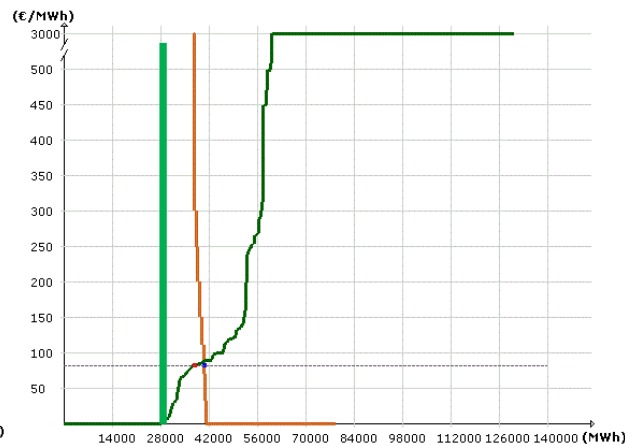
Date: 15/06/2020 Hour: 12



- Accepted offer quantity (36402,876 MWh)
- Accepted bid quantity (36717,306 MWh)

Market Zone: CALA; CNOR; CSUD; NORD; SARD; SIC1; SUD; AUST; COAC; CORS; FRAN; GREC; SLOV; SVIZ; MALT; MONT

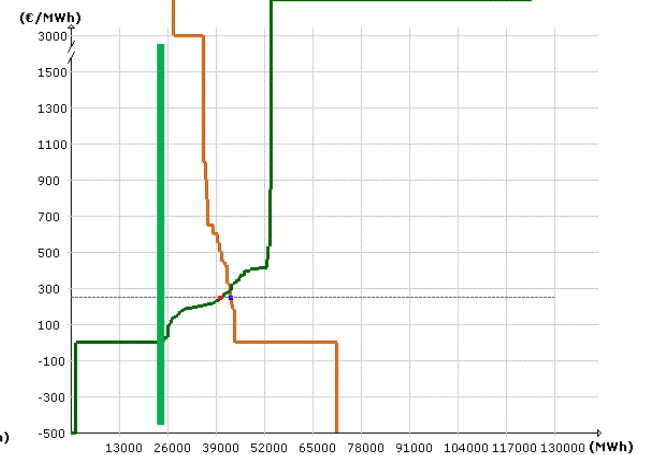
Date: 15/06/2021 Hour: 12



- Accepted offer quantity (37711,224 MWh)
- Accepted bid quantity (40583,224 MWh)

Market Zone: CALA; CNOR; CSUD; NORD; SARD; SIC1; SUD; AUST; COAC; CORS; FRAN; GREC; SLOV; SVIZ; MALT; COUP; MONT

Date: 15/06/2022 Hour: 12



- Accepted offer quantity (40156,114 MWh)
- Accepted bid quantity (42795,979 MWh)



ITALIA

CF

L'invasione russa dell'Ucraina nel febbraio 2022 ha determinato
dell'ulteriore rialzo dei prezzi delle materie prime e dell'acuirsi delle
strozzature dal lato dell'offerta.

EU

I prezzi al consumo hanno registrato un aumento del 7,4 per cento rispetto
allo stesso mese dello scorso anno, sospinti dai rincari dell'energia

Stati Uniti

L'inflazione di fondo, pari al 6,2 per cento, riflesso soprattutto del
surriscaldamento della domanda.



ITALIA

REL

2021

Peso beni energetici 8.8%

Inflazione componente energetica +14.3%

Contributo energia all'inflazionee = $14.3 \times 8.8 =$ circa 1.2%

Inflazione senza energia 0.8%

Inflazione tot IPCA 1.9%

Tavola 9.1

VOCI	Prezzi al consumo		
	Variazioni percentuali sull'anno precedente		Pesi percentuali
	2020	2021	2021
IPCA	-0,1	1,9	100,0
Alimentari freschi	2,8	0,7	7,5
Alimentari trasformati	1,0	0,4	17,0
Energetici	-8,6	14,3	8,8
Beni non alimentari e non energetici	0,7	0,7	28,2
Servizi	0,4	0,9	38,6
Beni e servizi a prezzo amministrato	-3,5	7,0	7,7
Indice generale al netto di alimentari, energetici e tabacchi	0,5	0,8	70,2
Deflatore del PIL	1,4	0,5	
Indice dei prezzi alla produzione dei beni industriali venduti sul mercato interno	-4,4	13,0	

Fonte: elaborazioni su dati Istat; cfr. nella sezione Note metodologiche dell'Appendice la voce *Indici dei prezzi al consumo: Italia*.

Figura 9.1



Fonte: elaborazioni su dati Istat; cfr. nella sezione Note metodologiche dell'Appendice la voce *Indici dei prezzi al consumo: Italia*.
(1) IPCA.



ITALIA

REL

2022 primi mesi

Peso beni energetici 8.8%

Inflazione componente energetica = circa +60%

Contributo energia all'inflazione = circa 5%

Inflazione senza energia 2%

Inflazione tot IPCA 6.8%

Tavola 9.1

VOCI	Prezzi al consumo		Pesi percentuali 2021
	Variazioni percentuali sull'anno precedente		
	2020	2021	
IPCA	-0,1	1,9	100,0
Alimentari freschi	2,8	0,7	7,5
Alimentari trasformati	1,0	0,4	17,0
Energetici	-8,6	14,3	8,8
Beni non alimentari e non energetici	0,7	0,7	28,2
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Fonte: elaborazioni su dati Istat; cfr. nella sezione Note metodologiche dell'Appendice la voce *Indici dei prezzi al consumo: Italia*.
(1) IPCA.



ITALIA



COSA SI POTEVA FARE 2022 primi mesi

Prima Considerazione: nel mercato elettrico ai generatori e' riconosciuto il prezzo zonale – i consumatori pagano il PUN (prezzo unico nazionale). Quindi una azione calmiera sul PUN e' facilissima da implementare

Seconda considerazione: nei primi 5 mesi 2022 il PUN e' aumentato da 125 a 244 e il costo mensile e' aumentato da 3 a 5.8 mld di euro – cioe' 2.8 mld , cioe' 14 mld EURO

Io avrei messo un calmiera al PUN pari al prezzo 2021

- Lo Stato avrebbe pagato 14 mld EURO (come la manovra attuata)
- Lo Stato avrebbe potuto imporre alle FER il prezzo calmiera, tramite il GSE, recuperando il 40% di 2.8 = 5.6 mld EURO

CONCLUSIONE:

- **Impatto su inflazione minore**
- **Impatto sul bollette famiglie e imprese minore**
- **Costo per lo Stato inferiore a quanto speso, invano, per le accise ... visto che la benzina e' di nuovo sopra 2 EURO/LITRO !**



PARTE 3 DIVERSIFICAZIONE AL 2050



Renewable energy

European and Italian 2030 and 2050 targets to reach net zero economy

	Europe	Italy
2030	<ul style="list-style-type: none">• -55% GHG emissions• 40% RES in final energy consumption• -36% final energy consumption	<ul style="list-style-type: none">• -43% GHG emissions in ETS sectors and -33% GHG emissions in non-ETS sectors• 30% RES in final energy consumption• 55% RES in electricity generation• -39.7% final energy consumption
2050	<ul style="list-style-type: none">• 0 net GHG emissions (European Union carbon neutrality at 2050)	<ul style="list-style-type: none">• -84/-87% GHG emissions• 85-90% RES in final energy consumption• 95-100% RES in electricity generation• -49% final energy consumption

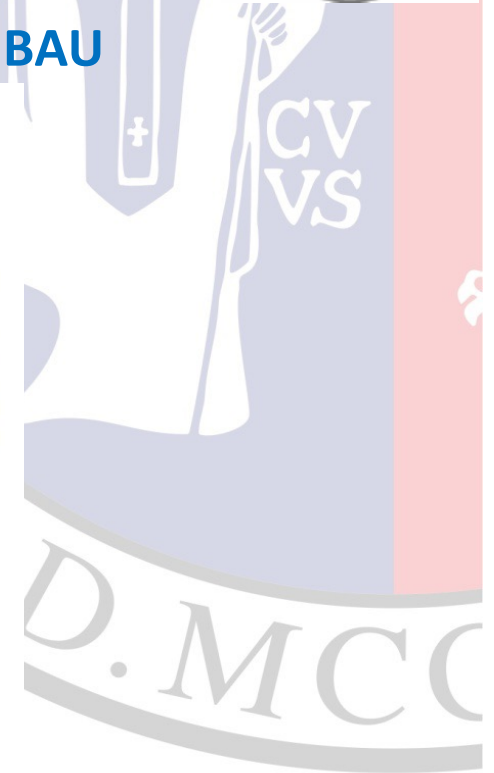
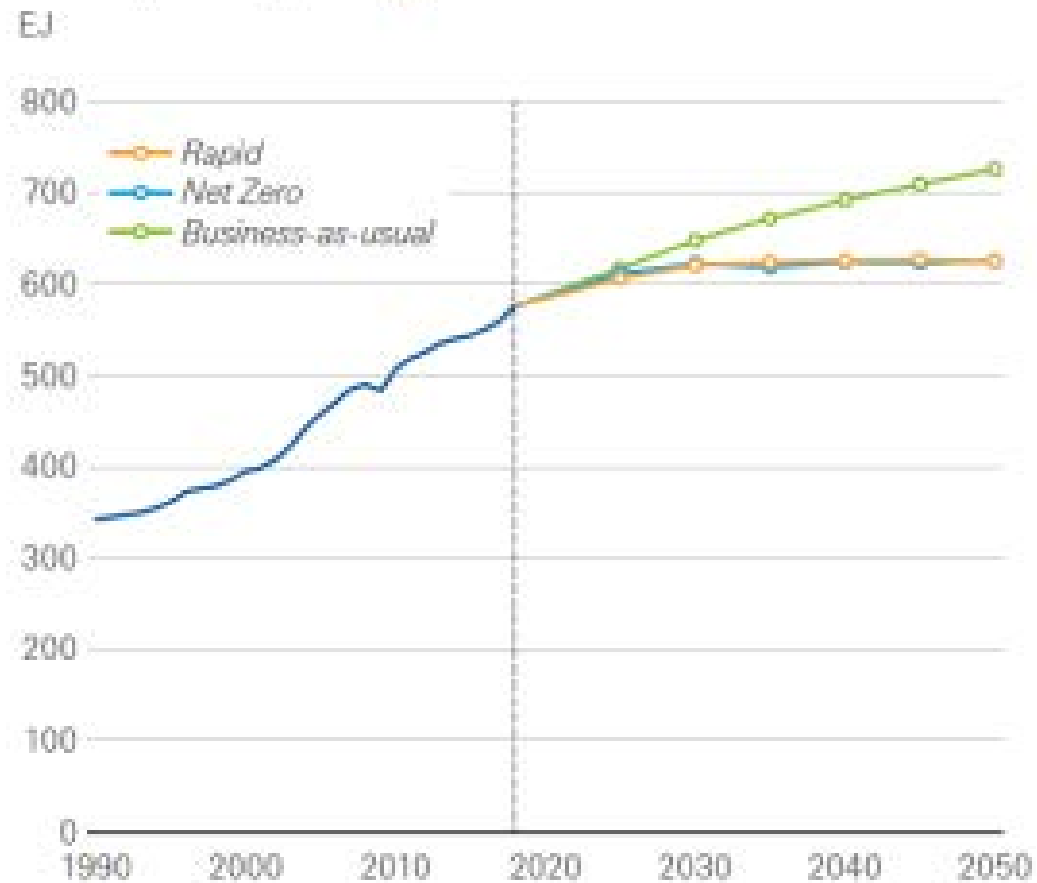


Renewable energy

THE WORLD SCENARIO to 2050

Primary demand increases 10% in Rapid and 25% on BAU

Global primary energy demand



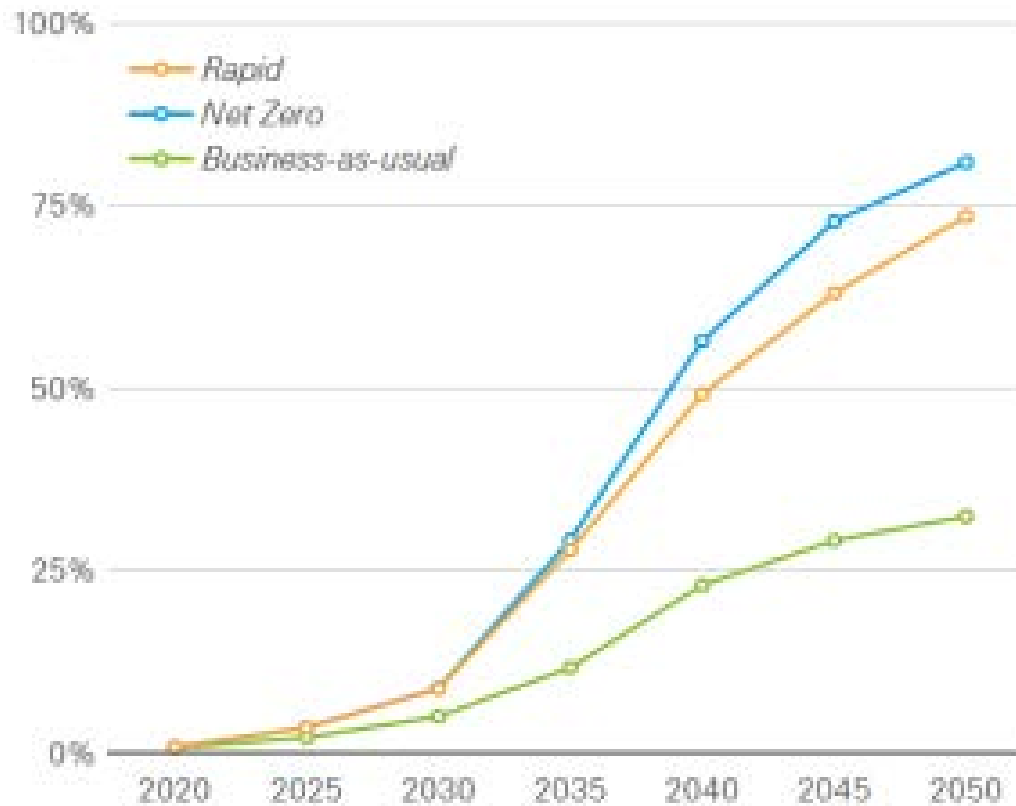


Renewable energy

THE WORLD SCENARIO to 2050

Diffusion of EV is 30% in BAU and 75% in Rapid

Share of car and truck vehicle kilometres electrified*





Renewable energy

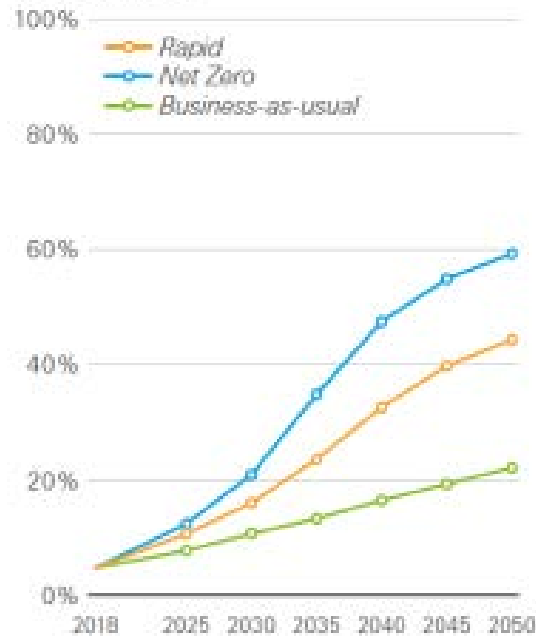
THE WORLD SCENARIO to 2050

Renewables share,
from 5% in 2018 to:
20 % in 2050 in BAU
40% in 2005 in Rapid
60 % in Net-zero

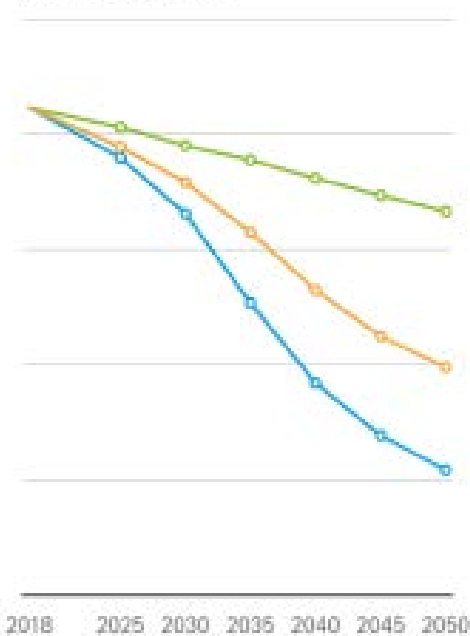
Hydrocarbons share,
from 85% in 2018 to:
65% in BAU
40% in Rapid
20% in Net-zero

Shares of primary energy

Renewables



Hydrocarbons





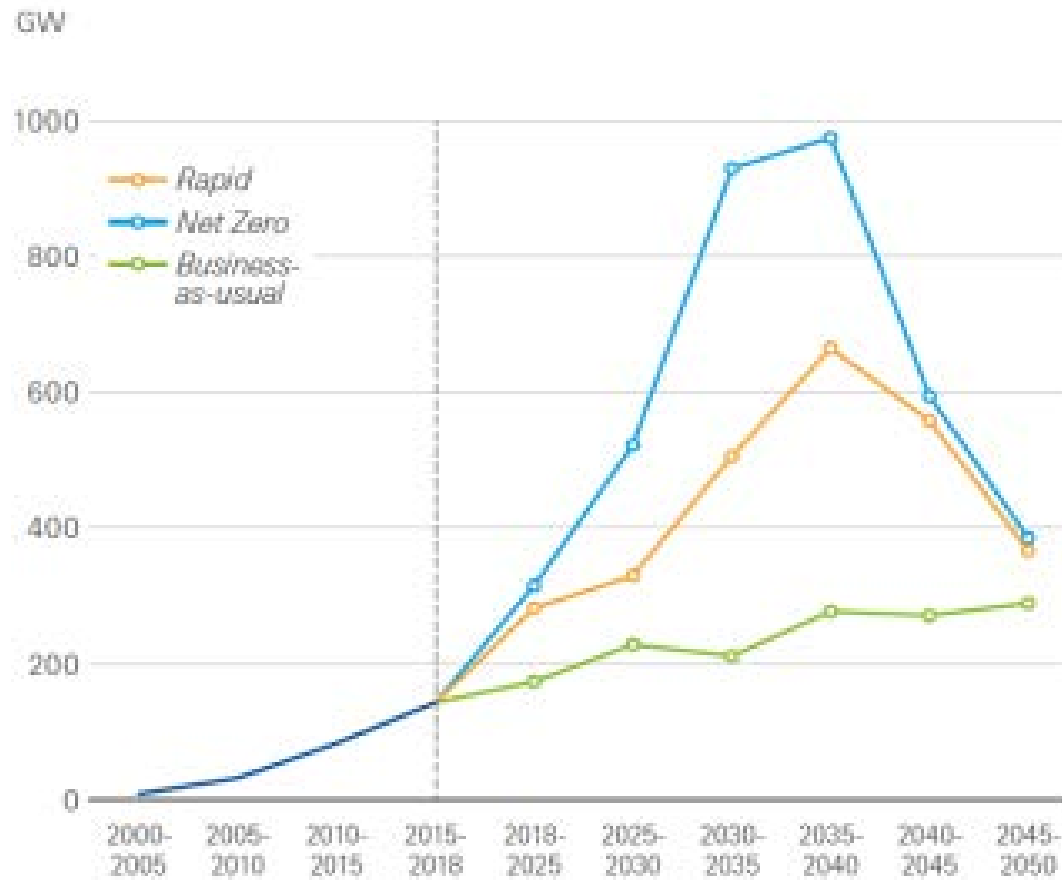
Renewable energy



THE WORLD SCENARIO to 2050

Renewables growth of wind and solar to 2050

Annual average increase in wind and solar capacity





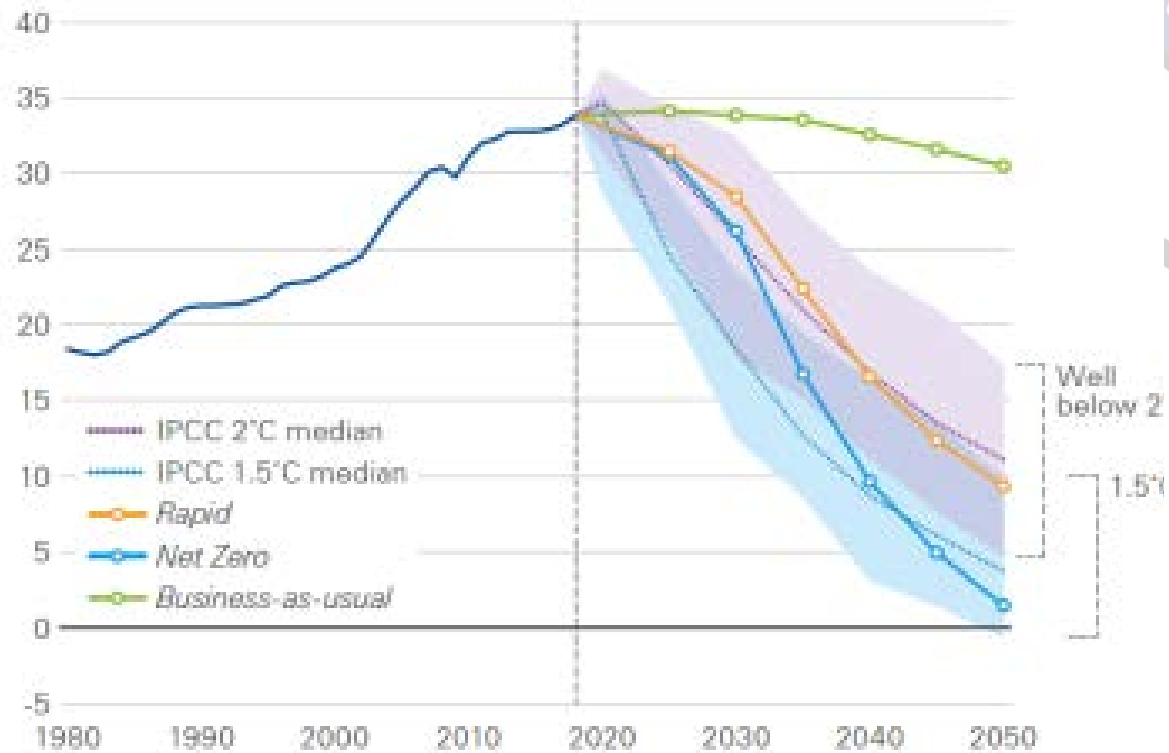
Renewable energy

THE WORLD SCENARIO to 2050

CO2 Emission in 2050

Global carbon emissions from energy use

Gt of CO₂





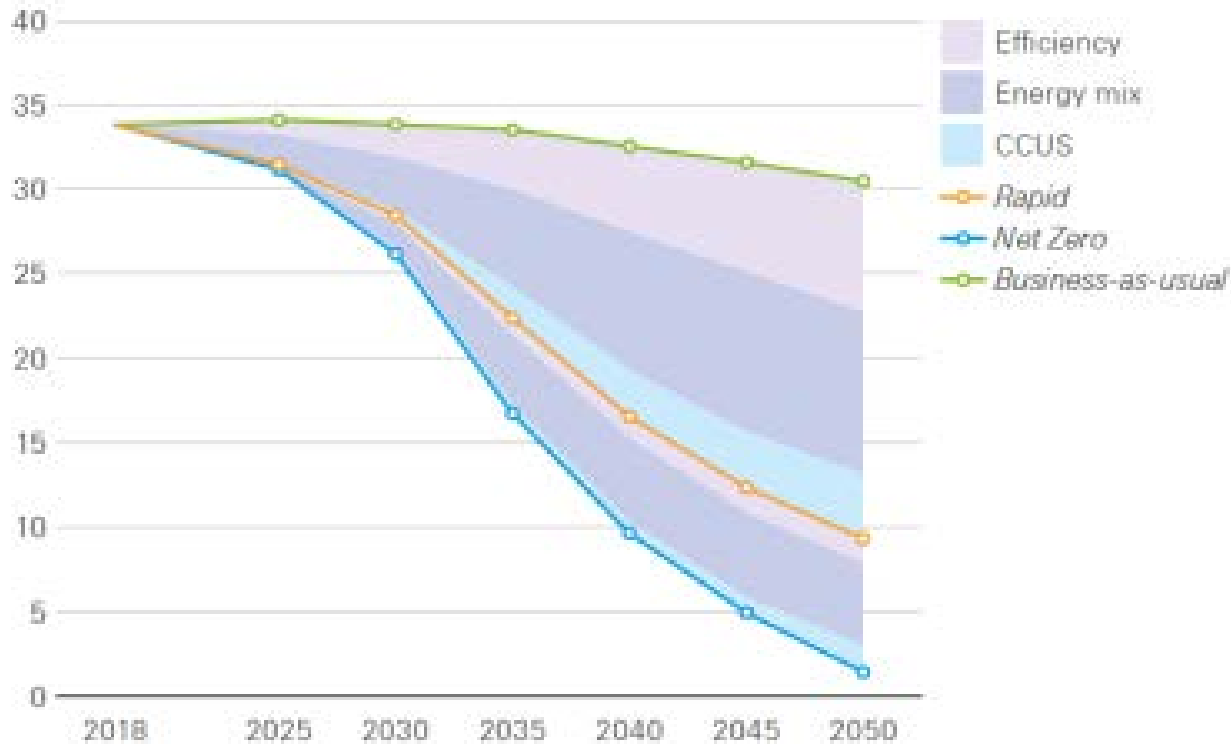
Renewable energy

THE WORLD SCENARIO to 2050

CO2 Emission in 2050: switch to low carbon energy

Carbon emissions from energy use

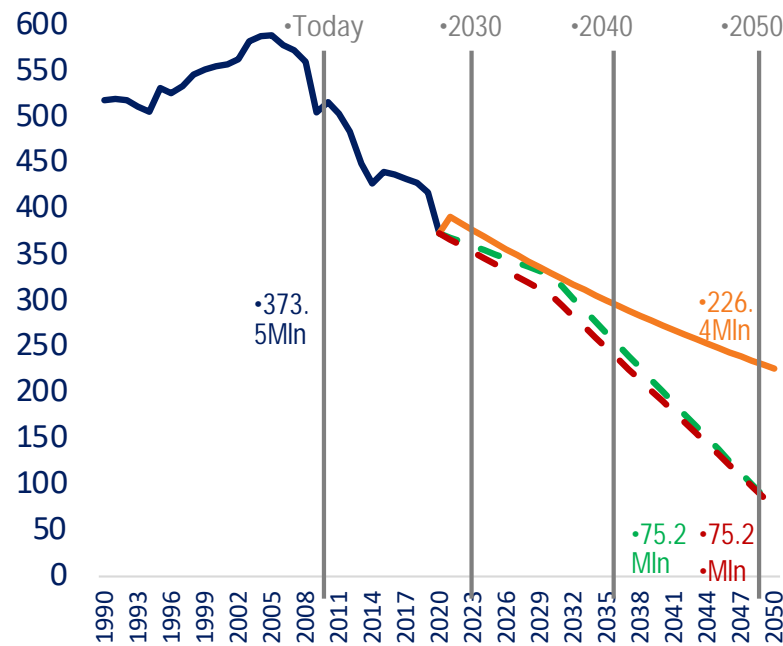
Gt of CO₂



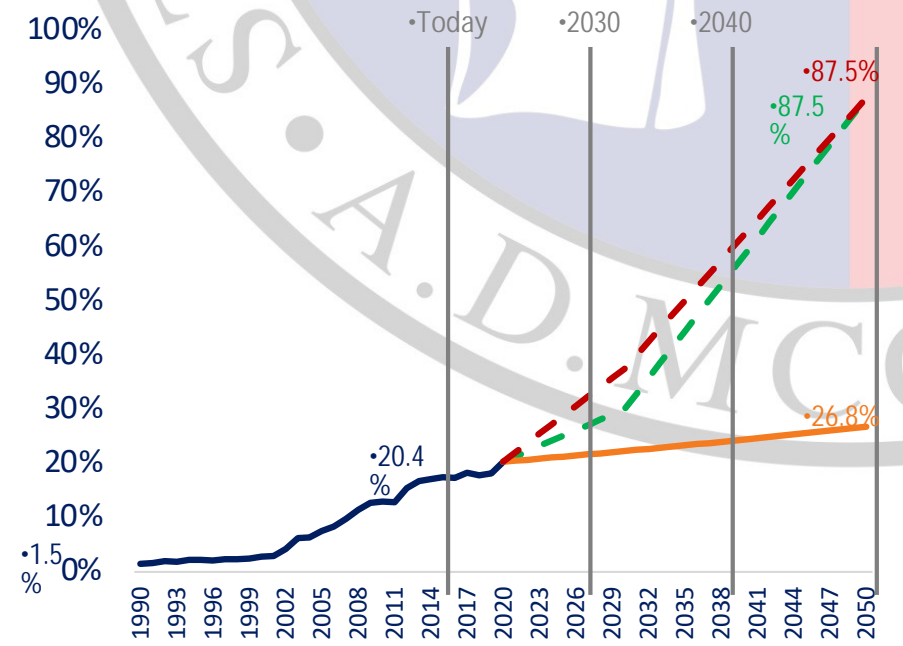


At the current pace, Italy would reach the 2050 GHG national policy target in 2109 and the RES target in 2179

Gross GHG emissions in Italy (million tonnes CO₂ equivalent), 1990-2050^E



Renewables energy sources in energy consumption in Italy (percentage value), 1990-2050^E



- Historical data
- Inertial trend*
- Trend needed to reach national policy targets**
- Trend needed to reach "Fit for 55" targets***

(*) Inertial trend has been calculated by projecting CAGR from 2009 to 2019.
 (***) Policy targets refers to the ones reported in 2030 Integrated Energy and Climate Plan and 2050 Long-Term strategies.
 (***) "Fit for 55" targets in 2030 have been estimated by projecting the same percentage increase estimated at European level.
 Source: The European House - Ambrosetti and Enel Foundation elaboration on Eurostat data, 2022