



EFFECTS OF COVID-19 ON MOBILITY: CAUSES AND SOLUTIONS

Vincenzo Antonucci
CNR ITAE



National Research Council of Italy
Institute of Advanced Technologies for Energy



World Federation of Engineering Organizations
Committee on Energy

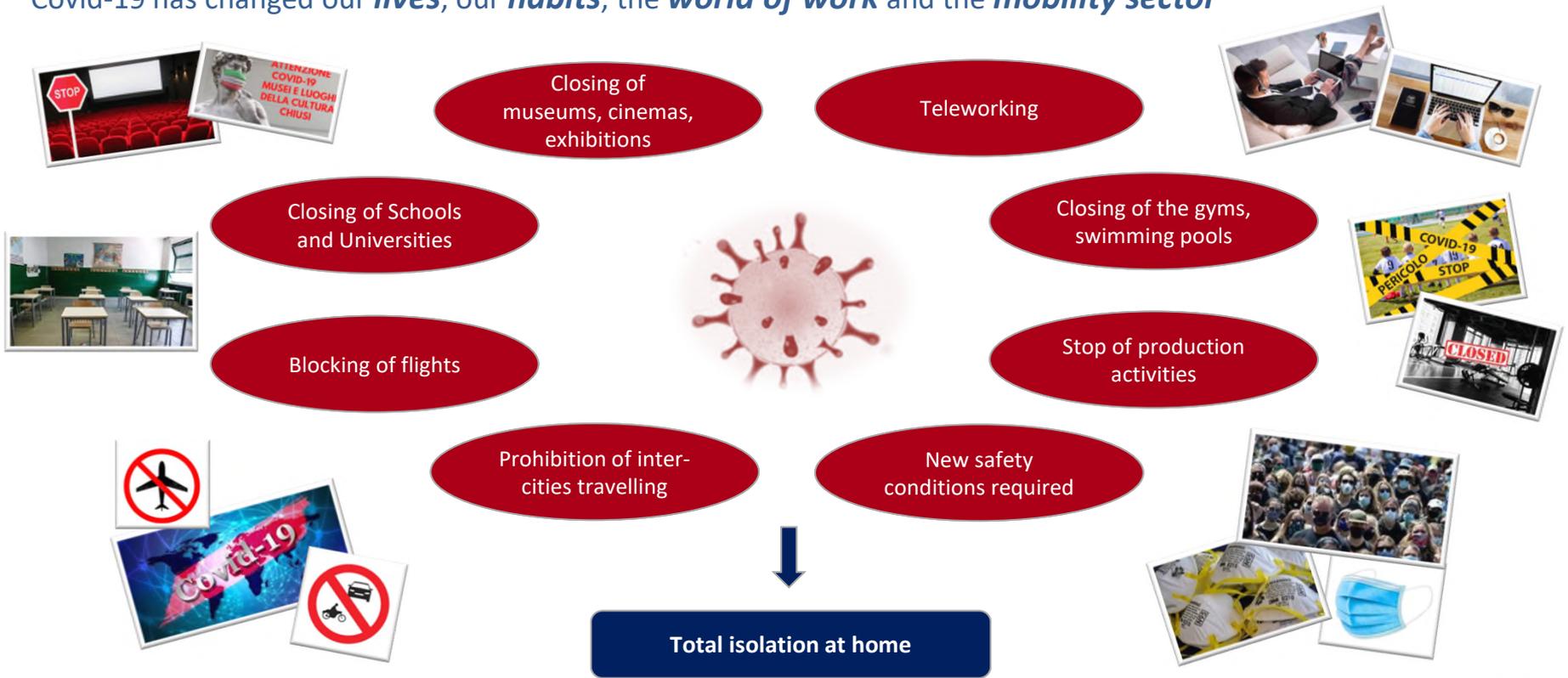
www.wfeo.org/committee-energy

Energy transition & Covid-19 crisis: the role of engineers



WHAT HAPPENED DURING COVID-19 PANDEMIC

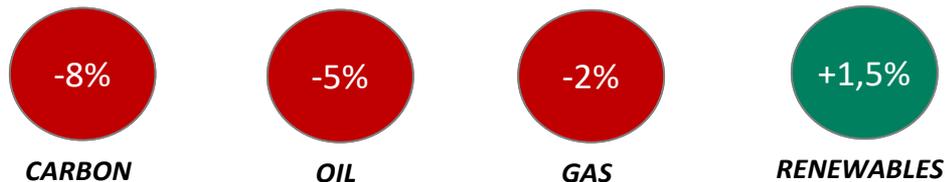
Covid-19 has changed our *lives*, our *habits*, the *world of work* and the *mobility sector*





IMPACT OF COVID-19 ON ENERGY SECTOR

- During the first quarter of 2020, the global energy demand has fallen by 3.8 % compared to the same period in 2019:



In Italy, the energy sector trend reflects the global one

- The interruption of commercial and industrial activities and the restrictions in the transport sector have inevitably led to a decrease in energy demand



Demand of electricity supply in Italy

- 10 %

2020 vs 2019

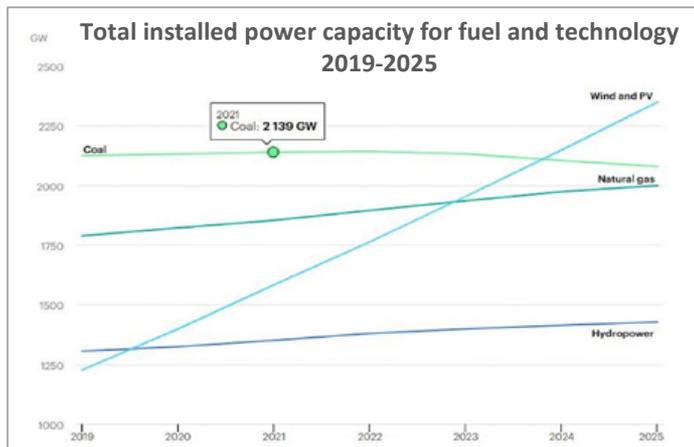
Source Terna

The drop in energy consumption recorded in Italy in 2020 is the highest ever since the Second World War



WHY RENEWABLES GROWING?

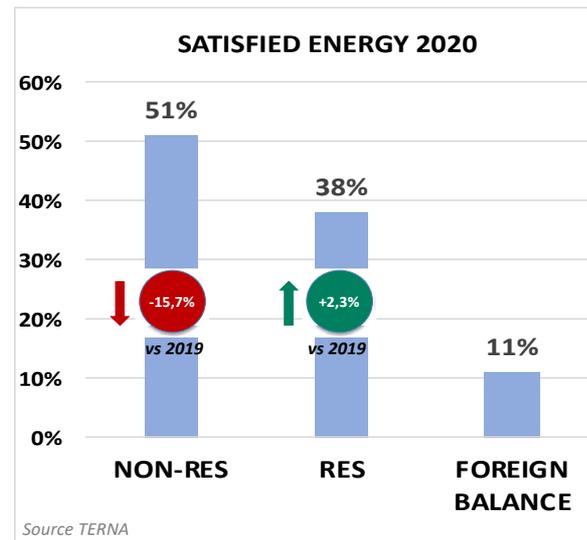
- Renewables have been the **only energy sources** that showed an **upward trend** during the pandemic
- The analysis of the energy mix shows that the:
 - energy production from NON-RES met 51% of the national energy requirements (- 15.7% vs 2019)
 - the energy production from RES satisfied 38% of energy requirements (+ 2,3% vs 2019)
 - remainder by the foreign balance



Total installed wind and solar photovoltaic capacity is set to exceed that of natural gas in 2023 and coal in 2024

Why has coal been affected by the pandemic?

- decrease of the general demand for electricity
- coal burning process has very high costs, on the contrary renewable energy plants have lower operating costs and can operate even when demand falls
- investing in energy from fossil fuels is not only harmful in environmental terms and economically risky also



IMPACT OF COVID-19 ON MOBILITY SECTOR



The lockdown led to the almost total block of mobility and circulation from March to late May 2020 and also in the winter months, to counter the second pandemic wave

The consequences of COVID-19 on transport sector were

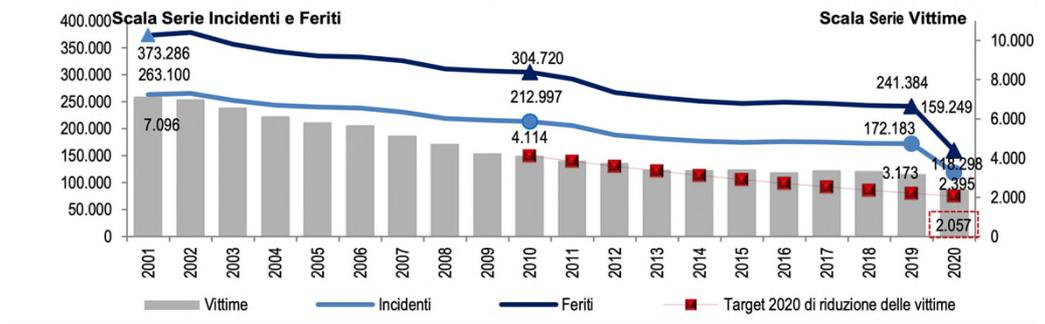
- The consumption of automotive fuels (petrol + diesel) in 2020 amounted to 25.6 million tons, with a loss of 17.7% on the previous year
- Reduction of road accidents and victims (2020 vs 2019) [Source Istat]:



Consumption of automotive fuels in Italy
- 17,7 %
 2020 vs 2019
 Source Mite



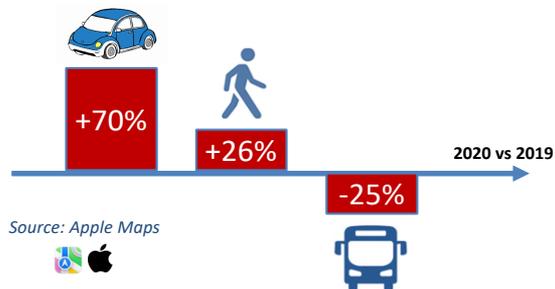
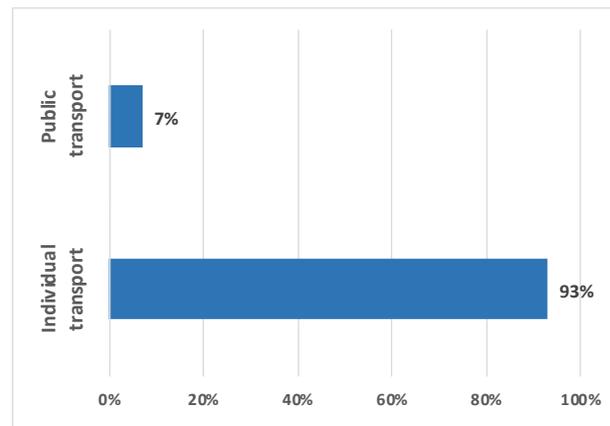
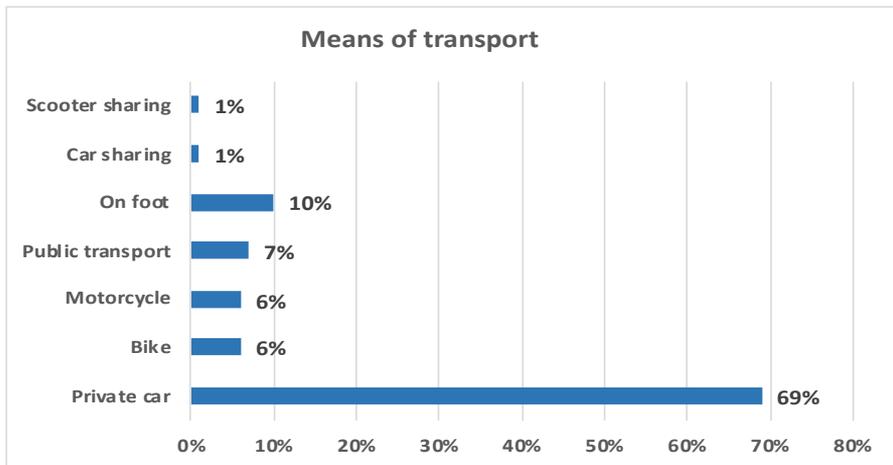
FIGURA 1. INCIDENTI STRADALI CON LESIONI A PERSONE, MORTI E FERITI. Anni 2001-2020, valori assoluti



IMPACT OF COVID-19 ON MOBILITY SECTOR



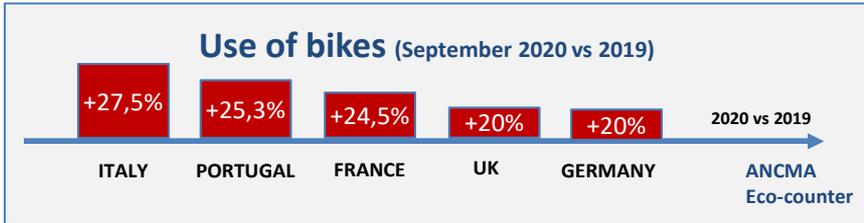
- Drastic reduction of use of public transport



IMPACT OF COVID-19 ON MOBILITY SECTOR



- Great increase in cycling mobility: **60% more** bicycles were purchased in May 2020 than in May 2019



Almost 200 km of 'light' cycle paths were born during 2020 in Italy



- In 2020 there was the first victim due to the electric scooter



Advantages of cycling

For People

For Cities

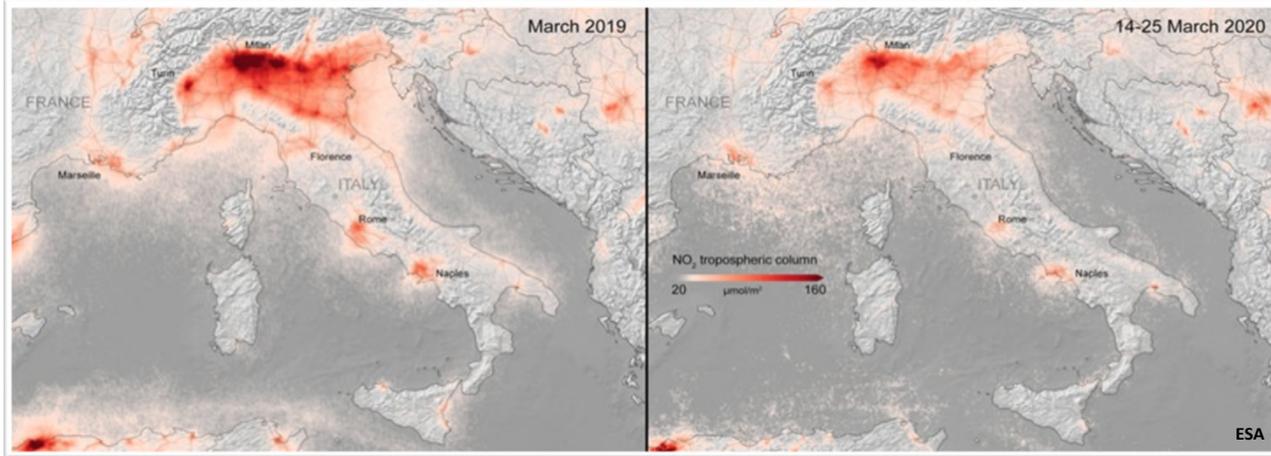
- ✓ reduced spending on travel
- ✓ greater psychophysical well-being

- ✓ reducing pollution
- ✓ reducing traffic



IMPACT OF COVID-19 ON MOBILITY SECTOR

- Drastic reduction of NO₂ emissions in northern Italy already after the first week of lockdown



- Reduction of CO₂ emissions in ITALY and at GLOBAL LEVEL in 2020



Source ISPRA



The coronavirus crisis should be used to take the opportunity to push towards a more environmentally friendly economy

THE RECOVERY PHASE HAS BEGUN: WHAT CHANGES?

- Stop **TELEWORKING**: everyone is returning to their workplaces
- **Daily commuting trips** are restarting
- **FLIGHTS** and **TRAINS** have been back to normal operation for months
- **Sports activities** and **concerts** are starting again
- **Cinemas, theatres** and **museums** are reopening

The transport system is
back on track

WHAT ARE THE RISKS IF WE GO BACK TO HABITS BEFORE COVID-19?

Efficiency of the transport system is linked to the ability to use **fewer vehicles** to transport **as many people as possible** (increasing load factor) and reduce distances and its impact (pollution, greenhouse gases, energy consumption, accidents, congestion)

Mass urban transport (undergrounds, trams and buses) is maximum expression of this: the only possible solution for congestion and pollution of the cities affected caused by the use of private cars

On the other hand the vehicle sharing seems impossible without violating the imperatives of physical distancing required by pandemic emergency

The solution to this problem is **NOT** a return to massive use of the individual car



1. COURAGE

to transform an emergency
into an opportunity

2. IMMAGINATION



to benefit from the potential offered by
new technologies



THINGS TO DO



THE REAL CHALLENGE IS TO ADAPT TRANSPORT SYSTEMS TO ENSURE SAFE MOBILITY WITHOUT LOSING EFFICIENCY

- **Rethinking the movements within cities:** provide entrances and exits from workplaces at different times in order to spread the traffic by reducing peaks (which mean slowdowns, traffic, greater pollution) → **flexibility**



- **Mobility on demand or MaaS (Mobility as a Service):** public transport that becomes flexible

- **Promote pedestrian and cycling mobility – “Micromobility”:** the bicycle is the fastest way through the city (especially in the presence of congestion)



- **Inter-modality:** it is necessary to ensure that there are more and more alternatives for people. Not just local public transport, but car sharing, bicycles, scooters, ...

- **Suitable infrastructures:** intermodal hubs (especially with the railways) and digital platforms that can make everything more usable



- **Maintain safety measures:** sanitation of shared cars, measurement of the temperature, request of the green pass, ...

- **Eco-sustainable mobility:** electric or hybrid car (for individual trips) and buses (for public transport)



NEW TECHNOLOGIES AS A KEY TO GETTING OUT OF THE COVID-19 CRISIS



The intense phase of recovery from the crisis due to COVID-19 presents us with a choice

to restore what we enjoyed before



to try to build a better situation



....Resilience is the ability to face a traumatic event by reorganizing positively....

NEW TECHNOLOGIES AS A KEY TO GETTING OUT OF THE COVID-19 CRISIS



- Looking towards electric mobility, there could be an imbalance in consumption and the network could suffer great instability
- Integration of the energy sector with the electric mobility sector
- The electricity grid should prepare to respond to the electricity demand of the transport system



HOW?

The answer is **ENERGY STORAGE** (Batteries and Hydrogen)



- It is necessary to look at the storage in a broader way than traditional batteries. **Electrochemical storage** will retain an important role, but we must not think about imbalances of minutes or hours, but with respect to structural imbalances for which more radical concepts are required.
- **Hydrogen** also plays a key role in the energy storage sector. Renewable energy (solar and wind) produced at peak times can be stored in compressed hydrogen (by using electrolyzer) to be used when there is demand and lack of supply.



Thank you!

Vincenzo Antonucci
CNR ITAE
Phone: +39.090.624234
email: vincenzo.antonucci@itae.cnr.it

