

Reti elettriche e mercati per una transizione sostenibile: nuovi paradigmi, sfide ed opportunità

Il ruolo dei DSO

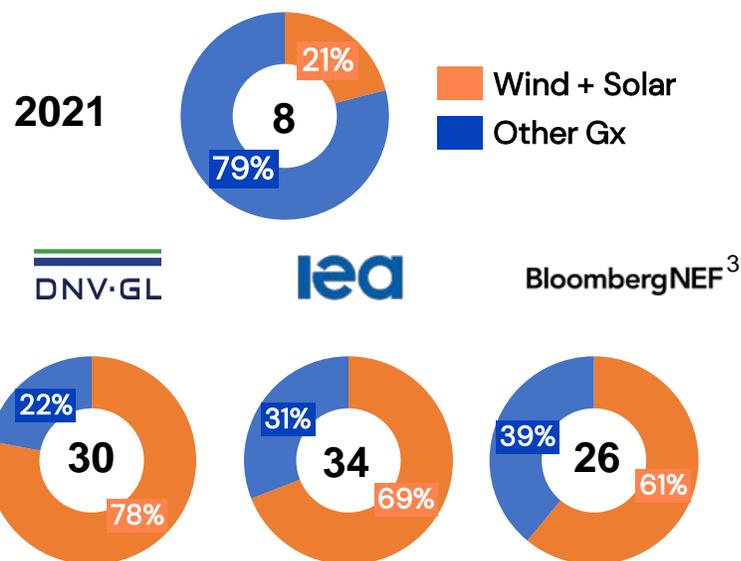
Francesco Amadei – Head of Engineering & Constructions Enel Grids



Global trends and impact on grids

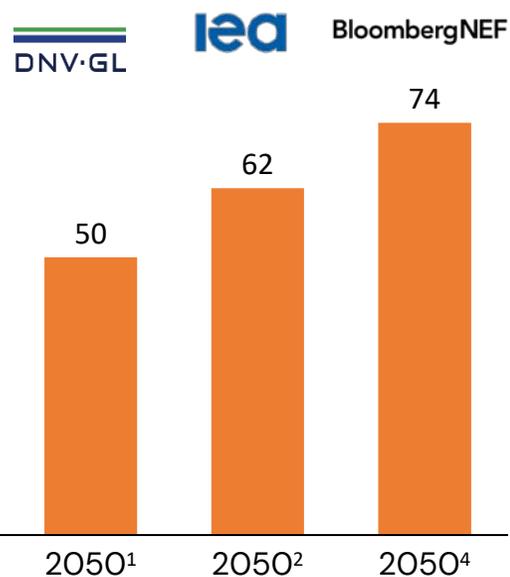
Production capacity

[TW]



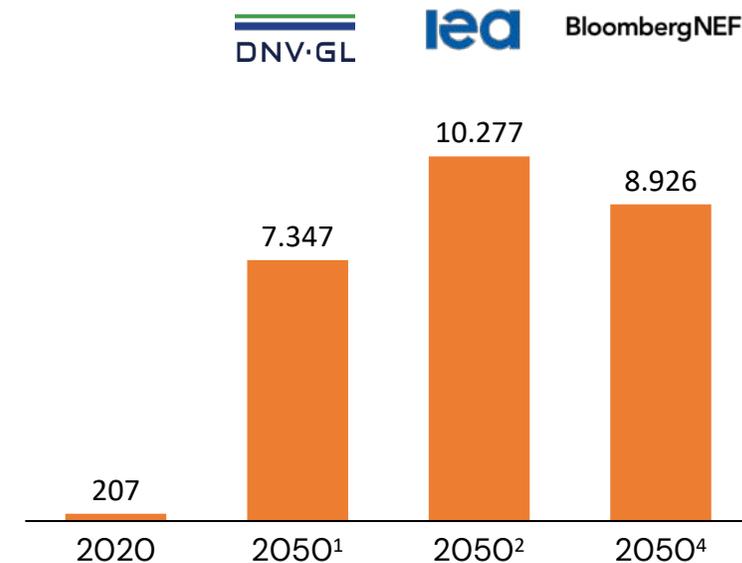
Electricity Demand

[10³ TWh]



Electric Vehicles⁵

[TWh]



1. DNV-GL Energy transition Outlook 2022 ETO scenario; 2. IEA World Energy Outlook 2022 (NZE scenario); 3. BNEF New Energy Outlook 2022 ETS scenario (no data on NZS); 4. BNEF New Energy Outlook 2022 NZS scenario; 5. Including all type of transport

Decentralized renewable generation, increasing electricity demand, and more active role of customers make the distribution grids the main point of energy entry into the system

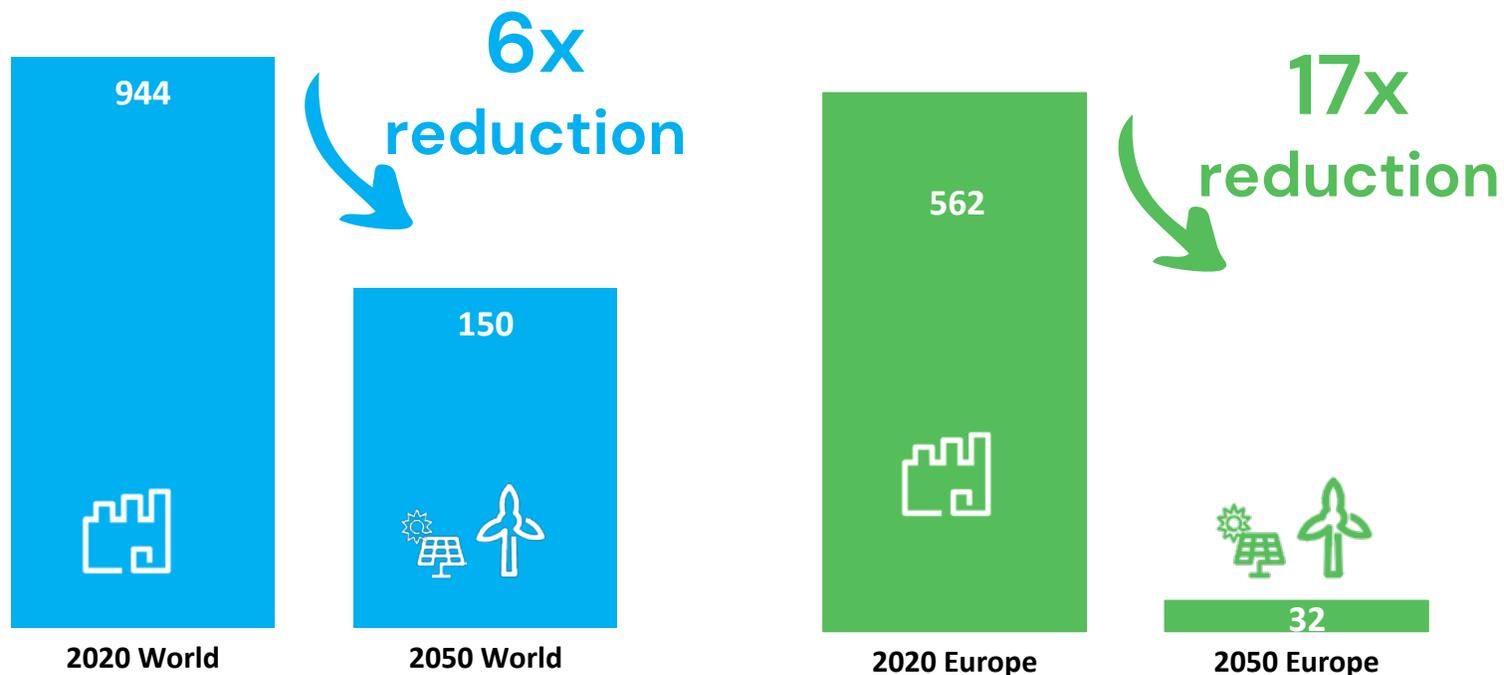
Decentralization of power plants



Global average size (MW)



European average size (MW)



Share of energy fed into distribution grids

2020 2030 2050

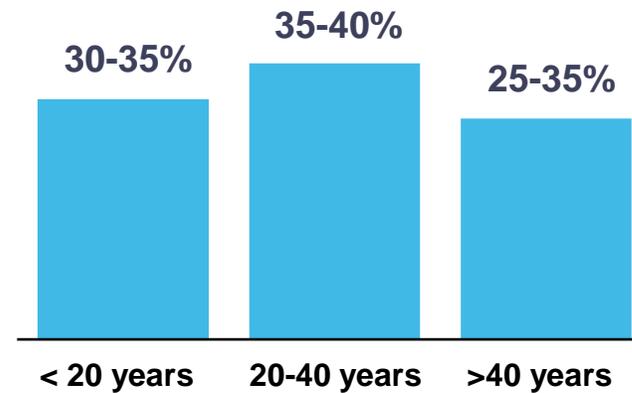
24% 50% 66%

Power plants connected to distribution grids will grow significantly by 2050

Distribution grids are aged



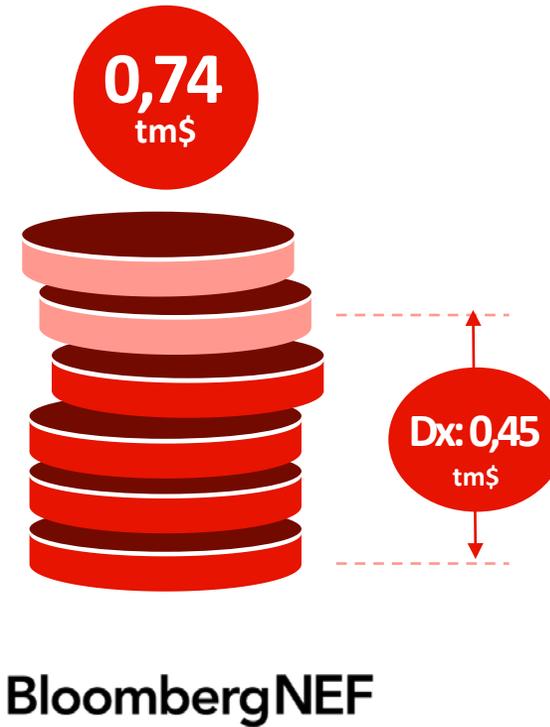
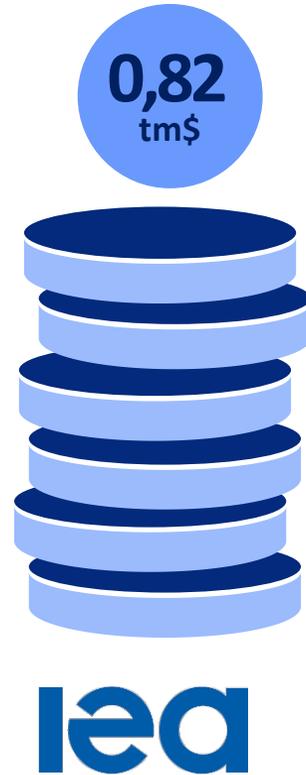
Low voltage grids in Europe*



* Source: Eurelectric Power Grid Outlook 2020

It is essential to plan renewal investments to avoid obsolescence and maintain high service quality

Investment in Grids: average yearly grid investments in 2021-2050



MAIN DRIVER

REINFORCEMENTS

REPLACEMENTS

NEW CONNECTIONS

DIGITALIZATION

Source: BloombergNEF: New Energy Outlook 2022 NZS Scenario, IEA World Energy Outlook 2022: Net-Zero Emission by 2050

Annual investments in 2022-2050 will more than double vs the 2021 ones (~300bn\$2)

The strategy for future-proof grids



Resilience

Ensure service quality even in extreme weather conditions

Investments in renewal and digitalization



Interactive

Enabling access and interaction with all transition players, granting Hosting capacity

The evolution of the DSO's role as orchestrator of the transition



Sustainable

Reducing the environmental impact of assets, also through innovation

Whole supply chain towards Energy Transition with Open approach

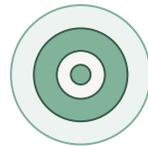
Engineering guidelines for futureproof power distribution networks



Resilient and sustainable design of lay out & components



Network sensorization, control & Automation



Broad band, low latency and reliable TLC network

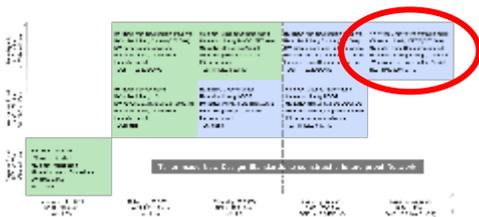


Balance between Cloud & edge computing



Virtual Network digital twin

Secondary substation for European network



Metering

MV Circuit breakers rather than disconnectors

LV circuit breakers remotely controlled rather than fuses

Low latency, broadband TLC

Digital twin

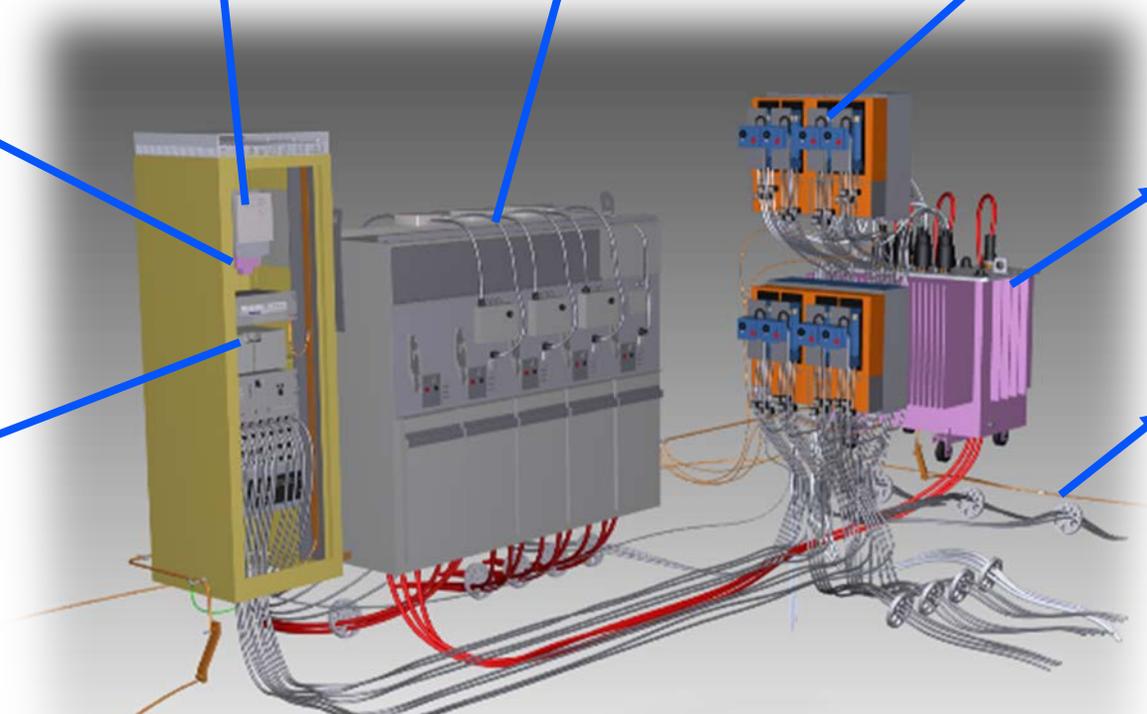
QED **UP2020/RTU**

Advanced network automation

Low losses MT/BT transformers insulated in natural esters

New low carbon design of the cabinet

Sensors



Collaboration with Ensiel



About 20 studies concerning:

- **Grid resilience to extreme wheatear events;**
- **Impact of RES on distribution networks**
- **Ancillary services on distribution network (dir. 352/2021);**
- **Planning criteria;**
- **Electric calculation innovative tools (multiconductor);**