Energia pulita e a costi accessibili con lo stoccaggio dell'idrogeno

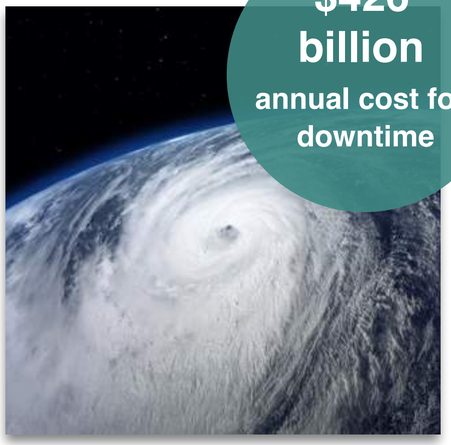
Milano, Fast, 1 luglio 2016

electro
POWER SYSTEMS GROUP

Our Mission

We **unlock the energy transition**, mastering the intermittency of renewable energy sources. We advocate competitive and **technology-neutral energy and emission markets**. Through the seamless integration of the best battery technologies, and our hydrogen and oxygen platform for long autonomy, **we enable renewable energies to power society:** reliably, affordably and sustainably.

Storage is the global challenge of the Energy Transition: a mega-trend



$426 billion
annual cost for downtime

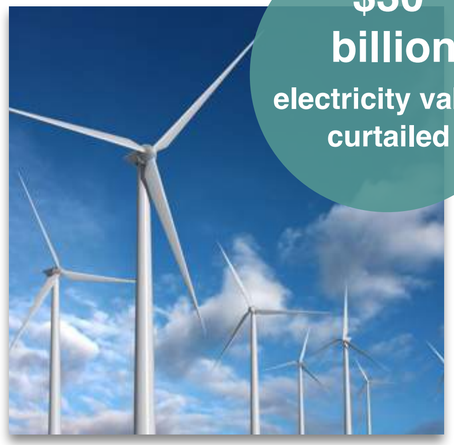
BLACKOUTS are less frequent but longer and more disruptive: natural events impact today a globalized ITC and datacenter worldwide infrastructure.

$293 billion
investment need for T&D

A CENTRALIZED ENERGY MODEL built in 1882 is not capable to manage the renewables penetration, and needs investments in transmission and distribution.

200Mio tons CO2/year
diesel generators emissions

2.4 BILLION PEOPLE, 35% of the global population, are OFF-GRID or under-electrified and generate electricity via a 600GW fleet of diesel generation.



$30 billion
electricity value curtailed

RENEWABLES INTERMITTENCY generates grid instability and a massive penetration of RES to manage global demand and base-loads is not feasible.

$280 bn

global investments in energy storage by 2030
(BCG)

up to $635bn

annual economic impact of energy storage in 2025
(McKinsey)

A technology-neutral approach: a technology group with two business units

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FLEXIBILITY
CONTROL & GRID INTEGRATION OF ANY BATTERY ENERGY STORAGE SYSTEM (BESS)

Storage required for despatchability of large and small electricity systems featuring high penetration of intermittent energy sources:

- Frequency and voltage regulation
- Operating and contingency reserves

Storage system can be located on generation, grid or demand-side in centralized electricity systems

Storage system represents the core of microgrid operation in decentralized electricity systems

CAPACITY
HYBRID STORAGE and HYDROGEN SOLUTIONS TO REPLACE GAS AND DIESEL GENERATION

Storage required to enable a RES-intensive electricity system to serve load in non-recurring demand/supply conditions:

- Constrained or scarcity-priced supply
- Extreme demand

In centralized electricity systems, capacity is usually associated to extreme environmental conditions boosting demand and/or limiting generation

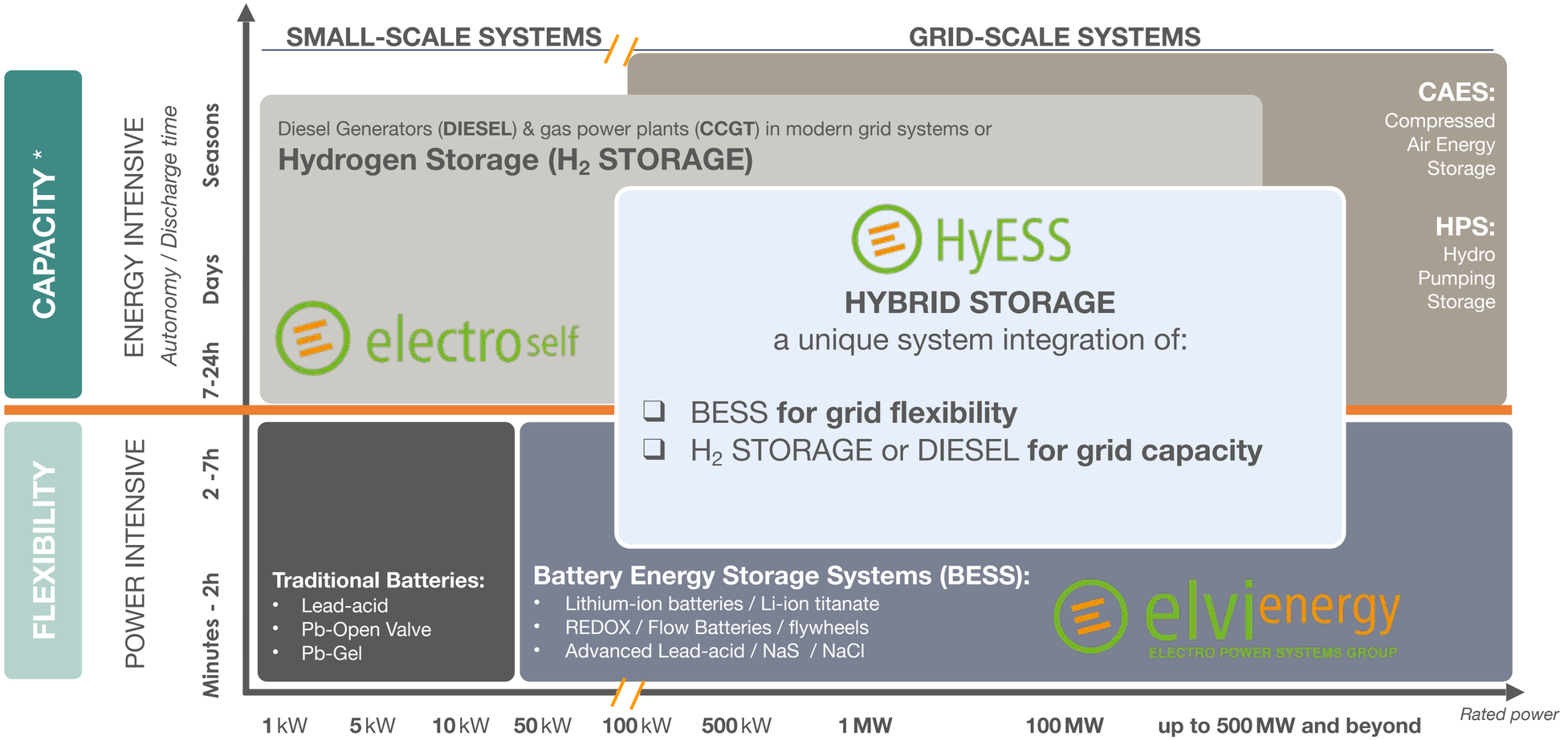
In decentralized electricity systems, capacity requirements are associated to extended scarcity of primary renewable energy resources and/or non-recurring peak demand conditions

HyESS

FLEXIBILITY + CAPACITY = HYBRID

HYBRID ENERGY STORAGE SYSTEM (HyESS)

Positioning: hybrid solutions represent the core of any storage need



* Pure Energy Applications (which cannot be classified as a flexibility or capacity application), aimed at regularly time-shift energy, have not been represented as not profitable in current market environment.

Technology Vertical Integration

What we do as a "*Vertically Integrated Energy Storage Company*"

Power Generation

1 Solar PV module

Solar inverter

1 Wind turbine

Windmill inverter

Flexibility

1 2 3 Battery Module

Battery Management System

BMS

Capacity

1 2 2 Diesel Generator
Gas Turbines

Power Conversion System

PCS

1 2 3 Hydrogen Storage Module

SCADA

Supervisory Control And Data Acquisition

MASTER CONTROLLER

Off-Grid Power generation

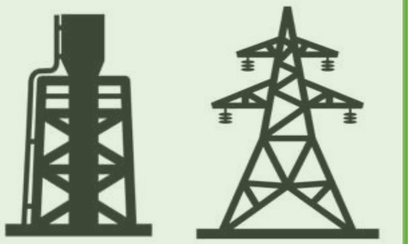
Grid Support

Distributed Smart Storage

1 **Diesel Replacement** for C&I isolated sites mining, oil companies and local communities

2 **Flexibility Services:** Primary reserve, frequency regulation

2 **Capacity Services:** Non-spinning reserve, Secondary & Tertiary Reserve



3 **Electricity Bills reduction** through peak shaving, demand response, energy efficiency and energy conversion optimisation

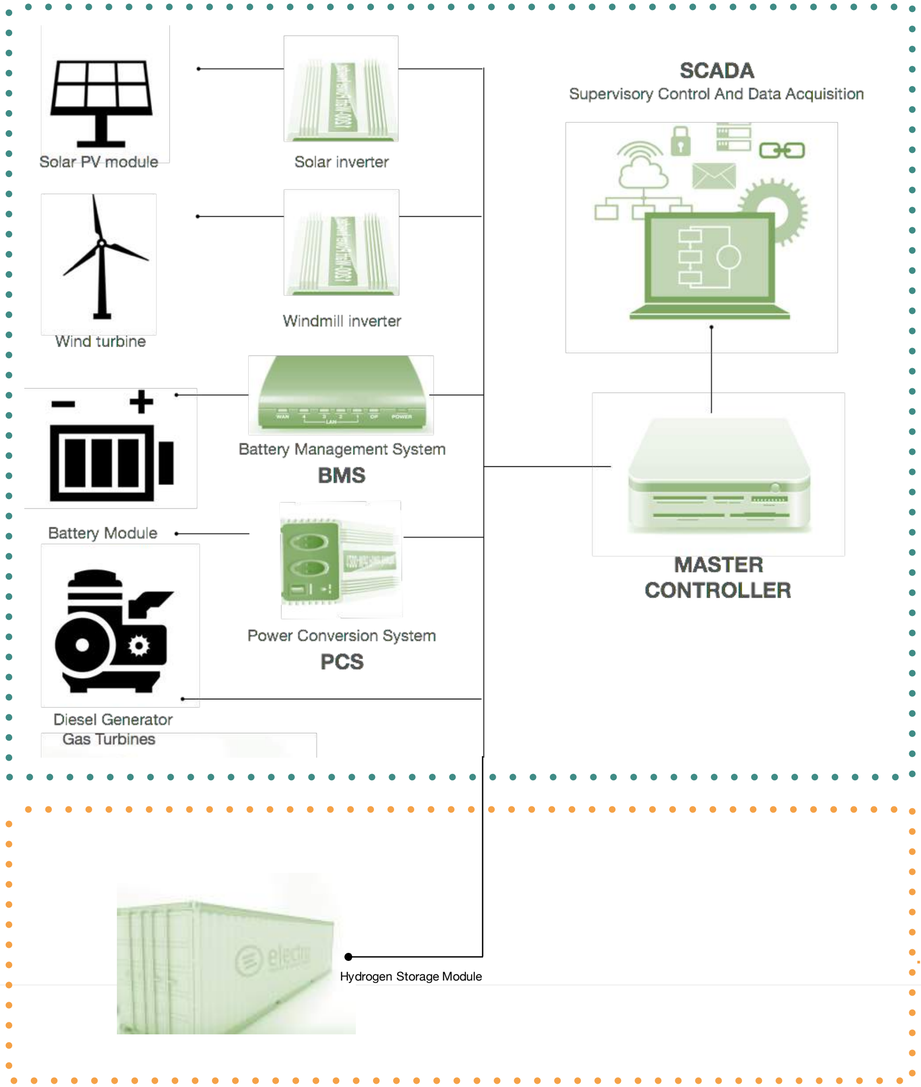
Full Diesel Replacement: a two-step business model

STEP 1: HYBRIDIZATION

MICROGRID
STORAGE ENABLED

Hybrid Power Plant

Microgrid composed by RES + HyESS (*Hybrid Energy Storage Systems*)



STEP 2

HYDROGEN
MODULE

1. The customer replaces current diesel generators with a Hybrid Power Plant: electronics, renewables and storage to lower the electricity bill (17% in Somalia).
2. Diesel consumptions and emissions are therefore reduced up to 70%, enabling a payback between 3 and 5 years and IRR up to 25%.
3. Any Hybrid Power Plant can be extended in size modularly with additional renewables (to increase power), and upgraded with the Hydrogen Storage Module.
4. Plugging in a Hybrid Power Plant the Hydrogen Storage Module is an additional investment, which enable complete avoidance of diesel fuel and a further reduction of the electricity bill.

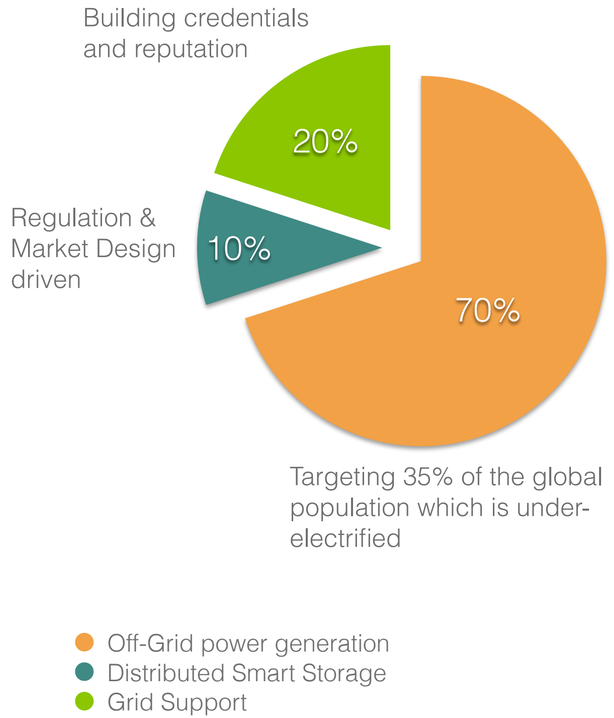
Our Markets: focus on profitable and unsubsidized business verticals

We provide grid operators and renewable energy players with **integrated storage solutions to master the intermittency of renewables**, and address the burgeoning demand for primary, secondary and tertiary reserve, reactive power and black-start capabilities, at a lower cost for consumers, **cutting electricity bills.**

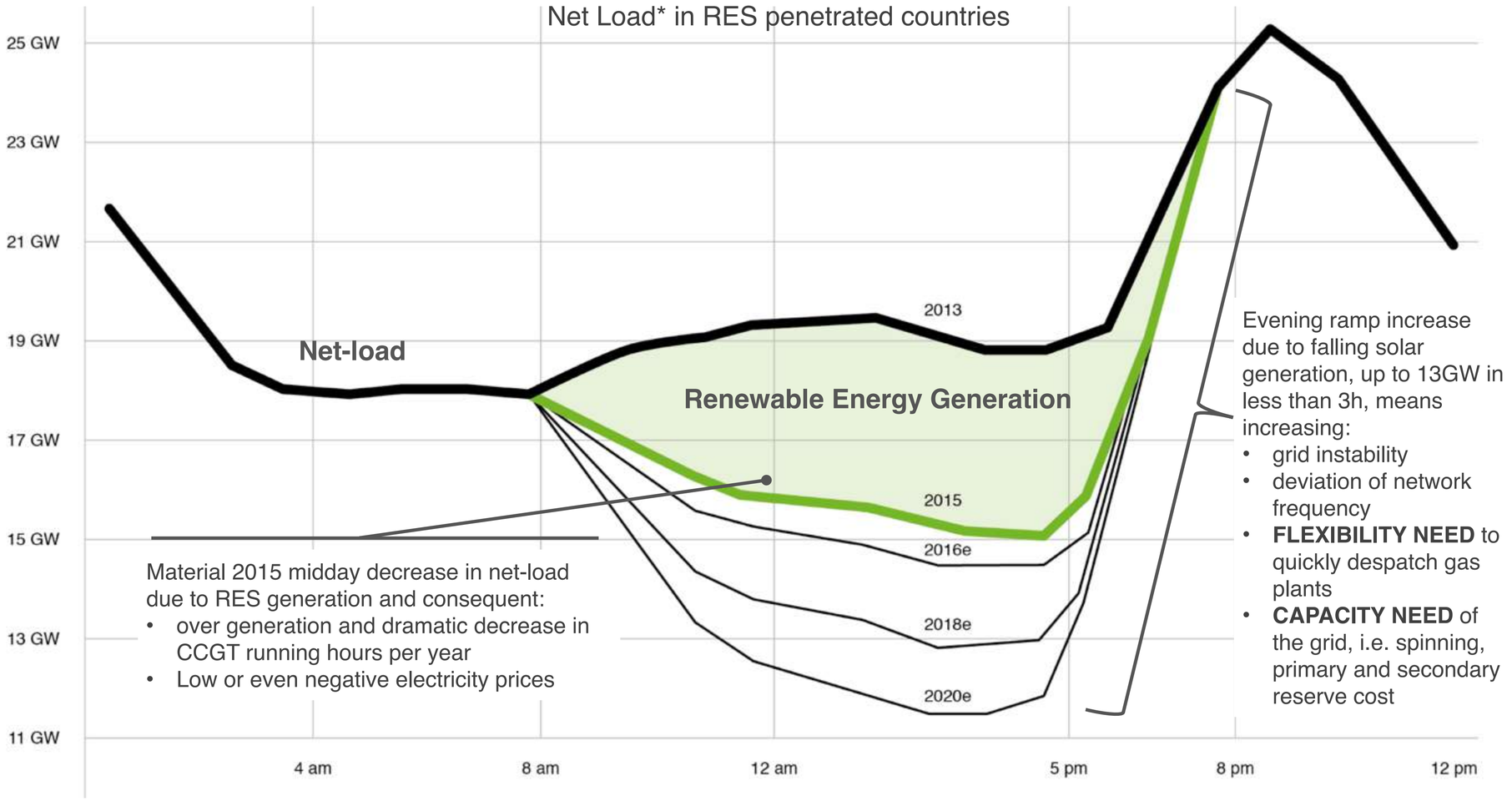
With behind-the-meter storage, we compress energy bills, by **peak-shaving the consumption profile of commercial and industrial users,** optimizing the utilization of distributed generation, enabling participation in demand response schemes, and delivering sustainable back-up power.

We enable **renewables as a reliable and affordable stand-alone power source** in emerging markets, displacing diesel and oil-fired generation. We foster a bottom-up, decentralized model of greenfield electrification, providing **clean energy 24/7 at cost lower than diesel generation**, the only alternative in such areas.

EPS Resources allocation and long term growth expectations



Renewables penetrated countries need Grid Support



* **Net Load** means the difference between the forecasted load and expected electricity production from RES. The Graph shows the net-load in a typical March day in California

Behind-the-meter storage to provide services to both industrial customers and TSOs

Services to Host Premises | **Services to TSO / IOUs**

1	2	3	4	5
DEMAND CHARGE REDUCTION	**CLEAN BACK-UP**	**INCREASED POWER QUALITY**	**DEMAND RESPONSE SCHEMES**	**GRID SUPPORT**
Lower electricity bills through shaving peak demand	No need to replace UPS and use old backup systems	Stabilizing voltage and frequency unbalancing	Participation to DR (capacity + ancillary services MSD)	Providing secondary and primary reserve to TSOs
cost saving	cost saving and CSR impact	cost saving and productivity enhancement	Additional revenue stream	Additional revenue stream
$	$	$	$	$

When installed in industrial plants, storage technologies can:

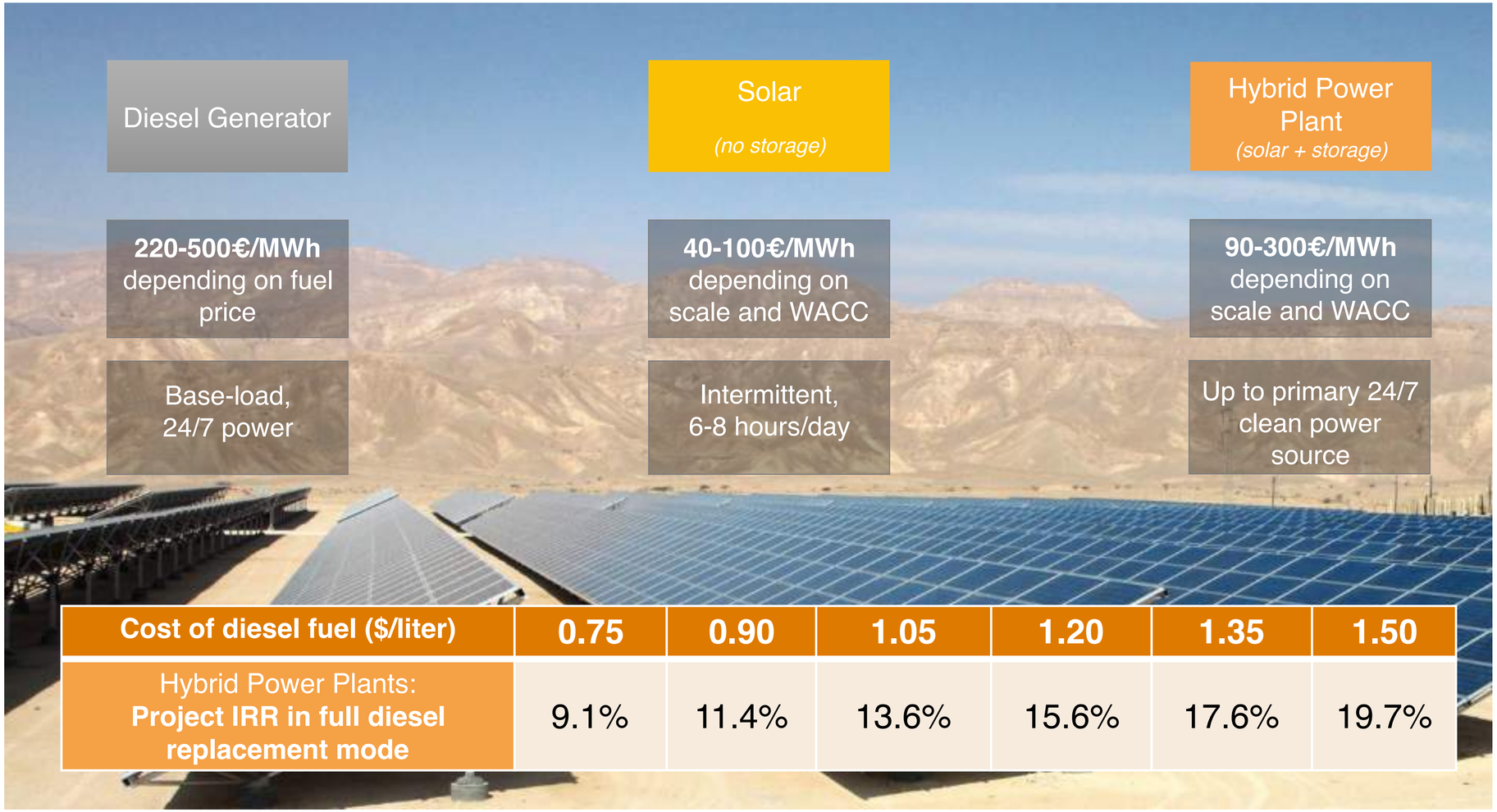
- dramatically reduce energy costs, particularly when coupled with renewables
- increase power quality and reducing manufacturing process constraints
- enhance backup capabilities in case of grid disruption
- generate revenues by using installed storage systems to provide to grid operators services

Energy Storage used to provide such "*behind-the-meter*" services is already competitive on a unsubsidized basis, and

any investment to provide such services can generate returns up to 25% IRR.

We reduce electricity cost in under-electrified areas

HyESS + Solar = **Hybrid Power Plants**



Cost of diesel fuel ($/liter)	0.75	0.90	1.05	1.20	1.35	1.50
Hybrid Power Plants: **Project IRR in full diesel replacement mode**	9.1%	11.4%	13.6%	15.6%	17.6%	19.7%

Solar is the cheapest source of energy but it is intermittent and available few hours per day.
As a result, this is neither the solution for off-grid areas that need 24/7 power, nor can support unreliable grids subject to outages and instability issues. Hybrid Power Plants transform RES into a 24/7 reliable power source at a cost lower than any alternative in the market today.

600GW
Installed fleet of diesel generation
300GW running over-the-clock at full load

200Mio tons CO_2
annual emissions potential reduction with Hybrid Power Plants

Group installed base

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Flexibility
Control and system integration of any BESS

Capacity
Hybrid Storage

21 countries
Covered by our installations

100,000+
People powered by our hybrid solutions

44.3 MWh
Aggregated energy storage installed or under commissioning

21.1 MW
Aggregate power output installed or under commissioning

EPS Group's companies (Elvi Energy, MCM, and Electro Power Systems) **have strong references and developed systems, projects and analysis for:**

ENGIE · TOSHIBA · GE Energy · BOSCH · enel · acea energia · Terna TERNA GROUP · gasNatural fenosa

Flexibility: proprietary vertically integrated technology

We developed and engineered an energy storage system which integrates in one single integrated system:

- **PCS:** a unique Power Conversion Systems with **DROOP Technology** with modular power range: 20, 35, 70, 125, 250, 1000 kVA
- **BMS:** Battery Management Systems for all available storage technologies
- **BMC:** BESS Master Controllers with **BlackStart Function**
- **MGC:** Micro Grid Controllers
- **EMS:** Energy Management Systems
- **SCADA*:** for Power Plants and Virtual Power Plants

Flexibility

Control and system integration of any BESS

2%

Global market share in 2014

8.7 MW

Hybrid power plants installed or under commissioning

9.4 MW

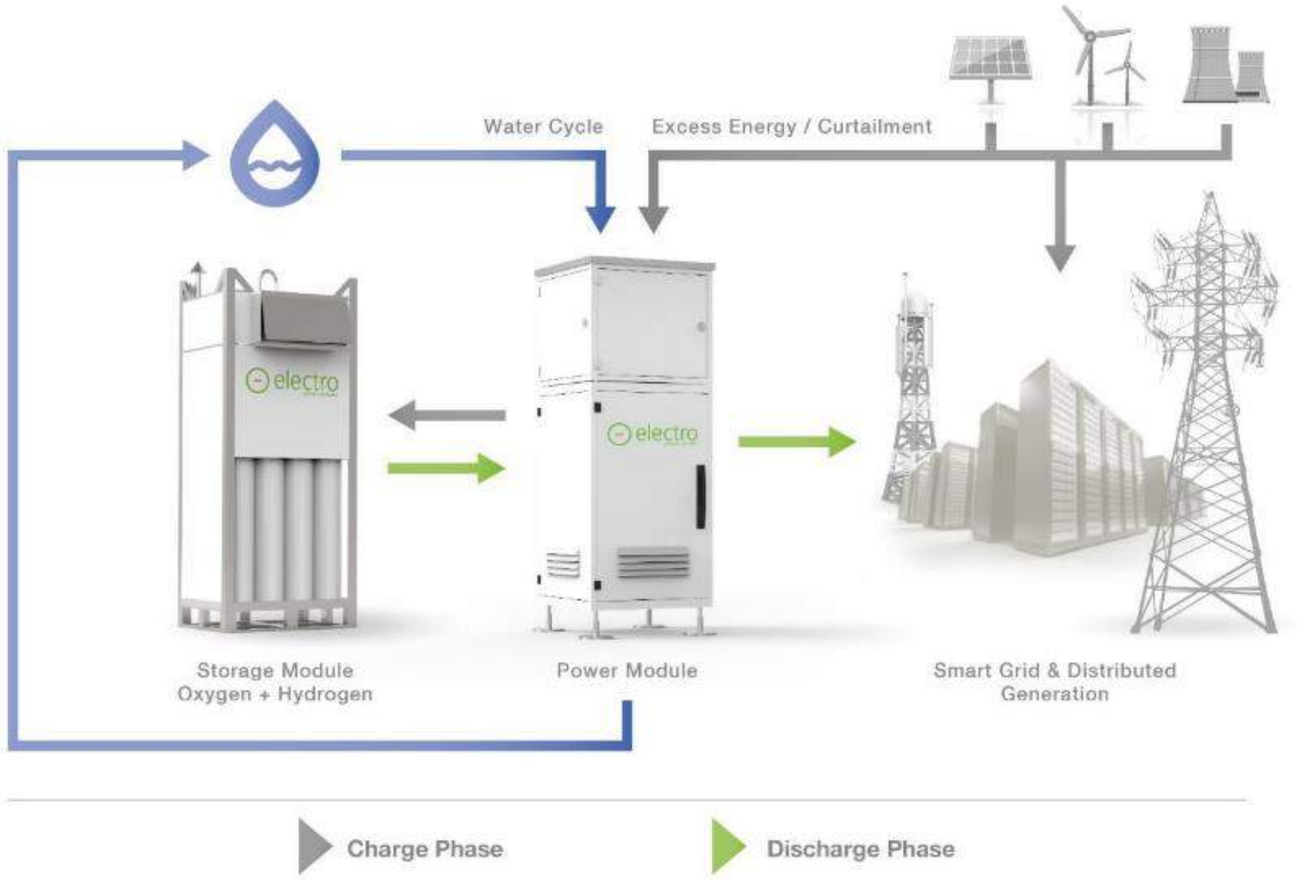
Battery technology integrated or under commissioning

Sole technology in Italy certified to install storage in MT networks from 1 Jan. 2016 CEI 016 All. N-bis

COMITATO ELETTROTECNICO ITALIANO

* Supervisory, Control and Data Acquisition Systems

Capacity: like a diesel generator with a lower generation cost. Fuelled by water, but 30% more efficient



125

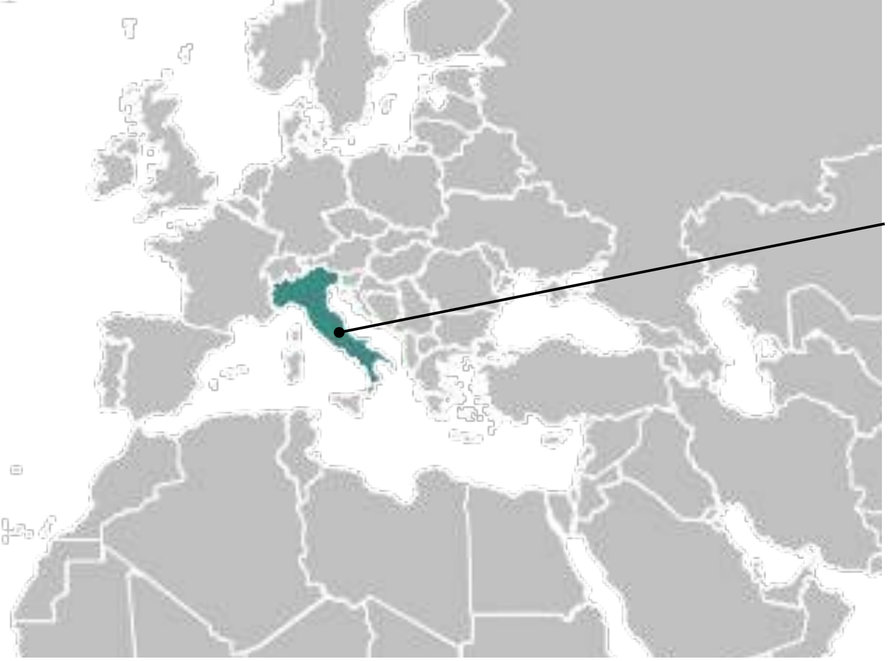
Cleantech patents and applications in 48 countries. Unique generator running with water only

3MW

Hydrogen systems power output utilized in aggregate

607

Systems installed devoted mainly to mission critical applications and telcos



Terna Plus is engaged in the development and implementation of storage system projects for the transmission grid.

This program consists of two macro-projects (“Energy intensive” and “Power intensive”) and plans the installation of different types of systems with technological features that meet the needs of functions and services to be provided.

Customer:

GE Energy

Final User:

Terna
TERNA GROUP

Grid Support System:

Storage: 1MVA/2MWh
(Li-ion titanate technology)

BESS Master Controller
Black Start Function
200,000h development

Smart MV Switchgear

Power Conversion: 1MVA
No. 4 C-BESS 250kW,
DROOP Control Technology

Customer:

NECSOM

The Hybrid Power Plant, awarded by NECSOM (National Electric Corporation of Somalia) involved the engineering, supply and installation of a renewable and storage turnkey solution that allows the reduction of diesel consumption by more than 2,000 litres per day.

The Hybrid Power Plant serves a 3.5MW load, and is expected to be shortly further extended with 450kW of wind energy, covering with renewables and storage more than 25% of the energy need of the city. Situated in North-East of Somalia, Garowe is the administrative capital of the autonomous Puntland region and a fast-growing city, which has also evolved into a local media and cultural hub.

Hybrid Power Plant:

PV: 1MW

Wind: 450kW

Storage: 700kWh

DG: 3.25MW

Electricity Bill reduction: 17%

Diesel reduction: 25%

Power Distribution Board

MV distribution to end-user

Peak Load: 3.5MW

People: 100,000

Customer:

TOSHIBA

Many remote Australian communities relying on diesel generators, expensive to run and vulnerable to the volatility of fuel prices.
Prior to the installation of the Hybrid Power Plant this iconic mining town in South Australia was entirely relying on diesel generation.
The Hybrid Power Plant, whose construction will be carried out starting from September 2016, will provide the mining site and its below-ground residences, with approximately 70% renewable energy over the 20 year life of the project.

Hybrid Power Plant:

PV: 3MW

Wind: 2MW

Storage: 1MW/250kWh

DG: 6MW

Demand: 3MW
(average load)

Power Conversion: 3MW
(peak load)

Diesel reduction: 70%

Our commitment to technology excellence:
125 patents in 48 countries, 500+ industrial secrets, international awards

Ilaria Rosso
Co-founder and Chief Innovation Officer

Scientist, PhD, 50+ publications

Prize for Women Innovators in Europe

EUROPEAN COMMISSION

Carlalberto Guglielminotti
Chief Executive Officer

WORLD ECONOMIC FORUM

Technology Pioneer

Host in 2015 world's most influent energy workshops: Brazil, USA, Singapore, China, Europe

Worldwide Technology Pioneer, Future of Electricity, selected within the 100 cleanest innovators worldwide

Giuseppe Artizzu
Executive Director, Global Energy Strategy

Our commitment to the market:
Listed on the Paris Stock Exchange, and certified worldwide

2015 listed on the regulated market

NYSE Euronext to start global sale (EPS:PA)

ISO9001, 14001, OHSAS, CEI certified

Full commercial product offer certified in USA, Canada, EU and China

Our Commitment as a management team: Solid technology, innovation and energy background

Carlalberto Guglielminotti
Chief Executive Officer

10y experience in growing technology companies, startup, restructuring and turnarounds.

Giuseppe Artizzu
Executive Director Global Energy Strategy

16y experience in energy strategies and markets, 10 with the Lehman Energy Division as ED.

Daniele Rosati
Executive Vice President Engineering

PhD, 10y experience in the most complex hybrid power generation project worldwide

Paolo Bonetti
Chief Financial Officer

22y experience in finance, operation and technology, private equity, and venture capital.

Ilaria Rosso
Chief Innovation Officer and Co-founder

PhD, 50 publications, 16y experience in efficient innovation processes with major EU operators and policymakers

Paolo Morandi
Chief Operating Officer

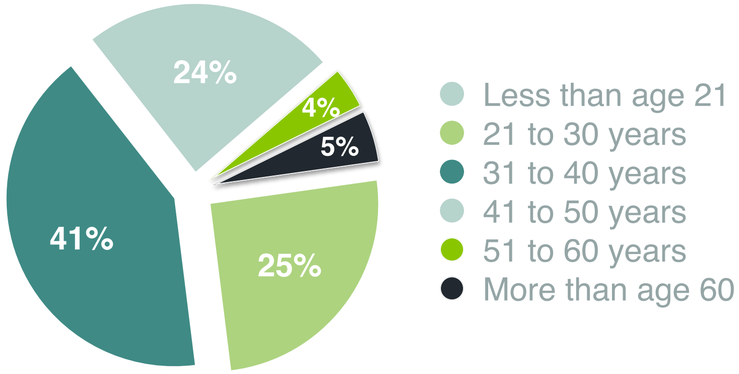
40y experience as CEO, COO, and manager in major energy and automation operators

Gabriele Marchegiani
Senior Vice President Energy Solutions

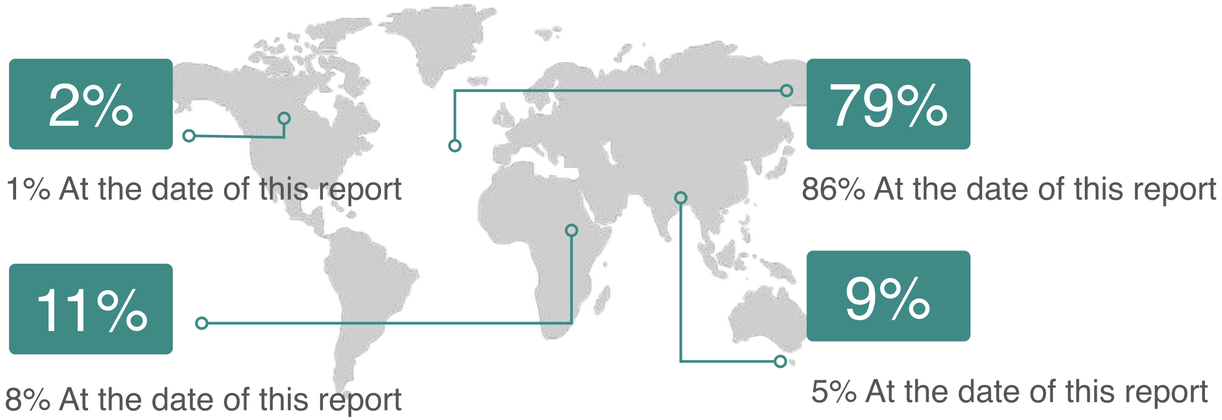
35y experience as entrepreneur and veteran in the field of magnetics, power electronics and renewable energies

Our commitment to people excellence

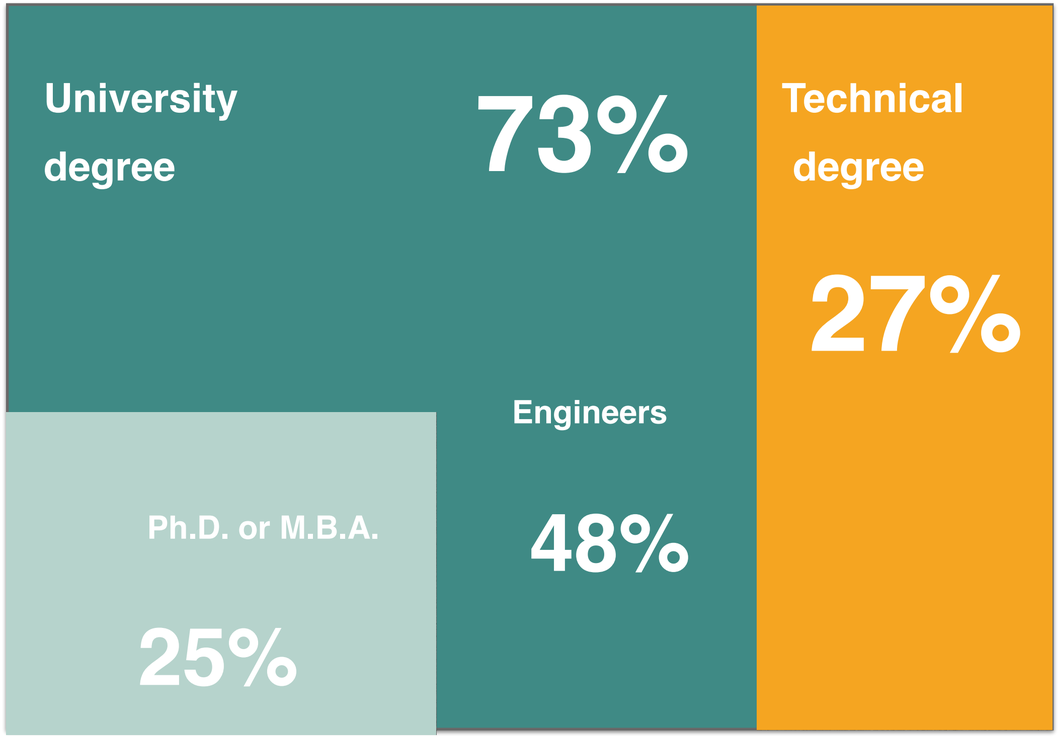
Human resources by age group



Headcount of the Group resources by geographical area



Human resources by degree

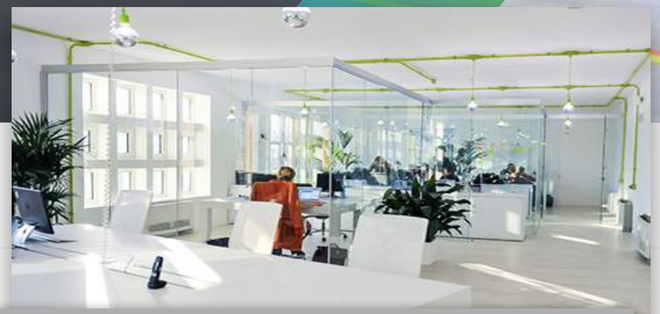


Our commitment to Italian manufacturing

Manufacturing consolidation

1. Efficient energy and lighting solutions, reduced CO_2 emissions and **4.6kW maximum peak**
2. The most advanced research center for hydrogen applications
3. 3,500sqm 2MW/month manufacturing capacity

Launched in December 2015



Headquarters (Milan, Italy)

R&D & Manufacturing (Turin, Italy)

System Integration (Delebio, Italy)

an Energy Company with a clear Mission

We **unlock the energy transition**, mastering the intermittency of renewable energy sources. We advocate competitive and **technology-neutral energy and emission markets**. Through the seamless integration of the best battery technologies, and our hydrogen and oxygen platform for long autonomy, **we enable renewable energies to power society:** reliably, affordably and sustainably.

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