

Next Generation of Energy Above the Horizon

ZORLUENERJİ
GELECEĞİN ENERJİSİ

TWI Innovation Partner Matching and Brokerage Workshop

12 Jan 2022

Ural Halaçođlu, M.Sc.

R&D Manager

Brief History of Zorlu Enerji



Foundations of Zorlu was first laid in 1953, as a company on weaving. The small company which only had 2 weaving looms grew into an export giant in Turkey in 5 decades.

Zorlu Holding was established in 1990 and until 1993, textile was the only sector Zorlu worked in. In 1993, Zorlu Enerji was established under the Zorlu Holding, in order to provide steam, heat and energy needs for the textile manufacturing.

By taking over the Vestel electronics and incorporation to Zorlu, Zorlu Holding become a multi disciplinary company.

Currently Zorlu has company establishments in US, Europe and Asia and continues to grow larger.

Zorlu Holding Group Companies



Electronics and White Goods	VESTEL	REGAL				
Textile	KORTEKS	ZORLUTEKS	ZORLU HOMETEKS			
Energy	ZORLUENERJİ	ZES Zorlu Energy Solutions	electrip GELECEĞİN SÜRÜŞ DENEYİMİ			
Real Estate	 ZORLU CENTER İSTANBUL	ZORLU GAYRİMENKUL	LEVENT 199			
Other	 ZORLU PSM	 meta NIKEL KOBALT A.Ş.	 JULES VERNE TRAVEL & EVENT	 ZORLU GRAND HOTEL TRABZON ★★★★★	ZORLU AIR ZORPET	ZORLU FAKTORİNG ZORLU MADEN GRUBU

About Zorlu Enerji

Zorlu Enerji was established as a company assisting the manufacturing of textile products in 1993 by producing steam, heat and energy for Zorlu textile companies.

After gaining some experience in energy sector, Zorlu extended its experience to natural gas based electricity production.

In 2006, Zorlu Enerji made an agreement with Pakistani government for a wind power plant to be built in Pakistan.

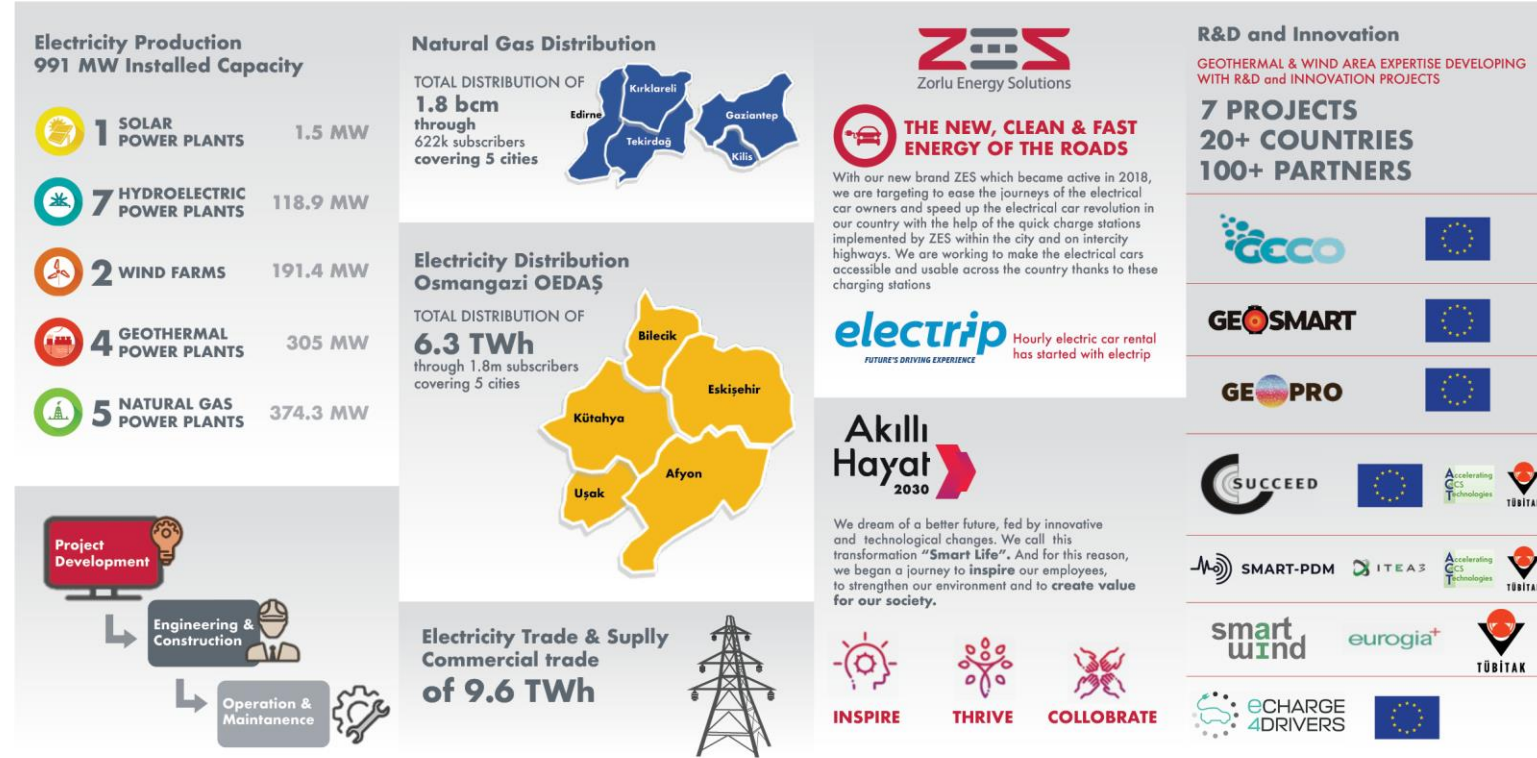
Zorlu acquired generation licence for two wind power plants with a total of 110 MW installed power and entered the renewable energy sector.



BAŞLIK ALANI



ENERGY OF THE FUTURE



In 2008, Zorlu Enerji acquired 7 hydrothermal and 1 geothermal plant licences, widening its field of work in renewable energy.

In 2013, Zorlu completed construction of Kızıldere II geothermal power plant with 80 MWe installed power and increased its experience in geothermal sector. By 2018, with Kızıldere III (165 MW) geothermal power plant's establishment, Zorlu became the lead company in Turkey.

Currently, Zorlu Enerji has 991 MW installed capacity.

Natural Gas Power Plants are not operational due to Zorlu's green future and renewable energy portfolio vision.

R&D and Innovation Projects of Zorlu Enerji



Zorlu Enerji has the green future in its vision. Optimisation, CO₂ emission reduction and efficiency increase are some of the main targets of Zorlu Enerji.

In 2018, Zorlu Enerji was approached by Turkish National Agency (TUBİTAK) for EU funded Horizon2020 projects and was given a detailed information.

Zorlu Enerji management was very pleased to be a part of international R&D projects and the first milestone in the H2020 was achieved by joining in the GECO project.

Currently Zorlu Enerji is working on European projects and global projects along with the national projects.

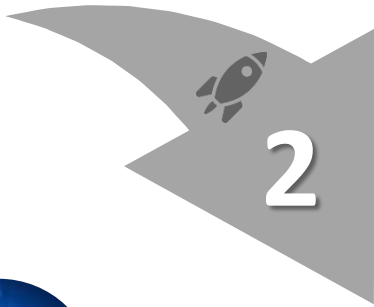


R&D and Innovation Projects of Zorlu Enerji



GECCO

1



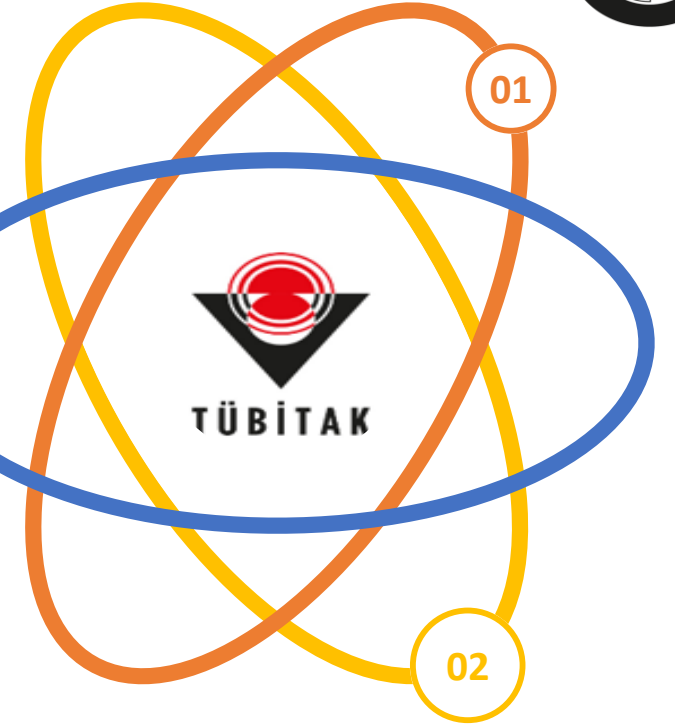
2

GEPRO



smart
wind

03



TÜBİTAK

02

SMART-PDM



4

3



eCHARGE
4DRIVERS

GEOSMART



Horizon2020 funded Projects

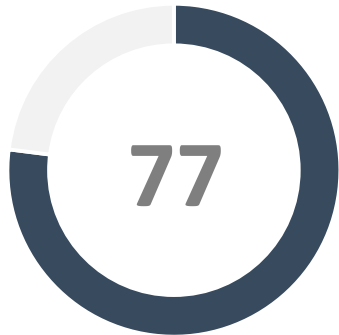
PROJECT GOALS

- Geothermal Power Plants with zero emissions
- Purification and regination of Non-Condensable Gases
- Development and global popularisation of CO2 re-injection technologies.
- Improvement of environmentally green and nature friendly Geothermal Power Plants



GEOTHERMAL
EMISSION
CONTROL

PROJECT PROGRESS



- We are in the 37th month of the Project, which started in October 2018 and is planned to last 48 months..
- Engineering studies of the reinjection system to be implemented in the Kızıldere field have been completed. Purchasing process is being carried out for equipment supply.
- It is aimed to complete the system installation in April 2022 and start the first reinjection.
- The Project will end in October 2022. 6 months of extension is planned.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 818169.

Horizon2020 funded Projects



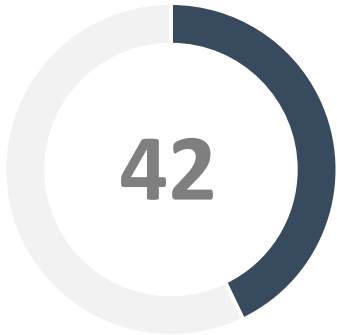
GEOSMART

Smart and Flexible
Geothermal Power Plants

PROJECT GOALS

- Compensation of fluctuations that occur on the grid because of the integration of renewable energy sources to the grid by thermal storage.
- Testing of thermal storage (as steam and hot water) which will be used in geothermal energy for the first time.
- Developing decision making and optimisation of electricity production between district or greenhouse heating.
- Designing more efficient and high-capacity power plants by decreasing reinjection temperatures.

PROJECT PROGRESS



- After 6 months of suspension period, the project which started in June 2019 and is planned to last for 57 months, with the activities that re-started in February 2021, is in its 24th month.
- Due to the presence of a new demo site in Germany, the suspension was terminated in February 2021 and the project was restarted. Technical design studies for the storage and scaling systems are currently continuing.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 818576.

Horizon2020 funded Projects

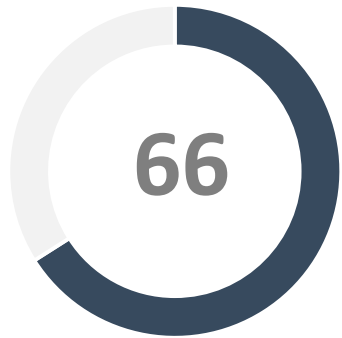


Accurate Geofluid Properties as key to Geothermal Process Optimisation

PROJECT GOALS

- Developing the Flow Assurance method for geothermal energy, which has been used for Oil and Gas industry for many years.
- Solving the problems experienced in the measurement of properties due to bi-phase flow, non-condensable gases and minerals in the geothermal fluid content with newly developed methods.
- Researching new methods required to decrease the reinjection temperatures and integrating them to the geothermal energy sector.

PROJECT PROGRESS



- We are in the 24st month of the Project, which started in November 2019 and is planned to last for 36 months.
- Data sets about Kızıldere field are shared with consortium members.
- The design process of the test equipment required for the tests to be carried out in the Icelandic field and laboratory continues.
- The Project is targeted to end in November 2022.

Horizon2020 funded Projects



Electric Vehicle Charging
Infrastructure for improved User
Experience

PROJECT GOALS

- Improving the charging experience of electric vehicle users, including long distance journeys,
- Integrating of ISO 15118 Plug & Charge into existing software,
- Making improvements on existing software for more advanced route planning and reservation process,
- Testing of user-friendly charging stations developed in our pilot region with various scenarios.

PROJECT PROGRESS



- We are in the 17th month of the project, which started in June 2020 and is planned to last for 48 months.
- Some of the usage data for stations in Istanbul and western regions of Turkey were shared with the project consortium for development activities.
- Project associated technical work continues.
- Project is expected to end in June 2024.

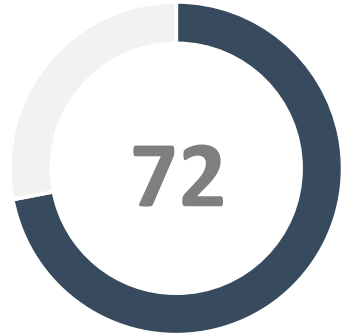
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875131.

TÜBİTAK Funded Projects

PROJECT GOALS

- Reducing emissions originating from geothermal power plants and observing the effects of re-injected carbon dioxide on the reservoir.
- Supplying the purified carbon dioxide from Linde Gas and pumping it back into the reservoir under supercritical conditions.
- Investigation of the effects of carbon dioxide re-injected back into the reservoir on seismic activity and other wells.

PROJECT PROGRESS



- We are in the 26rd month of the project, which started in September 2019 and is planned to last for 36 months.
- Due to the activities that the British partners could not carry out in the field because of the pandemic, it is planned to request a time extension of 6-12 months for the project.
- If the extension cannot be obtained, the project is planned to end in September 2022.
- The search for mechanical system design and equipment for the NCG injection system continues.



Synergetic Utilisation of CO₂ Storage Coupled with Geothermal Energy Deployment

SUCCEED is funded through the ACT programme (Accelerating CCS Technologies, Horizon 2020 Project No 294766). Financial contributions made by the Department for Business, Energy & Industrial Strategy UK (BEIS), the Rijksdienst voor Ondernemend Nederland (RVO), the Scientific and Technological Research Council of Turkey (TUBITAK), and our research partners Orkuveita Reykjavíkur/Reykjavik Energy Iceland (OR) and Istituto Nazionale di Oceanografia e di Geofisica Sperimentale Italy (OGS) are gratefully acknowledged.

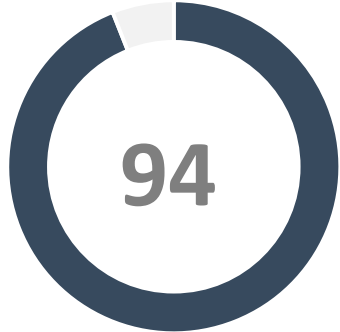
TÜBİTAK Funded Projects



PROJECT GOALS

- Carrying out predictive maintenance studies in wind power plants,
- By detecting malfunctions that may occur on the system at an early stage with predictive maintenance methods, shortening downtime and ensuring maximum production.
- Decreasing maintenance and equipment replacement costs.

PROJECT PROGRESS



- We are in the 34st month of the project, which started in December 2018 and is planned to last 36 months.
- As we ,Zorlu Energy, took place of another WPP operating firm in June 2019, the project had already begun when we joined.
- Currently, we have caught up with other work done in this project.
- The project is targeted to be completed in December 2021.



SMART-PDM

A Smart Predictive Maintenance Approach based on Cyber Physical Systems

TÜBİTAK Funded Projects



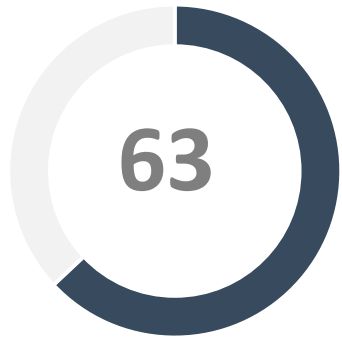
smart
wind

Smart wind asset O&M
planning

PROJECT GOALS

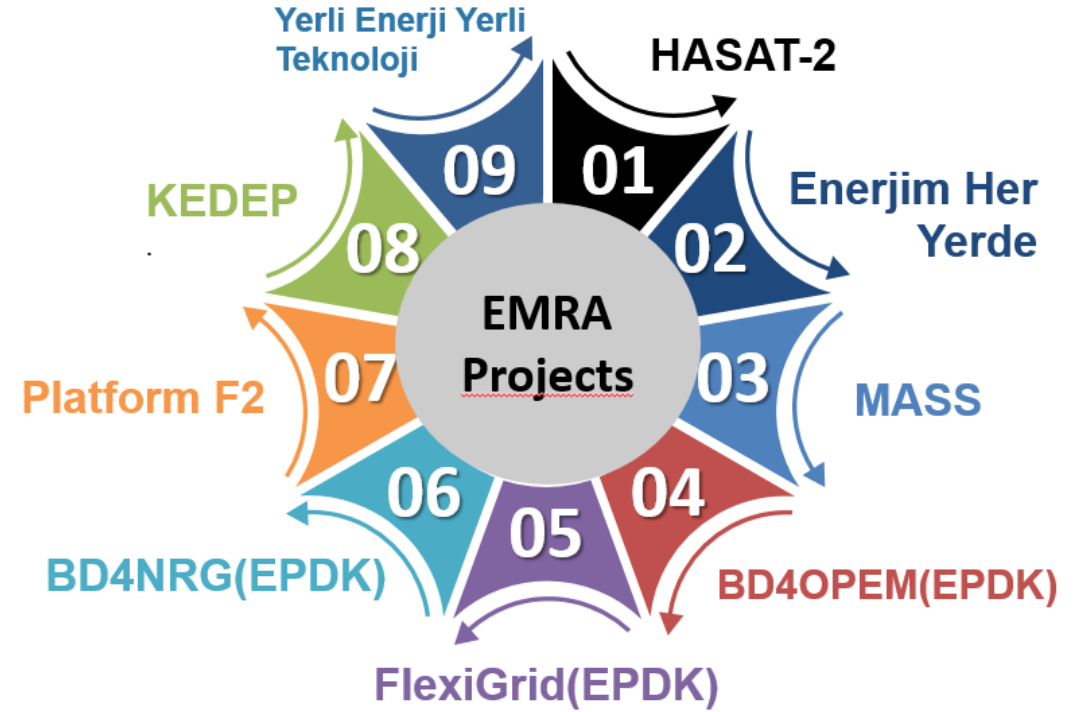
- Creating a decision support system for data analysis, performance diagnosis and operation maintenance works by collecting data from SCADA and sensor systems in a cloud infrastructure in order to reduce operating costs and increase electricity production in wind power plants.
- Economic gain by reducing operation and maintenance costs with decision support system.

PROJECT PROGRESS



- We are in the 23th month of the project, which started in December 2019 and is planned to last 36 months.
- Sensor data of some Gökçedağ WPP turbines selected to serve the project were shared with our Turkish partner NETAŞ for processing purposes.
- Project is targeted to be completed in December 2022.

Osmangazi DSO Company (OEDAŞ) Projects



Zorlu Enerji Projects and Applications



Apart from the funded projects, Zorlu Enerji also works on bilateral projects with companies and governments internationally.

Also, as the investment costs increase year by year and optimization is the most cost efficient and practical solution to the energy need, Zorlu Enerji looks for solutions where the power plant could be used in a more efficient way.

Both R&D department and Investment departments collaborate with operation teams in geothermal fields to overcome problems that occur in operation, find ways to use geothermal in multiple sectors and reduce the environmental foot-print of the geothermal.



Zorlu Enerji Projects and Applications

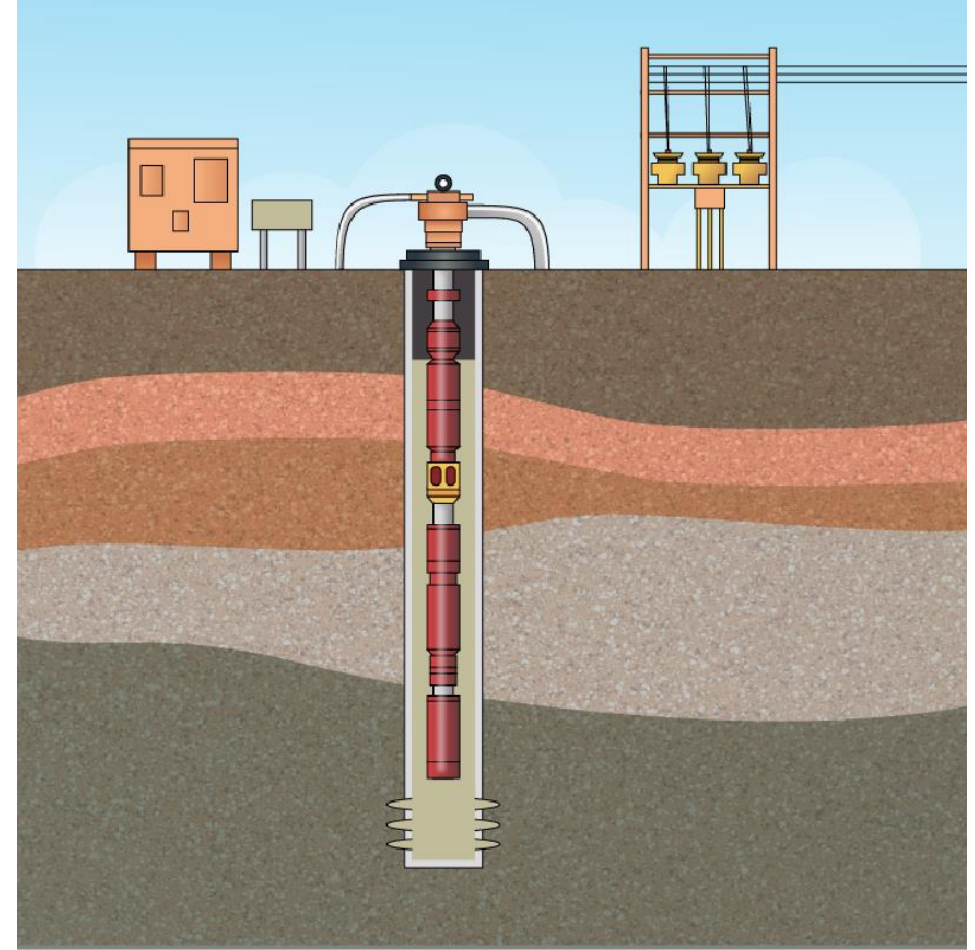


Geothermal resources are renewable sources, however, due to the electricity generation being reliant on the well-head pressure and temperature, production rates might not be consistent as the reservoir fluid levels may change by time.

Instead of drilling extra wells which have higher costs compared to more feasible solutions, Zorlu Enerji uses ESP (electric submersible pumps) to overcome decreasing pressure and flow rates.

Zorlu Enerji works with academicians from a number of universities in Turkey and uses its own experience in order to predict the outcome of using the before mentioned system.

The system proved both cost efficient and has less CO₂ foot-print compared to drilling new wells.



Zorlu Enerji Projects and Applications



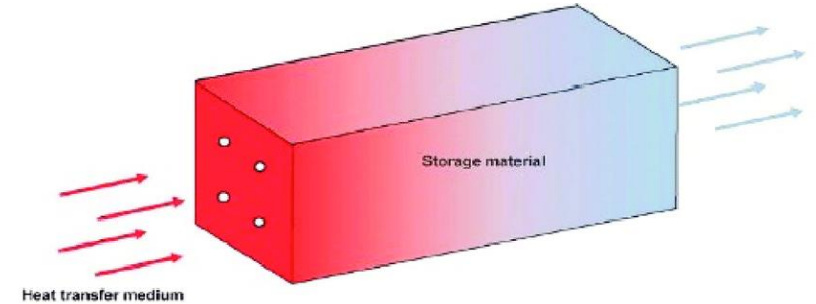
Electricity supply and demand depend on the time of day and even so, it is difficult to foresee the spontaneous demand as it fluctuates throughout the day.

In order to meet the high demands during the day and to prevent the unnecessary production during the night, Zorlu Enerji looks for alternative solutions one of which is the GeoSmart project as mentioned before.

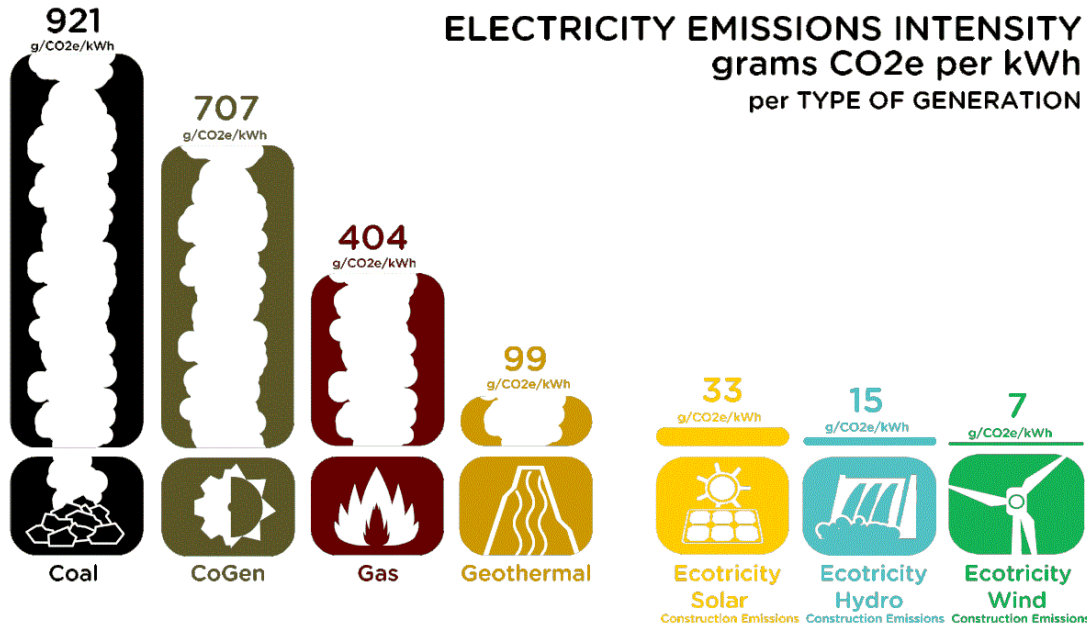


GeoSmart project aims to resolve the fluctuation issue by storing the thermal energy when it is not needed and utilizing it when the demand is higher.

Zorlu Enerji is also studying the electricity storage in different type of storage methods, thermal or battery, for this problem.



Zorlu Enerji Projects and Applications



Another issue Zorlu Enerji works on is the CO₂ emission from geothermal power plants. Western part of Turkey, next to Aegean sea is one of the most productive geothermal fields. However, the CO₂ ratio in the produced NCG (non-condensable gases) higher than the most of the geothermal fields in the world.

As it contradicts with the renewable green energy goal, Zorlu Enerji is working on multiple solutions to overcome this problem.

SUCCEED and GEKO projects both aim to minimize the CO₂ emissions by re-injecting the NCGs back into the reservoir with different methods.

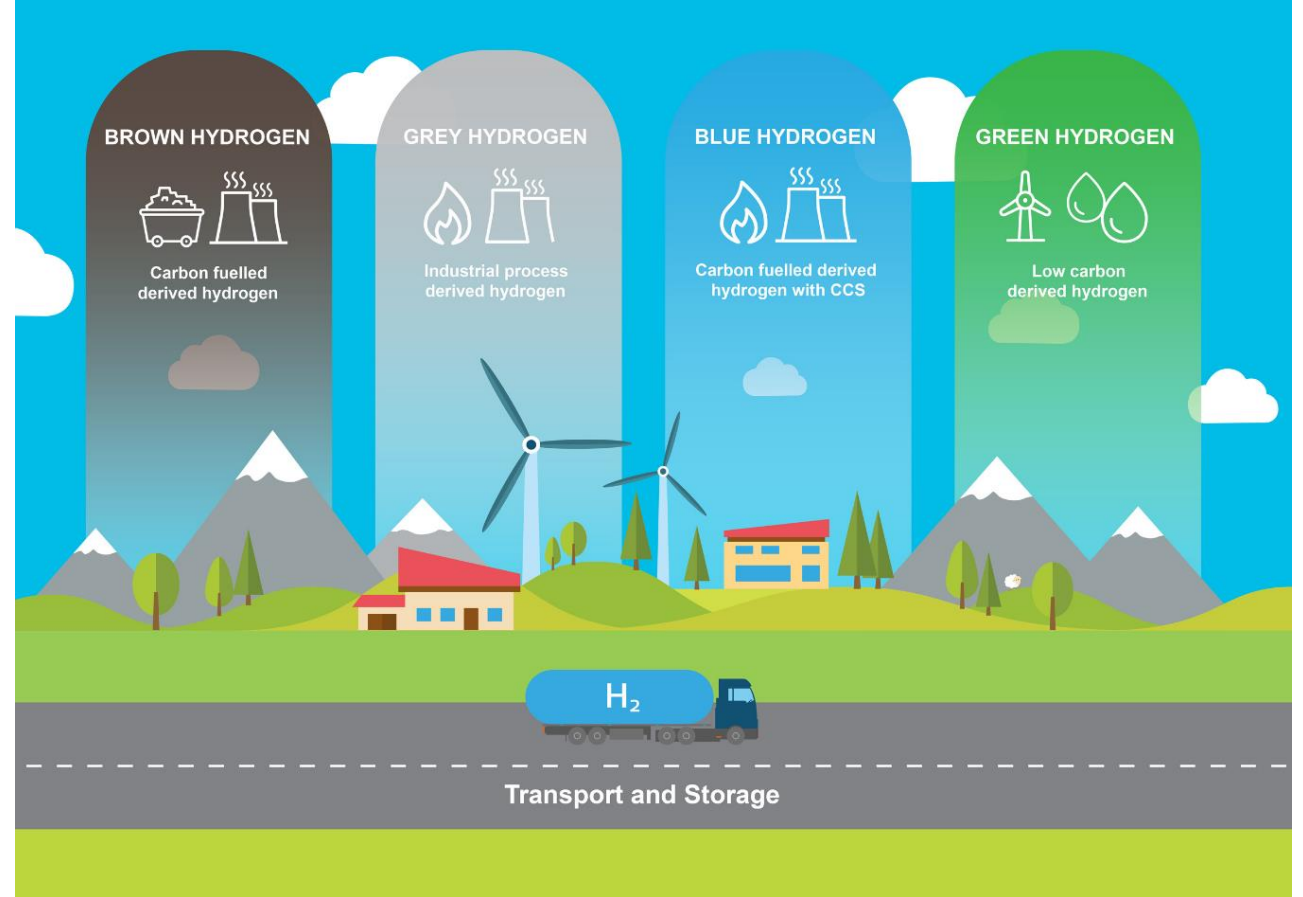
Zorlu Enerji Projects and Applications



Due to increase in renewable energy production globally, hydrogen, which has higher energy content than the traditional sources, is once again trending as the electrolysis process can be conducted without emission of CO₂.

Zorlu Enerji is working on Green Hydrogen solutions and plans to be the leader in the sector in Turkey. Zorlu Enerji has already taken steps to be a part of Hydrogen community, by joining with Hydrogen Technologies Association in Turkey.

Also, Zorlu Enerji has made international contacts for utilizing the geothermal energy for Green Hydrogen production. Ongoing studies will create roadmap for Zorlu Enerji on how to approach hydrogen generation.



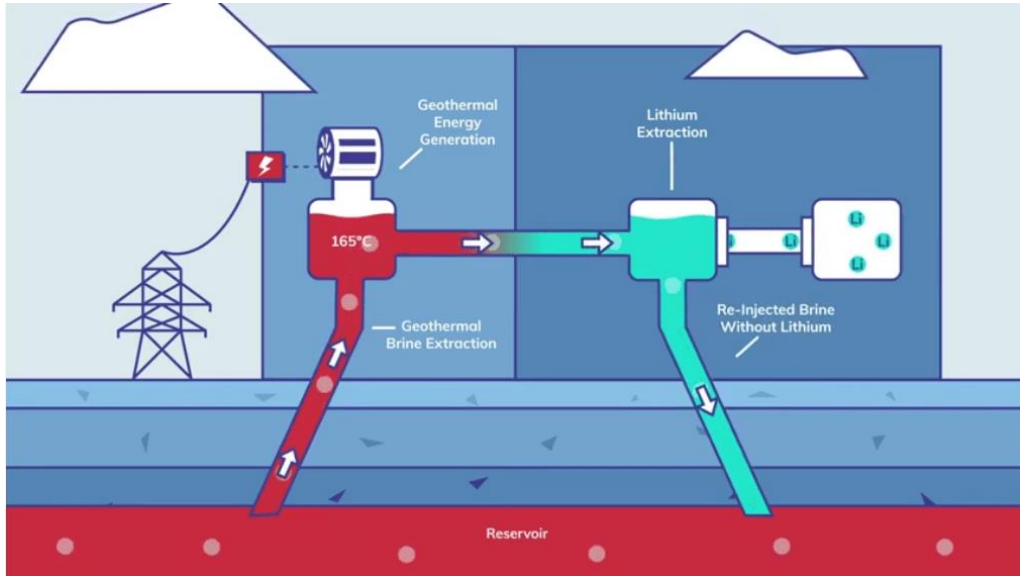
Zorlu Enerji Projects and Applications



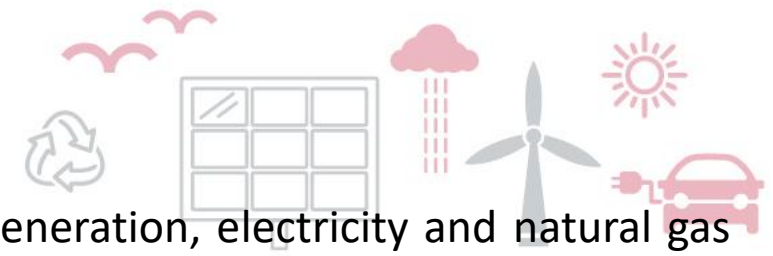
Electric vehicles and batteries are another area Zorlu Enerji has expertise on. Zorlu Enerji established its brand Zorlu Energy Solutions for electric vehicles and currently ZES has over 1.000 charging stations in Turkey. Progress is being made to join the European market for charging stations.

Zorlu subsidiary company OEDAŞ and Zorlu Enerji also work on various projects regarding electric vehicles and battery solutions as mentioned before, such as eCharge4Drivers and FlexiGrid.

Apart from the end user aspect of the electric vehicles, Zorlu Enerji is also researching the Lithium extraction from the geothermal brines. Different methods are being evaluated with partner companies.



Zorlu Enerji and Public Funding



Briefly, Zorlu Enerji has experience on renewable and traditional methods of power generation, electricity and natural gas distribution, electricity trade, electric vehicles, hydrogen sector and with Zorlu Holding's subsidiary companies, Zorlu Enerji has support on extractive industry, textile industry, white appliances industry and more.

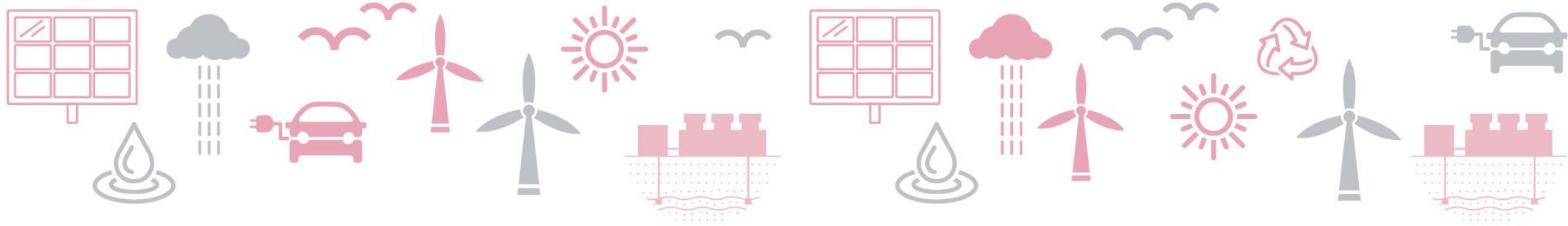
Zorlu Enerji searches for ways to share this experience and background with partners, whether consortium partners, communion or bilateral partners, in order to develop any line of business which is open for improvement.

Therefore, Zorlu Enerji Research & Development Department works in public funding calls, which helps finding partners with common goals and helps with the dissemination of know-how. Public funding projects also positively effects the recognition of the company and financially supports the otherwise difficult to manage projects come to life.

Zorlu Energy has responded to various calls such as;

- Horizon 2020
- Horizon Europe
- ACT
- Geothermica
- USTDA
- TÜBİTAK





ZORLUENERJİ

GELECEĞİN ENERJİSİ

THANK YOU