



WEBINAR

# Focus on Geothermal Energy for the Weekend

08 July 2022 14:00 (CEST)/15:00 (TR)

## Current Situation & Opportunities of Turkish Geothermal Market



**ALEXANDER  
RICHTER**  
THINKGEOENERGY



**CANNUR BOZKURT**  
ENERCHANGE  
TÜRKİYE

ORGANIZER:



SUPPORTED BY:



# Brief history of geothermal energy, Türkiye

Paleolithic ages

➤ Cooking & Health

1920 - 1960

- First thermal law
- Establishment of MTA
- Preparing and renewing hot & thermal water inventory

1960 - 1980

- First geothermal feasibility study, İzmir
- First geothermal well drilling operation
- Kick of MTA-UNDP Western Anatolia, Kızıldere-Denizli geothermal exploration project
- First high temp discovery @540 m - 198 °C, Kızıldere
- Establishment of the first pilot geothermal electricity power plant in Kızıldere, 0.5 MWe capacity and the first 1000 m<sup>2</sup> pilot greenhouse facility.

1980 - 2015

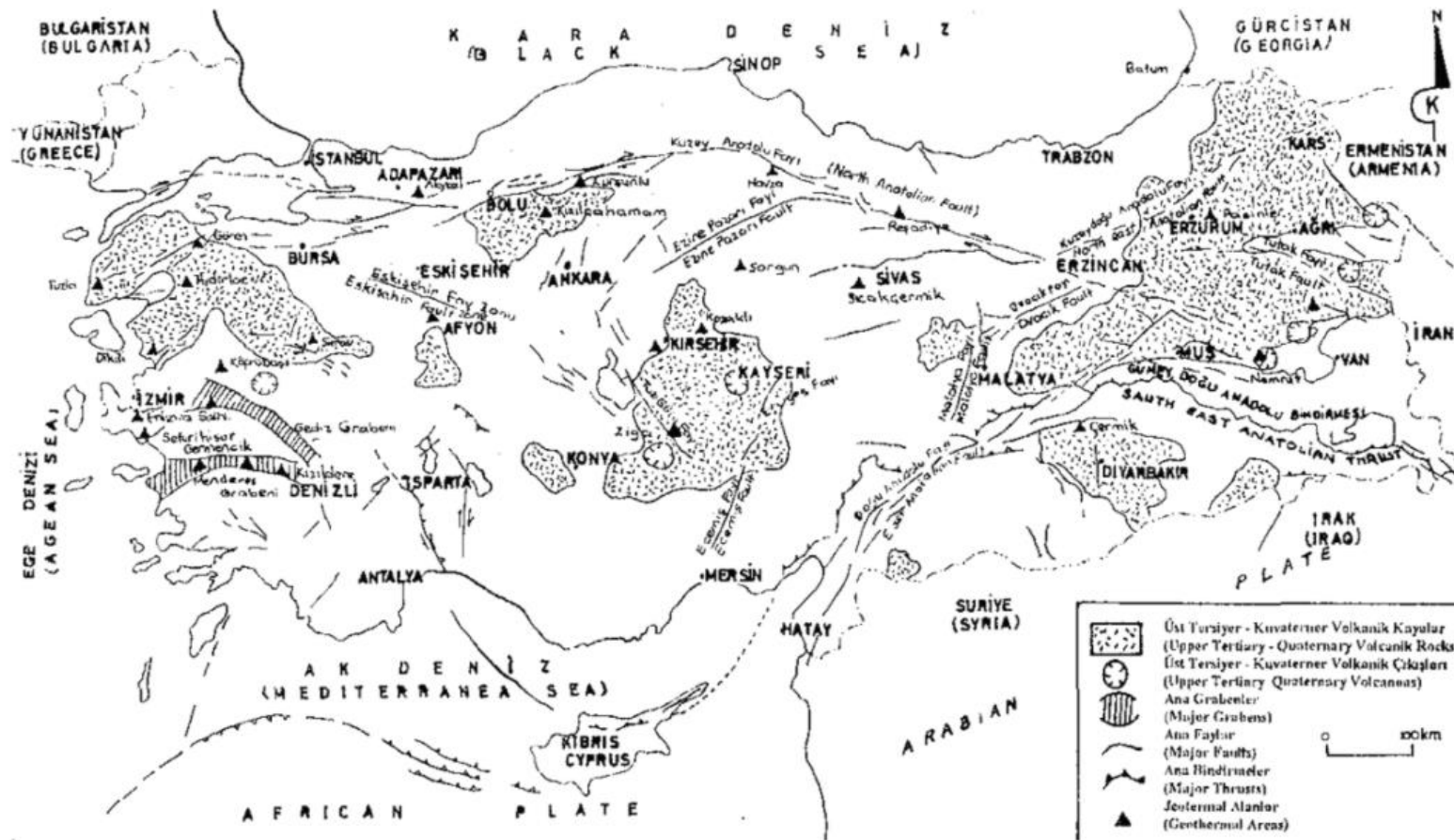
- Discoveries of Germencik (232 °C) and Tuzla (174 °C) fields
- Involvement of first geothermal regulation into the Mining Law
- Establishing first geothermal heating system in İzmir
- First single flash geothermal power plant commissioned in Kızıldere with 15 MWe installed capacity
- Establishment of the first CO<sub>2</sub> factory in Kızıldere
- Commissioned first district heating system in Balıkesir, Gönen
- Solving scaling challenges and increasing investments in district heating implementation
- Developed heating systems in Afyon, Kırşehir, İzmir, Edremit, Bigadiç, Salihli, Sandıklı, Kızılcahamam, Sarayköy, Simav, Sorgun ...
- Started funding structure for geothermal projects by a state bank
- WGC 2005 held in Antalya
- Establishing first private geothermal power plant in Aydın by MEGE
- Geothermal law came in force (2007)
- Privatization of Kızıldere field
- Granted 3000 exploration and exploitation licenses
- In 2015 total installed capacity of Türkiye was 614 MWe.

# Brief history of geothermal energy, Türkiye



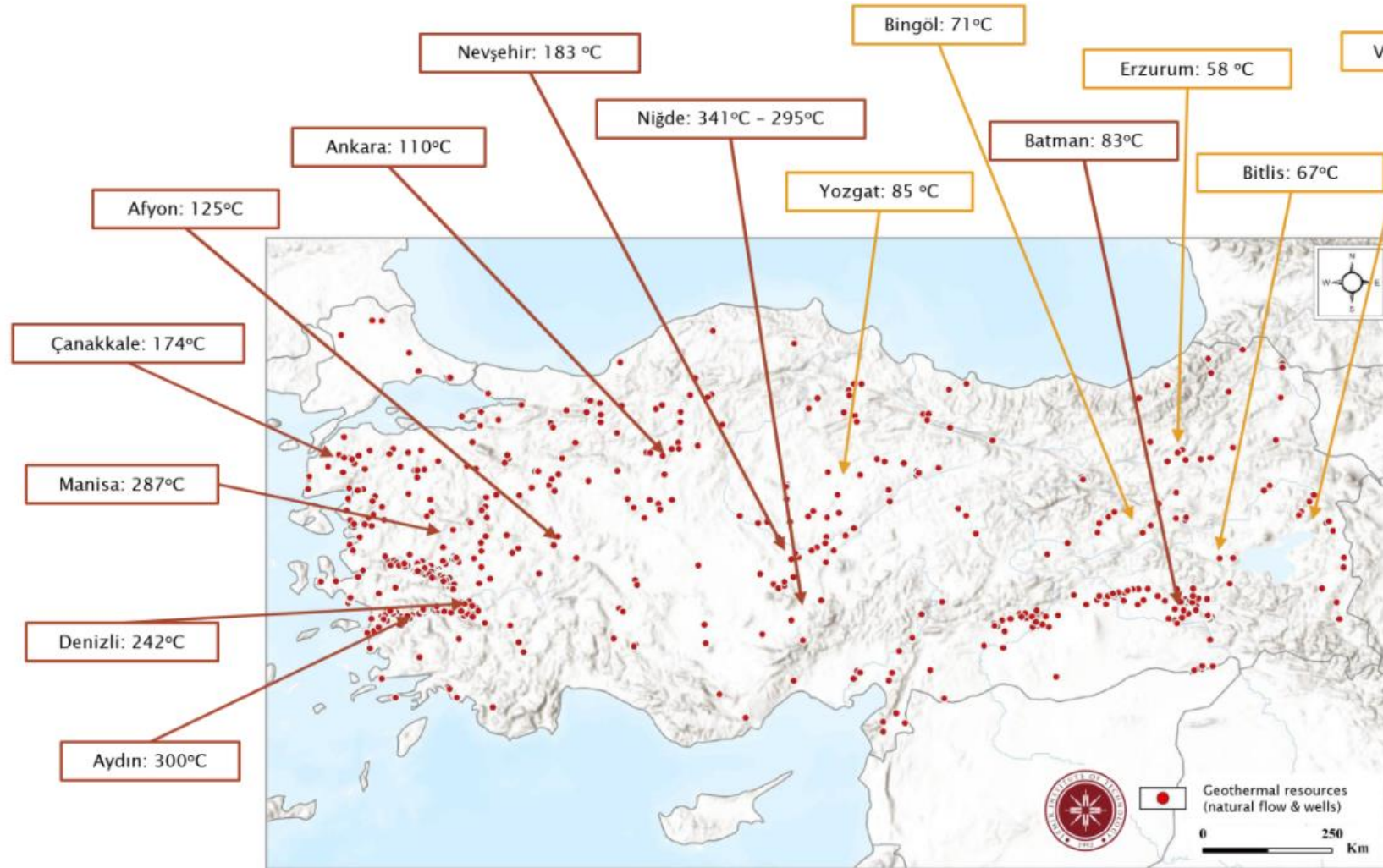
Forecasted theoretical potential @ 1990s

- 2.000 MWt
- 1.200 MWe



Mining Industrial Raw Material Sub-Commission Geothermal Energy Working Group report - 1996 May by T.R. PRIME MINISTRY STATE PLANNING ORGANIZATION UNDERSECRETARIAT

# Geothermal resources of Türkiye



- 63 cities have geothermal resources
- Approx. 415 geothermal fields (>30 °C)
- More than 1.000 geothermal spots (natural flows, hot springs)

Forecasted theoretical potential today:

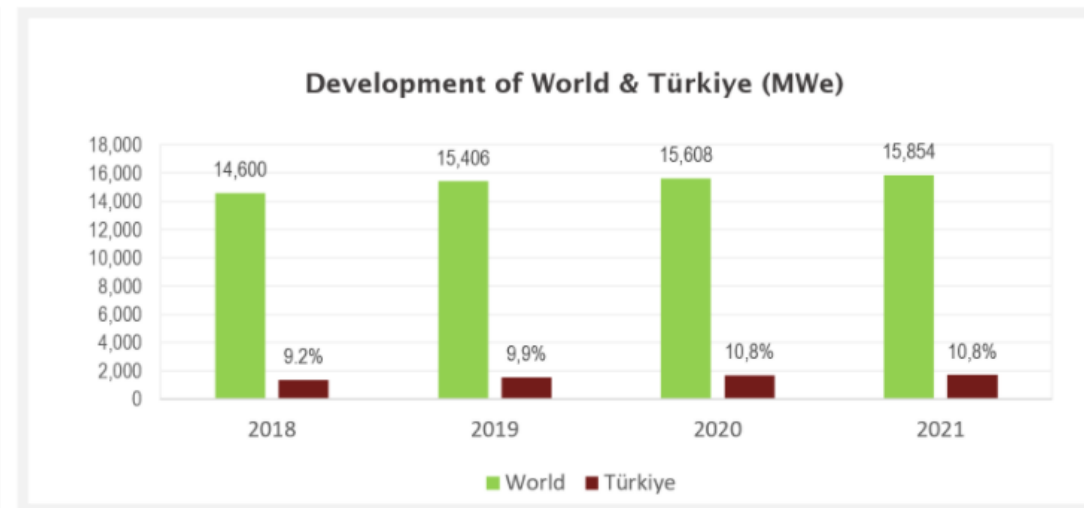
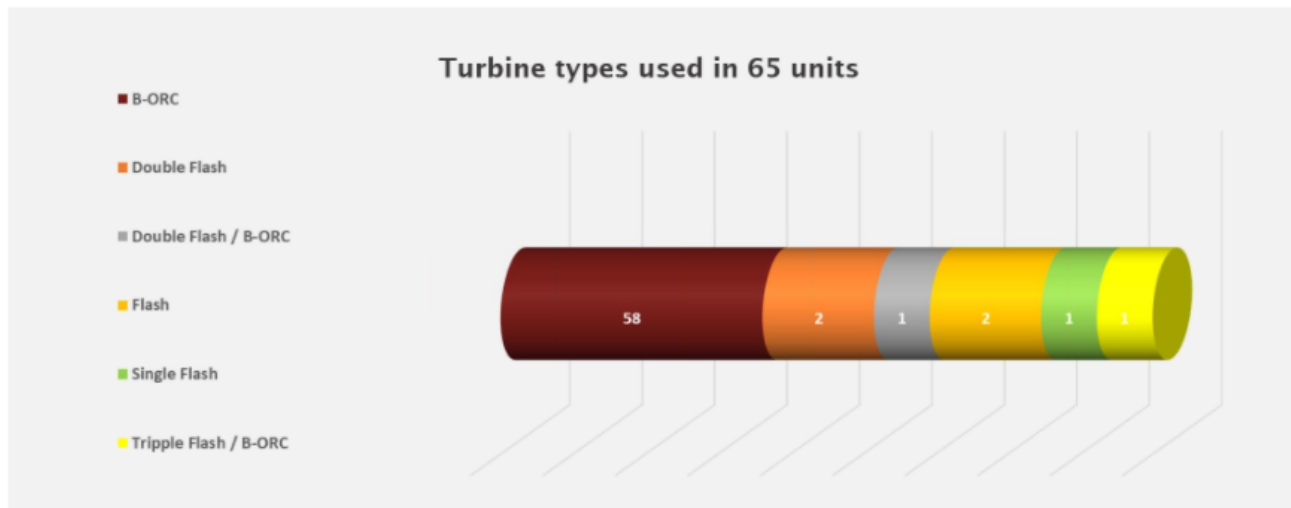
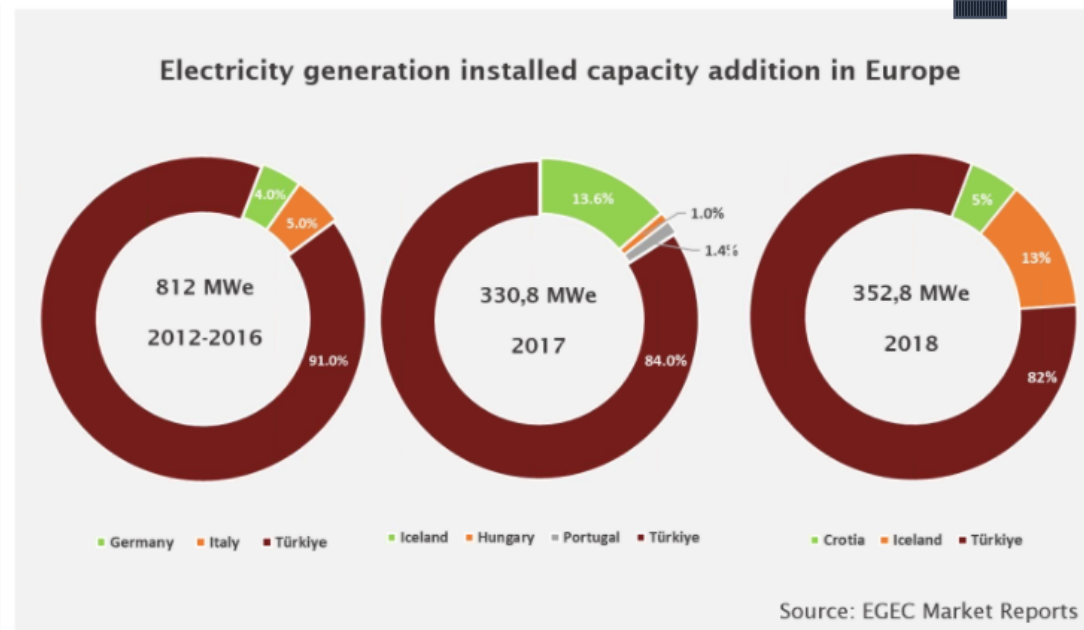
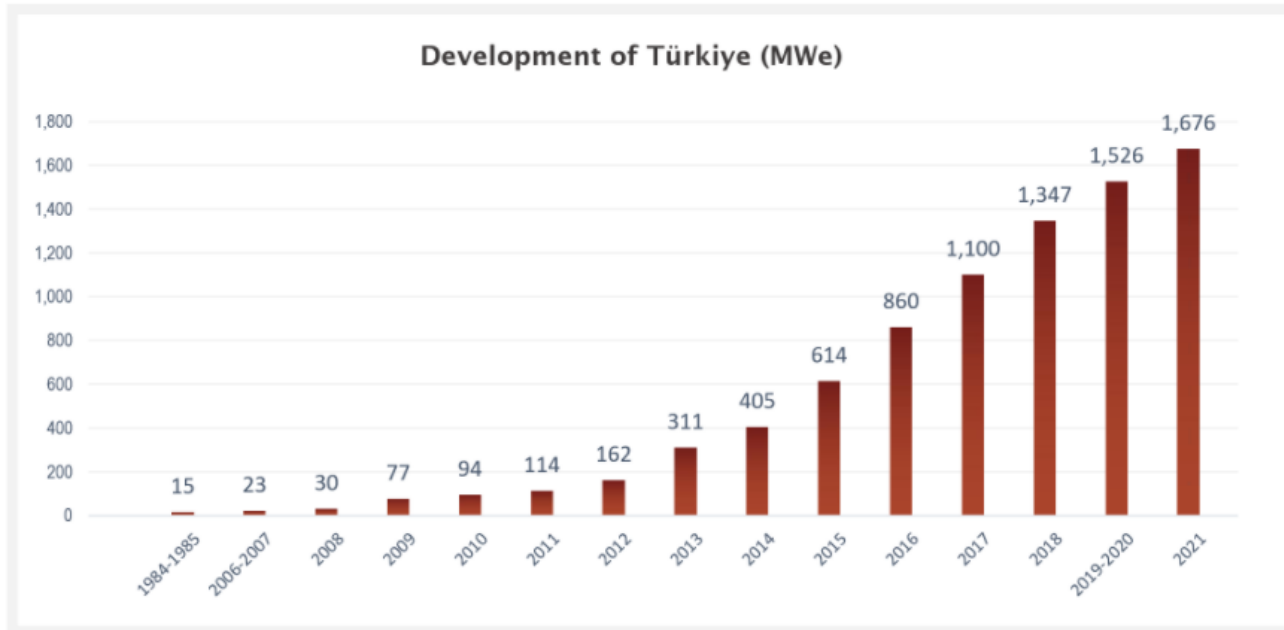
**60.000 MWt total**

- Equal to 60 billion m<sup>3</sup>/year gas (2020 consumption is 48.2 billion m<sup>3</sup>)
- 4.000 MWe is power generation potential
- 400.000 MWe power generation potential by EGS

\* Well data

\* Natural flow or hot-springs

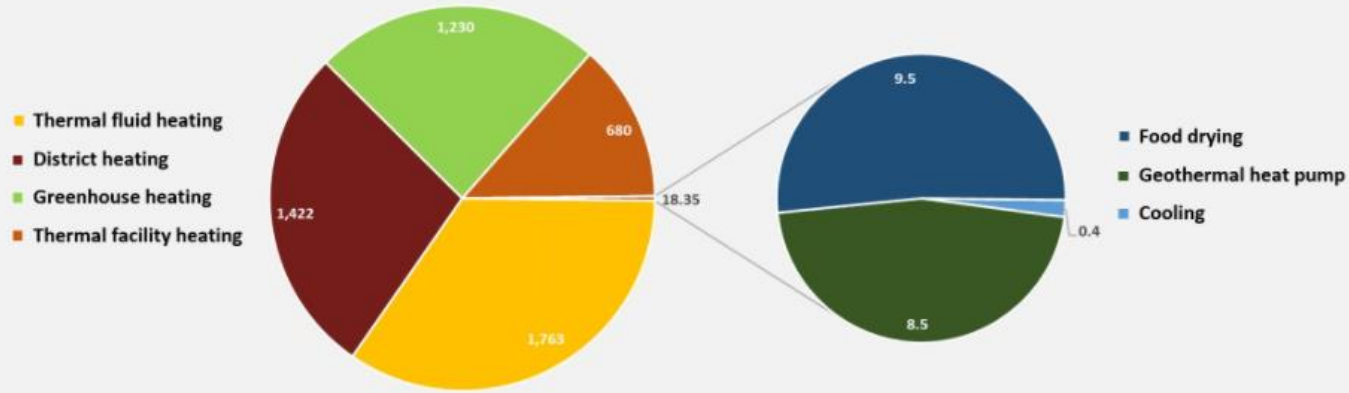
# Current electricity generation installed capacities



# Current direct use applications installed capacities



### Distribution of direct use applications (MWT)



### Cities using geothermal for heating



### Cities using geothermal for tourism & health



### Cities using geothermal for food drying

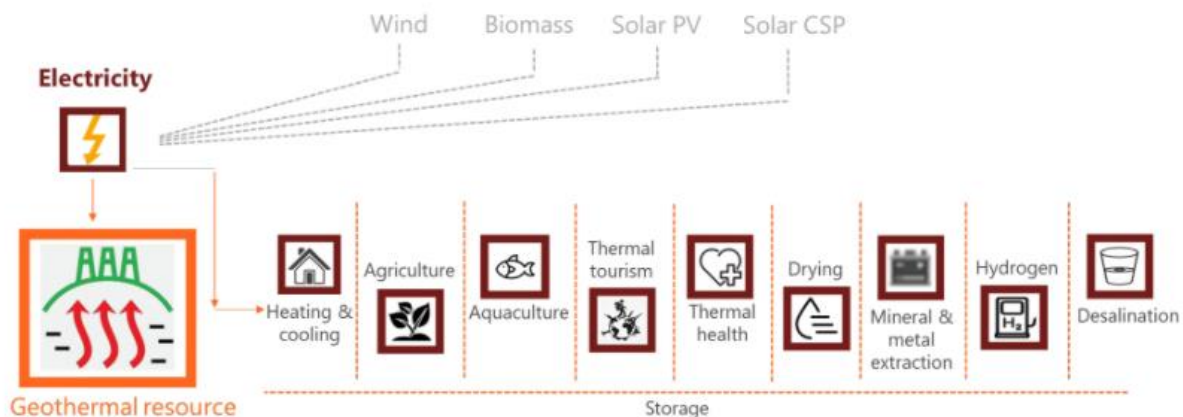


### Cities using geothermal for greenhouse heating



Source: IZTECH

# Current cascade applications



GEPP	Company	City - Town	District heating	Production
Kızıldere	Zorlu Energy	Denizli - Sarayköy	5000*	
Dora	MB Holding	Aydın - Salavatlı		41.400 m2
Kuyucak	BM Holding	Aydın - Ortaklar		49.832 m2
Babadere	MTN Energy	Çanakkale - Babadere		3.000 m2
Salihli	Sanko Energy	Manisa - Salihli	4000*	
Kubilay	Beştepeler Energy	Aydın - Germencik		65.000 m2
Tosunlar	Akça Energy	Denizli - Sarayköy		200.000 m2

\* House equivalent

GEPP	Company	City - Town	Production Capacity (ton/day)	Production
Gümüşköy	BM	Aydın - Germencik	25	Liquid CO2
Kızıldere	Linde	Denizli - Sarayköy	360	Liquid CO2
Dora I	Linde	Aydın - Köşk	100	Liquid CO2
Dora II	HABAŞ	Aydın - Köşk	300	Liquid CO2



# Incentives & supporting mechanism



## Power Generation

- Framed under YEKDEM (Renewable Energy Resources Supporting Mechanism)
- Valid for the facilities will start generation between 01.07.2021 and 31.12.2015
- Will be applicable for 10 years
- Additionally includes using domestic supplies incentive for 5 years.

Feed-In Tariff	Applicability	Domestic equipment usage	Applicability
USD cent /kWh	(years)	USD cent /kWh	(years)
3.4	10	7	5



## Greenhouse heating

- Establishment of geothermal resourced Greenhouse Organized Specialization Zones, to be carried out by our Ministry
- Usage rights of real estate, grassland belonging to the treasury within the framework of certain criteria for entrepreneurs investing in geothermal greenhouses
- Providing Low Interest Investment and Operational Loans for Agricultural Production by government bank.
- 50% grant support for greenhouse investments within the scope of Supporting Agriculture-Based Investments



## Other

- 10% reduction on the power generation pre-license and license application fees the regular fee
- Land allocation incentives
- Grid connection priority
- Tax incentives
- Incentives based on State Aids in at varying rates.
- RSM mechanism provided by World Bank
- Funding opportunities provided by World Bank

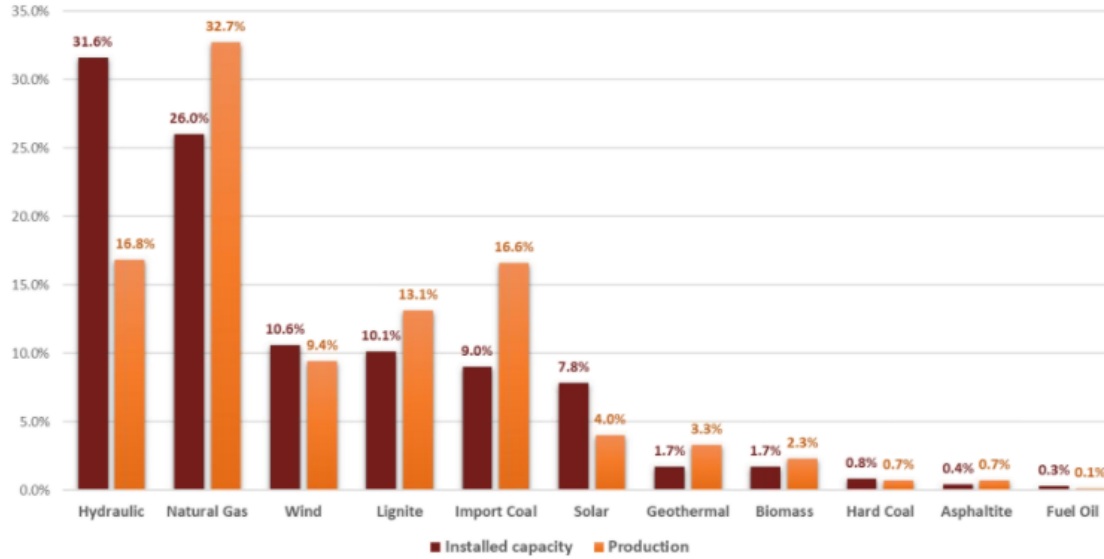




# Energy Data



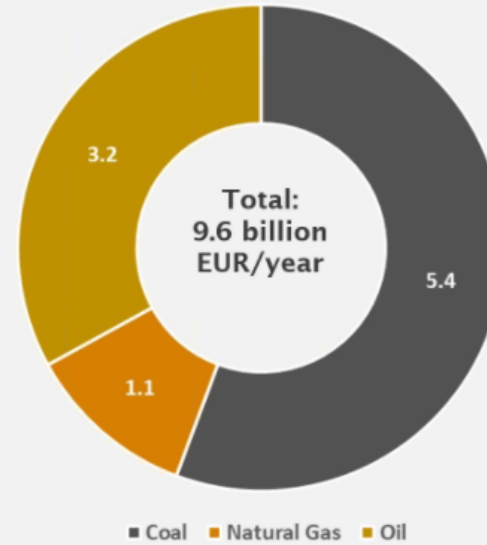
### Electricity Generation & Installed Capacities by Source



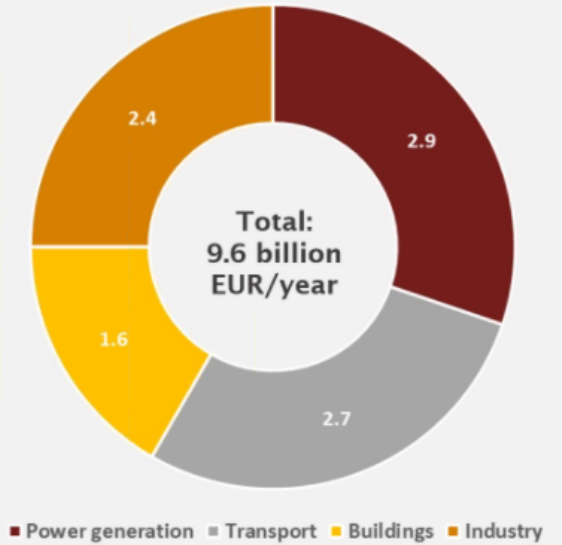
- Total installed capacity : 99.820 MW
- Total production: 331.491.935 MWh
- Includes licensed and unlicensed power plants
- The increase in demand is 8% including pandemic effect of 2021
- Share of electricity in final energy consumption is 20%
- Forecasted share in energy consumption @2040 is 40%

Source: Year end 2021 data of EPDK (Energy Market Regulator Authority)

### Breakdown of the External Costs of Fossil Fuel Use by Fuel Types, 2018



### Sectoral Breakdown of the External Costs of Fossil Fuel Use, 2018



- 56% of external cost of fossil fuel use arises from coal use (approx. 60% comes from lignite use for power generation and heating; EUR 5.4 b)
- 33% comes from petroleum products (EUR 4.3 b)
- Power generation constitutes about 30% of the external cost of fossil fuels (EUR 2.9 b)
- Industry 25% (EUR 2.4b ) and buildings 17% (EUR 1.6 b)

Source: SHURA Energy Transition Center Report, 2020 @Sabanci University

# There is no challenge without a solution!

Do we want to fight to keep climate change in control?

Do we want to have an independent economy?

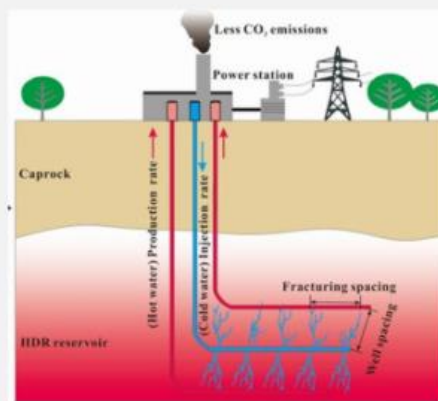
Do we want to generate green jobs?

## Then why not geothermal?

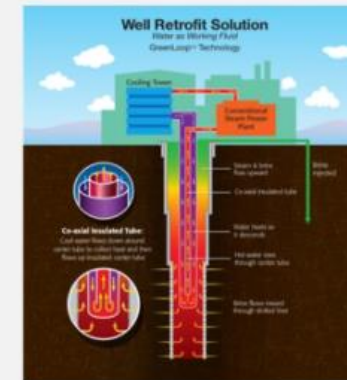
- Minimum carbon foot print
- Sustainable
- Cascade and hybrid opportunities
- Simply available everywhere

Forecasted theoretical potential today: **60.000 MWt total**

- Installed capacity for direct use applications: 5113 MWt
  - **91,5% outstanding**
- Installed power generation capacity: 1676 MWe
  - **53% outstanding**
- 400.000 MWe power generation potential by EGS-AGS
  - **100% outstanding**



Enhanced Geothermal Systems (EGS)



Advanced Geothermal Systems (AGS)

# International Geothermal Congress & Exhibition (IGC)Türkiye 2022



Venue & Date	Kaya izmir Thermal Hotel - 19-21 September 2022
Format	<ul style="list-style-type: none"><li>• September 19 - A workshop integrated to IGC Türkiye 2022</li><li>• September 20 - The Congress with exhibition floor   A business reception on the first day evening provides perfect networking opportunities.</li><li>• September 21 - GeoTHOUR to ALA-2 Geothermal Power Plant</li></ul>
Topics	<ul style="list-style-type: none"><li>• Impact financing</li><li>• Heating &amp; cooling applications</li><li>• Hybrid and cascade use</li><li>• Electricity production</li><li>• Region Overviews (Africa, Middle East, Europe)</li><li>• New Technologies: EGS, Closed Loop, Co-production from Oil&amp;Gas Wells</li></ul>
Interest	There already is a strong interest by a large group of national and international players who are supporting us in the preparation for the event.
Target	<ul style="list-style-type: none"><li>• Operators and developers</li><li>• Geothermal technology suppliers</li><li>• Green energy investors</li><li>• Financial sector</li><li>• Construction industry</li><li>• Academia</li></ul>



## IGC Türkiye 2016 - 2019



### Partners, sponsors & exhibitors



### Selected participating entities



## IGC Türkiye 2022 Overview

### Developing Technologies

#### Drilling

- AI applications
- Data collection

#### Heat Extraction Everywhere

- Open loop systems (EGS)
- Closed loop systems (AGS)

#### Innovation

- Scaling
- Art of re-injection
- Lithium
- Well recovery & stimulation

### Utilization

#### Direct use & Industry

- Greenhouses
- Hybrid applications
- Green H<sub>2</sub> & lithium

#### Power Plant Technologies

- Developments

#### Geothermal & Oil-Gas Fields

- Geothermal potential
- Re-purposing
- Co-generation

### Geo-Updates

#### Geothermal Countries

- Türkiye
- Europe
- Middle East
- Africa

#### Impact Funding

- Trends
- Applicability

#### TUBITAK Session & Panels

- EU Horizon 2023 funding schemes
- Panel by supported associations

# ENERCHANGE

**Thank you for the attention &**

**Looking forward to meet you all at  
IGC Türkiye 2022!**



**Cannur Bozkurt** – Managing Director of Enerchange Türkiye