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# SPECIALISTS IN HYDROPOWER PROJECTS

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ENGINEERING CONSULTING

HYDROELECTRIC

**OMEK Consulting Engineers S.A.** has played an important role in the Design, Supervision and Delivery of the vast majority of Major Infrastructure and Development Projects in Greece since 1994.

In all these years, **OMEK** has demonstrated a significant capability of providing High Quality Services in all Fields of Engineering Projects, in combination with the provision of an integrated package of Managerial, Technical, and Contractual support services, in all phases of the Projects.

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SPECIALISTS IN MAJOR HYDROELECTRIC PROJECTS

**TODAY** **OMEK** provides high quality services in **Major Hydropower Project** as:

**INDEPENDENT ENGINEER OF COST CERTIFICATION for PCI 3.24 HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE, which is the most complex and biggest pump storage project in Greece**

# OLDER PROJECTS

**Hydroelectric and Multiple purpose projects serving Power Production, Irrigation, Water Supply and Environmental purposes where OMEK staff was involved in the Design and Tender Phase**

- NESTOS RIVER
- AOOS RIVER
- ALIAKMON RIVER
- LOWER ACHELOOS
- ACHELOOS DIVERSION TO THESSALY PLANE

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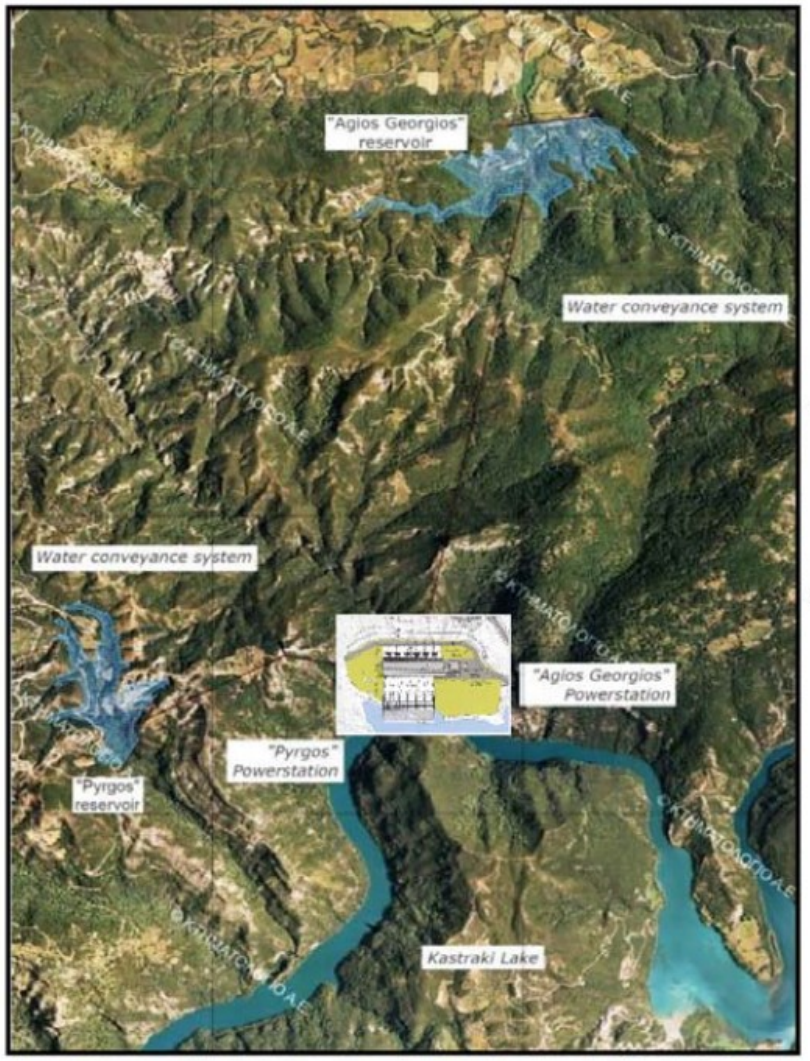
# OMEK CURRENT PROJECTS

# OMEK :

## INDEPENDENT ENGINEER OF COST CERTIFICATION

for PCI 2.9 (ex 3.24)

## HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

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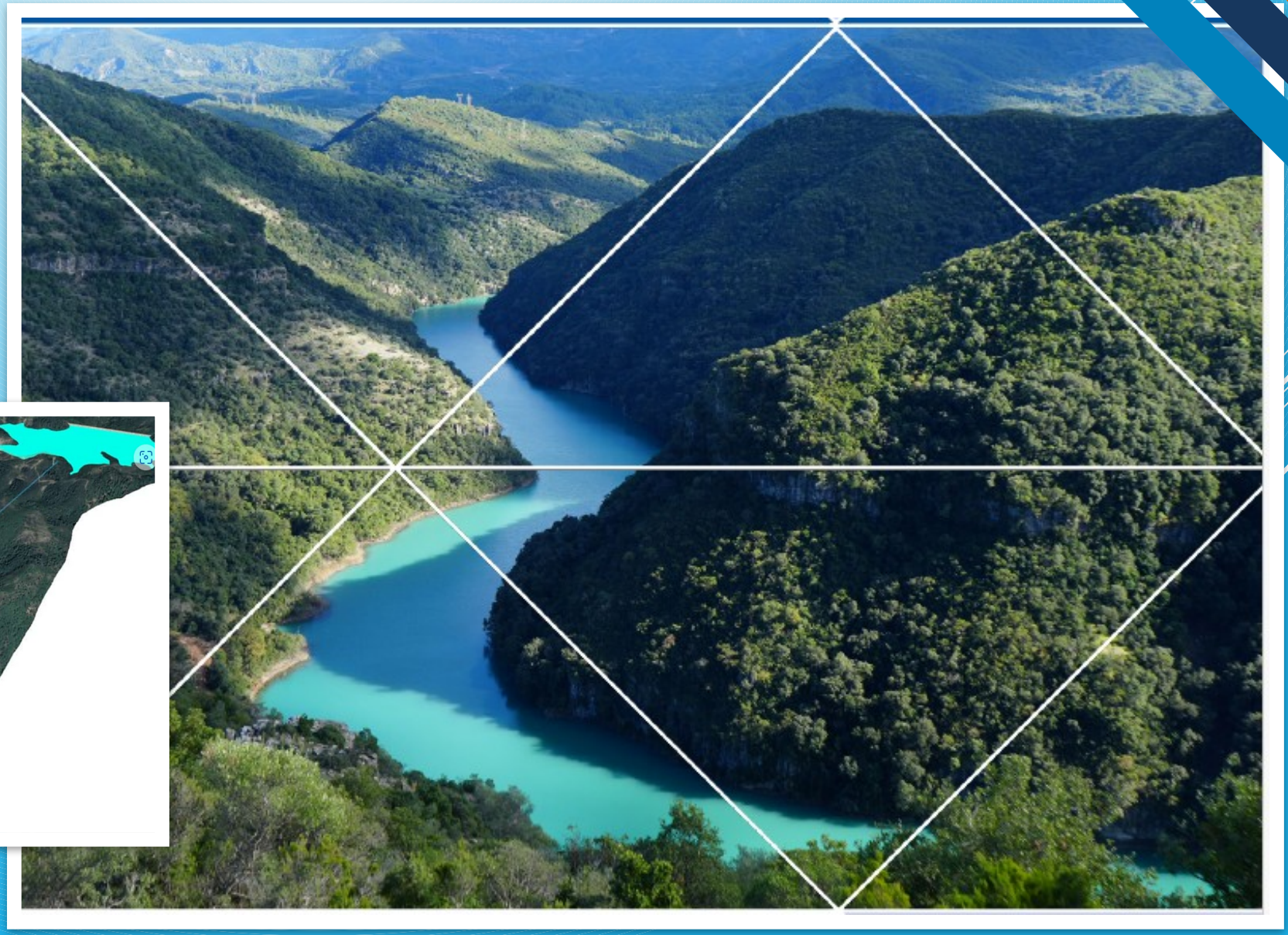
# HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

## KASTRAKI LAKE,

AMFILOCHIA, GREECE

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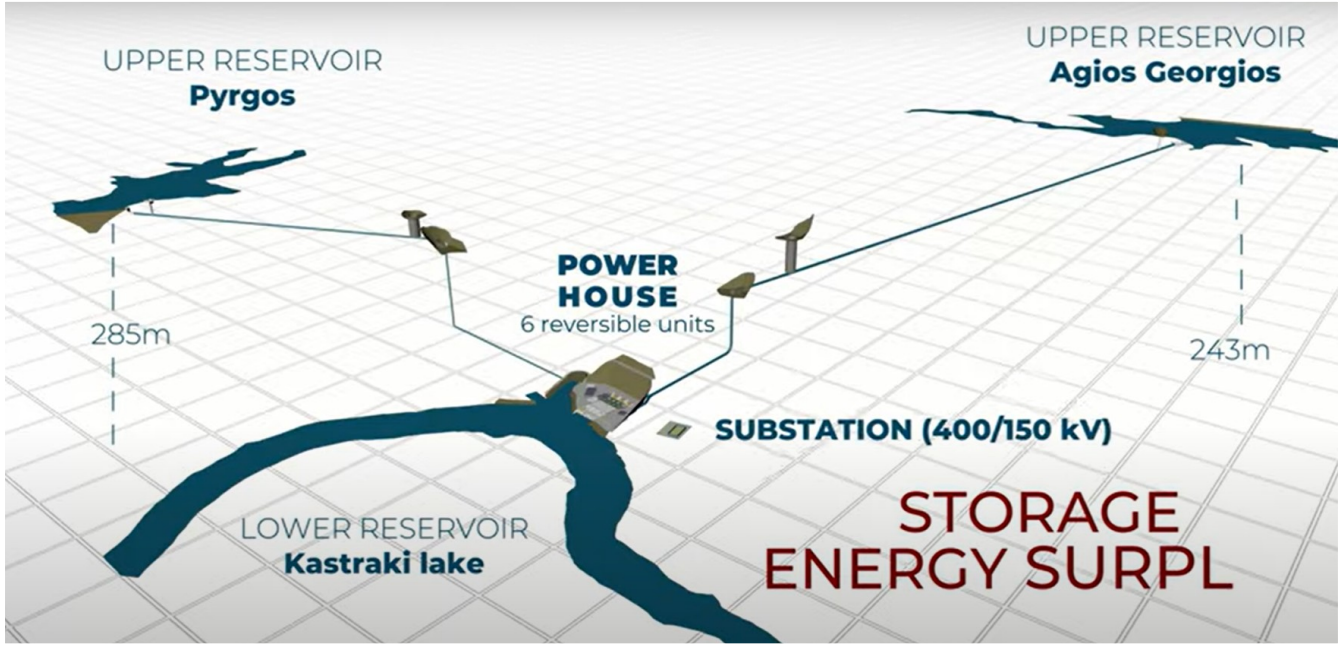
# HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

***The Project consists of :***

- **2 new Upper Reservoirs** at the locations of **Agios Georgios and Pyrgos - 2 DAMS**
- **1 Unified Power Station** with 6 in total reversible vertical axis Francis units, total capacity f 680MW/730MW**.**




**Accompanying projects**

- **Interconnection Project of new HVC of Amfilochia with HVC of Acheloos,**
- **Rearrangement of the transmission lines and access roads** for accessibility reasons as well as to serve the forestry surveillance of the area and the protection of the forest and wildlife of the region

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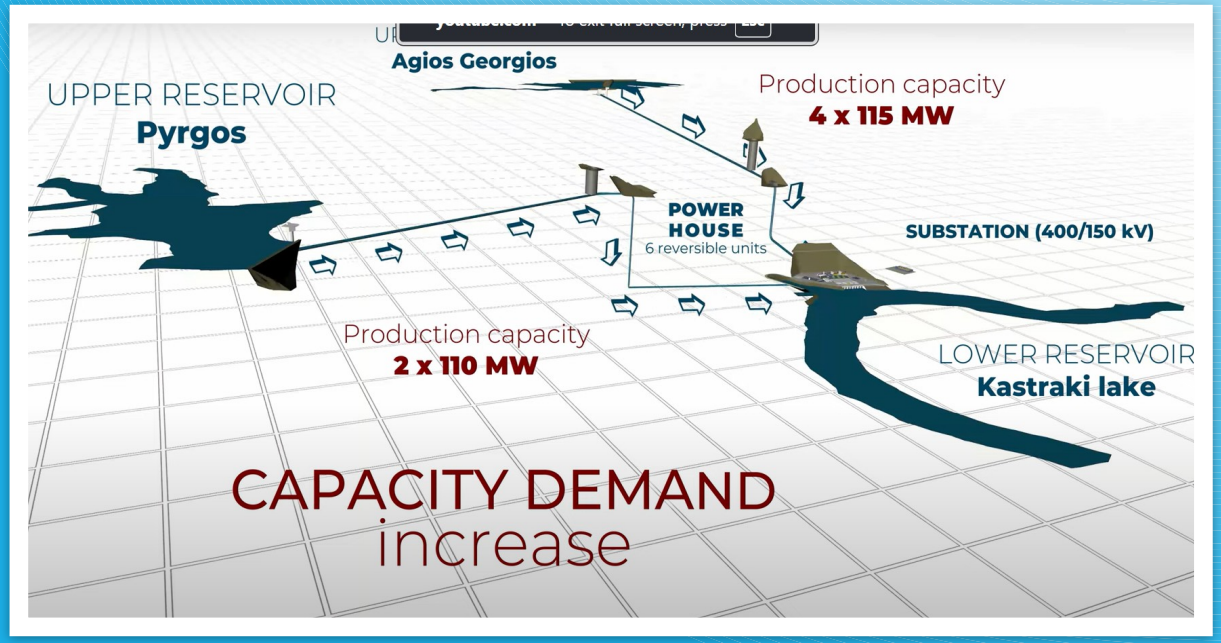
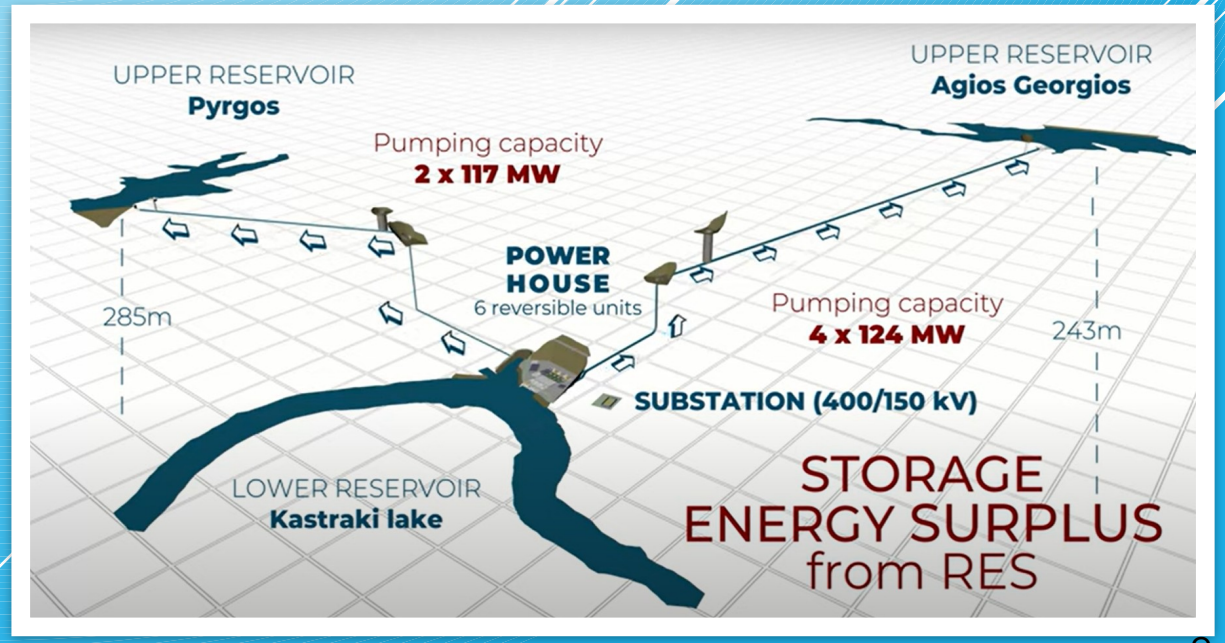
# HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

The new upper reservoirs Agios Georgios and Pyrgos will be connected to the lower reservoir Kastraki Lake.
The power facilities will act **in turbine and pump mode.**

## turbine mode 680 MW




## pump mode 730 MW



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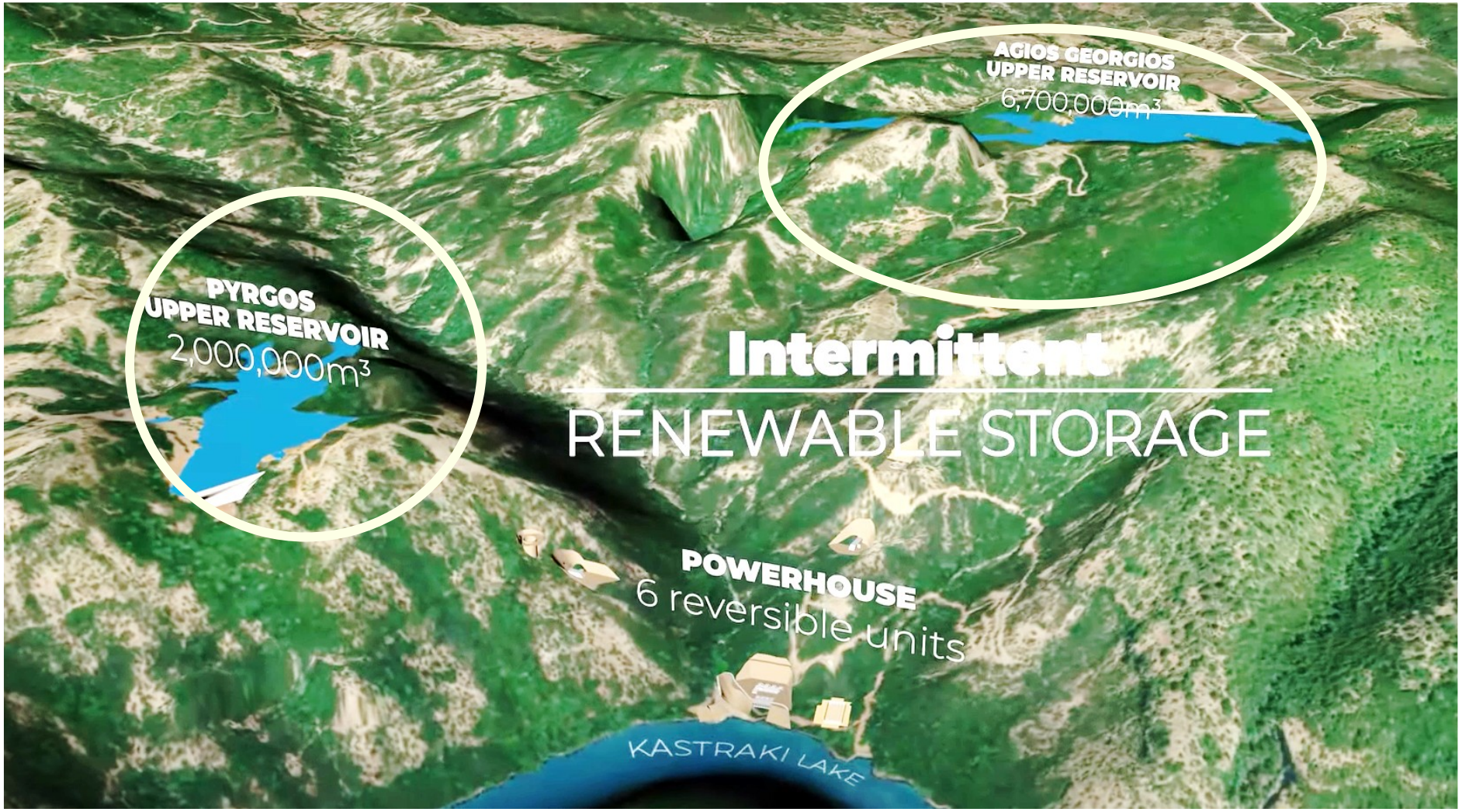
HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

# *2 new Upper Reservoirs at Agios Georgios and Pyrgos – 2 DAMS*



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# HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

## *Agios Georgios Dam*

# *Pyrgos Dam*


PYRGOS
UPPER RESERVOIR
net volume ~ 2 hm³
max P.P.: +430,00 m
min P.P.: +412,00 m
PYRGOS DAM
MAXIMUM HEIGHT 52m

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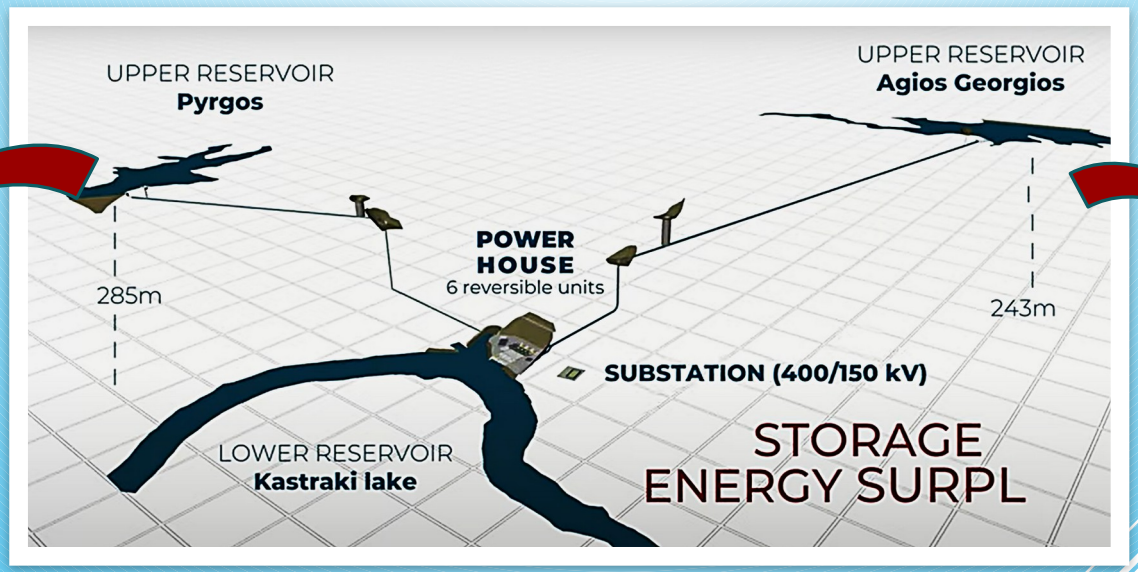
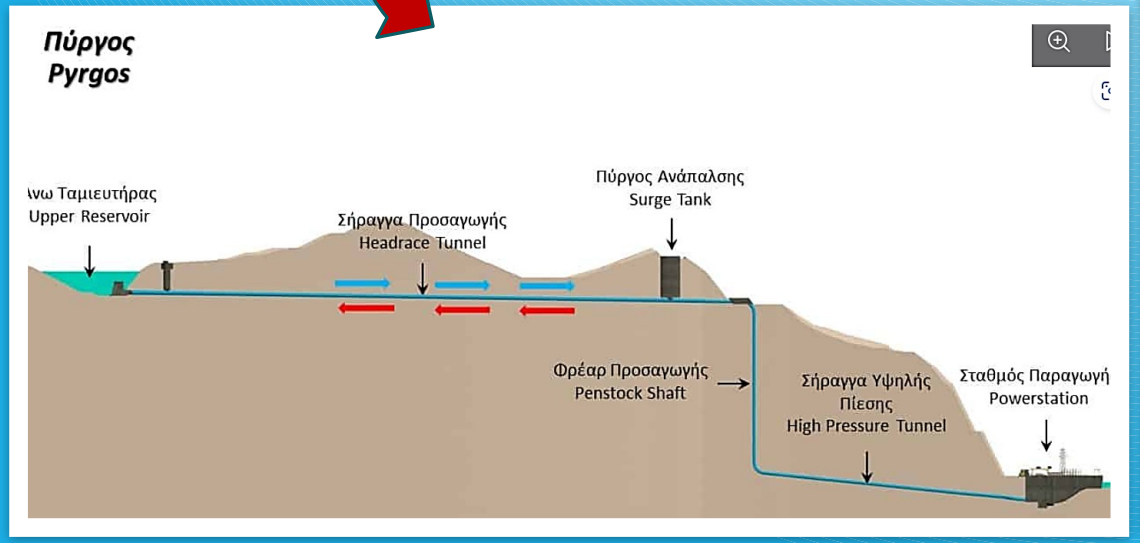
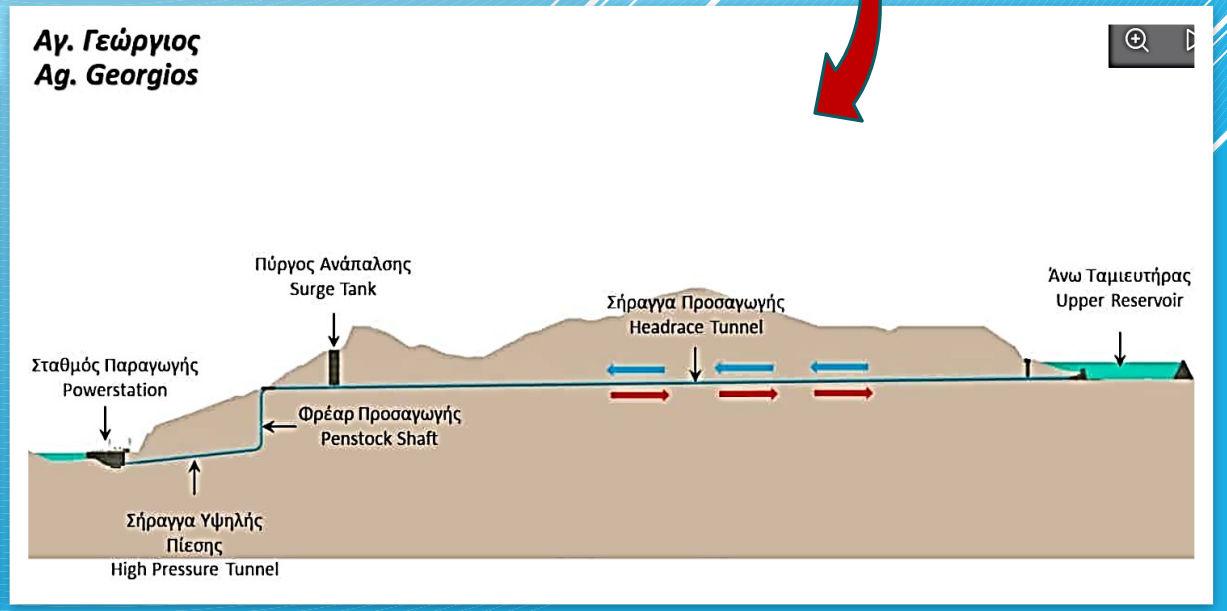
# HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

**Pyrgos High Pressure Tunnel**




**Agios Georgios High Pressure Tunnel**



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# HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

## Agios Georgios
## High Pressure Tunnel


**Tunnels Excavation and temporary Support**

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# HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

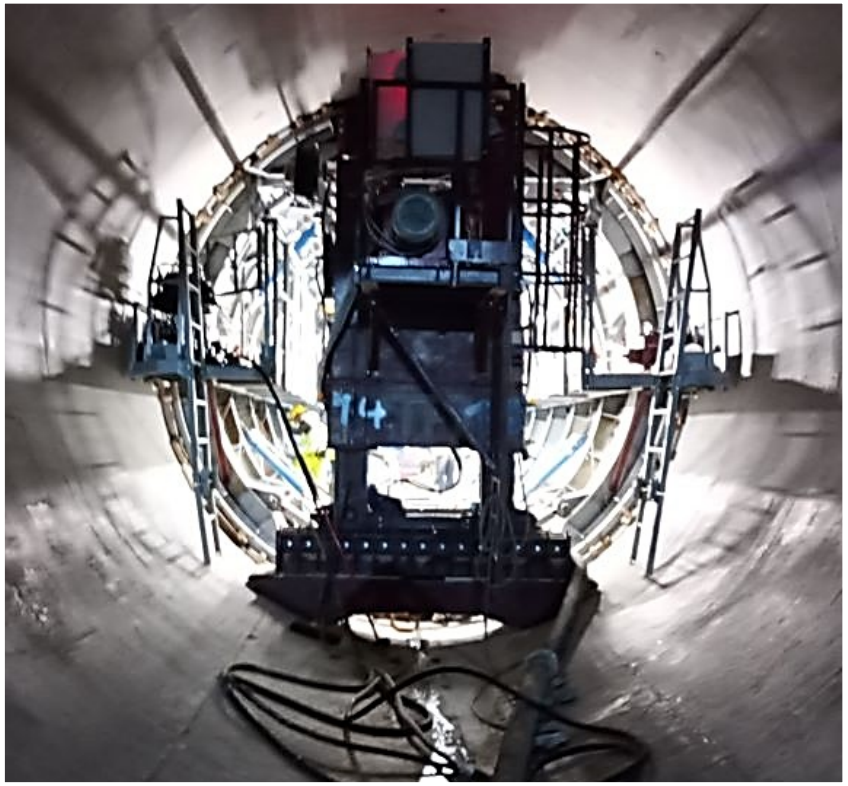
## Pyrgos High Pressure Tunnel

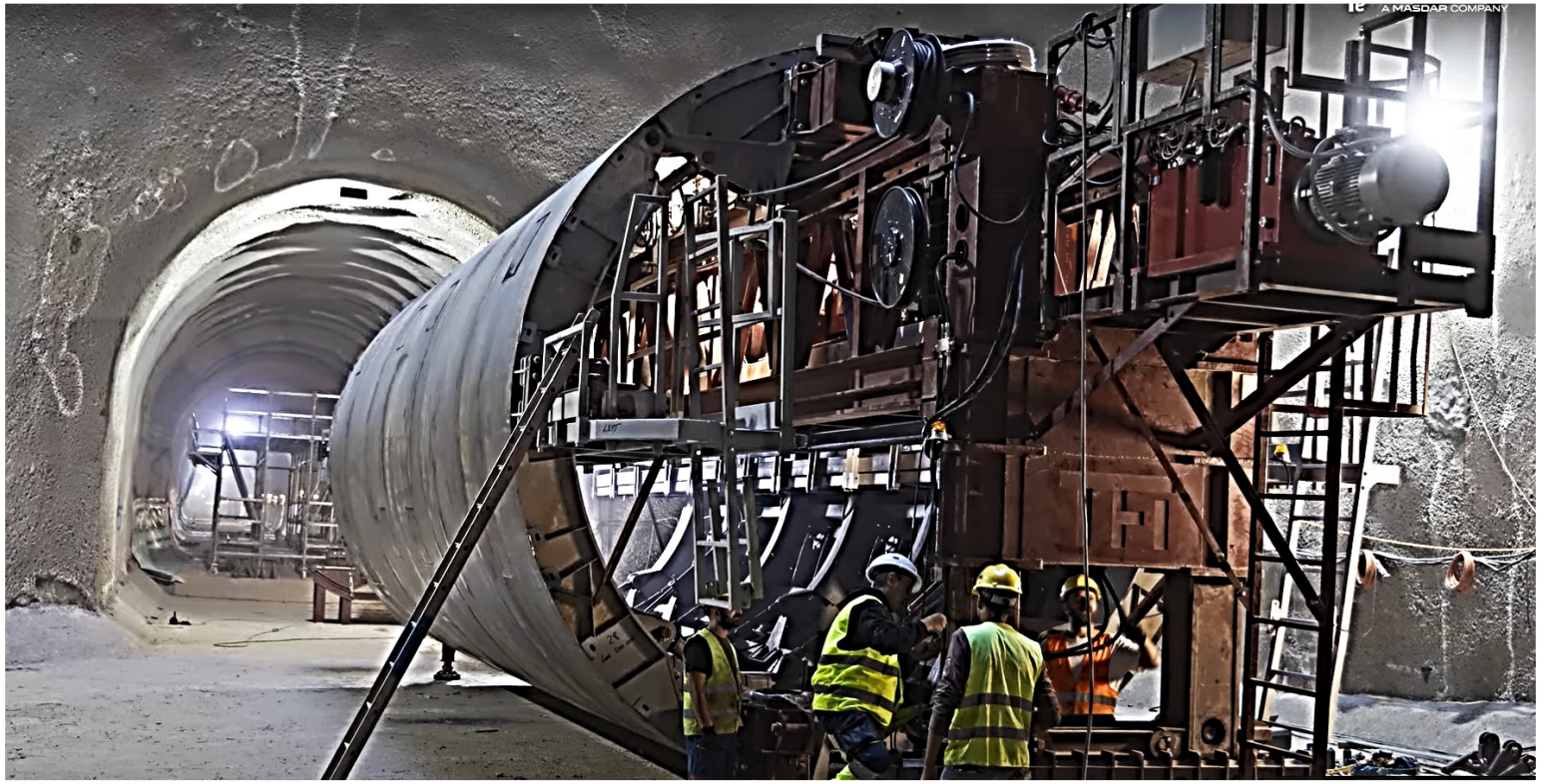


**Tunnels Excavation and temporary Support**

## Pyrgos High Pressure Tunnel

## Tunnels Final Lining with linear construction






# TUNNEL FORMWORKS - FULL ROUND Ø5m & Ø7.8m

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# HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

## Pyrgos High Pressure Tunnel

**Tunnels Final Lining with linear construction**

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# Pyrgos Surge Shaft excavation & support


**Deep shafts**

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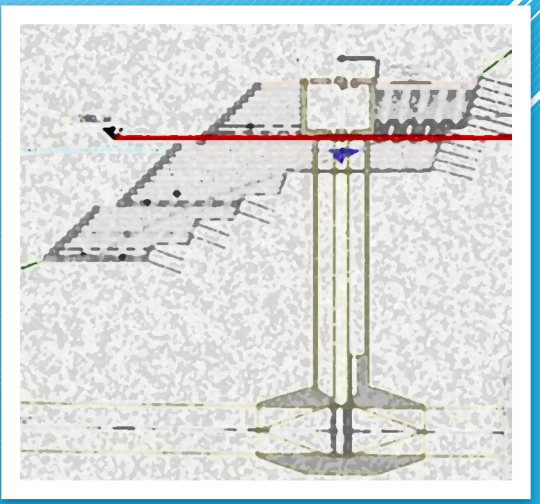
# Pyrgos Surge Shaft excavation & support


## Agios Georgios Gate Shaft



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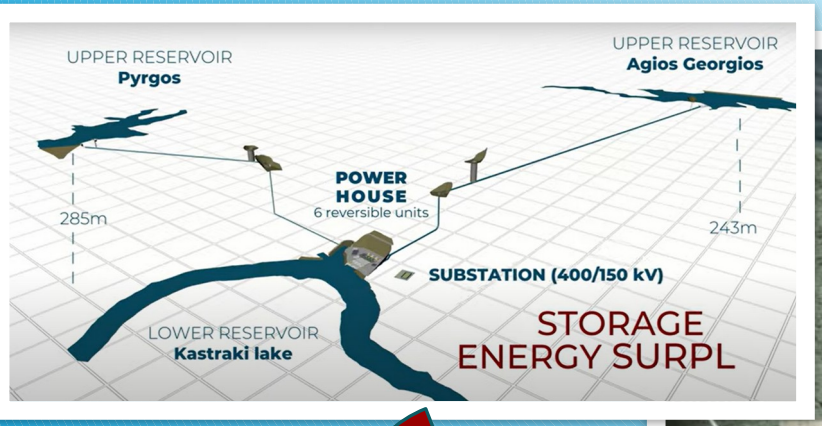
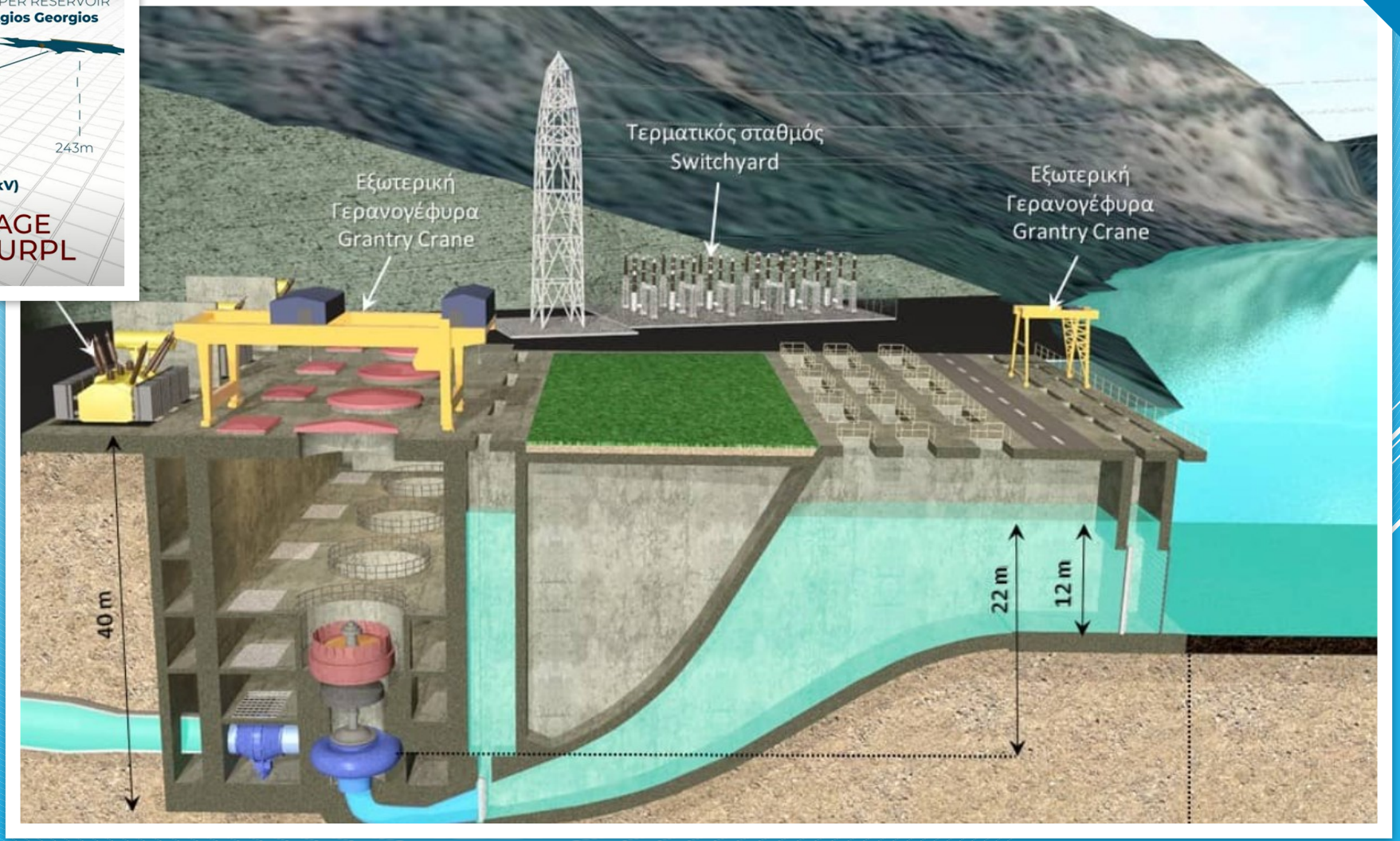
# HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE




**Power House**



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# HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

## Demanding Geotechnical Works


**100m Cut above Power House**

# Demanding Geotechnical Works


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# HYDRO-PUMPED STORAGE AT "AG. GEORGIOS" AND "PYRGOS", AMFILOCHIA, GREECE

The main geotechnical problems that needed to be handled and solved, were:

- The **high seismicity of the area** was the most important factor that demanded careful design.
- Existing Faults

Major Geotechnical Works included:

- **Piles Walls**
- **Prestressed Anchors** to stabilize Landslide areas
- **Reinforced Earth**
- **Reinforced Embankments** using Geotextiles.
- **Deep cuts and high embankments**

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# OMEK OLDER PROJECTS

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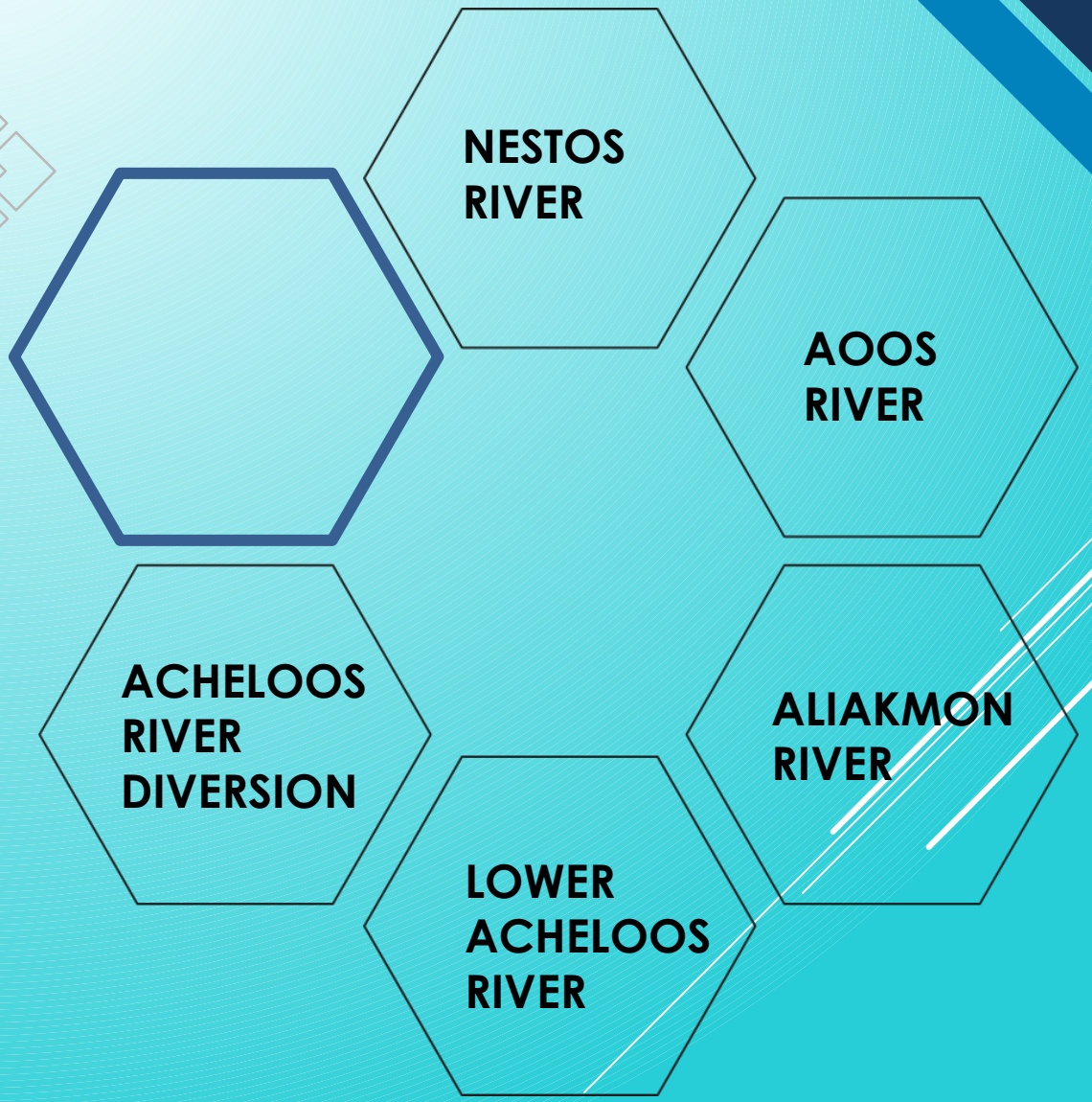
*Hydroelectric and Multiple purpose projects serving Power Production, Irrigation, Water Supply and Environmental purposes, where Senior Engineers currently cooperating with OMEK were involved in the Design and Tender Phase*

- NESTOS RIVER
- AOOS RIVER
- ALIAKMON RIVER
- LOWER ACHELOOS
- ACHELOOS DIVERSION TO THESSALY PLANE



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# Nestos river

**A. Thisavros hydroelectric project.**

**Rockfill dam with transition zones and clay core.**

- Nominal crown level 390m. Dam height 175m. Crown Length 540m.
- Dam Volume 12.000.000 m3, Reservoir area 18 Km2
- Utilized volume of reservoir 565.000.000 m3
- Underground Pump Storage Power Station 384MW capacity

**B. Platanovrissi hydroelectric project Dam of Roller Compacted Concrete and Flying Ash from the Lignite Stations**. Nominal crown level 230.5m., Dam height 95m. Reservoir area 3.25 Km2, Utilized volume of reservoir 57.000.000 m3

- Pump Storage Power Station 116MW capacity

**C. Future project of Temenos**

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# Aoos Hydroelectric Project

**Pigai :**

*The Aoos river diversion project involves the construction of hydroelectric power plant, directed to Metsovitiko Branch of Arachthos River.* It consists of 1 dam and 5 col earth dams with clay core.

**Dam** characteristics: Nominal crown level 1339m., Maximum height from foundation 78m.
Length of crown 300m. Dam Volume 3.200.000 m3,
Max operation level 1343m.
Reservoir area 9 Km2,
Utilized volume of reservoir 144.300.000 m3
**5 col dams** with characteristics: Total volume 900.000 m3, Dam height 12-30m.

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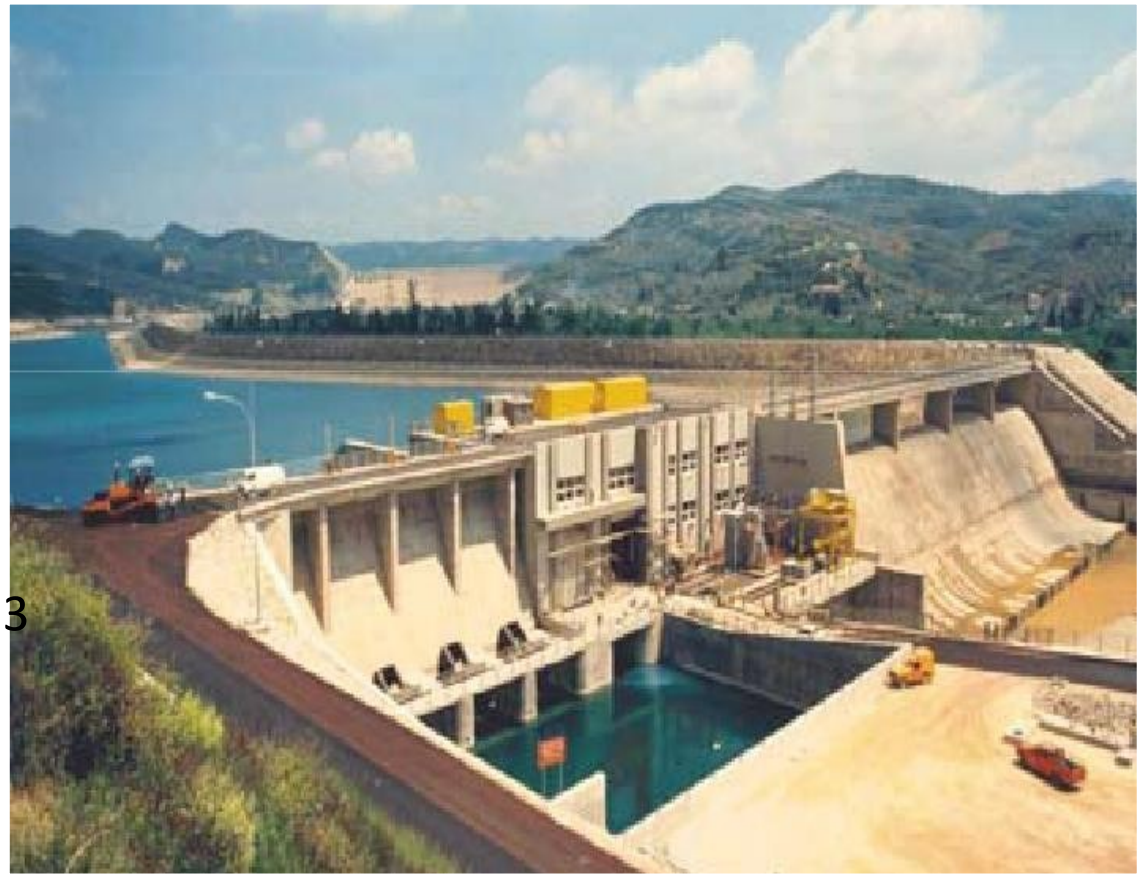
# Aoos Hydroelectric Project

**Pigai : Power complex:**
Power tunnel inclined 3 Km with diameter 3m
Vertical Section Height 440m - diameter 2,8 m
Surge Tank Height 90m,
Surge tank Diameter 7m
Underground Power Station capacity 210MW
Access tunnel length 1615m.,
Total Waterfall Height 675m.



**Pournari II**
Dam height 15m., Length of crown 2000m.
Dam volume 700.000 m3
Utilized volume of reservoir 4.000.000 m3
Reservoir area 0.65 Km2
Power Station capacity 33.6MW

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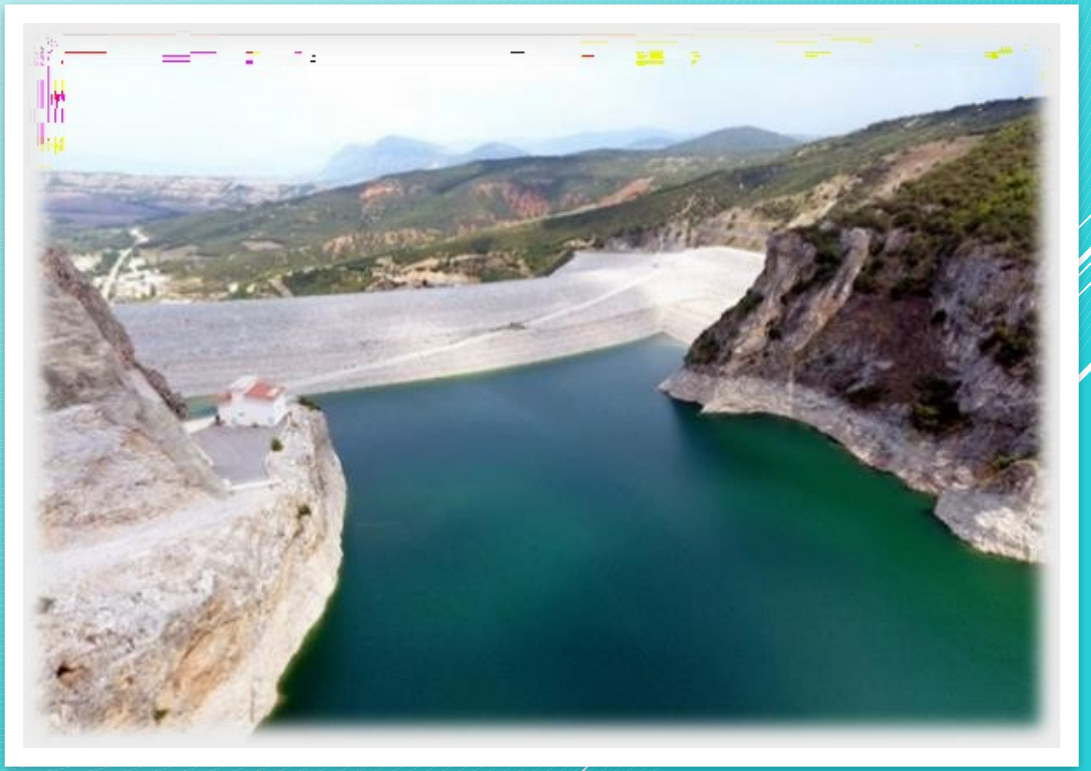
# Aliakmonas River

The project refers to the Aliakmonas River. It consists among others of the hydroelectric projects of Ilarionas, Sfikia, Asomata and Agia Varvara reregulating reservoir

**Ilarionas** dam is an earth dam with clay core

- Dam height 130m.
- Length of crown 540m
- Dam Volume 8.800.000 m3
- Utilized volume of reservoir 412.000.000 m3
- Reservoir surface 21.9 Km2
- Power Station 157 MW capacity
- Small power station at the bottom outlet with the discharge of 4.5 m3/sec for environmental purposes with capacity of 4.5 M



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# Aliakmonas River

**Sfikia** dam is a rockfill dam with clay core.
Dam height 82m., Length of crown 220m.
Dam Volume 1.620.000 m3, Reservoir area 4.3 Km2
Utilized volume of reservoir 18.000.000 m3
Max service level 146m.
Pump Storage Power Station 315MW capacity

**Asomata** rockfill dam with clay core. Its reservoir works as Lower reservoir of Sfikia Pump Power Station.
Dam height 52m. Length of crown 205m
Dam Volume 1.450.000 m3
Max service level 85.5m.
Utilized volume of reservoir 10.000.000 m3
Power Station 108MW capacity

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# Aliakmonas River

**Agia Varvara reregulating reservoir and water supply**

Serves the reregulation of the discharges of the upstream hydroelectric projects of Aliakmonas River. Ensures continuous discharge of the river for environmental purposes and serves the irrigation of Thessaloniki areas.

**Earth fill dam with sand gravel, clay core and foundation waterproofing cement bentonite diaphragm ~17m. deep.**

Nominal crown level 43.5 m.

Dam height 10 m., Length of crown 2400 m

Dam Volume 1.000.000 m3

Utilized volume of reservoir 4.500.000 m3

Power Station 0.92 MW capacity

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# Lower Acheloos River

## Stratos Hydroelectric project

The **Stratos Dam** is a multiple purpose project and is located downstream of Kastraki dam. It is an **earth fill dam with sand – gravel and clay core and deep bentonite cement diaphragm**

Dam height 26m.
Dam crest length 1900m.
Dam Volume 2.800.000 m3
Reservoir area 8.4 Km2
Utilized volume of reservoir 11.000.000 m3
Power Station 150MW capacity
and a small unit for irrigation and environmental purposes 6.2 MW

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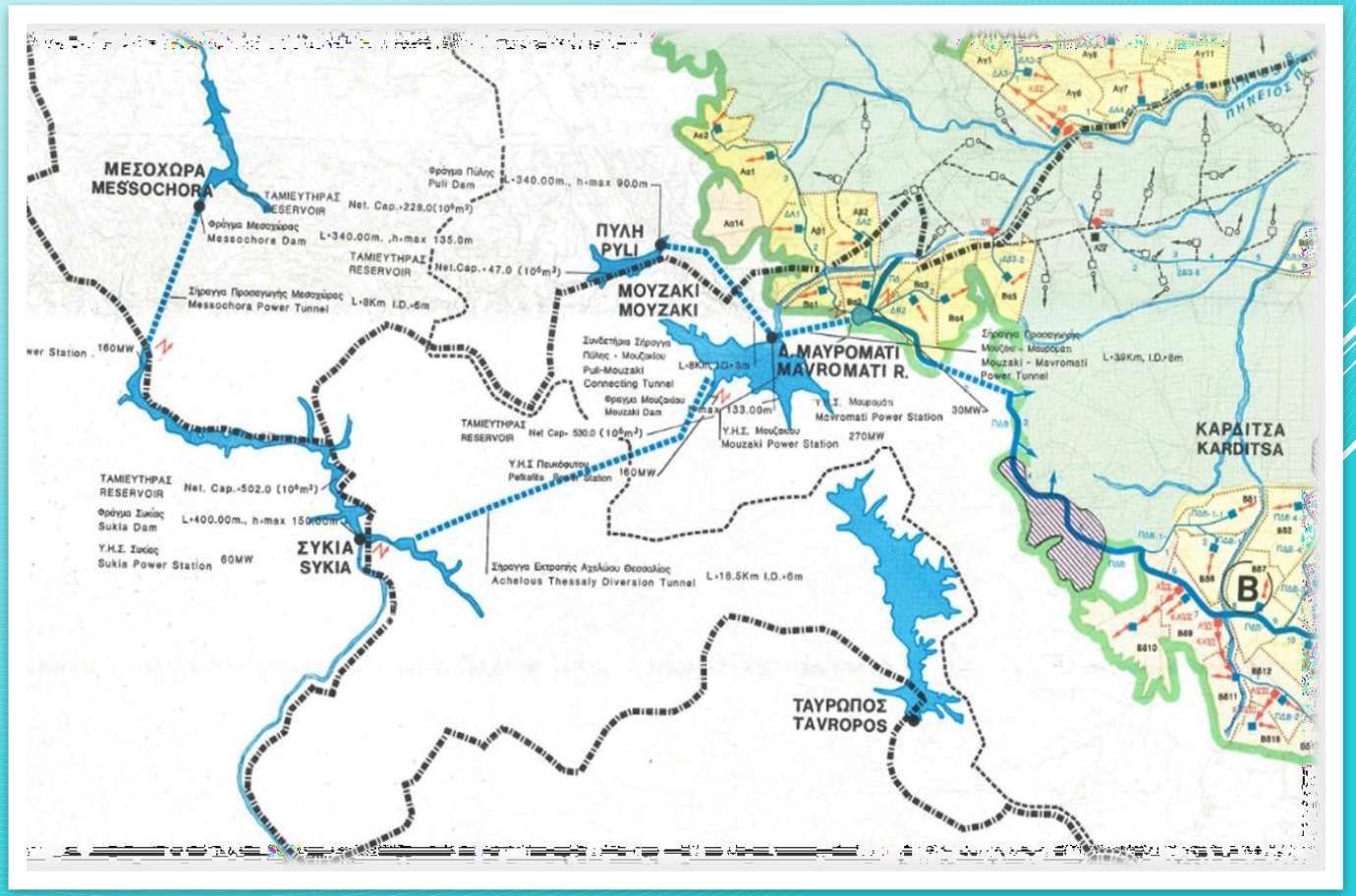
# Acheloos River diversion to Thessaly plane

The project is a multiple purpose one and refers to the Upper Acheloos diversion to Thessaly Plane. It consists from the hydroelectric projects Messochora, Sykia, the diversion tunnel of Acheloos to Thessaly, the dams Pyli and Mouzaki and the connecting tunnel Pyli -Mouzaki and Mavromati Reregulation reservoir and the irrigation of Thessaly Plane and other multiple.



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# Acheloos River diversion to Thessaly plane

**Messochora hydroelectric project. Messochora dam is a rockfill dam with an upstream concrete slab.** It is considered as the highest dam in Europe with these characteristics:

- Nominal crown level 775m.
- Dam height 135m., Length of crown 673m.
- Maximum height from foundation 150m.
- Dam Volume 4.000.000 m3
- Reservoir area 12.8 Km2
- Utilized volume of reservoir 228.000.000 m3
- Power tunnel 8 Km. long, diameter of 6m

**Messochora Power Station at Glystra 160MW capacity**

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# Acheloos River diversion to Thessaly plane

**Sykia hydroelectric project in Upper Acheloos River.** The project is located on river Acheloos at its junction with the tributary - Koumbourgianitis stream.
**Sykia dam is an earth dam with sand gravel and clay core** with these characteristics:

Nominal crown level 555m.

- Dam height 150m.  Length of crown 397m.
- Maximum height from foundation 175m.
- Dam Volume 12.400.000 m3
- Reservoir area 12.8 Km2

Utilized volume of reservoir 502.000.000 m3

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# Acheloos River diversion to Thessaly plane

**Upper Acheloos River Diversion Tunnel and Power Station**

- Length 17.3 Km
- Internal Diameter 6m.
- Min. concrete lining thickness 0.35m.
- Intake elevation 470m.
- Tail Water elevation 433.5m.
- Surge Chamber Height 143m.
- Surge Chamber Diameter 26m

Pefkofito Power Station 160MW capacity

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# Acheloos River diversion to Thessaly plane

**Mouzaki Dam** in Thessaly. Earth dam with sand gravel and clay core:

- Nominal crown level 333m.
- Dam height 128m.
- Length of crown 680m.
- Foundation with Waterproofing Concrete Bentonite Diaphragm Wall
- Power Tunnel 4 Km2 - Inside Diameter l 8m.
- Power Station 270 Mw capacity with outlet in the reregulating reservoir of Mavromati with Power Station 30 MW with outlet in Pamissos River for irrigation of Thessaly plane and other multiple purposes.

**Pyli Dam:** Earth dam with sand gravel and clay core :

- Nominal crown level 340m.
- Dam height 85m.
- Length of crown 350m.

Max height from foundation 115m.
Connecting Tunnel

**Pyli - Mouzaki**

- Length 8.11 Km
- Internal Diameter 3m.
- Intake elevation 310m.

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# OMEK Project Management Systems

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**OMEK in all years has invested in having High Level of Education and Experienced Engineers, specializing on all engineering areas. All of them are available to offer their expertise, upgrading the level of Consultancy Services in all Fields of Engineering.**

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# Consulting in all Fields of Engineering Projects

# High Level Engineering Services

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# Many thanks for your attention