PUBLIC POWER CORPORATION S.A. OF GREECE

HYDROELECTRIC GENERATION DEPARTMENT
DEVELOPMENT OF HYDROELECTRIC PROJECTS
The Hydroelectric development from 1950 up to date

- Greece is an over 80% mountainous country with a complicated rugged relief and a variety of climates.

- Hydroelectric Power Plants are situated in the northwestern part, where most of the mountains are located.
The development of hydroelectric projects is carried out by the Design Branch and the Construction Branch of the Directory.

Head of the Design Branch is the Assistant Director responsible for the design of the works.

Head of the Construction Branch is the Assistant Director responsible for the construction and supervision of the works.
The Design Branch includes six Sectors:

- The Hydrology Sector
- The Hydrodynamic, Preliminary Design and Licensing Sector
- The Surveying, Expropriation and Road Construction studies Sector
- The Geotechnical and Geological Design Sector
- The Civil Engineering Design Sector
- The Electro-Mechanical Design Sector
CONSTRUCTION BRANCH

The Construction Branch includes two Sectors and four site Supervision of Construction Works Departments (SCWD):

• The Civil Engineering Construction Supervision Sector

• The Electro-Mechanical Construction Supervision Sector and

• The SCWD of Western Macedonia

• The SCWD of Central and Eastern Macedonia

• The SCWD of Thessaly

• The SCWD of Piges Aoos
PPC, with the Hydroelectric Generation Department, has a lot of experience in planning, design, construction and commissioning of Hydroelectric Projects by using its own human resources consisting of more than 132 full time employees.

Additionally the Department is supplying technical consultancy services to third parties in Greece and abroad.

The projects that were designed, constructed and commissioned by the Department are as follows.

The Department has designed, supervised the construction and completed the following Large and Small Hydroelectric Projects.
LARGE HYDROELECTRIC PROJECTS

- POURNARI I (3X100 MW)
- SFIKIA (3X105 MW)
- ASSOMATA (2X54 MW)
- STRATOS I (2X75 MW)
- PIGAI AOOS (2X105 MW)
- THISSAVROS (3X127 MW)
- POURNARI II (2X16 MW + 1X1.6 MW)
- PLATANOVRISSI (2X54 MW)
- ILARION (2X76.5 MW) (recently completed)
Arachthos Hydropower Group
Pournari_I HPP

Location: Epirus, Arta prefecture
Purpose: hydropower, irrigation, flood control
Commercial operat.: 1981
Installed power: 300 MW (3x100) Francis type turbines
Mean an. Product.: 235 GWH
Dam: earthfill, 87 m height
Reserv. net cap.: 303 m.c.m.

It is the first hydro project fully planned & designed by the PPC’s local staff
Aliakmon Hydropower Group
Sfikia HPP
(pump-storage)

Location: Central Macedonia, Imathia prefecture
Purpose: hydropower
Commercial operat.: 1985/86
Installed power: 315 MW (3x105) Francis type pump turbines
Mean an. Product.: 380 GWH (incl. 200 GWH due to pumping)
Dam: earthfill, 82 m height
Reserv. net cap.: 18 m.c.m.
Aliakmon Hydropower
Group
Assomata HPP

Location: Central Macedonia, Imathia prefecture
Purpose: hydropower, irrigation
Commercial operat.: 1985
Installed power: 108 MW (2x54) Francis type turbines
Mean an. Product.: 130 GWH
Dam: earthfill, 52 m height
Reserv. net cap.: 10 m.c.m.
LARGE HYDROELECTRIC PROJECTS

Acheloos Hydropower Group
Stratos_I HPP &
Stratos_II small HPP

Purpose: hydropower, irrigation
Commercial operat.: 1989
Installed power: 150 MW
Francis type turb.
6.2 MW
Tube-S type turb.
Mean an. Product.: 237 GWH
Dam: earthfill, 26 m height
Reserv. net cap.: 11 m.c.m.
Arachthos Hydropower Group
Pigai Aoos HPP

Location: Epirus, Ioannina prefecture
Purpose: hydropower
Commercial operat.: 1990/1
Installed power: 210 MW (2x105) Pelton type turbines
Mean an. Product.: 165 GWH
Dam: earthfill, 78 m height
Reserv. net cap.: 144,3 m.c.m.
Nestos Hydropower Group
Thissavros HPP
(pump-storage)

Location: Eastern Macedonia, Drama prefecture
Purpose: hydropower, irrigation, flood control
Commercial operat.: 1998
Installed power: 384 MW (3x128)
Francis type pump turbines
Mean an. Product.: 440 GWH (incl. GWH due to pumping)
Dam: rockfill, 172 m height
Reserv. net cap.: 565 m.c.m.
LARGE HYDROELECTRIC PROJECTS

Arachthos Hydropower Group
Pournari II HPP

Location: Epirus, Arta prefecture
Purpose: hydropower, irrigation
Commercial operat.: 1998/9
Installed power: 33,6 MW
(2x16) bulb & (1x1,6) S units
Mean an. Product.: 45 GWH
Dam: earthfill, 15 m height
Reserv. net cap.: 4 m.c.m.
LARGE HYDROELECTRIC PROJECTS

It is the **first RCC dam** in the construction of which the fly ash of the Ptolemais thermal plant was utilized as basic cement, achieving thus big financial benefits & reducing the construction expenses.

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**Nestos Hydropower Group**

**Platanovryssi HPP**

**Location:** Eastern Macedonia, Drama prefecture

**Purpose:** hydropower, irrigation

**Commercial operat.:** 1999

**Installed power:** 116 MW (2x58) Francis type turbines

**Mean an. Product.:** 240 GWH

**Dam:** Roller Compacted Concrete, 95 m height

**Reserv. net cap.:** 57 m.c.m.
Aliakmon Hydropower Group
Ilarion HPP

Location: Western Macedonia, Kozani prefecture
Purpose: hydropower, irrigation
Commercial operat.: 2016
Installed power: 153 MW (2x76.5)
Francis type turbines
Mean an. Product.: 330 GWH
Dam: earthfill, 130 m height
Reserv. net cap.: 320 m.c.m.
SMALL HYDROELECTRIC PROJECTS

- SMOKOVO  (1X7.13 MW+1X3.24 MW)
- AGIA VARVARA  (1X920 kW)
- MAKROCHORI  (3X3.6 MW)
- STRATOS II  (2X3 MW)
- GHIONA  (1X8.5 MW)
- PAPADIA (1Xk00 kW)
- ILARION  (1X4.2 MW) (recently completed)
Aliakmon Hydropower Group
Reregulation Reservoir & New Reregulation
Aghia Varvara Small HPP

Location: Western Macedonia, Imathia prefecture
Purpose: hydropower, water supply, irrigation,
Commercial operat.: 2008
Installed power: 0.92 MW
Kaplan axial flow S-type turbine of horizontal shaft
Mean an. Product.: 4.5 GWH
Dam: earthfill, 15.5 m height, 2400m length
Reserv. net cap.: 3.0 m.c.m.
Aliakmon Hydropower Group
Makrochori small HPP

Location: Central Macedonia, Imathia prefecture
Purpose: hydropower, irrigation, water supply
Commercial operat.: 1992
Installed power: 10.8 MW (3x3.6)
Caplan tubular S-type turb.
Mean an. Product.: 30 GWH
Acheloos Hydropower Group
Ghiona small HPP

Location: East Continental Greece, Fokis prefecture
Purpose: hydropower, water supply
Commercial operat.: 1988
Installed power: 8,5 MW (1x8,5)
Francis type turbine
Mean an. Product.: 40 GWH
UNDER CONSTRUCTION HYDROELECTRIC PROJECTS

- MESSOCHORA (2X80 MW+1X1.6 MW)
- METSOVITIKO (2X14.5 MW)
Acheloos Hydropower Group

Location: Thessaly, Trikala prefecture
Purpose: hydropower,
Mean an. Production: 362 GWH
Dam: concrete face rockfill dam,
150 m height
Reservoir net capacity: 228 m.c.m.
MESSOCHORA HYDROELECTRIC PROJECT

LOCATION OF MESSOCHORA HEP
MESSOCHORA HYDROELECTRIC PROJECT

GENERAL ARRANGEMENT
MESSOCHORA HYDROELECTRIC PROJECT

DAM

- Type: Concrete Face Rockfill Dam (CFRD)
- Height: 150 m
- Concrete face area: 52,000 m²
MESSOCHORA HYDROELECTRIC PROJECT

DAM SECTION

DAM UPSTREAM FACE
MESSOCHORA HYDROELECTRIC PROJECT

SPILLWAY

- Open with gate structure, inclined channel, flip bucket and plunge pool
- The gate structure has two (2) steel radial gates with dimensions: height 13.45 m and width 12.5 m
- Maximum flow $Q_{\text{max}} = 3.300 \text{ m}^3/\text{sec}$
MESSOCHORA HYDROELECTRIC PROJECT

POWER INTAKE
- Vertical with steel Trashracks

POWER TUNNEL
- Length 7.500 m
- Circular section with internal diameter 5,30 m
- Concrete lining except for the part near the Powerhouse witch has steel lining
MESSECHORA HYDROELECTRIC PROJECT

SURGE SHAFT

- Vertical with concrete lining and a narrow opening at the bottom
- Height: 130 m
- Internal diameter: 12.5 m
MESSOCHORA HYDROELECTRIC PROJECT

POWERHOUSE
METSOVITIKO HYDROELECTRIC PROJECT

(2X14.5 MW)

Arachthos Hydropower Group

Location: Epirus, Ioannina prefecture

Purpose: hydropower

Mean an. Product.: 46 GWH

Dam: earthfill, 11 m height

Reserv. net cap.: 260,000 c.m.
• METSOVITIKO HYDROELECTRIC PROJECT

GENERAL ARRANGEMENT
METSOVITIKO HYDROELECTRIC PROJECT

GENERAL ARRANGEMENT OF DAM AREA

- FLOOD FLOWS CHANNEL
- POWER INTAKE
- DAM
- MOUNTAINOUS TYPE INTAKE
METSOVITIKO HYDROELECTRIC PROJECT

TYPICAL DAM SECTION
UNDERGROUND STRUCTURES OF POWER PLANT COMPLEX

- POWER TUNNEL AND BRANCHES (length 4,430m and excavation diameter 4.9m)
- POWERHOUSE ACCESS AND VENTILATION TUNNEL (length 265 m)
- CABLE AND ESCAPE INCLINED TUNNEL (length 78m)
- POWERHOUSE (excavation dimensions: height 35 m, length 35.5m and width 17m)
- SURGE CHAMBER (excavation dimensions: diameter 14.2 m, ύψος 28 m)
- SURGE SHAFT (total height 119 m, excavation diameter 14m to the top 40 meters and 5 m to the lower part)
- TAILRACE TUNNEL AND BRANCHES (length 692m)
METSOVITIKO HYDROELECTRIC PROJECT

POWER TUNNEL STEEL LINER
METSOVITIKO HYDROELECTRIC PROJECT
POWER PLANT LONGITUDINAL SECTION
METSOVITIKO HYDROELECTRIC PROJECT

POWERHOUSE CROSS SECTIONS
METSOVITIKO HYDROELECTRIC PROJECT
POWERHOUSE LONGITUDINAL SECTION
UNDER DESIGN HYDROELECTRIC PROJECTS

- SYKIA (2X60 MW + 1X6.5 MW)
- PEFKOPHYTO (2X80 MW)
- TEMENOS (3X6.3 MW)
PROVIDING TECHNICAL CONSULTANCY SERVICES TO OTHER AGENCIES

<table>
<thead>
<tr>
<th>Consultant for the Design and Supervision of Works</th>
<th>Projects (indicatively)</th>
<th>Client</th>
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<tbody>
<tr>
<td>Finished</td>
<td></td>
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<tr>
<td>Sykia Dam on Acheloos River</td>
<td>Ministry of Public Works</td>
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<tr>
<td>Pramoritsa Dam</td>
<td>Prefecture of Cozani</td>
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<tr>
<td>Amari Dam</td>
<td>Organization for the Development of West Crete</td>
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<tr>
<td>Longa Dam</td>
<td>Prefecture of Trikala</td>
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<tr>
<td>Livadi Dam</td>
<td>Prefecture of Larissa</td>
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<tr>
<td>Panagiotiko Dam in Magnissia Prefect.</td>
<td>Region of Thessaly</td>
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<tr>
<td>Patara Dam</td>
<td>Public Corporation for Water Supply of Alexandroupoli</td>
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<td>Agioneri Dam in Larissa Prefecture</td>
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<tr>
<td>Valsamiotis Dam</td>
<td>Organization for the Development of Crete</td>
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<tr>
<td><strong>Finished</strong></td>
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<tr>
<td>Kamares Dam in Sifnos Island</td>
<td>Prefecture of Cyclades</td>
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<tr>
<td>Vaketa Dam in Tinos Island</td>
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<td>Anafi Island Dam</td>
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<td>Neochoriti Dam</td>
<td>Region of Thessaly</td>
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<tr>
<td><strong>Under Development</strong></td>
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<td>Embankment for Protection of Saint George MYROPHILLO Monastery in Sykia Dam Reservoir</td>
<td>Ministry of Public Works</td>
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<tr>
<td>Pili Dam</td>
<td>Region of Thessaly</td>
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## PROVIDING TECHNICAL CONSULTANCY SERVICES TO OTHER AGENCIES

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<tr>
<th>Projects (indicatively)</th>
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<th>Status</th>
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<tbody>
<tr>
<td>Preparing Preliminary Designs</td>
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<tr>
<td>(in cooperation with the Institute of Geology and Mineral Exploration)</td>
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<td>Saint John Dam</td>
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<td>Katharo Dam</td>
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<tr>
<td>Chochlakies Artificial Lake</td>
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<td>(finished)</td>
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<td>Schinokapsala Artificial Lake</td>
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<td>Tsikalaria Artificial Lake</td>
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<td>Lapathos Artificial Lake</td>
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<tr>
<td>Fourni Artificial Lake</td>
<td>Prefecture of Lassithi</td>
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## PROVIDING TECHNICAL CONSULTANCY SERVICES TO OTHER AGENCIES

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<tr>
<td><strong>Preparation of Preliminary Studies</strong></td>
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<tr>
<td>Seta-Manikia Dam (completion)</td>
<td>Prefecture of Efvia</td>
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<tr>
<td>Istiea Dam</td>
<td>Prefecture of Efvia</td>
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<tr>
<td>Mandoudi Dam</td>
<td>Prefecture of Efvia</td>
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<tr>
<td>Steni Dam</td>
<td>Prefecture of Efvia</td>
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<tr>
<td>Komitos SHEP</td>
<td>Prefecture of Efvia</td>
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<tr>
<td>Platanovrissi Dam</td>
<td>Aristomenous Municipality, Messinia Pref.</td>
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<tr>
<td>Kombona Dam</td>
<td>Megalopoli Municipality</td>
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<tr>
<td>Tropeouchos Dam</td>
<td>Prefecture of Florina</td>
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<tr>
<td>Inachos Dam</td>
<td>Inachos Municipality, Prefecture of Etoloakarnania</td>
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## Providing Technical Consultancy Services to Other Agencies

### Consultant for the Design and Supervision of Works

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<tbody>
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<td><strong>Preparation of Final Designs</strong></td>
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<tr>
<td>Megaplatanos Dam</td>
<td>Prefecture of Fthiotida</td>
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<tr>
<td>Myloi Dam</td>
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<tr>
<td>Smokovo I SHEP</td>
<td>PPC RENEWABLES S.A. (finished)</td>
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<tr>
<td>Ikaria Hybrid Energy Project</td>
<td>PPC RENEWABLES S.A.</td>
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<tr>
<td>Smokovo IV SHEP</td>
<td>PPC RENEWABLES S.A.</td>
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Thank you!