MVM EGI

Hybrid Delugable Cooler in Dominion's Greensville CCPP

Dr. György Budik, Commercial Director
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ABOUT MVM EGI

Profile: Globally active cooling system provider
Consultancy, design, engineering, delivery, after sales

Manufacturing: Fully owned factory in Wuqing, CN

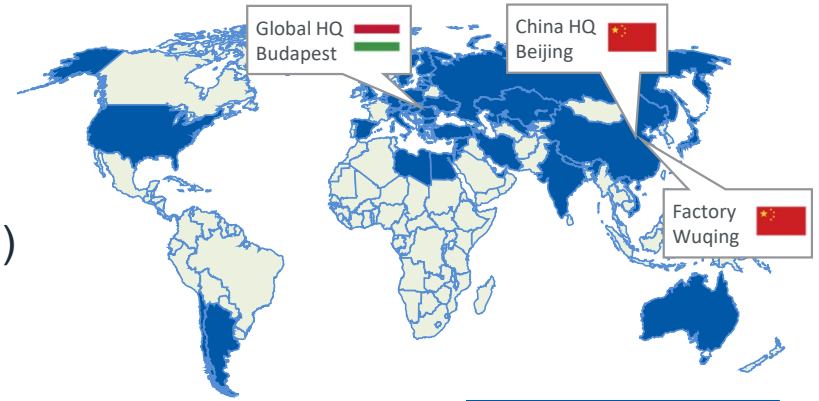
Founded in 1948 as EGI
GEA Group 1992-2014, ENEXIO 2014-2020

Owner: MVM Group *(100% Hungarian state owned)*
The largest power-utility company in CEE region

Headcount (FTE): 124 (68 Budapest, 24 Beijing, 32 Wuqing)
Headquarters: Budapest, Hungary

MVM EGI Factory in Wuqing, China

Global supply track record



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ABOUT MVM EGI

Technology leader with strong Hungarian engineering heritage

Organization milestones

1948 — Foundation of EGI by Prof. Dr László Heller and Dr. László Forgó

1962 — Heat exchanger workshop starts production in Jászberény, Hungary

1984 — Acquisition of EGI by GEA Group *(German Industrial Conglomerate)*

GEA-EGI

1994 — New heat exchanger production site in Wuqing, China

2008 — Acquisition of EGI by Triton Partners *(German Private Investment Fund)*

Triton

2014 — Brand change from EGI to ENEXIO

ENEXIO

2020 — Acquisition of ENEXIO Hungary by MVM Group

group
m
v m

2021 — MVM EGI

Technology milestones

1954 — First pilot-plant scale Heller system

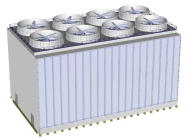
1962 — First mechanical draft indirect cooling tower *Eilenburg Chemical Works, Germany*

1972 — First dry cooled nuclear power plant Mechanical draft indirect cooling towers *Bilibino NPP, Russia*

1992 — First hybrid cooler *Great Isfahan Power Station, Iran*

2008 — First hybrid cooler in the USA *Neil Simpson Power Station, Wyoming, USA*

2015 — Next generation mechanical draft indirect dry cooling tower, *Avtovo PP, Russia*



2021 — Air-Cooled Condenser for *Waste to Energy Plant, Warsaw, Poland*

PRODUCT PORTFOLIO

Excellence in engineering and highest quality project execution

		HELLER INDIRECT DRY COOLING	AIR-COOLED CONDENSERS	EVAPORATIVE COOLING TOWERS	HYBRID DRY/WET COOLING TOWERS	DRY COOLING SPECIAL APPLICATIONS	CIRCUMIX ASH HANDLING
POWER PLANTS	COAL FIRED	x	x	x	x	x	x
	COMBINED-CYCLE	x	x	x	x	x	
	NUCLEAR	x		x	x	x	
	BIOMASS & W2E	x	x	x	x	x	
	CONCENTRATED SOLAR	x	x	x	x	x	
	DATA CENTERS	x		x	x	x	
	CHEMICAL PLANTS	x		x	x	x	
	INDUSTRIAL APPLICATIONS	x	x	x	x	x	

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HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER

Dramatic reduction of cooler size relative to all-dry coolers, significant reduction in civil and maintenance work

- Induced draft cooler with horizontal cooling deltas
- Ambient limit temperature of dry operation exactly as high as that of advanced all-dry coolers
- Additional all-dry unit not required besides deluged unit to achieve high ambient limit temperature of dry operation
- Deluging system operates in hot summer hours only
- Deluging system requires good quality water for make-up (first-pass RO water is acceptable)
- Continuous water film on fins, no dry spots
- Flat fins prevent air-side scaling from deluge water and ease cleaning
- Circulation, make-up and blow-down for the deluging system

HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER

Our scope provided:

- Contracting and full-scope contract management
- Design and engineering
- Manufacturing of the core component (Forgó HX bundles)
- QA/QC of bought-out items
- Optional trial assembly at the workshop
  (in whole or by bays, size dependent)
- Optional supervision of site erection
- Field performance testing and evaluation
- After-sales services

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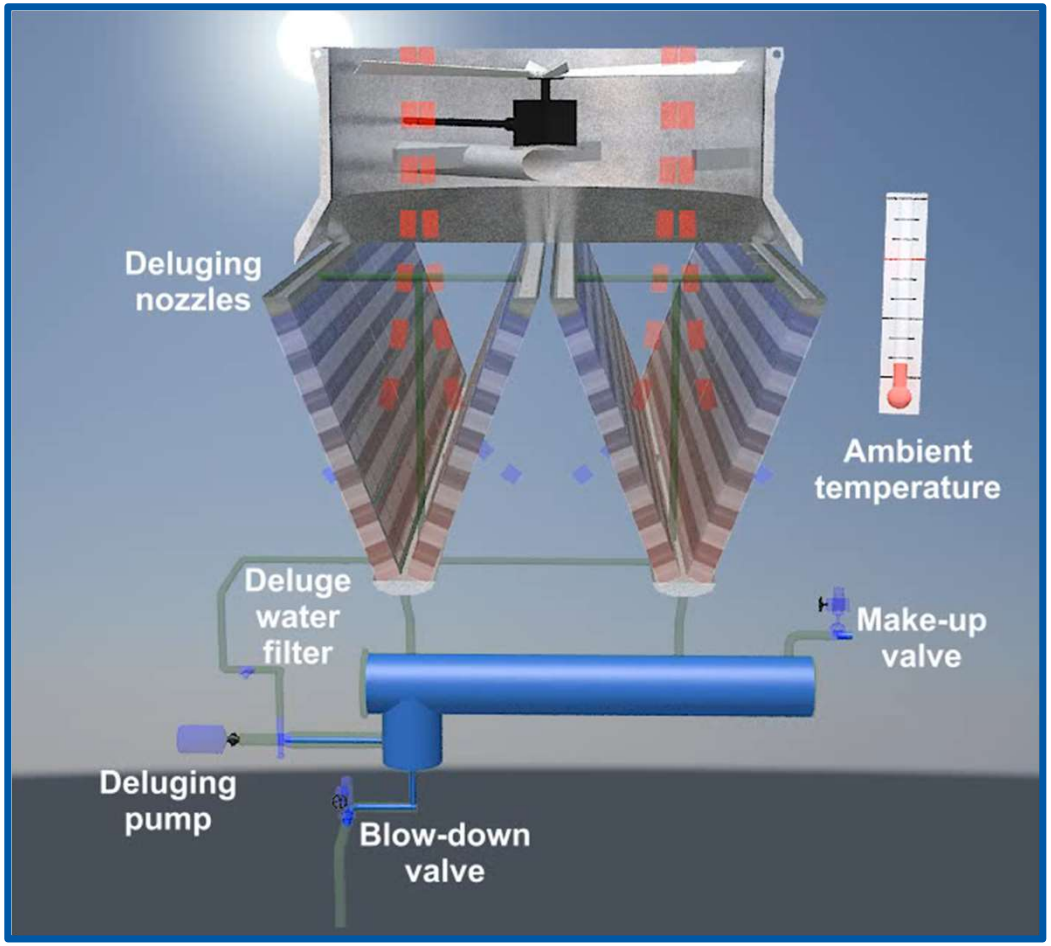
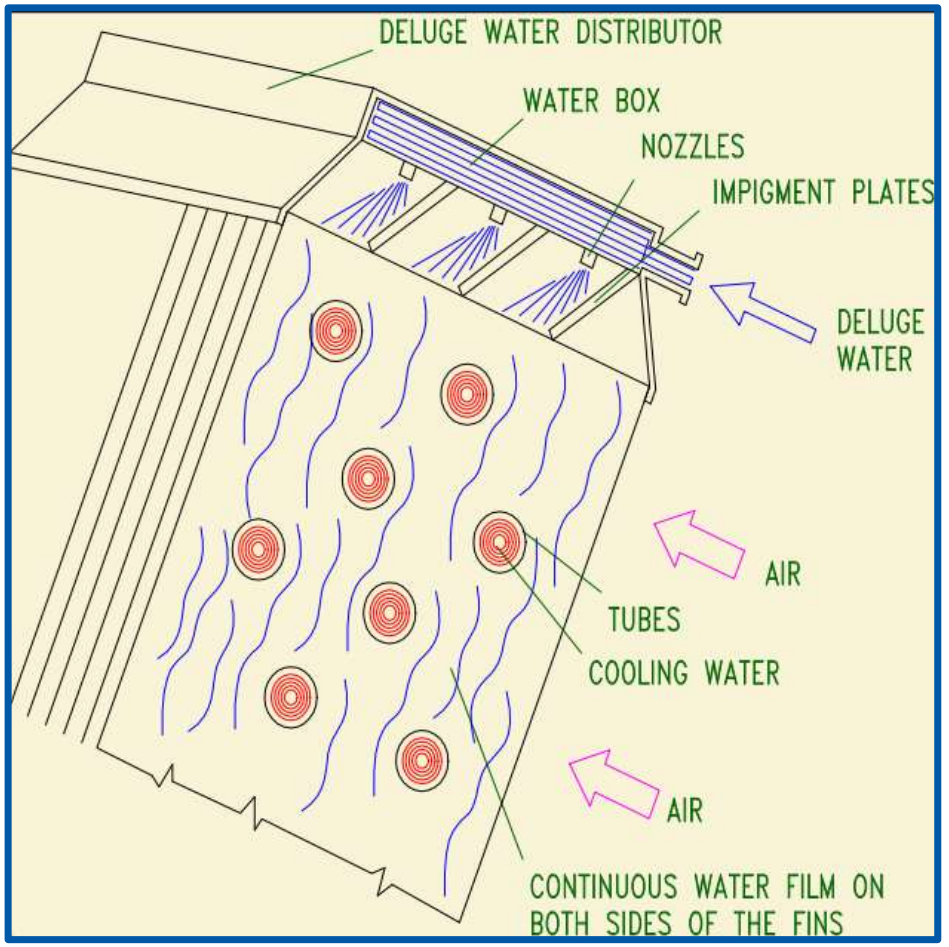
HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER





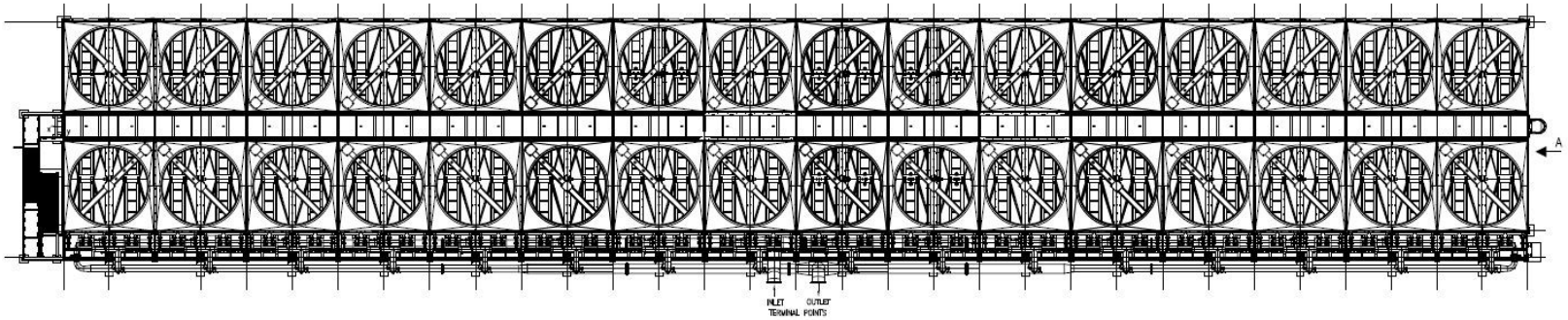
HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER – GREENSVILLE CCPP

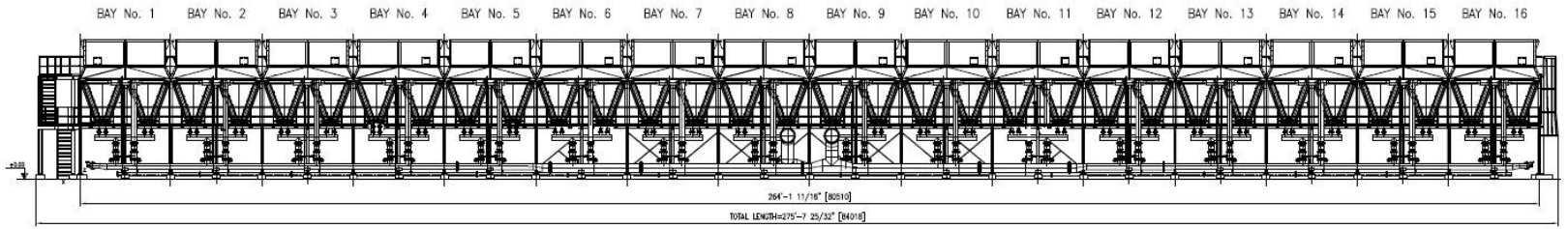
- **Design data:**
  - Fluid flow rate: 18300gpm (4156m3/h)
  - Heat Duty: 150.000.000 BTU/hr (~44MW)

- **Number of bays:** 16, 2 fans/bay
  - Delugable: 6
  - Dry: 10
- **Fan speed:**
  - Dry operation: 232 rpm
  - Deluged op.: 155 rpm

- **Deluging system:**
  - Pump rated power: 6 x 7,5 HP / 6 x 5,6 kW
  - Deluge water consumption:
    - 250 gpm @ 107°F (dry bulb)
    - 56,8 m3/h @ 41,7°C (dry bulb)
  - All dry operation up to: 98°F / 36,7°C (dry bulb)

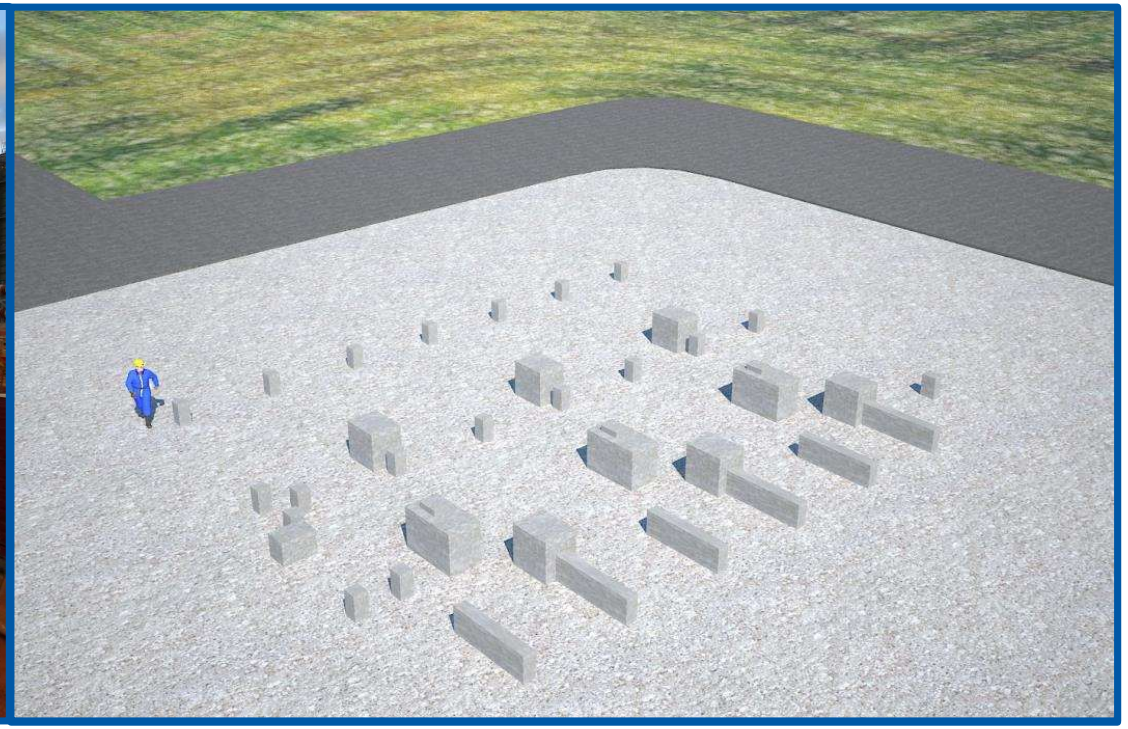
- **Dimensions:**
  - Length: 276 ft / 84,1 m
  - Width: 46 ft / 14 m
  - Height: 32 ft / 9,8 m





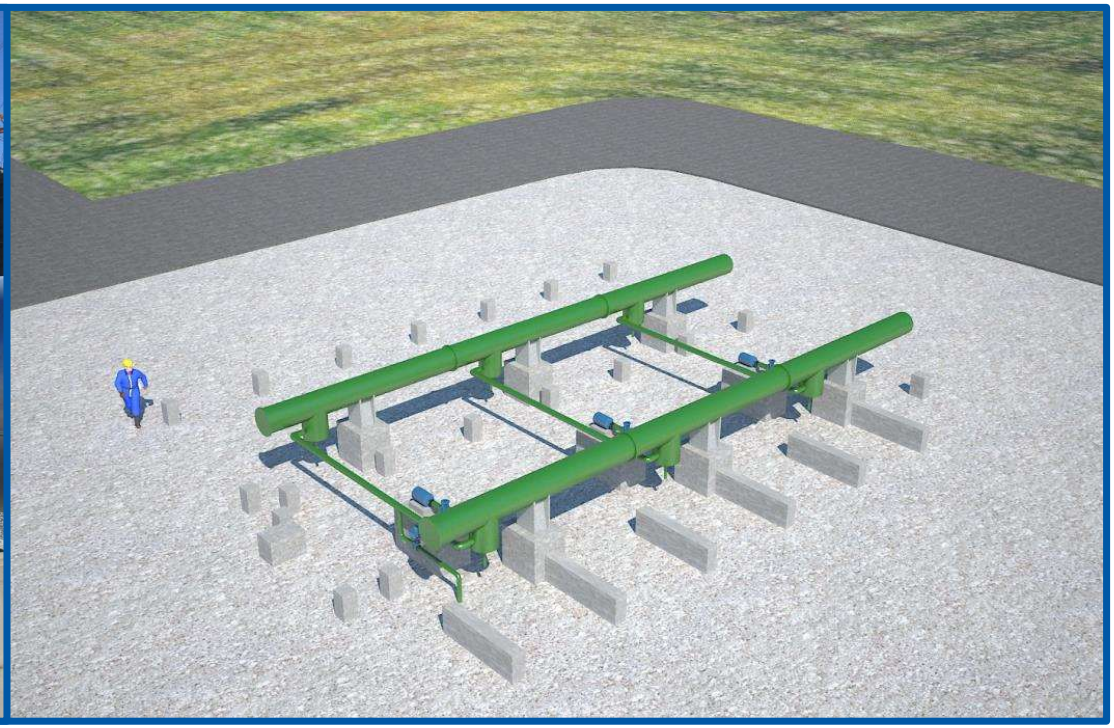
HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER – GREENSVILLE CCPP

- Few concrete foundations, almost as few as an all-dry cooler
- No basin needed
- No extensive civil works



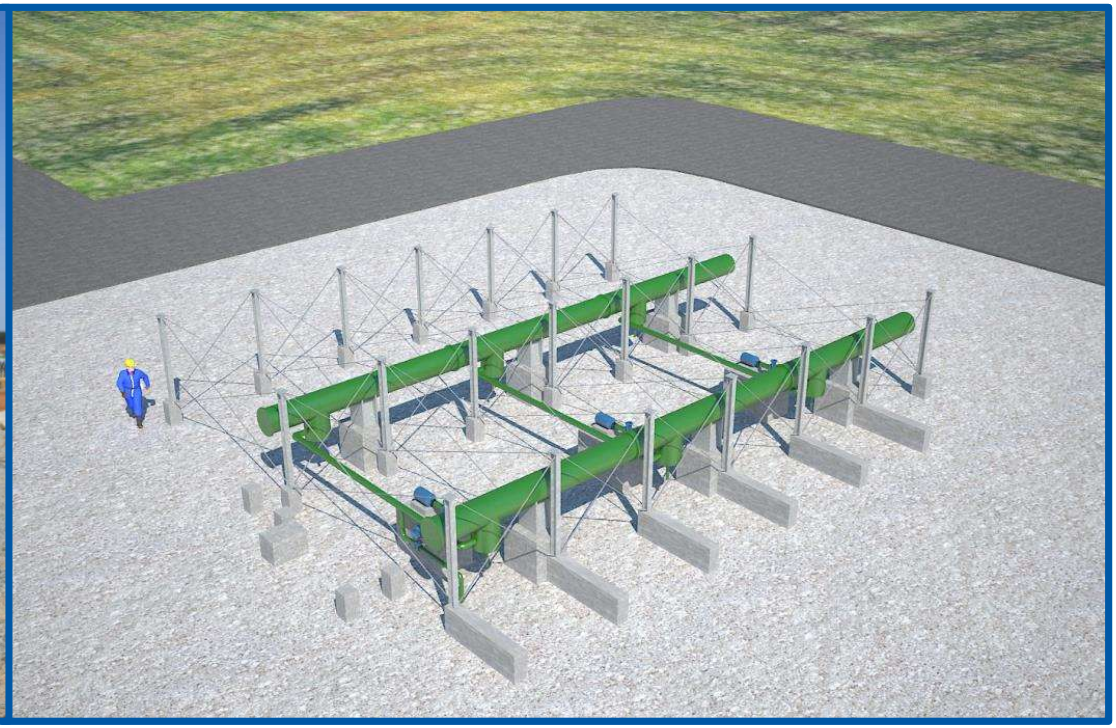
HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER – GREENSVILLE CCPP

- Deluge water tanks, pumps, etc. are located under the cooler
- Painted carbon steel tanks
- Automated pumps, make-up & blow-down valves



HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER – GREENSVILLE CCPP

- Hot-dip galvanized carbon steel supporting structure
- Advanced design
- 3D CAD Design



HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER – GREENSVILLE CCPP

- Cooling deltas arrive on site pre-assembled
- Steel structure of cooling delta is hot-dip galvanized
- First cooling delta lifted into position

HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER – GREENSVILLE CCPP

- Cooling deltas in place
- Heat exchangers and deluging system (pipes, nozzles) factory installed

HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER – GREENSVILLE CCPP

- First fan unit lifted into position
- Fan plenum hot dip galvanized carbon steel
- Fan units assembled on ground

HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER – GREENSVILLE CCPP

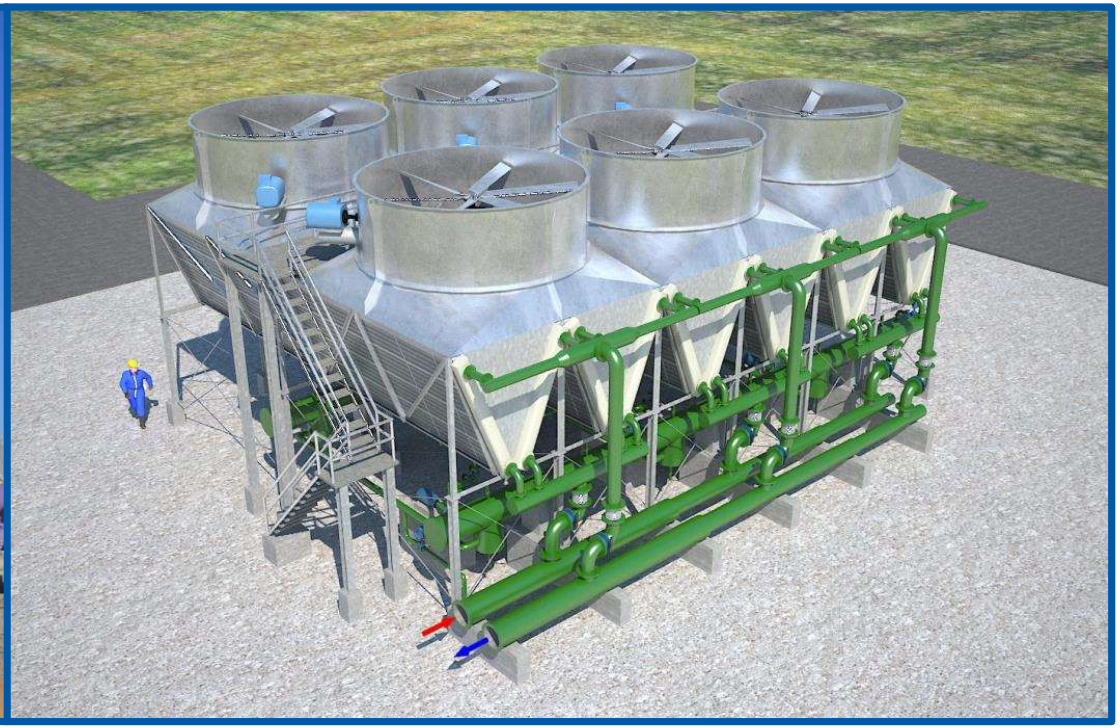
- Fan units in place
- Two fans serve two cooling deltas, forming one cooler bay
- Fans are VFD equipped
  (lower fan RPM when deluged to avoid drift loss)

HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER – GREENSVILLE CCPP

- Hot-dip galvanized carbon steel stairway, ladders and walkways
- Convenient platform to ease maintenance

HYBRID DRY/WET COOLING TOWERS:
HYBRID COOLER – GREENSVILLE CCPP

- The Hybrid Cooler is ready



WARSAW WASTE TO ENERGY PROJECT

Characteristics of the project:

- **EPC: POSCO E&C**
- **Electricity generated: 25 MW**
  - Largest Waste to Energy project in Poland
- **District heating capacity: 54 MW**
- **Thermal characteristics of the ACC:**
  - Heat load: **51 MWth**
  - Design steam flow: **90 t/h**
  - Minimum design temperature: **-30 °C**
  - Maximum design temperature**: 25 °C**

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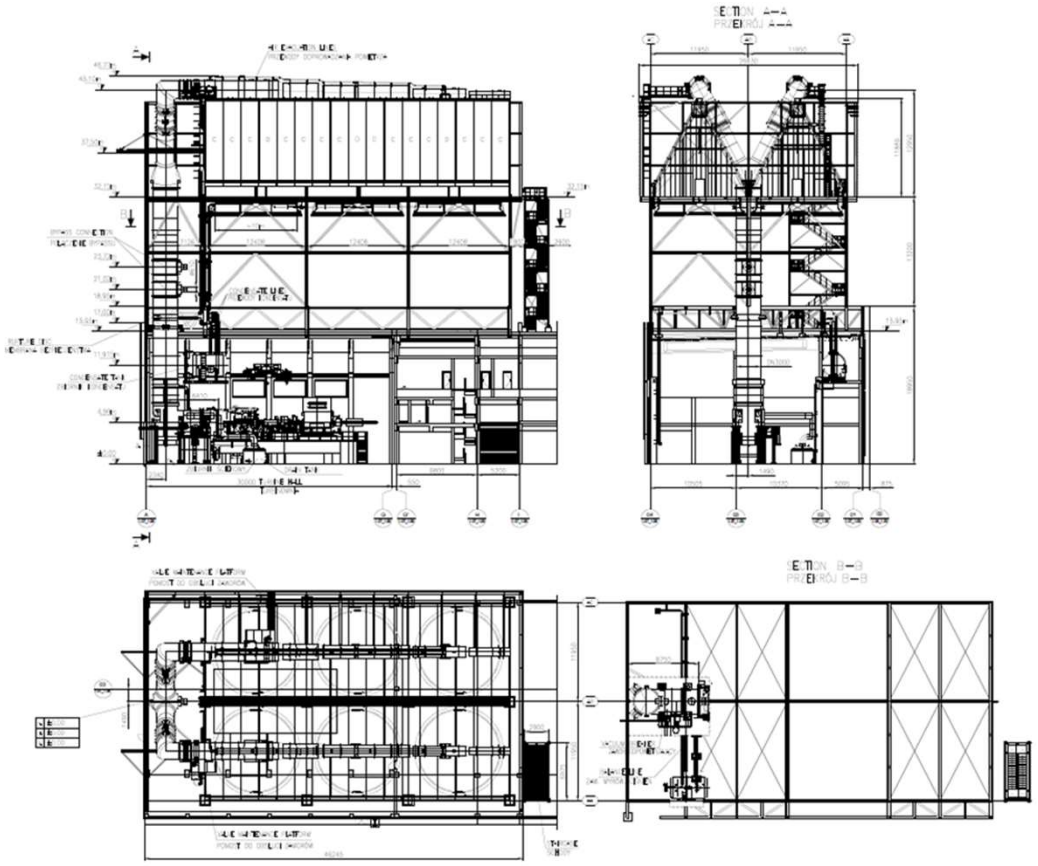
WARSAW WASTE TO ENERGY PROJECT

Main challenges

- ACC is mounted on the roof of a building
- Limited space for the ESD
- Unique requirements for air evacuation
- Low steam flow while operating in cold weather



WARSAW WASTE TO ENERGY PROJECT
PROGRESS

- **Limited space for the ESD:**
  - Expansion joint successfully delivered
- **Rooftop mounted ACC:**
  - Steel structure progress on schedule and overcoming the challenges presented

CONTACT

MVM EGI Zrt.

www.mvmegi.com
E-mail: info@mvmegi.com
Tel.: +36 1 225 6100
Office: Irinyi József str. 4-20, Budapest, Hungary 1117