Palace of Justice in Pristina, Kosovo

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The Palace of Justice in Pristina, Kosovo is heated and cooled primarily geothermal energy and solar collectors. The primary energy is produced through 212 geothermal probes, combined with solar panels. The project is designed to meet the highest standards for energy efficiency.

The Palace of Justice construction began on 23 June 2011 and and was completed in December 2014. The Palace of Justice is a project co-funded by the European Union and the government of Kosovo at an approximate cost of €30 million.

The entire system has the capacity and capability to provide the temperature range as required by the technical norms and specifications in the whole building supporting its regular use, with special attention to the crucial rooms, such as courtrooms and archives, in which it also controls the humidity of the air.

One energy centre is installed, where heating and cooling fluids, as well as hot water, is produced. The system provides a uniform ground temperature throughout the year.

Based on geothermal energy source the heating/cooling centre covers:

- 100 % of the heating demand
- 80 % of the cooling demand
- 50 % of the hot water with heat recovery from Heat Pumps

The property is covered by 212 boreholes, in distances of 8 m between their centres, having 125 m depth each.

The geothermal based, HVAC system consists of the following main parts:

Geothermal Heat Pumps

Two heat pumps, connected with the boreholes /located in under building A basement/

High energy efficiency heat pumps, equipped with doubles crew compressors at equipped with continuous capacity control.

Each of the basic heat pumps is equipped with “Free cooling” heat exchangers, heat exchangers for pumping

the energy back into the earth and Heating/Cooling Buffer vessels

The total installed power is:

- For heating it is 2112 Kw (Reserve 716 kW)
- For cooling 1570 kW (Reserve 786 kW)

Higher transfer coefficient is achieved using maximal supply fluid temperature for building heating systems of 45°C.

PERFORMANCE DATA HEAT PUMPS / BHE

- Cooling capacity +2.5°C/-2.0°C kW 2 * 785
- Compressor power input kW 2 * 271
- Heating capacity 47°C/42°C kW 2 * 1056
- Energetic class "A"

PERFORMANCE DATA AIR/WATER HEAT PUMP

- Cooling capacity +2.5°C/-2.0°C kW 786.2
- Compressor power input kW 301
- Heating capacity 47°C/42°C kW 716.6
- Energetic class "A

Dry Cooler

Ground Heat Exchanger (closed) - 212 BHE

HEATING/COOLING WATER FLOW DISTRIBUTION SYSTEM

The geothermal heat pumps are capable to produce simultaneously heating and cooling agents, necessary for the HVAC building systems, as well to recuperate the excess heat. The heating of the buildings is secured by dry boreholes and heat pumps. The same system is designed to serve for cooling of the buildings and be backed up by air-water heat pump and dry cooler during the summer months.

The air-water heat pump is planned to operate:

- During the summer months, covering the cooling energy shortness
- As a spare heat pump in case of basic heat pump failure during the winter months.

The dry cooler is operating during the summer months, dissipating the excess heat in the atmosphere which is not possible to be recuperated or pumped back into the earth.

Hot and chilly water, produced in the heating/cooling centre are being transported to the building’s local energy centre by groups of pumps. From there the heating and cooling agents will be distributed to the air conditioning systems through manifolds and regulation devices.

The location of the pipe network, connecting the heating/cooling centre with the local centres, is installed in the basements of the buildings.

Central hot water preparation is installed in the same heating /cooling machine room, where heat recuperation takes place, when the demand for cooling is greater than that for heating. A higher transfer coefficient is achieved using a supply fluid temperature for building heating systems of maximal 45°C.

The use of solar energy is considered for the purposes of providing renewable energy sources and energy efficient operation. Solar panels are used for providing additional heat sources for the sanitary hot water system.

The coefficient of performance (COP Heat Pumps) is being designed at max. 6.8 and min. 3.9.

The potential heating and cooling load as well as the potential annual heating and cooling energy are determined by a thermal simulation using EED-software. For the design of the borehole heat exchanger (BHE) field, no

national regulations were provided. The design is therefore based on the German technical specification VDI 4640.

The geothermal heat pumps are to be capable to produce simultaneously heating and cooling agents, necessary for the HVAC building systems, as well as to recuperate the excess heat.

- The coefficient of performance (COP Heat Pumps) is in accordance with planning at max.6.8 and min.3.9.
- Annual consumption of heat 1902855 kWh, 100% covered
- Annual consumption of cold 1777134 kWh, up to 80% covered
- Annual consumption of domestic hot water with heat recovery from heat pumps up to 50% covered
- Reduced CO2 emissions for 25 years - 57500 tonnes

Saving energy, efficiency and new energy sources, one of the largest Heat Pump systems with borehole heat exchanger (BHE). 2MW heating, 1.6 MW cooling has been installed.

We applied our knowledge and experience in this big project which we have gained by the planning of small and medium-sized geothermal installations for many years.

In the future we are confident to implement similar and larger projects with heat pumps and borehole heat exchanger (BHE). This will help other colleagues and construction companies.

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This will help other fellow colleagues and construction companies. Planners, architects, builder, plant owners, etc.

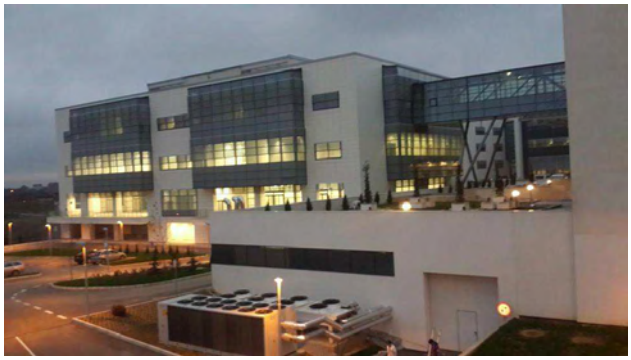
The experience can be realized well back in Europe, America and Near East.

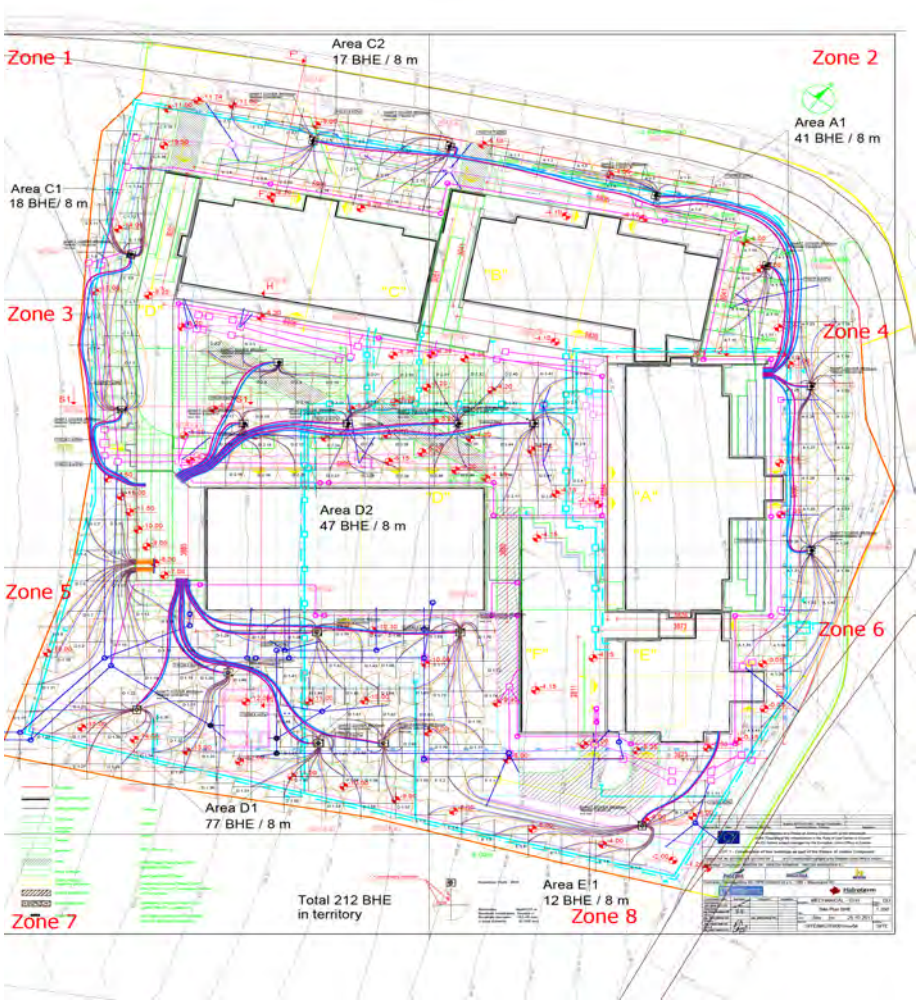
- The construction company is Glavbolgarstroy Sofia, Bulgaria
- Report of borehole drilling and installation of a Borehole Heat Exchanger – Dr. Reiner Klein und Geser Erdwärme GmbH, Germany
- Supplier of heat pumps is Hidria/Lindab Slovenia
- Installations are performed by company Klimatronik, Sofia, Bulgaria
- The drillings were performed by company Megaterm, Pristina, Kosovo

PALACE OF JUSTICE ACCOMMODATES SEVERAL COURTS AND PROSECUTOR OFFICES

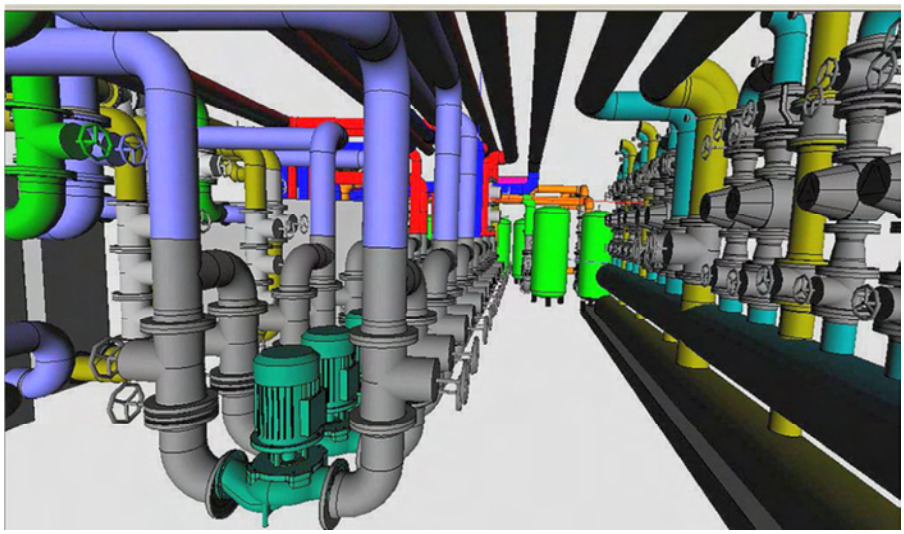
Palace of Justice compound comprises of five main buildings constructed according to EU and international standards. It's designed to accommodate Pristina Basic Court, Special Chamber of the Supreme Court on Privatization Agency of Kosovo related matters, Court of Appeals, Supreme Court and Constitutional Court.

It will also become the home of Kosovo Judicial Council and Kosovo Prosecutorial Council, Appellate Prosecution, Basic Prosecution, Serious Crimes Prosecution Department and Special Prosecution Office of the Republic of Kosovo. All those institutions were until now spread around Pristina, while one compound will increase work efficiency and contribute to timely resolution of court cases.

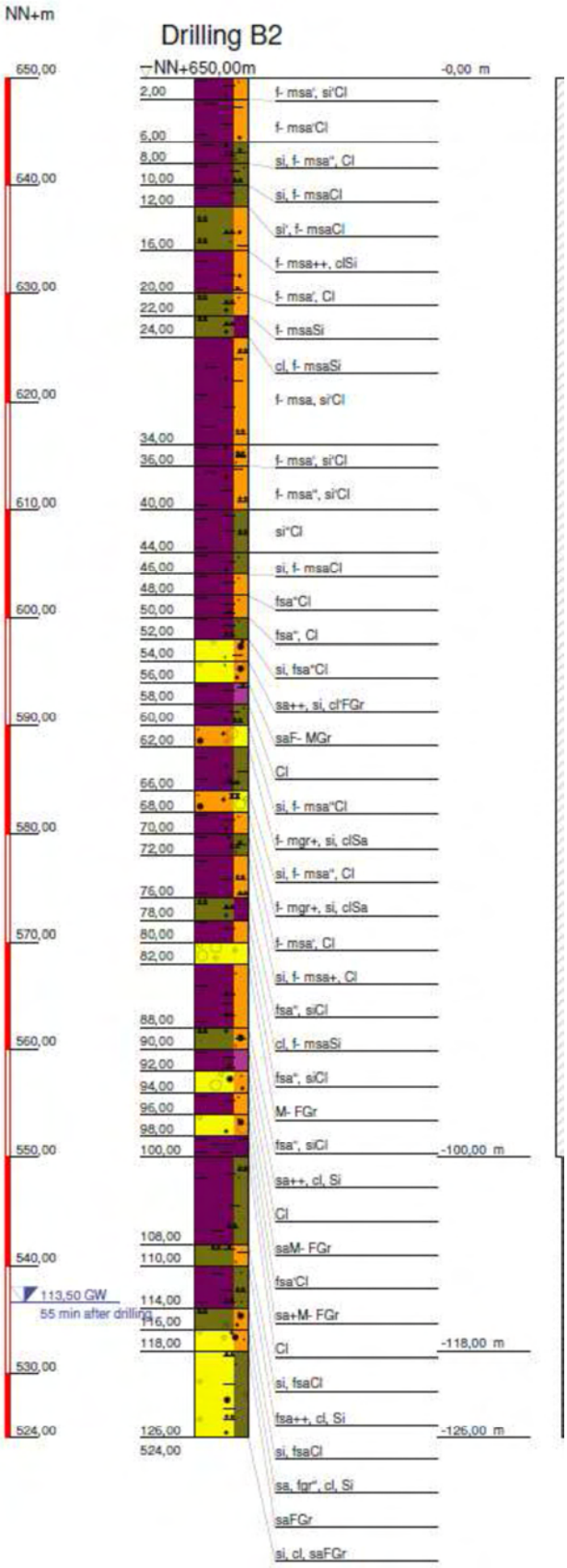




BHE Area



3D Project



Profile of the drilling

Heat pumps –BHE/Water

Geothermal probes

Hot water tank

Heating distributor

Heating and cooling demand - Peak and monthly averages.

Annual Demand, Peak Load,

Annual heating demand per Building

Building	A	B	C	D	E	Total
	kWh	kWh	kWh	kWh	kWh	kWh
Month						
January	70814	33017	35'625	189'539	56'033	385'028
February	61767	28591	30'216	170'757	49'639	340'970
March	43125	17962	18'280	138'700	37'895	255'962
April	18661	5995	6'716	85'683	18'444	135'499
May	8510	1601	2'534	55'192	9'468	77'305
June	0	0	0	0	0	0
July	0	0	0	0	0	0
August	0	0	0	0	0	0
September	5809	842	1'508	44'941	6'462	59'562
October	20290	7078	7'501	86'056	19'949	140'874
Nevember	45420	20321	20'701	143'555	38'360	268'357
December	70047	33062	34'039	183'878	53'950	374'976
Annual heating demand	344'443	148'469	157'120	1'098'301	290'200	2'038'533

Peak Load kW

Building	Heating [kW)	Chiller[kW]
A	351	414
B	196	274
C	225	296
D	624	431
E	225	240
Total	1621	1655

Annual cooling demand per Building kWh

Building	A	B	C	D	E	Total
	kWh	kWh	kWh	kWh	kWh	kWh
Month						
January	10890	8065	6'838	6'037	933	32'763
February	12519	9800	8'212	9'006	2'547	42'084
March	22176	19073	15'554	19'122	7'187	83'112
April	35242	31026	23'778	31'899	16'371	138'316
May	55966	46821	37'194	51'854	28'582	220'417
June	85995	68155	60'787	92'296	48'109	355'342
Luly	96445	76252	66'810	100'785	53'077	393'369
August	98462	77237	67'610	102'480	53'392	399'181
September	61679	50722	40'151	54'043	30'114	236'709
October	35881	29684	23'703	28'965	14'659	132'892
Nevember	14760	11791	10'452	10'050	2'202	49'255
December	10170	7812	6'631	5'550	415	30'578
Annual cooling demand	**540'185**	**436'438**	**367'720**	**512'087**	**257'588**	**2'114'018**