step2sport

step by step renovation towards nearly zero energy SPORT buildings

# Energy Renovation Project in Stalowa Wola Sport Building

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KAPE
KRAJOWA AGENCJA POSZANOWANIA ENERGII S.A.

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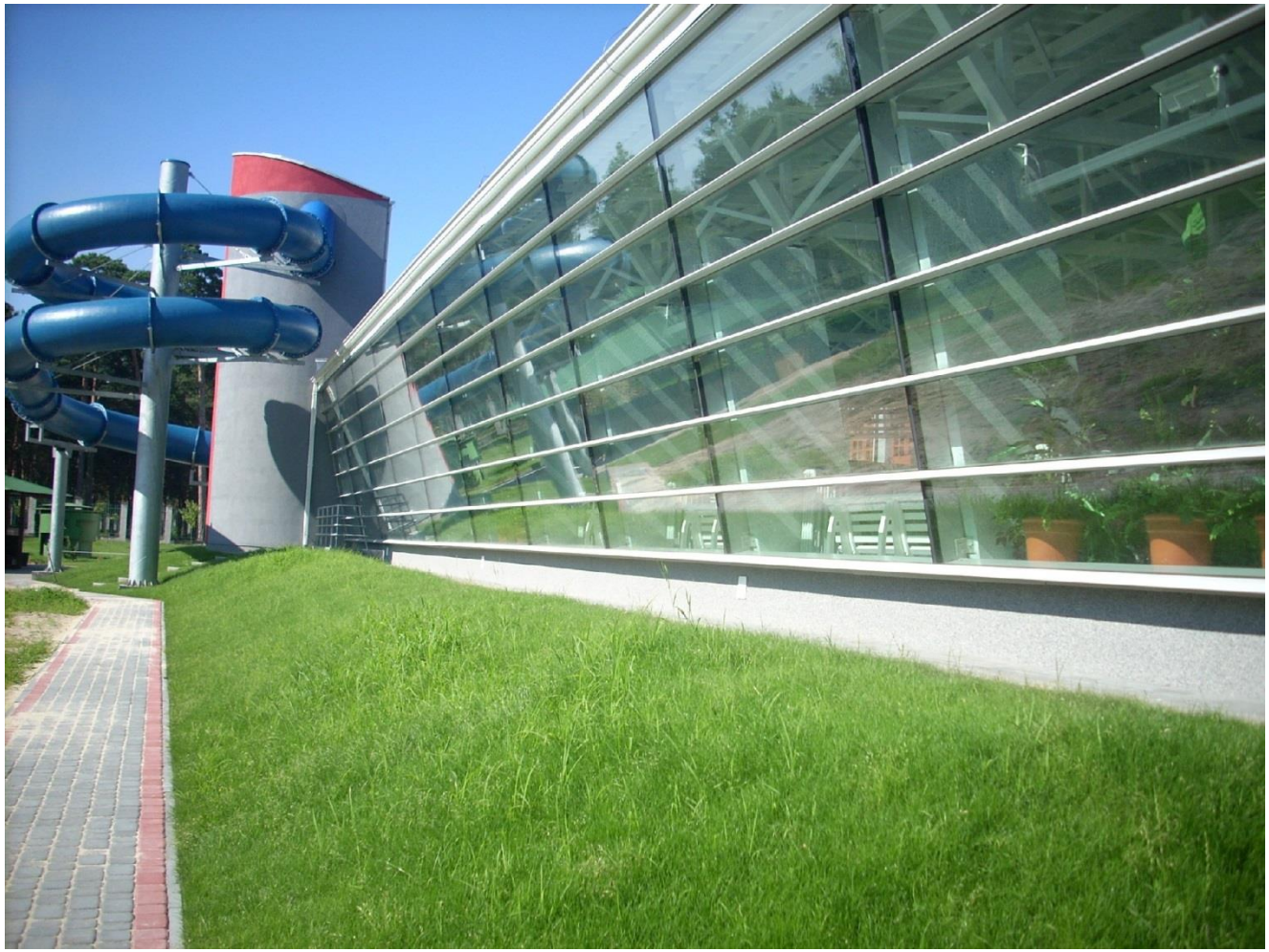

# Modernization of swimming pool in Stalowa Wola

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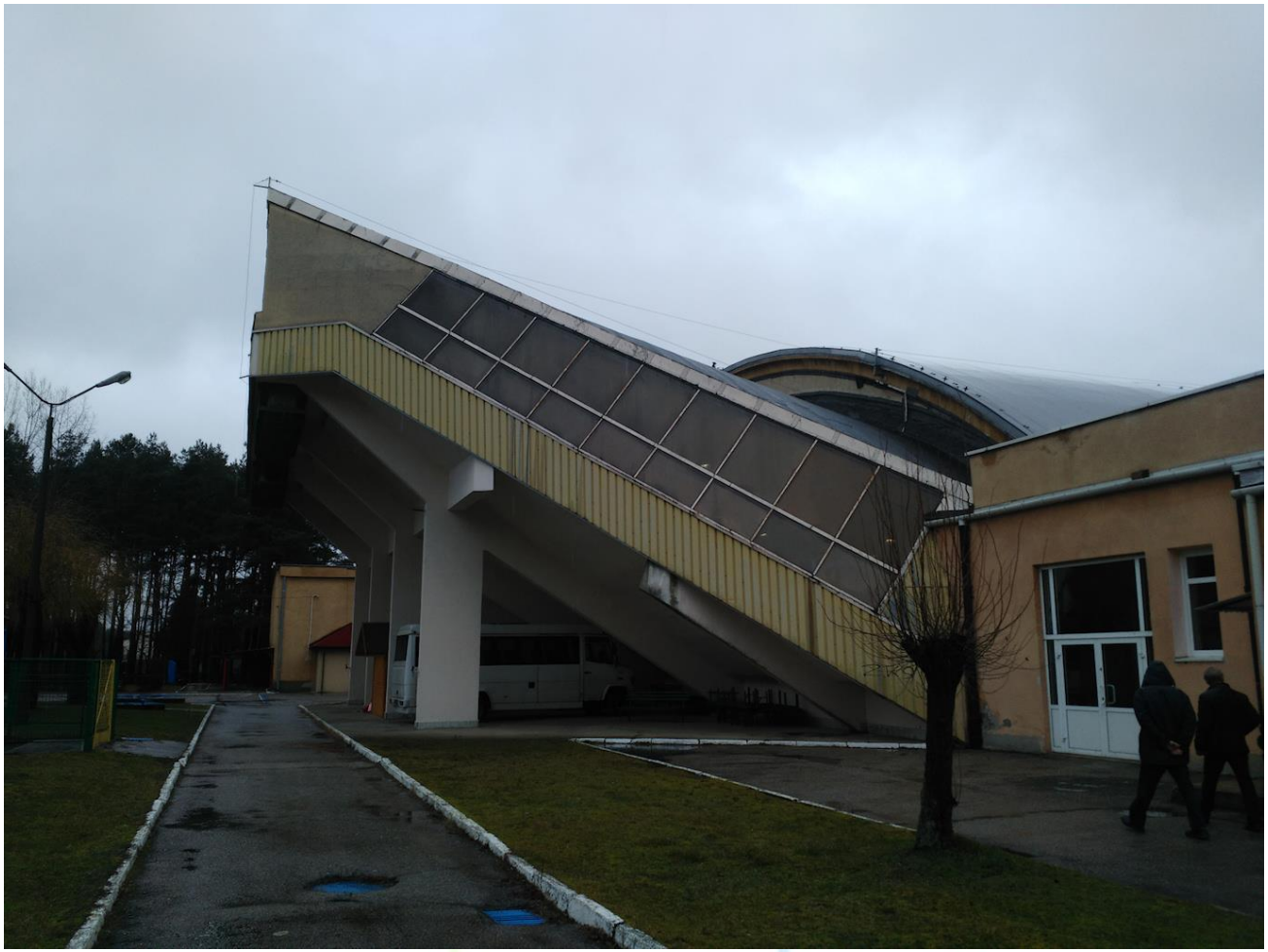

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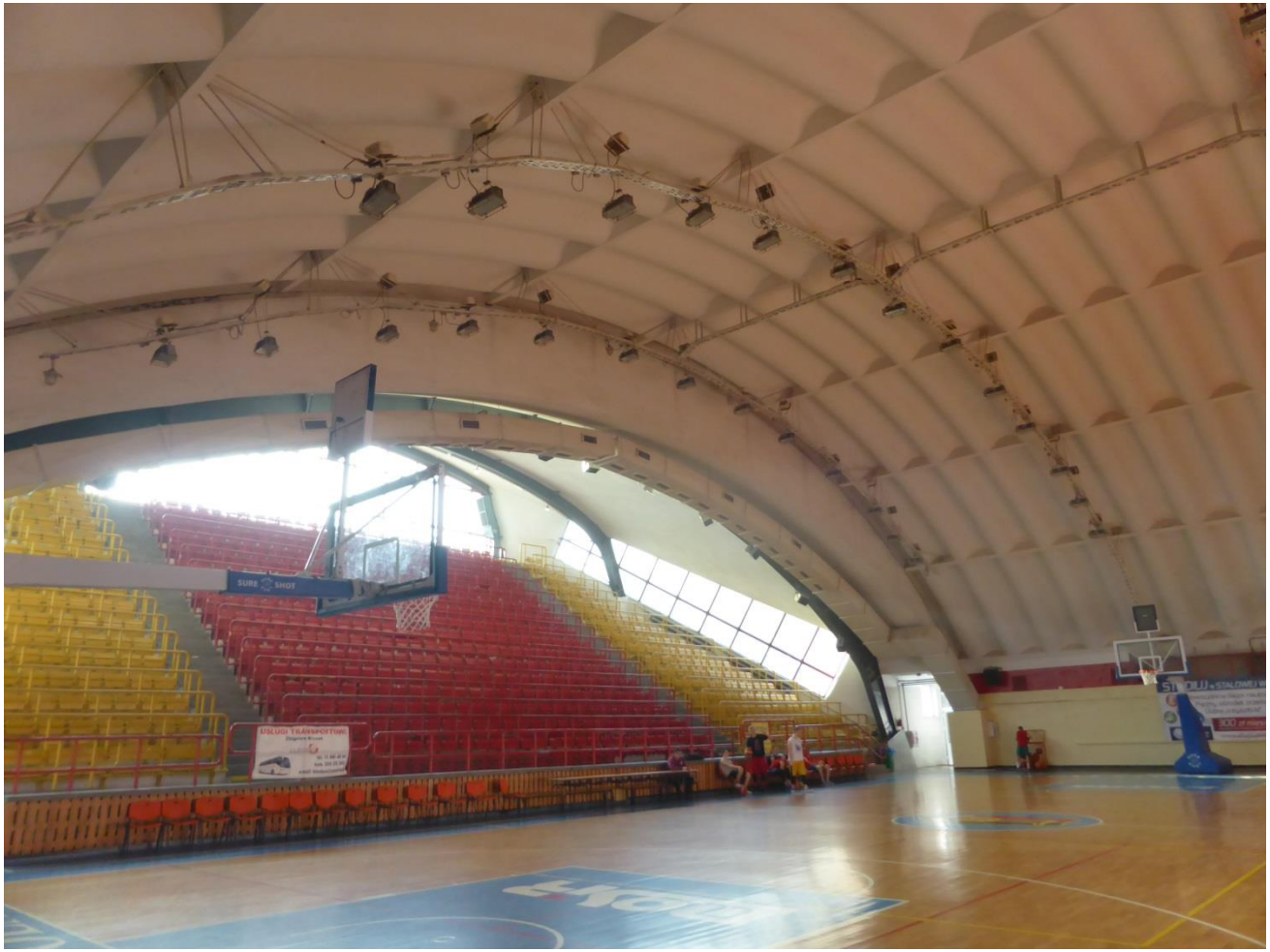

# Modernization of swimming pool in Stalowa Wola

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In energy audit done by KAPE S.A. it was suggested to implement measures listed below:

1. Insulating brick external walls with Styrofoam/rock wool λ = 0,040 W/(m*K) d = 18,0 cm. – 1.850,0 m2,
2. Insulating concrete external walls with Styrofoam/rock wool d = 20,0 cm. – 1.740,0 m2
3. Insulating roof over administration building and corridors with rock wool granulate λ = 0,040 W/(m*K) d = 23,0 cm. – 990,0 m2,
3. Exchange of old joinery to new windows U= 0,90 W/m2*K – 266,0 m2,
4. Replacing old windows U= 0,90 W/m2*K– 363,0 m2,

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6. Modernization of ventilation system,
7. Modernization of warm water system and installation of solar collectors,
8. Modernization of heating system with exchange of heaters and adding regulating valves.

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# Current heat transfer coefficients compared to regulations in 2021

| Partition | U [W/(m2 K) | | |
|---|---|---|---|
| | Actual | Umax (WT2021) | Difference % |
| External walls | 1,88 | 0,2 | 840 |
| Roof | 1,04 | 0,15 | 593 |
| Roof over basment | 0,57 | 0,25 | 128 |
| Glass walls | 5,1 | 0,9 | 467 |
| Windows | 1,8 | 0,9 | 100 |

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- Currently used air handling units are out of date and not suited for demanded work,
- It is suggested to use heat recovery units with efficiency of 65 %,
- It is important to adjust heaters power to conditions after modernization.



# Air handling units

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| | Current state | After modernization |
|---|---|---|
| Energy demand for the purpose of heating [GJ/rok] | 4551,12 | 967,15 |
| Energy demand for the purpose of preparing warm water [GJ/rok] | 904,84 | 352,89 |
| Working cost[zł/rok] | 382 321 | 122 030 |

Implementation of suggested measures will result in reducing energy demand by **76,83 %.**

The investment will pay off in 24 years.

# Modernization of swimming pool in Stalowa Wola

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It is planned to install system based on heat pump that will recover heat from water used for cleaning pool filters.

- Cleaning filters consume around 4500 $m^3$ of water every year,
- The water needs to be warmth to 25° C,
- It is possible to regain 282,8 GJ/year of heat,
- Annual savings of 7 378,89 zł,
- The investment will pay off in 5 years.



# Heat recovery from filter cleaning water

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It is planned to install system based on heat pump that will recover heat from waste water

- Average water consumption oscillates around 3570 $m^3$,
- Average temperature of waste water is 20° C,
- It is possible to regain 142,47 GJ/year of heat,
- Annual savings of 840 zł,
- The investment will pay off in 6,5 years.



# Heat recovery from waste water

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- It is planned to install 278 panels with total area of 656 $m^{2,}$
- System will generate 1151 GJ of energy, which will cover 61% of heat needed to prepare warm water,
- Assuming that energy costs 10 €/GJ, the system will bring savings of 11 500 € /year,
- The investment will pay off in 26,5 years.

# Solar panels

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- Total power of 28 $kW_p$,
- 30 988 kWh of total energy generated during one year,
- Total area of panels 158 $m^2$
- The investment will pay off in 12 years.
- Annual reduction of emitted CO2 of 25 162 kg.



# Photovoltaics

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| | Current state | After modernization |
|---|---|---|
| Total power[kW] | 109,88 | 55,25 |
| Reduction of installed power[kW] | - | 54,63 |
| Cost of kWh [€] | 0,107 | 0,107 |
| Annual energy consumption [kWh] | 234 793,42 | 118 147,52 |
| Annual energy cost[€] | 30 992 | 9060 |
| Annual energy savings[kWh] | - | 116 645,90 |
| Annual energy savings [%] | - | 49,68 |
| Annual savings [€] | - | 21 932 |
| Investment cost [€] | - | 223 634 |
| Payback [years] | - | 10,20 |
| LENI [kWh/ m2*a] | 24,07 | 8,57 |

# Lightning

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# View after renovation

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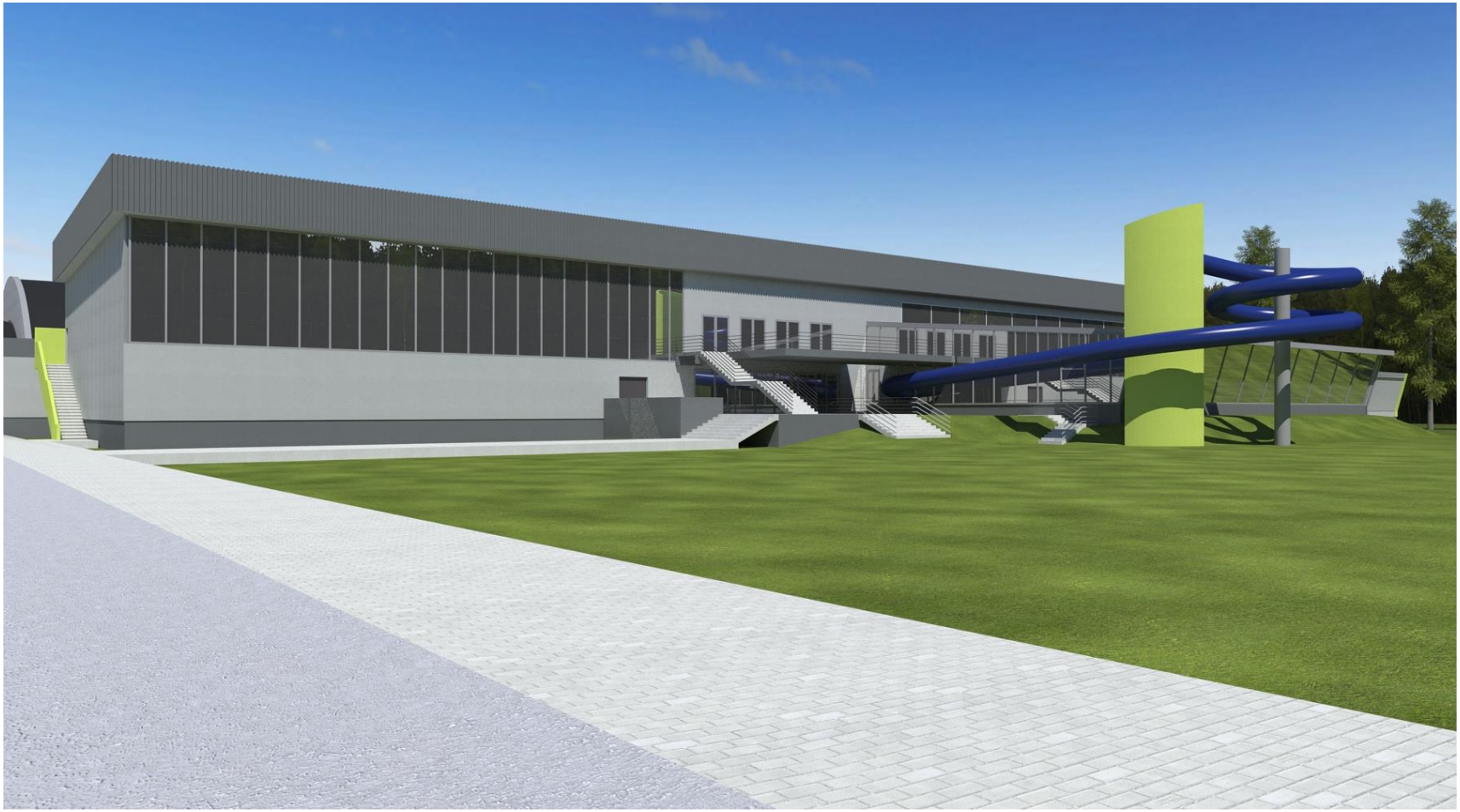

# View after renovation

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# *Thank You for Your attention!*

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