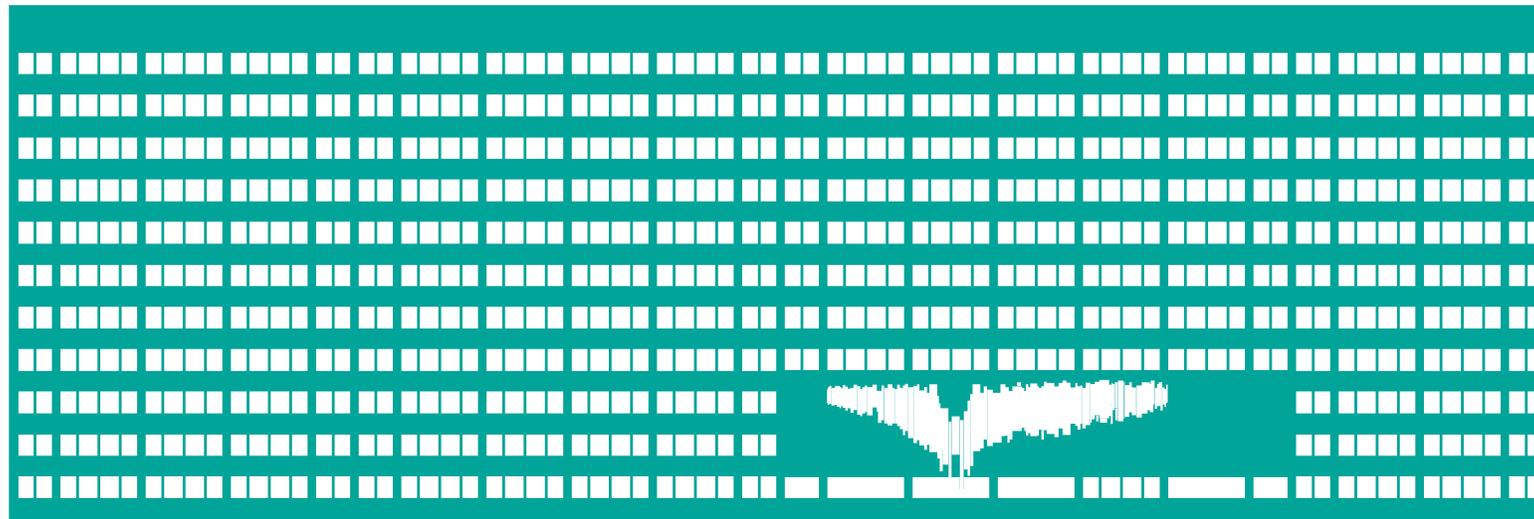


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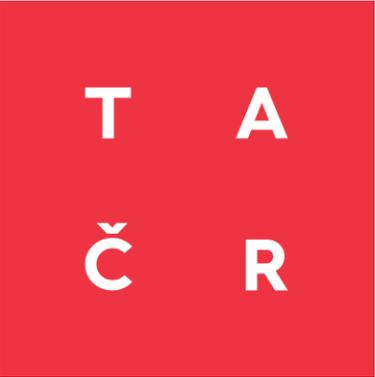
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AND HYDRAULIC EQUIPMENT

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T A
Č R

Project TK03030037 New type of pumped-storage hydroelectric power plant is co-financed from the state budget by the Technology agency of the Czech Republic under the THÉTA 3 Programme.

TK3030037

New type of Pumped-Storage Hydropower Plant AVE

Ing. Roman Lukeš

Team Members:

Ing. M. **Balco**, Ph.D., Assoc. Ing. M. **Bojko**, Ph.D., Ing. et Ing. P. **Čambala**, Ing. O. **Černý**, J. **Gadula**, **Prof. Ing. S. Honus, Ph.D.**, Ph.D, Assoc. Ing. V. **Křivý**, Ph.D., Ing. R. **Lukeš**, Ing. D. **Mikolášek**, Ing. P. **Mynarčík**, Ph.D., Ing. M. **Pešek**, Ph.D. MBA, Ing. Jiří **Ptáček**, Ph.D, Ing. Jan **Toufar**, Ph.D

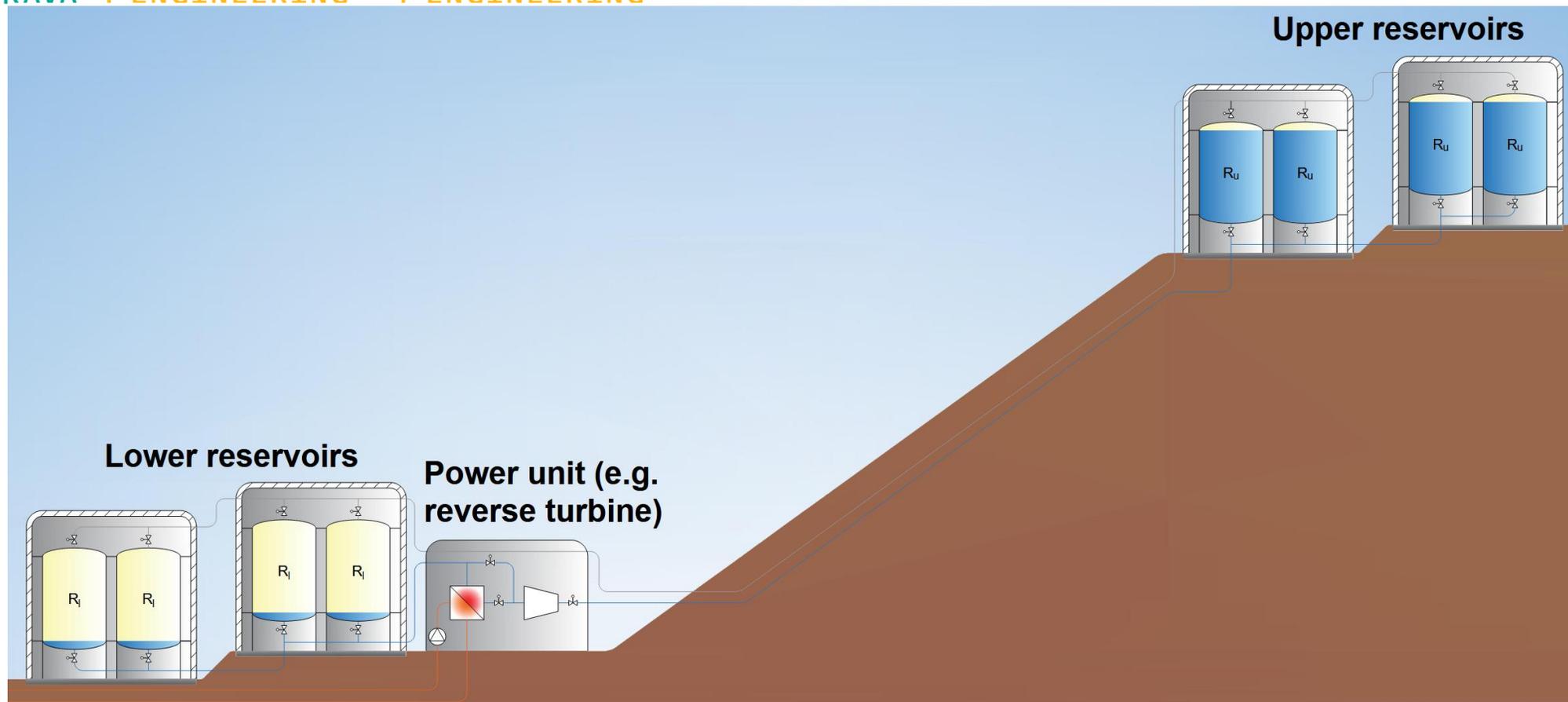
Presented Concepts

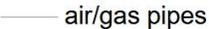
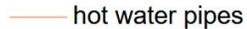
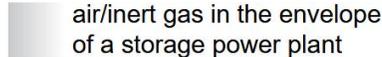
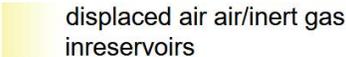
MPHES-2R – Modular Pumped-Storage Plant with Floating Reservoirs

MPHES-FR – Modular Pumped-Storage Plant with Fixed Reservoirs

MPHES-SFR – Modular Pumped-Storage Plant with Separated Fixed Reservoirs

MPHES-SFR

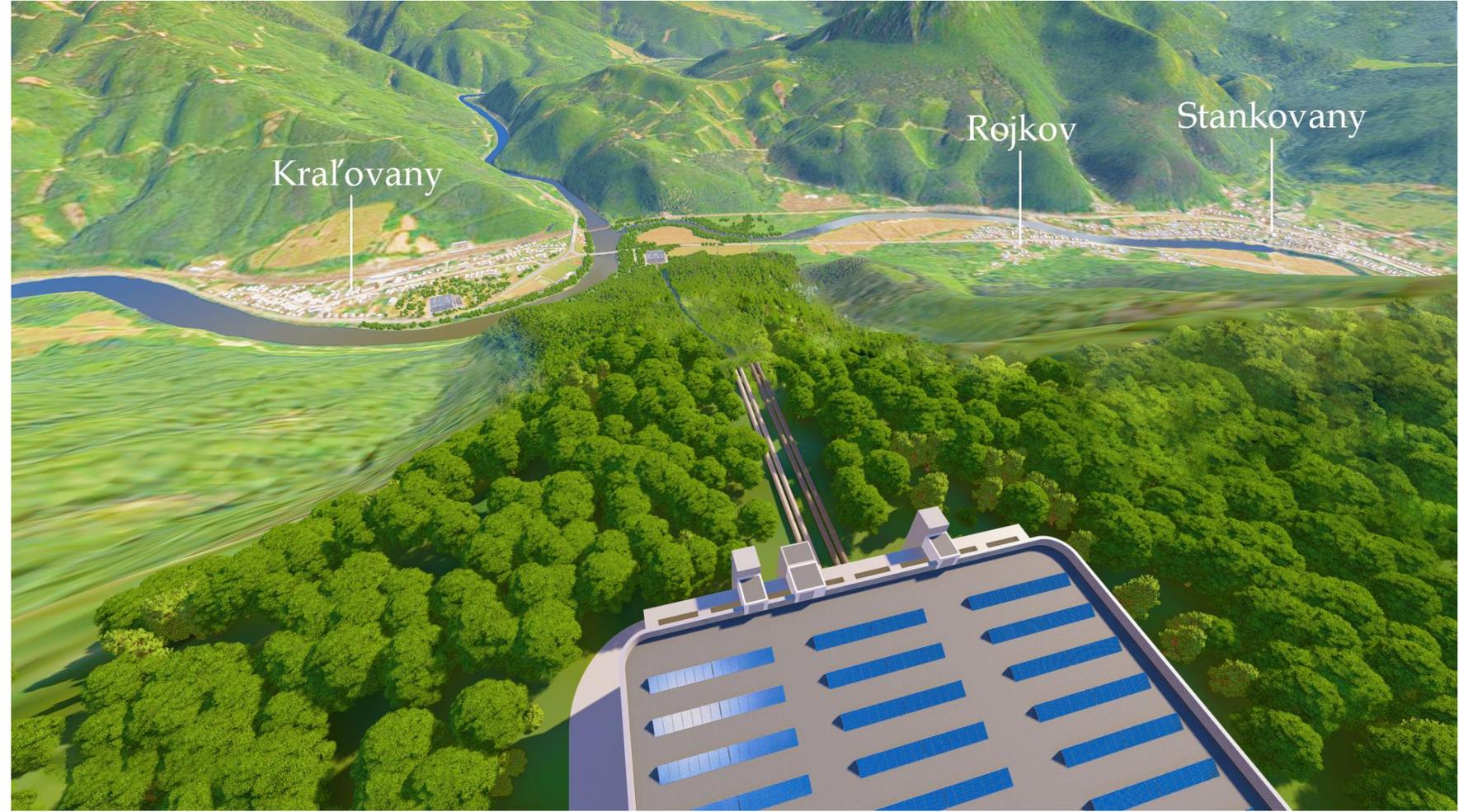


-  power unit
-  cooling system/hot water pump
-  automatically controlled control valve
-  water pipes
-  air/gas pipes
-  hot water pipes
-  cooling system/hot water exchanger
-  R reservoir
-  l lower
-  u upper
-  air/inert gas in the envelope of a storage power plant
-  pumped water in reservoirs
-  displaced air air/inert gas in reservoirs
-  thermal insulation

AVE

Visualization – MPHES-SFR

- **Footprint:** 60 × 60 m
- **Tank height:** 15 m
- **Head:** 700 m
- **Storage capacity:** 76 MWh
- **Electric output:** 6.3 MWe1
(peak 12.6 MWe1)
- **Thermal output:** 0.34 MWt
(for 590 apartments)
- **Total efficiency:** 88%
- **Investment cost:** CZK 480 million
(CZK 6,350/kWh), €19 million
(€252/kWh)



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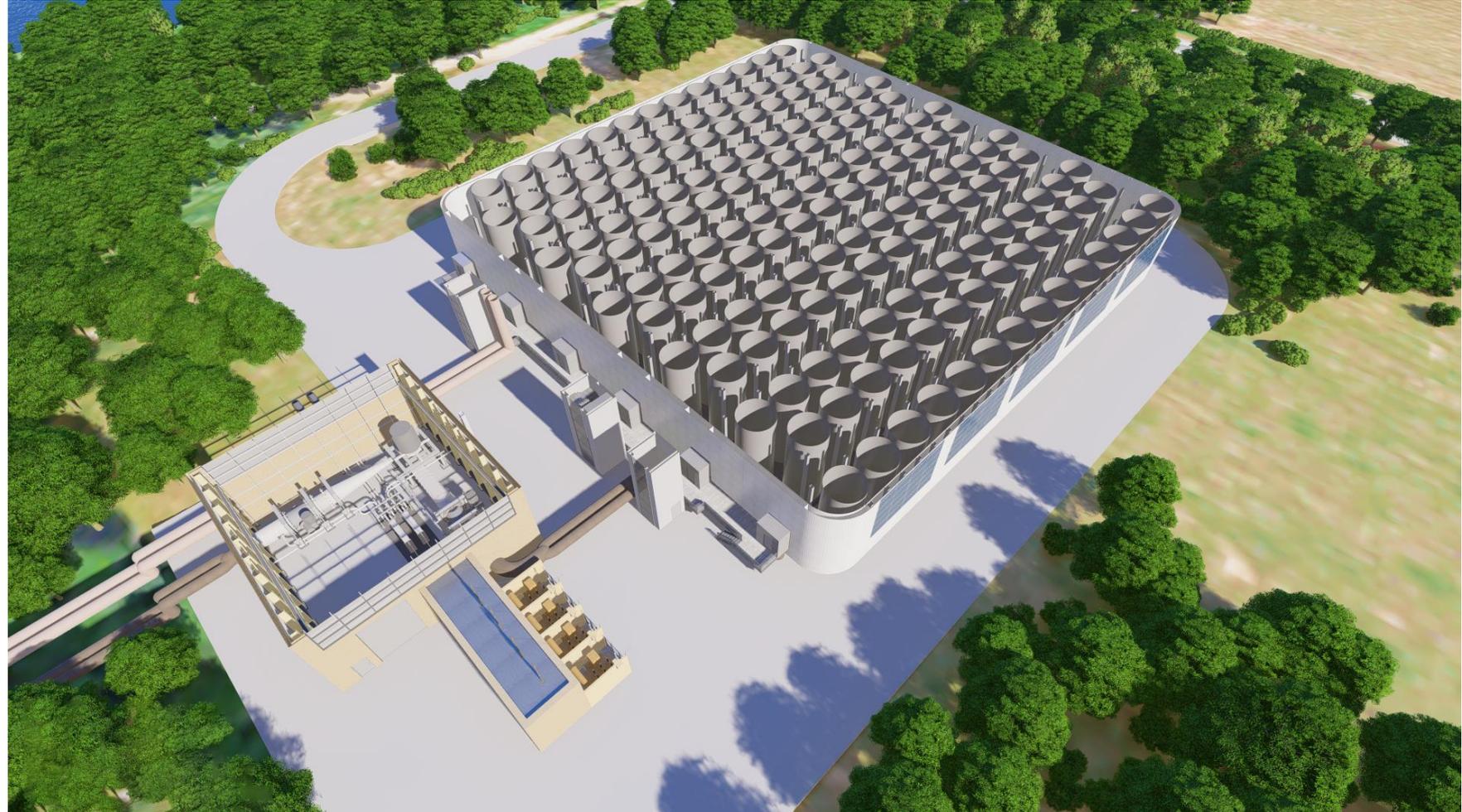
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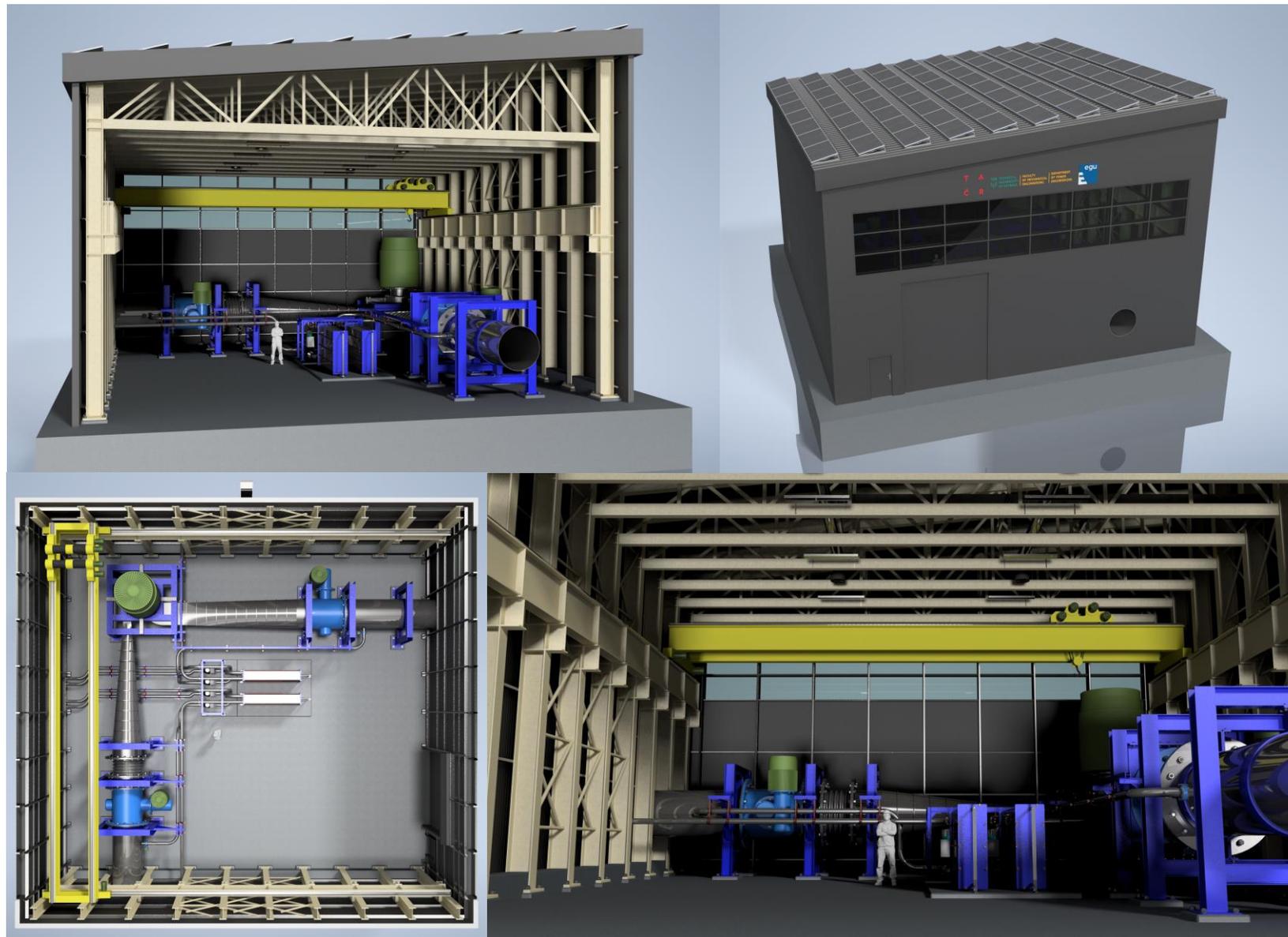
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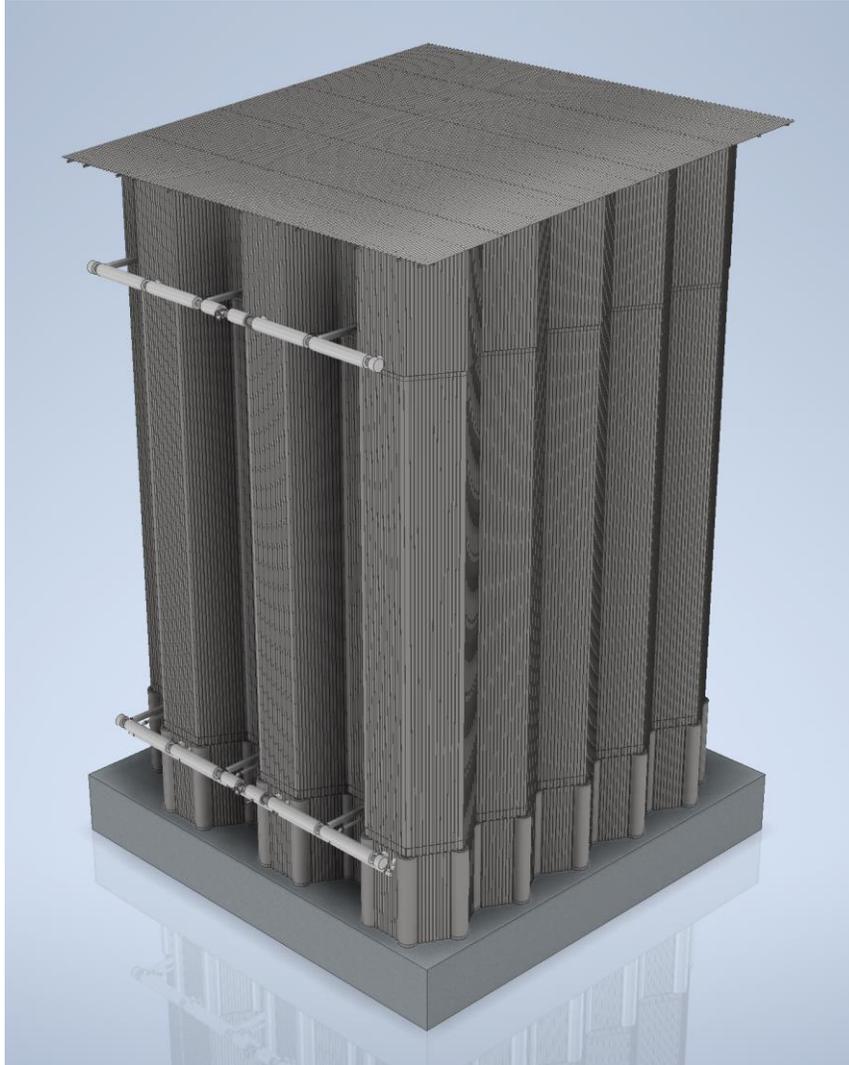
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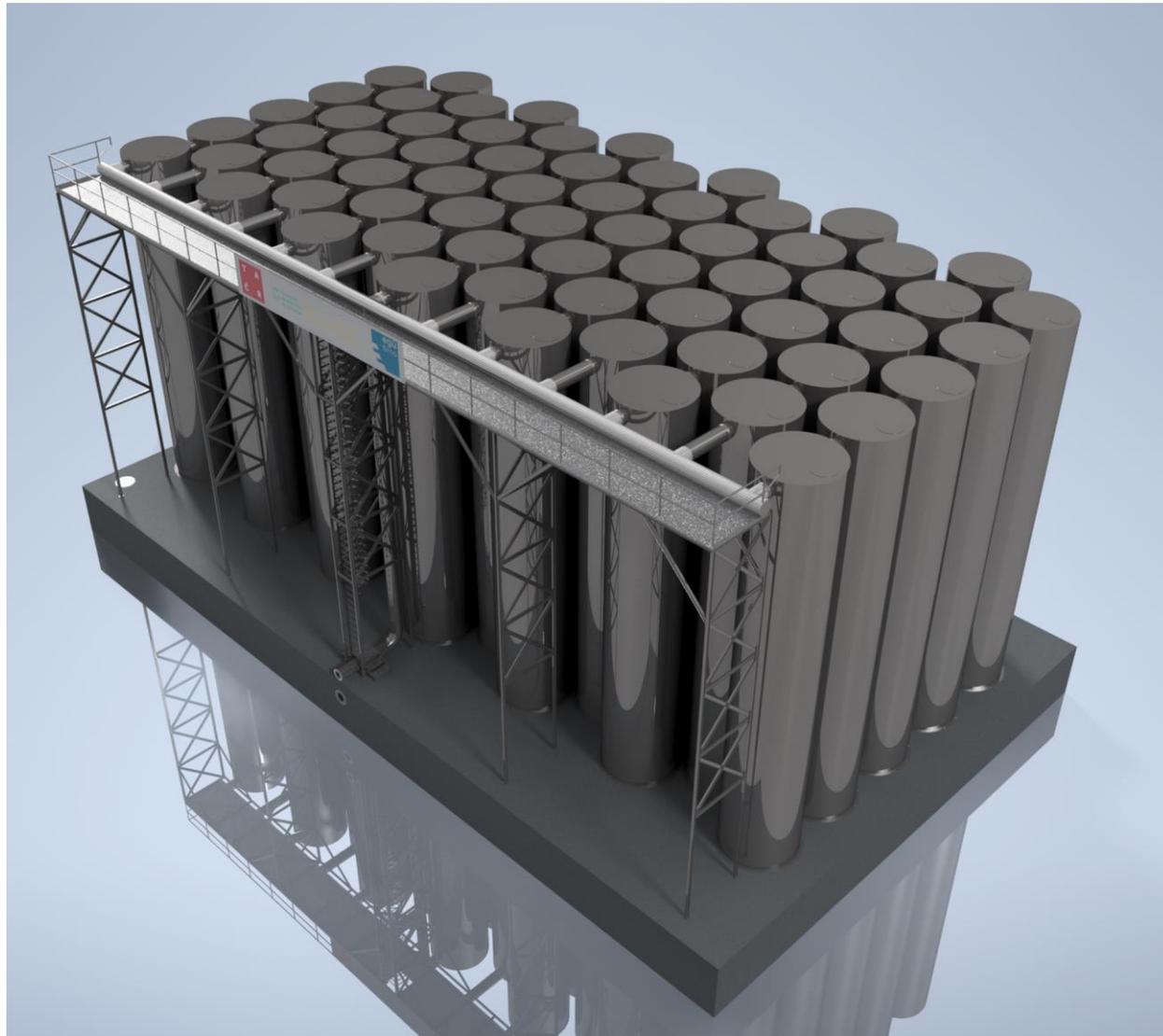


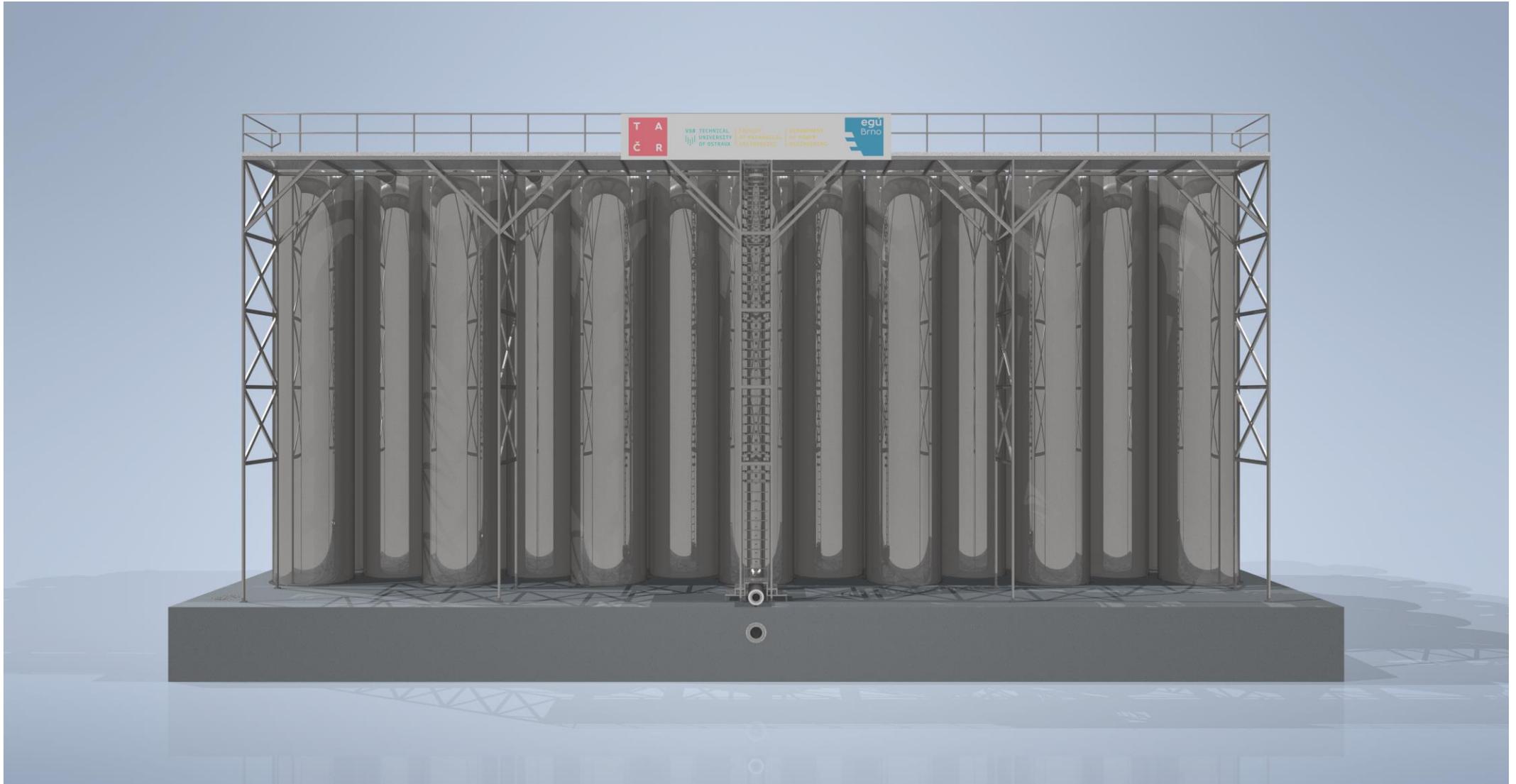
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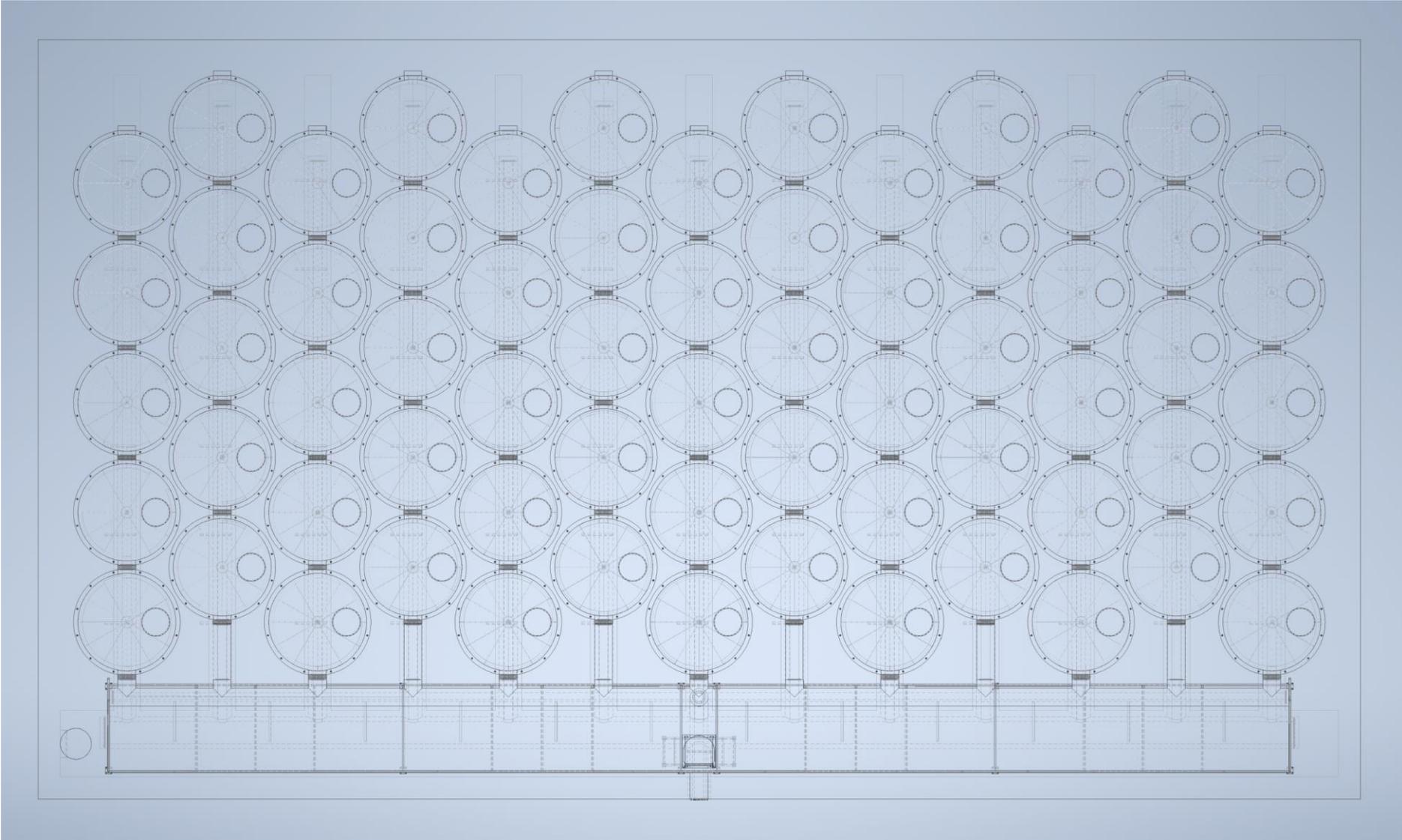
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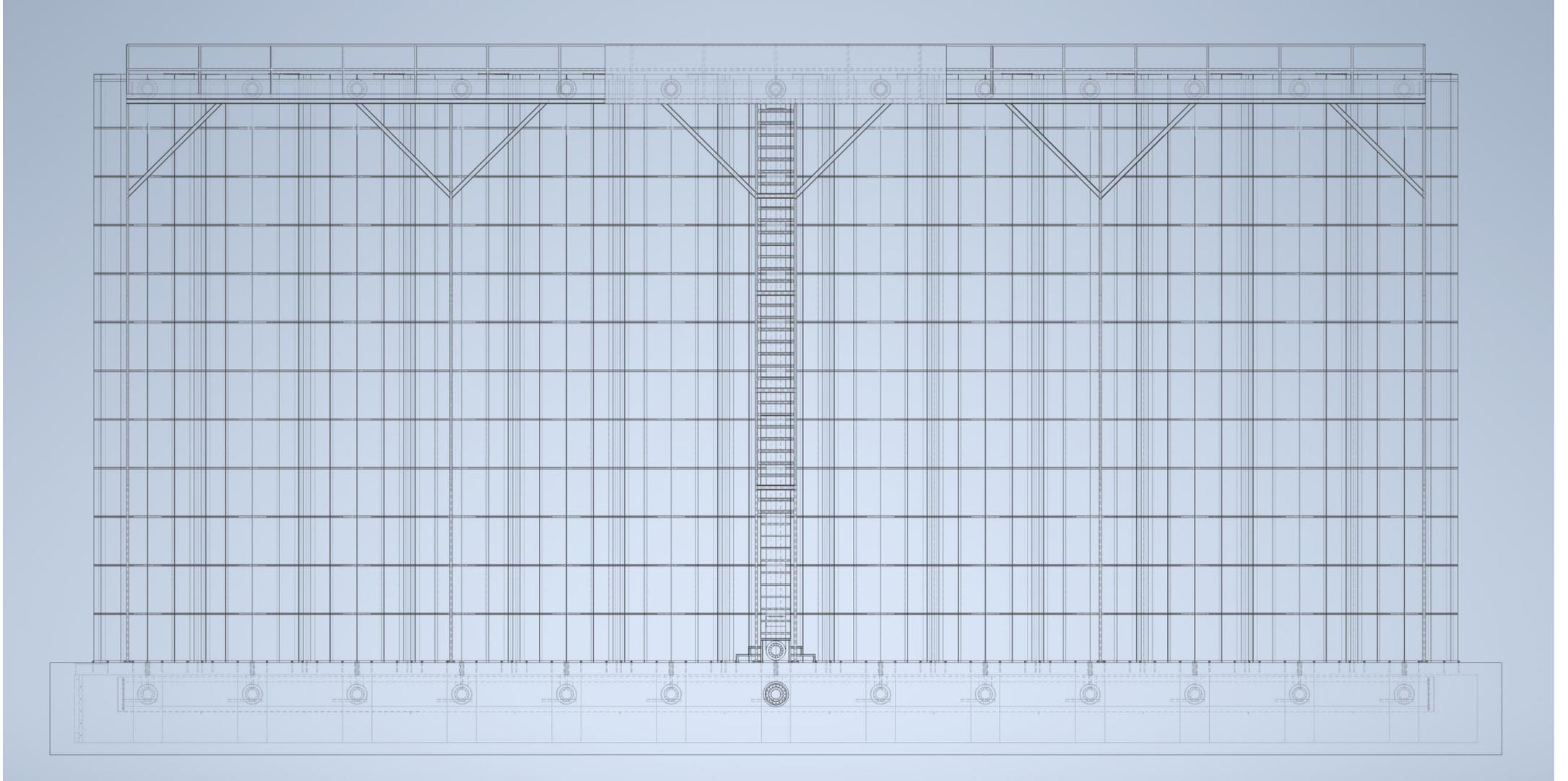


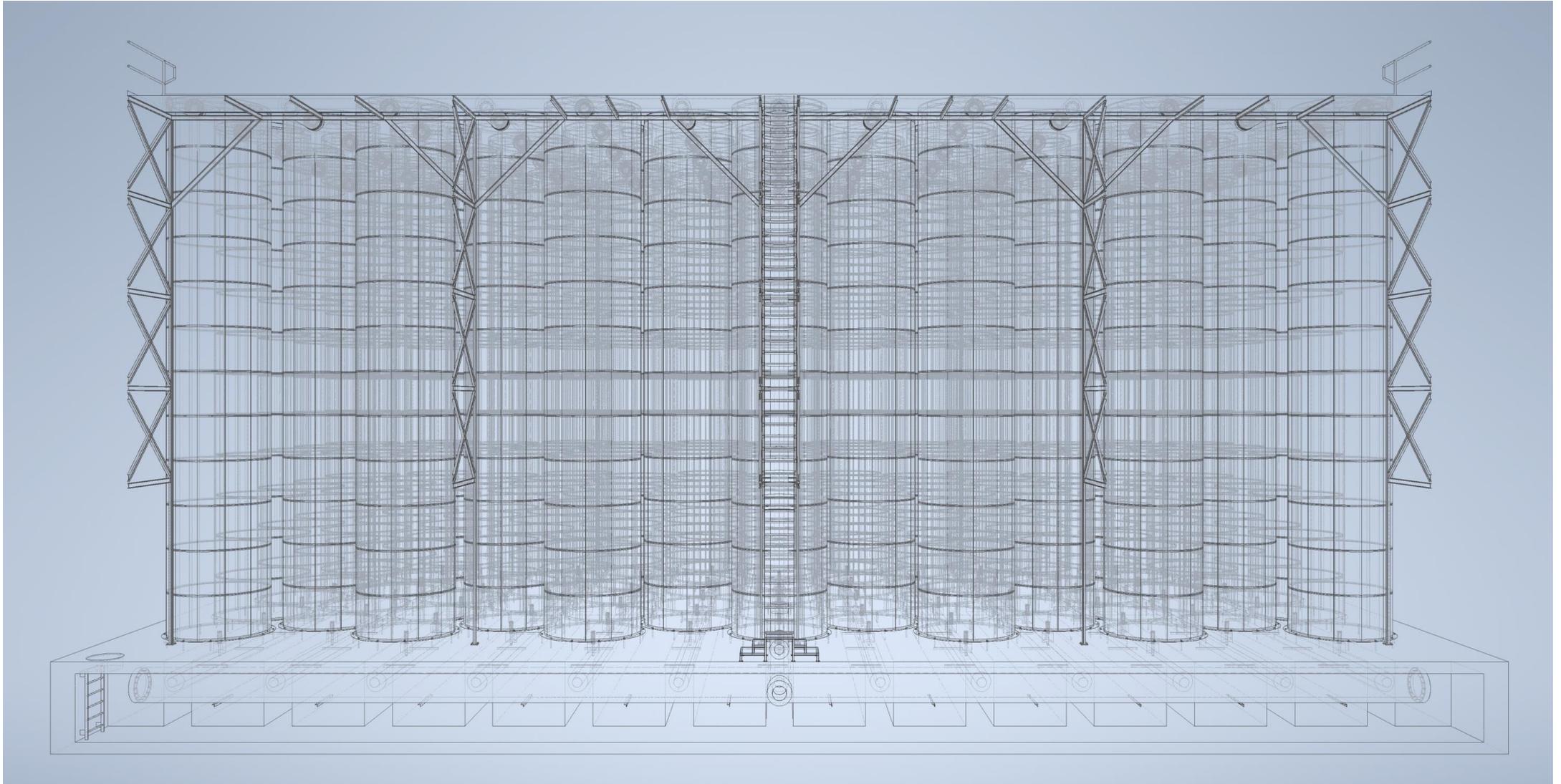














Hledání Trasa Přihlásit do Moje mapy

Ruční měření

Uložit Sdílet Exportovat Nové měření

Úsek	Vzdálenost	Součet	Azimut
1.	479 m	479 m	116°
2.	190 m	670 m	131°

Kliknutím do mapy můžete pokračovat v měření

Délka **670** m Plocha **11 803** m²

Výškový profil

0 m 227 m

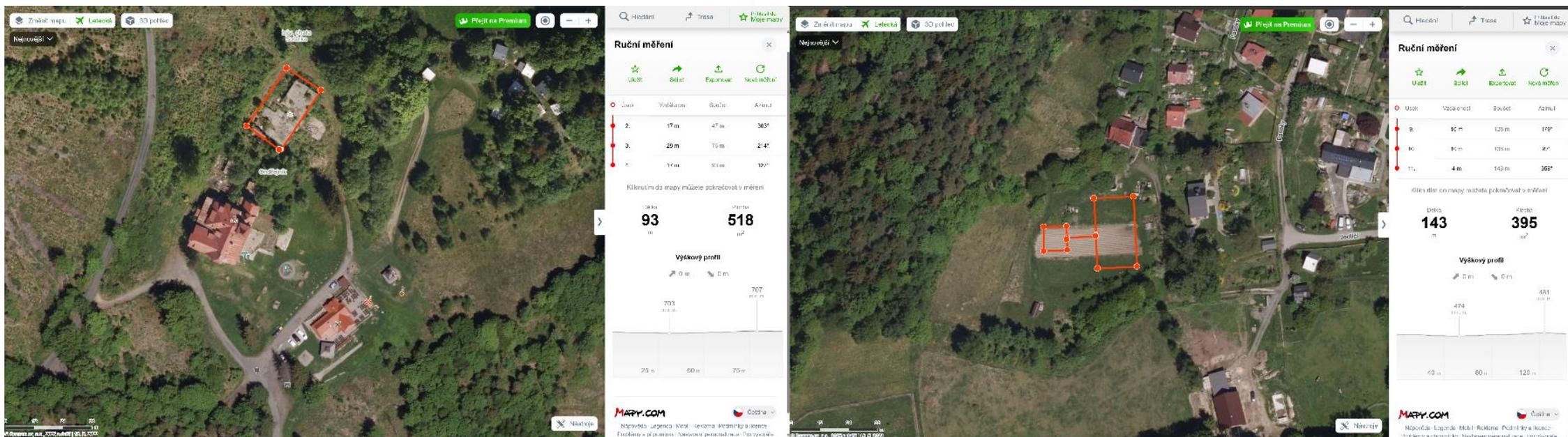
705 m n. m. 477 m n. m.

170 m 340 m 510 m

MAPY.COM Čeština

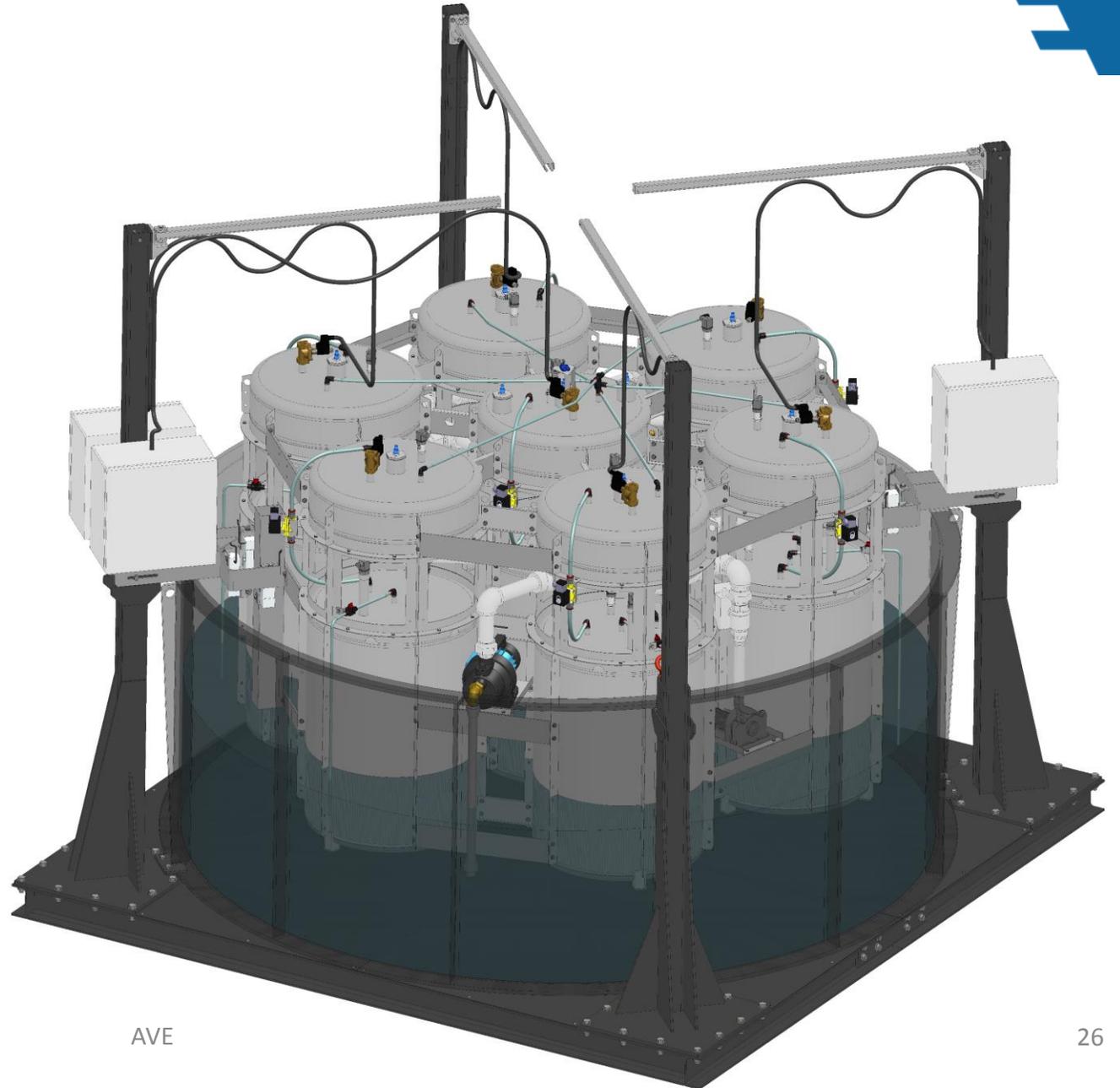
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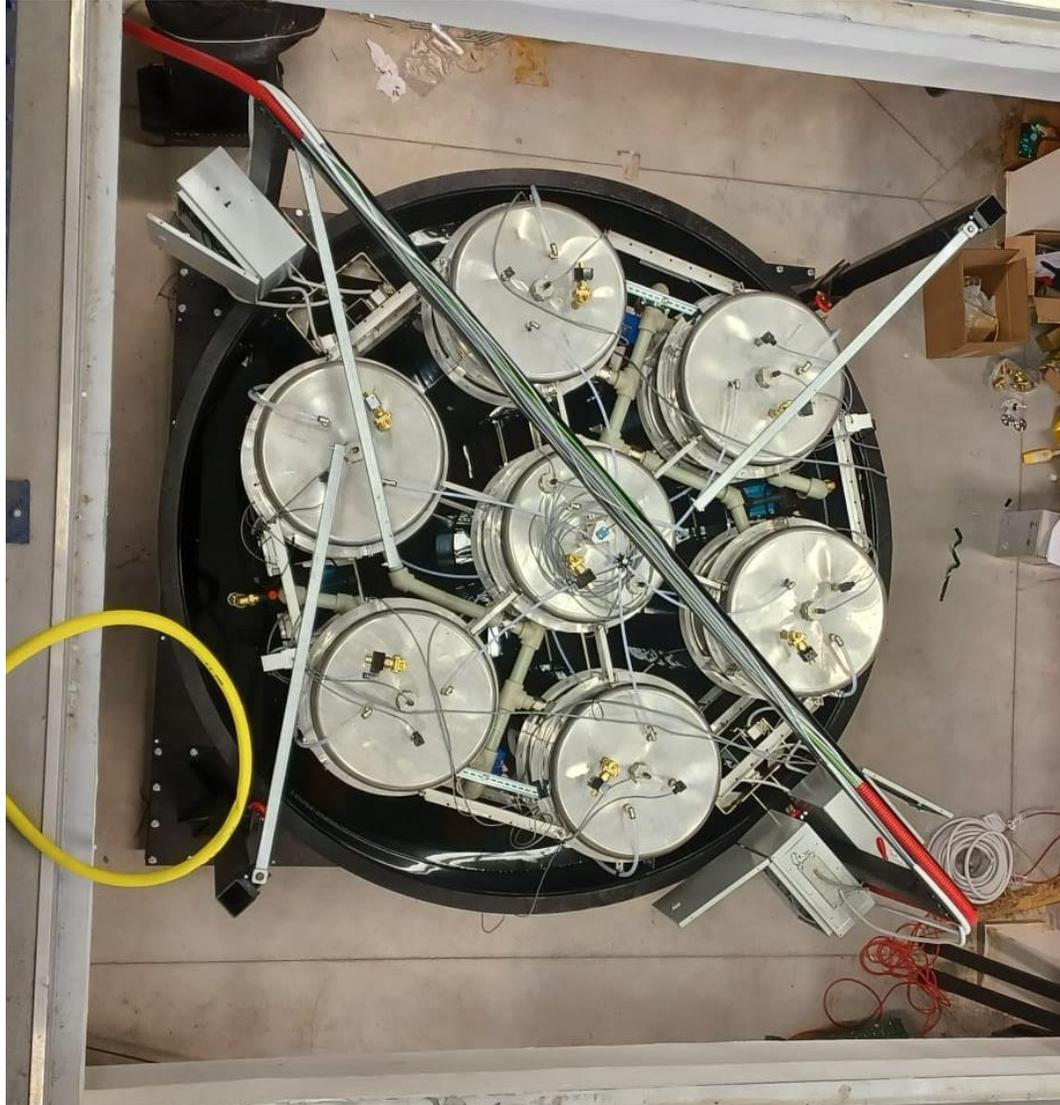
Nástroje



Laboratory model MPHES-1R

- Small testing facility for evaluation of the stabilization system
- Built with intentionally unstable structure to simulate challenges
- Control software and regulation components reliably manage charging and discharging while maintaining safe and stable positioning
- Safety systems are designed for the most extreme operational and failure scenarios





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AVE

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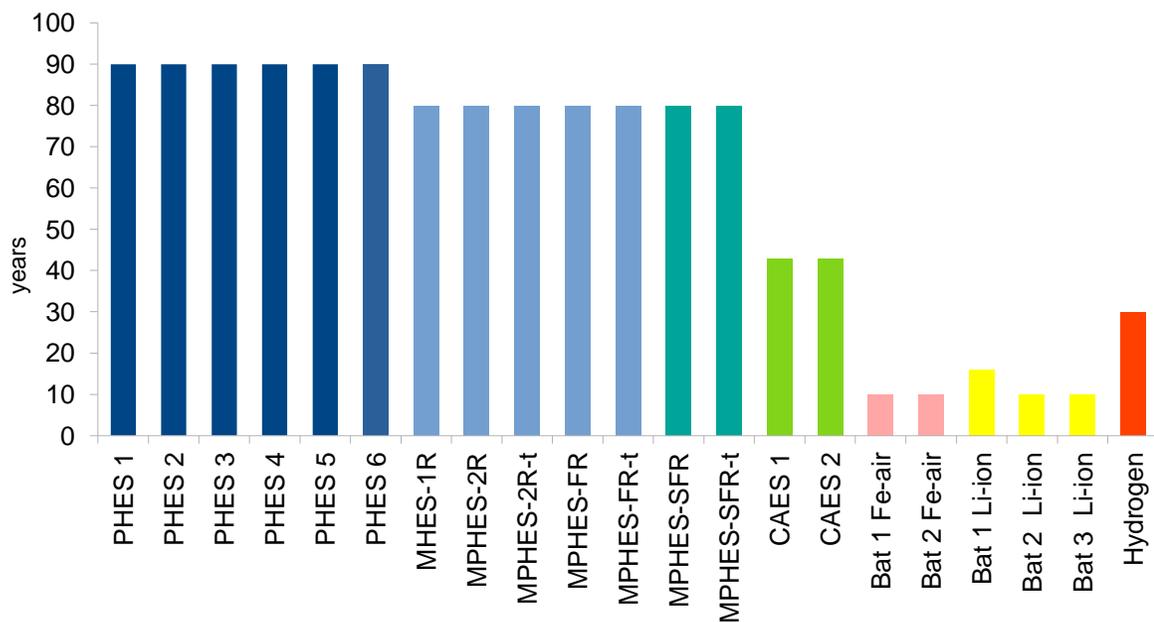
Outdoor Model MPHES-2R



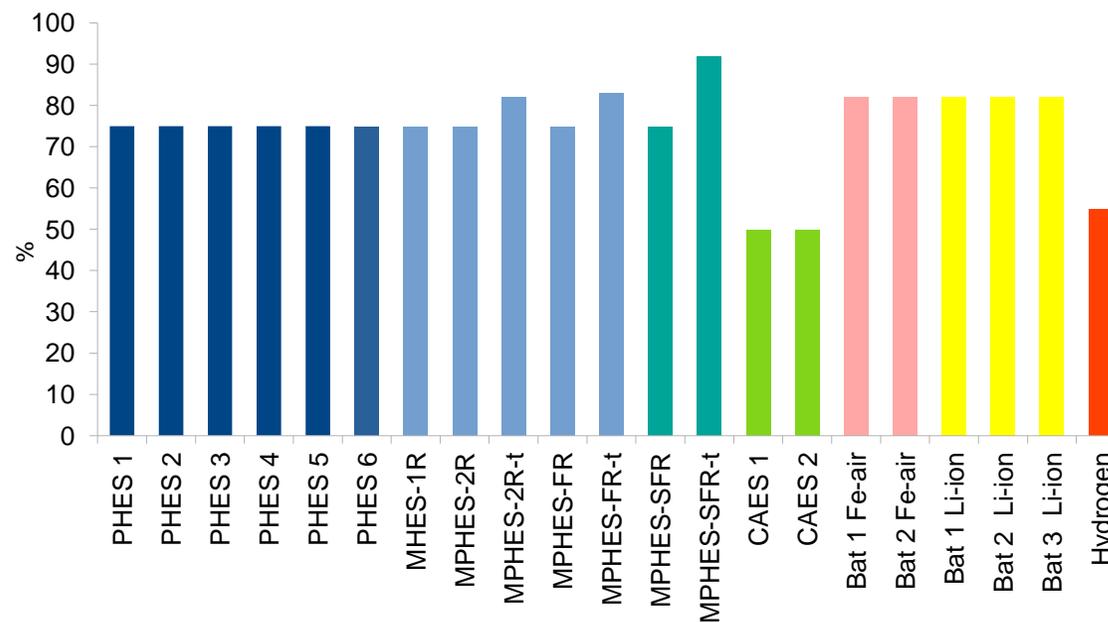
- Dimensions 11 x 9 x 5.2 m
- Power output: 0.9 kW (0.5 h...0.45kWh)

Comparison with Competing Technologies

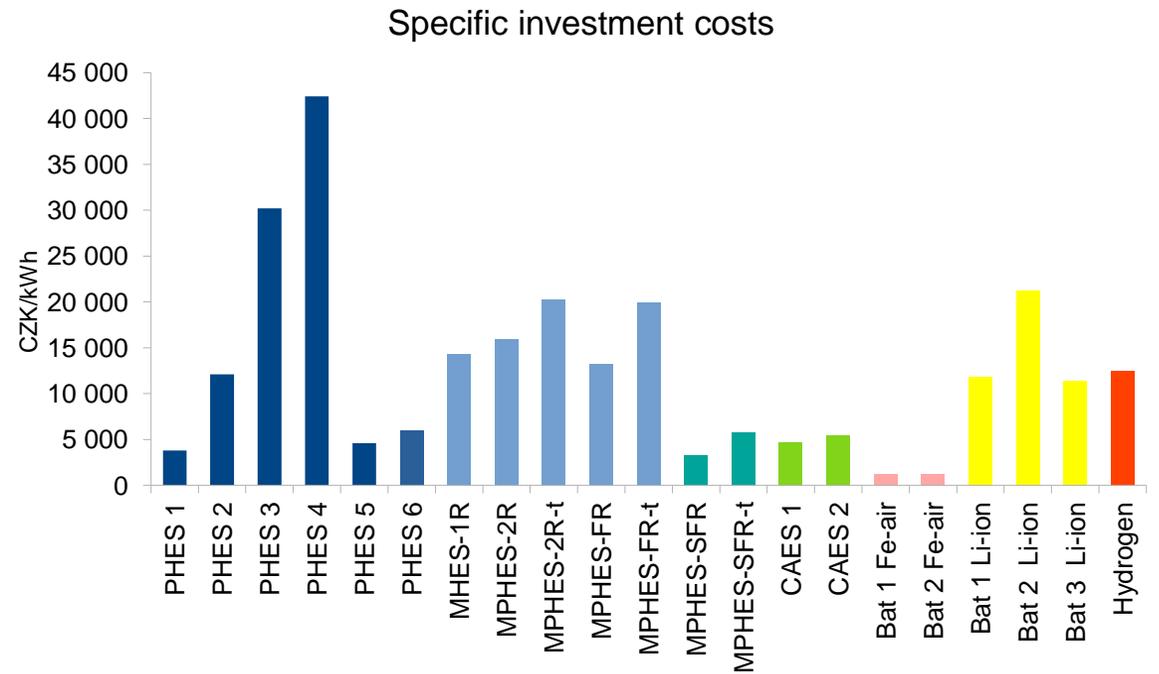
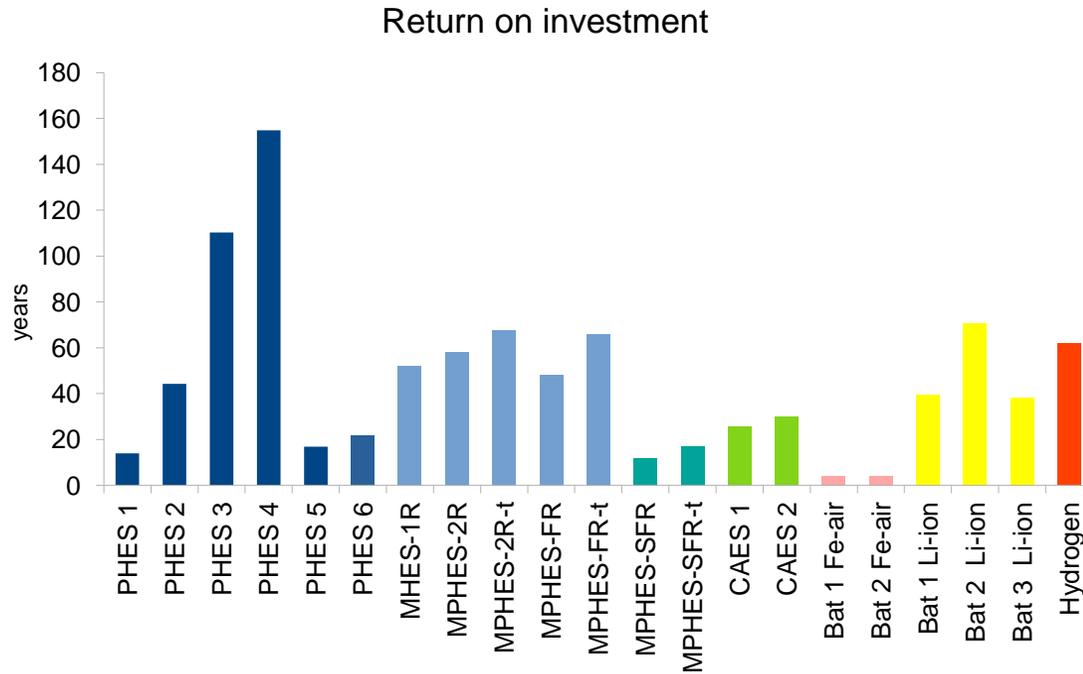
Lifetime



Efficiency



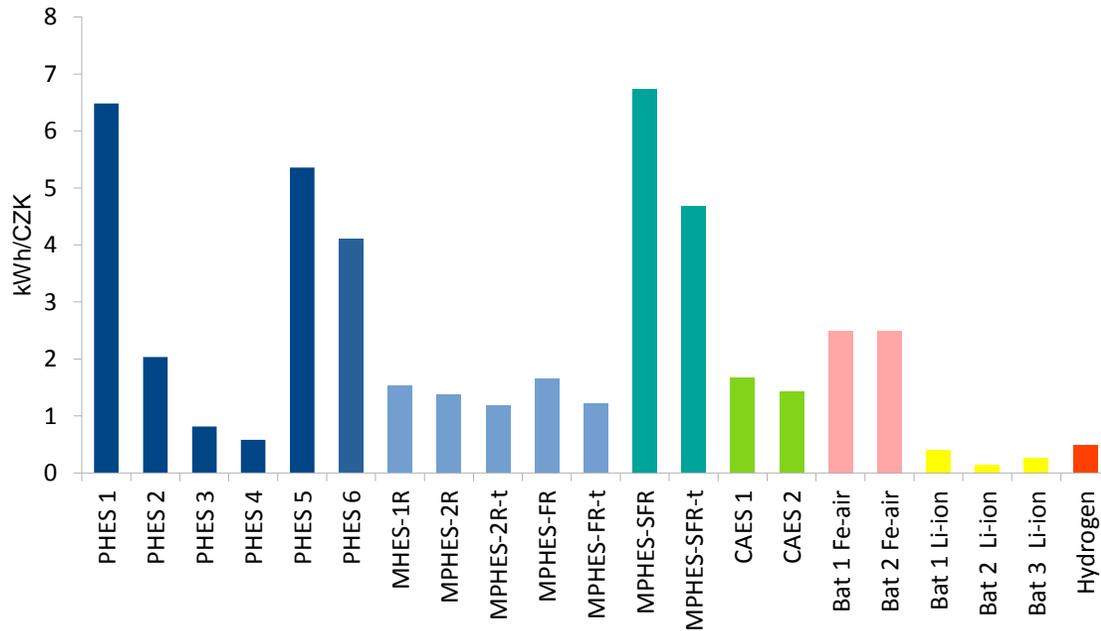
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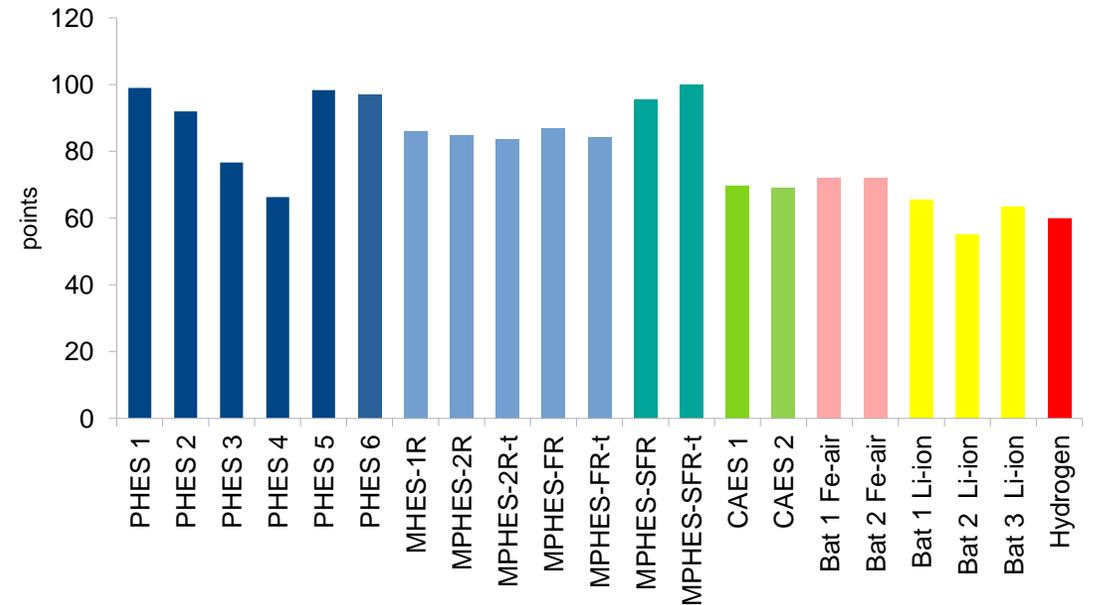
Payback and Profitability Calculated at Electricity Price of **CZK 1/kWh (€0.04)**

Comparison with Competing Technologies

Profitability



Comparison of the best values



Payback and Profitability Calculated at Electricity Price of CZK 1/kWh (€0.04)

Acknowledgments

- This study was written in connection with the project *New Type of Pumped-Storage Hydroelectric Power Plant* (Reg. No. TK03030037), financed by Technology Agency of the Czech Republic and *REFRESH – Research Excellence For Region Sustainability and High-tech Industries* (Reg. No. CZ.10.03.01/00/22_003/0000048), financed by EU structural funds.
- This presentation was created in connection of the project: SP2025/100 - Specifický výzkum v oblasti zvyšování efektivity vybraných energetických procesů

Thank You for Your Attention

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