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The **AIVP** Days

Dublin - Ireland
28 - 30 May 2015
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General Assembly
and the AIVP Days

"Working Waterfront": a City-Port mix in progress

In pertnership with:

Comhairle Cathrach
Bhaile Átha Cliath
Dublin City Council

COMHLACHT CHALAFORT
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DUBLIN PORT COMPANY

PANEL 4: WORKING WATERFRONT, A SPACE FOR GREEN INNOVATIONS
Friday, 29 May 2015 - 11:30 - 13:00

Tiit POLLER
Technical Director
Seaplane Harbour MuseumTallinn, Estonia

TALLINN (ESTONIE) : L'ENERGIE MAREMOTRICE POUR CLIMATISER LE SEAPLANE HARBOUR MUSEUM

TALLINN (ESTONIA): USING TIDAL ENERGY TO HEAT THE SEAPLANE HARBOUR MUSEUM

TALLIN (ESTONIA) : LA ENERGÍA DE MAREA PARA CLIMATIZAR EL MUSEO SEAPLANE HARBOUR


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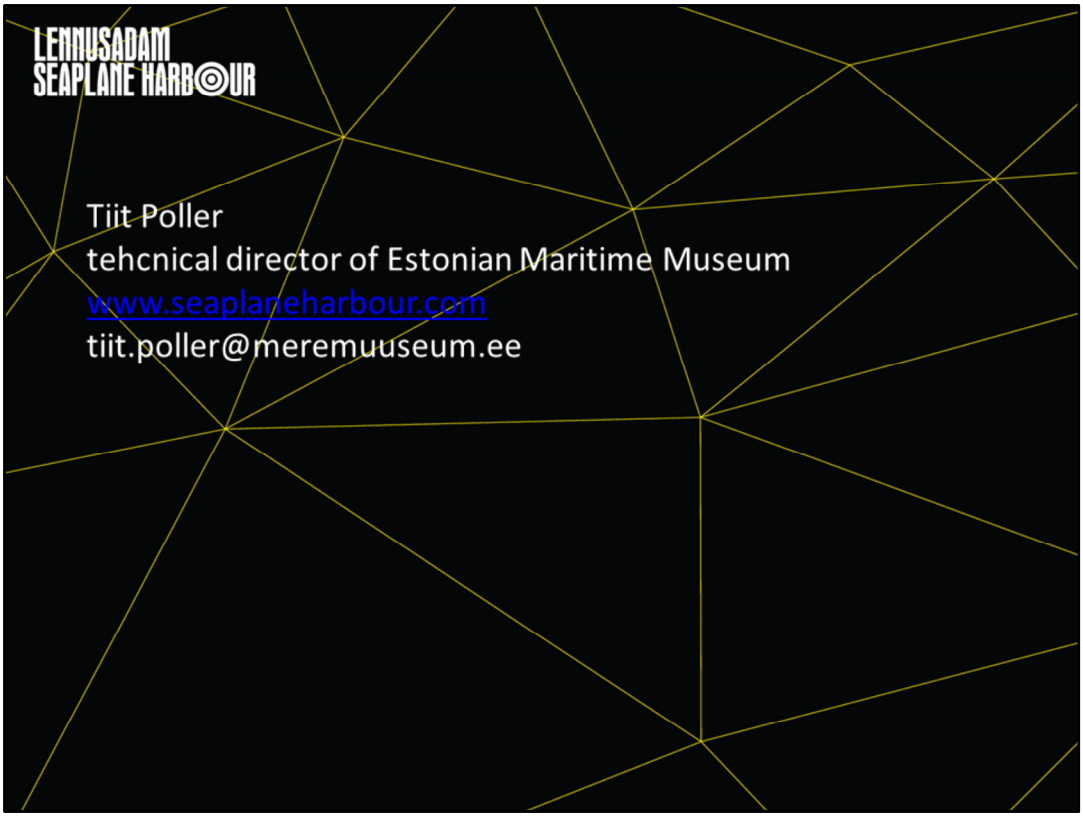
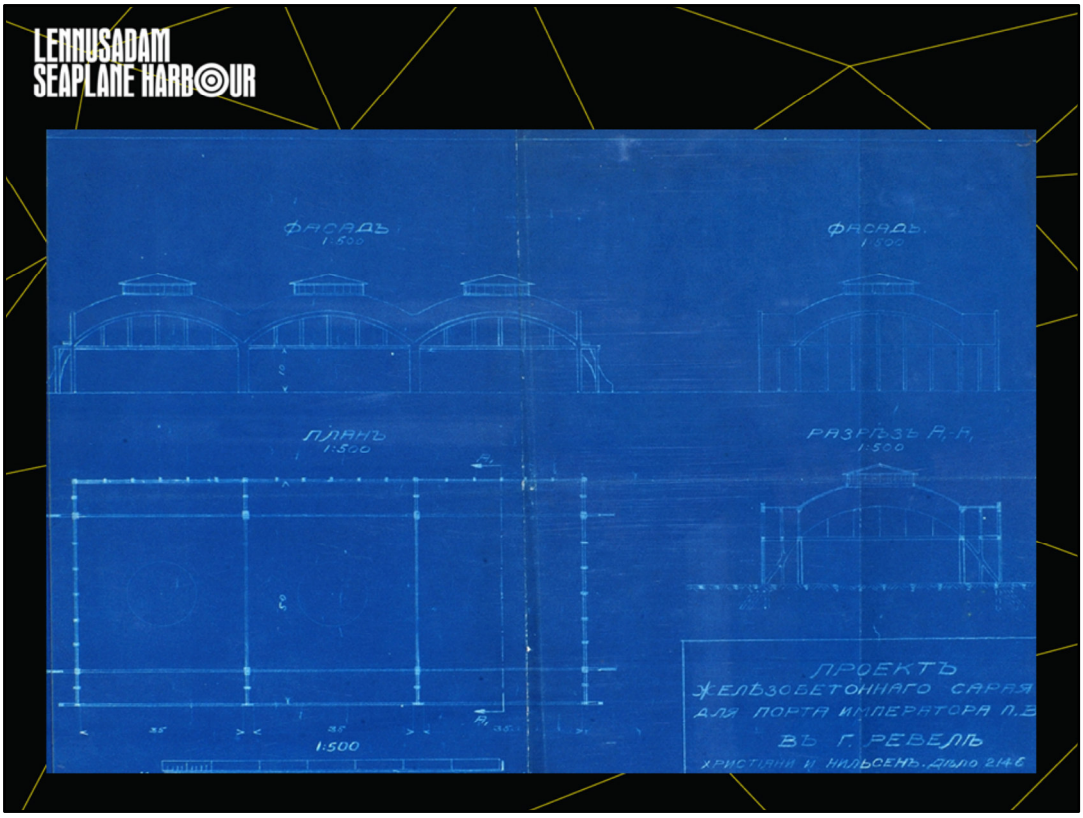
SEAPLANE HARBOUR



Started working in Estonian maritime museum in January two thousand and twelve. Today I can say that it was the most intense period of my life.

The hangar at the Tallinn Seaplane Harbour is considered to be one of the most significant engineering structures ever completed in Estonia. It is perhaps among the few 20th century buildings in our country that merits international attention and has a place in the history of world architecture.

The Tallinn seaplane hangar was designed by the famous Danish engineering company Christiani & Nielsen, on the basis of its winning entry at the competition. It was remarkable that an architectural competition for a building with a relatively utilitarian function was organised during the War.



This was probably one of the first large scale reinforced concrete shell structures in the world.

On the slide you see one of Seaplane Competition drawings of revolutionary concrete shells.

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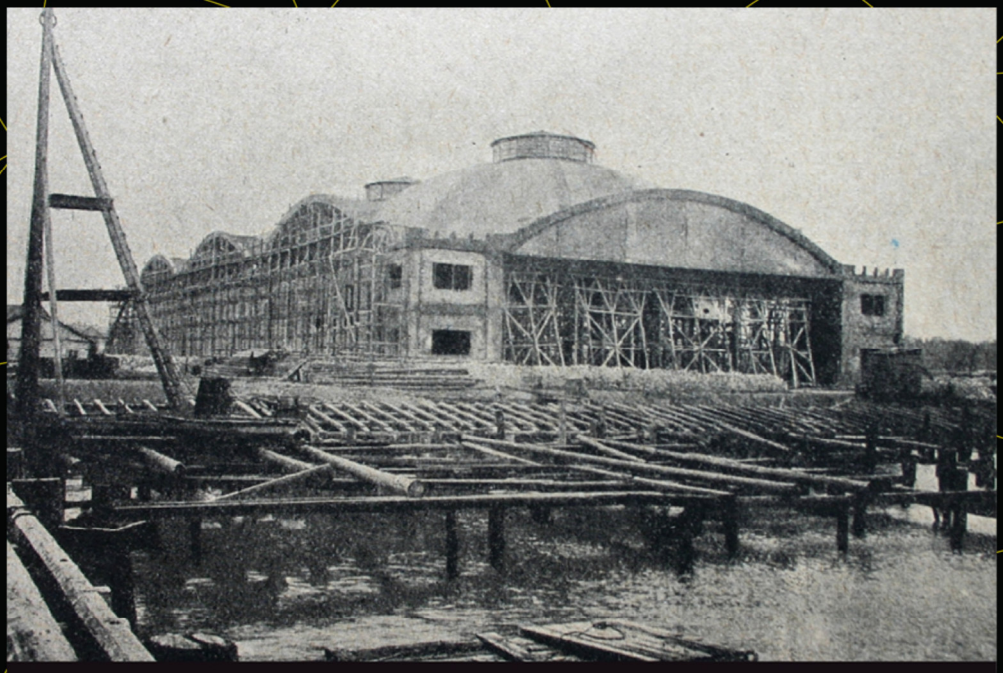


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Tallinn aerial view with old town on Toompea hill and Seaplane Harbour on the right front. 1922.

SOVIET ERA INFLUENCE

By the time the reconstruction began in May 2010, the technical condition of the hangars was truly desperate.


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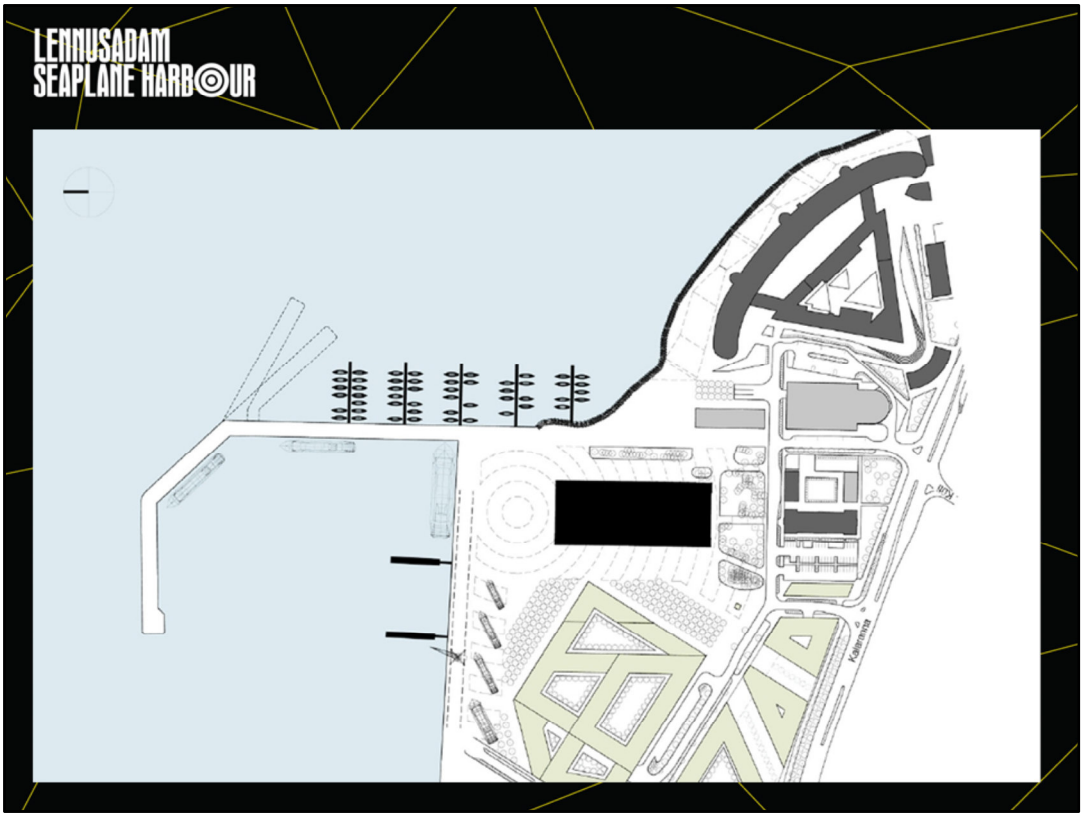

fragment of city planning- seaplane harbour and hangars

The hangars were completed two years after the reconstruction started, and the historical building was opened as part of the Estonian Maritime Museum in May 2012.


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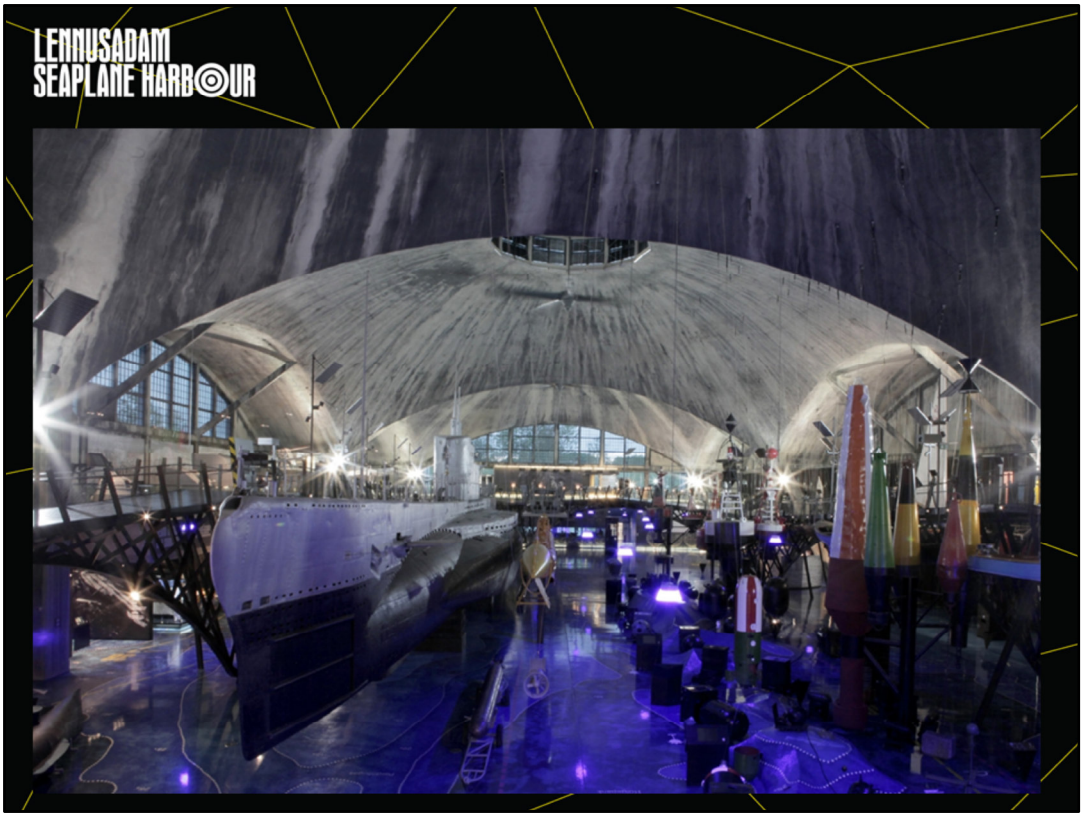
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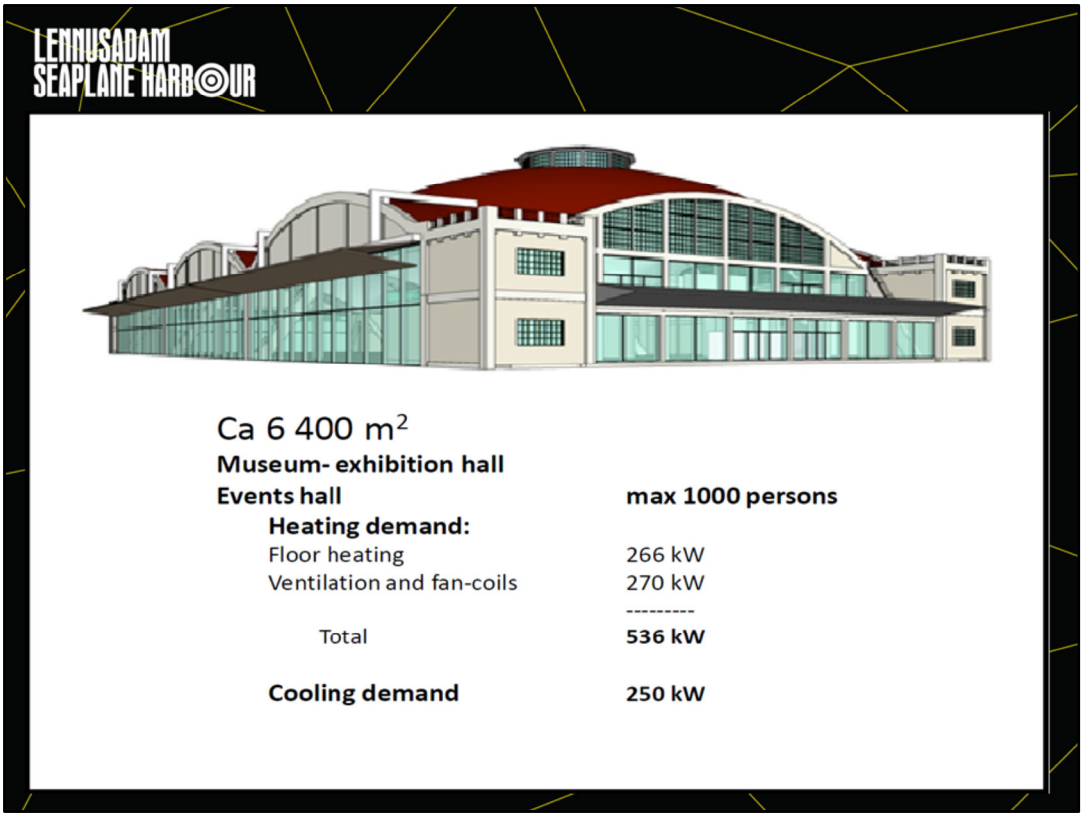
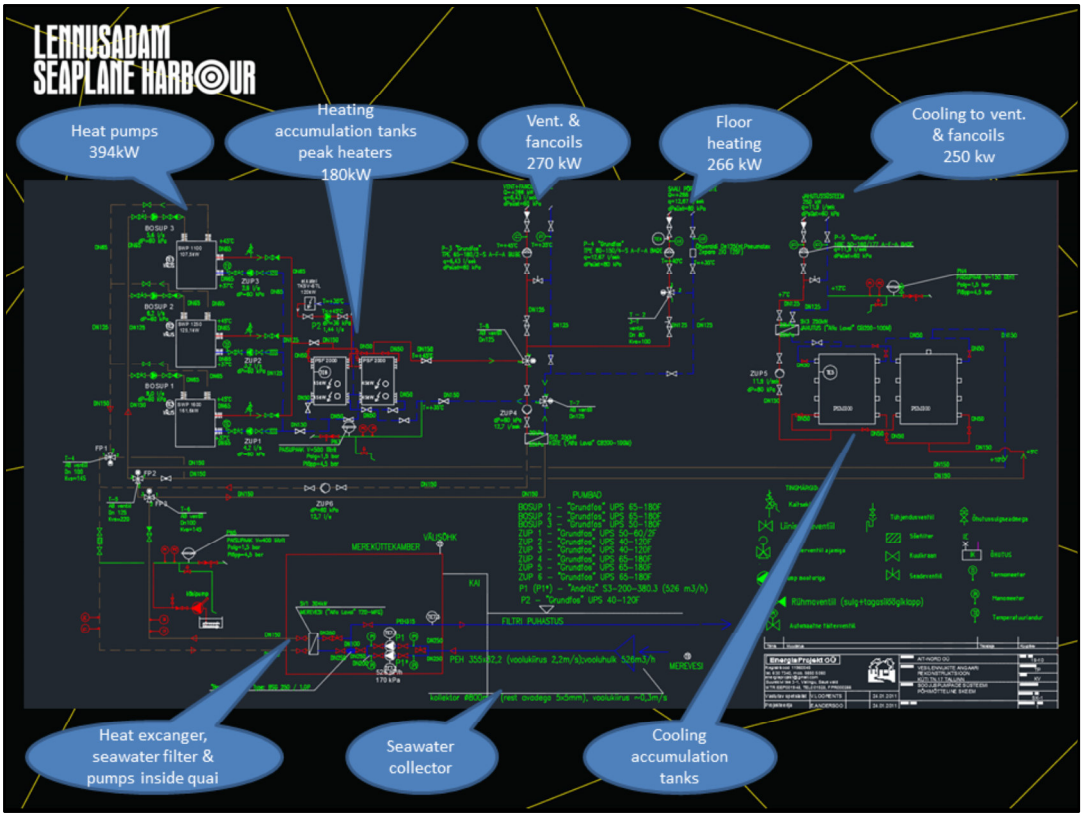


The harbour hangar was planned as an alternative energy building. Thus, the heating system used had to provide high energy efficiency to be able to heat with low operating temperatures. Furthermore, to maintain enough room for the displayed ships, space-consuming HEVAC components should not disturb the large hall.

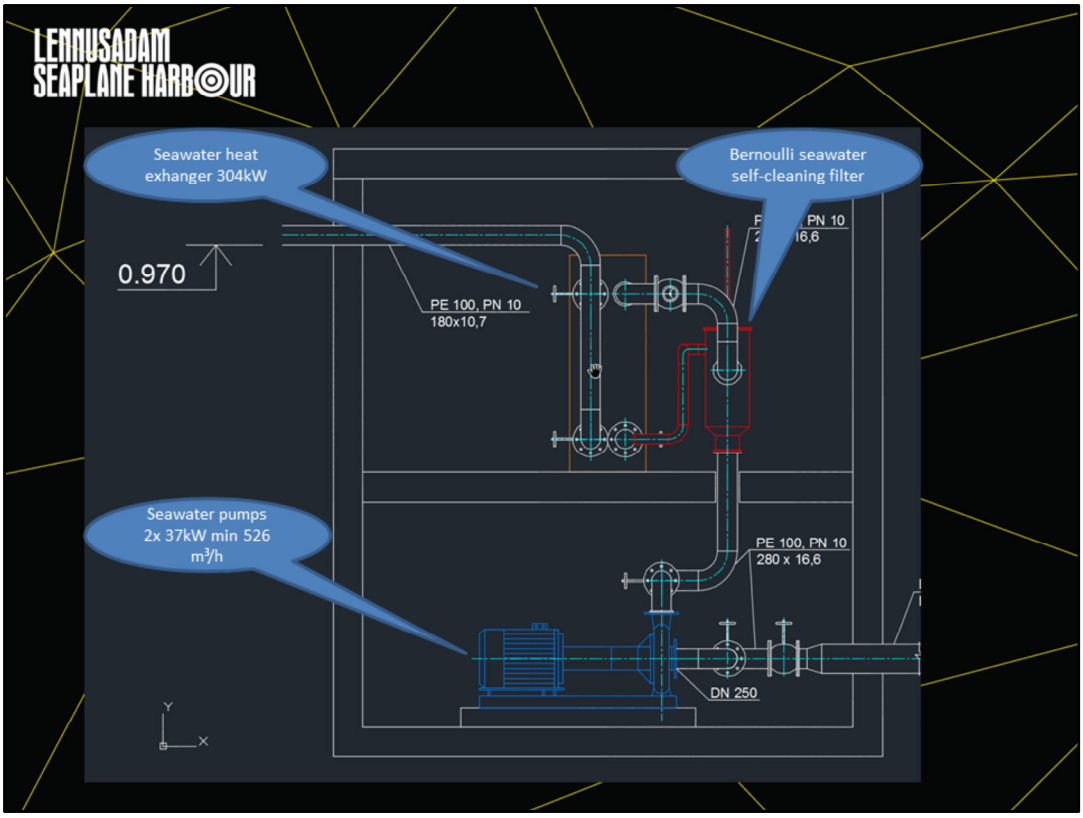
An underfloor heating system heats the large, 6,300 m2 harbour hangar. Providing radiant heat for a large area, the underfloor heating system creates a feeling of warmth with low temperature parameters of 40 °C flow and 35 °C return temperature. Only with this energy efficiency system, the remarkable heat supply by heat pumps and sea water was possible.



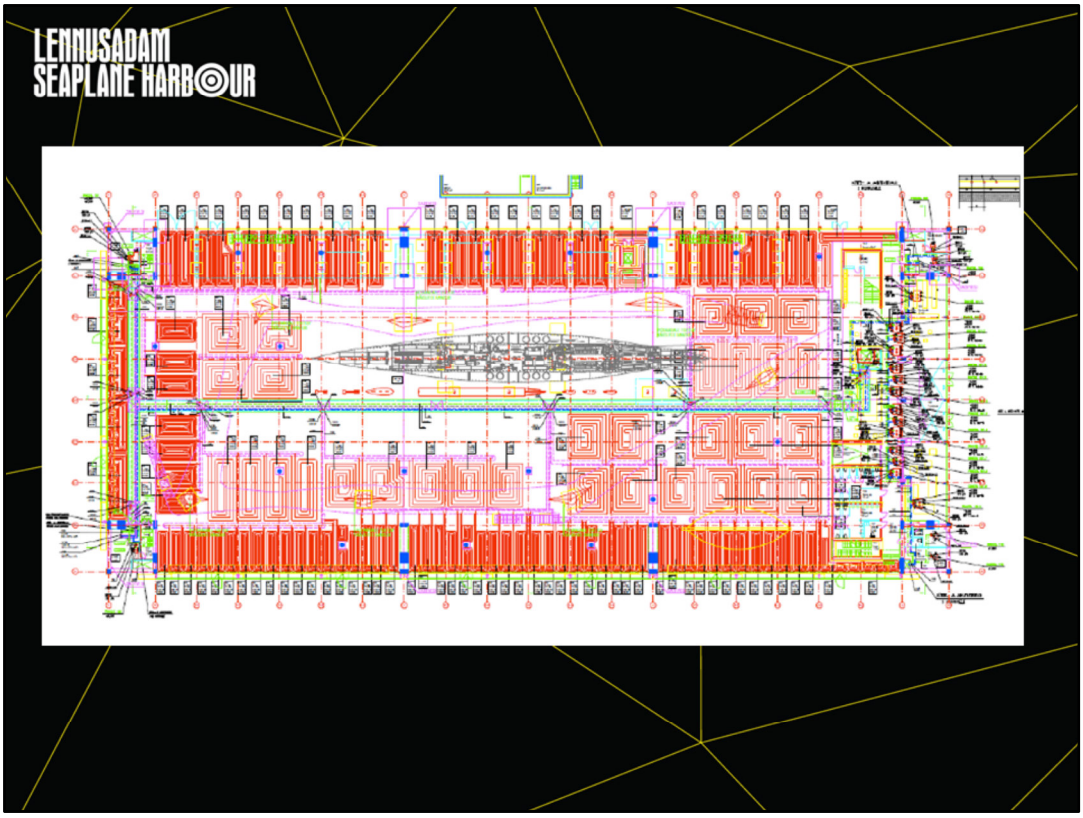
System uses seawater heat through heat exchanger and heat pumps deliver the heat to the hangars.
The same system works also as a cooling system on summer season.
The open sea heating contains:

- 2 storey sea heating chambers
- a water-water heat pump (161,6kW + 125,1kW + 107,5kW; total 394,2 kW)
- electrical heaters (180kW), a heating boiler (120kW),
- heat accumulation tanks (2x2000L) and heating and ventilation system pipes

Integration of heat pumps:
3 heat pumps differed by the output power connected in cascade system -> they create a whole unit.
The Heat pumps automatic control system is directing circulations pumps, electric heating boilers, compressors, seawater pumps and cooling system.
The heat pumps are the main connection between the seawater heat exchanger and the hangars heating system.

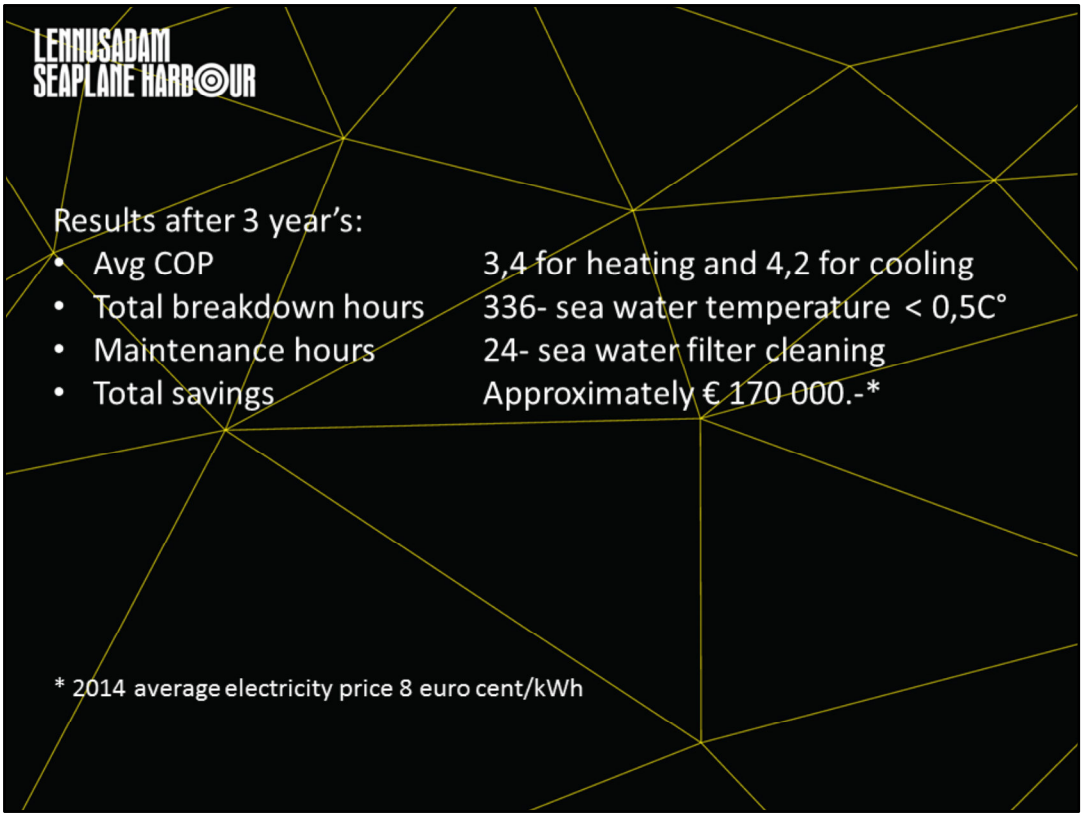


Heat exhanger and pumps chamber inside quay, bottom lies 6m below seawater line.



To provide the space in the harbour for the ships and at the same time achieve high comfort for visitors, a special technology known as the Tichelmann system was used. The harbour hangar is the first Estonian building with this technology. The Tichelmann system uses distribution and collection pipes for connections instead of one manifold. Therefore, it is especially beneficial to install underfloor heating in large areas with zone control like the seaplane harbour.

The heating, distribution and collection pipes can be connected directly to the integral structural steel mesh in the concrete floor surface. Thus, there are no visible and thereby space-consuming manifolds, access panels or inspection shafts. Additional walls to cover HEVAC-components are not necessary. Hence, the large exhibits can be positioned without limitations and visitors can wander freely within the hangar.



The **coefficient of performance** or **COP** (sometimes CP) of a heat pump is a ratio of heating or cooling provided to electrical energy consumed.[1][2] Higher COPs equate to lower operating costs. The COP may exceed 1, because it is a ratio of output:loss, unlike the thermal efficiency ratio of output:input energy. For complete systems, COP should include energy consumption of all auxiliaries. COP is highly dependent on operating conditions, especially absolute temperature and relative temperature between sink and system, and is often graphed or averaged against expected conditions.

Thermal inertia (800 tons of steel and 1,500 m3 of concrete inside building) gives us the opportunity to use the cheaper electricity prices

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Recognition:

2014 European Museum Forum / European Museum of the Year Award / Special Commendation
2013 EU Prize for Cultural Heritage / Europa Nostra Awards 2013 / Conservation / Grand Prix
2013 DOMUS International award for restoration and preservation / Ex Aequo Silver Medal
2013 Interior Design Association (IIDA) Global Excellence Awards / Category: cultural, institutional, educational / Best of Category winner / Interior Architecture of the Seaplane Harbour
2013 EU Prize for Contemporary Architecture / Mies van der Rohe Award / Nominee
2012 Cultural Endowment of Estonia / Annual Prize / Reconstruction of Seaplane Harbour hangars and Tallinn TV Tower
2012 Swedish Business Awards / Estonia / Environmental Award / Seawater heating system for Seaplane Harbour
2012 Tallinn Culture and Heritage Department / Honourable mention
2012 Estonian Design Awards / Product Design Award BRUNO / Best Design Project
2012 Estonian Design Awards / Best Design Team / Seaplane Harbour / KOKO architects & Produktsioonigrupp
2012 Estonian Design Awards / Graphic Design / Environmental Design / bronze / Seaplane hangar floor / KOKO architects & Produktsioonigrupp
2012 World Architecture Festival / Old and new & Display / Shortlisted
2012 Estonian Association of Architectural and Consulting Engineering Companies / Construction Project of the Year
2012 Estonian Concrete Association / Concrete Building of the Year


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Thank you!