



REALice Pilot - KEBO Zurich

RESPONSIBLE for the information provided:

Ice rink: **KEB Oerlikon**
Name: **Andreas Schnyder**
Function: **Operations management**

SUMMARY

This document explains the effects of REALice on energy consumption as well as the effect on sliding ability, hardness and maintenance. REALice removes air bubbles from the water through the physical vortex process, thereby lowering the viscosity and reducing limescale residue for better ice build-up and higher quality.

PURPOSE

Comparison and evaluation of the energy performance data for 2019 and 2020 with reference to the external conditions.

- Lower water temperatures (hot water not needed)
- Higher ice temperatures with consistent quality
- Reduction in water consumption

DATA SOURCES

- EDL data management
- Meteo-Swiss weather data

TIME SPAN OF THE ASSESSEMENT OF THE MEASUREMENT DATA

Measurement data was recorded over a period of 2 months. Two weeks from each month in 2019 and 2020 with comparable environmental conditions were examined in detail.

ANALYSIS: WEEKS IN COMPARISON

Data analysis of the recorded data considering the outside temperature, energy consumption and the effective ice temperature.

CONCLUSION

Review on the test phase and properties.

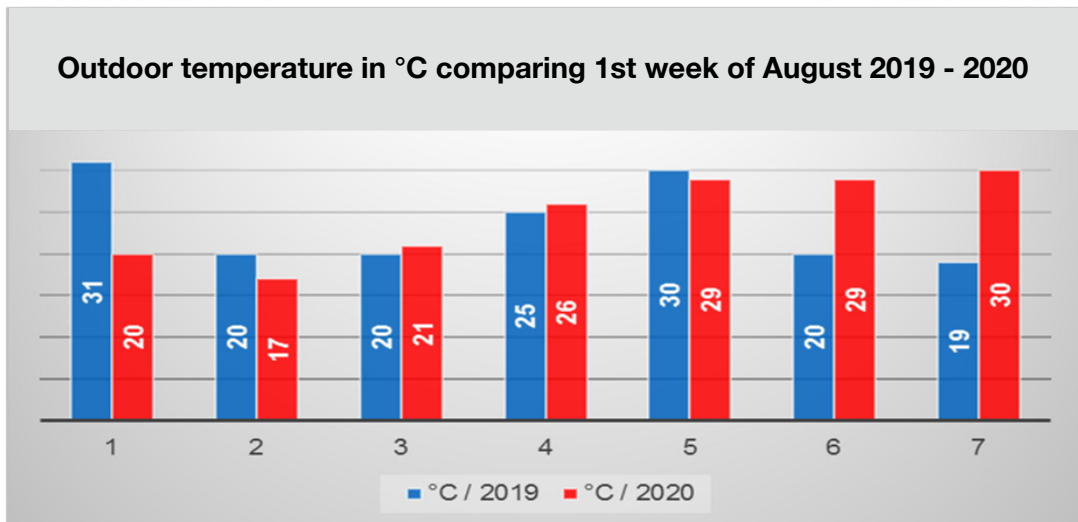
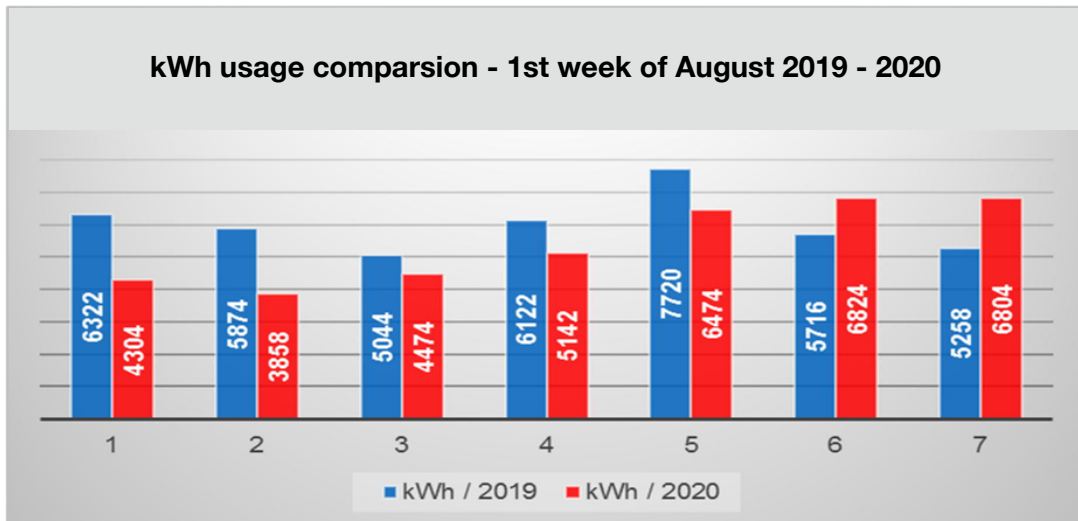
FEEDBACK ICEMAKERS

Overall impressions of the icemakers.

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ANALYSIS: Energy consumption in the week of ice-building outdoors

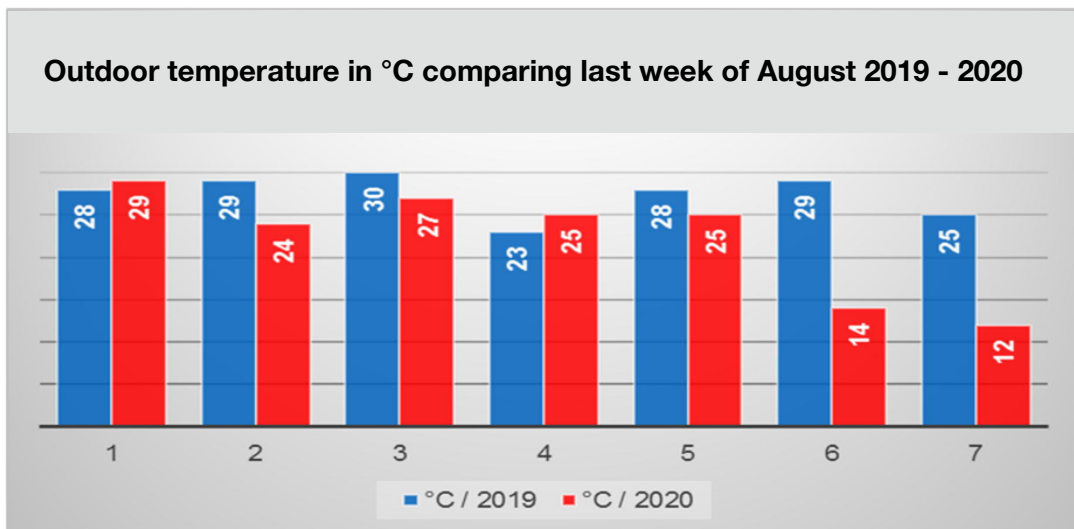
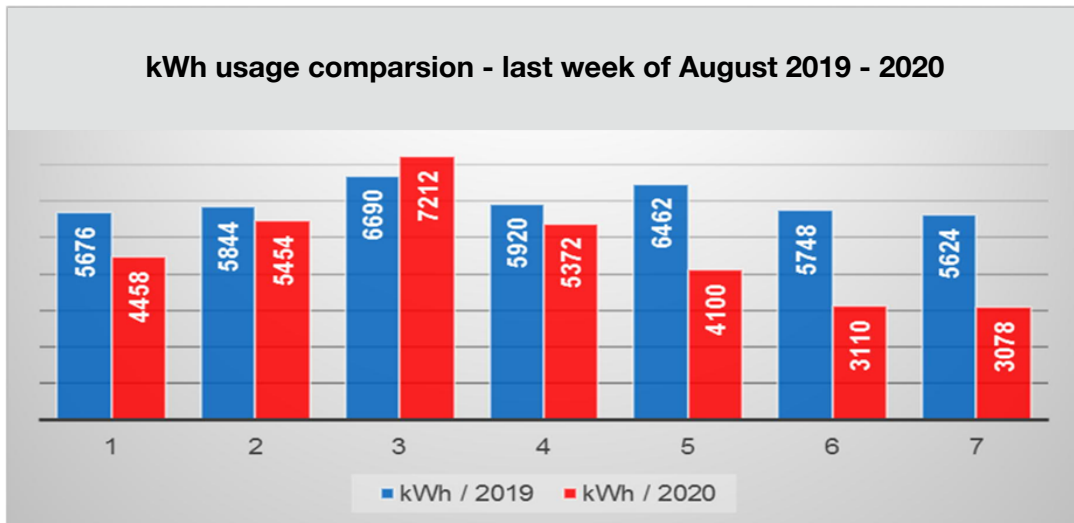


Analysis 1st week August 2019/2020:

Energy consumption during the construction of indoor ice is reduced by 13-16% by using REALice on days with mainly identical external influences (days 3 - 5). The influence of the outside temperatures is obvious on the energy consumption. Nevertheless, the trend of effectively reduced energy consumption is clearly visible.

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ANALYSIS: Correlation of outside temperature to energy consumption



Analysis last week August 2019/2020:

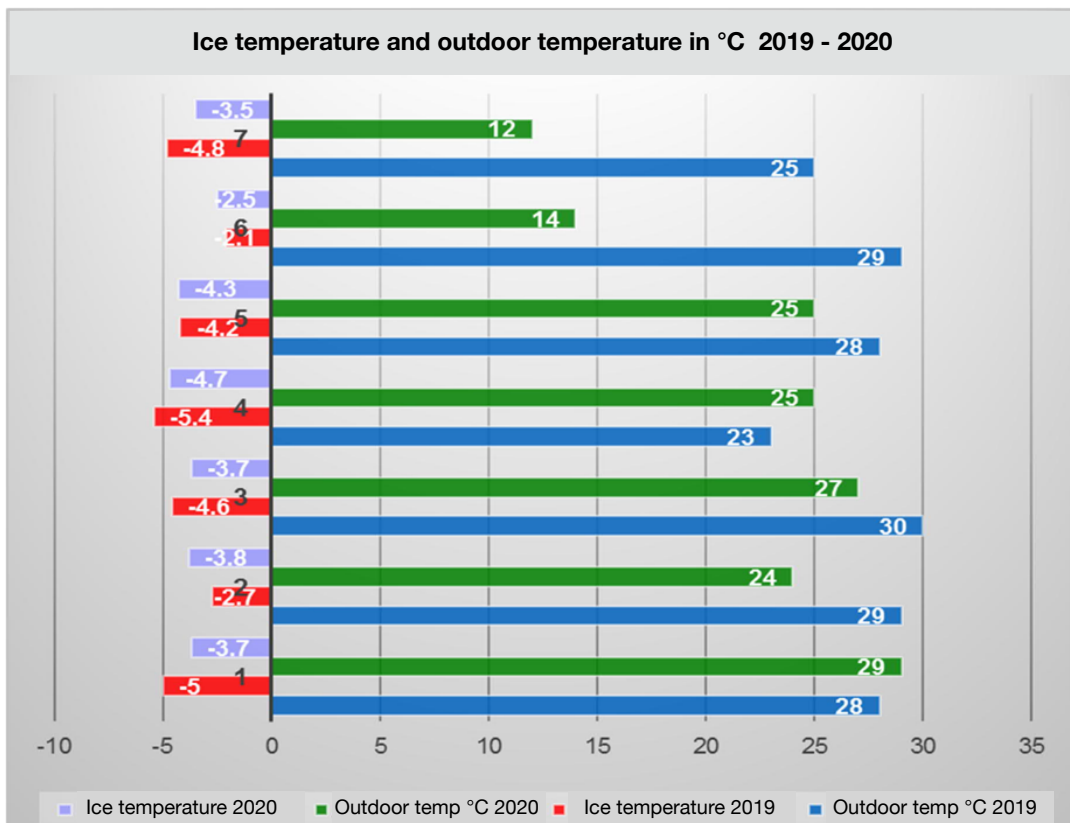
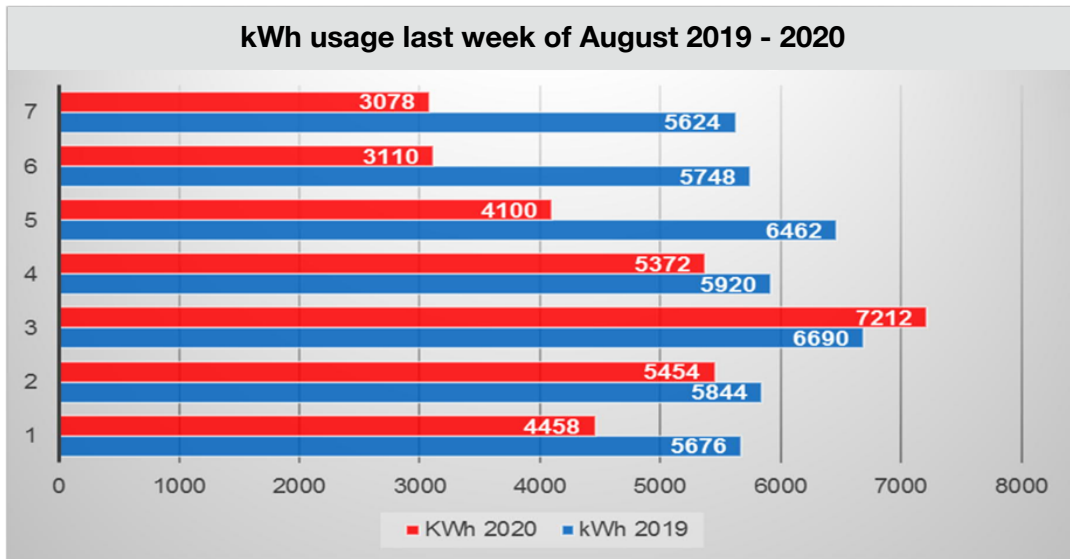
The correlation between outside temperature and energy consumption in 2019 is clear, i.e. Energy consumption is in line with the outside temperature. This correlation with REALice does not show up yet unfortunately due to the yet unknown optimal cooling / ice temperature setting. For optimal adjustment in terms of ice hardness and energy consumption the knowledge is not yet sufficient.

But even this week we see a clear energy saving on days with similar temperatures. e.g.:

- Day 5 with 25°C (77°F) 2020 compared to day 7 with 25°C 2019: up to 37%
- Day 1 with 29°C (84.2°F) 2020 compared to day 2 with 29°C 2019: up to 24%

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ANALYSIS: Energy consumption in consideration with indoor ice surface temp.



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Analysis last week August 2019/2020:

By looking at the air and ice surface temperatures individually, REALice shows only a small temperature fluctuation on the ice. Although the external conditions differ greatly. Looking at position 5 and 7 on both graphs is interesting. With REALice, the energy consumption is about 52% lower than with untreated water at an outside temperature of 25°C (77°F) with almost identical ice temperatures.

CONCLUSION

Individual detailed observations of the presented correlations between temperatures and energy consumption confirm the overall optical impression, including:

- harder ice
- reduced ice thickness
- faster freezing of water

The short test phase highlights the positive properties of the treated REALice water on the entire spectrum. We are convinced that we still need to gain some more experience to access the full potential of improvements and savings.

FEEDBACK icemakers

Andreas Schnyder (operations manager; has been working as an icemaker for 15 years):

Usually there can be tension (spider) cracks while placing the first few layers of ice, but with REALice that was not the case.

Daniel Weidmann (19 years as icemaker):

Very compact and hard artificial ice. Fewer gouges and blowouts after ice skaters and hockey players have been on the ice. We're also seeing fewer temperature fluctuations in the ideal ice temperature range from -3.5°C to -3.8°C (25.5°F to 25.1°F)

Evelyn Hürlimann (20 years as icemaker):

There is less snow produced and the ice seems to be more compact.

Rolf Frei (10 years as icemaker):

The ice shavings are more compact resulting in less volume. I also noticed that an ice temperature of -4.5°C (23.9°F) with REALice is far too low. That was easily seen when we were doing drill tests and drilling holes for the nets at the beginning, before we raised our temperatures higher. The shavings were just too brittle.

Thanasi Karasimos (Head of Technology; 11 years as icemaker):

The ice is denser, resulting in fewer gouges. Even the blowouts the figure skaters are making are less deep. The ice shavings are denser, too, so a larger ice surfacing machine can clean more ice per trip, as it takes longer for the snow tank to fill up. This is giving the ice makers more flexibility in ice cleaning. After the ice cleaning, it is obvious that the water cools and freezes faster, shortening the reaction times of the refrigeration plant.