LHEnergyInfo

More transparency, greater savings potential

Sustainability in gear production

LIEBHERR

Liebherr Verzahntechnik GmbH

Motivation – LHEnergyInfo

In a world where efficiency and sustainability determine a company's success, it is essential to keep a close eye on the consumption of energy, compressed air and cooling lubricants in your production.

Imagine if you could monitor, analyze and optimize all this data in real time - with just one app.

Welcome to

LHEnergyInfo - your new app for monitoring and optimizing machine tool consumption.

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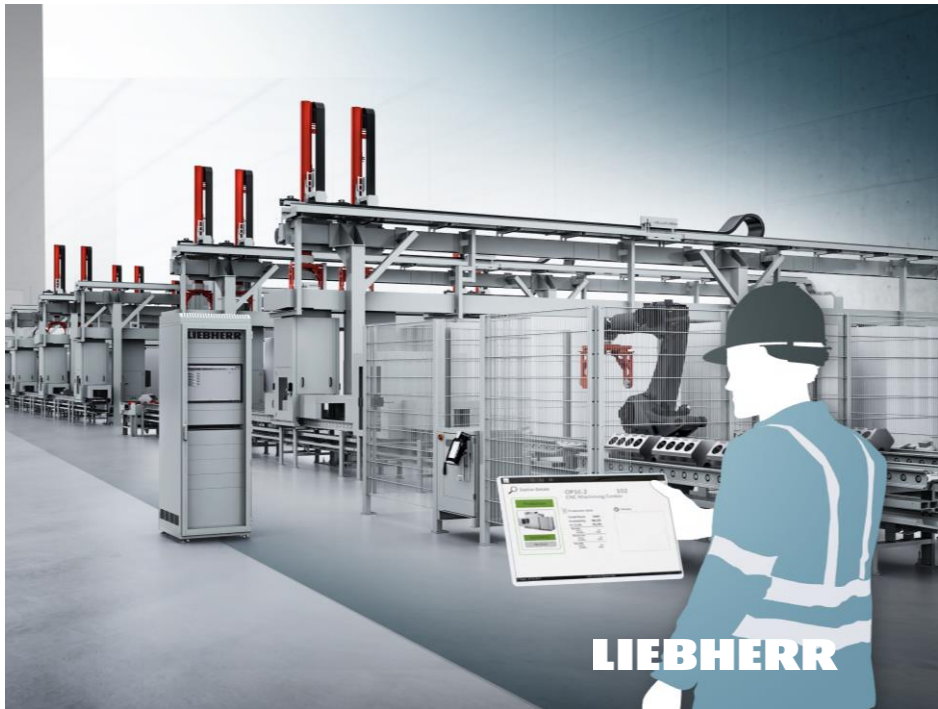
Challenges

In modern production facilities, machine tools are the heart of production.

However, high energy costs, inefficient compressed air consumption and the excessive use of cooling lubricants can drive up operating costs and impact sustainability.

Traditional methods don’t show very detailed information and therefore it’s not easy to win efficiency quickly. LHEnergyInfo shows its strength with the ability to visualize the context of data and to ensure the right actions.



LHEnergyInfo App

LHMachineInfo

Here you can check the live status of your machines at a glance. Observe changes in real time or analyze recorded measurement values. Define rules what the colors of the signal lamp mean to you.

LHSignalInfo

Analyze the recorded signals and export them e.g. to Excel taking into account all measuring points and their exact time stamp.

LHReportInfo

The dashboard displays the most important reports and updates them constantly. Improve your controlling by analyzing reports and statistics.

LHEnergyInfo

The app visualizes the energy consumption of the machine, such as electricity, air or cooling water. The energy costs are recorded per workpiece or as average values for all workpieces. This allows hourly rates to be calculated more precisely or CO2 equivalents to be determined for sustainability reports. Graphical evaluations of energy consumption over a period of time or shifts can be created.

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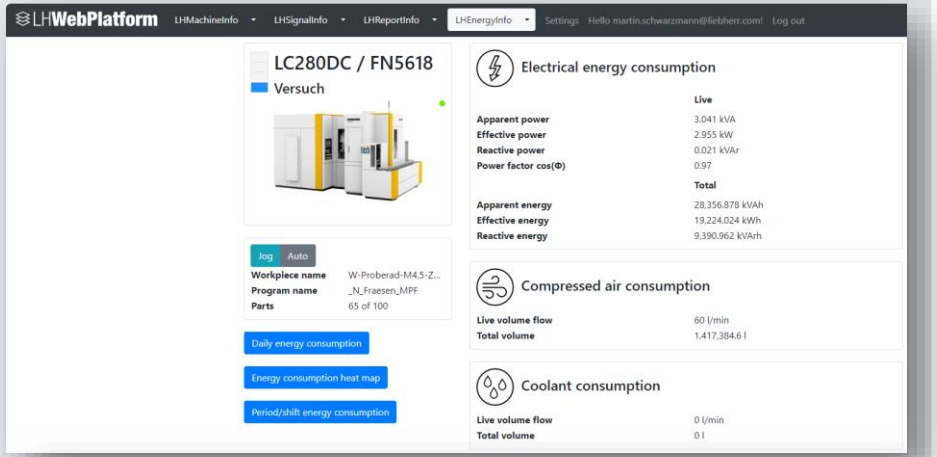

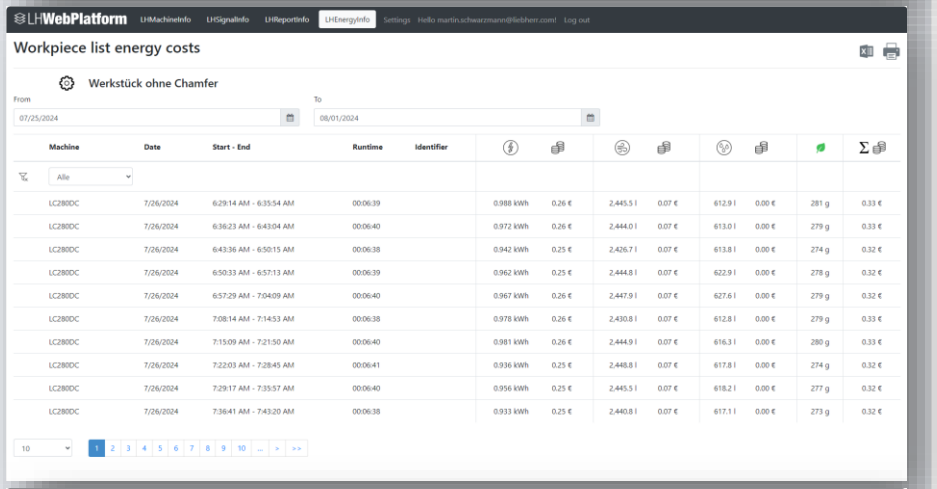

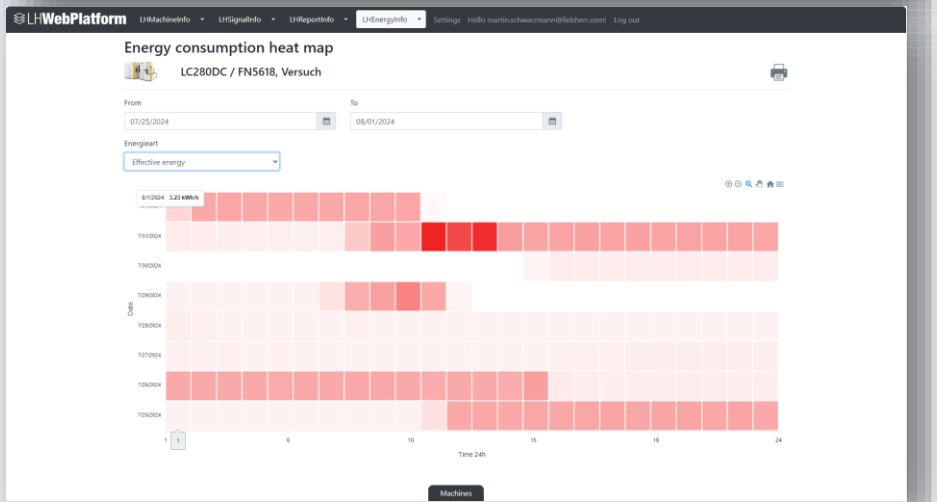

the solution is - LHEnergyInfo

LHEnergyInfo offers you a user-friendly platform that gives you detailed insights into the consumption of your machine tools.

With our app you can:

- Monitor energy consumption

  Get real-time data on each machine's power consumption and identify instant savings potential.

- Use compressed air efficiently

  Analyze compressed air consumption and identify leaks or inefficient use to reduce your compressed air costs.

- Optimize cooling lubricants

  Track the use of cooling lubricants and ensure that they are used efficiently and in an environmentally friendly way.

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Required Hardware

Various sensors are required for precise and transparent measurements, such as

Sensor for energy consumption

- SIEMENS SENTRON PAC 4220 – V-035926
- SIEMENS SENTRON PAC 4220 with Power factor correction – V-035947

Retooling of existing Machines, the sensors will be placed inside of the control cabinet

- SIEMENS SENTRON PAC 4220 – V-035984
- SIEMENS SENTRON PAC 4220 with Power factor correction – V-035983

The installation will be not on the control cabinet door !

Sensor for compressed air

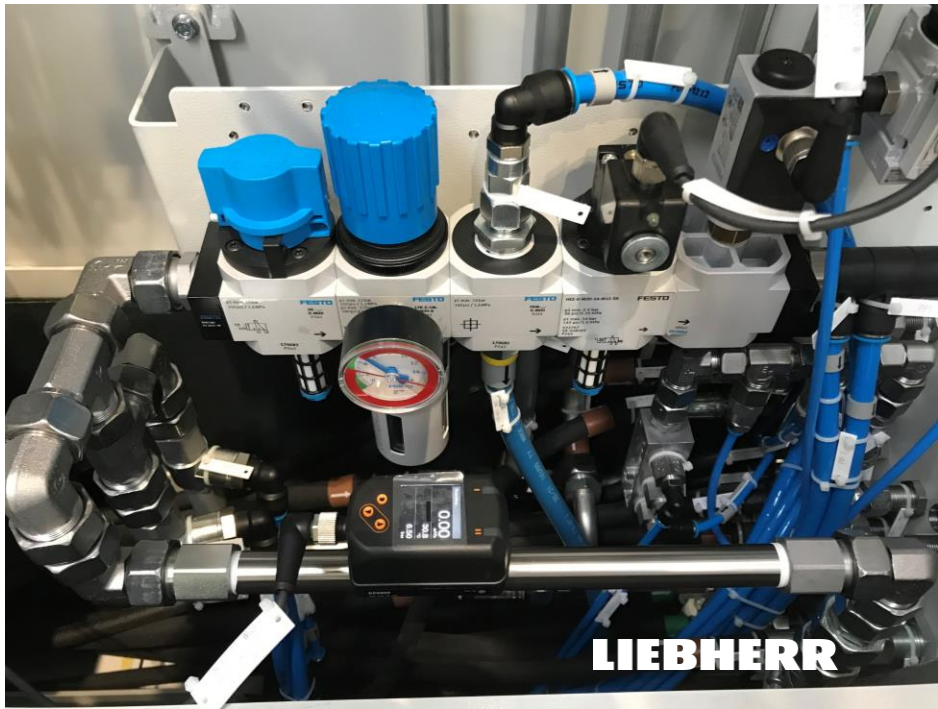
- The SD6500 (IFM brand) compressed air meter is used to monitor the compressed air consumption (V-035582)

Sensor for Coolant flow measurement

- Flow sensor SA5000 (IFM brand) (V-035583)

Picture Source: SA5000 - Flow sensor - ifm

Picture SourceSentron Pac 4220
https://mall.industry.siemens.com/mall/de/de/Catalog/Product/7KM4220-1BA01-1EA0



Advantages

- **Transparency and control:**

  By closely see the consumption of your machines in real time and at a glance. Our app offers intuitive dashboards and detailed reports to help you make informed decisions.

- **Cost reduction:**

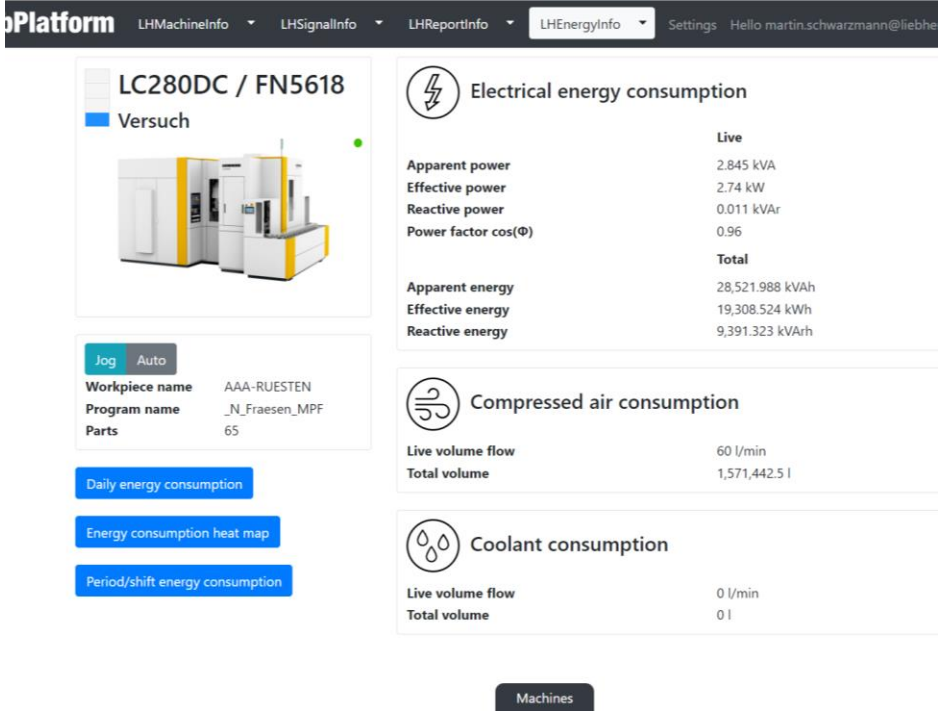
  monitoring and analyzing, you can quickly identify and eliminate inefficiencies. Reduce your energy costs, minimize compressed air consumption and optimize the use of cooling lubricants.

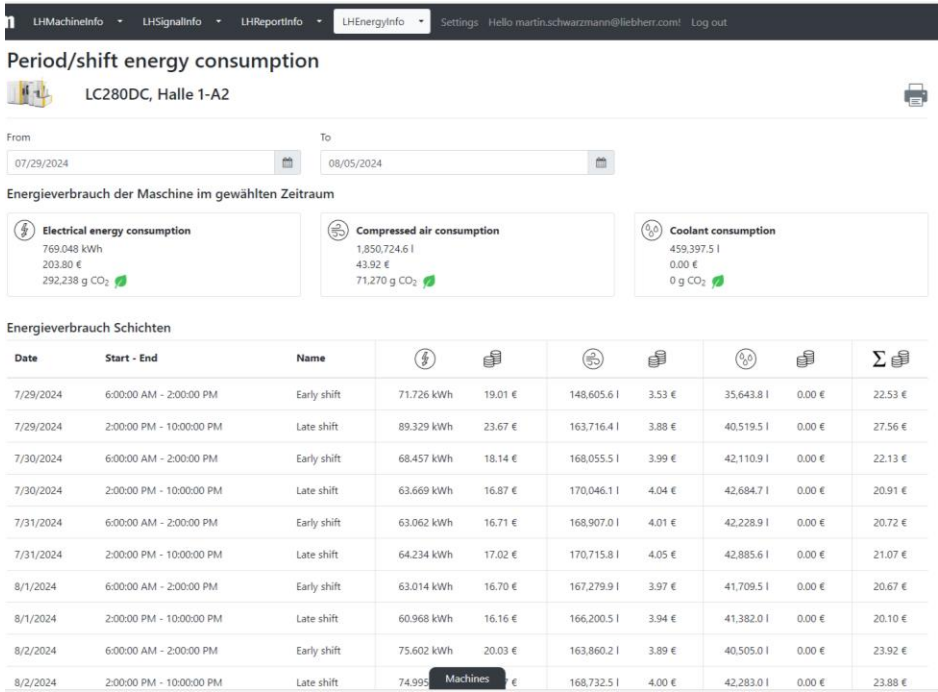
- **Sustainability:**

  Make an active contribution to environmental protection by reducing consumption in your production. Less energy consumption and more efficient use of resources mean a smaller ecological footprint.

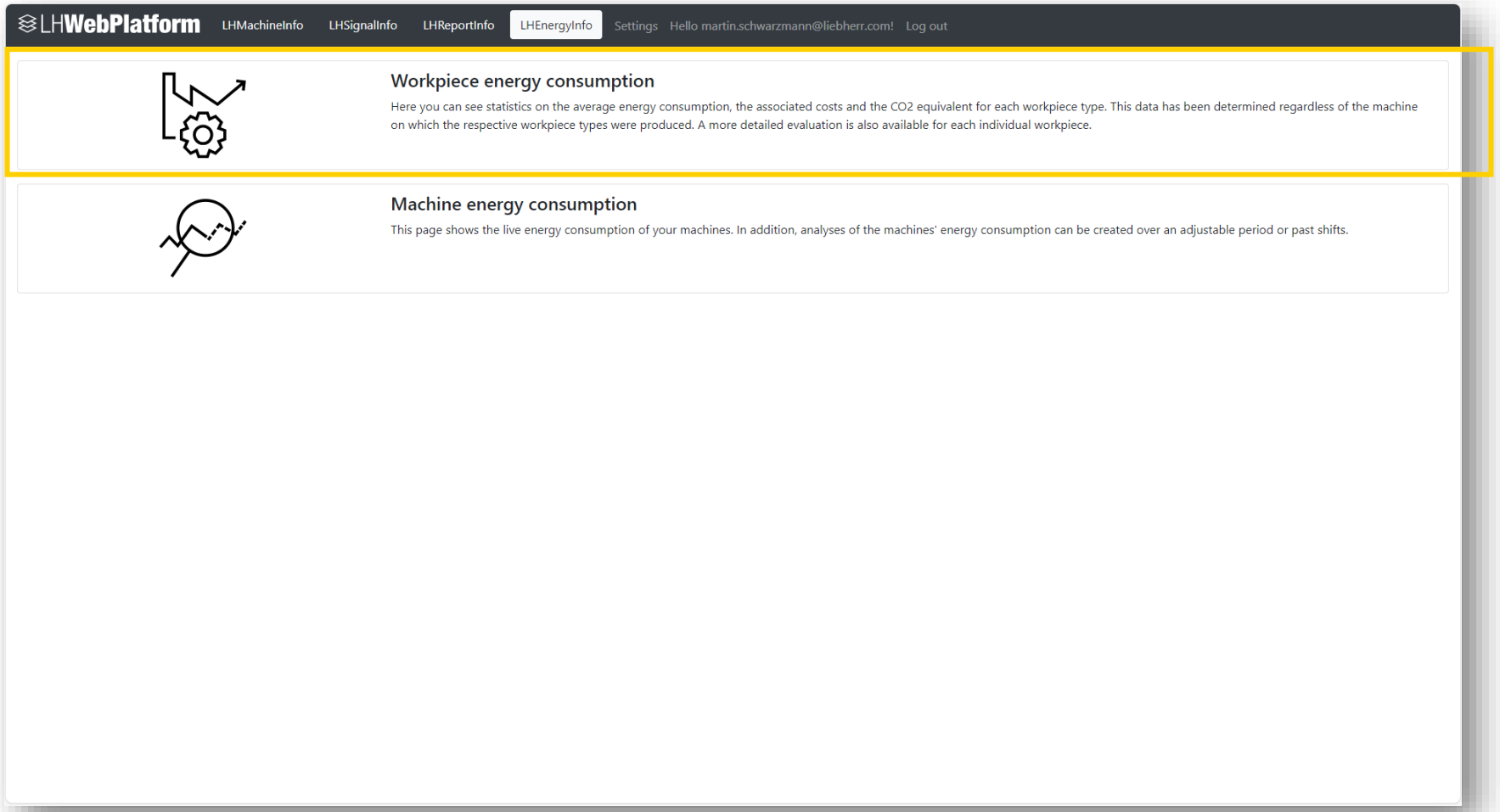
- **User-friendliness:**

  Our app is easy to install and use. No complicated technology, no long training sessions. You have immediate access to all important data.





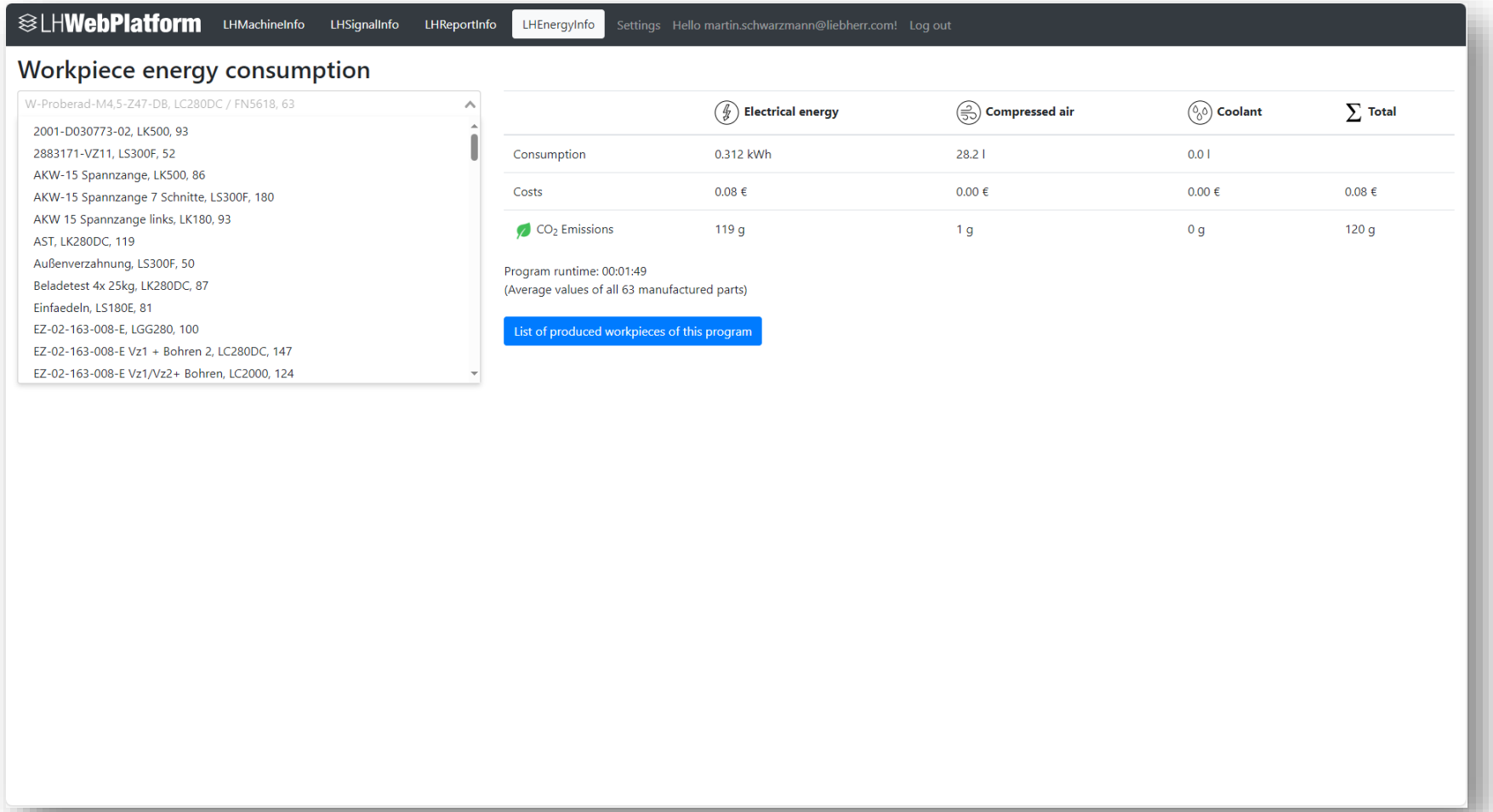
LHEnergyInfo – entry page



Choose between the following display options “workpiece energy consumption” or “machine energy consumption”

Impressions **workpiece energy consumption**

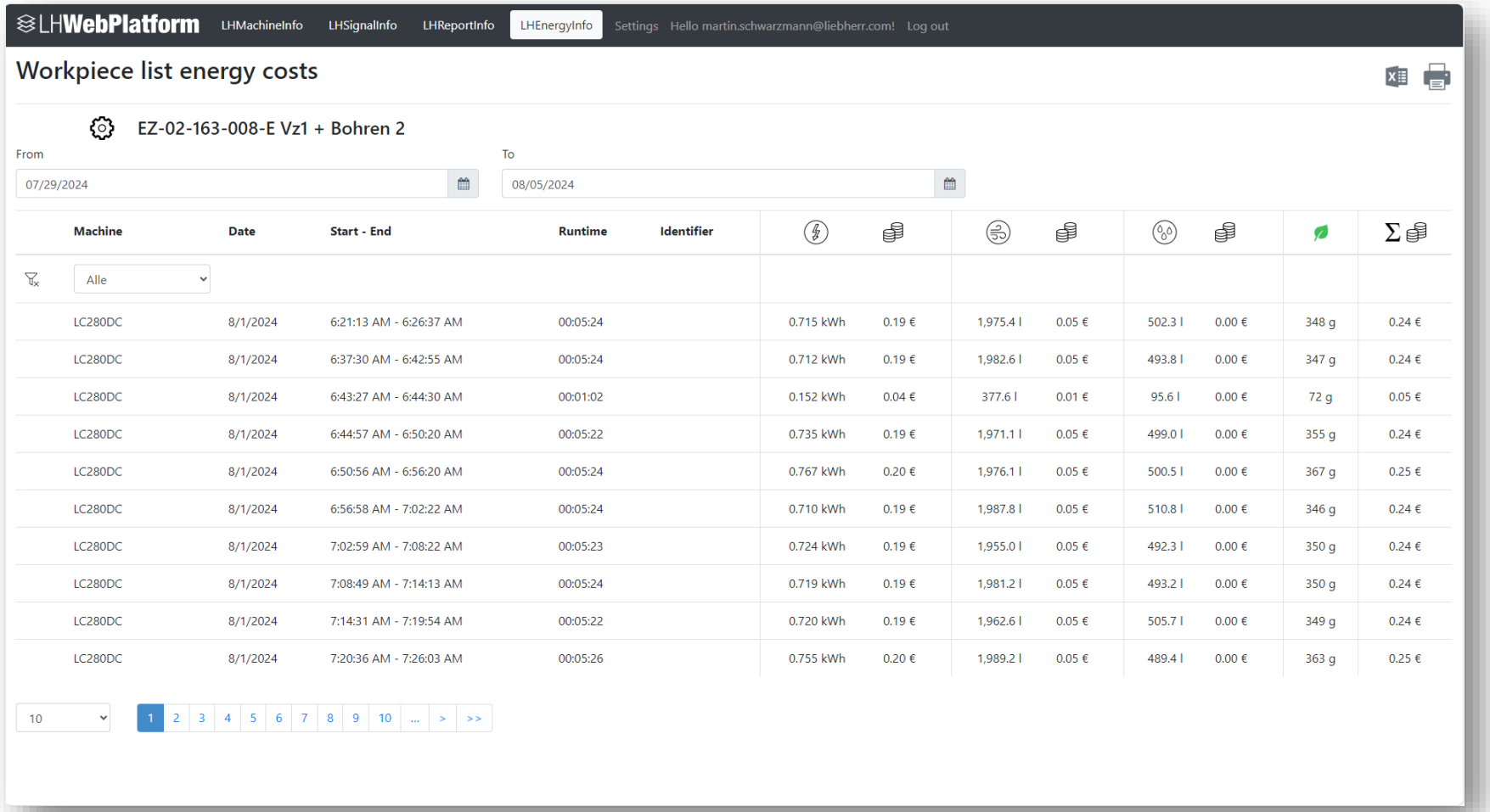
LHEnergyInfo



Select the respective workpiece which you want to analyze

Impressions **workpiece energy consumption**

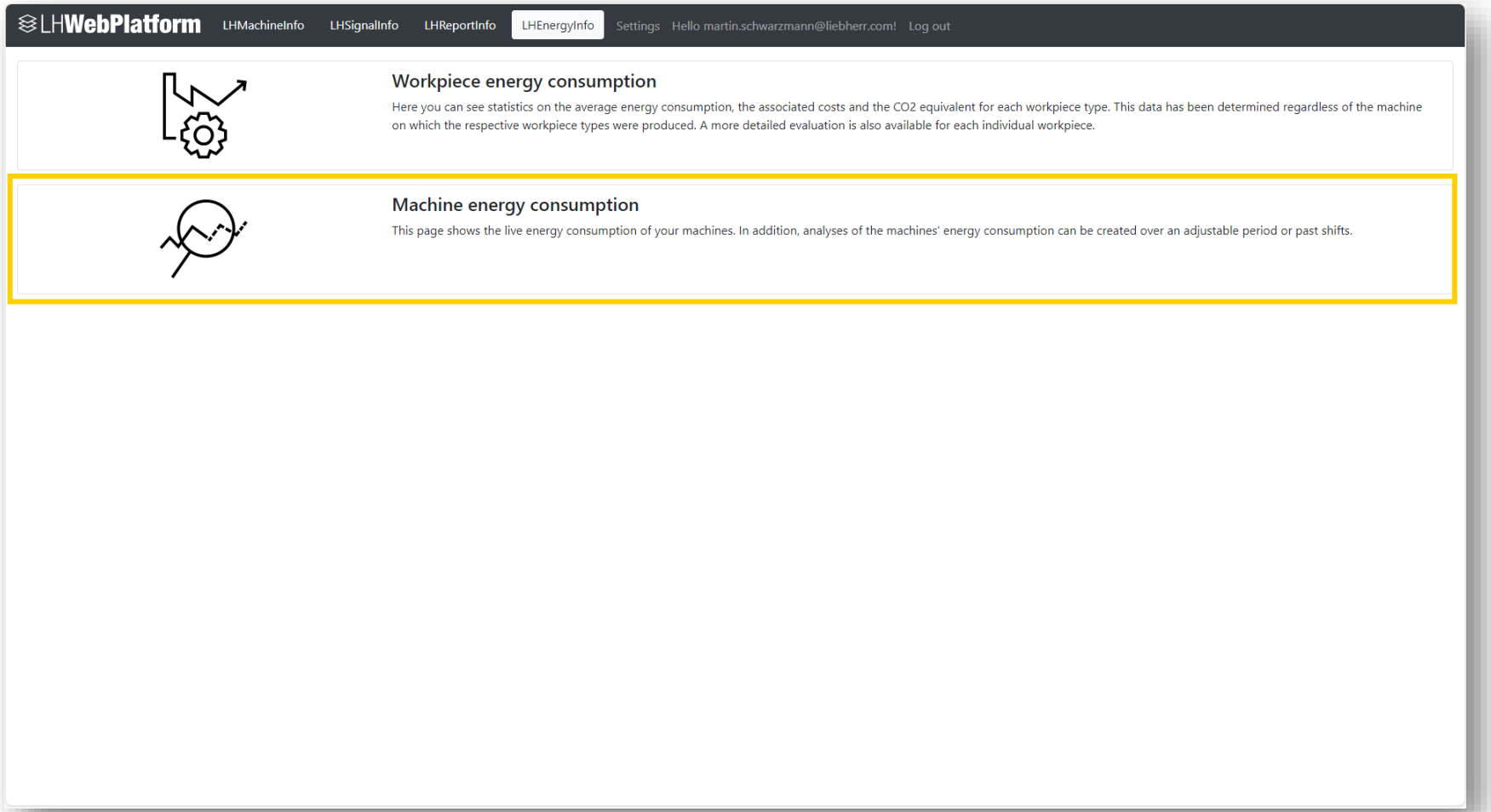
LHEnergyInfo – Workpiece list with energy costs



Machine	Date	Start - End	Runtime	Identifier							
Alle											
LC280DC	8/1/2024	6:21:13 AM - 6:26:37 AM	00:05:24		0.715 kWh	0.19 €	1,975.4 l	0.05 €	502.3 l	0.00 €	348 g	0.24 €
LC280DC	8/1/2024	6:37:30 AM - 6:42:55 AM	00:05:24		0.712 kWh	0.19 €	1,982.6 l	0.05 €	493.8 l	0.00 €	347 g	0.24 €
LC280DC	8/1/2024	6:43:27 AM - 6:44:30 AM	00:01:02		0.152 kWh	0.04 €	377.6 l	0.01 €	95.6 l	0.00 €	72 g	0.05 €
LC280DC	8/1/2024	6:44:57 AM - 6:50:20 AM	00:05:22		0.735 kWh	0.19 €	1,971.1 l	0.05 €	499.0 l	0.00 €	355 g	0.24 €
LC280DC	8/1/2024	6:50:56 AM - 6:56:20 AM	00:05:24		0.767 kWh	0.20 €	1,976.1 l	0.05 €	500.5 l	0.00 €	367 g	0.25 €
LC280DC	8/1/2024	6:56:58 AM - 7:02:22 AM	00:05:24		0.710 kWh	0.19 €	1,987.8 l	0.05 €	510.8 l	0.00 €	346 g	0.24 €
LC280DC	8/1/2024	7:02:59 AM - 7:08:22 AM	00:05:23		0.724 kWh	0.19 €	1,955.0 l	0.05 €	492.3 l	0.00 €	350 g	0.24 €
LC280DC	8/1/2024	7:08:49 AM - 7:14:13 AM	00:05:24		0.719 kWh	0.19 €	1,981.2 l	0.05 €	493.2 l	0.00 €	350 g	0.24 €
LC280DC	8/1/2024	7:14:31 AM - 7:19:54 AM	00:05:22		0.720 kWh	0.19 €	1,962.6 l	0.05 €	505.7 l	0.00 €	349 g	0.24 €
LC280DC	8/1/2024	7:20:36 AM - 7:26:03 AM	00:05:26		0.755 kWh	0.20 €	1,989.2 l	0.05 €	489.4 l	0.00 €	363 g	0.25 €

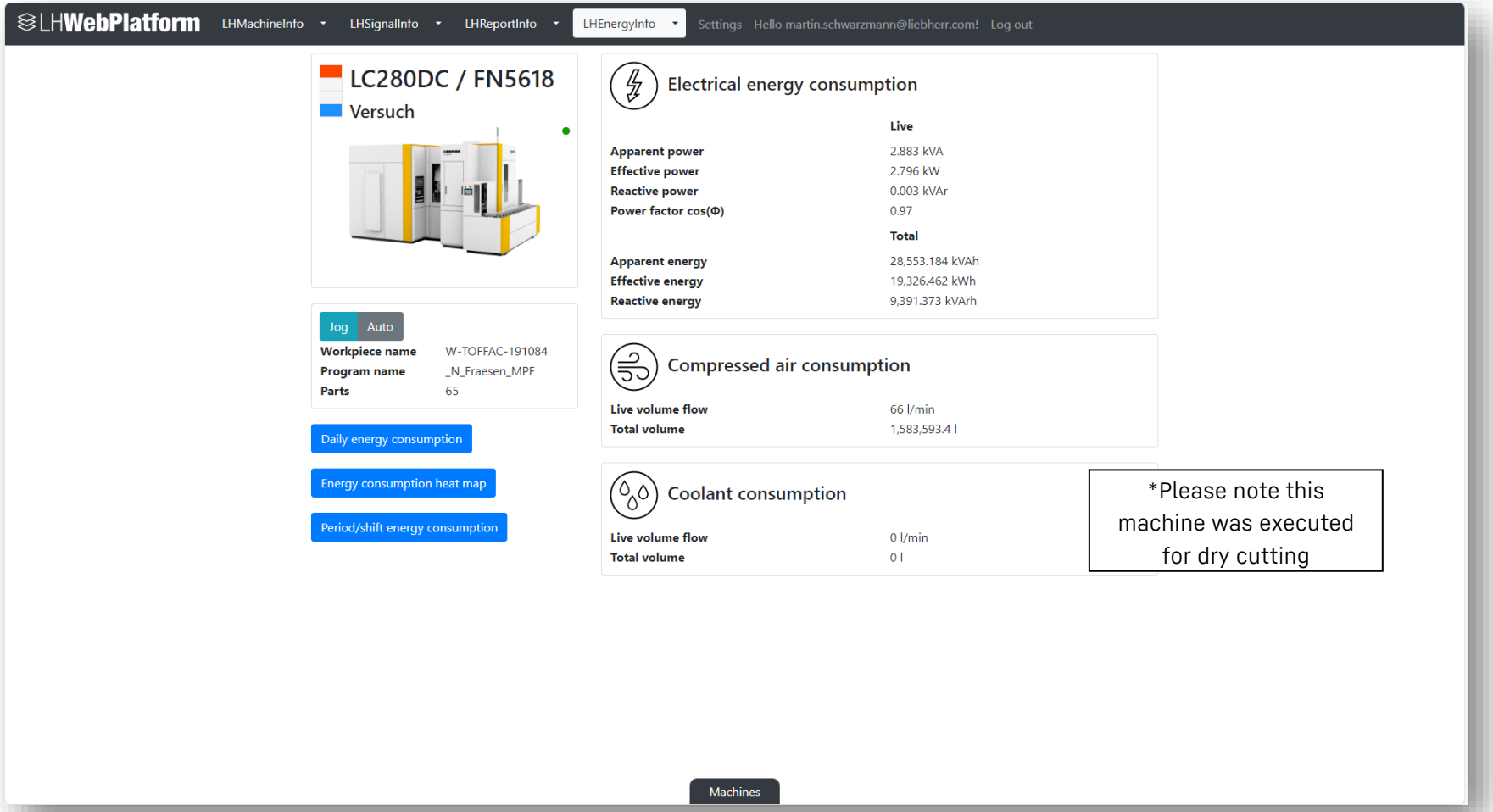
You can see in detail the consumption and costs per workpiece at a glance.

LHEnergyInfo – entry page



Choose between the following display options “workpiece energy consumption” or “machine energy consumption”

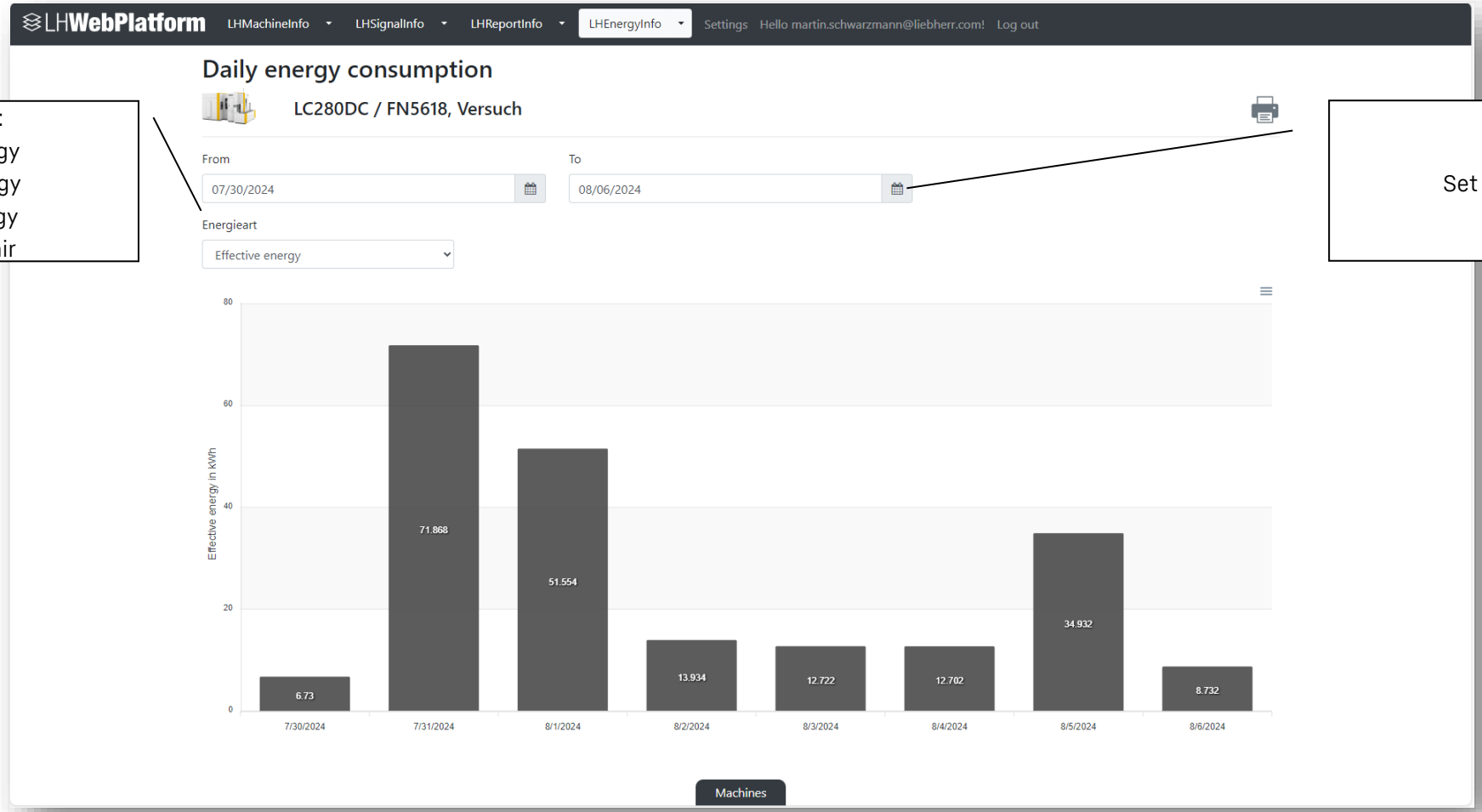
LHEnergyInfo – Machine Energy Consumption



see the live consumption and the total consumption at a glance

LHEnergyInfo – Daily Consumption

Select between:
- Effective energy
- Apparent energy
- Reactive energy
- Compressed air



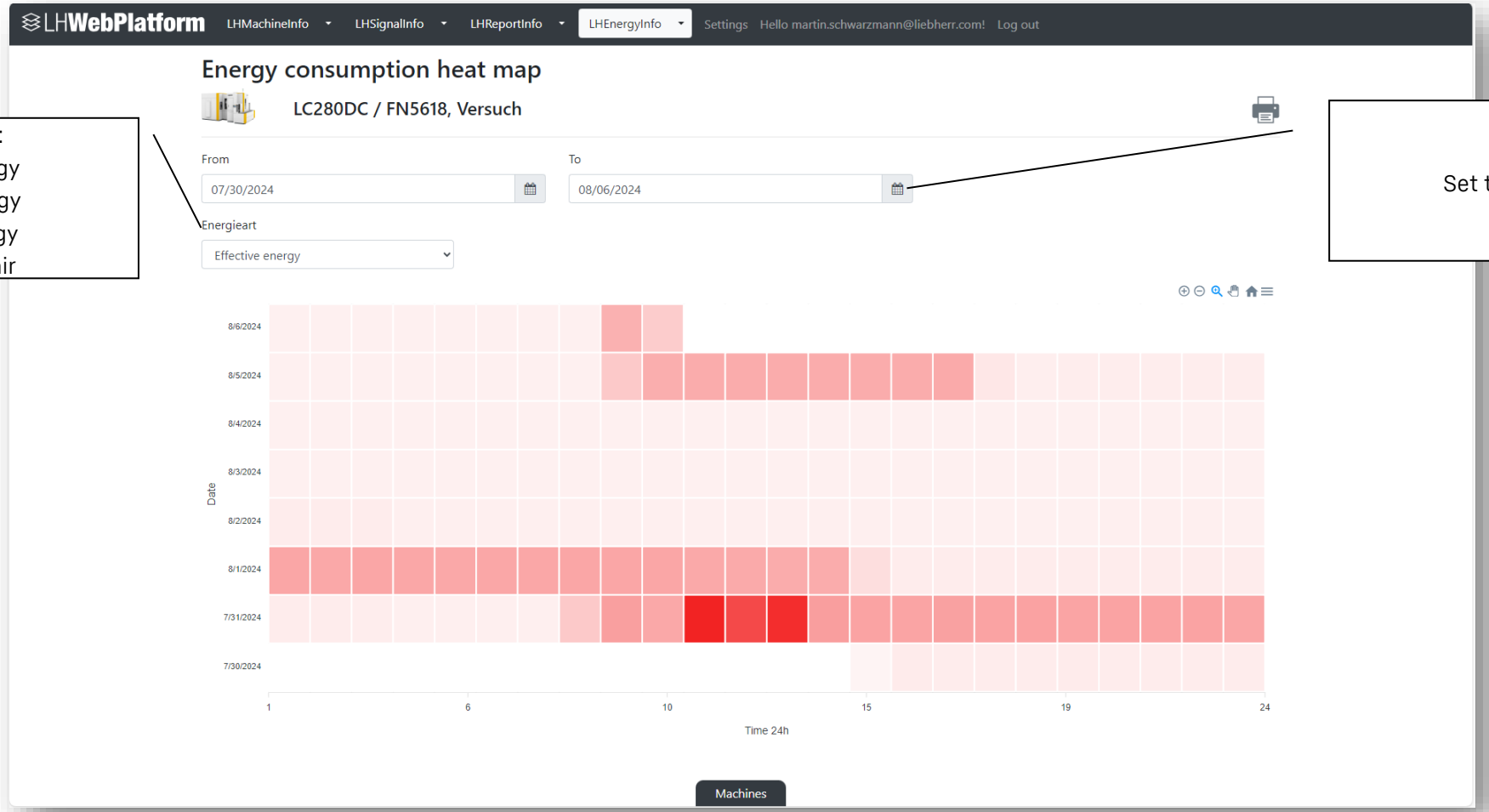
Set the time periods

see the consumption for a specific period what you select

Impressions

LHEnergyInfo – Consumption heat map

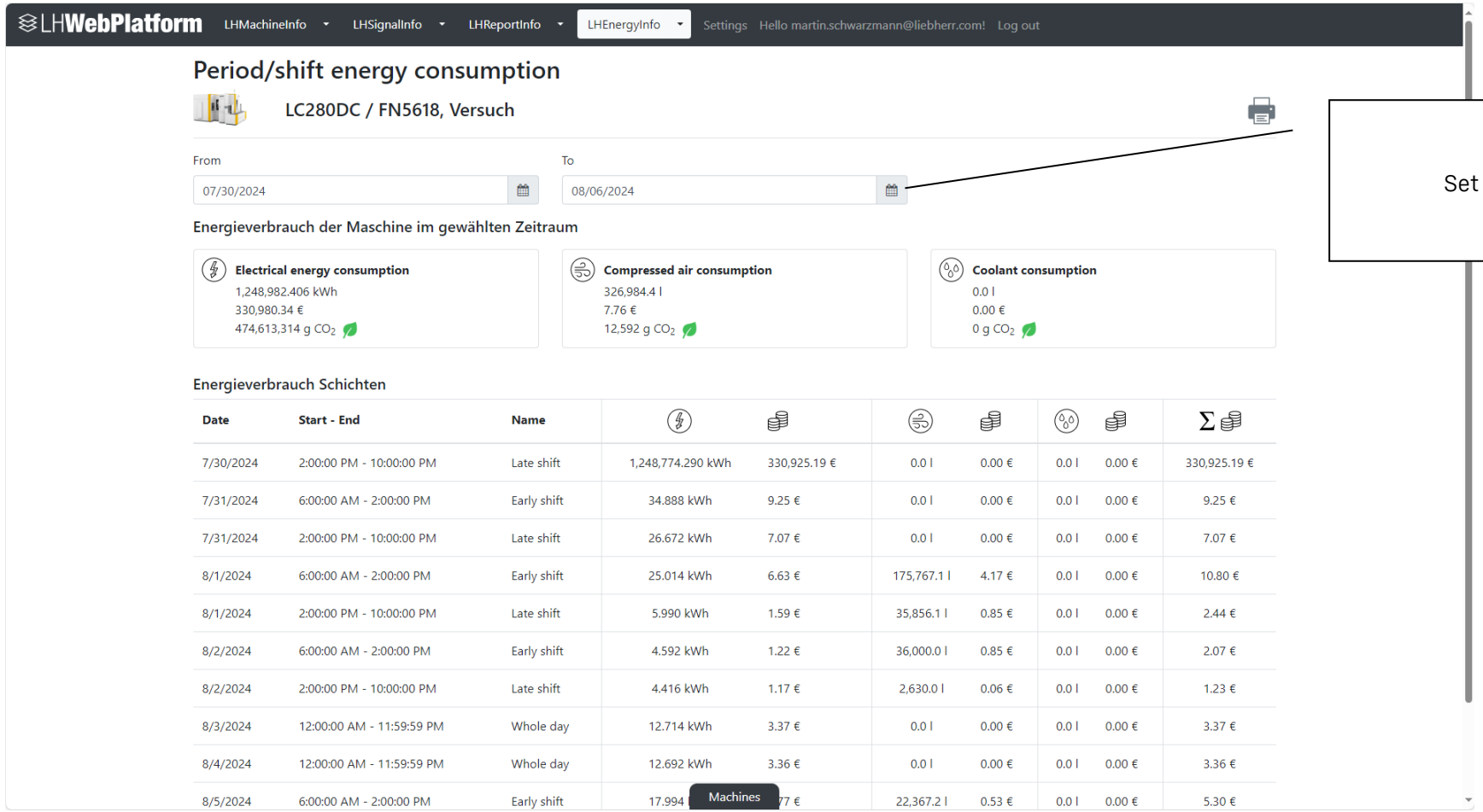
Select between:
- Effective energy
- Apparent energy
- Reactive energy
- Compressed air



Set the time periods

see the consumption for a specific period visualized with a heat map

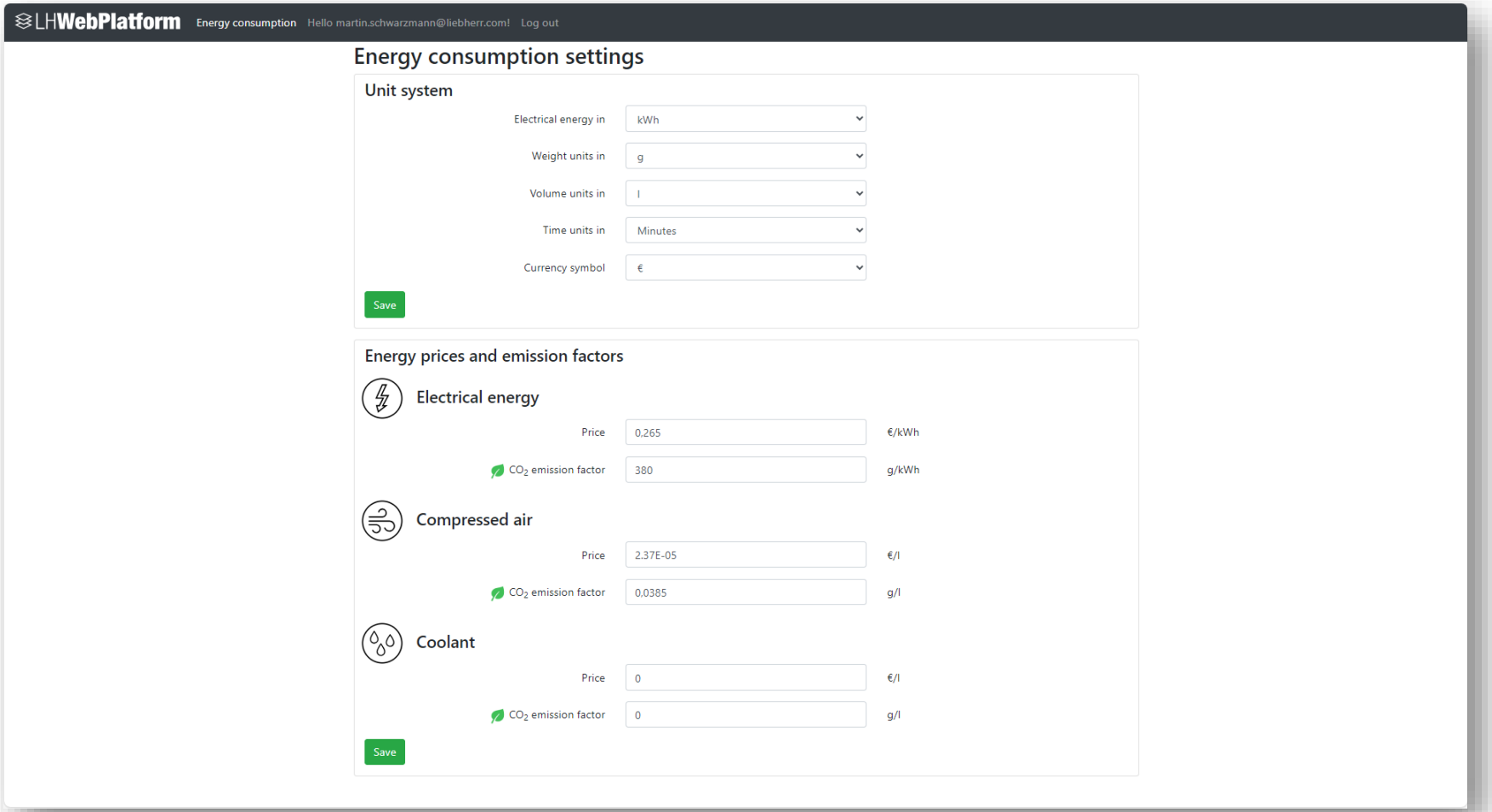
LHEnergyInfo – Period / shift energy consumption



Set the time periods

see the consumption for shift comparison

LHEnergyInfo – settings



Simple settings of “Unit systems” – Prices for Energy, Compressed Air & Coolant

Deliberately induced compressed air leakage

Compressed air leakage as example

A hole with a diameter of 1 mm was deliberately made

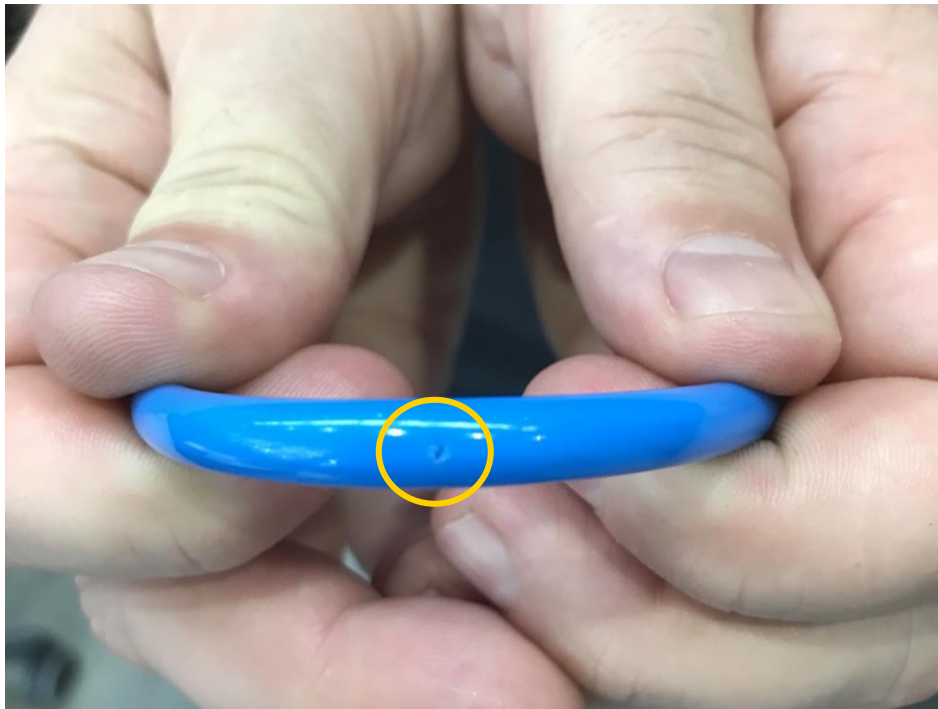
The consumption per minute increased from 60 l/min to 72 l/min

Sample calculation:

$$\frac{additional\ consumption\ l\ per\ \min * \ 60\ \min * \ 24\ h * \ 365\ days/year}{\frac{1000\ l}{m3}} * \frac{0{,}023\ €}{m^3}$$

$$\frac{12\ \frac{l}{min} * 60\ \min \quad * 24\ h * 365\ days/year}{\frac{1000\ l}{m3}} * \frac{0{,}023\ €}{m^3} =$$

$6.307{,}2\ m^3 * 0{,}023\ \frac{€}{m^3}$ = **145,07 € per year**



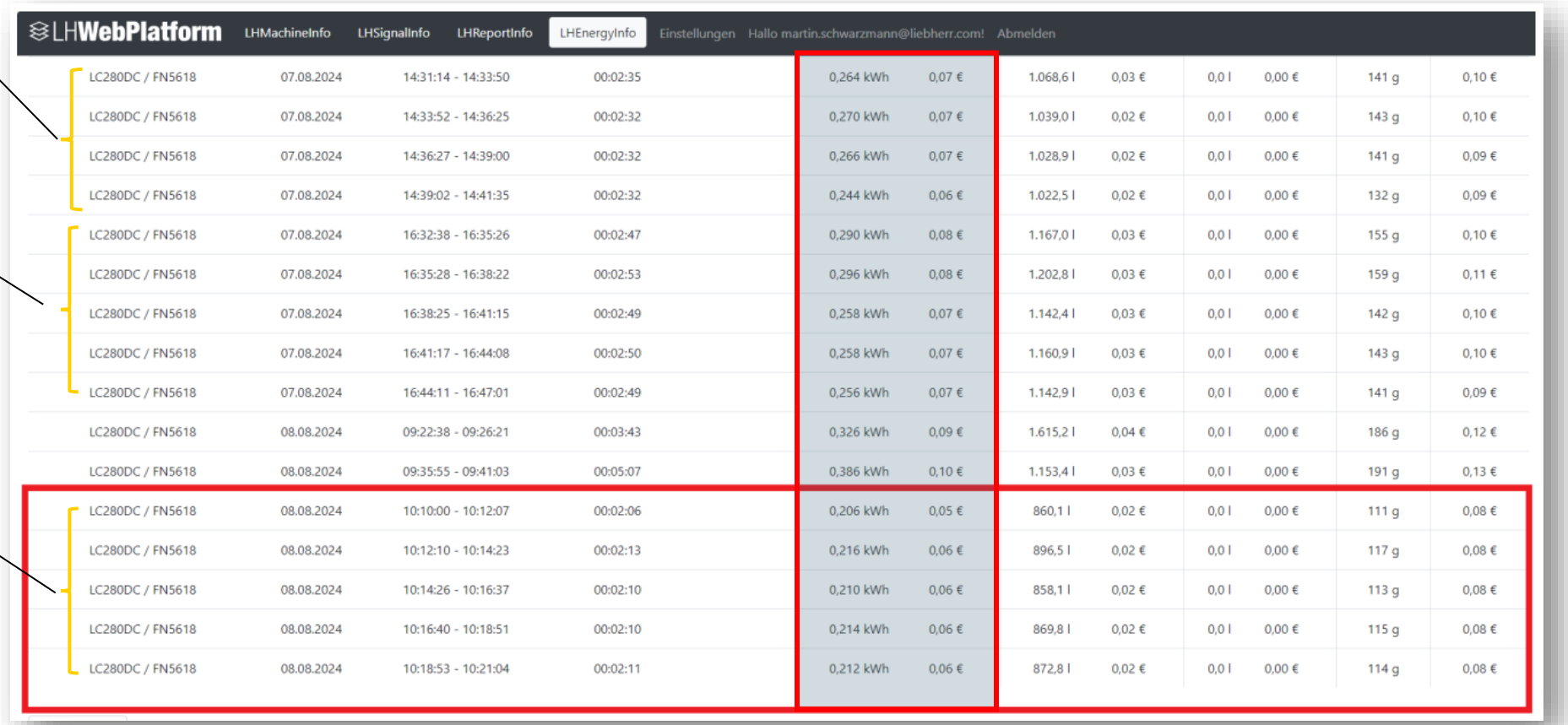
Use Case with process optimization

Energy saving potential by process optimization!

Serie A
Axial Feed fa = 3mm/WR

Serie B
Axial Feed fa = 2,4 mm/WR

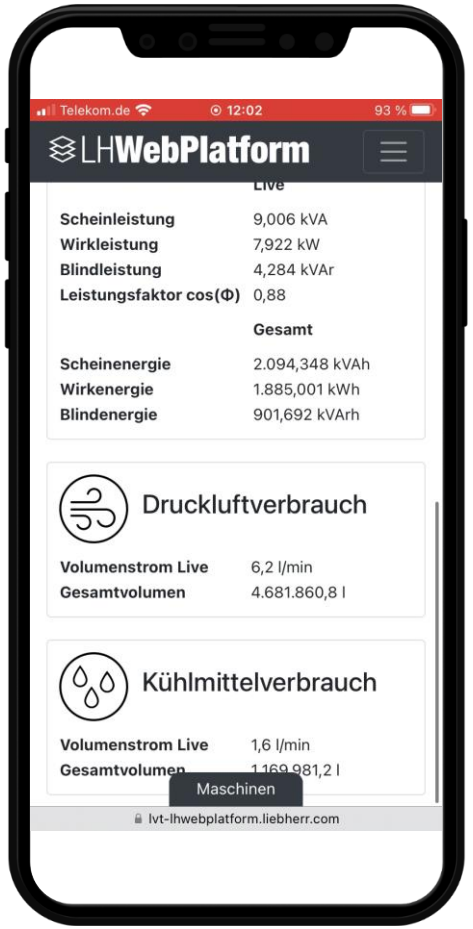
Serie C
Axial Feed fa = 4,5 mm/WR



LC280DC / FN5618	07.08.2024	14:31:14 - 14:33:50	00:02:35	0,264 kWh	0,07 €	1.068,6 l	0,03 €	0,0 l	0,00 €	141 g	0,10 €
LC280DC / FN5618	07.08.2024	14:33:52 - 14:36:25	00:02:32	0,270 kWh	0,07 €	1.039,0 l	0,02 €	0,0 l	0,00 €	143 g	0,10 €
LC280DC / FN5618	07.08.2024	14:36:27 - 14:39:00	00:02:32	0,266 kWh	0,07 €	1.028,9 l	0,02 €	0,0 l	0,00 €	141 g	0,09 €
LC280DC / FN5618	07.08.2024	14:39:02 - 14:41:35	00:02:32	0,244 kWh	0,06 €	1.022,5 l	0,02 €	0,0 l	0,00 €	132 g	0,09 €
LC280DC / FN5618	07.08.2024	16:32:38 - 16:35:26	00:02:47	0,290 kWh	0,08 €	1.167,0 l	0,03 €	0,0 l	0,00 €	155 g	0,10 €
LC280DC / FN5618	07.08.2024	16:35:28 - 16:38:22	00:02:53	0,296 kWh	0,08 €	1.202,8 l	0,03 €	0,0 l	0,00 €	159 g	0,11 €
LC280DC / FN5618	07.08.2024	16:38:25 - 16:41:15	00:02:49	0,258 kWh	0,07 €	1.142,4 l	0,03 €	0,0 l	0,00 €	142 g	0,10 €
LC280DC / FN5618	07.08.2024	16:41:17 - 16:44:08	00:02:50	0,258 kWh	0,07 €	1.160,9 l	0,03 €	0,0 l	0,00 €	143 g	0,10 €
LC280DC / FN5618	07.08.2024	16:44:11 - 16:47:01	00:02:49	0,256 kWh	0,07 €	1.142,9 l	0,03 €	0,0 l	0,00 €	141 g	0,09 €
LC280DC / FN5618	08.08.2024	09:22:38 - 09:26:21	00:03:43	0,326 kWh	0,09 €	1.615,2 l	0,04 €	0,0 l	0,00 €	186 g	0,12 €
LC280DC / FN5618	08.08.2024	09:35:55 - 09:41:03	00:05:07	0,386 kWh	0,10 €	1.153,4 l	0,03 €	0,0 l	0,00 €	191 g	0,13 €
LC280DC / FN5618	08.08.2024	10:10:00 - 10:12:07	00:02:06	0,206 kWh	0,05 €	860,1 l	0,02 €	0,0 l	0,00 €	111 g	0,08 €
LC280DC / FN5618	08.08.2024	10:12:10 - 10:14:23	00:02:13	0,216 kWh	0,06 €	896,5 l	0,02 €	0,0 l	0,00 €	117 g	0,08 €
LC280DC / FN5618	08.08.2024	10:14:26 - 10:16:37	00:02:10	0,210 kWh	0,06 €	858,1 l	0,02 €	0,0 l	0,00 €	113 g	0,08 €
LC280DC / FN5618	08.08.2024	10:16:40 - 10:18:51	00:02:10	0,214 kWh	0,06 €	869,8 l	0,02 €	0,0 l	0,00 €	115 g	0,08 €
LC280DC / FN5618	08.08.2024	10:18:53 - 10:21:04	00:02:11	0,212 kWh	0,06 €	872,8 l	0,02 €	0,0 l	0,00 €	114 g	0,08 €

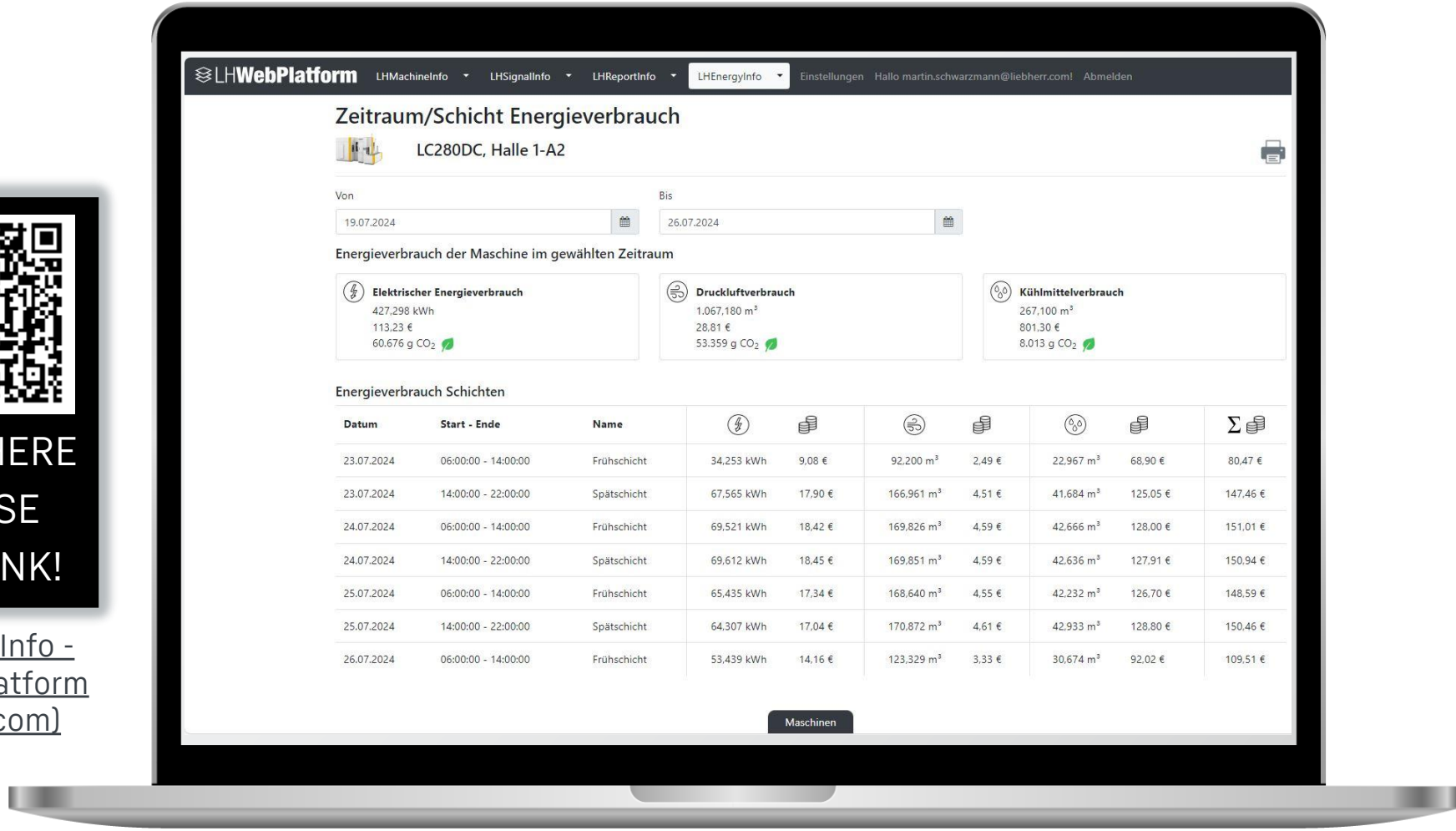
In the C series, ~ 1-2 cents of energy could be saved per workpiece - with 1,000,000 workpieces per year, this corresponds to €10,000 saving potential!

LHEnergyInfo – Convince yourself in our Demo Version!

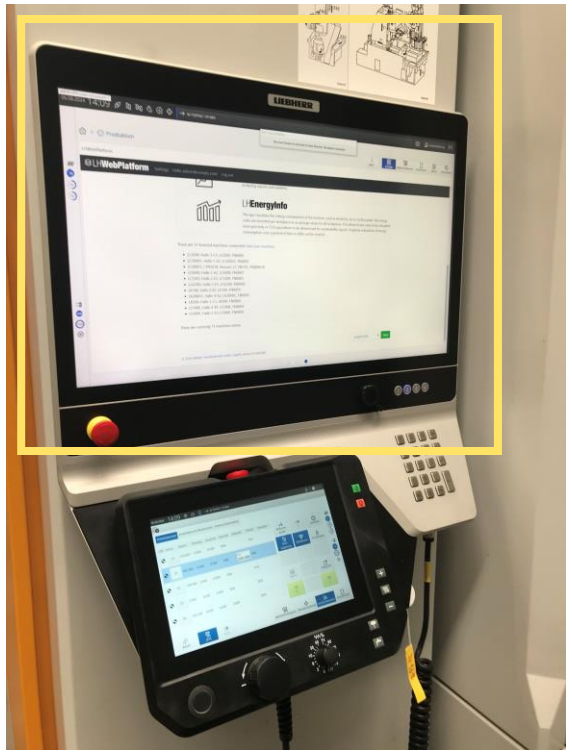


SCAN HERE OR USE WEBLINK!

[LHEnergyInfo - LHWebPlatform (liebherr.com)]

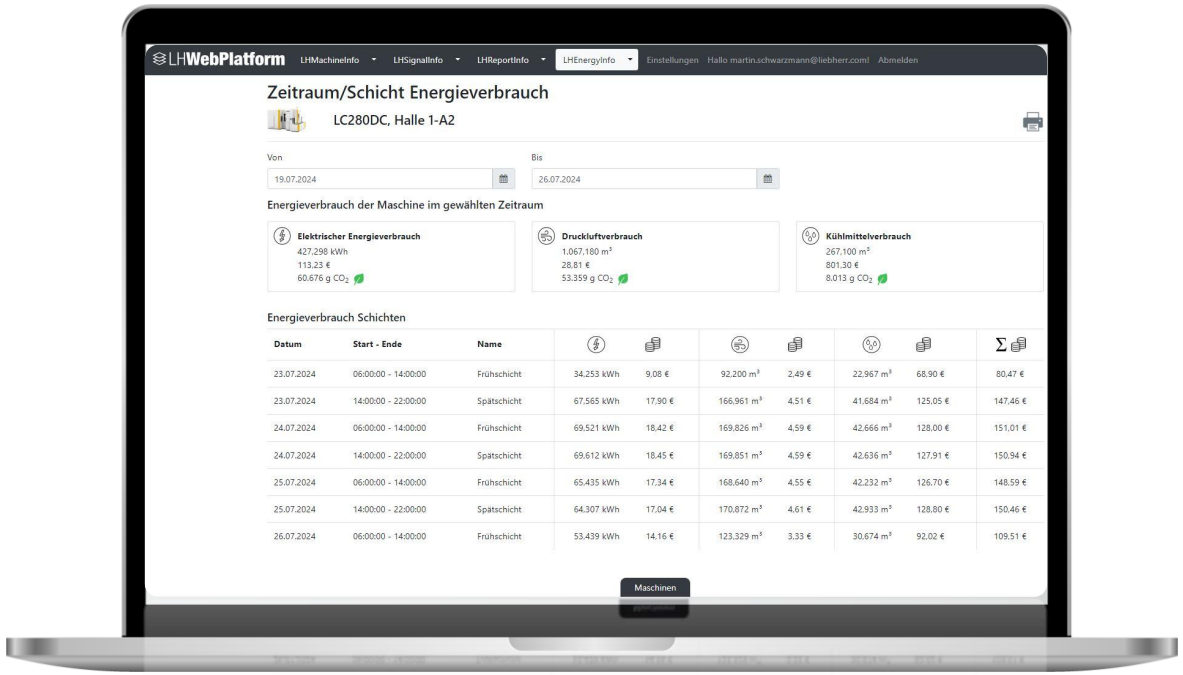


LHEnergyInfo can be displayed

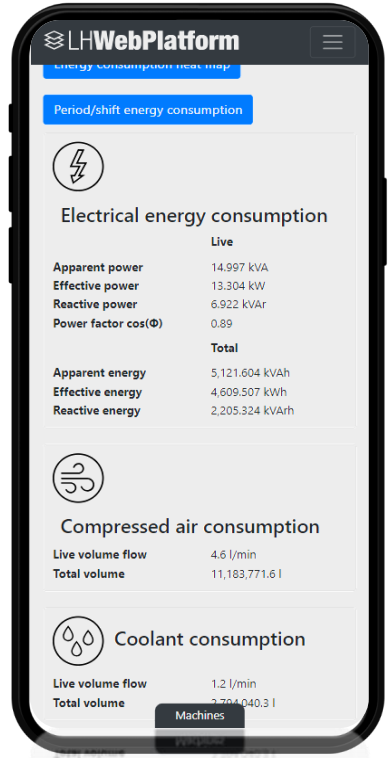


– Machine Control

LHStation & LHMobile



– Desktop devices



– Mobile devices

Thank you

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