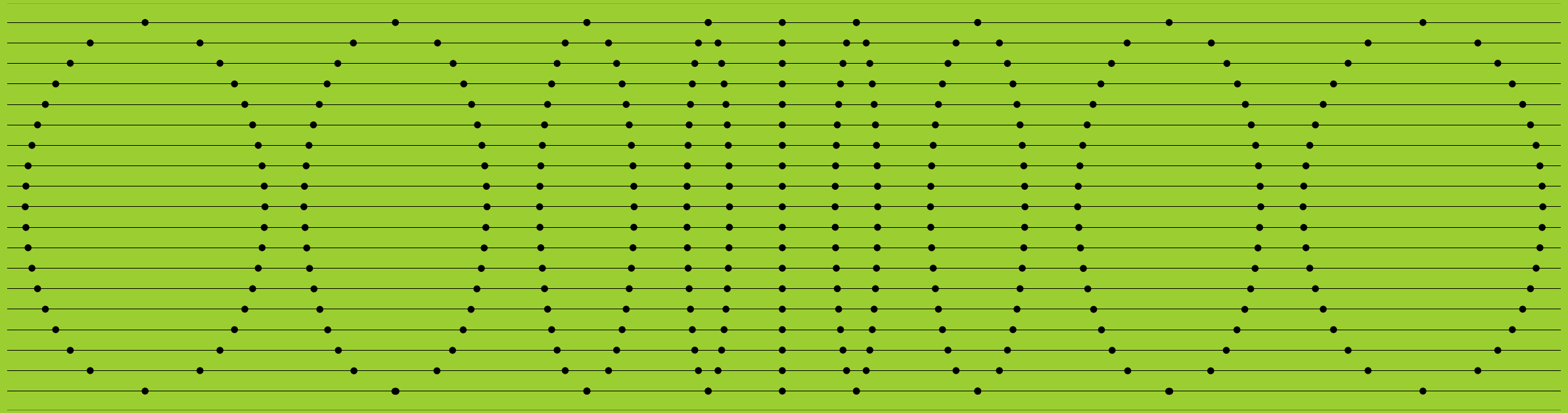
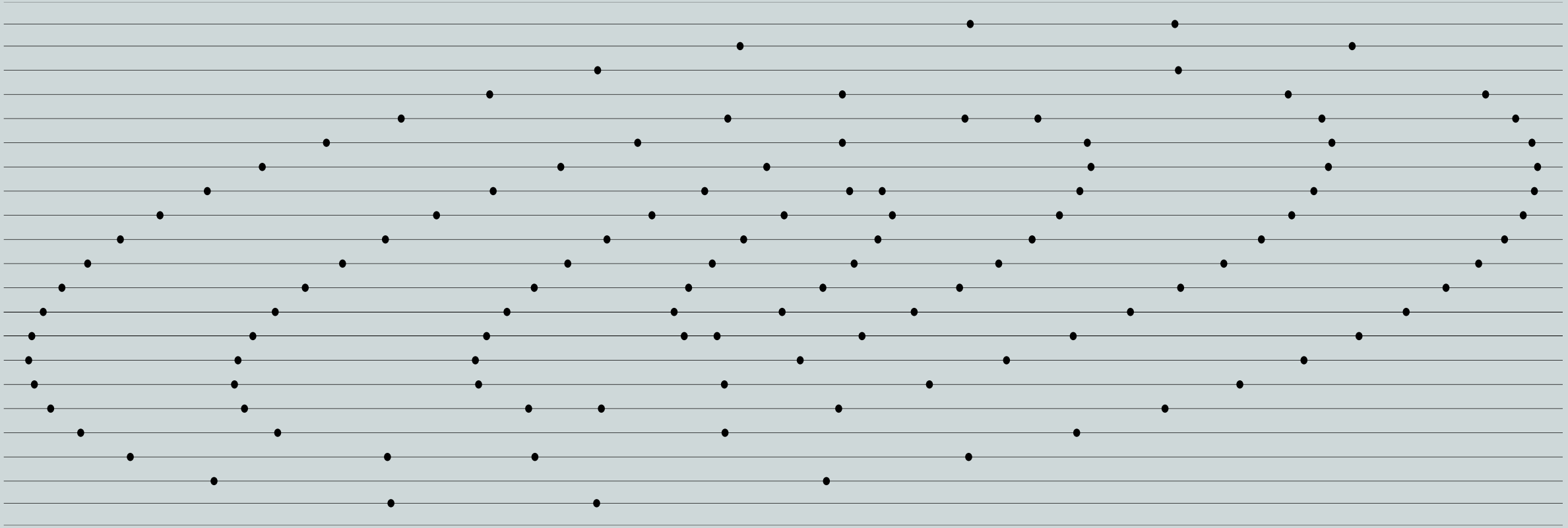
DWEEN Boiler

+37063516380
info@energyadvice.lt
dween.com



Technological Process Perfection for Biomass Power Plant

DWEEN Boiler



01 Basic Package

Basic Package

01 Boiler System Data Collection Module

Installation and configuration of data collection equipment Dween Data Hub in the client-specific environment.

Real-time collection of boiler technological parameters from the existing system.

Real-time data are stored for one calendar year.

02 Data Visualization Module

Data visualized in separate Dween Dashboard sections.

Data visualized in SCADA components representing the client's physical system, graphs, charts,

Data visualization is freely configurable and can be customized according to each Client's needs.

Possible Dween Dashboard access rights configuration for individual users.

03 Boiler Energy Balance Calculation in Real-Time Module

Calculation of primary air mass flow.

Calculation of secondary air mass flow.

Calculation of recirculating mass flow.

Calculation of smoke mass flow into the chimney.

Mass balance.

Energy balance.

Calculation of fuel supply rate and layer.

Calculation of the secondary and primary air ratio.

04 Control Module

Calculated optimal control recommendations (Set Points) provided to the operator via Dween Dashboard or email.

Recommendations are tailored for every hour of boiler operation according to required control parameters.

05 Reporting Module

Calculation and visualization of daily/weekly/monthly indicators:

- Boiler efficiency, %
- Economizer efficiency, %
- System efficiency, %
- Biomass consumption in MWh and tons
- Cost of energy production in Eur/MWh and Eur/toe
- Electricity consumption, kWh/MWh thermal
- Energy prime cost, toe/MWh
- Biomass calorific value MJ/and water content %
- Excess air coefficient variation over time, %

Preparation of a user interface for entering biomass and electricity prices.

Reports with boiler efficiency indicators are sent to responsible individuals daily, weekly, monthly.

The format of reports is easily configurable and can be adapted according to each client's needs.

Reports are sent to easily configurable email addresses.

Reports are stored in the database for six months.

06 Notifications Module

Operators receive notifications via email or SMS with an action prompt as soon as a deviation is detected.

Deviations are freely configurable and can be customized according to each Client's needs.

07 Boiler Flue Gas Heat Exchanger Cleaning Recommendations

An algorithm is prepared that calculates the efficiency of the boiler flue gas heat exchangers' heat transfer.

Results are presented in a separate Dween Dashboard.

Results are continuously monitored, and staff are informed about the need for cleaning when the heat transfer efficiency falls below the set threshold.

Prediction of cleaning needs.

Basic Package

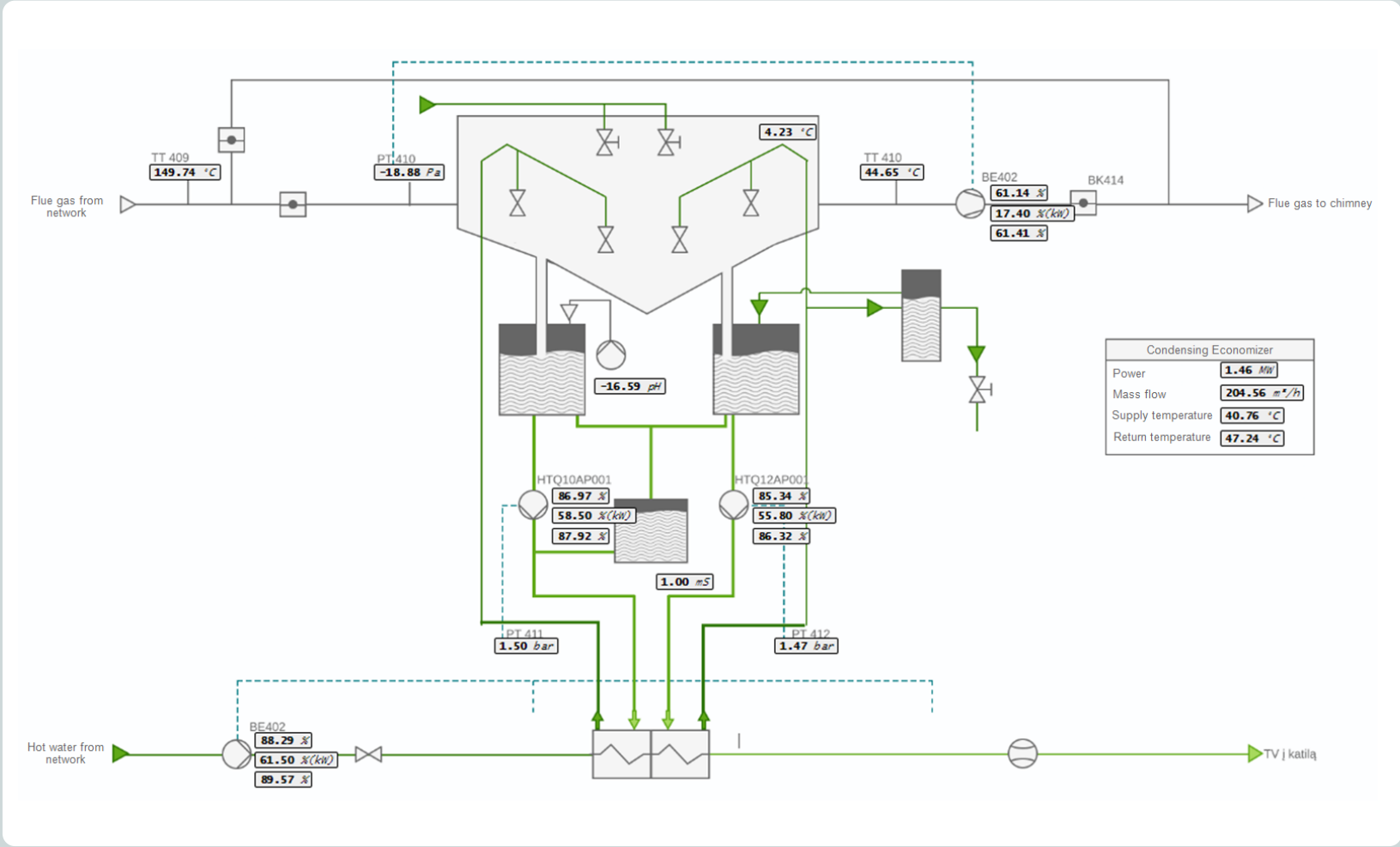
01

Boiler System Data Collection Module

Installation and configuration of data collection equipment Dween Data Hub in the client-specific environment.

Real-time collection of boiler technological parameters from the existing system.

Real-time data are stored for one calendar year.



Basic Package

02

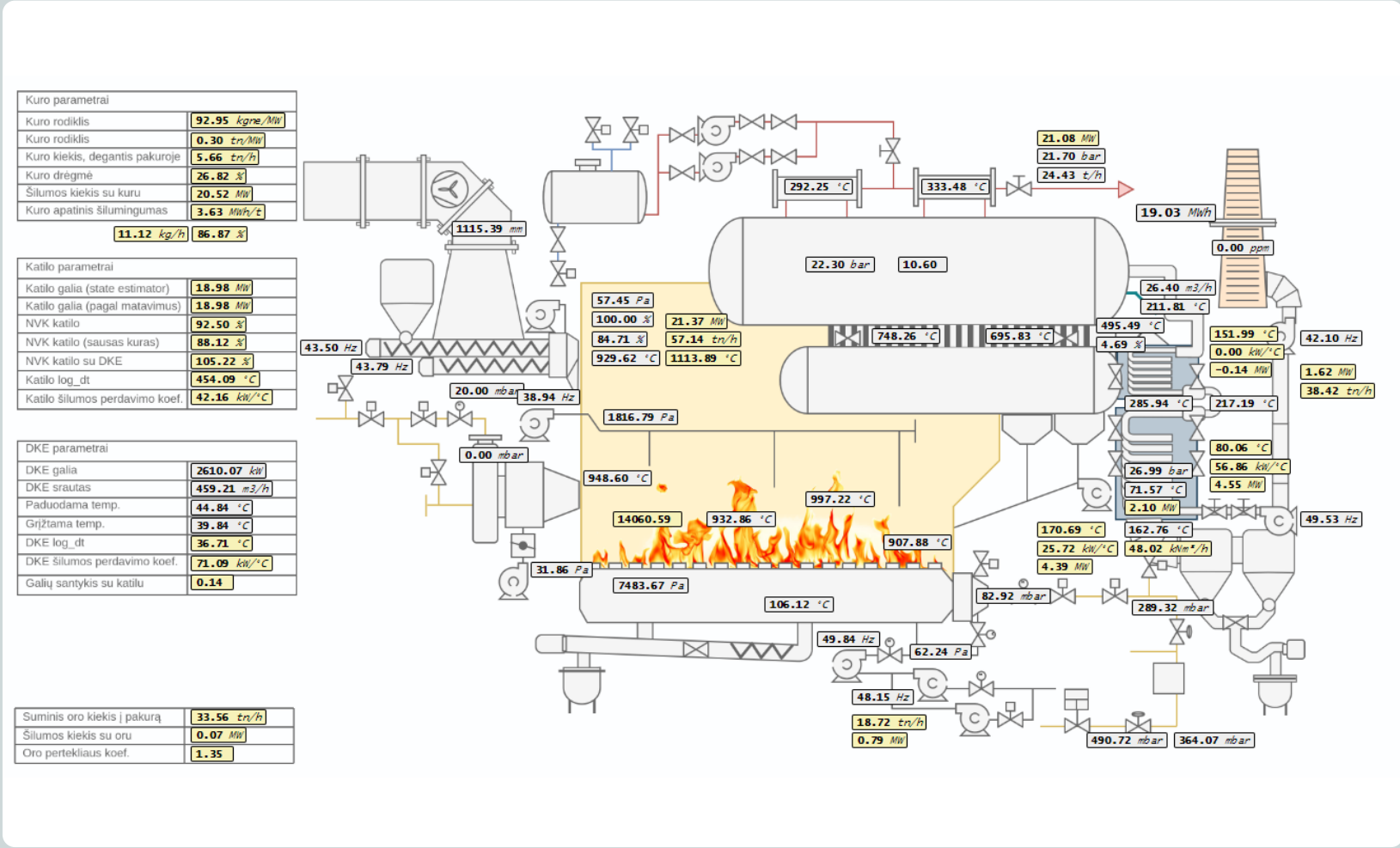
Data Visualization Module

Data visualized in separate Dween Dashboard sections.

Data visualized in Dween components representing the client's physical system, graphs, charts.

Data visualization is freely configurable and can be customized according to each Client's needs.

Possible Dween Dashboard access rights configuration for individual users.



Basic Package

02

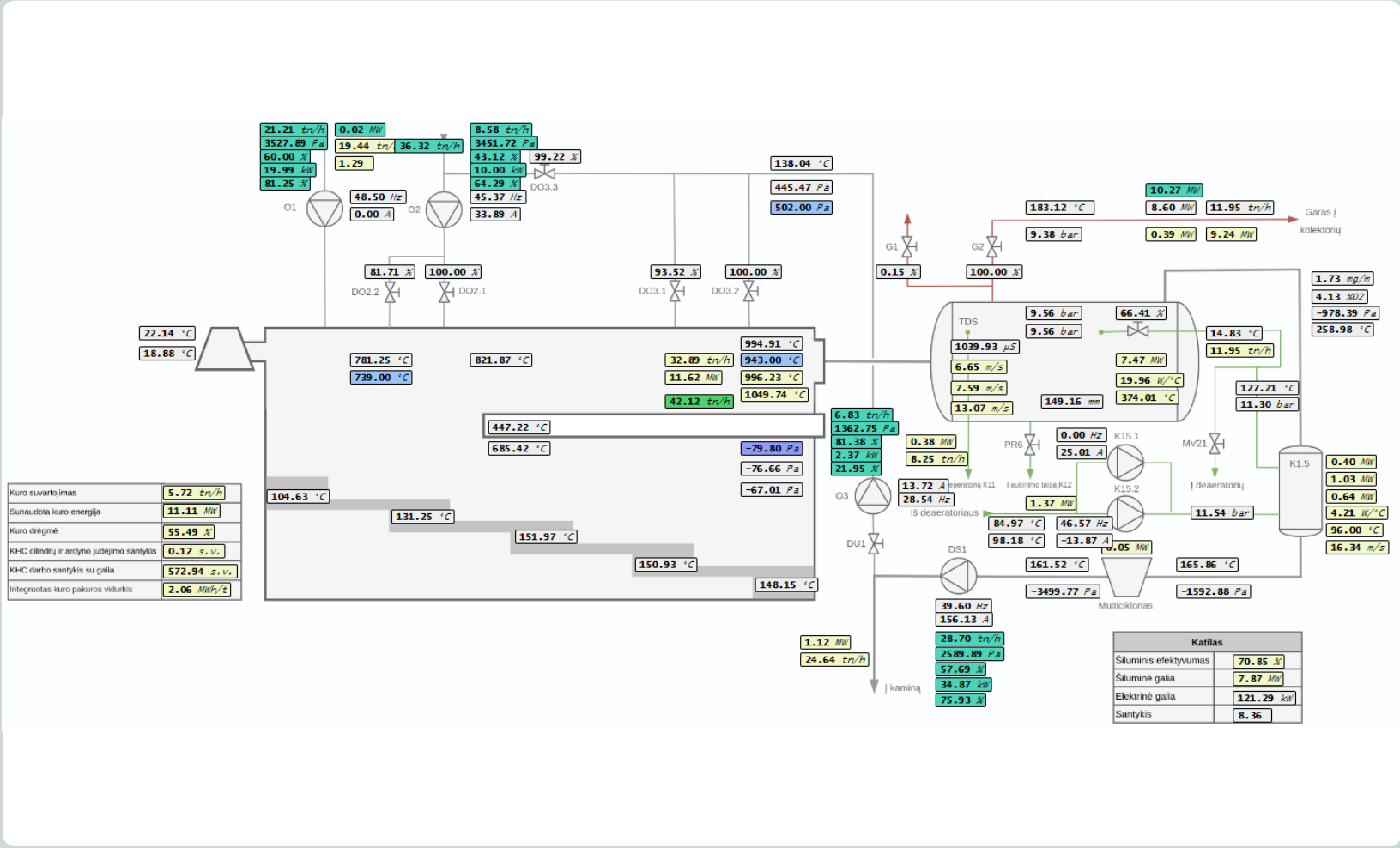
Data Visualization Module

Data visualized in separate Dween Dashboard sections.

Data visualized in Dween components representing the client's physical system, graphs, charts.

Data visualization is freely configurable and can be customized according to each Client's needs.

Possible Dween Dashboard access rights configuration for individual users.



Basic Package

02

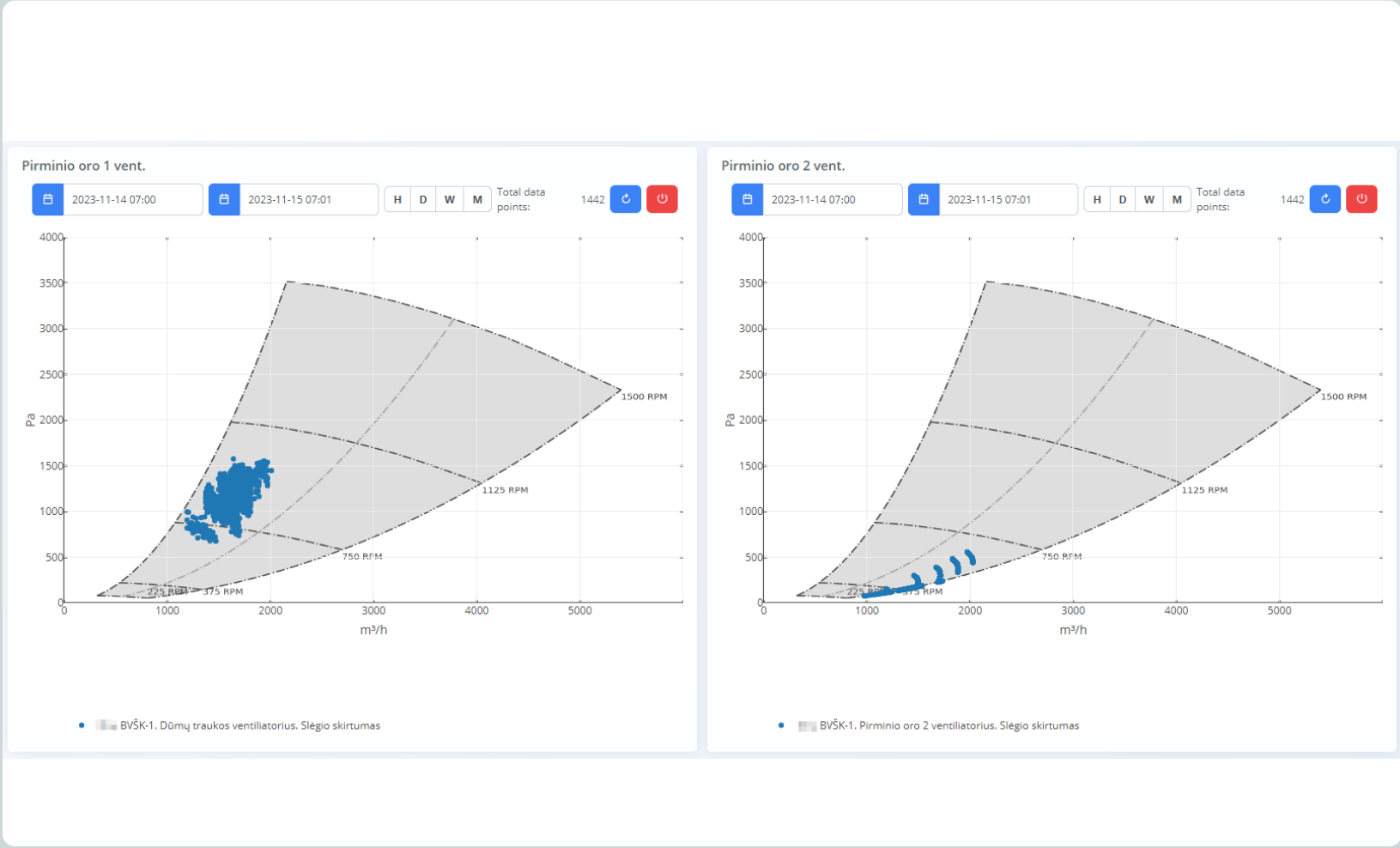
Data Visualization Module

Data visualized in separate Dween Dashboard sections.

Data visualized in Dween components representing the client's physical system, graphs, charts.

Data visualization is freely configurable and can be customized according to each Client's needs.

Possible Dween Dashboard access rights configuration for individual users.



Basic Package

03

Boiler Energy Balance Calculation in Real-Time Module

Calculation of primary air mass flow.

Calculation of secondary air mass flow.

Calculation of recirculating mass flow.

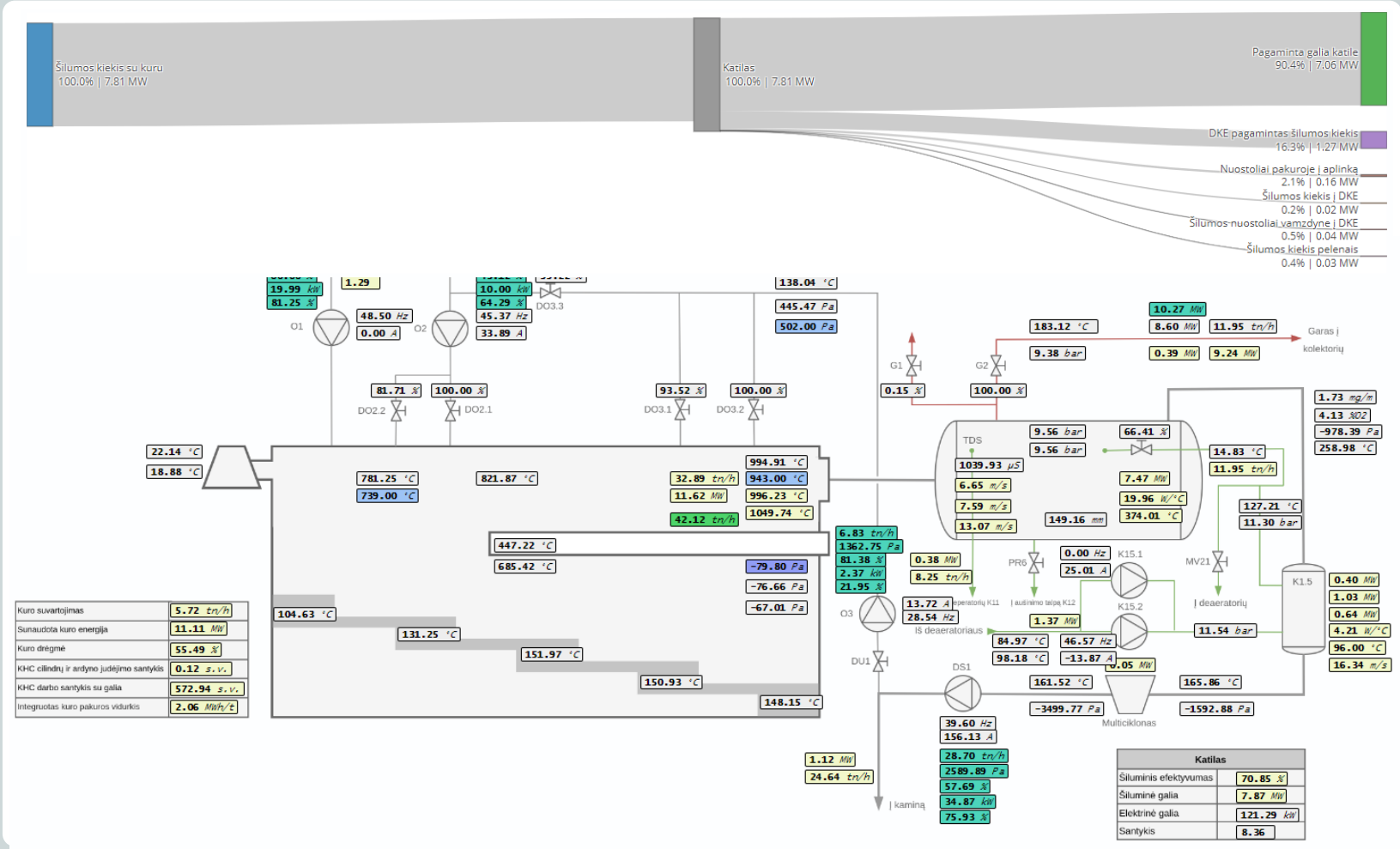
Calculation of smoke mass flow into the chimney.

Mass balance.

Energy balance.

Calculation of fuel supply rate and layer.

Calculation of the secondary and primary air ratio.



Basic Package

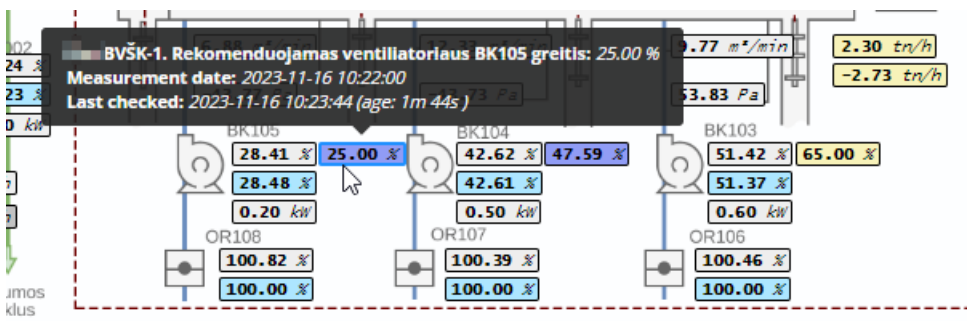
04 **Control Module**

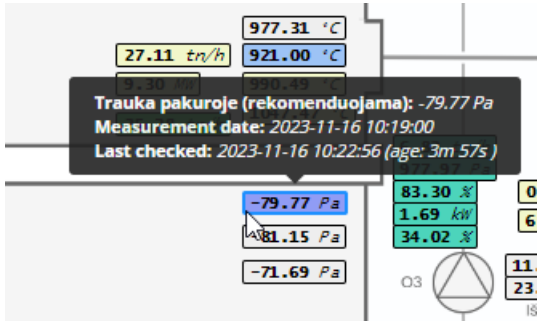
Calculated optimal control recommendations (Set Points) provided to the operator via Dween Dashboard or email.

Recommendations are tailored for every hour of boiler operation according to required control parameters.

Valdymo parametrai

	Esami	Rekomenduojami
Trauka, kai galingumas 0%	30.00 Pa	30.00 Pa
Trauka, kai galingumas 100%	53.00 Pa	53.00 Pa
I oro kiekis kai galingumas 0%	65.00 Pa	65.00 Pa
I oro kiekis kai galingumas 25%	70.00 Pa	70.00 Pa
I oro kiekis kai galingumas 50%	75.00 Pa	75.00 Pa
I oro kiekis kai galingumas 75%	78.00 Pa	80.00 Pa
I oro kiekis kai galingumas 100%	85.00 Pa	85.00 Pa
Dūmų recirkuliacija	49.07 Hz	49.67 Hz
I oro slėgis į pakurą	7319.18 Pa	6942.60 Pa
Maitintuvų greitis kai galingumas 100%	88.00 %	88.00 %





Basic Package

05 **Reporting Module**

Calculation and visualization of daily/weekly/monthly indicators:

- Boiler efficiency, %
- Economizer efficiency, %
- System efficiency, %
- Biomass consumption in MWh and tons
- Cost of energy production in Eur/MWh and Eur/toe
- Electricity consumption, kWh/MWh thermal
- Energy prime cost, toe/MWh
- Biomass calorific value MJ/and water content %
- Excess air coefficient variation over time, %

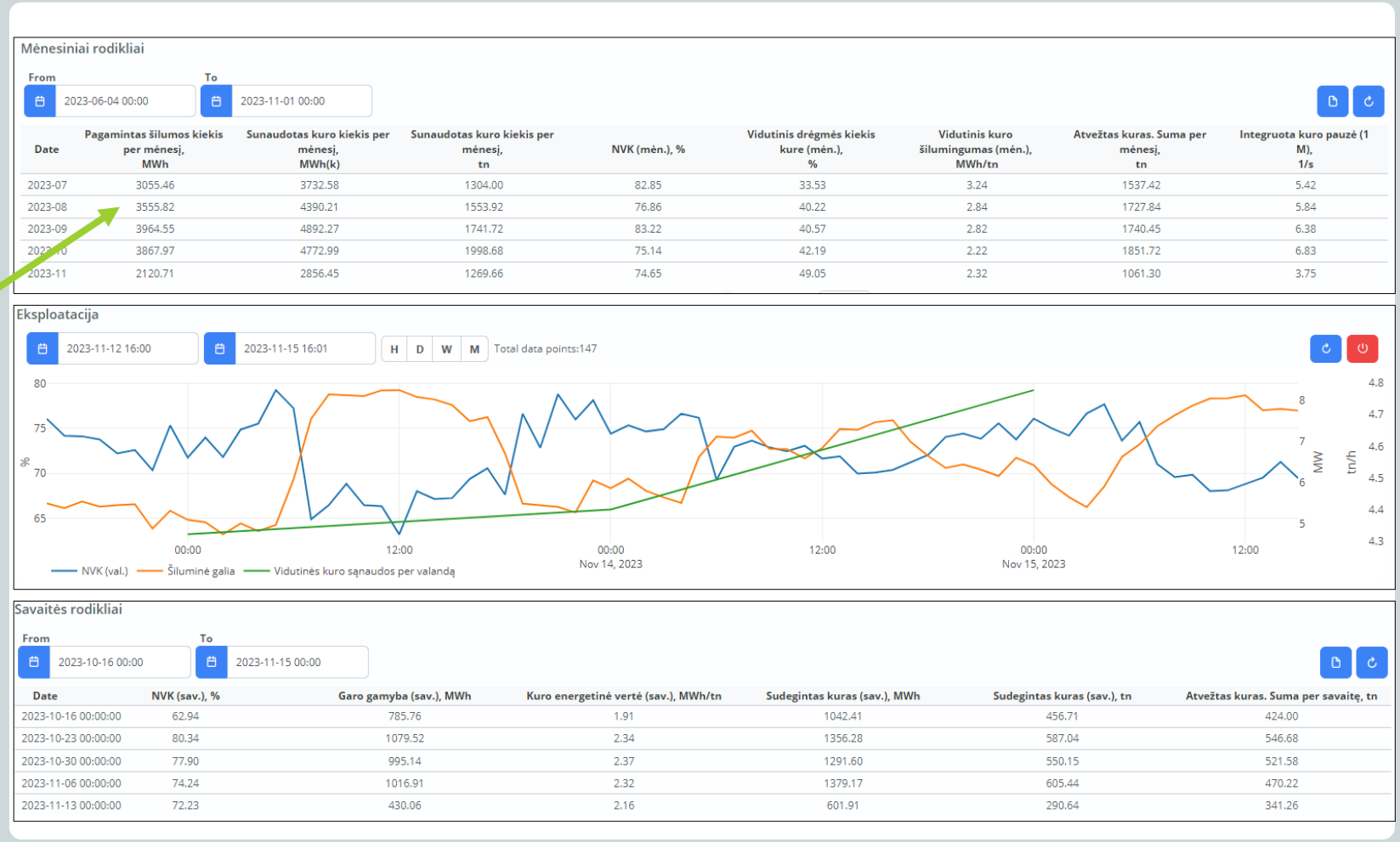
Preparation of a user interface for entering biomass and electricity prices.

Reports with boiler efficiency indicators are sent to responsible individuals daily, weekly, monthly.

The format of reports is easily configurable and can be adapted according to each client's needs.

Reports are sent to easily configurable email addresses.

Reports are stored in the database for six months.



Mėnesiniai rodikliai

From 2023-06-04 00:00 To 2023-11-01 00:00

Date	Pagamintas šilumos kiekis per mėnesį, MWh	Sunaudotas kuro kiekis per mėnesį, MWh(k)	Sunaudotas kuro kiekis per mėnesį, tn	NVK (mėn.), %	Vidutinis drėgmės kiekis kure (mėn.), %	Vidutinis kuro šiluningumas (mėn.), MWh/tn	Atvežtas kuras. Suma per mėnesį, tn	Integruota kuro pauzė (1 M), 1/s
2023-07	3055.46	3732.58	1304.00	82.85	33.53	3.24	1537.42	5.42
2023-08	3555.82	4390.21	1553.92	76.86	40.22	2.84	1727.84	5.84
2023-09	3964.55	4892.27	1741.72	83.22	40.57	2.82	1740.45	6.38
2023-10	3867.97	4772.99	1998.68	75.14	42.19	2.22	1851.72	6.83
2023-11	2120.71	2856.45	1269.66	74.65	49.05	2.32	1061.30	3.75

Eksploatacija

2023-11-12 16:00 2023-11-15 16:01 H D W M Total data points:147

Savaitės rodikliai

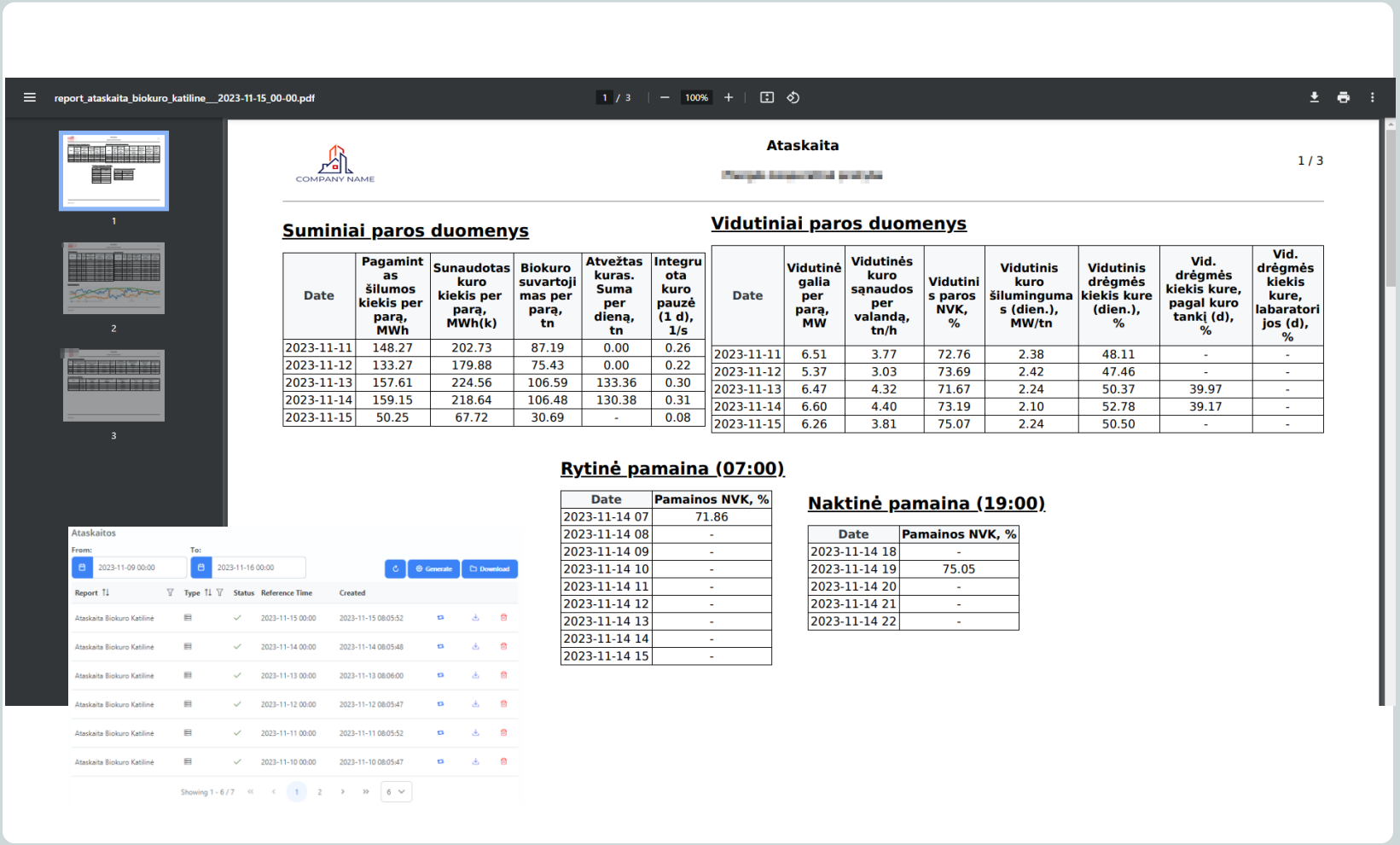
From 2023-10-16 00:00 To 2023-11-15 00:00

Date	NVK (sav.), %	Garo gamyba (sav.), MWh	Kuro energetinė vertė (sav.), MWh/tn	Sudegintas kuras (sav.), MWh	Sudegintas kuras (sav.), tn	Atvežtas kuras. Suma per savaitę, tn
2023-10-16 00:00:00	62.94	785.76	1.91	1042.41	456.71	424.00
2023-10-23 00:00:00	80.34	1079.52	2.34	1356.28	587.04	546.68
2023-10-30 00:00:00	77.90	995.14	2.37	1291.60	550.15	521.58
2023-11-06 00:00:00	74.24	1016.91	2.32	1379.17	605.44	470.22
2023-11-13 00:00:00	72.23	430.06	2.16	601.91	290.64	341.26

Basic Package

05 **Reporting Module**

Generation of PDF reports



Date	Pagamintas šilumos kiekis per parą, MWh	Sunaudotas kuro kiekis per parą, MWh(k)	Biokuro suvartojimas per parą, tn	Atvežtas kuras. Suma per dieną, tn	Integruota kuro pauzė (1 d), 1/s
2023-11-11	148.27	202.73	87.19	0.00	0.26
2023-11-12	133.27	179.88	75.43	0.00	0.22
2023-11-13	157.61	224.56	106.59	133.36	0.30
2023-11-14	159.15	218.64	106.48	130.38	0.31
2023-11-15	50.25	67.72	30.69	-	0.08

Date	Vidutinė galia per parą, MW	Vidutinės kuro sąnaudos per valandą, tn/h	Vidutinis paros NVK, %	Vidutinis kuro šilumingumas (dien.), MW/tn	Vidutinis drėgmės kiekis kure (dien.), %	Vid. drėgmės kiekis kure, pagal kuro tankį (d), %	Vid. drėgmės kiekis kure, labaratorijos (d), %
2023-11-11	6.51	3.77	72.76	2.38	48.11	-	-
2023-11-12	5.37	3.03	73.69	2.42	47.46	-	-
2023-11-13	6.47	4.32	71.67	2.24	50.37	39.97	-
2023-11-14	6.60	4.40	73.19	2.10	52.78	39.17	-
2023-11-15	6.26	3.81	75.07	2.24	50.50	-	-

Date	Pamainos NVK, %
2023-11-14 07	71.86
2023-11-14 08	-
2023-11-14 09	-
2023-11-14 10	-
2023-11-14 11	-
2023-11-14 12	-
2023-11-14 13	-
2023-11-14 14	-
2023-11-14 15	-

Date	Pamainos NVK, %
2023-11-14 18	-
2023-11-14 19	75.05
2023-11-14 20	-
2023-11-14 21	-
2023-11-14 22	-

Basic Package

05

Reporting Module

Calculation and visualization of daily/weekly/monthly indicators:

- Boiler efficiency, %
- Economizer efficiency, %
- System efficiency, %
- Biomass consumption in MWh and tons
- Cost of energy production in Eur/MWh and Eur/toe
- Electricity consumption, kWh/MWh thermal
- Energy prime cost, toe/MWh
- Biomass calorific value MJ/and water content %
- Excess air coefficient variation over time, %

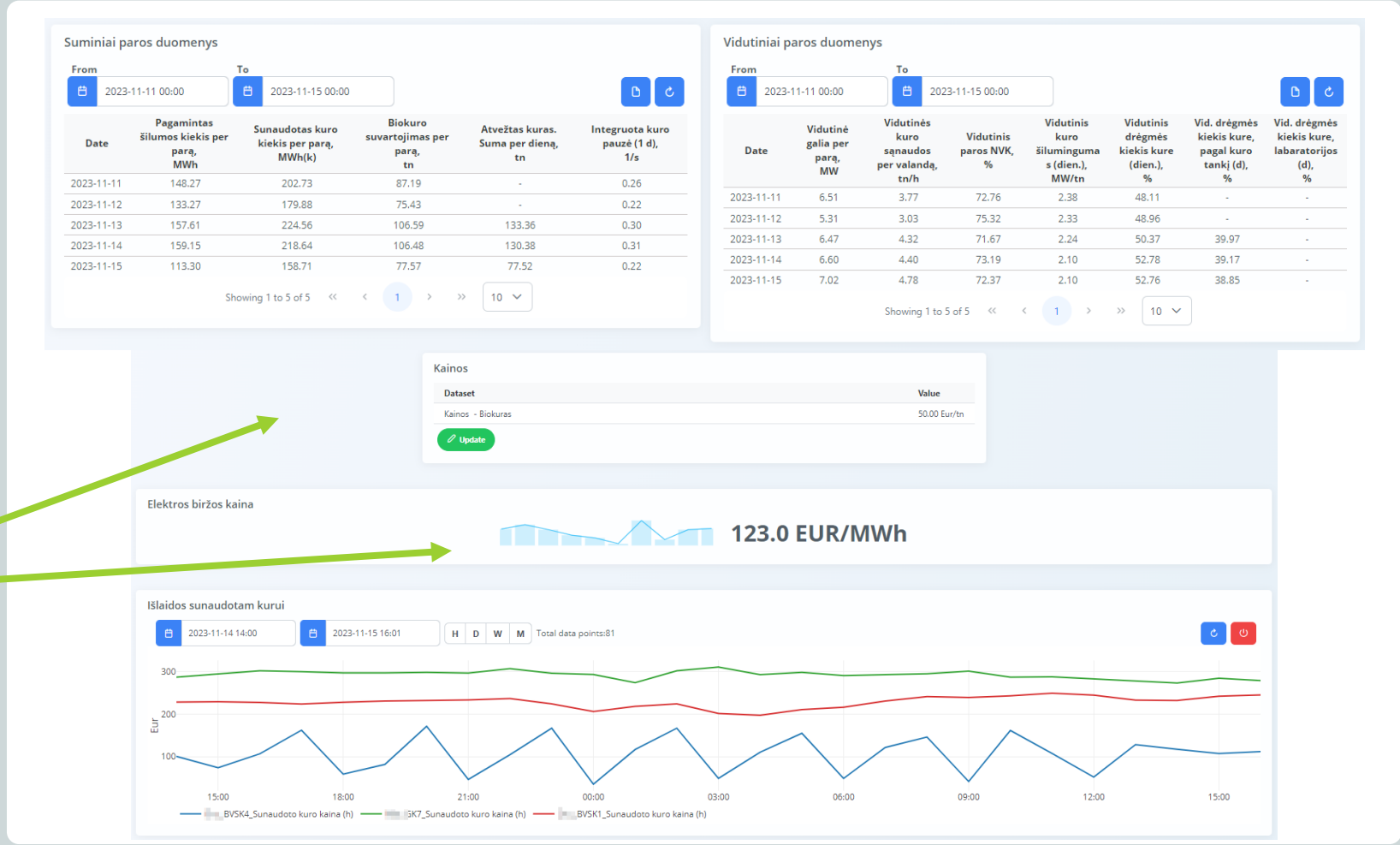
Preparation of a user interface for entering biomass and electricity prices.

Reports with boiler efficiency indicators are sent to responsible individuals daily, weekly, monthly.

The format of reports is easily configurable and can be adapted according to each client's needs.

Reports are sent to easily configurable email addresses.

Reports are stored in the database for six months.



Basic Package

05 **Reporting Module**

Calculation and visualization of daily/weekly/monthly indicators:

- Boiler efficiency, %
- Economizer efficiency, %
- System efficiency, %
- Biomass consumption in MWh and tons
- Cost of energy production in Eur/MWh and Eur/toe
- Electricity consumption, kWh/MWh thermal
- Energy prime cost, toe/MWh
- Biomass calorific value MJ/and water content %
- Excess air coefficient variation over time, %

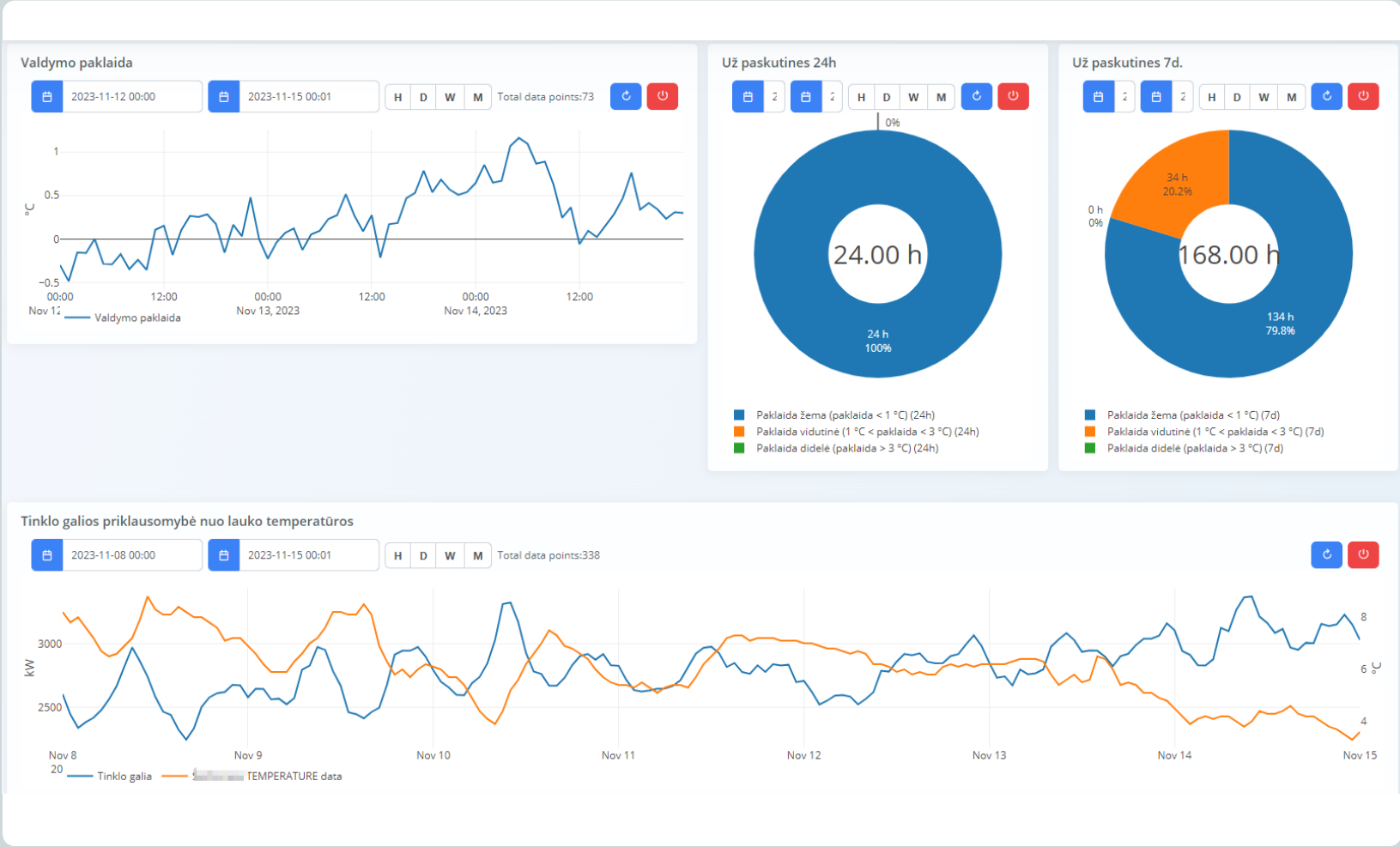
Preparation of a user interface for entering biomass and electricity prices.

Reports with boiler efficiency indicators are sent to responsible individuals daily, weekly, monthly.

The format of reports is easily configurable and can be adapted according to each client's needs.

Reports are sent to easily configurable email addresses.

Reports are stored in the database for six months.

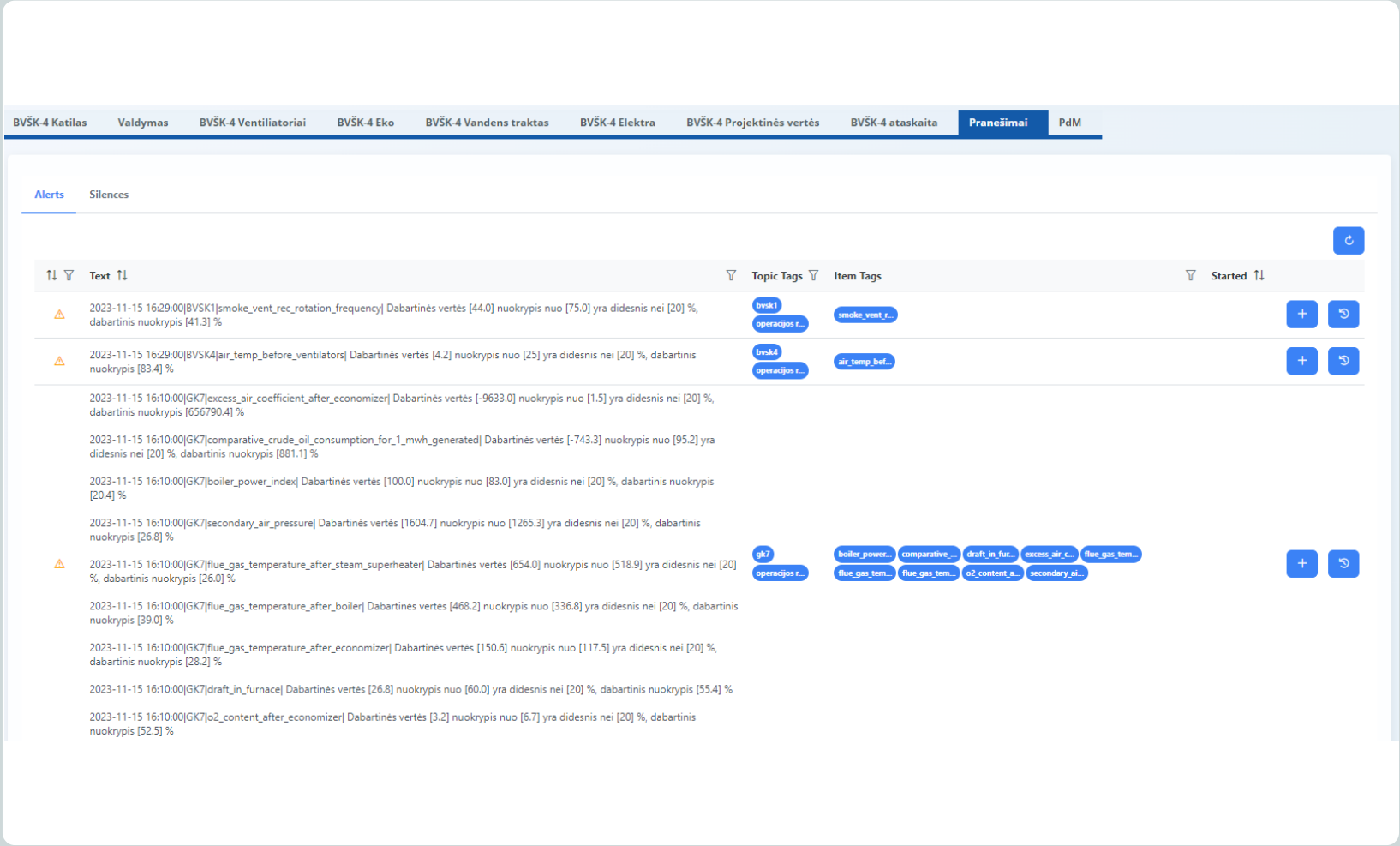


Basic Package

06 **Notifications Module**

Operators receive notifications via email or SMS with an action prompt as soon as a deviation is detected.

Deviations are freely configurable and can be customized according to each Client's needs.



Basic Package

07 **Boiler Flue Gas Heat Exchanger Cleaning Recommendations**

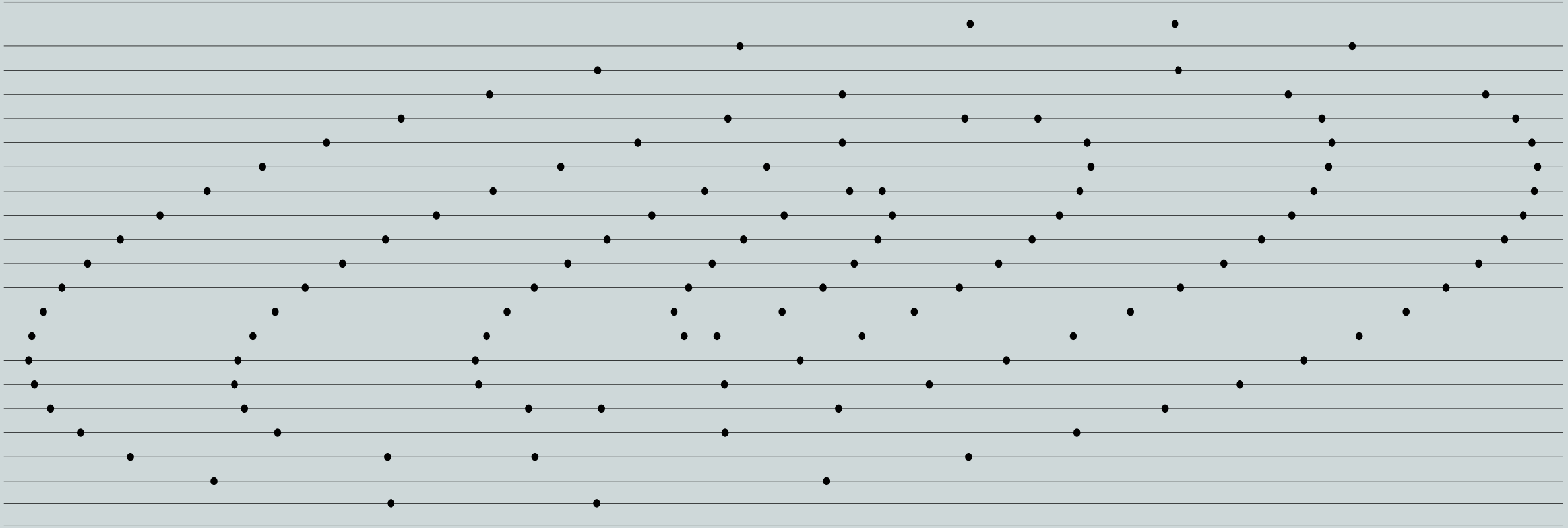
An algorithm is prepared that calculates the efficiency of the boiler flue gas heat exchangers' heat transfer.

Results are presented in a separate Dween Dashboard.

Results are continuously monitored, and staff are informed about the need for cleaning when the heat transfer efficiency falls below the set threshold.

Prediction of cleaning needs.

DWEEN Boiler



02 Advanced Package

Advanced Package

08 Automatic Control Module

Calculated optimal control recommendations (Set Points) are sent directly into the control system without human intervention.

Recommendations are sent at needed frequency for the required control parameters.

09 Water/Steam Cycle Balance Calculation Module

An algorithm is prepared that calculates the balance of the boiler water system, evaluating returning condensate, prepared water, tank level fluctuations, and produced steam.

Balance results are available in a separate Dween Dashboard.

Balance results are continuously monitored, and staff are informed via email or SMS about any deviation that would indicate equipment malfunction.

10 Boiler Long-Term Performance Monitoring Module

An algorithm is prepared calculating the efficiency of heat transfer across surfaces (reduced boiler efficiency).

An algorithm is prepared evaluating the deterioration of hydraulic pipeline properties

11 Boiler Operation Availability Module

Based on agreed terms, the operating status of the boiler, turbine, economizers (operating/not operating) is tracked.

Operation status reports for the day, month, and year are presented.

A report is compiled showing actual operation and downtime hours for each analysed unit (boiler, turbine, economizer).

12 Boiler Design Values Tracking Module

Data collection software Dween Data Collector is configured for the additional data collection from the fuel tracking/weighing system.

The boiler energy balance calculation module is periodically calibrated based on the received data.

Data of delivered biomass and other calculated indicators are included in reports.

13 Fuel tracking system integration

Data collection software Dween Data Collector is configured for the additional data collection from the fuel tracking/weighing system.

The boiler energy balance calculation module is periodically calibrated based on the received data.

Data of delivered biomass and other calculated indicators are included in reports.

14 Boiler Load Forecasting Module

An algorithm is prepared that calculates the forecast of boiler load 24 hours ahead.

Forecast data is presented in a periodic report in the user interface.

Advanced Package

08 **Automatic Control Module**

Calculated optimal control recommendations (Set Points) are sent directly into the control system without human intervention.

Recommendations are sent at needed frequency for the required control parameters.

Advanced Package

09 **Automatic Control Module**

An algorithm is prepared that calculates the balance of the boiler water system, evaluating returning condensate, prepared water, tank level fluctuations, and produced steam.

Balance results are available in a separate Dween Dashboard.

Balance results are continuously monitored, and staff are informed via email or SMS about any deviation that would indicate equipment malfunction.

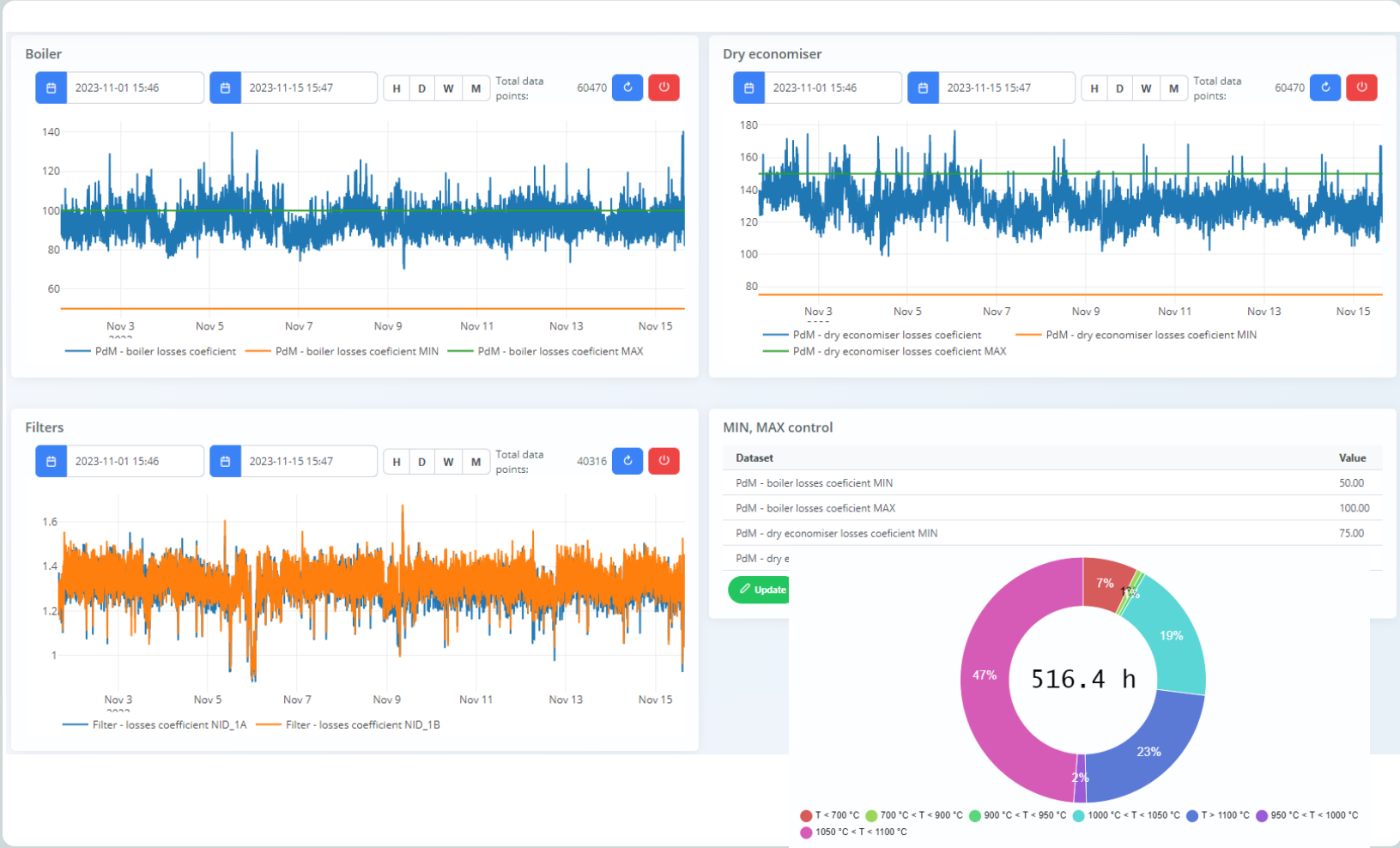
Advanced Package

10

Boiler Long-Term Performance Monitoring Module

An algorithm is prepared calculating the efficiency of heat transfer across surfaces (reduced boiler efficiency).

An algorithm is prepared evaluating the deterioration of hydraulic pipeline properties



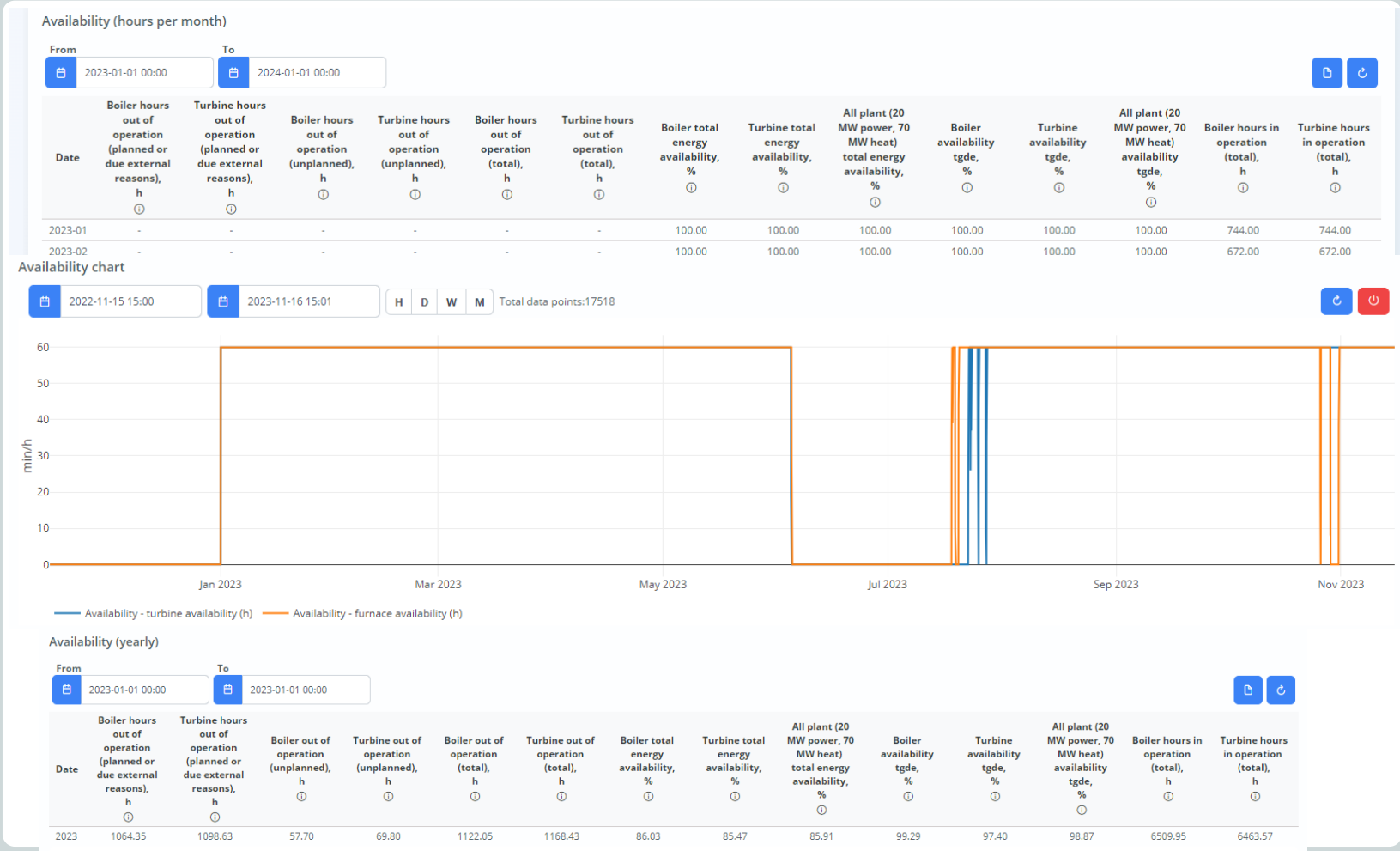
Advanced Package

11 **Boiler Operation Availability Module**

Based on agreed terms, the operating status of the boiler, turbine, economizers (operating/not operating) is tracked.

Operation status reports for the day, month, and year are presented.

A report is compiled showing actual operation and downtime hours for each analysed unit (boiler, turbine, economizer).



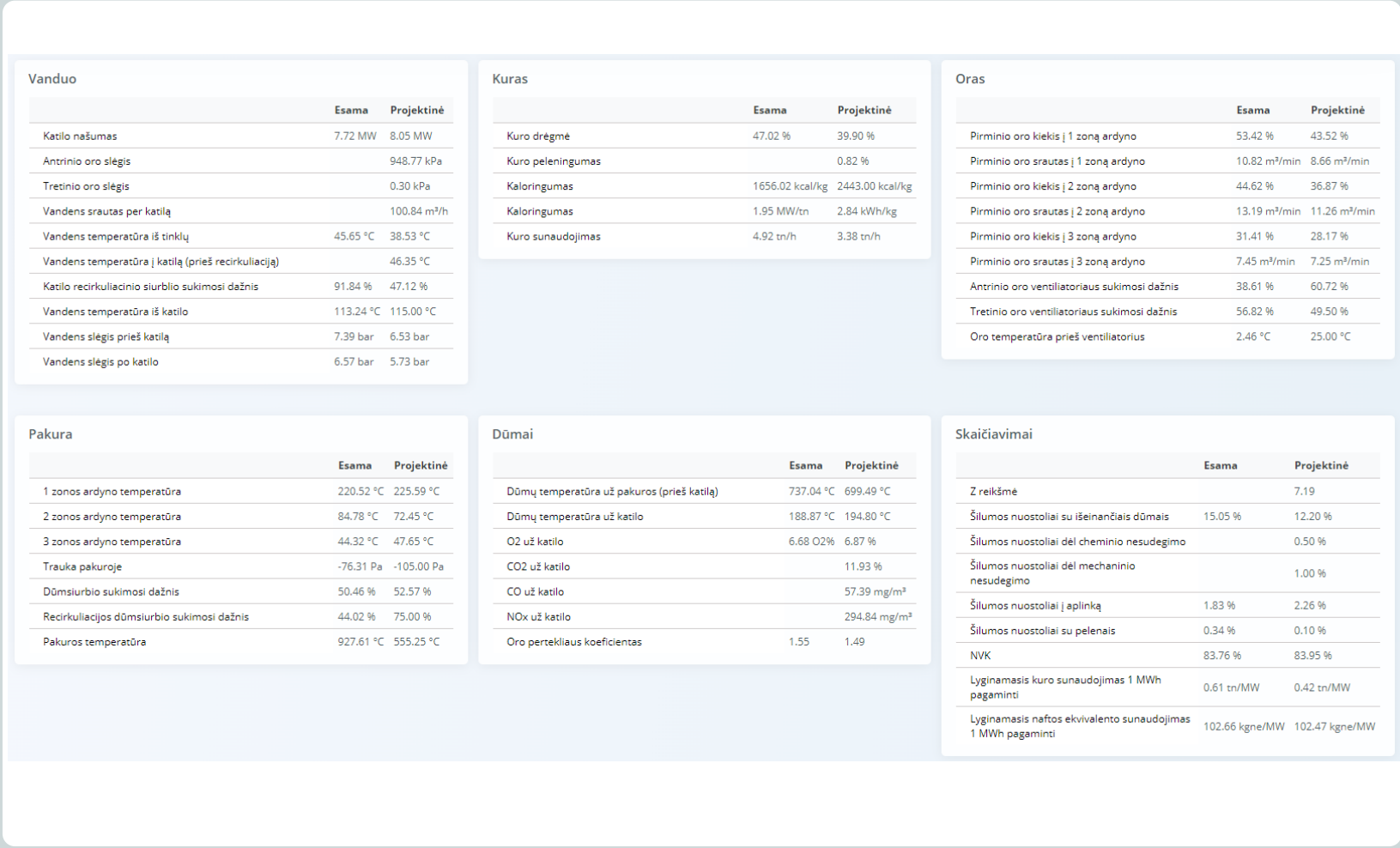
Advanced Package

12

Boiler Design Values Tracking Module

In the separate Dween Dashboard, boiler design and their corresponding measured or calculated values.

Staff are informed via email about deviations from design values.



Vanduo

	Esama	Projektinė
Katilo našumas	7.72 MW	8.05 MW
Antrinio oro slėgis		948.77 kPa
Tretinio oro slėgis		0.30 kPa
Vandens srautas per katilą		100.84 m³/h
Vandens temperatūra iš tinklų	45.65 °C	38.53 °C
Vandens temperatūra į katilą (prieš recirkuliaciją)		46.35 °C
Katilo recirkuliacinio siurblio sukimosi dažnis	91.84 %	47.12 %
Vandens temperatūra iš katilo	113.24 °C	115.00 °C
Vandens slėgis prieš katilą	7.39 bar	6.53 bar
Vandens slėgis po katilo	6.57 bar	5.73 bar

Kuras

	Esama	Projektinė
Kuro drėgmė	47.02 %	39.90 %
Kuro peleningumas		0.82 %
Kaloringumas	1656.02 kcal/kg	2443.00 kcal/kg
Kaloringumas	1.95 MW/tn	2.84 kWh/kg
Kuro sunaudojimas	4.92 tn/h	3.38 tn/h

Oras

	Esama	Projektinė
Pirminio oro kiekis į 1 zoną ardyno	53.42 %	43.52 %
Pirminio oro srautas į 1 zoną ardyno	10.82 m³/min	8.66 m³/min
Pirminio oro kiekis į 2 zoną ardyno	44.62 %	36.87 %
Pirminio oro srautas į 2 zoną ardyno	13.19 m³/min	11.26 m³/min
Pirminio oro kiekis į 3 zoną ardyno	31.41 %	28.17 %
Pirminio oro srautas į 3 zoną ardyno	7.45 m³/min	7.25 m³/min
Antrinio oro ventiliatoriaus sukimosi dažnis	38.61 %	60.72 %
Tretinio oro ventiliatoriaus sukimosi dažnis	56.82 %	49.50 %
Oro temperatūra prieš ventiliatorius	2.46 °C	25.00 °C

Pakura

	Esama	Projektinė
1 zonos ardyno temperatūra	220.52 °C	225.59 °C
2 zonos ardyno temperatūra	84.78 °C	72.45 °C
3 zonos ardyno temperatūra	44.32 °C	47.65 °C
Trauka pakuroje	-76.31 Pa	-105.00 Pa
Dūmsiurbio sukimosi dažnis	50.46 %	52.57 %
Recirkuliacijos dūmsiurbio sukimosi dažnis	44.02 %	75.00 %
Pakuros temperatūra	927.61 °C	555.25 °C

Dūmai

	Esama	Projektinė
Dūmų temperatūra už pakuros (prieš katilą)	737.04 °C	699.49 °C
Dūmų temperatūra už katilo	188.87 °C	194.80 °C
O2 už katilo	6.68 O2%	6.87 %
CO2 už katilo		11.93 %
CO už katilo		57.39 mg/m³
NOx už katilo		294.84 mg/m³
Oro pertekliaus koeficientas	1.55	1.49

Skaičiavimai

	Esama	Projektinė
Z reikšmė		7.19
Šilumos nuostoliai su išeinančiais dūmais	15.05 %	12.20 %
Šilumos nuostoliai dėl cheminio nesudegimo		0.50 %
Šilumos nuostoliai dėl mechaninio nesudegimo		1.00 %
Šilumos nuostoliai į aplinką	1.83 %	2.26 %
Šilumos nuostoliai su pelenais	0.34 %	0.10 %
NVK	83.76 %	83.95 %
Lyginamasis kuro sunaudojimas 1 MWh pagaminti	0.61 tn/MW	0.42 tn/MW
Lyginamasis naftos ekvivalento sunaudojimas 1 MWh pagaminti	102.66 kgne/MW	102.47 kgne/MW

Advanced Package

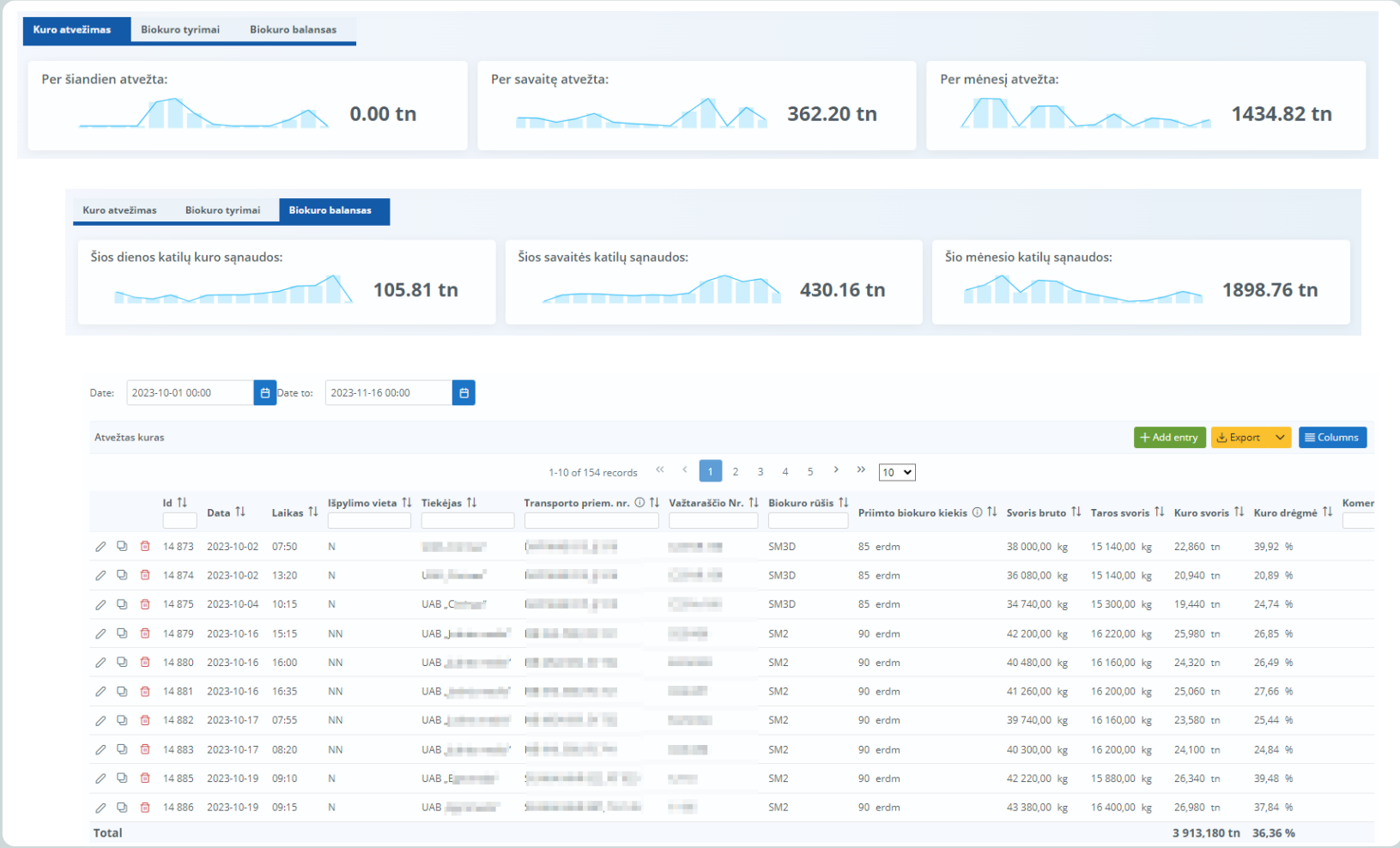
13

Fuel tracking system integration

Data collection software Dween Data Collector is configured for the additional data collection from the fuel tracking/weighing system.

The boiler energy balance calculation module is periodically calibrated based on the received data.

Data of delivered biomass and other calculated indicators are included in reports.



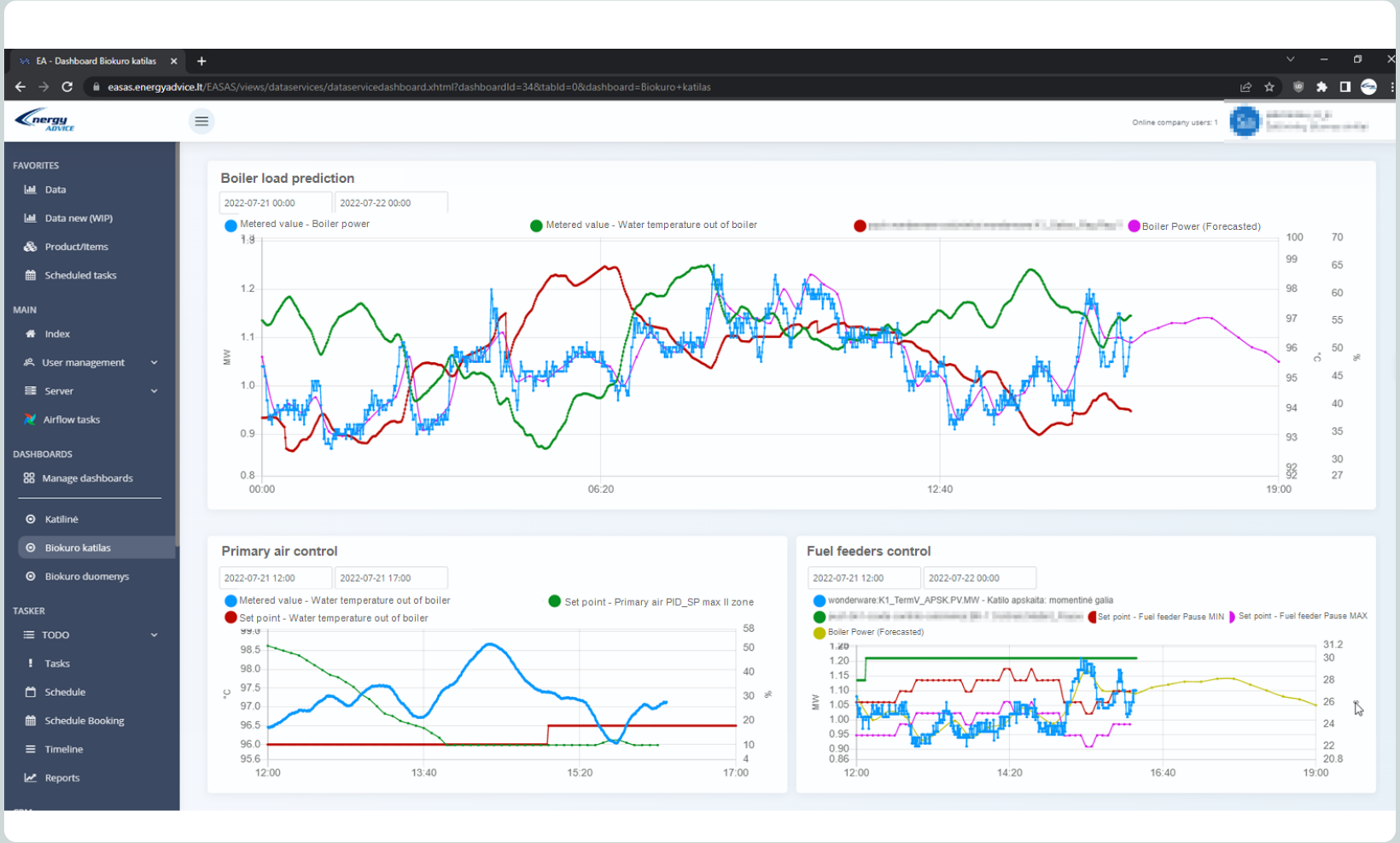
Advanced Package

14

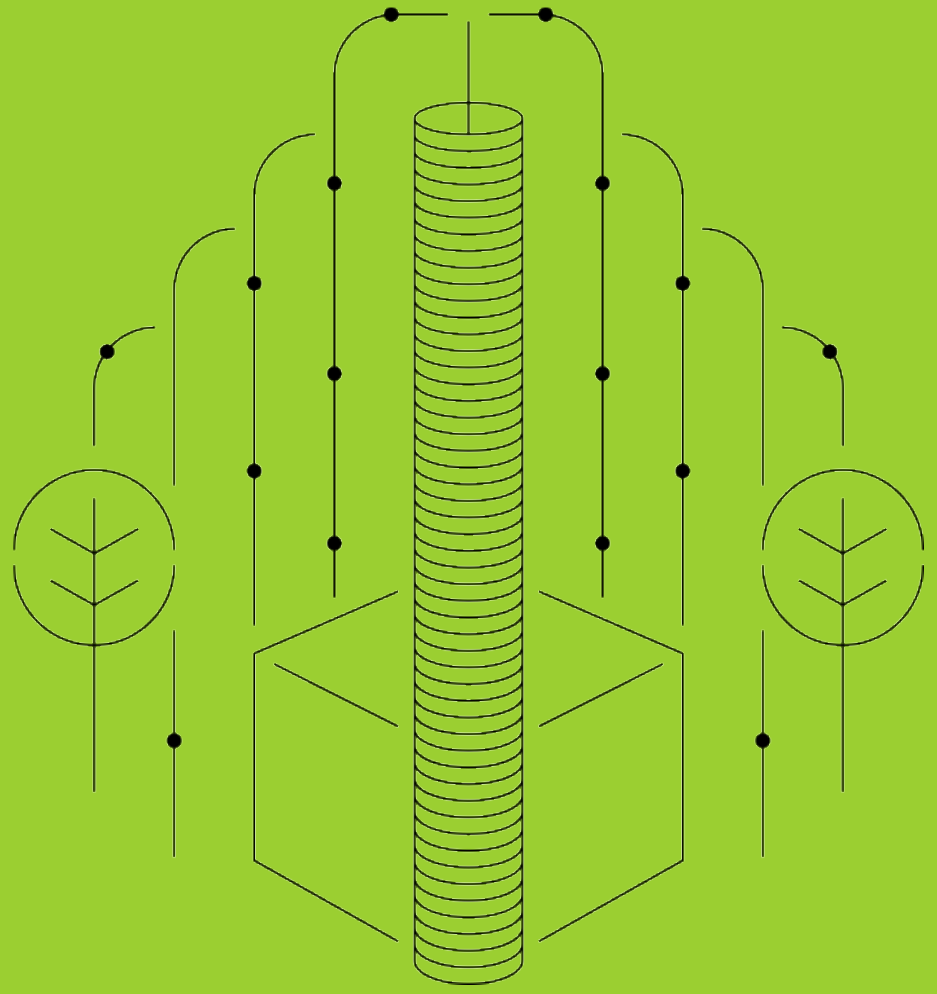
Boiler Load Forecasting Module

An algorithm is prepared that calculates the forecast of boiler load 24 hours ahead.

Forecast data is presented in a periodic report in the user interface.



DWEEN Boiler



Technological Process Perfection for Biomass Power Plant

+37063516380

info@dween.com

dween.com