

- Visegrad Fund
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Smart meter data analysis for public buildings

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TOGETHER project concept

TOGETHER aims at

- encouraging public administrations to adopt managerial EE solutions
- involving users in the energy management process
- to improve energy efficiency of their buildings
- to innovate their management system by integrating different tools:
 - space/time organisation of the buildings
 - installing and using smart metering systems
 - Demand Side Management (DSM)

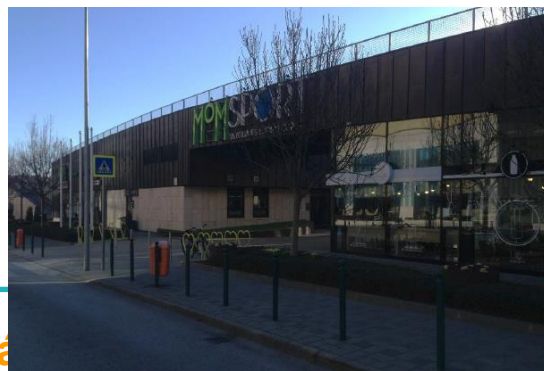


<https://www.youtube.com/watch?v=n8n1jzb4nSk&feature=youtu.be>

Project action flow

- Energy audits
- Installation of smart meters
- Development of data display
- Identification of target groups
- Social audits
- Analysis of data
- DSM actions:
 - Analytical DSM
 - Behavioural DSM

Clusters of buildings



Clusters of buildings

9 buildings, of which:

- 3 office buildings, incl. municipal office building
- 3 kindergardens
- 1 drawing school
- 1 sport center (swimming pool)
- 1 cultural center

Close cooperation with building actors



Smart meters and dashboard



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SMART meter alerts

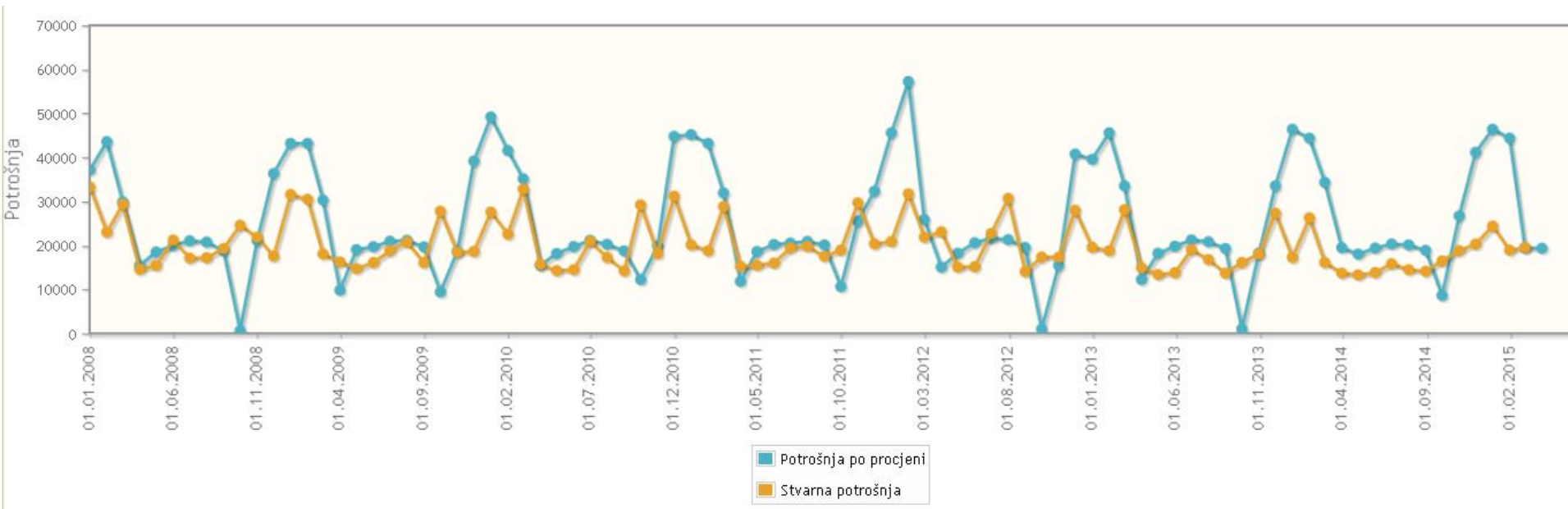
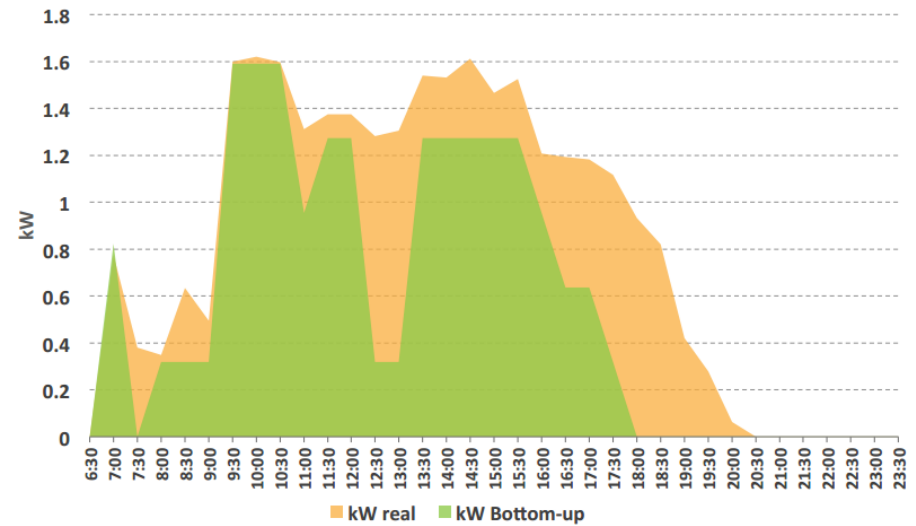
Water consumption monitoring with alerts at treshhold values

Osvježi Godina: 2015 Mjesec: 10 Voda [m³]

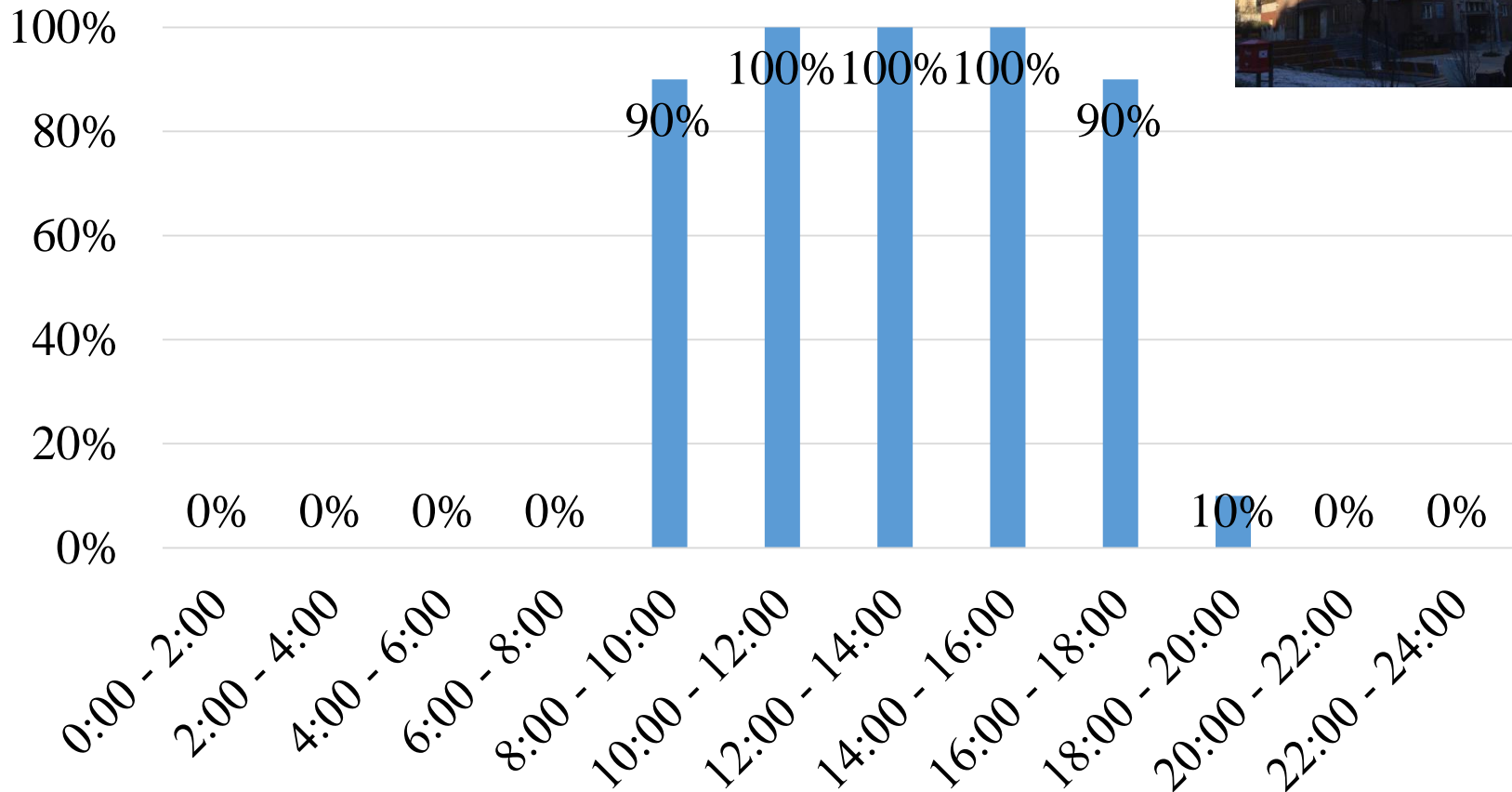
MTR: (456260) \$		Godina:2015 Mjesec:10																												Brojači:1 Voda [m³]		
Sat / Dan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0		0.3	0.3	0.3	0.3	0.5	0.3	0.7	0.4	0.3	0.7	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.4	0.3	0.4	0.7
1		0.3	0.4	0.3	0.4	0.3	0.4	0.9	0.3	0.4	0.8	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.15	0.4	0.3	0.3	0.3	0.4	0.6
2		0.4	0.3	0.4	0.4	0.3	0.3	0.8	0.3	0.3	0.7	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.15	0.3	0.3	0.4	0.4	0.4	0.7
3		0.4	0.3	0.3	0.4	0.4	0.4	0.8	0.4	0.4	0.7	0.3	0.3	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.4	0.3	0.3	0.7	
4		0.3	0.4	0.3	0.3	0.3	0.3	0.9	0.3	0.3	0.7	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.3	0.3	0.4	0.3	0.4	0.6
5		0.3	0.3	0.4	0.4	0.3	0.3	0.8	0.4	0.4	0.7	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.4	0.7	
6		0.4	0.4	0.4	0.3	0.4	1.4	0.8	0.3	0.4	0.8	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.3	0.4	0.4	0.3	0.3	0.4	0.3	0.4	0.3	0.4	0.6
7		0.4	0.4	0.4	0.4	0.5	0.5	1.1	0.4	0.5	0.9	0.4	0.5	0.5	0.6	0.4	0.5	0.6	0.4	0.4	0.5	0.4	0.6	0.6	0.4	0.4	0.5	0.6	0.5	0.7	0.4	0.7
8		1.2	1.3	0.5	0.3	1.33	1.33	1.42	0.4	1.14	1.0	0.4	1.21	1.12	1.11	1.12	1.13	0.6	0.3	1.21	1.24	1.33	1.23	1.32	0.5	0.3	1.43	1.14	1.24	1.14	1.23	0.7
9		1.4	1.4	0.5	0.4	1.17	1.41	1.38	0.3	1.52	1.0	0.4	1.41	1.31	1.4	1.32	1.41	0.4	0.3	1.25	1.42	1.23	1.4	1.47	0.5	0.4	1.18	1.35	1.4	1.42	1.45	0.6
10		0.9	0.9	0.4	0.3	1.42	1.24	1.35	0.4	1.36	0.5	0.3	1.21	1.34	1.27	1.4	1.4	0.5	0.4	1.22	1.11	1.2	1.16	1.32	0.5	0.3	1.25	1.27	1.02	1.19	1.35	0.6
11		1.1	1.2	0.6	0.4	1.09	1.26	1.25	0.4	1.48	0.6	0.4	1.33	1.41	1.18	1.15	1.32	0.5	0.3	1.13	1.2	1.19	1.2	1.26	0.4	0.4	1.13	1.16	1.41	1.26	1.15	0.7
12		0.9	0.0	0.6	0.3	1.08	1.15	1.21	0.7	1.32	0.5	0.4	1.18	1.06	1.27	1.12	1.24	0.5	0.3	1.05	1.12	1.11	1.12	1.35	0.8	0.3	1.1	1.2	1.13	1.09	1.18	0.7
13		1.0	1.1	0.5	0.4	1.26	1.33	1.03	0.8	1.4	0.6	0.4	1.43	1.26	1.33	1.32	1.42	0.5	0.4	1.26	1.32	1.32	1.19	1.47	0.4	0.3	1.41	1.24	1.32	1.36	1.41	0.6
14		1.2	1.44	0.6	0.4	1.31	1.34	1.41	0.7	1.4	0.4	0.4	1.31	1.39	1.35	1.41	1.38	0.4	0.4	1.26	1.17	1.49	1.32	1.3	0.4	0.4	1.25	1.32	1.4	1.17	1.39	0.7
15		1.2	1.22	0.7	0.4	1.4	1.26	1.25	0.7	1.53	0.4	0.4	1.5	1.4	1.32	1.33	1.38	0.4	0.3	1.2	0.98	1.16	1.32	1.55	0.4	0.4	1.25	1.33	1.31	1.25	1.55	0.7
16		0.9	1.36	0.6	0.3	1.18	1.21	1.18	0.8	1.25	0.3	0.4	1.16	1.11	1.13	1.19	1.03	0.3	0.3	1.12	1.01	0.91	1.22	1.27	0.4	0.3	1.13	1.19	1.28	1.18	1.26	0.6
17		1.4	1.29	0.5	0.4	1.33	1.44	1.41	0.8	1.49	0.4	0.4	1.35	1.41	1.36	1.42	1.4	0.4	0.4	1.33	1.23	1.36	1.34	1.39	0.3	0.3	1.33	1.36	1.48	1.41	1.48	0.7
18		0.7	0.7	0.6	0.4	0.8	1.21	0.9	0.5	1.01	0.4	0.4	1.3	1.01	1.0	1.0	0.8	0.4	0.4	0.8	0.91	0.8	0.9	1.0	0.4	0.4	0.8	0.7	0.9	0.8	0.4	0.6
19		0.7	0.6	0.4	0.4	0.5	0.9	0.5	0.4	0.8	0.3	0.3	0.6	0.6	0.9	0.6	0.5	0.3	0.4	0.7	0.5	0.7	0.5	0.6	0.4	0.4	0.5	0.6	0.7	0.5	0.1	0.7
20		0.5	0.6	0.5	0.4	0.7	0.9	0.6	0.3	0.9	0.4	0.4	0.7	0.6	0.8	0.7	0.7	0.4	0.3	0.7	1.0	0.8	0.6	0.5	0.3	0.4	0.7	0.7	0.6	0.2	0.7	
21		0.6	0.5	0.4	0.3	0.8	1.0	0.4	0.4	0.8	0.4	0.3	0.6	0.6	0.5	0.5	0.4	0.3	0.3	1.06	1.0	0.6	0.6	0.5	0.3	0.3	0.6	1.1	0.61	0.6	0.1	0.6
22		0.4	0.5	0.3	0.5	0.9	0.9	0.5	0.4	0.8	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.61	0.5	0.4	0.5	0.4	0.4	0.4	0.8	0.5	0.5	0.53	0.6
23		0.4	0.4	0.4	0.3	0.8	0.7	0.4	0.3	0.7	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.8	0.7

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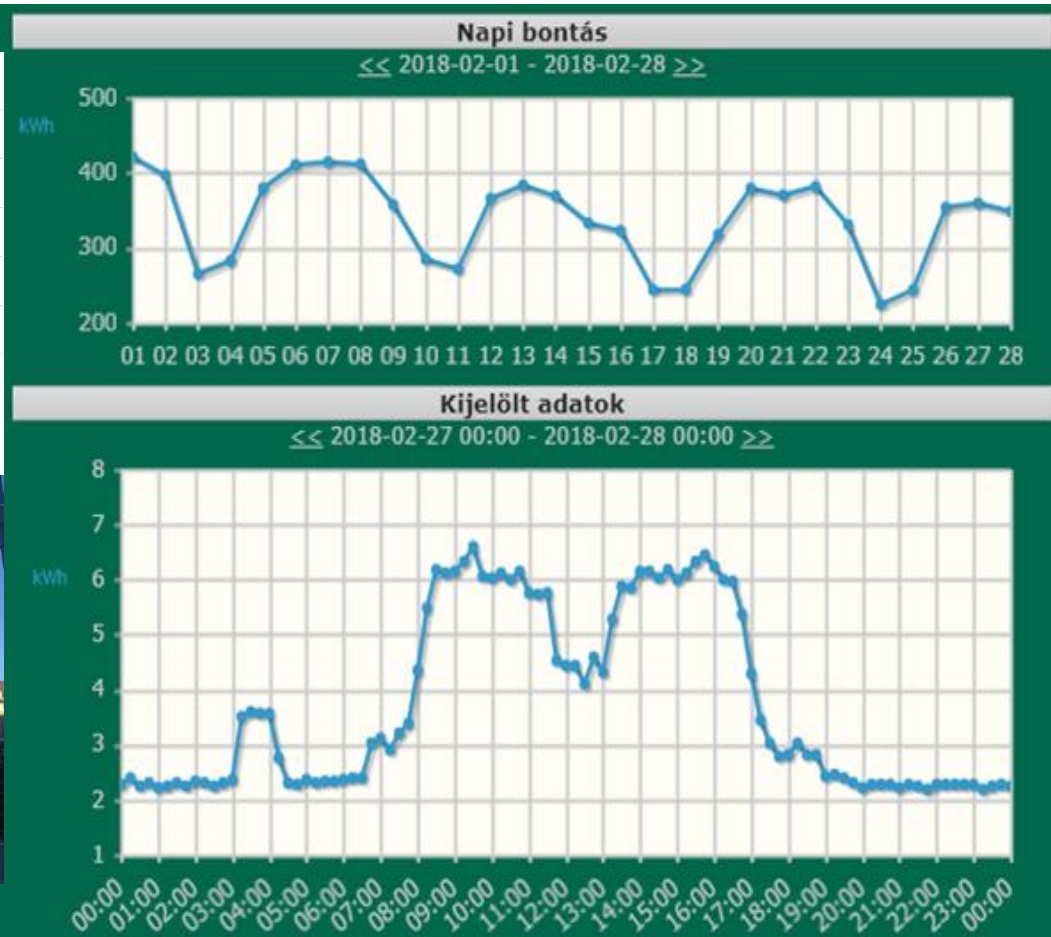
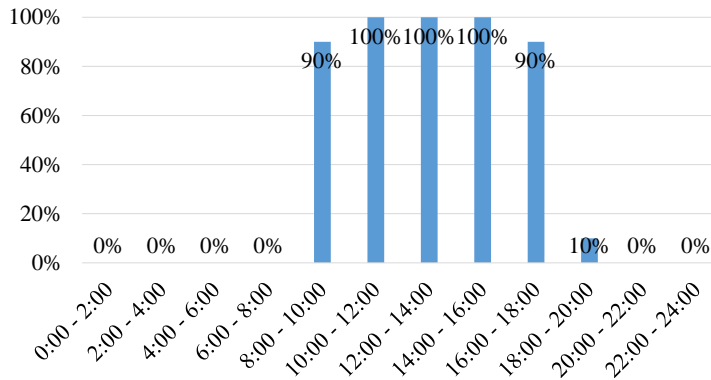
Analytical DSM



Occupancy schedule in a municipality building

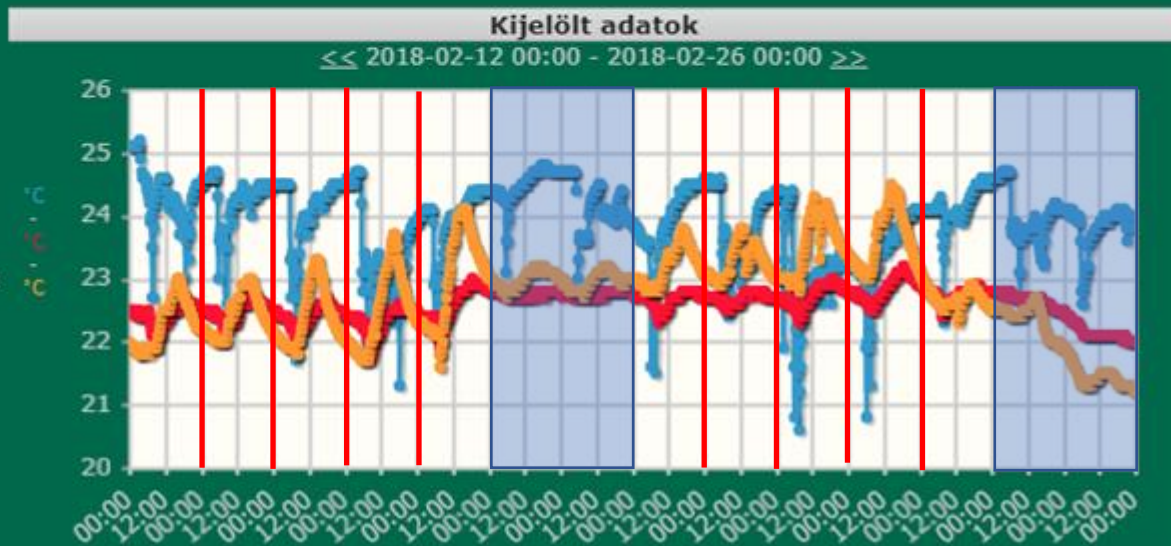
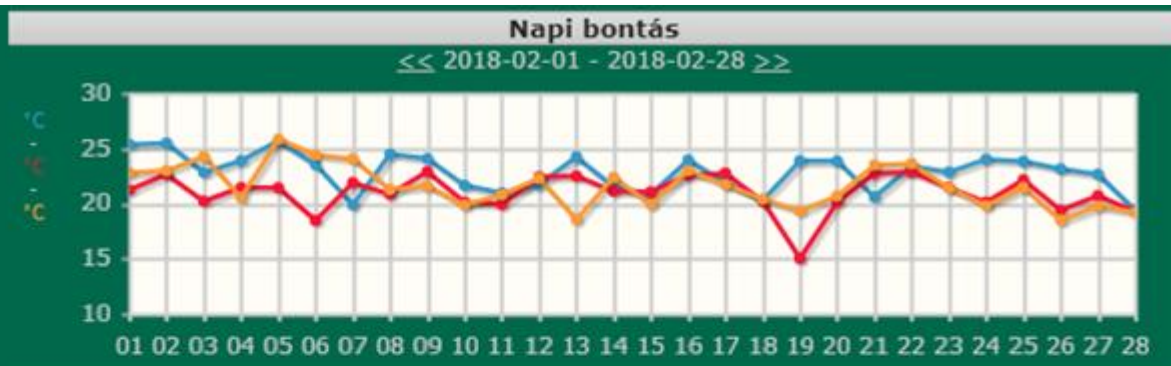


Monthly and daily electricity consumption in a municipality building

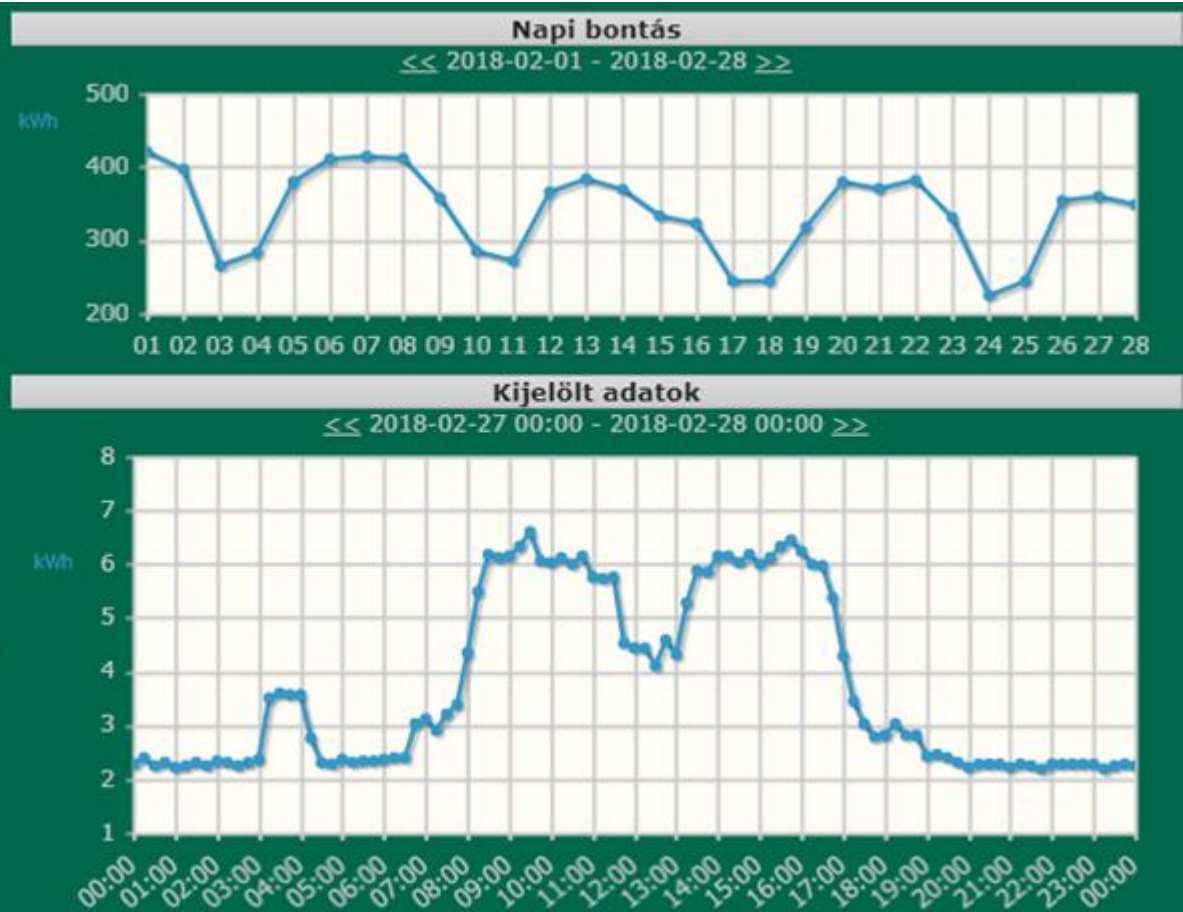


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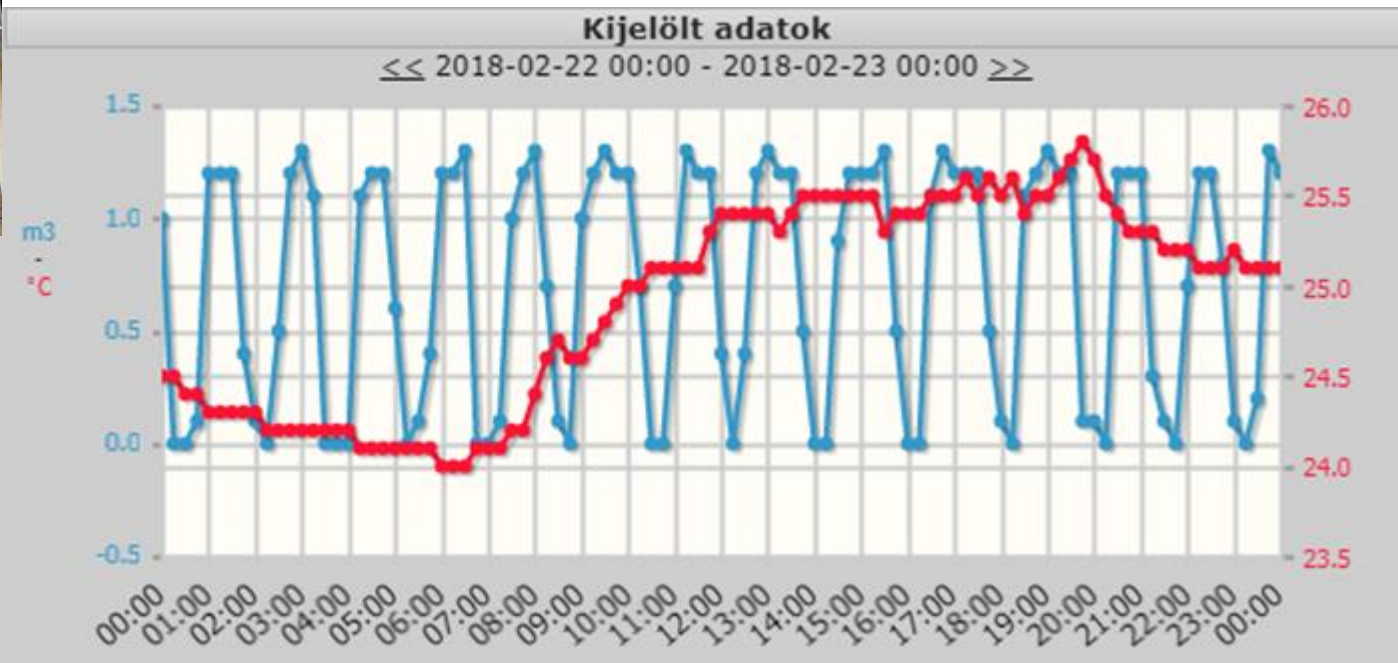
Monitoring – temperature in an office building



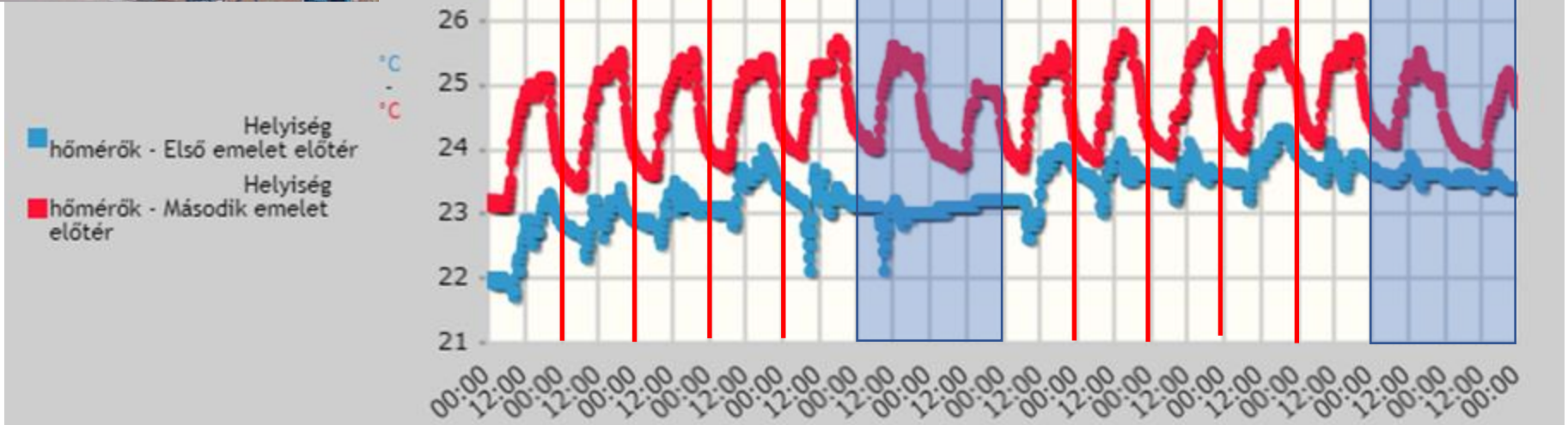
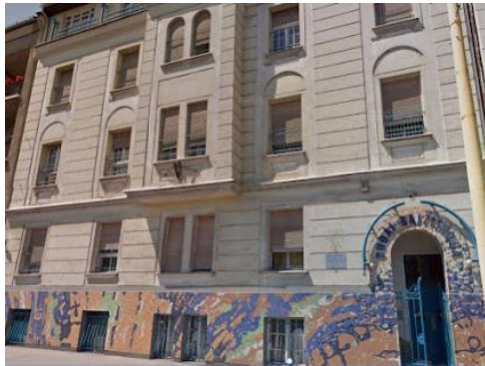
Electricity consumption in an office building



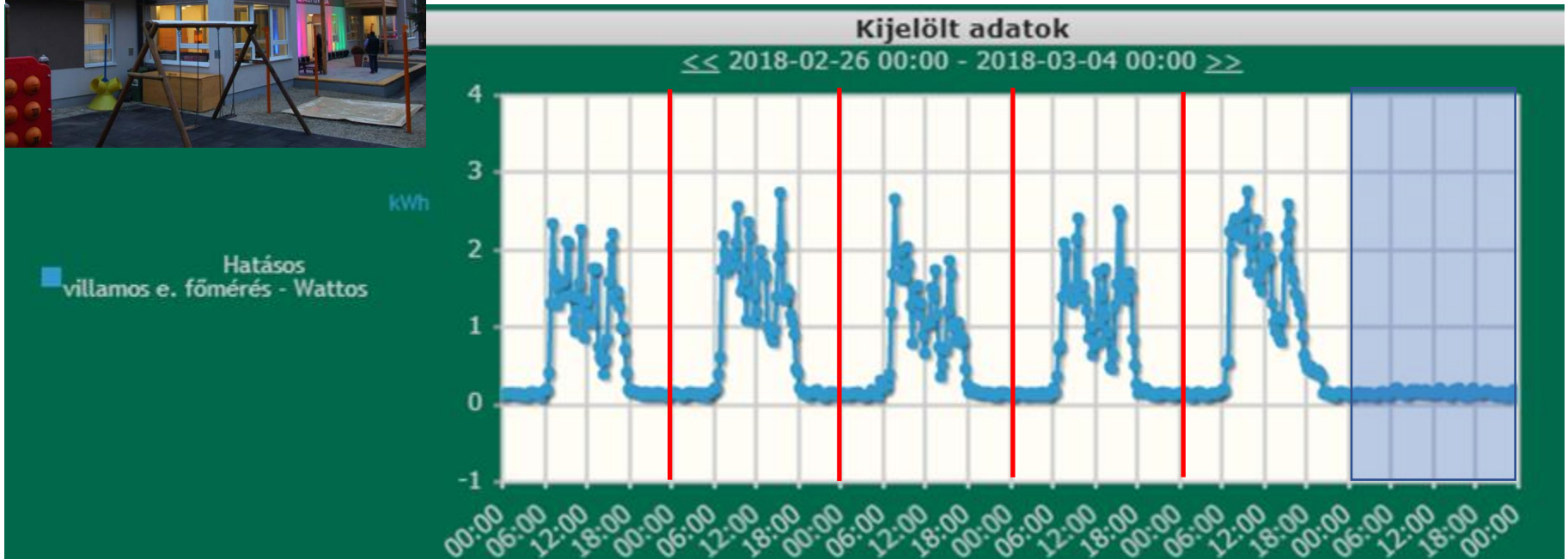
Gas consumption and temperature in a school



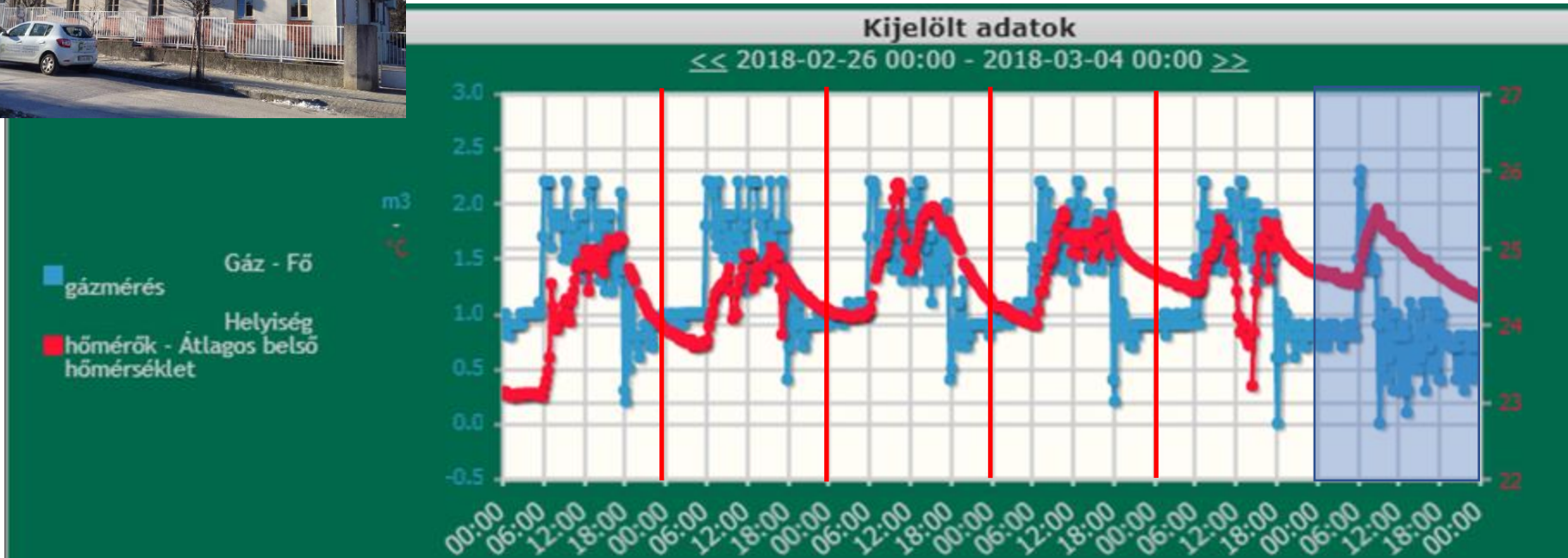
Temperature in a school



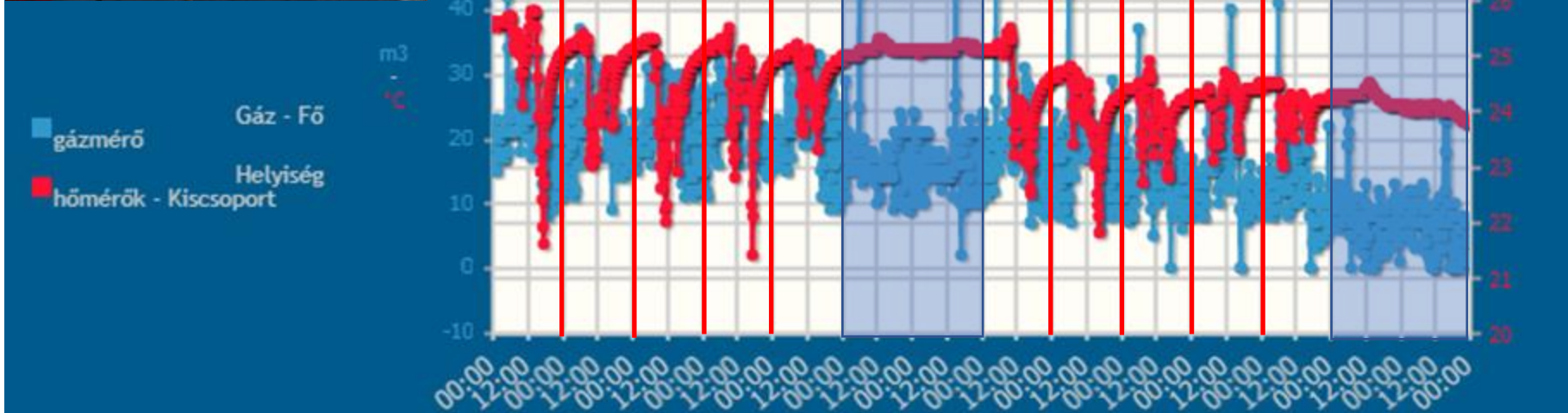
Electricity consumption in a kindergarden



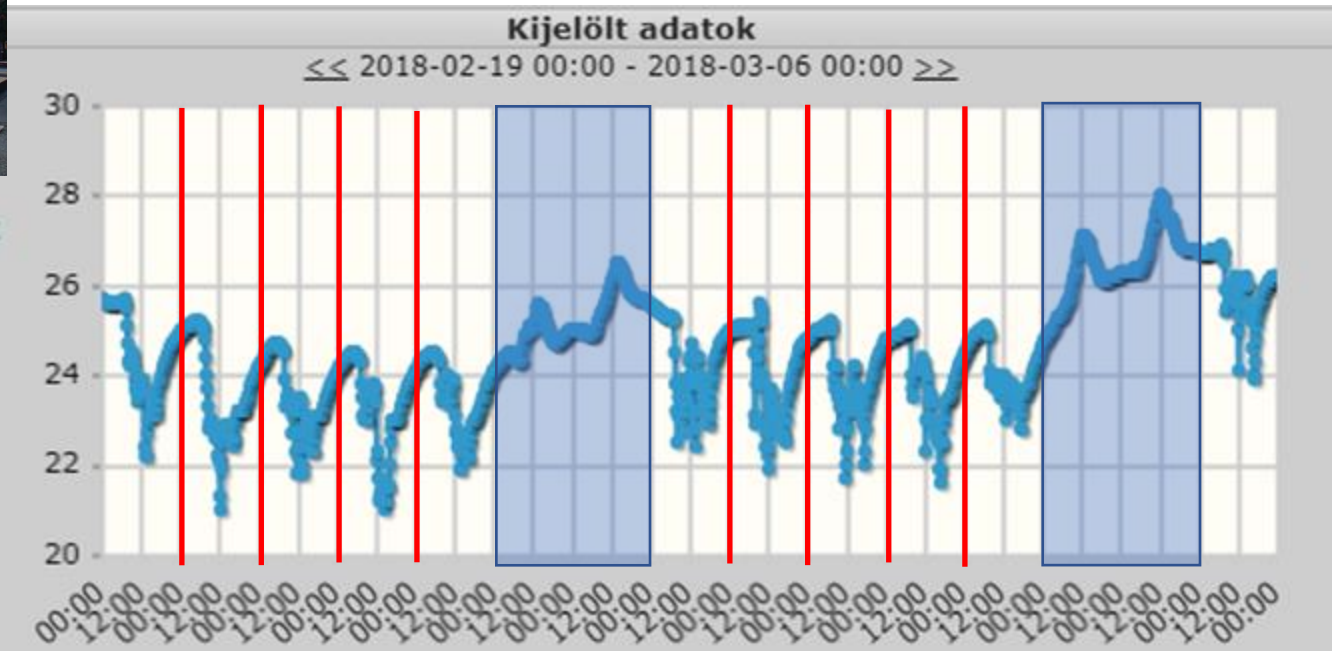
Gas consumption and temperature in a kindergarden



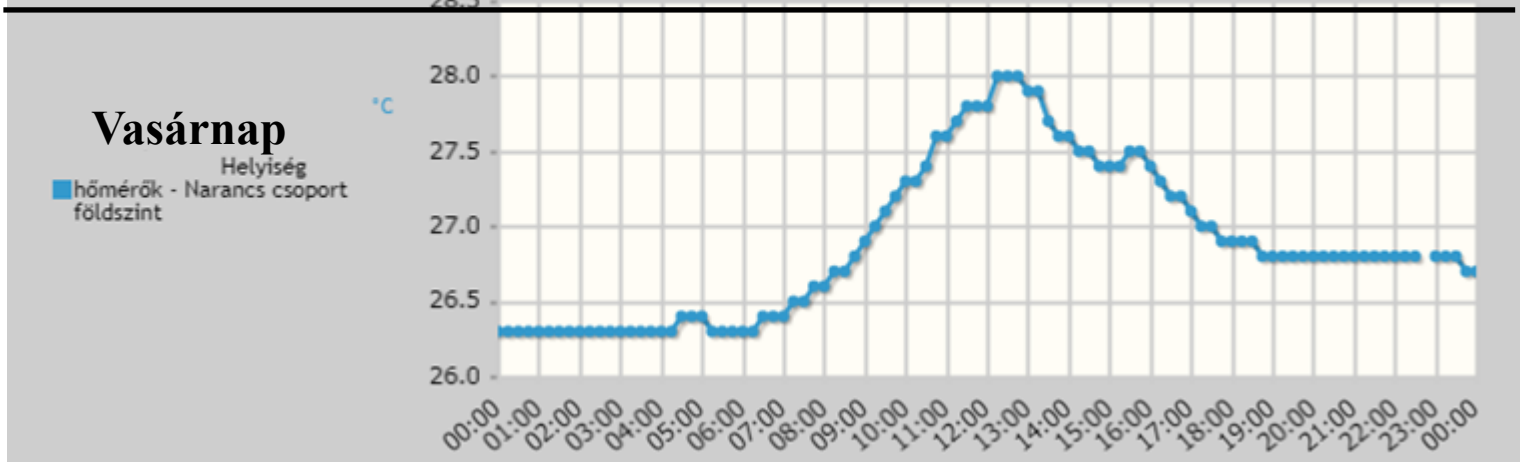
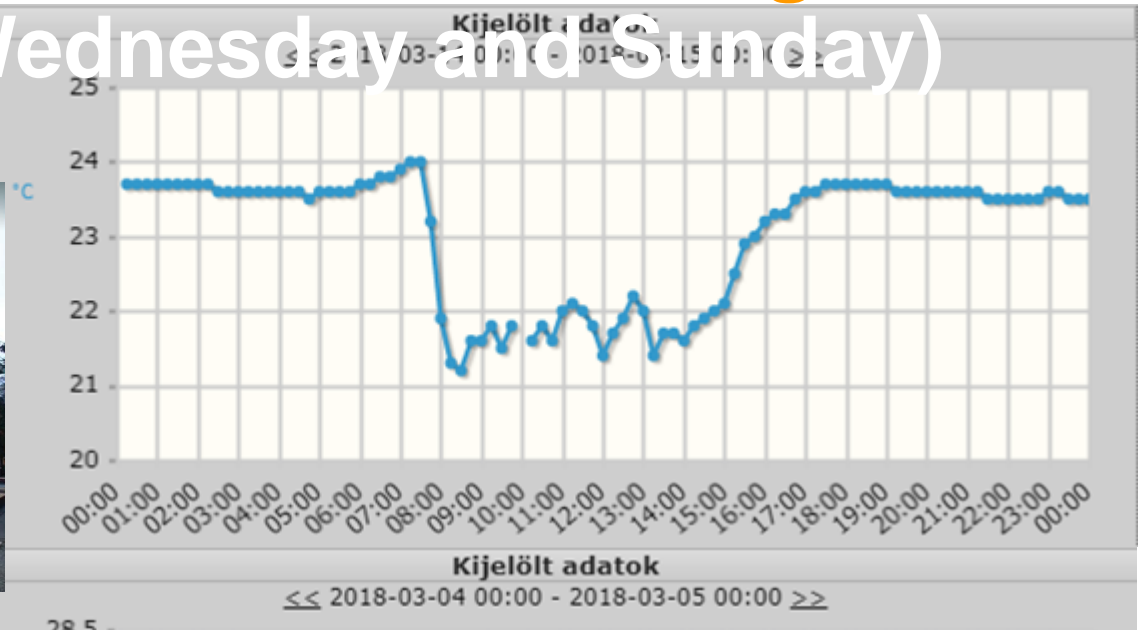
Gas consumption and temperature in a kindergarden



Temperature in a kindergarden

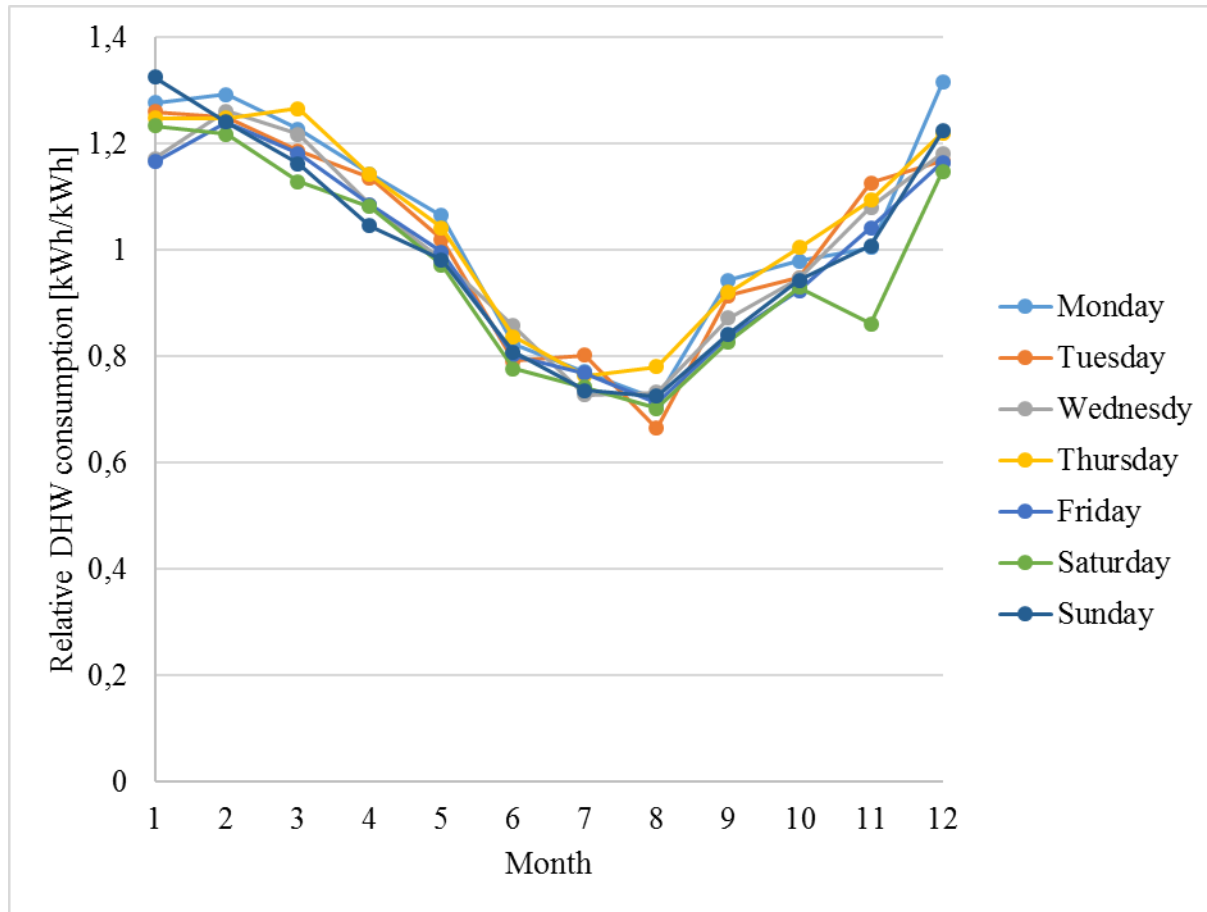


Temperature in a kindergarden (Wednesday and Sunday)



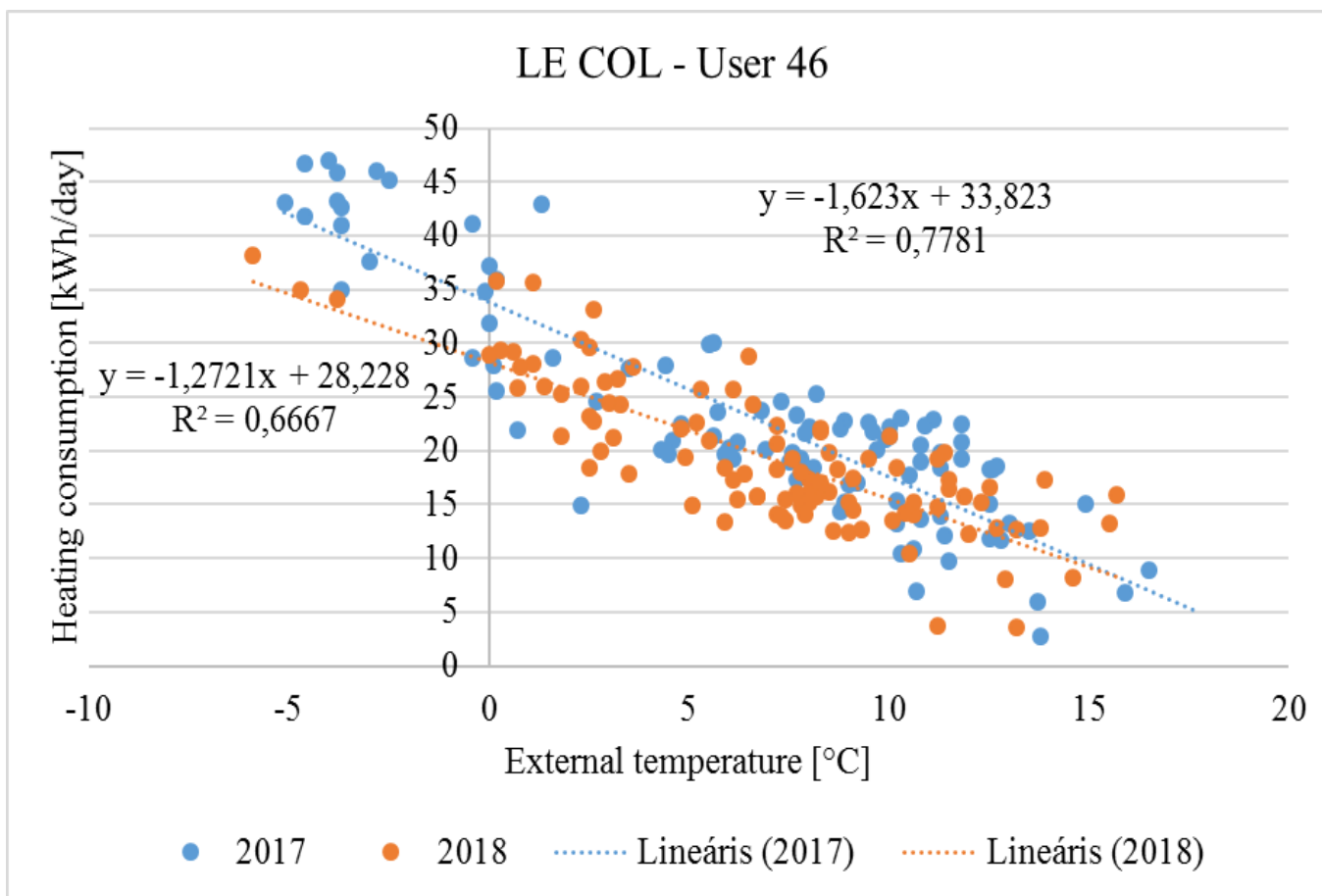
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Analysis of hot water consumption habits



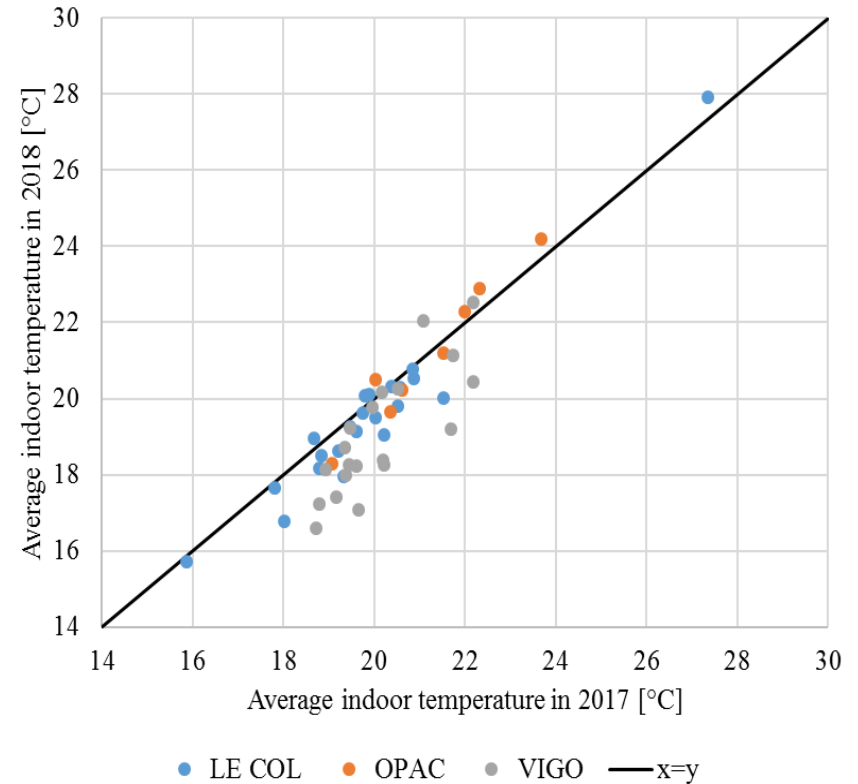
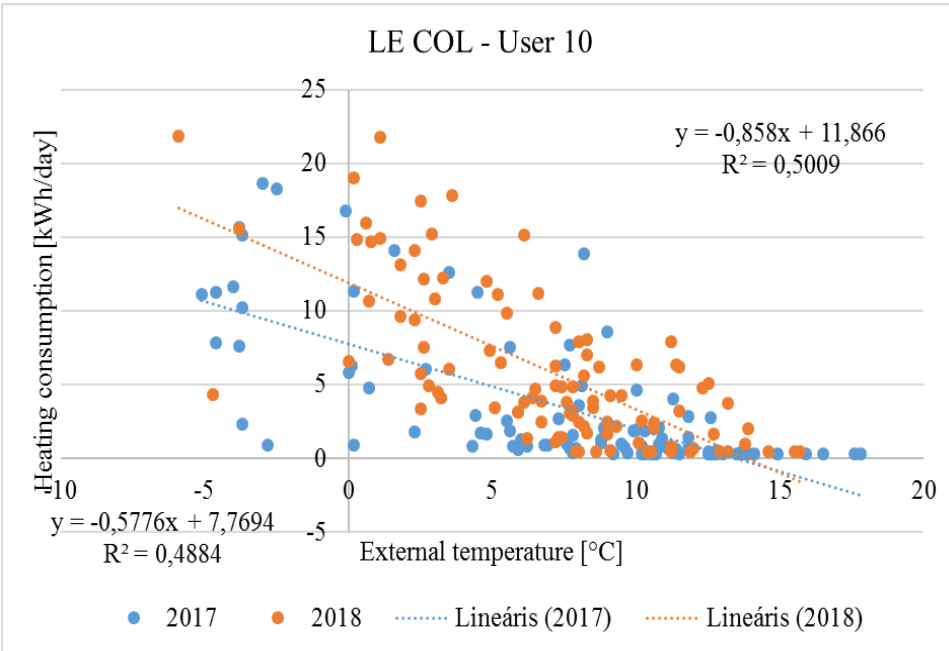
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Analysis of intervention impacts



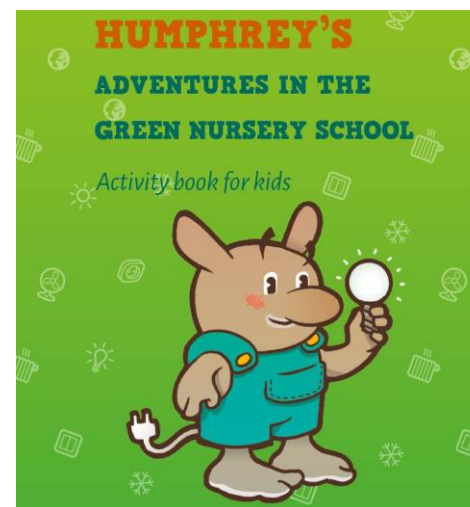
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Analysis of intervention impacts



Changing behaviour – actions other than analytical DSM

- Leaflets, newsletters:
 - Introduce project
 - Explain display
 - Energy saving tips
- Display of monitored data
- Energy saving tips
- Posters, pictograms designed by the drawing school
- „Energy commandos”
- Competitions



Further information



Contact Mr Tamás Csoknyai PhD*
Ms Zsófia Hamza
Mr Attila Varga



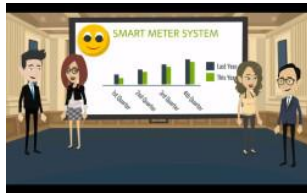
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