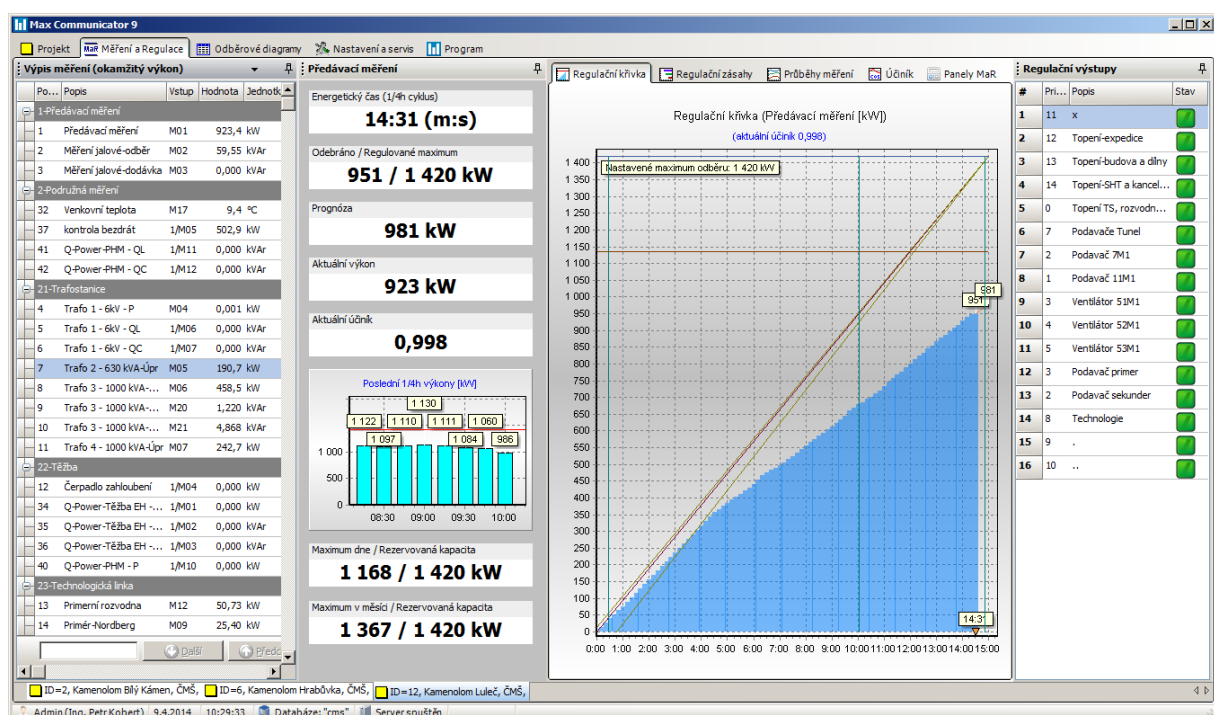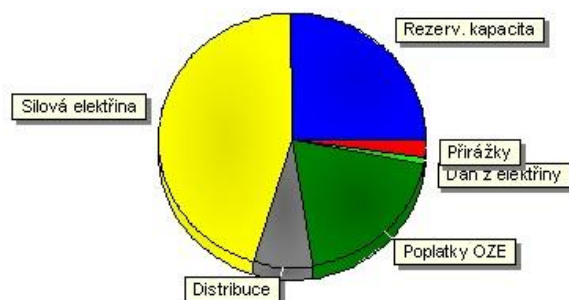**PK ELEKTRONICKÉ SYSTÉMY A SOFTWARE**
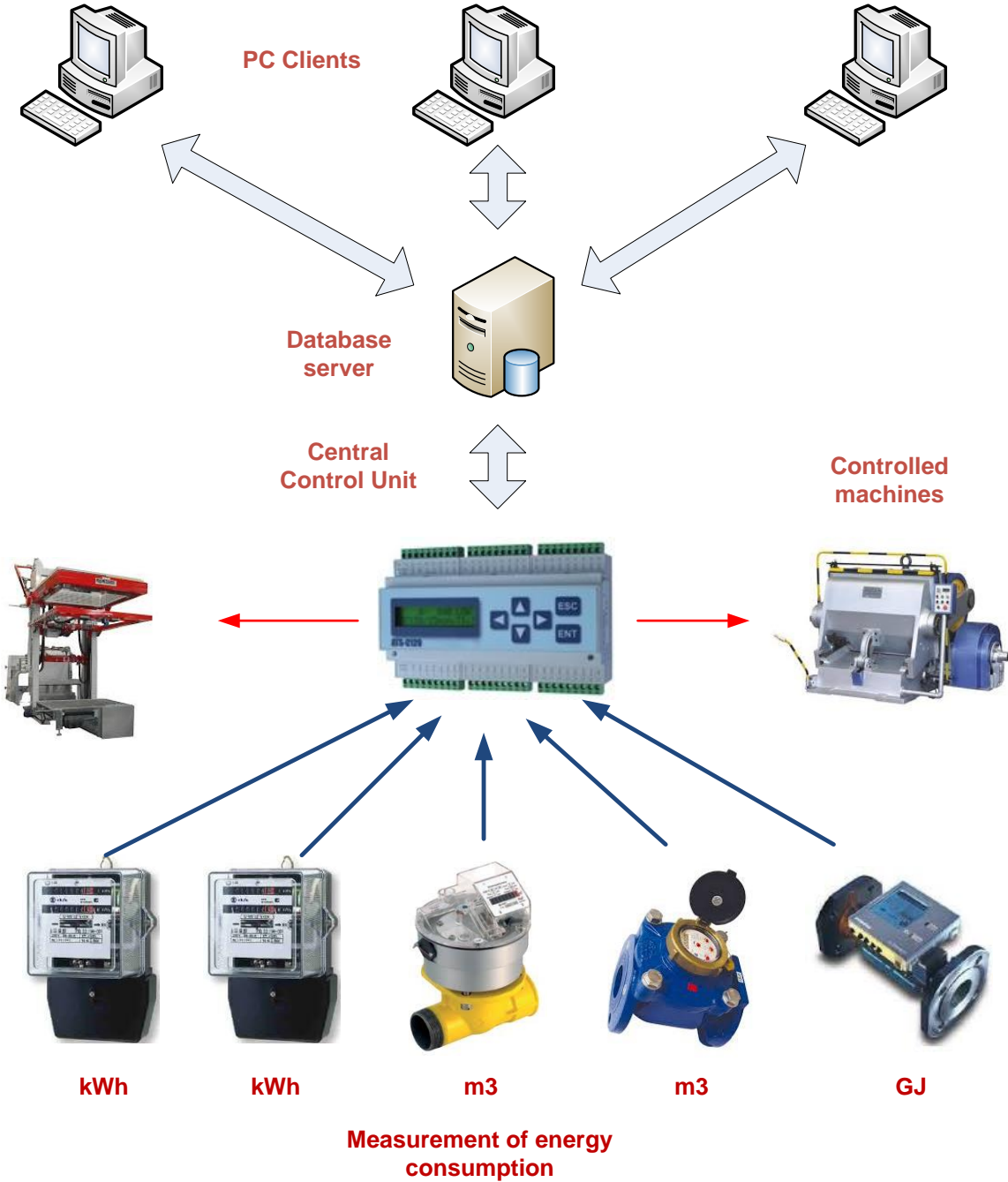
PRESENTATION

Max Communicator 9

A solution for enterprise energy management

- **Metering and regulating the progress of energy consumption (electricity, gas, water, heat, …)**
- **Calculating costs of operation, production and reserved capacity**
- **Monitoring the operation of means of production and effectivity assessment**
- **Optional manual operation management**
- **Network quality control**
- **Complete data archive**

System structure

PC Clients

Database server

Central Control Unit

Controlled machines

kWh   **kWh**   **m3**   **m3**   **GJ**

Measurement of energy consumption

System structure description:

Meters

- Any energy consumption meter as – electricity meter, gasometer, hydrometer, heat meter, etc., with so-called *"impulse output"*.
- Metering other quantities: temperature, humidity, pressure, flow, surface, voltage, current, etc., through the converter PRx2P or temperature and humidity sensors THPC-18
- Connection with a central control unit (e.g. ATS-C120) using a cable (up to hundreds of meters) or a LAN data network (transmitter ECT-16)

Central control unit

- Serves for autonomous meterings and all-system management
- Automatic operation independent on a user or a superior software
- Backed-up memory, automatic recovery of operation after a power outage
- Types of control units:
  - o ATS-C120 (120 metering inputs, 32 regulating outputs)
  - o ATS-mini (6 metering inputs, 6 regulating outputs)
 - o MM-216 (16 metering inputs, 1 regulating output)

Server

- Serves for a communication with control units – the number of control units in a system is not limited
- Provides automatic downloading and saving of measured data
- The server is divided into:
  - o A powerful MAXCOMM server (requires OS MS Windows)
  - o A database MySQL server (besides Windows supports Linux as well)
- The number of connected users (clients) is not limited
- A server can also be omitted and it's possible to run a software with an embedded server (*one-user mode*)

Software

- A visual part of the control software – so-called client part of the software
- Each user of the system has his/her "own" client installed on his/her computer *(a terminal server can be used as well)*
- The number of client installations is not limited in a software nor licensing way
- The license is of the OEM type – bound to the central control unit
- No additional after-purchase fees for running the system
- Automatic updates (can be switched off)
- Remote technical support (through Team Viewer)

Software description
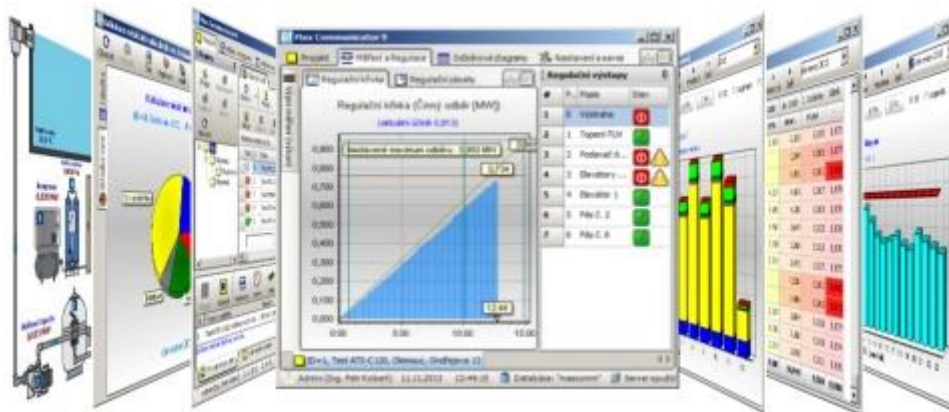
A complete description and manuals for running and installing the application **Max Communicator 9** can be found on the maker's website: https://www.pk-elsys.cz/max-communicator/.

Characteristics

- A Windows app (*from XP to the last version*)
- Server-client operation mode or an operation with an embedded server and database
- Data from the central control unit (the progress of metering and regulation) are downloaded in batches – it's not necessary to maintain a permanent connection between SW and HW – the control unit has a months-long memory capacity
- Data are saved to a MySQL-type database and it's possible to share/export them with another apps
- The software can be run in Czech / English / Serbian or it's possible to add another translation
- Three-level user authorization – admin / operator / user
- Warning reports – visual, sound, e-mail, SMS, history
- Management of up to hundreds control units and thousands of meterings
- Visualization of the current state of energy consumption, adherence to the reserved capacity and network quality (*power factor, voltage, outages*)
- Print reports of metered and saved data, exports, Excel, …
- Cost calculation, comparing consumptions for previous periods of with other plants
- History of regulating interventions, regulating progress
- User-defined technological panels with current power values
- User-defined desktop with all required information
- Automatic data back-up to an external or network disk
- Retroactive corrections and data re-calculations
- Data back-up / recovery

Management of more business premises

- Hierarchical layout
- Quick overview of the state of metering and connections
- Import/Export of individual projects
- Setting metering and regulating parameters (*e.g. reserved capacity*)

Diagnostics history

Current state of metering and regulating

- A list of all meters and their current instantaneous power (energetic flow)
- A panel of the main (handover) metering with data about keeping/exceeding the reserved capacity and import quality (power factor)
- Current regulating curve versus reserved capacity
- The state of regulating outputs incl. possibility to be switched on / switched off manually
- Bars on the right and on the left can be hidden, more data on the tabs:
    - Regulating interventions (the progress of switching off regulating outputs)
    - Metering progresses (the progresses of instantaneous power for selected meterings)
    - Power factor (ratio of idle and active power)
    - MaR panels (user-drawn technological scheme with current data)
    - Regulating panel (displaying basic regulating data in capital letters)
    - Voltage, current, … (displaying the current state of the network)
    - VA history (displaying a history of the network state)
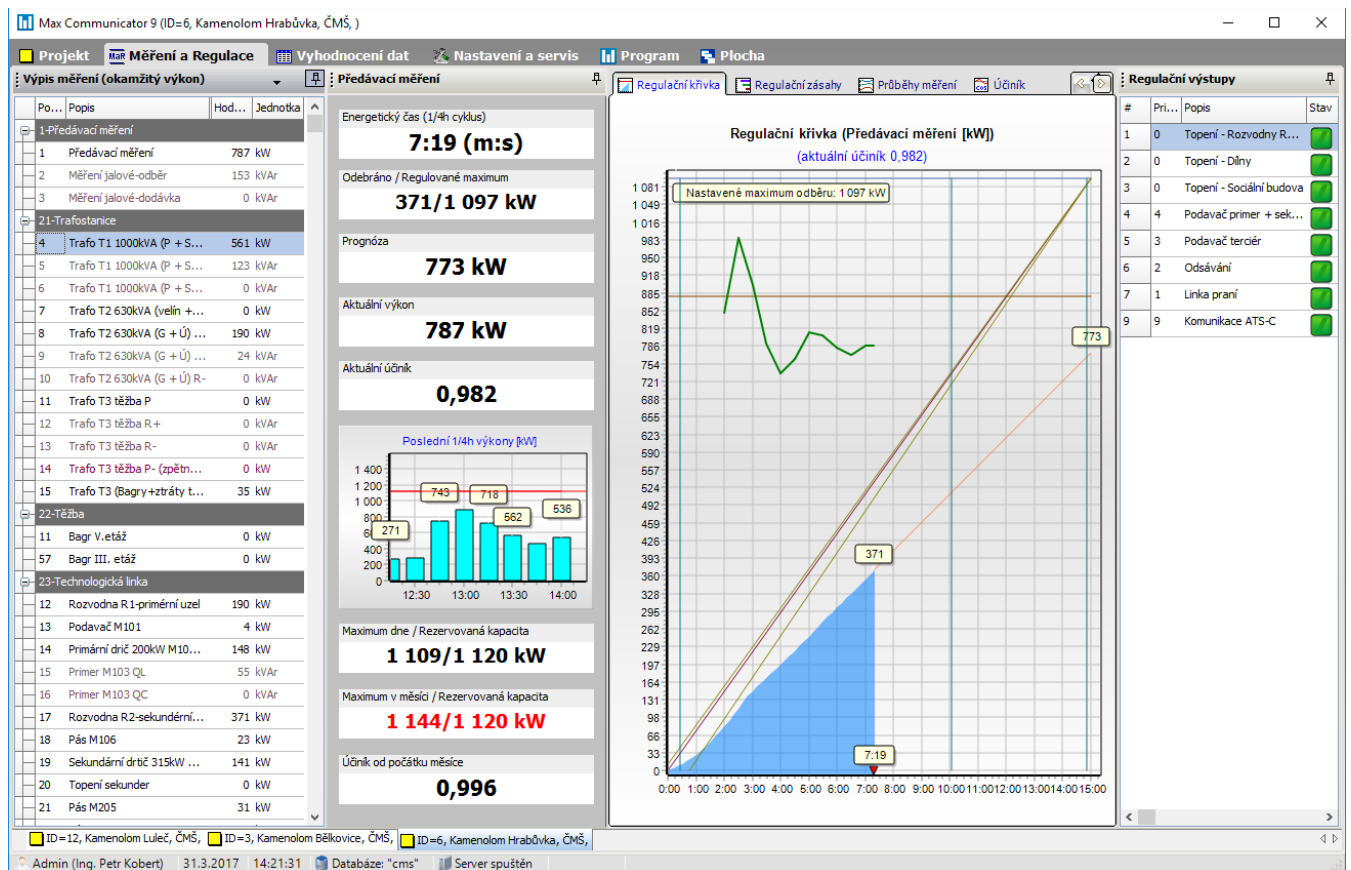
The progress of instantaneous power for selected meterings
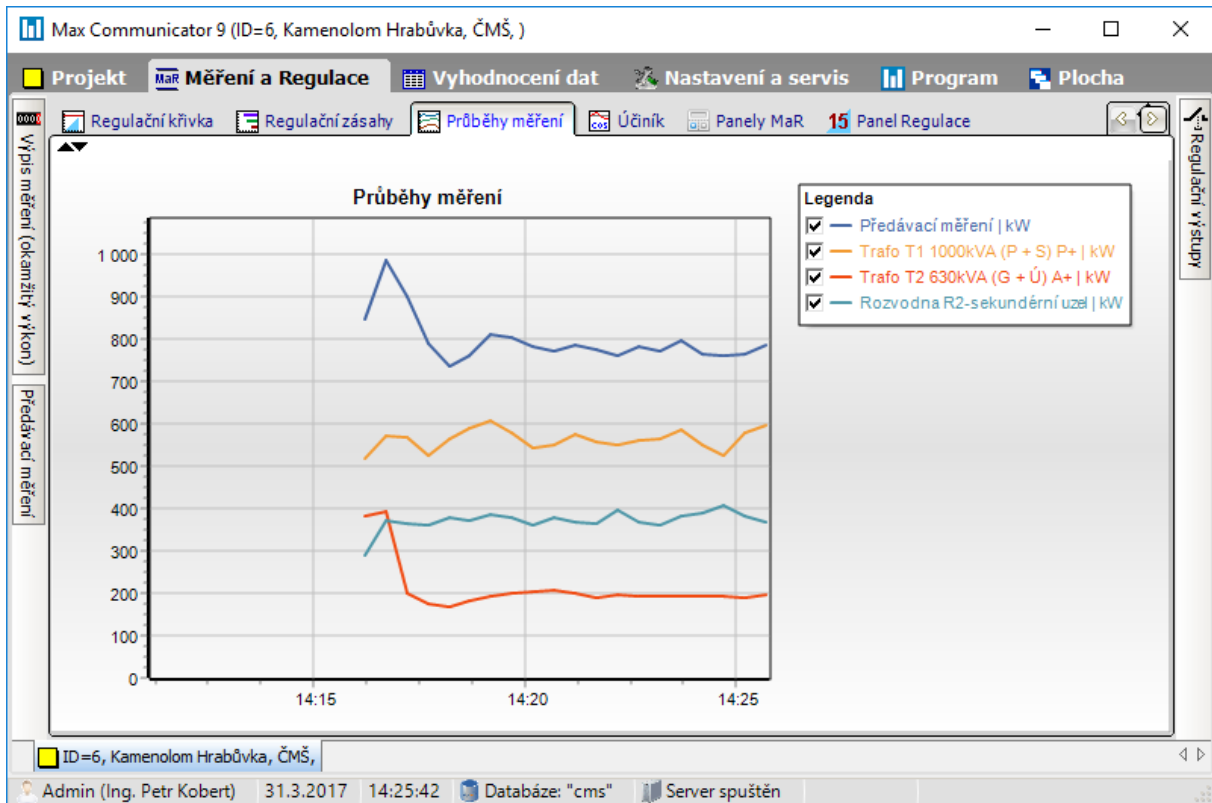
The progress of power factor
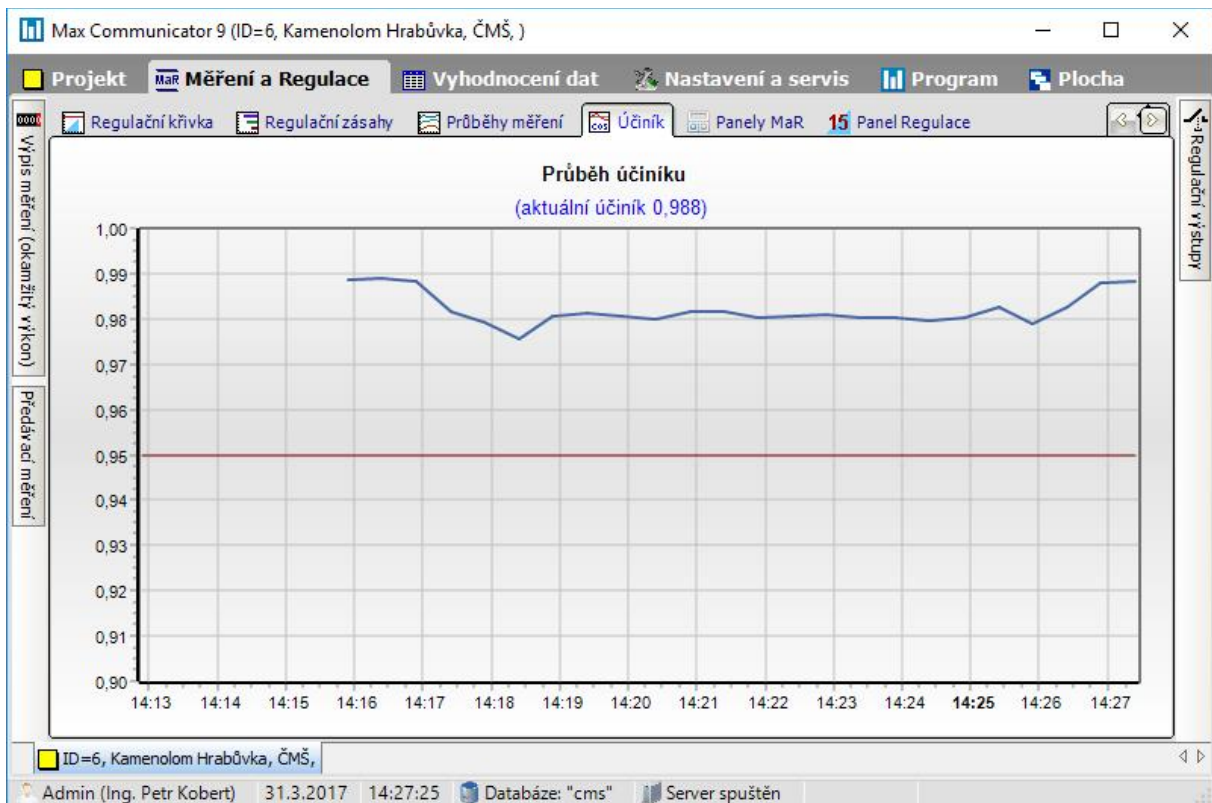
Current network state (voltage, current, power)
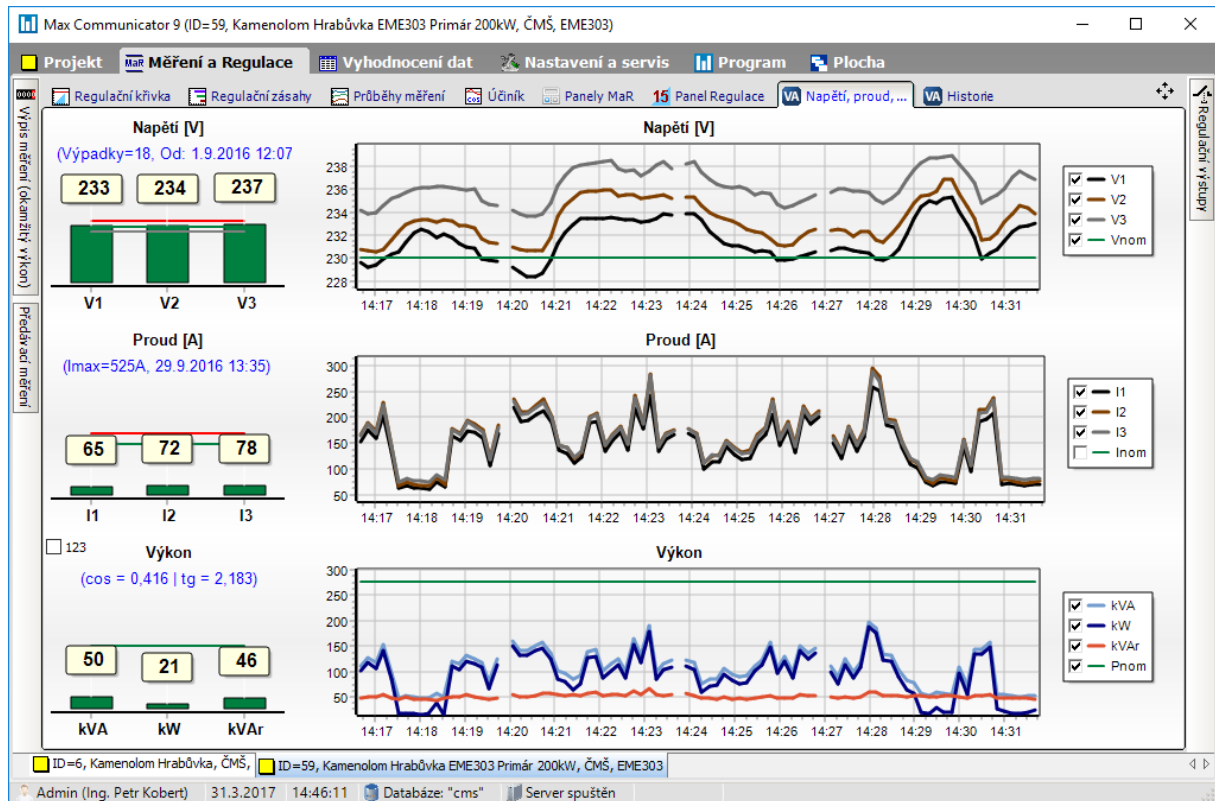
Network state history (voltage, outages, current, max. curr…)
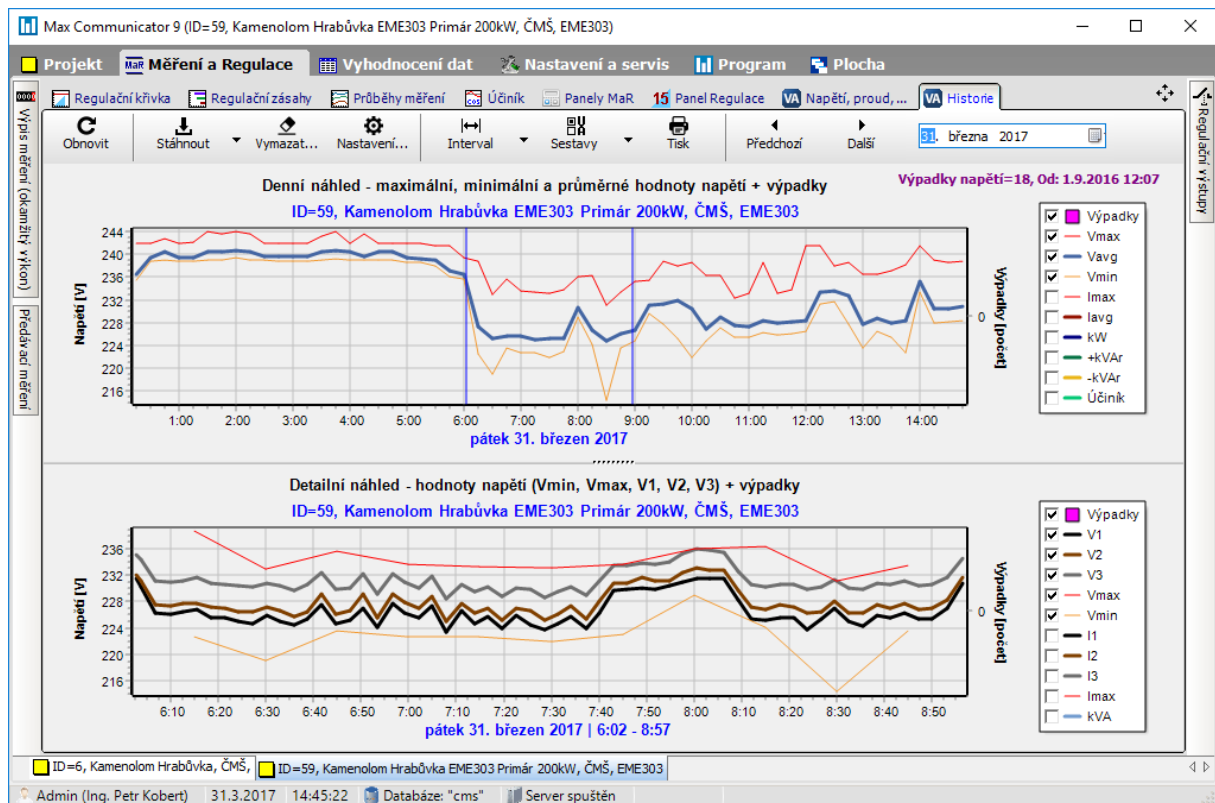
MaR panels – user-defined schemes
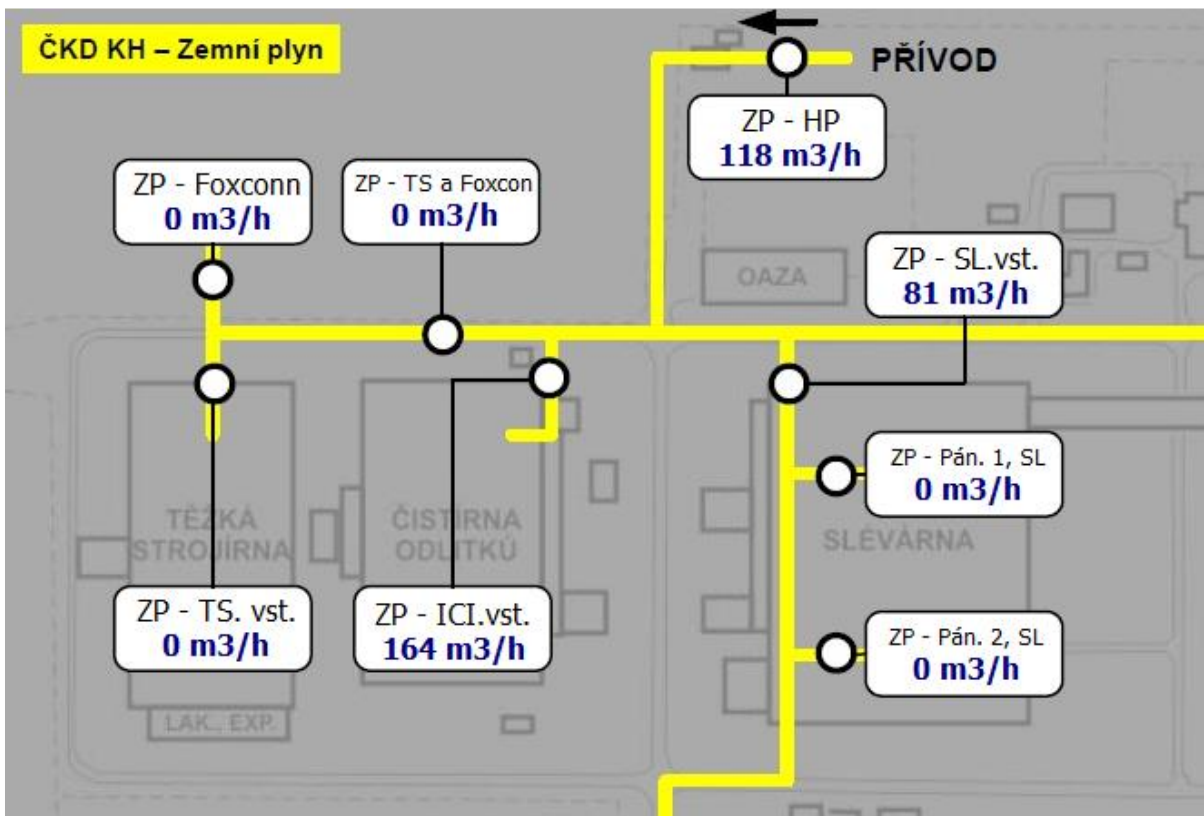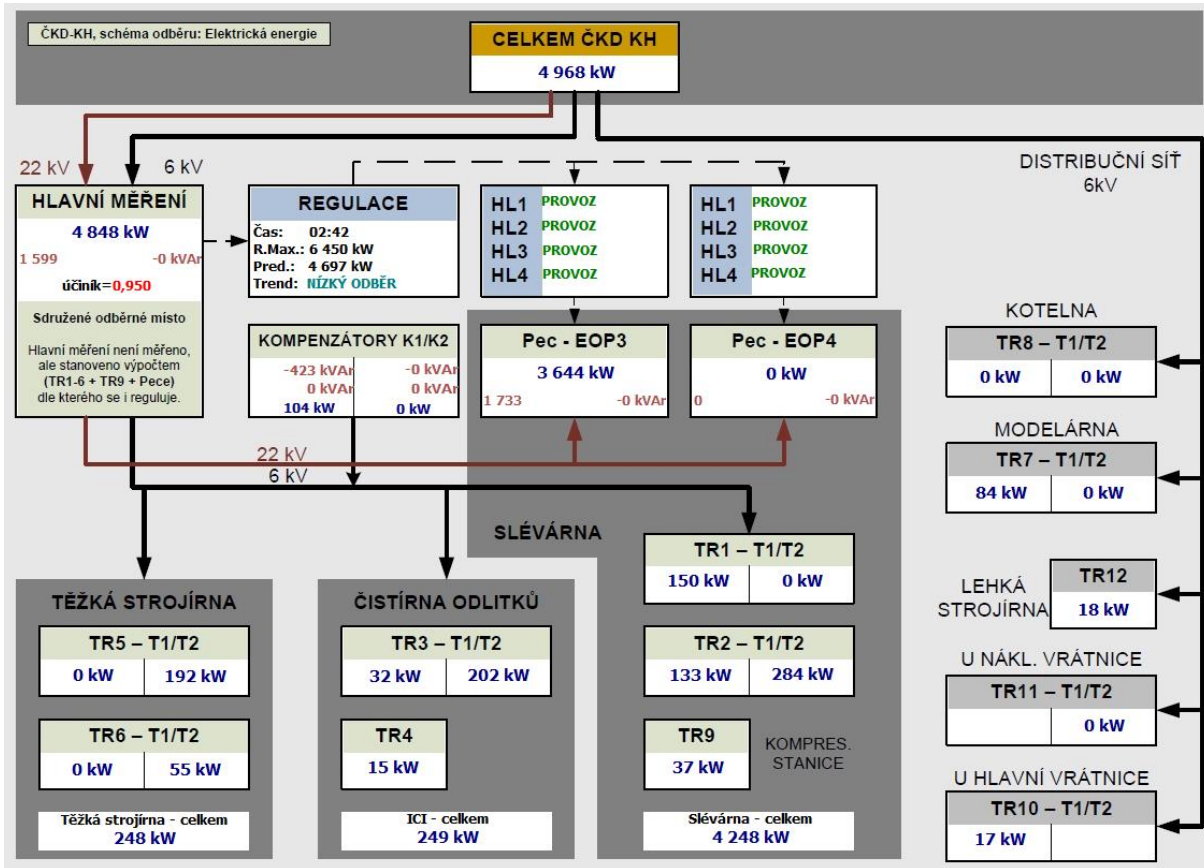
Daily progress of the electric energy import - main metering

- Visualization of saved data – measured values of the energy consumption progress
- Each report (print report) of data has two parts – a table and a graph
- Control bar (buttons) is common
- A diagram (print report) of a handover metering is specific in that it includes data about keeping the reserved capacity and idle import / export
- The bottom row includes overall data for all day, month, year – according to the diagram type

Yearly print report – main (handover) metering

- Includes also a cost calculation incl. additional charges according to the assigned pricelist
- The buttons "Previous" a "Next" will load the data of an adjacent period or use the calendar

Roční předávací diagram (ID=1, Elektro, ,)

Otevřít... | Obnovit | ▼ | Přerušit | Tisk | Kopírovat | Uložit | Excel | Email | ◄ Předchozí | ► Další | 2016 ▦▾

Interval	Odběr	Kumulace	Max. Výkon	Rezerv. Kap.	Překročení	Využití	Jal. Odběr	Jal. Dodávka	Účiník	Platba	Cena/jedn.
2016	MWh	MWh	MW	MW	MW	%	MVArh	MVArh	-	Kč	Kč
1	1 367,039	1 367,039	6,434	6,500		29	203,496	2,602	0,989	3 150 862	2 305
2	1 414,357	2 781,396	6,433	6,500		30	261,744	7,566	0,983	3 224 727	2 280
3	1 441,123	4 222,519	6,438	6,500		30	252,810	13,801	0,985	3 268 017	2 268
4	1 373,797	5 596,316	6,399	6,500		29	316,679	11,586	0,974	3 165 054	2 304
5	1 381,988	6 978,304	6,412	6,500		29	290,275	8,351	0,979	3 176 037	2 298
6	1 264,355	8 242,659	6,367	6,500		27	304,644	1,275	0,972	2 994 726	2 369
7	781,655	9 024,314	6,355	6,500		16	182,442	0,712	0,974	2 263 250	2 895
8	1 273,637	10 297,951	6,282	6,500		27	296,733	0,707	0,974	3 008 537	2 362
9	1 153,957	11 451,908	6,386	6,500		24	289,549	0,031	0,970	2 859 251	2 478
10	1 232,095	12 684,003	6,393	6,500		26	294,463	0,206	0,973	2 979 884	2 419
11	1 509,383	14 193,386	6,445	6,500		32	341,445	0,010	0,975	3 407 618	2 258
12	1 192,885	15 386,271	6,399	6,500		25	250,554	0,237	0,979	2 919 401	2 447
Souhrn	**15 386,271**		**6,445**			**27**	**3 284,834**	**47,086**	**0,978**	**36 417 364**	**2 390**

Monthly print report of a subsidiary metering

- View can be changed to 2D/3D, the menu bar and legend can be hidden
- Under the "green arrow" button there is another setting hidden – adding import limits
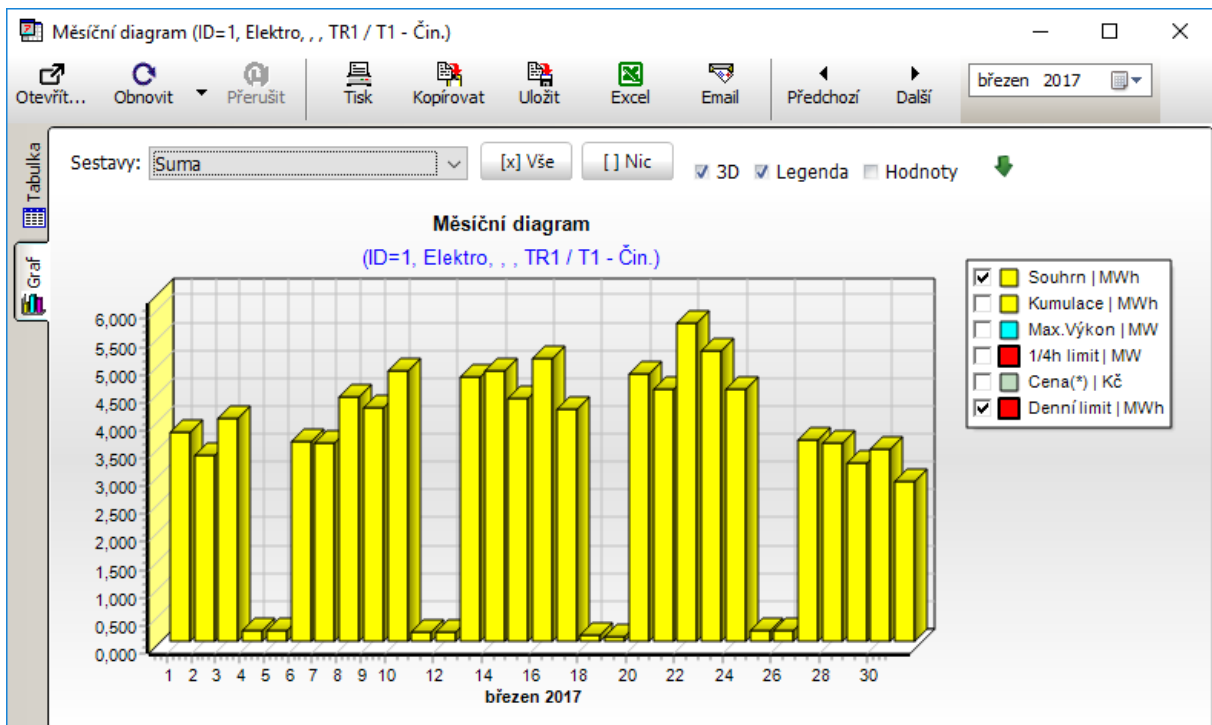
Reading of a meter in a free interval FROM-TO

Progress of a spatial temperature metering

Yearly diagram of natural gas consumption

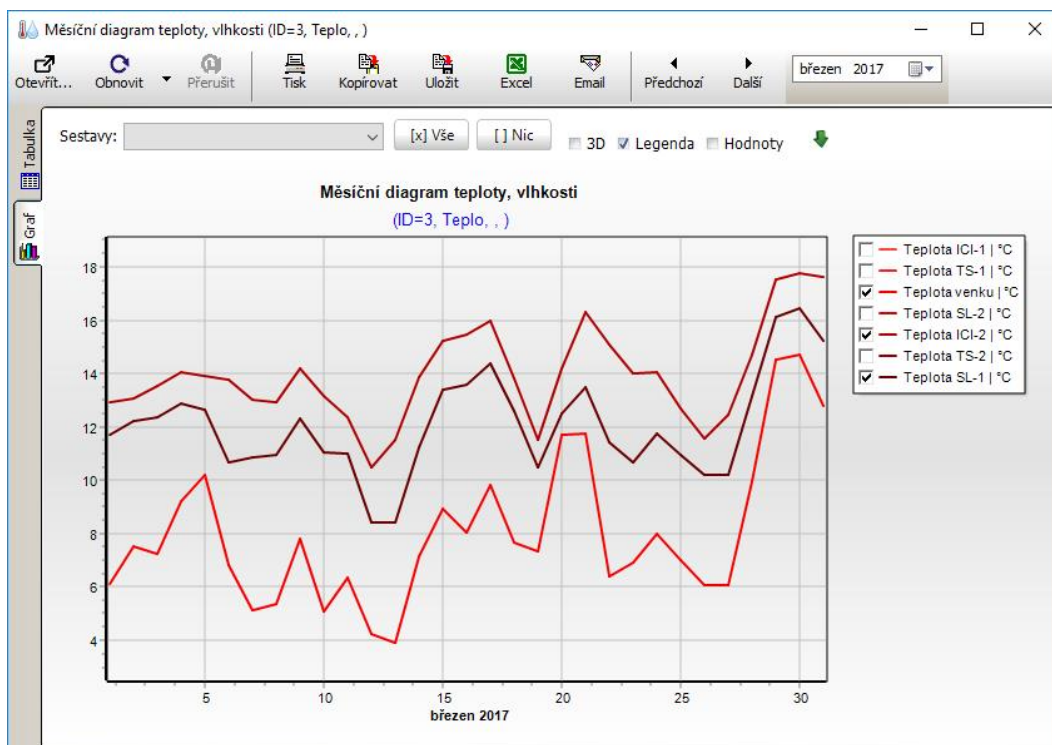- Evaluation according to a gas day from 6:00 AM to 5:59 AM the following day

Roční diagram spotřeby plynu (ID=4, Plyn, ,)

Otevřít... Obnovit ▾ Přerušit Tisk Kopírovat Uložit Excel Email Předchozí Další 2016

Interval	ZP - HP	ZP - SL.vst.	ZP - ICI.vst.	ZP - TS a Foxcon	ZP - TS. vst.	ZP - Foxconn	ZP - Pán. 1, SL	ZP - Pán. 2, SL	ZP - LS	ZP - SL- AL	ZP
2016	m3	m3	m3	m3	m3	m3	m3	m3	m3	m3	
1	79 912	30 820	46 730	0	0	160	1 229	0	0	565	
2	74 549	30 130	48 402	0	0	147	1 967	0	0	648	
3	75 080	29 544	45 593	0	0	158	1 266	0	0	0	
4	71 965	24 533	46 989	0	0	149	1 726	0	0	1 017	
5	84 800	19 188	68 057	0	0	161	1 997	0	0	0	
6	82 036	26 961	57 611	0	0	128	1 718	0	0	0	
7	40 061	7 331	32 779	0	0	119	882	0	0	986	
8	53 688	15 204	42 754	0	0	104	2 048	0	0	0	
9	56 787	19 349	37 898	0	0	89	1 641	0	0	757	
10	67 998	27 461	41 885	0	0	101	1 857	0	0	0	
11	91 635	35 685	54 514	0	0	90	2 763	0	0	0	
12	74 671	29 530	43 746	0	0	78	2 331	0	0	0	
Souhrn	853 181	295 735	566 957	0	0	1 483	21 425	0	0	3 973	

Yearly user report for more meterings

Roční diagram sestavy měření (1 - Souhrn energií)

Otevřít... Obnovit ▾ Přerušit Tisk Kopírovat Uložit Excel Email

Předchozí Další 2016 MWh/Kč ▾

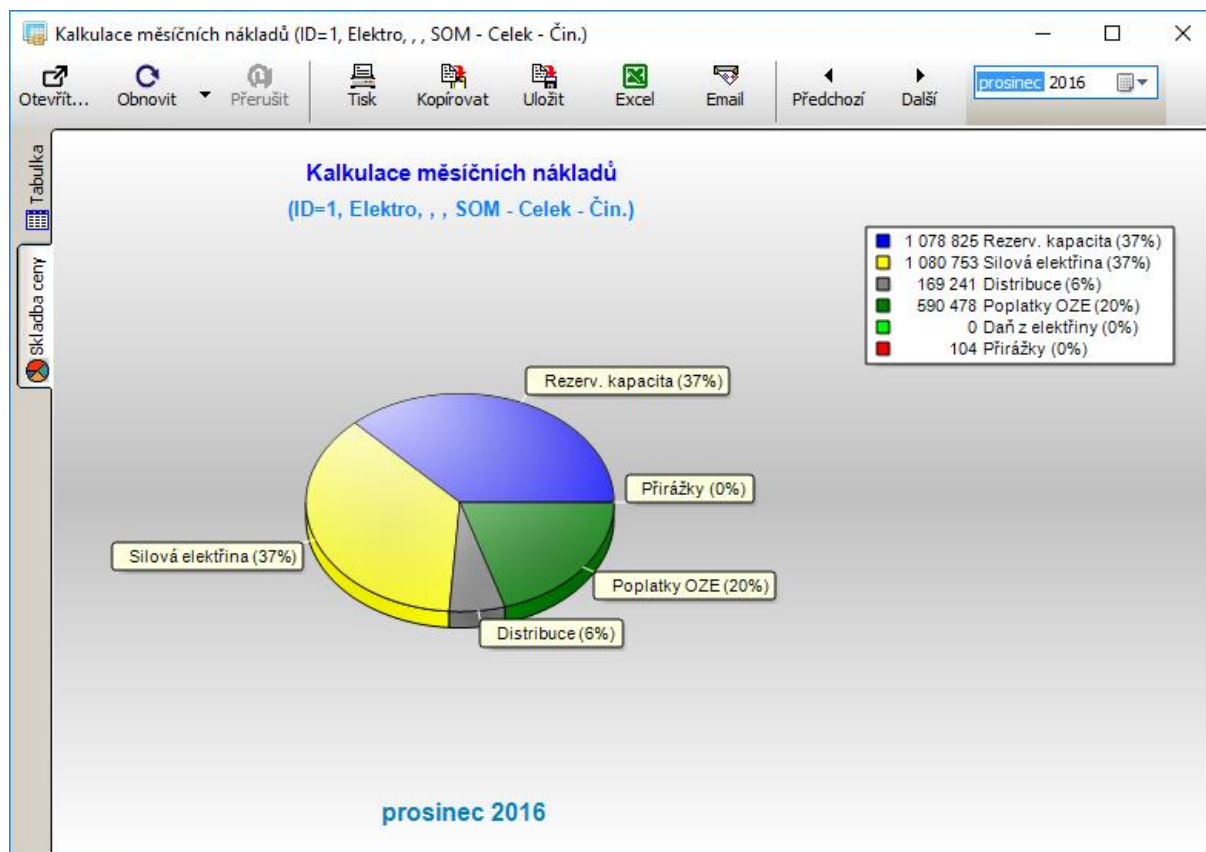| Interval	Elektr. Energie	Pitná voda	Užitková voda	Teplo	Acetylen	Argon	Kyslík	Směsný plyn	Zemní plyn
2016	MWh	m3	m3	GJ	m3	m3	m3	m3	m3
1	1 482,579	4 560	2 429	8 521	4 678	93	10 068	312	79 912
2	1 527,951	5 201	5 106	4 284	5 406	216	15 844	269	74 124
3	1 536,028	4 655	2 557	4 653	6 763	159	14 856	276	75 137
4	1 473,581	4 265	3 080	2 426	5 925	214	18 608	327	72 382
5	1 479,105	4 562	4 618	1 356	6 128	190	38 100	16 672	84 544
6	1 326,016	4 143	4 948	1 041,5	4 987	137	47 134	70 818	81 485
7	833,926	4 151	5 396	984	4 255	81	222 563	122 052	40 898
8	1 338,380	4 407	5 950	913,5	4 609	133	373 325	64 321	53 678
9	1 236,751	4 749	5 311	900	4 312	194	344 084	52 638	56 802
10	1 337,780	4 691	3 616	1 619	3 788	165	388 177	2 467	67 707
11	1 643,821	5 003	2 833	6 281	4 817	227	460 628	297	90 828
12	1 301,694	5 341	2 581	9 211	3 612	165	308 680	205	75 689
Souhrn	16 517,613	55 727	48 425	42 190	59 280	1 974	2 242 067	330 652	853 185

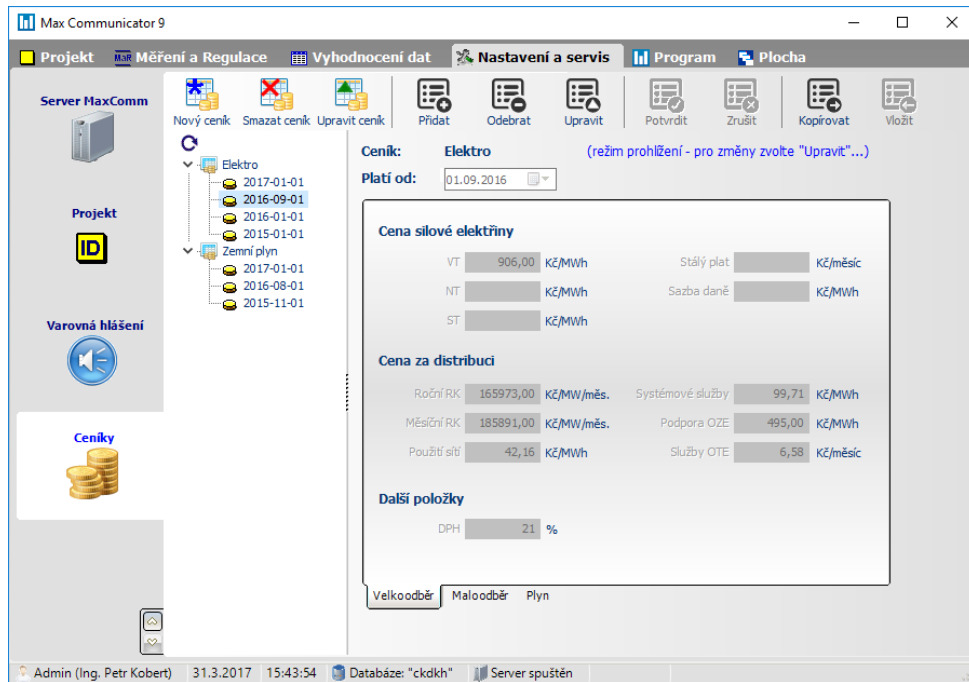# Calculating monthly costs of a handover metering

Kalkulace měsíčních nákladů (ID=1, Elektro, , , SOM - Celek - Čin.)

prosinec 2016

ID	Období: 2016-12	Jednotka	Množství	Cena/jedn.	Platba [Kč]
	1-Distribuce				
1	Naměřené 1/4h maximum	MW	6,399		
2	Stálý měsíční plat za měsíční RK	MW*měs.		185 891,00	
3	Stálý měsíční plat za roční RK	MW*měs.	6,500	165 973,00	**1 078 825**
4	Překročení rezerv. příkonu	MW		743 564,00	
5	Překročení RK	MW		663 892,00	
6	Přirážka za nedodržení účiníku	%			
7	Nevyžádaná dodávka jalové energie	MVArh	0,237	440,00	**104**
8	Použití sítí	MWh	1 192,885	42,16	**50 292**
13	Systémové služby	MWh	1 192,885	99,71	**118 943**
15	Podpora výkupu el. z OZE	MWh	1 192,885	495,00	**590 478**
17	Služby OTE	měsíc	1,000	6,58	**7**
	2-Silová elektřina				
19	Stálý měsíční plat	měsíc			
21	Vysoký tarif	MWh	1 192,885	906,00	**1 080 753**
23	Nízký tarif	MWh			
25	Špičkový tarif	MWh			
27	Daň z elektřiny	MWh	1 192,885		
	3-Celkem				
29	Základ daně				**2 919 401**
31	DPH				**613 074**
33	Platba				**3 532 475**

Kalkulace měsíčních nákladů
(ID=1, Elektro, , , SOM - Celek - Čin.)

- 1 078 825 Rezerv. kapacita (37%)
- 1 080 753 Silová elektřina (37%)
- 169 241 Distribuce (6%)
- 590 478 Poplatky OZE (20%)
- 0 Daň z elektřiny (0%)
- 104 Přirážky (0%)

prosinec 2016

Pricelist definitions

User-compiled desktop

--- End of presentation, for more information see: https://www.pk-elsys.cz/ ---