INFRALEUNA

Energy/Water Department

Energy and Water Supply - Wastewater Disposal

LEUNA THE SITE FOR SUSTAINABLE CHEMISTRY

1. Energy/Water

InfraLeuna's Energy/Water service division operates extensive and comprehensive networks to supply customers at the Leuna Chemical Complex with steam, hot water, natural gas, air, electrical energy, drinking water, fresh water, cooling water, condensate, demineralized water, and cold water. These media can be made available to customers in different qualities.

InfraLeuna generates electricity and steam in modern gas and steam turbine plants to supply its customers at the Leuna Chemical Complex. The combined heat and power process together with reserve steam boilers ensures a demand-oriented, environmentally friendly, cost-effective, and sustainable energy supply.

1.1. Basic Services Energy

1.1.1. Steam

InfraLeuna offers you steam at different pressure levels to supply heat to plants and chemical processes:

high-pressure steam medium-pressure steam low-pressure steam.

The low-pressure steam network covers almost the entire chemical complex. Low-pressure steam is used primarily for technological processes and partly for space and building heating. In individual cases, supply tasks can also be fulfilled by reducing medium-pressure steam.

The medium-pressure steam network is the main supply system for process heat and is used exclusively in technological energy application processes. Medium-pressure steam is available site-wide for safe as well as effective supply.

High-pressure steam is available for specific applications requiring elevated thermodynamic parameters in the pressure stages 23 bar, 45 bar and 70 bar.

Technical Parameters – low-pressure steam:

parameter	unit of measurement	minimum	maximum
operating pressure	bar (g)	1.7	2.3
operating temperature	°C	saturated steam *)	210

*) steam feed temperature into the network is at least 20 K above respective saturation temperature

Technical Parameters – medium-pressure steam:

parameter	unit of measurement	minimum	maximum
operating pressure	bar (g)	12.0	15.0
operating temperature	°C	saturated steam *)	320

*) steam feed temperature into the network is at least 20 K above respective saturation temperature

Technical Parameters – high-pressure steam:

parameter (23 bar)	unit of measurement	minimum	maximum
operating pressure	bar (g)	19.0	21.0
operating temperature	°C	saturated steam *)	320

parameter (45 bar)	unit of measurement	minimum	maximum
operating pressure	bar (g)	39.0	45.0
operating temperature	°C	saturated steam *)	320

*) steam feed temperature into the network is at least 20 K above respective saturation temperature

Waste Heat Steam:

In the case of exothermic chemical processes, it is possible to feed the waste heat steam into InfraLeuna's networks. The prerequisites for this are the suitability of the parameters and compliance with the quality requirements as well as a sufficiently large number of feed-in hours per year.

The supplier of the waste heat steam is responsible for verifiable monitoring and compliance with the following quality values:

parameter	unit of measurement	limit	frequency of analysis	remarks
pH-value		7,5 - 9,5	1x per week	especially because of the possibility of organic acids and CO_2 breaking in
specific electrical conductivity	µS/cm	< 0,2	continuous measurement	degassed after strongly acidic cation exchanger at 25 °C
TOC	mg/l	< 0,2	continuous measurement	thermal catalytic digestion at > 850 °C
silicic acid	mg/l	< 0,02	1x per week	
Fe (total)	mg/l	< 0,02	1x per week	
Cu	mg/l	< 0,003	1x per week	
$Na^+ + K^+$	mg/l	< 0,01	1x per week	
Σ other cations	mg/l	n. n.	by agreement	
ammonium	mg/l	< 2,5	1x daily	
hydrazine	mg/l	< 0,01	by agreement	when hydrazine is used
Note: film-forming amines are not used in the water-steam cycle.				

The design parameters to be observed for the technical system design are to be agreed between the supplier and the customer.

1.1.2. Hot Water

InfraLeuna offers hot water for an effective design of room and building heating as well as for the preparation of service hot water. A state-of-the-art district heating network is operated in parts of site part I as well as in parts of the city of Leuna.

flow pipe	unit of measurement	minimum	maximum
operating pressure	bar (g)	2.5	8.0
operating temperature	°C	70	110 (operation in winter)

Requirements for the supply of hot water:

- The maximum return temperature of 60 °C must not be exceeded.
- The house connection station must be designed for a pressure of at least pN = 16 bar (g).
- The hot water volume flow is to be limited to the contractually agreed heat output.
- An appropriate differential pressure control with volume limitation must be provided, the differential pressure between flow and return must be < 0.8 bar.

The design parameters to be observed for the technical system design must be agreed between the supplier and the customer.

1.1.3. Natural Gas

Natural gas is available in various pressure levels for material and thermal use. This corresponds to natural gas of the 2nd gas family according to the technical rules of the DVGW for gas quality in accordance with worksheet G 260/I, II in the currently valid version.

The gas currently has the following characteristics:

characteristics	sign	unit of measurement	value
calorific value (guide value)	H_o,n	kWh/m³	11.1
Wobbe-index	W_o	kWh/m³	14.7
relative density	d	-	0.57
total sulfur content	S	mg/m³	< 20
water dew point		°C	approx. 5 1)

1) Depending on the respective transfer pressure of the gas. On an annual average, the water dew point is 5 °C.

The following pressure levels are available at the Leuna Chemical Complex:

natural gas 4 bar natural gas 16 bar natural gas 55 bar.

Natural gas at a pressure level of 4 bar supplies customers with a low to medium gas demand.

Natural gas at a pressure level of 16 bar supplies customers with a medium gas demand.
High-pressure natural gas at 55 bar is mainly used to supply combined heat and power plants and chemical plants that require large quantities of gas for material use. This pressure level also represents the transfer pressure level from the upstream network operator.

Technical parameter – natural gas 4 bar:

parameter	unit of measurement	minimum	maximum
operating pressure	bar (g)	2.0	3.5
operating temperature	°C	tu	50

tu = ambient temperature

Technical parameter – natural gas 16 bar:

parameter	unit of measurement	minimum	maximum
operating pressure	bar (g)	9.0	16.0
operating temperature	°C	tu	50

tu = ambient temperature

Technical parameter – high-pressure natural gas 55 bar:

parameter	unit of measurement	minimum	maximum
operating pressure	bar (g)	25.0	55.0
operating temperature	°C	tu	50

tu = ambient temperature

The design parameters to be observed for the technical system design are to be agreed between the supplier and the customer.

1.1.4. Air

Control air is dried compressed air (dew point -20 °C) and is mainly used for control and regulation processes.

The control air network is available throughout site part II and in the south of site part I. The compressed air network is only available for special supply tasks in site part II.

Technical parameter – compressed air:

parameter	unit of measurement	minimum	maximum
operating pressure	bar (g)	6.5	8.2
operating temperature	°C	tu	50

tu = ambient temperature

Technical parameter – control air:

parameter	unit of measurement	minimum	maximum
operating pressure	bar (g)	6.0	7.0
operating temperature	°C	tu	50
pressure dew point at tu > 0 °C	°C	- 20 (ISO 8573-1 class 3)	
pressure dew point at tu ≤ 0 °C	°C	- 40 (ISO 8573-1 class 2)	

tu = ambient temperature

The design parameters to be observed for the technical system design are to be agreed between the supplier and the customer.

1.1.5. Electrical Energy

Electrical energy is available in different voltage levels. The 110 kV and 30 kV voltage levels are the preferred distribution levels. Customers are supplied predominantly at the 6 kV voltage level, with small customers also being supplied at the 0.4 kV voltage level. In the case of greater power requirements, it is also possible to obtain electrical energy above the 6 kV voltage level.

Based on two feeds from the 110 kV high-voltage grid of the upstream grid operator and site-specific power plant feeds, two grid groups (A central/B central), which are to be regarded as galvanically separated, are operated across all voltage levels to ensure a high level of supply security.

voltage level	usage	Frequency (Hz)	Phases
110 kV	distribution level	50	3
30 kV	distribution level	50	3
6 kV	connected load > 200 kW	50	3
0.4 kV	connected load < 200 kW	50	3

The frequency is determined by the European interconnected grid, to which there is a rigid coupling.

Grid operation is managed from a central location (grid command center), which is staffed around the clock. A central network control system is used for the visualization of network conditions as well as for load flow monitoring and active influence, so that short response times are guaranteed in case of unscheduled events.

The power grid is basically operated as a beam network. To increase supply reliability, the network topology often includes ring structures. Special load flow requirements can be met by selectively arranging or relocating the disconnection point in the ring.

Once the power demand and reliability requirements have been determined, a power supply concept for the grid connection is jointly developed.

Quality parameters:

In principle, the parameters anchored in DIN EN 50160 apply to the voltage quality. As a result of start-up processes of motors or similar dynamic processes in the network, voltage reductions down to 85% of the nominal network voltage are possible in the range of a few seconds. If the customer's consumer equipment is sensitive to short-term voltage drops or supply interruptions, the customer must take suitable precautions.

Reactions from the customer's equipment to the InfraLeuna network that jeopardize compliance with the voltage quality parameters in accordance with DIN EN 50160 must be prevented by taking suitable technical measures.

A cos φ > 0.90 (inductive) must be maintained for the reactive power reference.

1.1.6. Provision of Cable Routes

The provision and supply of cable routes is offered for the laying of customer-owned cables on InfraLeuna premises. The main types of cable routes are:

- buried (backfilled cable trench)
- cable trough
- cable duct (accessible or non-accessible).

1.2. Basic Services Water

1.2.1. Drinking Water

Drinking water is treated in a modern drinking water plant in Daspig. Wells in the neighboring water protection area are used for drinking water generation. Treatment is carried out in a modern plant through several stages, such as gravel filters, reverse osmosis and activated carbon filters. Disinfection is caused by UV irradiation.

From the Daspig waterworks, drinking water is pumped into the site's supply network. Drinking water is offered to customers throughout the site. A reliable supply is ensured via simple ring structures of the water network.

In addition to its use in sanitary applications, drinking water is also used in many technological processes. In hazardous areas, drinking water is used for emergency showers and eye rinses.

The quality of drinking water meets the requirements of the currently valid drinking water ordinance. For a detailed overview of the drinking water data, please visit: Drinking water data • InfraLeuna.

Technical parameter – drinking water:

parameter	unit of measurement	minimum	standard	maximum
operating pressure site part I	bar (g)	2.5	4.0	6.0
operating pressure site part II	bar (g)	1.8	3.5	6.0
operating temperature*)	°C	8.0	10.0**)	15.0

*) outflow waterworks **) annual mean

Quality parameters for drinking water:

quality parameters	unit of measurement	mean	maximum	minimum
pH-value	-	8,1	8,5	7,7
$Ks_{4,3}$	mmol/l	1,7	2,5	1,3
electrical conductivity (25 °C)	µS/cm	661	689	636
hardness	°dH	8,1	10,1	6,3
calcium	mg/l	43	54	33
magnesium	mg/l	8,9	11,2	6,8
iron (total)	mg/l	<0,005	0,006	< 0,005
chloride	mg/l	91	108	70
sulfate	mg/l	89	111	70
nitrate	mg/l	2,6	7,5	0,6
nitrite	mg/l	<0,016	0,03	< 0,016
ortho-phosphate	mg/l	<0,092	<0,092	<0,092
ammonium	mg/l	<0,019	0,05	< 0,019
silicic acid (dissolved)	mg/l	2,3	2,9	1,8
staining (SAK 436 nm)	1/m	<0,2	<0,2	< 0,2
oxygen, dissolved	mg/l	8,4	13,4	5,4
turbidity	TE/F	<0,09	0,26	<0,09
total organically bound carbon (TOC(NPOC))	mg/l	0,5	1,0	0,1

1.2.2. Fresh Water

Using the latest technology, such as flocculation/sedimentation and multi-layer filtration, customers at the Leuna Chemical Complex can be offered high-quality fresh water for cooling purposes, as process water or fire extinguishing water.

Fresh water is pumped from the Daspig waterworks into the site's supply network. Simple ring structures of the water network ensure a safe and comprehensive supply.

You have the option of connecting your internal fire extinguishing systems to the main supply network. Fire prevention in the InfraLeuna corridors is ensured by the systematic and targeted installation of hydrants.

Technical parameter – fresh water:

parameter	unit of measurement	minimum	standard	maximum
operating pressure site part I	bar (g)	3.0	3.5	6.0
operating pressure site part II	bar (g)	2.0	2.5	6.0
operating temperature*)	°C	2.0	15.0**)	25.0

*) outflow waterworks **) annual mean

The quality parameters for fresh water presented below result from the analysis data of the years 2010 to 2020. They are dependent on the conditions of the Saale at the Daspig abstraction site and are not influenced by the fresh water treatment process.

InfraLeuna guarantees a content of filterable substances in the fresh water < 30 mg/l. All other values are guideline values and InfraLeuna does not guarantee compliance with them.

Quality parameters for fresh water:

quality parameters	unit of measurement	mean	maximum	minimum
pH-value		7.9	8.6	7.1
$Kb_{8,2}$	mmol/l	0.11	0.25	< 0.01
$Ks_{4,3}$	mmol/l	3.2	4.7	1.5
$Ks_{8,2}$	mmol/l	<0.01	0.3	< 0.01
electrical conductivity (25 °C)	µS/cm	1430	1935	694
hardness	°dH	26	38	11
chloride	mg/l	192	300	58
sulfate	mg/l	259	383	98
nitrate	mg/l	20	34	12
nitrite	mg/l	<0.02	0.07	< 0.02
silicic acid (dissolved)	mg/l	6.6	12.1	0.04
ortho-phosphate	mg/l	0.16	0.48	< 0.15
ammonium	mg/l	0.02	0.51	< 0.02
calcium	mg/l	132	195	58
magnesium	mg/l	32	50	7
iron (total)	mg/l	0.04	0.79	< 0.014
phosphate (total)	mg/l	0.17	0.6	< 0.15
filterable substances	mg/l	<1.0	9.9	< 1.0
staining (SAK 436 nm)	1/m	0.35	0.56	< 0.20
hydrocarbon index	mg/l	< 0.1	< 0.1	< 0.1
oxygen, dissolved	mg/l	10.5	16.4	6.5
turbidity	TE/F	0.66	5.3	0.13
total organically bound carbon (TOC(NPOC))	mg/l	3.2	4.7	2.0

1.2.3. Cooling Water

Cooling water is a circulating water that is used exclusively for technical cooling processes. It is supplied via a pipeline network as "cold water supply" and "hot water return".

The cooling water is treated with corrosion inhibitors and hardness stabilizers.

Technical parameter – cooling water site part I:

flow	unit of measurement	minimum	standard	maximum
operating pressure	bar (g)	4.7	5.0 – 5.4	6.5
operating temperature summer	°C	15	20 ± 1	25 (27)[1]
operating temperature winter	°C	15	20 ± 2	25

[1)] (27 °C) = at an outside temperature > 35 °C and a humidity > 80 %.

return	unit of measurement	minimum	maximum
operating pressure	bar (g)	1.7	
operating temperature	°C		35

flow/return	unit of measurement	
temperature difference	K	≤ 10
pressure difference	bar	≤ 2,5

Technical parameter – cooling water site part II:

flow	unit of measurement	minimum	standard	maximum
operating pressure	bar (g)	4.5	4.8 – 5.2	6.5
operating temperature summer	°C	15	20 ± 1	25 (27)[1)]
operating temperature winter	°C	15	20 ± 2	25

[1)] (27 °C) = at an outside temperature > 35 °C and a humidity > 80 %.

return	unit of measurement	minimum	maximum
operating pressure	bar (g)	1.7	
operating temperature	°C		35

flow/return	unit of measurement	
temperature difference	K	≤ 10
pressure difference	bar	≤ 2.5

Quality parameters for cooling water (site part I and site part II):

parameter	unit of measurement	range	remarks
pH-value		7,5 – 9,0	2)
$Ks_{4,3}$	mmol/l	< 6,0	2)
chloride	mg/l	≤ 600	
phosphate	mg/l	≤ 9	
phosphorus (total)	mg/l	≤ 3	
hardness	°dH	< 75	
sulfate	mg/l	< 1200	
filterable substances	mg/l	≤ 5	4)
hydrocarbon index	mg/l	≤ 0,2	3)

1) VL maximum working temperature 27 °C with wet bulb temperature ≤ 25 °C

2) with hardness stabilization

3) If the customer experiences product intrusion into the cooling water system, the defective system must be shut down immediately and the InfraLeuna central control room must be informed (phone: 3995).

4) Open evaporative cooling circuit - entry of individual large-volume solids cannot be ruled out.

1.2.4. Condensate/Demineralized Water/Collected Condensate

Many industrial processes require water with high quality requirements for dissolving and rinsing processes and as feed water for waste heat steam generation. For this purpose, InfraLeuna provides a fully demineralized water (also referred to as deionate) or a high-quality turbine condensate (referred to as condensate).

The condensate distributed by InfraLeuna has the quality of steam in its composition and is produced during condensing turbine operation. The quality parameters are constantly monitored.

Demineralized water is a high-quality water obtained from condensate or fresh water by means of technological treatment and purification processes.

InfraLeuna operates a demineralized water network in construction site 12 (IKW Nord), the north of site part I up to road junction J/7 and in site part II. The southern part of site part I is supplied with turbine condensate.

Technical parameter – condensate:

parameter	unit of measurement	minimum	maximum
operation pressure	bar (ü)	3.0	6.0
operation temperature	°C	5	50

Quality limits of condensate:

parameter	unit of measurement	limit
specific electrical conductivity at 25 °C (Sampling downstream of strongly acidic cation exchanger as continuous measurement under CO2 exclusion).	µS/cm	< 1
pH-value		< 9.5
silicic acid	mg/l	< 0.02
sodium	mg/l	< 0.1
TOC	mg/l	< 0.2
ammonium	mg/l	< 2.0
general conditions: colorless, clear, non-degassing		

Technical parameter – demineralized water:

parameter	unit of measurement	minimum	maximum
operating pressure	bar(g)	2.5	6.0
operating temperature	°C	5	50

Quality limits of demineralized water:

parameter	unit of measurement	limit
specific electrical conductivity at 25 °C	µS/cm	< 0.2
pH-value at 25 °C		6.5 – 7.8
TOC	mg/l	< 0.2
natrium	mg/l	< 0.01
silicic acid	mg/l	< 0.02
Fe (total)	mg/l	< 0.02
ammonium	mg/l	< 0.02
general conditions: colorless, clear, non-degassing, non-alkalized		

Steam is used in many heat-consuming processes. The customer can return the resulting condensate to InfraLeuna as a collected condensate, which is subject to compliance with certain quality requirements. The supplier of the collected condensate is responsible for monitoring and complying with the following parameters and quality values.

Technical parameter – collected condensate:

parameter	unit of measurement	minimum	maximum
operating pressure	bar (g)	1.0	2.3
operating temperature	°C	50	95

Quality limits of collected condensate:

parameter	unit of measure-ment	limit	frequency of analysis	remarks
pH-value	-	7.0 – 9.5	1 x per week	
specific electrical conductivity	µS/cm	< 20	continuous measurement required	direct measurement at 25 °C
TOC	mg/l	< 2.0	continuous measurement required	thermal-catalytic digestion
hardness	°dH	< 0.1	1 x daily	
silicic acid	mg/l	< 0.05	1 x per week	
Fe	mg/l	< 0.05	1 x per week	
Cu	mg/l	< 0.003	1 x per week	
Na^++K^+	mg/l	< 0.05	1 x per week	
content of other organics	mg/l		by arrangement	
oil content	mg/l	< 0.5	1 x per week	
ammonium	mg/l	< 5.0	1 x daily	
general conditions: collected condensate must be colorless and clear, film-forming amines are not used in the water-steam cycle				

The design parameters to be observed for the technical system design are to be agreed between the supplier and the customer.

1.2.5. Cold Water

For effective design of room, building or process cooling, a territorially limited cold water network is available in site part II.

Technical parameter – cold water:

flow	unit of measurement	minimum	standard	maximum
operating pressure	bar (g)	2.0	2.5 – 4.0	6.0
operating temperature flow	°C	6	8	10
operating temperature return	°C	12	14	16

The cold water is circulated. Cooling is provided via heat exchangers at the customer's premises. There is no exchange of substances between the cold water supplied and the customer's media to be cooled. The circulated cold water is of demineralized quality and is mixed with the conditioning agent cetamine.

Requirements for the supply of cold water:

- The maximum return temperature of 16 °C must not be exceeded.
- The customer heat exchangers must be designed for a pressure of at least pN = 6 bar (g).
- The cold water volume flow must be limited to the contractually agreed cooling capacity.
- An appropriate differential pressure control with volume limitation must be provided, the differential pressure between flow and return must be ≤ 1.0 bar.

1.3. Summary of Parameters for Pipeline-bound Energy and Water Networks of InfraLeuna

network	pipe number	abbreviation	PD [bar]	PS [bar]	PO,MIN [bar]	PO,MAX [bar]	TD [°C]	TO,MIN [°C]	TO,MAX [°C]
collected condensate [1)]	ER 157	SAKO	10	7.0	1.0	2.3	140	50	95
turbine condensate	ER 150	TKO	10	8.0	3.0	6.0	70	5	50
demineralized water [3)]	ER 151	DEI	10	8.0	2.5	6.0	50	15	50
hot water flow		HW VL	16	16.0	2.5	8.0	130	70	100
hot water return		HW RL	16	16.0	2.5	8.0	130	30	60
high-pressure steam (70 bar)	ER 009	HDD70	160	88	67.0	69.0	430	400	410
high-pressure steam (45 bar)	ER 008	HDD45	100	50.0	39.0	45.0	340	saturated steam [2)]	320
high-pressure steam (23 bar)	ER 005	HDD23	40	22.0	19.0	21.0	340	saturated steam [2)]	320
medium-pressure steam	ER 001	MDD	40	16.0	12.0	15.0	330	saturated steam [2)]	320
low-pressure steam	ER 010	NDD	16	2.5	1.7	2.3	230	saturated steam [2)]	210
compressed air	ER 060	DRUL	10	10.0	6.5	8.2	50	t_u	50
control air	ER 061	STEU	10	10.0	6.0	7.0	50	t_u	50
cold water flow	ER198	KW VL	10	10	3.0	6.0	-10 … 50	6	10
cold water return	ER199	KW RL	10	10	2.0	5.0	-10 … 50	12	16
fresh water site part I		FW 1	10	10	3.0	6.0	50	2[4)]	25
fresh water site part II		FW 2	10	10	2.0	6.0	50	2[4)]	25
drinking water site part I		TW 1	10	10	2.5	6.0	20	8	15
drinking water site part II		TW 2	10	10	1.8	6.0	20	8	15
cooling water site part I flow		RKW-WTI-VL	10	10	4.7	6.5	50	15	25 (27)
cooling water site part I return		RKW-WTI-RL	10	10	1.7	6.5	50	15	35
cooling water site part II flow		RKW-WTII-VL	10	10	4.5	6.5	50	15	25 (27)
cooling water site part II return		RKW-WTII-RL	10	10	1.7	6.5	50	15	35

network	pipe number	abbreviation	DP [bar]	MOP [bar]	OP,MIN [bar]	OP,MAX [bar]	DT [°C]	OT,MIN [°C]	OT,MAX [°C]
high pressure natural gas 4bar	NG 008	HDE4	10	4.0	2.0	3.5	50	t_u	50
high pressure natural gas 16bar	NG 015	HDE16	16	16.0	9.0	16.0	50	t_u	50
high pressure natural gas 55bar	NG 013/014	HDE55	63	55.0	25.0	55.0	50	t_u	50

Remarks:

1) maximum feed pressure directly at the feed point must not exceed the maximum operating pressure PO,MAX

2) steam feed temperature into the network > 20 K above saturated steam temperature

3) demineralized water = fully desalinated water (for customers in site part I + BF 12)

4) water temperature of the river Saale

All pressures correspond to gauge pressures.

t_u = ambient temperature

Abbreviations for **steam, condensate, demineralized water, air** *(according to DIN EN 764-1)*:

PD - design pressure

PS - maximum permissible operating pressure

PO,MIN - minimum operating pressure

PO,MAX - maximum operating pressure

TD - design temperature

TO,MIN - minimum operating temperature

TO,MAX - maximum operating temperature

Abbreviations for **natural gas** *(according to DIN EN 12186):*

DP - design pressure

MOP - maximum permissible operating pressure

MIP - Limit pressure in case of malfunction (MIP= 1.1xMOP)

OP,MIN - minimum operating pressure

OP,MAX - maximum operating pressure

DT - design temperature

OT,MIN - minimum operating temperature

OT,MAX - maximum operating temperature

1.4. Further Services Energy/Water

In addition to the basic services, various other services are available on request.

1.4.1. Energy Systems

The services regarding energy systems include:

- consulting on the optimal chemical-physical operation of water-steam cycles (conditioning, monitoring, etc.)
- consulting by competent partners for the operation of gas turbines, steam turbines, compressors, steam boiler plants, heat exchangers etc.
- consulting in planning and effective use of primary energy sources (natural gas, fuel oil (heavy and light)) as well as other fuels in small-scale power plants regarding technical/technological tasks
- taking over the complete operational management of energy plants.

1.4.2. Electricity Grids

Electricity grid services include:

- consulting on the design and layout of electrical power distribution systems, such as switchgear, transformers, grid protection technology, etc.
- operational management of electrotechnical plants in low, medium, and high voltage (execution of station controls and switching operations, issuing of requirement-specific permission certificates, fault de-escalation, supervision of non-electrical specialists in electrotechnical plants, etc.)
- advice on the preparation of metering concepts as well as the implementation of regulatory requirements from the Metering and Calibration Act and the Metering Point Operation Act
- evaluation of the selectivity of network protection devices
- carrying out cyclical checks on digital network protection devices
- evaluation of disturbances and advice on avoiding disturbances or mitigating the effects of disturbance events
- advice on the optimization of maintenance tasks.

1.4.3. Pipeline Networks

Pipeline network services include:

- support of pipeline systems for energy supply
- commissioning and decommissioning pipelines and carrying out switching operations in pipeline networks
- coordination of repair work on pipelines, fault location and inspection work accompanying repairs
- assisting in the selection of subcontractors for installation
- obtaining and processing required permit certificates
- care and maintenance of valves, steam traps and piping
- maintaining and providing connection/transfer points on pipe bridges
- supporting the preparation and realization of investments
- control and acceptance of the performed works on the pipeline routes during/after the initial installation

- specification of the pipeline marking to be applied in accordance with the rules uniformly established at the site
- maintenance and operation of gas measuring and control stations, including the associated pipelines
- operation and maintenance of customers' house connection stations in the district heating network.

1.4.4. Pipe Bridges

The services for pipe bridge utilization include:

- provision and maintenance of pipe bridges
- granting of occupancy and determination of the pipe route with associated structural analysis regarding the permissible load absorption
- initiation and execution of the procedure for issuing the pipe bridge certificate
- operational management of pipe bridges in the customer's area.

1.4.5. Water Supply Systems

We will gladly take over the operation and maintenance of your water supply systems as a chargeable service. This includes:

- carrying out switching operations in water networks in accordance with appropriate operating instructions
- carrying out inspection work for leak detection and pipe locating
- maintenance, inspection, and replacement of water meters
- flushing and disinfection of drinking water networks
- care and maintenance of valves, vents, hydrants
- assistance in preparation and realization of investments
- advice on the selection of cooling plants, use of materials, method of operation, as well as the conditioning of circulating water
- signage of faucets, hydrants according to the rules uniformly established at the site
- preparation and provision of network documentation in the form of circuit diagrams.

1.5. Measurement Technology and Metrological Investigations

1.5.1. Pipeline Networks, Power Generation Plants

We offer the following services in the field of pipeline networks and power generation systems:

- competent consulting in the field of automation technology and remote data transmission
- assistance in the phase of task development, design, and assembly
- verification and determination of accuracy of measuring chains
- parameterization of flow rate computers.

1.5.2. Electrical Networks, Relay Protection Technology

The service programme for electrical networks and relay protection technology includes:

- performing and evaluating recordings of power quality parameters, e.g., to verify compliance with the limit values specified in DIN EN 50160
- investigation of transient processes in the network, e.g., start-up processes of motors, switch-on and switch-off processes of large consumers
- testing of metering locations (clearing metering points)
- setting and testing of digital protection relays, especially independent and dependent overcurrent protection, earth fault direction detection, differential protection relays and distance protection relays.

1.5.3. Cable Inspection

The service programme for cable inspection work includes:

- cable fault location on telephone, signal, control, and power cables up to 110 kV
- high-voltage tests on plastic cables (with PVC, PE or XLPE insulation) and on ground cables up to 30 kV
- partial discharge measurements on plastic cables and ground cables
- sheath tests and location of sheath defects on plastic cables
- metrological determinations of the cable course in cable trays
- cable determination, cutting and testing in preparation of work on cables
- statistical recording and evaluation of test results
- attenuation measurements on fiber optic cables.

1.6. Drainage of Wastewater

1.6.1. Basic Services for Wastewater Drainage

The subject of the basic service offered is the use of the sewer system and the various pressure pipeline systems of InfraLeuna for the transfer of wastewater and its discharge to the receiving water Saale or to the central biological wastewater treatment plant in site part II.

An emergency basin (retention capacity 12,000 m³) is available to prevent the discharge of disruptive wastewater or contaminated firefighting water into the Saale. A further emergency basin (retention capacity 2,500 m³) and stacking tanks (retention capacity 12,000 m³) are available in site part II. A prerequisite for the provision of the basic service is the approval of the responsible authority for the discharge of wastewater:

- for site part II into the ZAB in accordance with the Indirect Discharger Ordinance (does not apply to rainwater, groundwater, and sanitary wastewater, only InfraLeuna permit)
- for site part I into a sewer for wastewater suitable for pre-flooding or as an indirect discharge into the designated pressure pipe systems for production and sanitary wastewater.

Permit requirements for wastewater:

InfraLeuna holds the water-law permit for the discharge of wastewater from the industrial site into the river Saale. Among other things, this regulates the transfer of the wastewater disposal obligation to InfraLeuna GmbH. The inclusion of new wastewater sub flows from companies on site in this permit is based on a corresponding application by InfraLeuna to the upper water authority.

The use of InfraLeuna's wastewater facilities requires an indirect discharger permit which is issued by the lower water authority upon application by the wastewater producer (application form is available from InfraLeuna).

1.6.2. Wastewater Drainage Services

We are pleased to provide the following services for customers' own systems if required:

Assistance with the:
- structural design of the transfer shafts
- hydraulic design of the connection pipe
- material selection for new connections
- selection of suitable sewer rehabilitation methods
- assumption of coordination of sewer cleaning work, local construction supervision for construction and rehabilitation measures of daily business.

1.6.3. Wastewater Treatment in the Central Biological Wastewater Treatment Plant

In the central biological wastewater treatment plant (ZAB) process wastewater from the production plants and contaminated groundwater together with sanitary wastewater are treated mechanically, chemically-physically, and biologically to such an extent that their quality meets the requirements of Annex 22 of the Wastewater Ordinance.

The treated water is discharged via the sewer system to the receiving water. The sewage sludge produced at the central biological wastewater treatment plant is thickened, dewatered, and disposed.

As a basic service, we offer the treatment of various types of wastewaters in the ZAB and the discharge of treated wastewater into the receiving waters.

For wastewater/sludge water:

- treatment of production wastewater, contaminated groundwater and surface water, and fecal and sanitary wastewater with the mechanical, chemical-physical, and biological treatment stages, including sludge treatment and disposal
- provision of a stacking capacity in case of wastewater disturbances
- discharge of treated wastewater to receiving waters in accordance with legal requirements
- declaration of wastewater origin, type, quantity, and quality (physico-chemical parameters)
- determination of the degradation performance and possible inhibition or toxic effect on the clarification process by biochemical tests
- determination of average and maximum influent quantity and influent rates based on declaration analysis and biochemical tests
- determination of the control point for the wastewater discharge
- determination of the point of discharge of the wastewater into the InfraLeuna sewer system or penstocks
- issuance of a declaration of acceptance by the ZAB
- elaboration of a reporting regulation between the customer and the ZAB.

For rainwater/preflood wastewater:

- treatment of non-contaminated surface water in the mechanical treatment stage including sludge treatment and disposal

- passage and average protection for pre-flood wastewater
- provision of a stacking capacity in case of wastewater incidents
- discharge of wastewater into receiving waters in accordance with legal requirements
- declaration of wastewater origin, type, quantity, and quality
- information on average and maximum quantities
- issuance of a declaration of acceptance by the ZAB
- elaboration of a reporting regulation between the customer and ZAB.

Discharge options:

For site part I:

- sewer system of InfraLeuna (open channel) to the river Saale, e.g., for:
  - rainwater
  - cooling water
  - treated wastewater

- pressure pipelines of InfraLeuna to the central wastewater treatment (ZAB) in site part II (biological treatment), e.g., for:
  - wastewater requiring treatment from production processes
  - sanitary wastewater.

For site part II:

- wastewater channel (open channel) to the ZAB (biological cleaning)
- cooling water/rainwater sewer (open channel) to ZAB (mechanical cleaning).

In addition, we offer the operational management of groundwater purification plants and other wastewater treatment plants for customers.

1.7. Wastewater Networks/Analytical Measurement

We offer the following services:

- expert advice in the field of effective self-monitoring of wastewater networks
- consulting in the field of online analysis and in the use of automated wastewater analysis technology - the offer complements the comprehensive range of analytical services provided by InfraLeuna's Analytics Division
- advice on the selection of instrumentation and measurement principles
- evaluation of measurement data
- taking over the measurement and monitoring of e.g., ammonium, nitrate, nitrite, total nitrogen, pH, oxygen, conductivity
- use of measuring instruments for the following substances: calcium, carbonate, free chlorine, chromium VI, cobalt, total cyanide, free cyanide, ethanol, formaldehyde, urea, total hardness, hydrazine, methanol, total phosphate.

1.8. Summary of Parameters for Wastewater Networks

		abbre-viation	nominal Pressure	max. permissible operating pressure	operating pressure P_A		max. permissible operating temperature	operating temperature T_A	
			P_N (bar)	P_B (bar)	$P_{A\ MIN}$ (bar)	$P_{A\ MAX}$ (bar)	T_B (°C)	$T_{A\ MIN}$ (°C)	$T_{A\ MAX}$ (°C)
network	channels site part I (main/side channel)	HK, SK	open channel				40	10	32
	wastewater channels site part II	SW	open channel				40	10	32
	rainwater channels site part II	RW	open channel				40	10	32
	process wastewater site part I + northern part site part II	PrW	16	12		12	40	10	32
	sanitary wastewater site part I + northern part site part II	SaW	10	10		10	40	10	32

The abbreviations in the table header (P_N, P_B) correspond to DIN 2401 Part 1. The pressure data also correspond to DIN 2401 Part 1 and are given as gauge pressures.

1.9. Contact Persons

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