SAKO BRNO

PUBLIC CONTRACT

02/2022

HIGH-EFFICIENT COMBINED HEAT AND POWER FACILITY UTILIZING RENEWABLE SOURCES (OHB II - LINE K1)

Safety first

Site safety

Covid measures

General information on public procurement

Procurement regime

Over-the-limit utilities contract for construction works awarded in a negotiated procedure with prior publication as per provisions of Section 60 of the PPA.

Main stages

- Qualification - *completed*
- Call for indicative tenders - *ongoing*
- Negotiation of indicatives tenders
- Call for final tenders
- Evaluation of final tenders

Important note:

All the information provided during site visit are exclusively of informative nature and therefore are not binding to the contracting authority.

Evaluation criteria

	Evaluation criteria	Weight
K.1	**Overall financial advantageousness**	**70 %**
K.2	**Quality of performance**	**25 %**
K.2.1	*Proposed technology and solution concept*	*75 %*
K.2.2	*Technical guarantees*	*15 %*
K.2.3	*Environmental parameters*	*10 %*
K.3	**Layout of the construction and technological solution**	**5 %**

The most important evaluation parameters

- Net present value of the project in 7 years
  - Significant impact of balance price/efficiency
  - Potential bonus for shorter construction period
- Well specified, comprehensive and robust solution
- Tender with detail descriptions (design, execution, management)

1. Základní provozní předpoklad / General operational assumption	
1.1 Zpracovaný odpad / Proccessed waste	tun/rok (tons/annum)
1.2 Výhřevnost odpadu / Waste LHV	MJ/kg
1.3 Roční disponibilita / Annual availability	h
2. Roční bilance produkce energií / Annual balance of energy production	
2.1 Dodané teplo / heat delivered	GJ
2.2 Čistá výroba el.energie / net electricity production	MWh

3. Roční výnosy / Annual income	
3.1 Prodej tepla / Heat sales	
3.2 Prodej elektriny / electricity sales	
3.3 Celkem / In total	

4. Roční náklady provozu / Aannual operational expenditure	
4.1 Regular maintenance	
4.2 Wear parts	
4.3 Spotřeba vody - kotel / water consumption - boiler	
4.4 Spotřeba pitné vody / fresh water consumption	
4.5 Spotřeba močoviny / urea consumption	
4.6 Spotřeba nehašeného vápna / quick lime consumption	
4.7 Spotřeba hydroxidu vápenatého / hydrated lime consumption	
4.8 Spotřeba aktivního uhlí / active carbon consumption	
4.9 Spotřeba stlačeného přístrojového vzduchu / instrument air consumption	
4.10 Spotřeba stlačeného procesního vzduchu / process air consumption	
4.11 Odpad - škvára / IBA residue	
4. 12 Popel z kotle a zbytky ze systému čištění spalin / Boiler ash and FGT residue	
*4.13 *Spotřeba ostatních chemikálií / other reagents consumption*	
4.14 Celkem / In Total	

SAKO BRNO

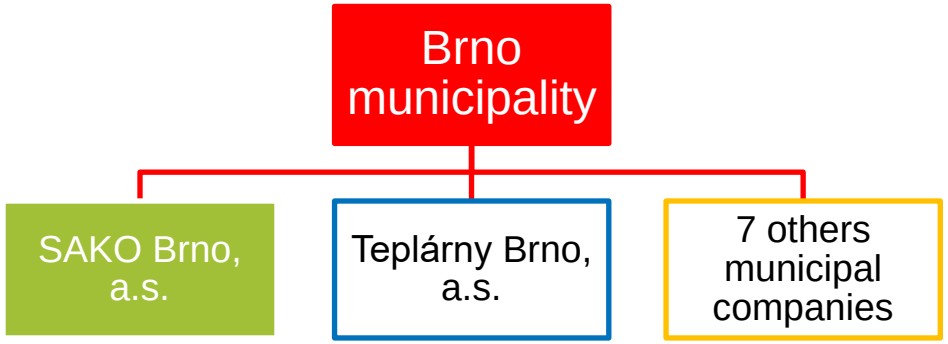
PUBLIC CONTRACT

INVESTOR DESCRIPTION

Investor description

SAKO Brno, a.s. as municipality owned company operates independently and provides services for Brno city (open-ended contract) and to others:

- Waste collection
- Recycling
- Waste disposal by energy utilization



SAKO Brno, a.s.
=
Experienced operator of WtE since 1994

Main company area of the operation

Collection
- Municipal waste
- Mixed municipal waste
- Recyclables
- Collection centers

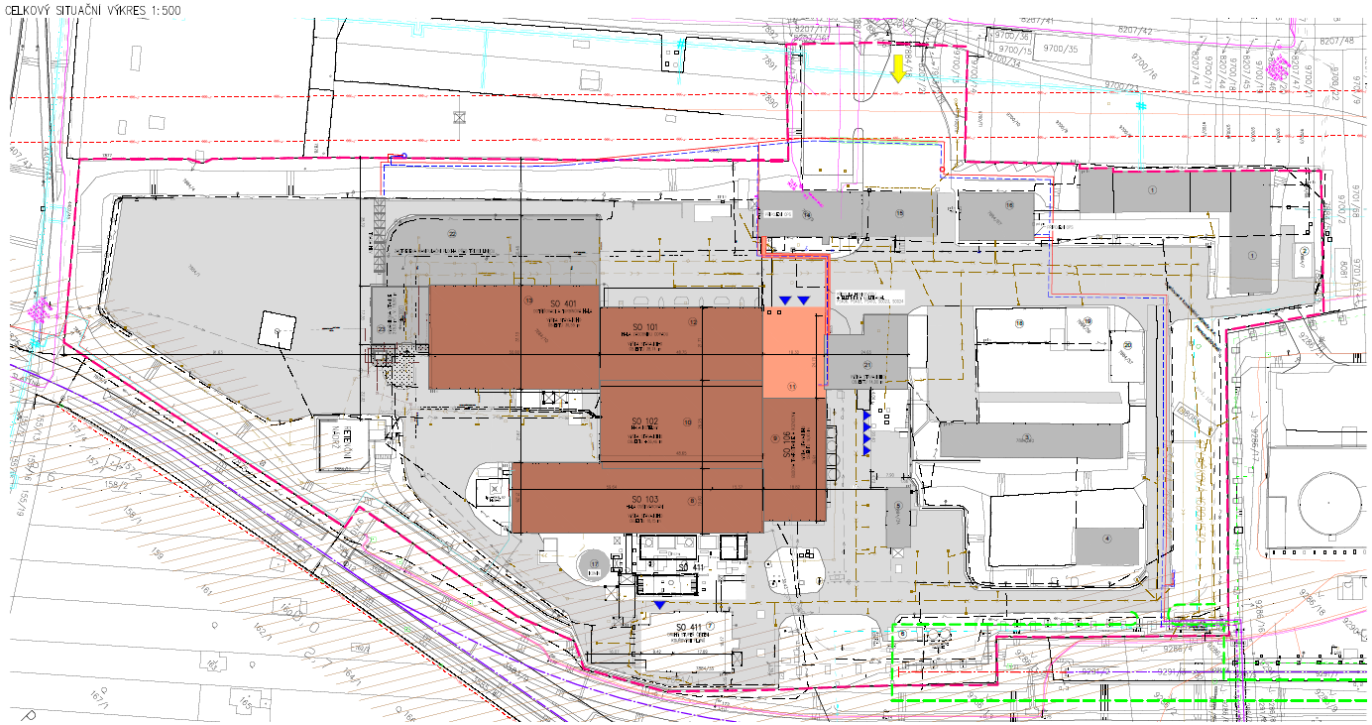
Processing
- WtE Plant
- Sorting line (recyclables)
- Shredder (bulky waste)

Utilization
- Energy (District Heating & Electricity)
- Recyclables (plastics; paper; glass; metals)
- Education program (schools & public)

SAKO BRNO, a.s. – Existing Waste-to-Energy plant

Existing line K2 and K3

- Plant from 1980's, refurbished in 2010
- 2x14 ton/h identical EfW lines
- 2 manual waste cranes
- Vertical 5-pass steam boilers, Steam parameters: 40 bar/400ºC
- Extraction steam turbine, 20 MWe
- Air-cooled condenser
- SNCR, bagfilter & semi-dry FGT system
- Production of electricity and district heating (DH), both steam and hot water



SAKO BRNO

PUBLIC CONTRACT

PROJECT DESCRIPTION

Envisaged Project and Contractual structure

Project procurement phase

Project procurement phase under cooperation with experienced advisors:

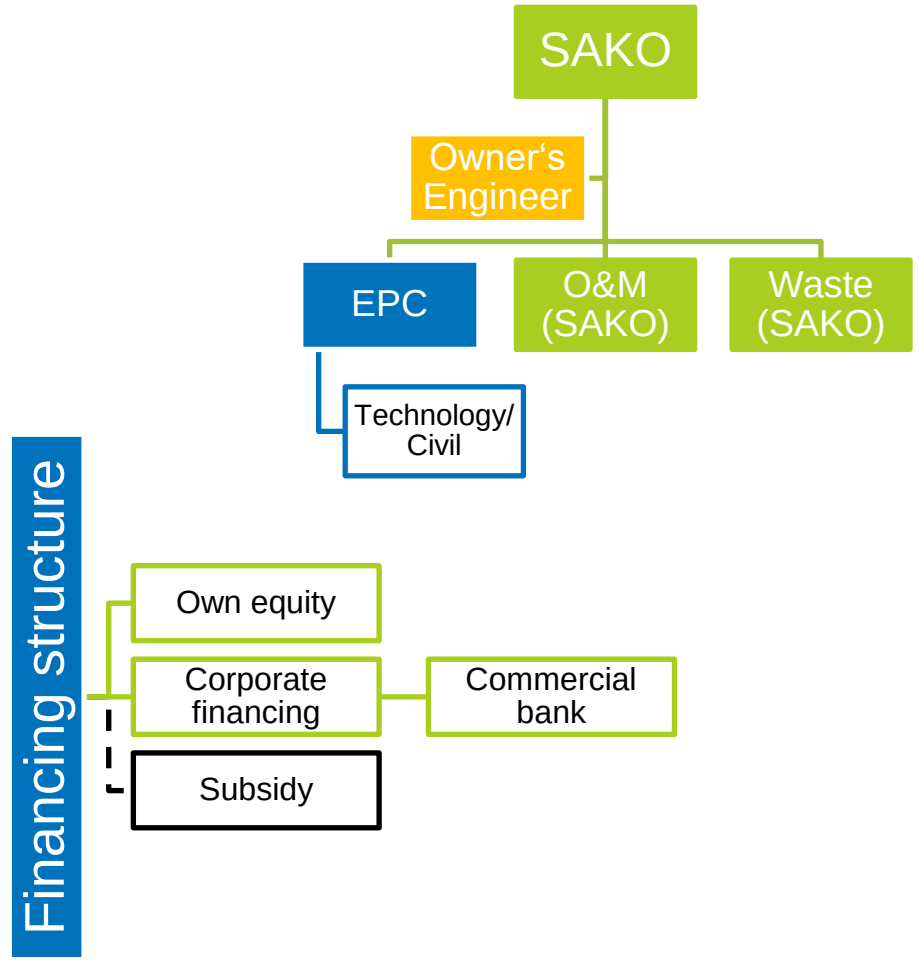
- Ramboll Group A/S : technical advisor
- PricewaterhouseCoopers : financial advisor
- Legal team: MT Legal

Project structure

- Design & Build project engaged under EPC contract
- Fixed lump-sum contract

Anticipated financing structure

- Own equity in combination with corporate financing
- Subsidy from Modernization fund (in negotiation)



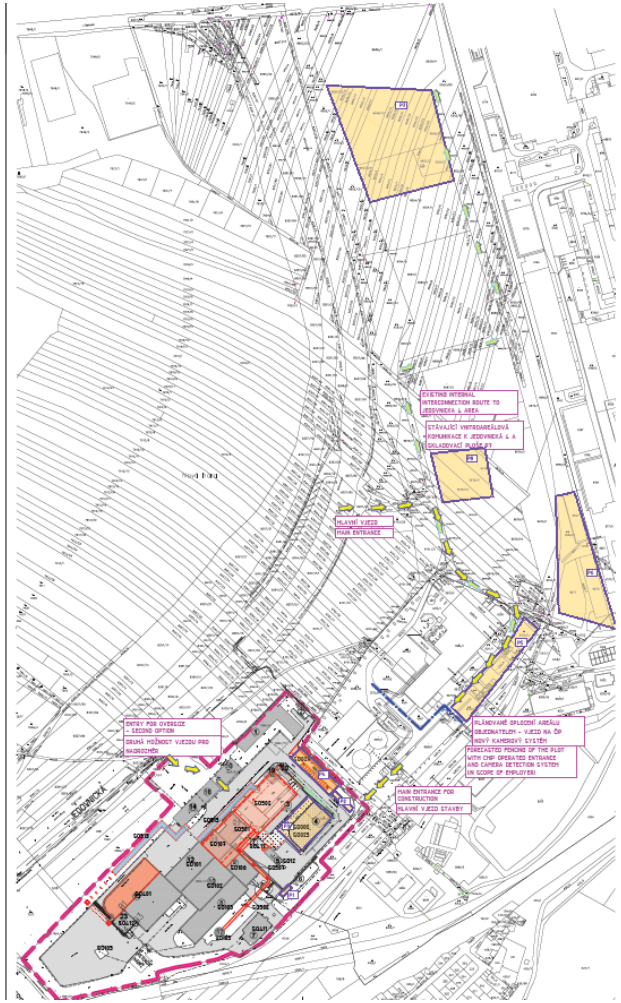
Site conditions

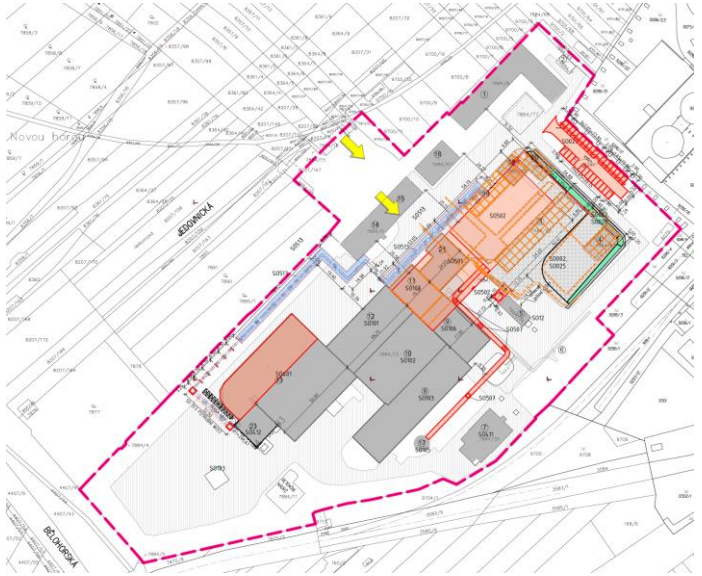
Major highlights

- Urban area (distance to residential area 150 meters)
- Limited area in place of construction
- Parallel construction projects
- Full operation of existing facility
- Strict noise and dust requirements

Available areas for site facilities

- P1 – ca. 62 m2
- P2 – ca. 125 m2
- P3 – ca. 1400 m2
- P4 – ca. 740 m2
- P5 – ca. 2100 m2;
- P6 – ca. 4500 m2;
- P7 – ca. 10000 m2;

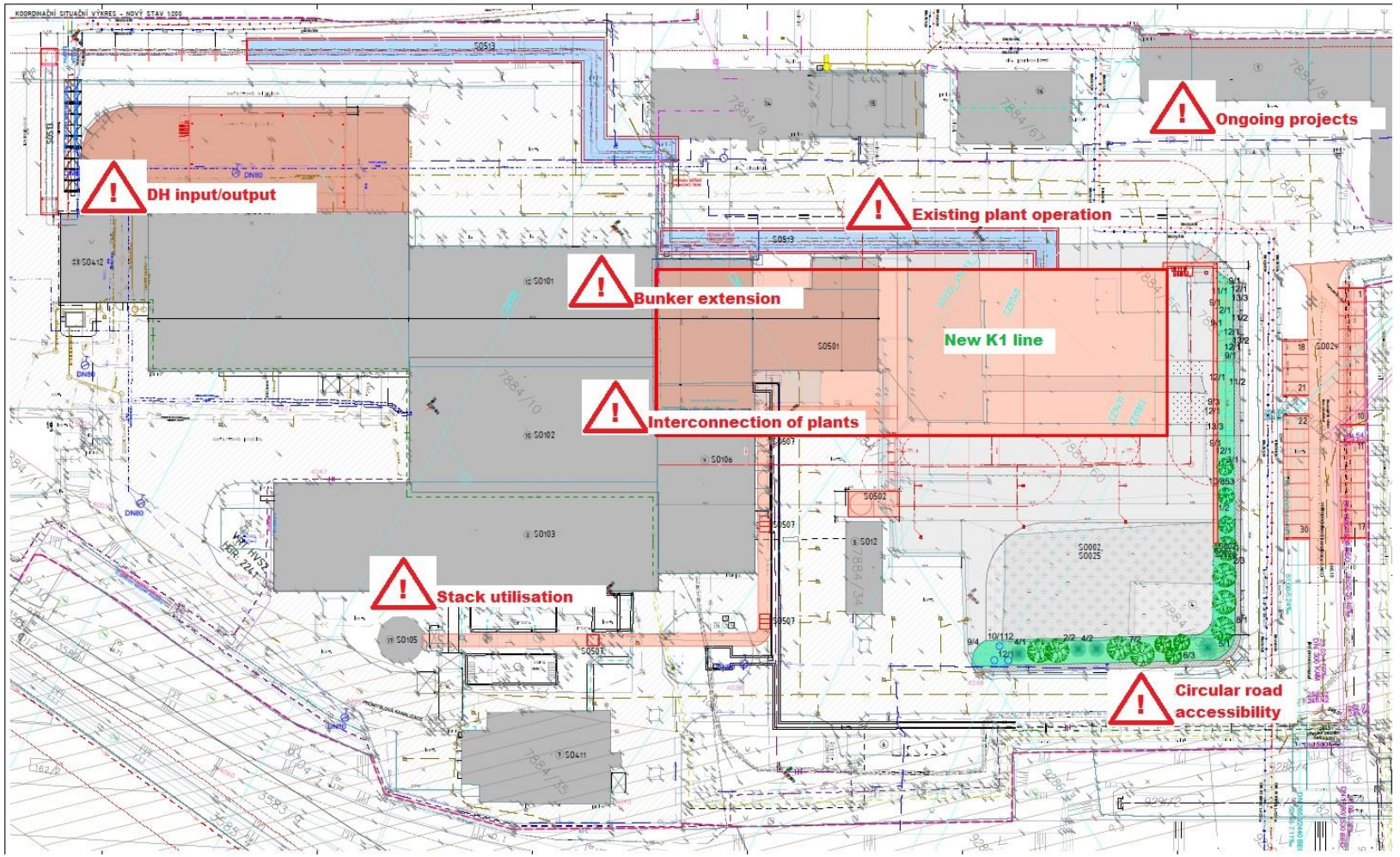




Most demanding battery limits

Investor‘s priorities

1. **Safety first**
2. **Continuous operation of existing WtE plant**
3. **Upfront detail planning of most demanding tasks**



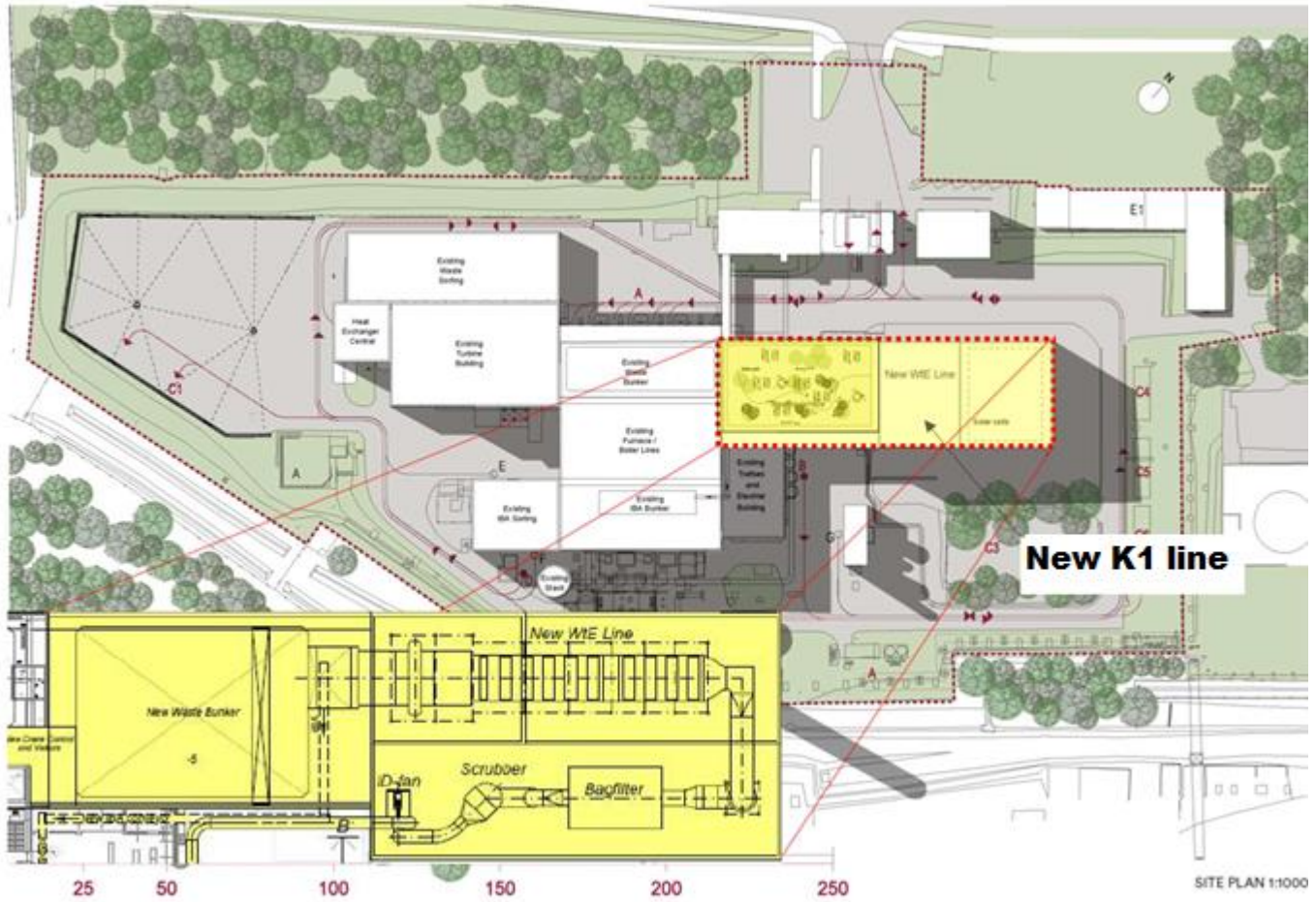
Project scope

New K1 line

- New boiler hall
- 180° U turn – flue gas treatment
- Extension of bunker
- Automatic cranes

- Backpressure turbine‘s machine hall
- Interconnection of new DH lines- DN600

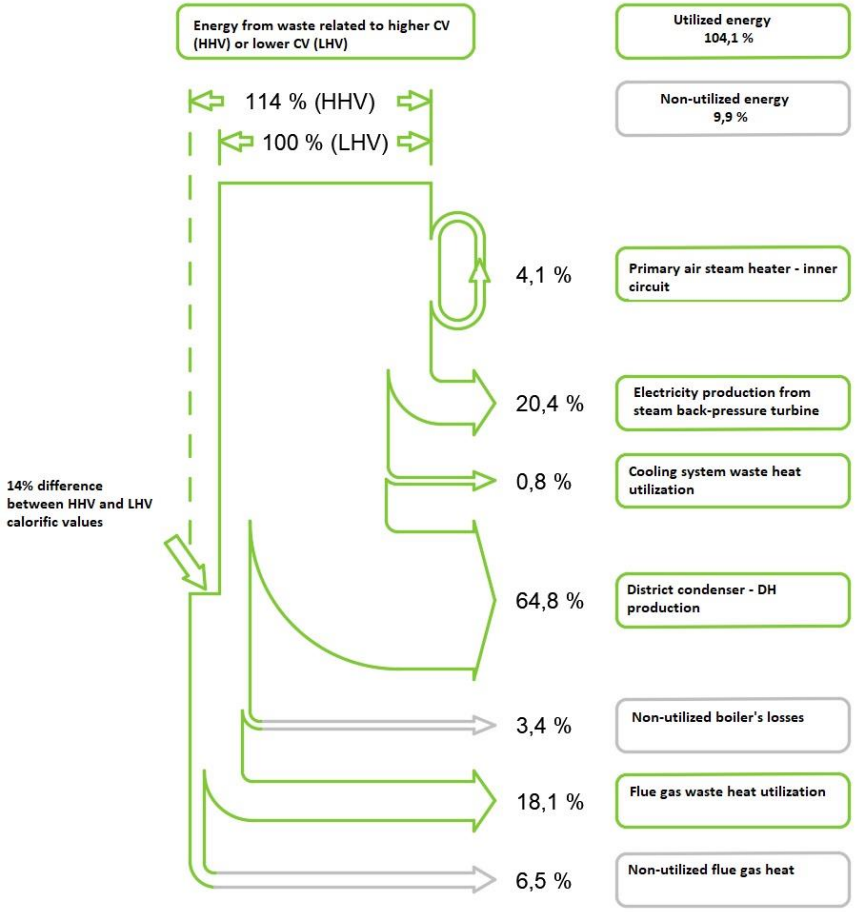
- Control room relocation
- Existing auxiliaries relocation
- Existing stack utilization
- Former K1 existing space utilization



Emphasis on efficiency → Highly efficient CHP

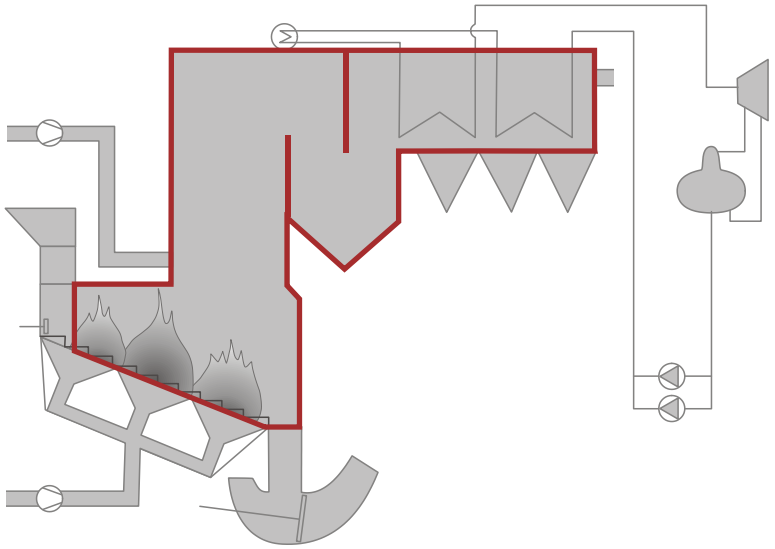
Operational energy efficiency

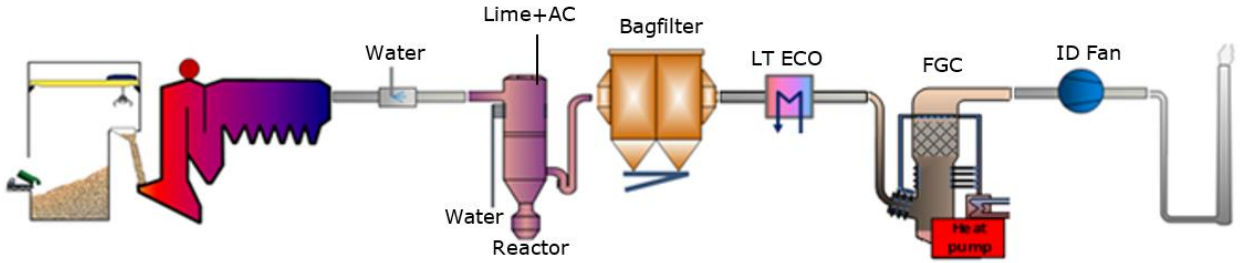
- Maximal utilization of residual waste energy potential
- Flue gas and cooling system waste heat utilization
- Absorbtion heat pump
- Emphasis on flexibility of heat and electricity supply



The resulting energy efficiency
104%

Key design basis requirements





Semi-Dry Flue Gas Treatment System and downstream LT ECO and flue gas condensation.

Air emission at stack		BATAELs		
Substance	Unit ref=(11% O_2, dry)	NEW plants	EXISTING plants	Sampling period
Dust	mg/Nm^3	**<2-5**		Daily
TVOC	mg/Nm^3	**<3-10** (6)		Daily
CO	mg/Nm^3	**10-50**		Daily
HCl	mg/Nm^3	**<2-6**	**<2-8**	Daily
HF	mg/Nm^3	**<1** (6)		Daily [1]
SO_2	mg/Nm^3	**5-30**	**5-40**	Daily
NO_x (SCR, SNCR…)	mg/Nm^3	**50-120**	**50-150**	Daily
SNCR, if SCR not possible			**up to 180**	
NH_3 (SCR or SNCR) (Exist. SNCR not wet)	mg/Nm^3	**2-10**	**2-10 (15)**	Daily
Hg	$\mu g/Nm^3$	**<5-20**		Daily [2, 3]
		1-10		Long term sampling [2]
		<5-20		Periodic, short term [2]
PCDD/F [5]	ng $_{I\text{-}TEQ}/Nm^3$	**<0.01-0.06**	**<0.01-0.08**	Long term sampling [5]
PCDD/F + PCB-DL [5]	ng $_{I \& WHO\text{-}TEQ}/Nm^3$	**<0.01-0.08**	**<0.01-0.1**	
PCDD/F [5]	ng $_{I\text{-}TEQ}/Nm^3$	**<0.01-0.04**	**<0.01-0.06**	Periodic, short term
PCDD/F + PCB-DL [5]	ng $_{I \& WHO\text{-}TEQ}/Nm^3$	**<0.01-0.06**	**<0.01-0.08**	
Cd+Tl	mg/Nm^3	**0.005 - 0.02**		Periodic, short term
Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V	mg/Nm^3	**0.01-0.3**		Periodic, short term

(1): HF continuous measurement may be replaced by periodic measurements if HCl emission are proven to be sufficiently stable (BAT4).

(2): Hg continuous measurement may be replaced by long-term sampling or periodic measurements if incinerated waste Hg content proven low and stable (e.g. mono-streams of waste of a controlled composition) (BAT4).

(3): Hg ½_hr average indicative value (not BATAELs) for new plants 15-35 $\mu g/Nm^3$, for existing 15-40 $\mu g/Nm^3$ (BAT31).

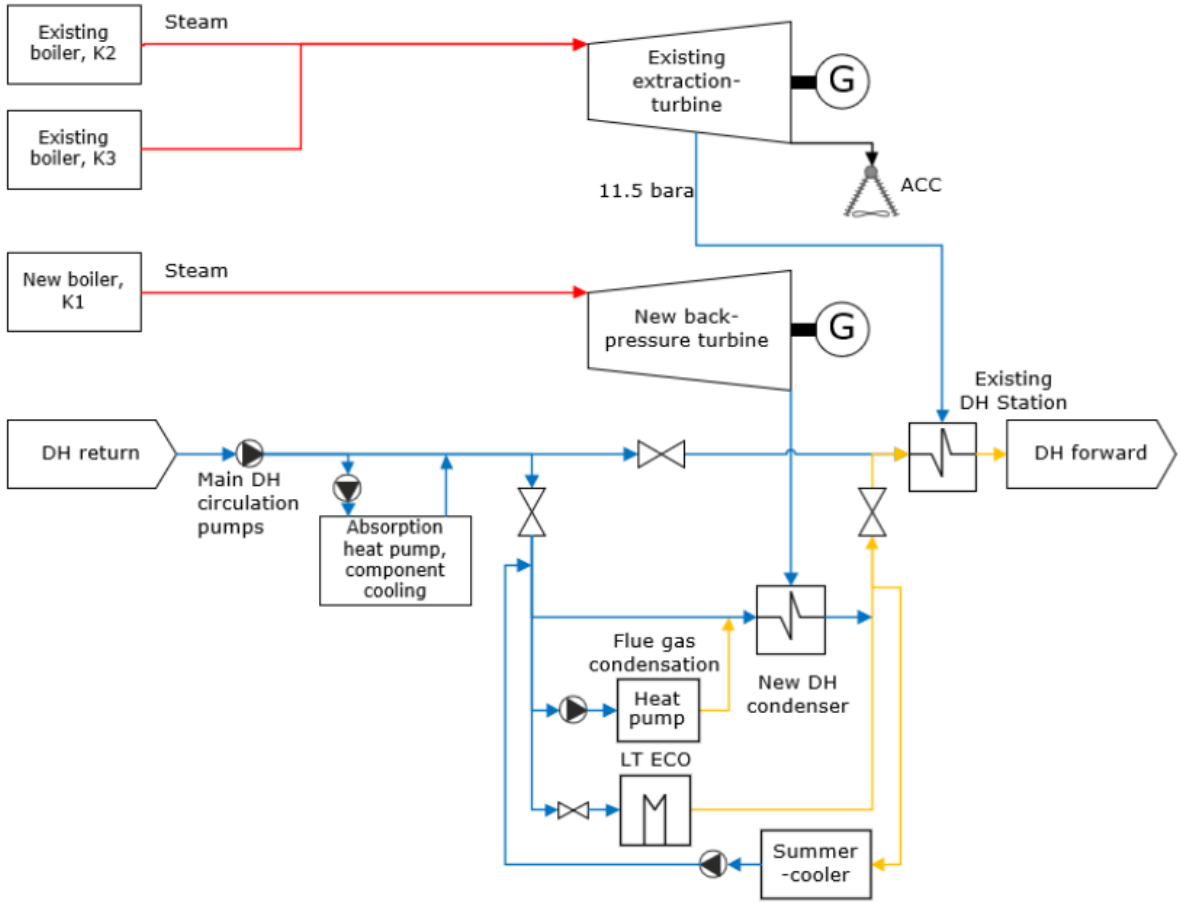
(4): Either the BATAELs for PCDD/F or the BATAELs for PCDD/F + PCBs-DL apply. PCB-DL monitoring does not apply if PCB-DL are proven to be less than 0.01 ng $_{WHO\text{-}TEQ}/Nm^3$ (BAT30).

(5): The long term sampling BATAELs do not apply if the emission levels are proven to be sufficiently stable (BAT30).

Energy system - Highlights

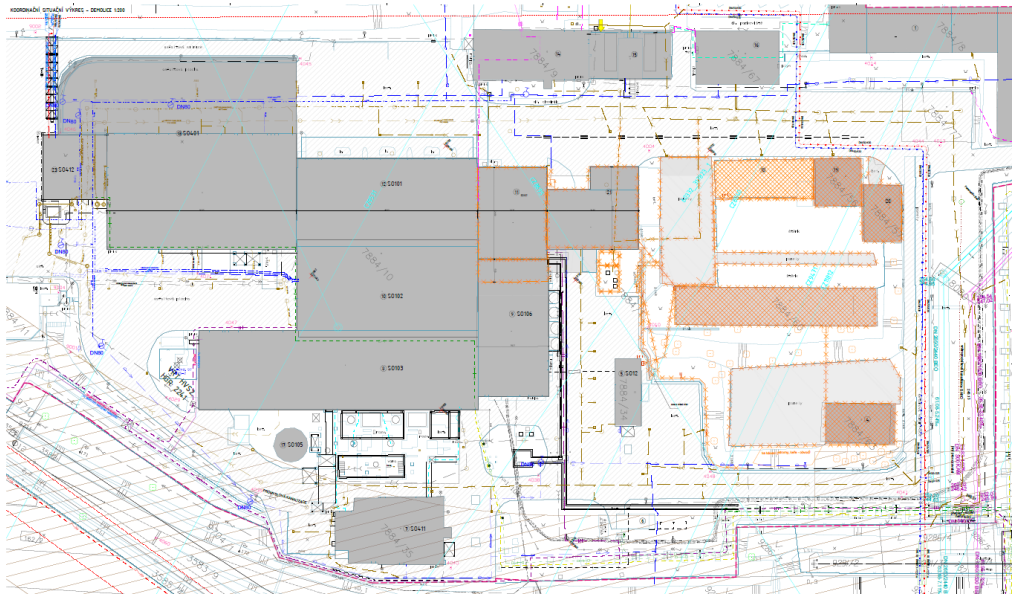
Combined Heat & Power

- Moderate steam parameters: 400°C / 40 bar
- Efficient and flexible CHP production
- New back-pressure turbine optimized for DH production
- Increased electricity production of existing turbine by replacing in-efficient DH production with new efficient DH production
- Two-step flue gas condensation: direct and heat pump* driven which cools the flue gas to 41 °C
- Energy recovery from component cooling to DH



Civil part → Existing buildings

BO 101/1 – Waste Bunker	**Medium impact** Installation of new cranes and control room and all necessary accessories (e.g. fire safety, etc.). Demolition of the dividing wall above the level of the existing boiler hoppers. Disassembly of crane cabins and fire protection equipment.
BO 102/1 – Boiler hall	**Minor impact** Linking and delivery of the slag conveyor to the slag bunker. Linking to service platforms and lift in required levels. Linking/installation of new fire pumps.
BO 103/1 – Slag treatment hall	**Small impact** Linking a joint drainage from the new line to the existing slag bunker. Wastewater linked to a slag waste-water sump.
BO 106 – Trafoes and electrical building	**Medium impact** Demolition of a part of the building (stair tower) for connection of the service route and removal of the slag conveyor.
BO 401 – Sorting and turbine hall	**Small impact** Installation of an independent steel platform above the existing roof structure.
BO 412 – District heating station	**Medium impact** Connection of hot water pipes for heat dissipation from the new K1 technology.
BO 108 – Maintenance and locker room building	**High impact** Will need to be demolished**.**
BO 107 – CHUV Building (chemical water treatment)	**High impact** Will need to be demolished**.**



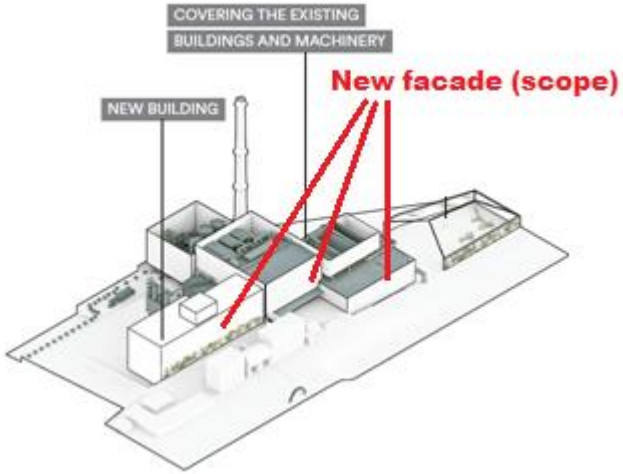
New buildings

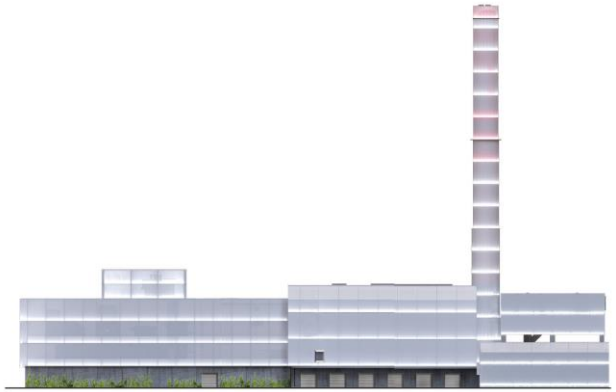
BO 501 – Extension of the waste bunker	New bunker connected to an existing bunker without new feed-in gate. All waste will be received through existing dumps. The new bunker will be linked to the existing BO 101 via new crane tracks.
BO 502 – K1 Boiler hall and flue gas treatment	The new boiler and flue gas treatment hall will be connected to an extended bunker. All technology related to the new K1 incinerator line will be installed in this new building.

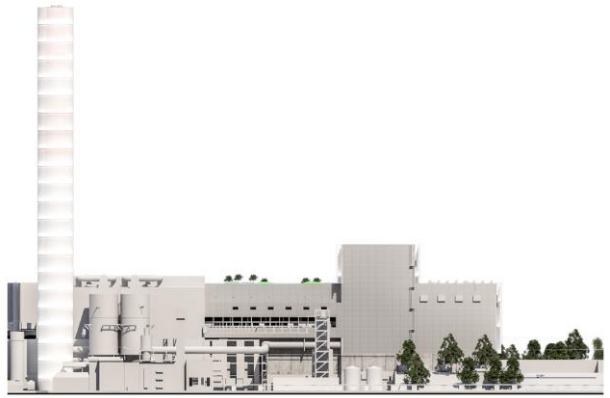
Civil part and Architecture

Major highlights

- Combination of polycarbonate and sandwich paroc panels
- Emphasis on quality and proven materials with long-term lifespan
- Integrated RGWB illumination with advance control system
- Accessible green walking roof for future visits
- United facade of new and existing building







SAKO BRNO

PUBLIC CONTRACT

PROJECT TIMELINE

Project timeline and day-to-day status

Activity	Start	Finish	Status
Conceptual design	04/2019	09/2019	Finalized
Architectural study	09/2019	12/2019	Finalized
Feasibility study	09/2019	11/2019	Finalized
Waste availability study	09/2019	11/2019	Finalized
Future DH delivery study	09/2019	12/2019	Finalized
Project definition	12/2019	05/2020	Finalized
EIA	08/2019	01/2021	Finalized
Zoning permission	09/2019	08/2021	Finalized
Integrated pollution prevention control permission	11/2020	11/2021	Finalized
Contracts for main utilities (waste; heat; electricity)	01/2020	12/2021	Finalized
Public procurement preparation	10/2019	09/2021	Finalized
Finance raising and Insurance process	01/2020	08/2022	Ongoing
Public procurement (Owner‘s engineer)	10/2021	04/2022	Ongoing
Public procurement (Contractor)	07/2021	08/2022	Ongoing
City council approval procedure	08/2022	09/2022	
Project construction	10/2022	10/2025	

SAKO Brno, a.s.
Jedovnická 2, 628 00 Brno, Česká republika
tel.: +420 548 138 217
mobil: +420 603 140 618
e-mail: reditelstvi@sako.cz, www.sako.cz