

# CFB boiler conversion to biomass

Reference project

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SUMITOMO SHI FW ENERGIA  
POLSKA SP. Z O.O.

ENERGETIKA A ŽIVOTNÍ PROSTŘEDÍ 2024

Ostravice, 10.09.2024

# Agenda

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SHI FW Company introduction

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CFB Bio-100 conversion

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Project development stage

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Basic assumptions

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Technology concept & scope of works

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Execution milestone schedule

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Q&A

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SFW | Powering a decarbonized world for everyone

**1 800**  
employees  
across the globe

**20+**  
locations  
around the world

**130+**  
years of  
experience

**800 +**  
successful references worldwide  
**122** | **344** | **419**  
Americas | Europe | Asia






**4**

**businesses**

- Energy Generation
- Circular Carbon
- Energy Storage
- Services

**5**

**values of SFW**

-  Respect for people
-  Committed to customers
-  Passion to innovate and grow
-  Ownership of results
-  Safety, integrity and teamwork

# SFW Services

Global operator in energy market services

## Products and Services

### Basic Maintenance (BM)

- Maintenance (outages, hourly rated works, condition monitoring, emergency services)
- Pressure equipment and pressure part replacements
- Steam and condensate pipings
- Auxiliary equipment services and renewals
- Spare parts
- Inspection and specialist services
- EIC Services
- Process, EIC and mechanical designing

### Technology, Modernizations and Upgrades (TMU)

- Fuel range expansions and conversions
- Capacity upgrades and process improvements
- Fluidized bed boiler retrofits
- Environmental upgrades
- Plant optimization and feasibility studies

### LTSA (Long Term Service Agreement)

- Daily maintenance, outage maintenance
- Boiler condition monitoring
- Nominated plant organization
- Spare Parts & Materials
- Technical advisors on-shore
- Expert services off-shore

### Digital Services

- Envelope
- Bed Management and Hotloop Diagnostics
- Grid Condition Monitoring
- Fouling Management
- Leakage detection
- Reporting

Own Manufacturing facilities  
SFW laboratory services

# Our Manufacturing Network

## We Deliver Quality Products for New Equipment and After Market Service



### China

Established: 1997

Location: Xinhui City, PRC  
(95 km NW of Hong Kong)

Production Area: 50,000 m<sup>2</sup>

Capacity: 1,200,000 man-hours

Certifications: ASME code certifications  
S & PP, China Boiler Manufacturing  
Certificate Level A, ISO 9001



### Poland

Established: 1880

Location: Sosnowiec, Poland

Production area: 33,000 m<sup>2</sup>

Capacity: 400,000 man-hours

Certifications: ISO 9001, ISO 14001,  
OHSAS 18001, PED, ASME S & U  
stamp, Germany and Poland service cert  
(HPO, UDT), EN 1090, lab cert EN  
ISO/IEC 17025



### Thailand

Established: 2000

Location: Chonburi, Thailand

Production area: 4,000 m<sup>2</sup>

Capacity: 160,000 man-hours

Certifications: OHSAS 18001, ISO  
18001, ASME Code Certification S,R,NB  
Stamp



### Finland

Established: 1860

Location: Varkaus, Finland

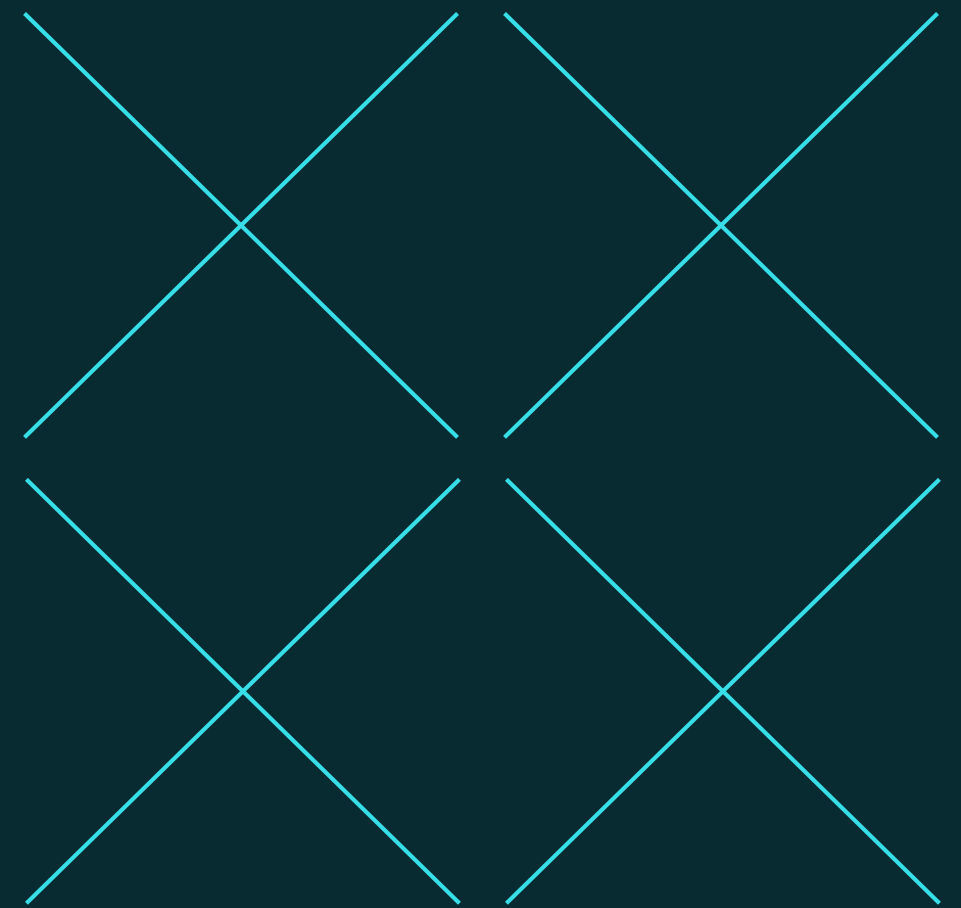
Production area: 4,000 m<sup>2</sup>

Capacity: 100,000 man-hours

Certifications: ISO 9001,  
ISO 3834-2, ISO 14001,  
OHSAS 18001

# Reference Project Development

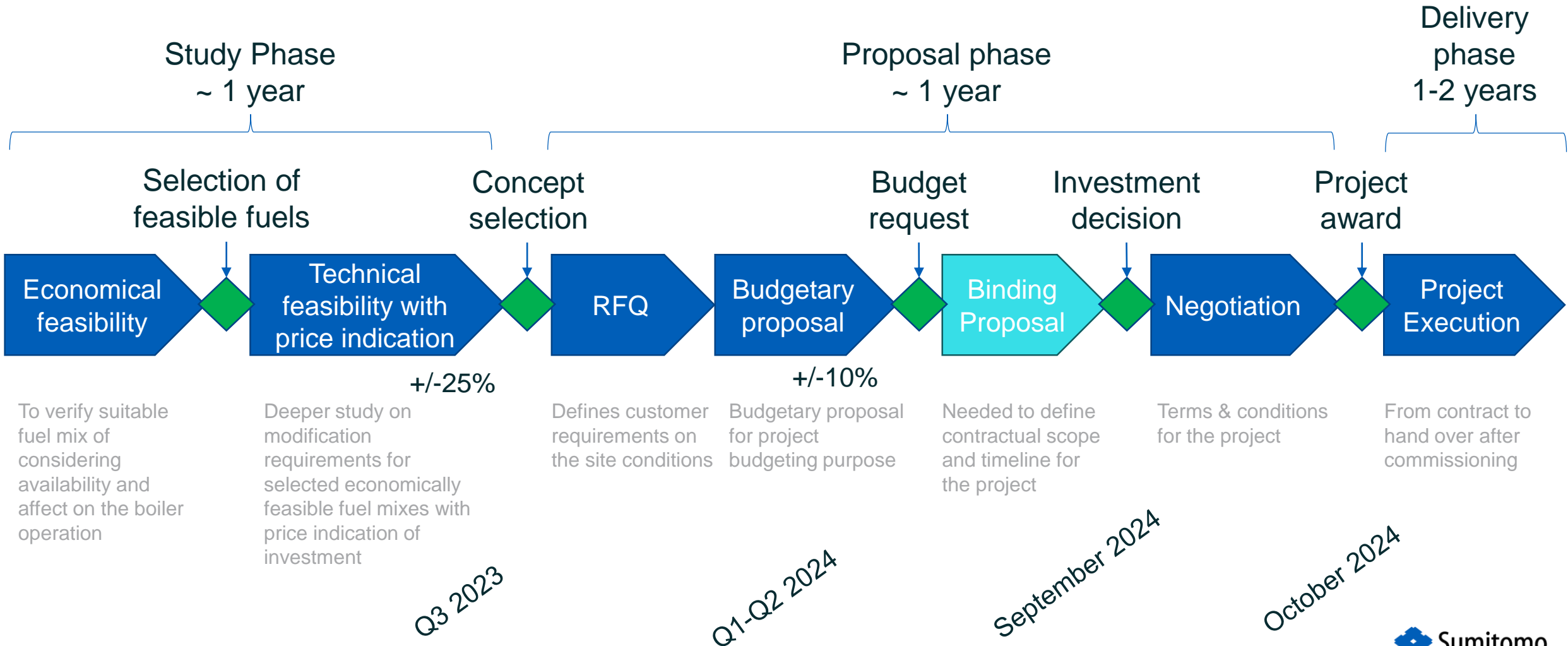
CFB Bio-100 conversion



# Fuel conversion project development: milestones

Typical project overview

 Plant owner milestone





# CFB boiler Island conversion to 100% biomass

## Original fuel parameters :

Fuel (by heat input):

- Bituminous coal 65 – 100%
- LHV 20,4-23,1 MJ/kg
- Total moisture 5-15%
- Ash 20-25%
- Biomass 0 – 35% (wood chips, energy willow)

## Boiler after modernization:

Fuel (by heat input):

- LHV 6,5-15MJ/kg
- Total moisture 20-55%
- Ash 1-12%
- PSD P63 and F10 acc to EN ISO 17225-1, max size  $\leq 350$ mm
- Impurities Non-fluidized particles  $\leq 0,1\%$ ds, max size  $\leq 50$ mm







## CFB Bio-100 conversion

### CFB Boiler parameters

#### Original CFB boiler parameters:

Steam capacity: MCR = 77.2 kg/s (278 t/h)

Steam parameters: 111 bar(a), 515°C

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#### Boiler after modernization:

Steam capacity: reduced to ~ 75% MCR,  
max ~57.9 kg/s (208 t/h)  
min ~30.9 kg/s (111 t/h)

Steam parameters: 111 bar(a), 515°C  
(sliding pressure turbine)

Continuous sand feeding to the boiler required

# Guarantees



Heat to steam:

Steam pressure

Steam temperature at max load

Steam temperature at min load

SO<sub>2</sub> emission

NO<sub>x</sub>

Dust

CO

NH<sub>3</sub>

HCl

HF

Hg

Consumables

Boiler efficiency

Noise emission

Availability

Vibrations

@ max load: 144.5 MW and  
@ min load: 77.2 MW

111 bar(a) ±2 bar

515°C ± 5°C

≥ 450°C

max 30 mg/m<sup>3</sup>n

max 120 mg/m<sup>3</sup>n

max 10/5 mg/m<sup>3</sup>n

max 50 mg/m<sup>3</sup>n

max 10 mg/m<sup>3</sup>n

max 10 mg/m<sup>3</sup>n

max 1 mg/m<sup>3</sup>n

max 5 ug/m<sup>3</sup>n

ammonia water, aux  
power, sorbent, activated  
carbon, sand, pressurized  
air

>91%

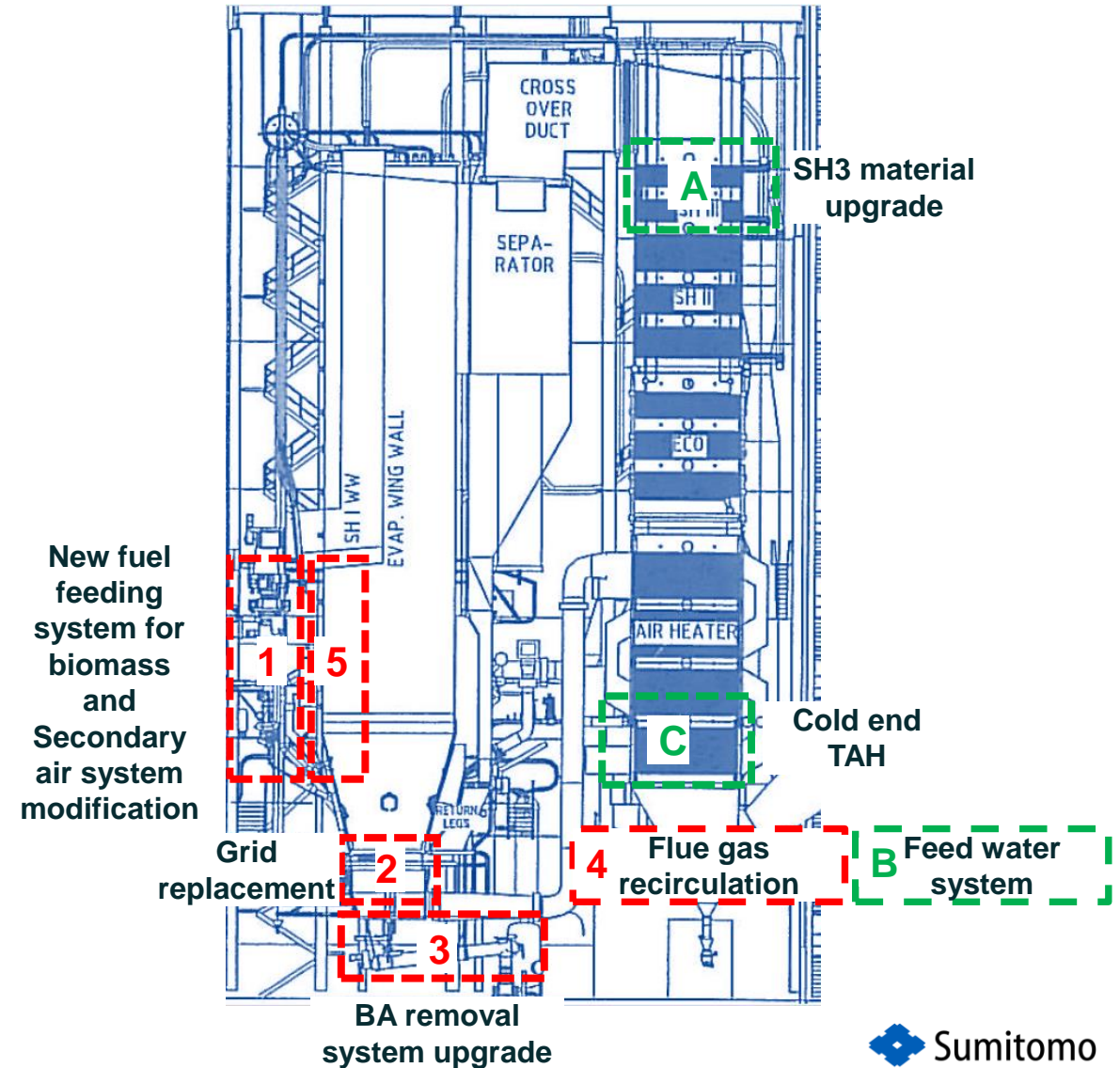
indoor and outdoor

# Basic scope of D&E modernization project

1. New fuel feeding system + conversion of coal silos into biomass
  2. Step grid
  3. Bottom ash removal system upgrade
  4. Flue gas recirculation
  5. Secondary air system modifications
- A. Delivery of tertiary superheater tube bundles  
 B. Delivery of feed water system,  
 C. Delivery of third section (cold end) of tubular air heater (TAH).

## Cost effective concept:

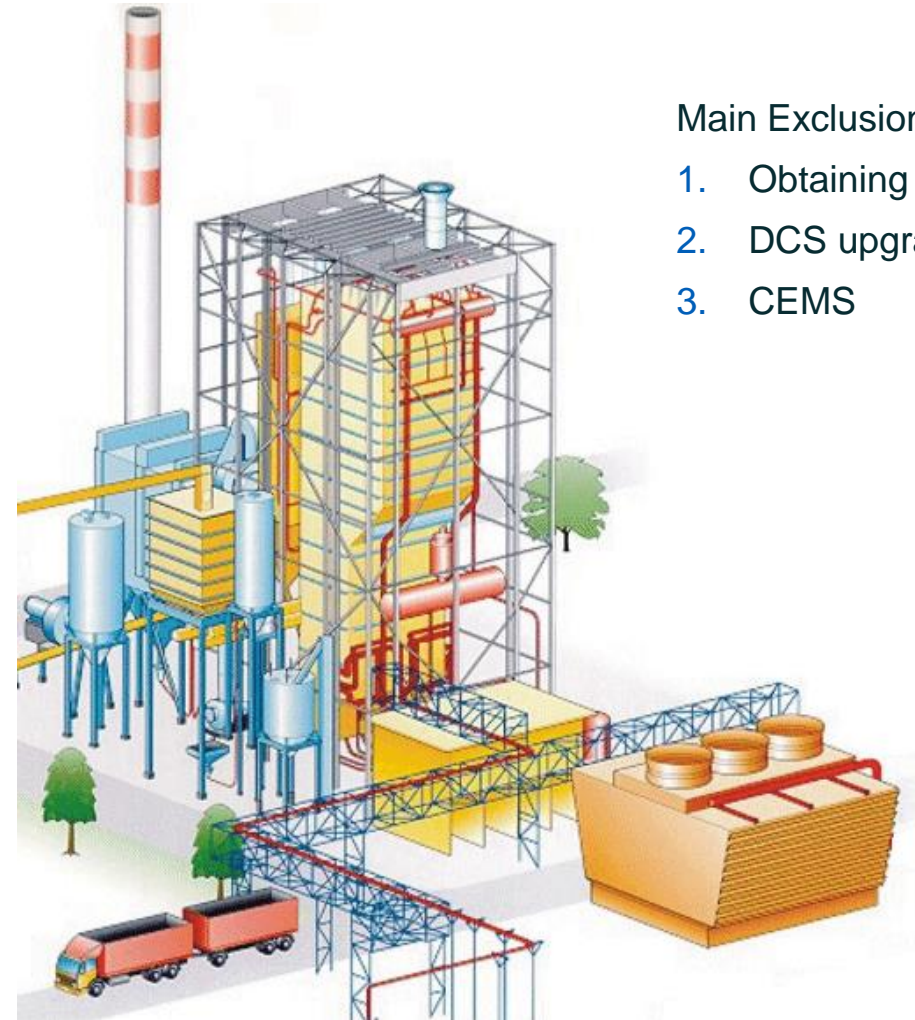
- ✓ No INTREX SH
- ✓ No separator type change
- ✓ No changes to existing AQCS





# Remaining scope of D&E formula modernization project

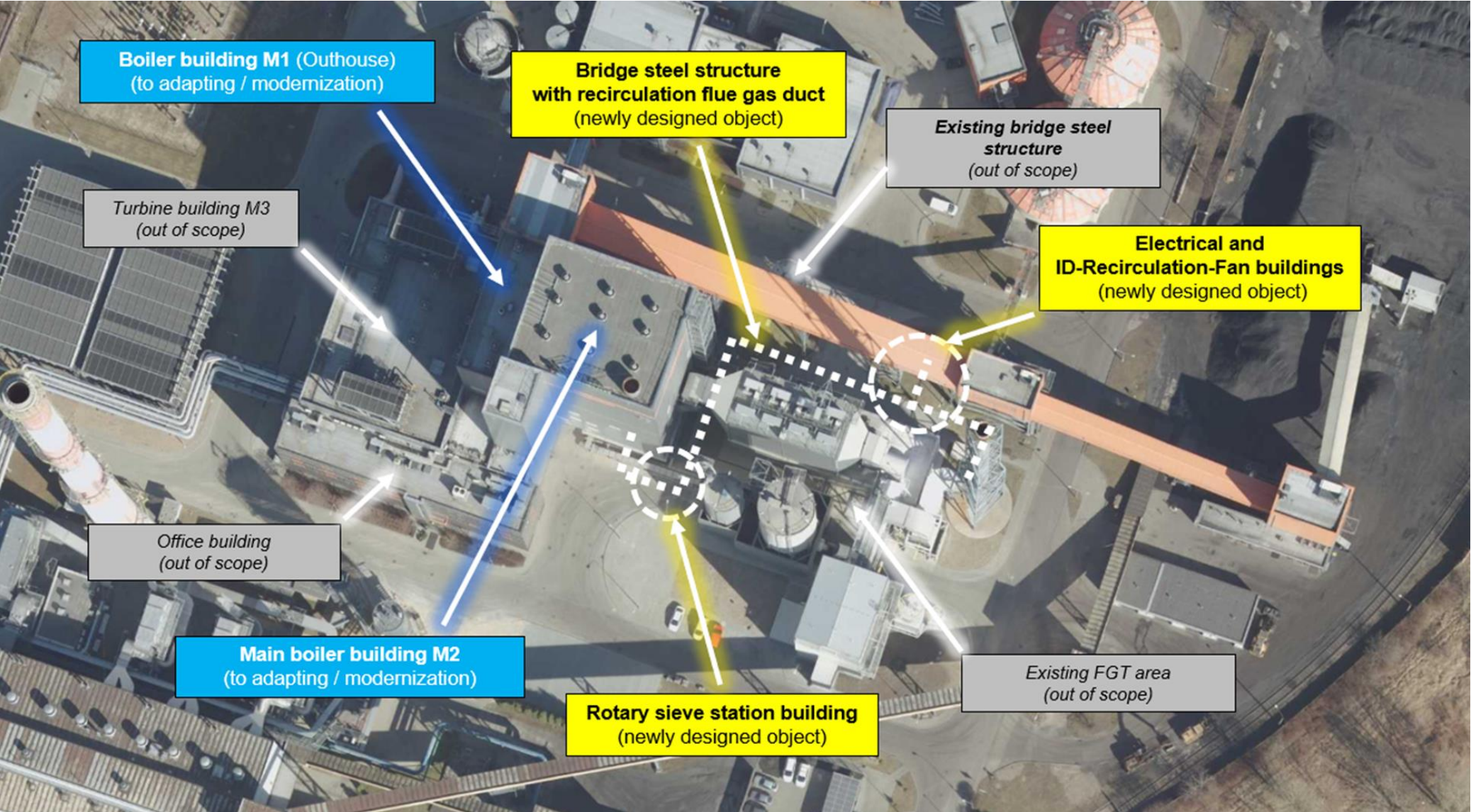
- Boiler Pressure parts
- Refractory
- Auxiliary steam systems
- Thermal and noise insulation
- Fire water and service water systems
- Closed cooling water system
- Pressurized air system
- Central vacuum cleaning
- Powering and electrification
- Instrumentation up to field boxes
- Land development & roads & green in term of architectural, structural and civil scope
- Foundation works for new buildings & structures.
- Building adaptation to EuroCode
- Input documentation for obtaining permits



## Main Exclusions

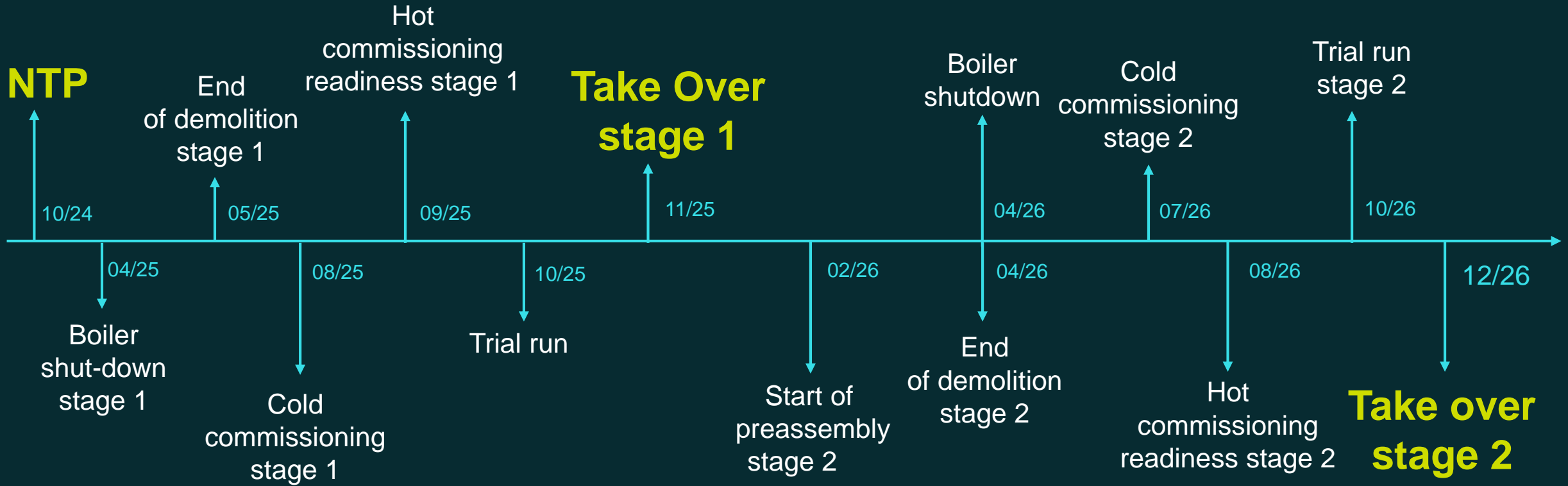
1. Obtaining permits
2. DCS upgrade
3. CEMS

# Satellite / Top view with modernization concept for civil & architectural scope





# Execution milestone schedule



Duration

1st stage  
13 months

2nd stage  
13 months

Total boiler shutdown  
9 months

# Q&A





# Thank you

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For more information, please contact:

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