

BELGRADE WASTE PPP

Design-Build-Finance-Operate of Modern Waste
Management Infrastructure in an Emerging Market

10/03/2021



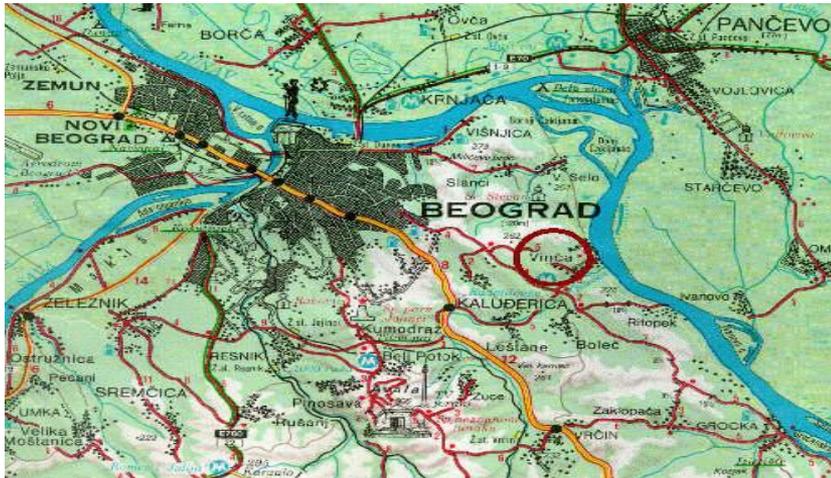
Project Background: Serbia and Belgrade

- 7.2 m population, of which **1.7m in Belgrade greater area** (40% of national GDP)
- EU **candidate** country with on-going accession negotiations (currently 18/34 chapters opened, 2 closed, special chapter on relations with Kosovo being problematic)
- Upper middle-income country, **GDP per capita 2019: \$7,020** [source World Bank]
- City of Belgrade rated Ba3 by Moody's → **below investment grade**



Why a Waste Management PPP in Belgrade ?

- Project site: Vinča dump, 15 km from city center - **42 ha in operation since 1977** - 700,000+ tons/year
- On ISWA's list of the world's 50 largest active dumpsites. **120 scavengers** living on/from the dumpsite
- **No containment of pollution** with substantial impact on air, soil and Danube water quality
- Fires in May-June 2017 increased the general awareness that **the issue must be addressed**











Why a Waste Management PPP in Belgrade ?

City's Objectives and Challenges

- Close **Vinča dumpsite** and ensure **long-term aftercare**
- Develop a **closed-loop** waste management solution based on **thermal treatment**
- Substitute waste heat for natural gas in **district heating system**
- Tap into private sector's expertise and finance for **cost efficiency** and **long-term performance**
- Achieve an **affordable solution for end-users**
- Landfill remediation is **not commercially viable**
- Manage the risks of **pollution legacy**
- Achieve a flexible system with enough **headroom for MSW recycling** in the future
- **Avoid reliance on third parties** without long term commitment (eg. RDF to cement kilns)
- Develop a **bankable** Design-Build-Finance-Operate scheme with **City as sole counterparty**
- Baseline **household charge (2019)** for waste collection + treatment: **2.9€/mth** (0.4% of budget)

Shaping Waste PPP using Competitive Dialogue

- EfW PPPs are complex projects involving **multiple revenues sources** as well as some **technological** risk.
- Complexity further increases when **combining EfW with a landfill and remediation** components
- Like many transition economies, Serbia is a jurisdiction with **limited PPP background** and practice
- **Public procurement with competitive dialogue** suits well the challenges of developing a bankable PPP project
 - **City secured PPP transaction advisory services from IFC** (World Bank Group) throughout the procedure
 - **5 consortia prequalified** in November 2015
 - **4 competitive dialogue meetings** with each bidder to develop a **bankable allocation of risks**
 - **Multiple iterations of PPP Contract** and key project documents
 - Bid submission in July 2017, with **lowest availability payment offered** as main tender criteria
 - **PPP Contract signed in September 2017** between City and SPV formed by SUEZ, Itochu and Marguerite)
 - Overall **2-year process**

Achieving an Affordable and Flexible Waste Treatment Mix

ENERGY-FROM-WASTE

340,000 tpa MSW

$X_{mcr} = 43.6$ tons/hour @ 8.5 MJ/kg

1 line, 103 MW - steam cycle 58 bar / 396°C

Condensing – extraction turbine with ACC

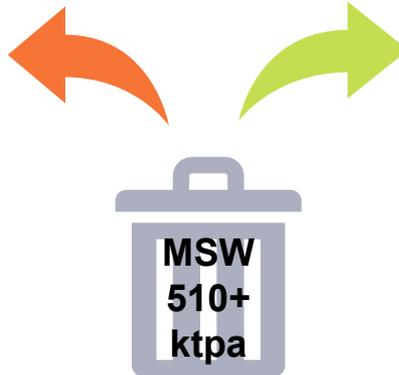
Max gross electricity output: 30 MWe

Max heat output to district heating: 56 MWth

IBA recovery facility

APC residues solidification plant to non-hazardous waste criteria (to landfill)

*EfW facility downsized from 510kt to 340kt during competitive dialogue to make the project more **affordable** and allow **headroom for recycling** in future*



ENGINEERED LANDFILL

170,000 tpa MSW

7.5 million m³ capacity

Leachate treatment plant : R/O + evapo-concentration (90,000 m³/y)

Biogas engines 3MW



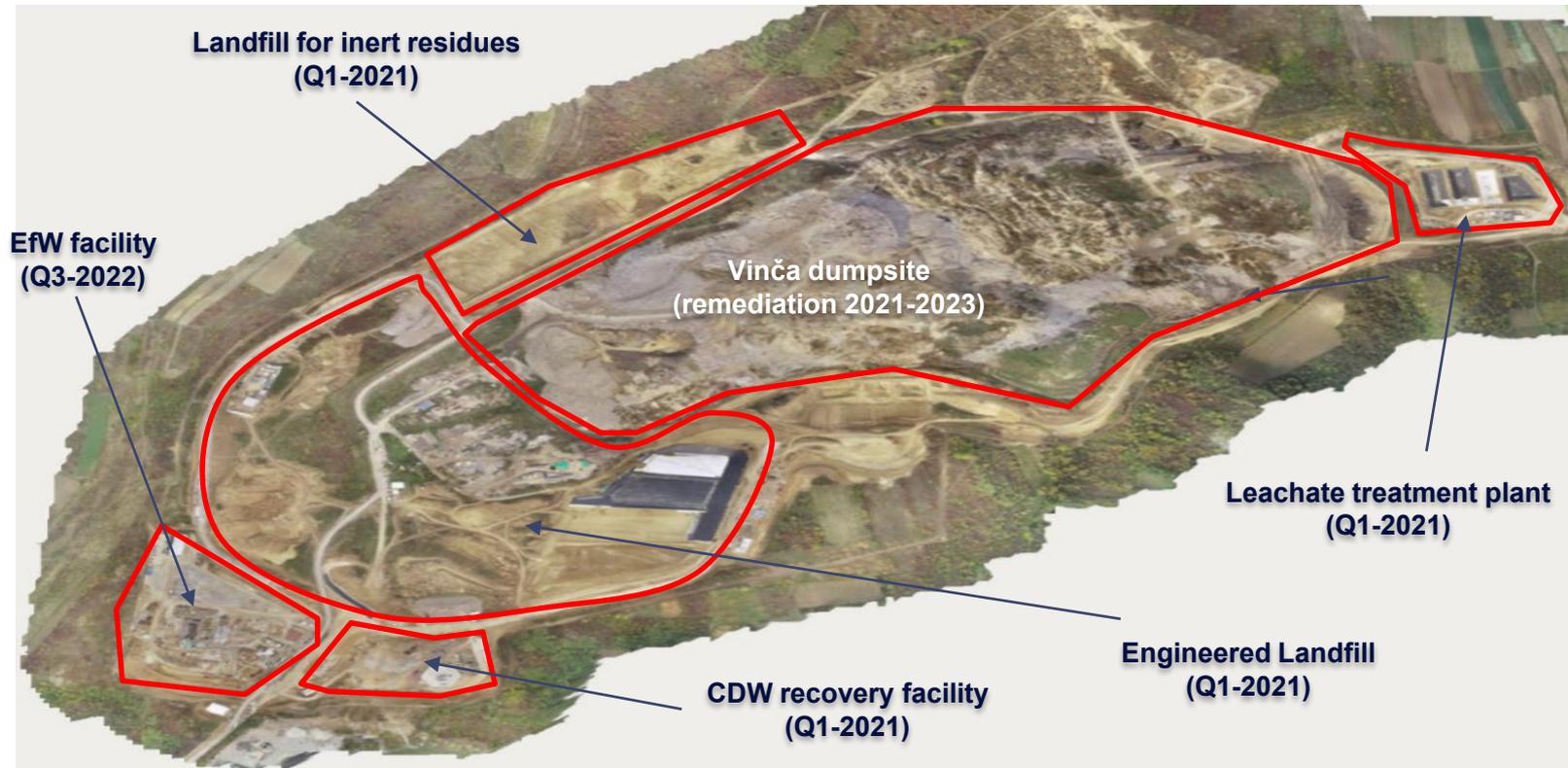
CONSTRUCTION & DEMOLITION WASTE RECYCLING

200,000 tpa

removal of contaminants, crushing, sieving (0-30mm, 30-80mm, 80-150mm)

70% CDW recovery target (roadworks, backfills, landfill covers)

Project Facilities



Environmental impact

- EIAs (Serbian regulation) and ESIA (based on IFIs requirements) have been developed and completed with an Environmental and Social Management System within the project monitoring all actions and impacts during construction and operation.
- Over the 25 years of operation, the project will allow to avoid 250,000 tCO₂eq per annum, substitute 5 million tons of coal.
- **EfW compliant** with 2019 EU revised Best Available Techniques reference document (**New BREF**): **lower emissions limits and reinforcement of continuous monitoring**

- **What is BREF?**

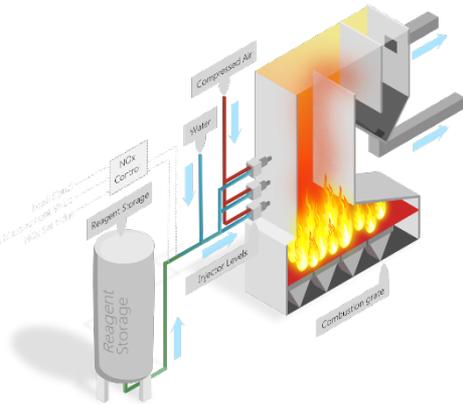
BREF or 'BAT reference document' means a document, resulting from the exchange of information organized pursuant to Article 13 of the Industrial Emissions Directive (IED) (2010/75/EU). BREFs are drawn up for defined activities and describing, in particular, applied techniques, present emissions and consumption levels, techniques considered for the determination of **Best Available Techniques** as well as BAT conclusions and any emerging techniques, giving special consideration to the criteria listed in Annex III to Directive 2010/75/EU.

BREFs are the main reference documents used by the EPA (Environmental Protection Agency) when issuing operating permits/licenses for the IED activities specified in the First Schedule of the EPA Act 1992, as amended.

- **On 20/12/2019, the 2019 BREF was published and replaced the first edition of 2006**

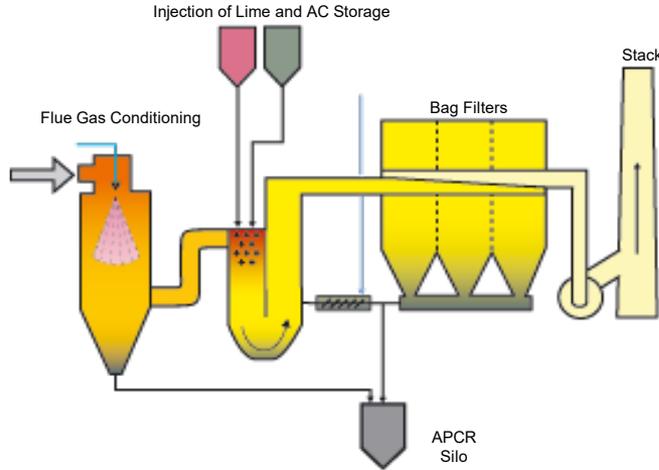
Emissions

Denox: SNCR by urea injection

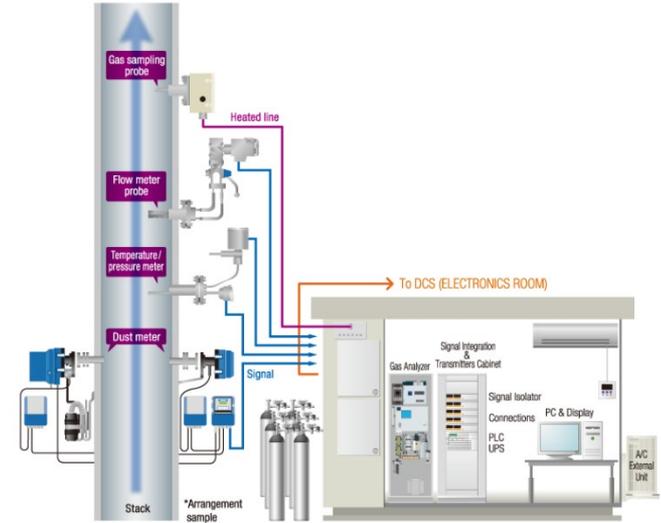


Flue Gas Treatment: Dry with lime and

activated carbon - Secolab



Emissions measurement system

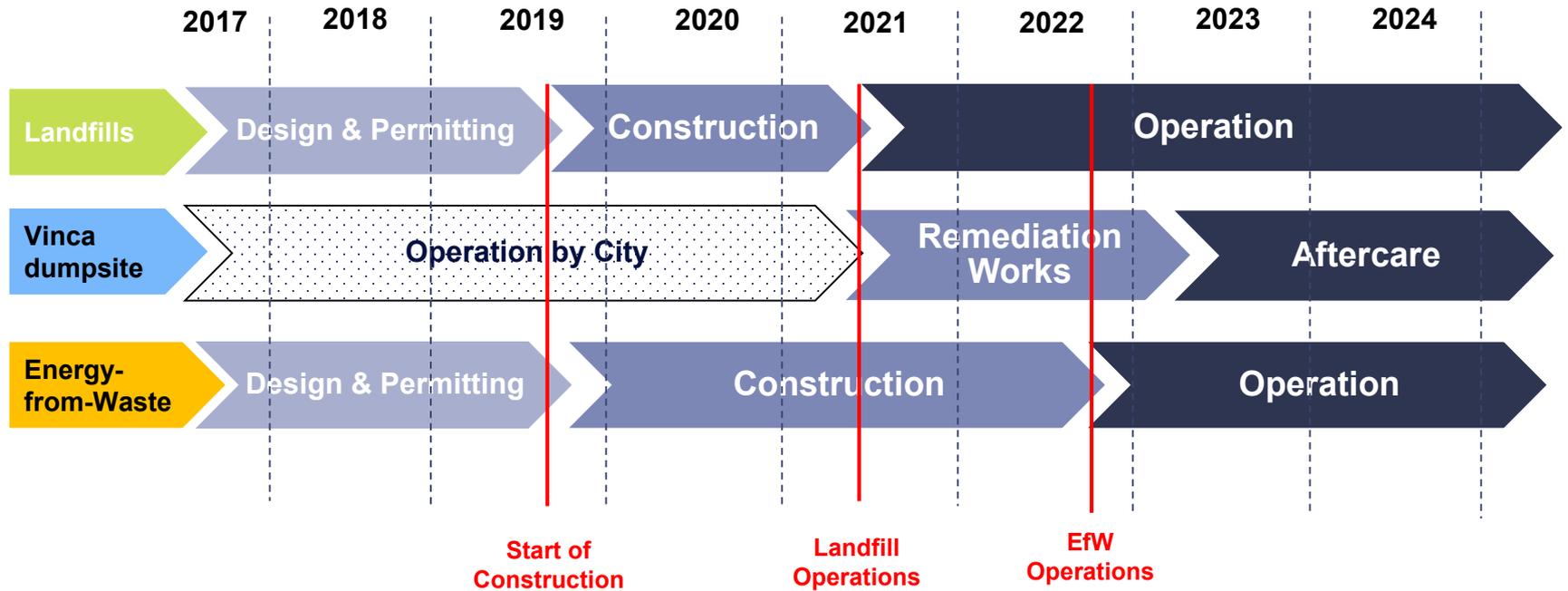


- To reach the limit values fixed by the EU directive we have elected a Selective Non Catalytic Reduction with liquid urea solution injection and a CNIM/LAB “SECOLAB” dry process.
- Continuous Emissions Monitoring Systems (CEMS) are provided to monitor the full range of pollutants stipulated by the Waste Incineration Directive. The systems are arranged in a duty and standby configuration to ensure the continuity of operation in the event of a fault on one of the systems.
- Official reports are to be issued by certified independent laboratory.

Solutions for Air Pollution Control Residues and Bottom Ashes

- The Air Pollution Control Residues (APCRs) will be processed into a dedicated facility and mixed with cement, blast furnace slag and leachates from the landfills to produce a solidified and stabilized concrete satisfying the criteria of non-hazardous waste. Solidified APCR (assumed to be produced in the amount of approx. 33,000 tpa from 13,600 tpa extracted from the FGT system) will be landfilled at a dedicated area at the landfill for treatment residues.
- Incineration Bottom Ashes (approx. 91,000 tpa) will be processed at a plant within the EfW Site to remove metals (approx. 4,300 tpa) and prepare two aggregate fractions of 0-40mm and 40-300mm. Processed IBAs will be cured during 12 weeks. Possible outputs are:
 - Commercial off-take for reuse in external roadworks – To be developed
 - intermediate covers and capping at the landfill
 - Final disposal at the landfill for treatment residues

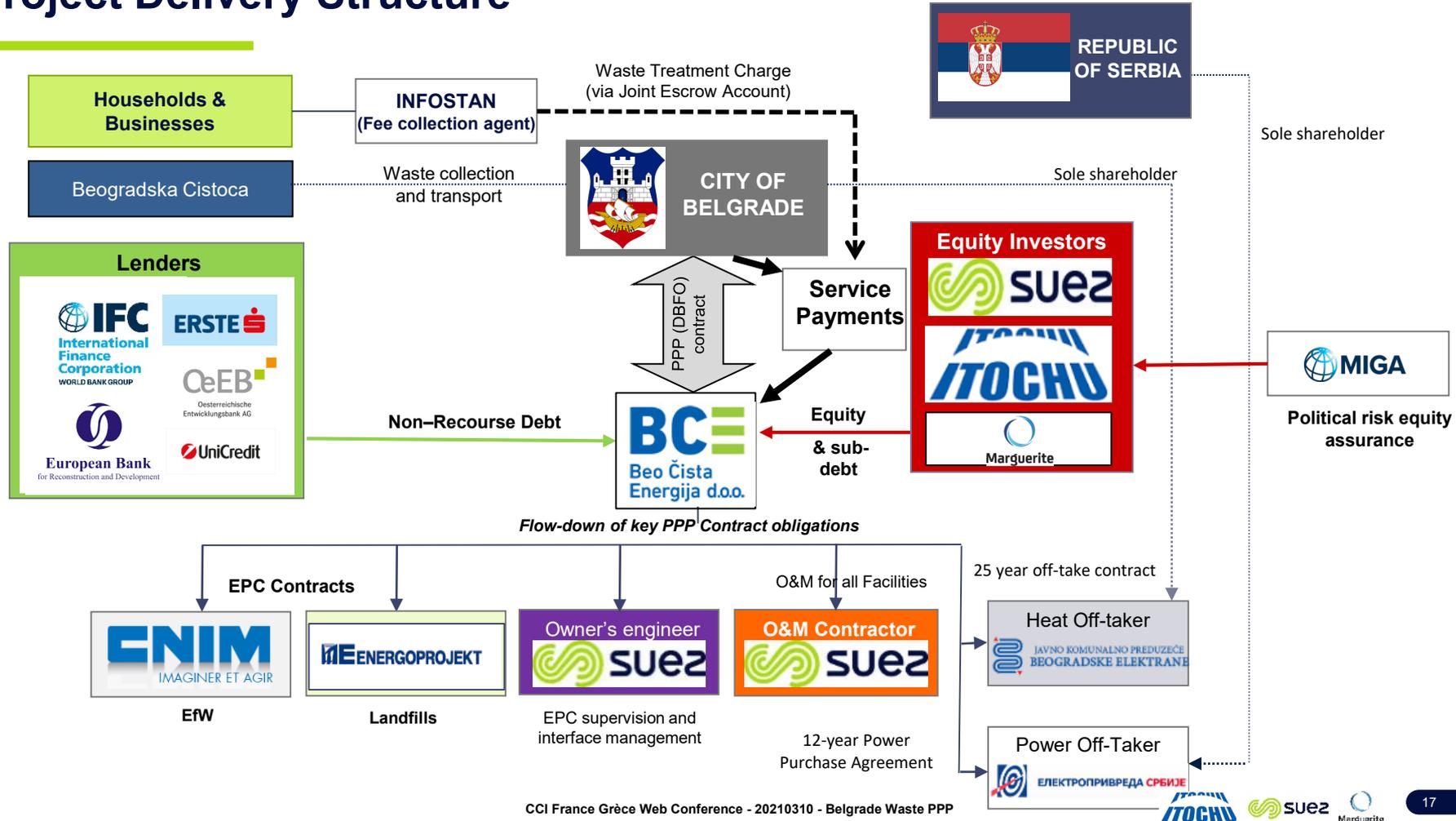
Project Timeline



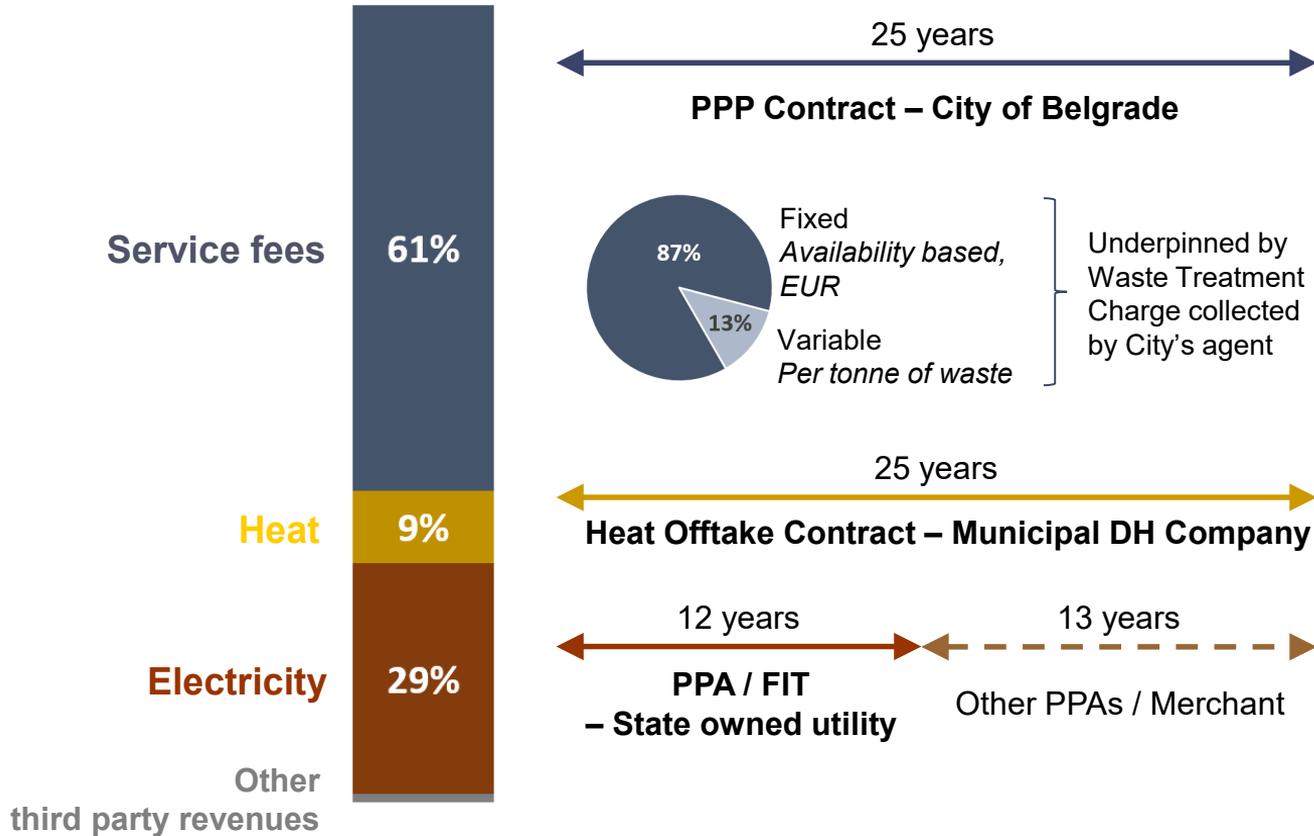
PPP Contract - Allocation of Key Risks

- SPV's fixed costs (financing and operation) are covered by a **fixed availability fee in EUR** : no forex risk, no volume risk, no third-party waste. Variable costs (operation) are covered by a **variable fee per ton**
- City's payments (60% of project revenues) are funded by a new earmarked **waste treatment charge** levied from residents and businesses and transferred to an escrow account
- LCV risk is mitigated by the **flexibility of EfW combustion diagram** (from 340kt @8.5 MJ/kg to 385 kt @7,5 MJ/kg) and waste availability (total waste envelope is about 510 ktpa)
- Feed-in tariff of 85.7 €/MWh guaranteed under **12-year PPA with national power company EPS**
- Heat offtake volume and price of 30 €/MWh are guaranteed under **25-year take-or-pay Heat Offtake Agreement**
- Urban Plan to be updated by City but all other **construction and environmental permits to secured by SPV**
- **Tentative financing conditions by IFIs set at bid stage** with an upside/downside sharing mechanism on Financial Close depending on the final loan conditions
- Ground Contamination, Protestor Actions and Change in Law are **Compensation Events**
- **Bankable regime of compensation on Termination** with 90% of Senior Debt repaid in case of SPV default

Project Delivery Structure



SPV Revenue Structure



Stable revenue streams secured under long term contracts with reputable counterparties

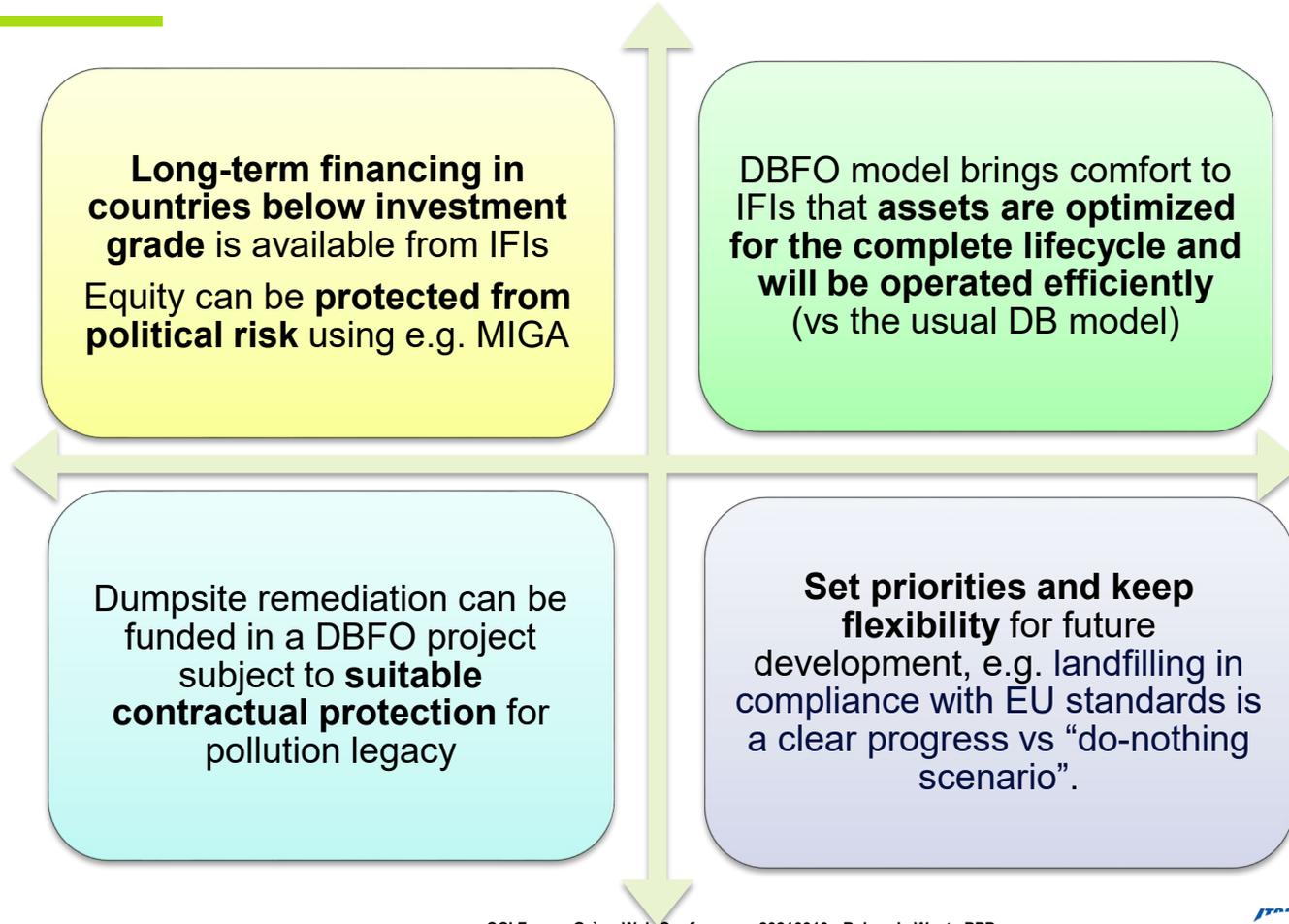


Non-recourse project financing with long tenors, high leverage

Investments and Financing Plan

- **Total design and construction capex: € 310m**
 - EfW, New Landfills, Leachate Plant, Biogas Recovery Facility, CDW facility, Remediation of Vinča Dumpsite
- **Total funding requirement (including capitalized interests): € 373m**
- **Equity: € 93m**
 - SUEZ (40%), Itochu (40%), Marguerite Fund (20%)
 - Financed through **Equity Bridge Loans during construction** for IRR optimization and bid competitiveness
 - **Covered by MIGA political risk insurance** (currency inconvertibility and transfer restriction, expropriation, war, civil disturbance, arbitral award default)
- **Non-recourse senior loans from IFIs: € 280m**
 - **A-loan - EBRD, IFC, OeEB** - 18 years door-to-door (including subsidized tranches from EBRD's Green Energy Special Fund (GESF) and the Canada-IFC Blended Climate Finance Program)
 - **B-loan - Unicredit, Erste Bank** - 15 years door-to-door

Belgrade PPP Project – A Replicable Model









Thank you for your attention - visit us at www.bcenergy.rs !

