



Hitachi Zosen
INOVA

Increasing energy and materials recovery while
keeping EPC cost down

WTERT 2016 Bi-annual Meeting, New York, Oct. 6/7, 2016

Peter Chromec, Senior Sales Director

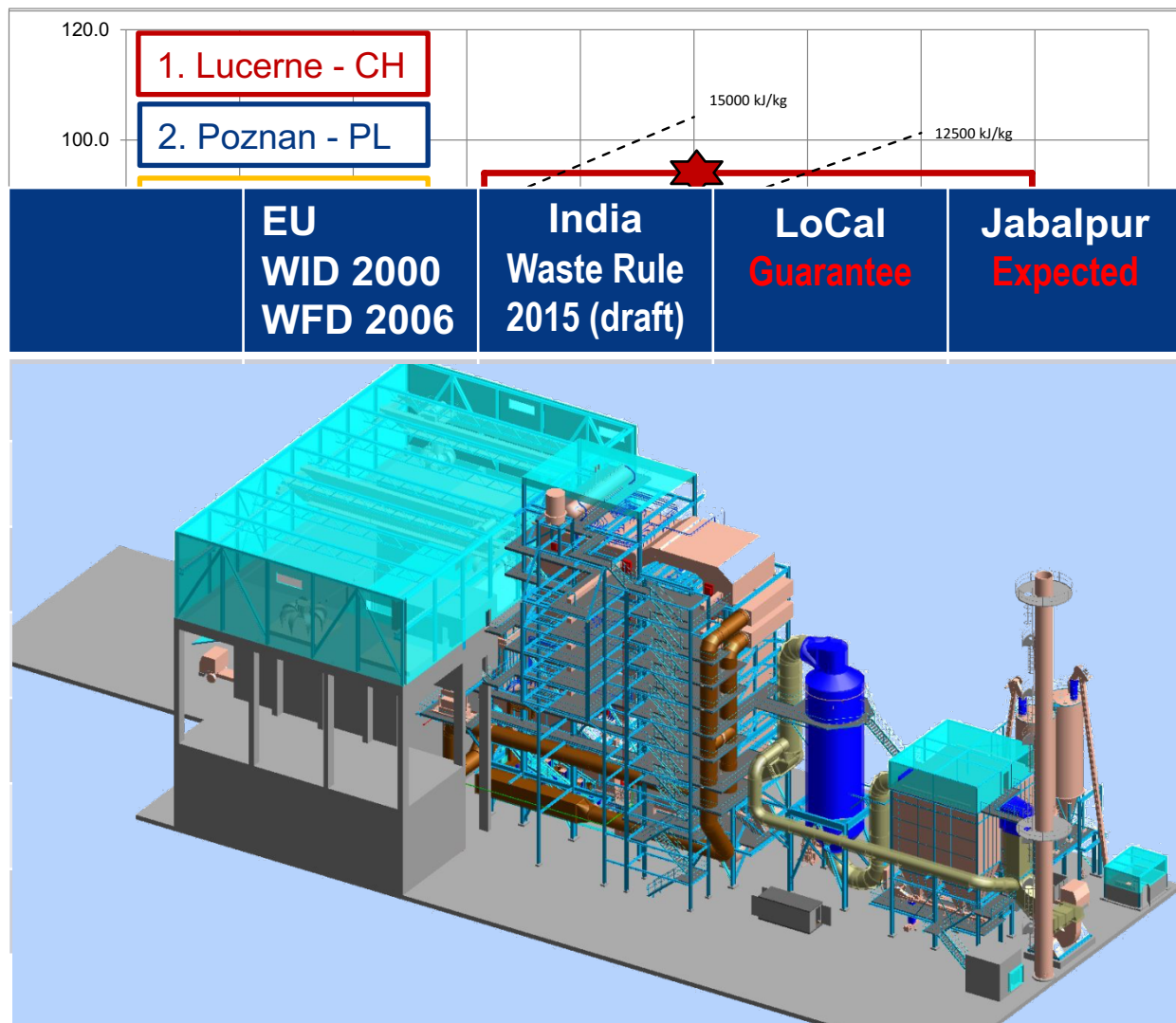
1) Keeping EPC Cost Down

Main Differentiators:

Waste Spec

Emissions Fear

No Tip Fee/ Affordability



Plan vs. Actual: Supply Chain

| >90% of materials have been sourced from India

Grate castings & control	Sourced from Europe*
Grate and ram feeder general	Sourced from India
Bottom ash extractor	Sourced from India**
Boiler accessories and Refractory	Sourced from India
Turbine Island, ACC	Sourced from India
FGT System	Sourced from India
Material and Residue handling	Sourced from India
Process steel structure	Sourced from India
Balance of Plant	Sourced from India

| Civil scope : Client scope and sourced from India

*) Combustion Controls need to be adapted to waste composition

**) Waste Composition differences had highest impact on ash extraction

Jabalpur Project Cost

Waste throughput:	25 t/h = 666 tpd
Design CV (LHV):	6900 kJ/kg = 3600 BTU/lb
Plant Capacity:	200 MMBTU/hr (48 MW_{th}) - 12 MW_{el}
Total Investment:	INR 200 cr (USD 30 Million)

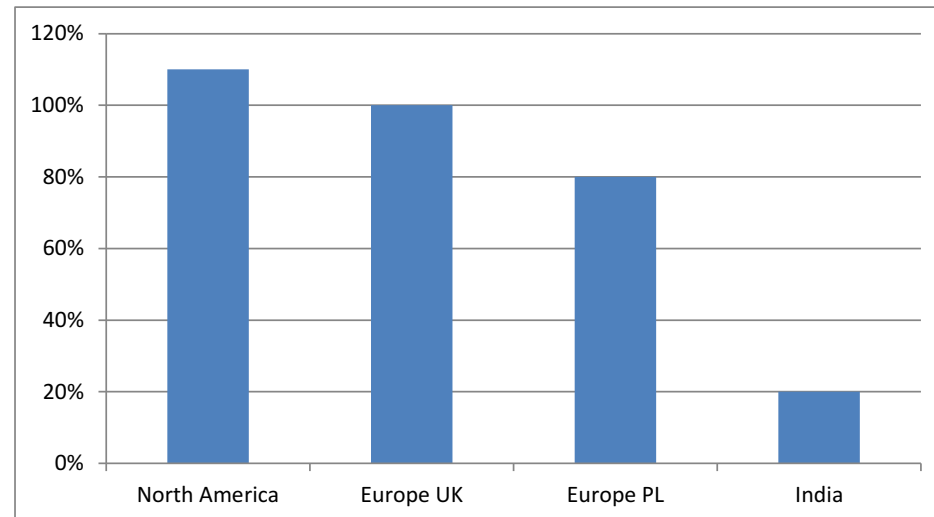
Including following scope changes compared to Jabalpur initial:

- SNCR ¹⁾
- Residue recirculation system ¹⁾
- Bottom ash extractor ²⁾

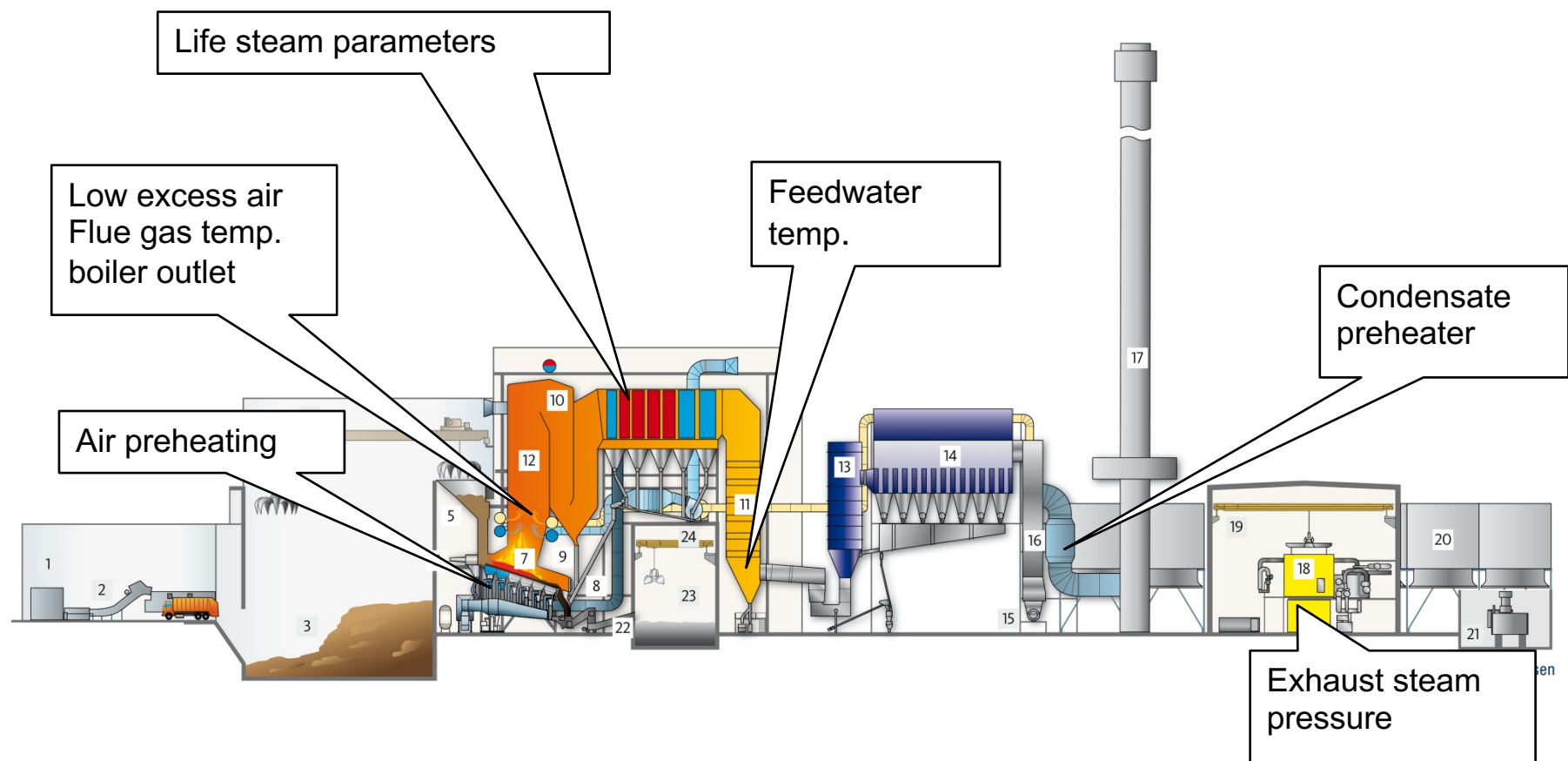
1) Due to SWM 2016 implementation

2) Type change due to expected waste composition

Cost Comparison of ~12-14 MWe1 1-line EfW plants



2) Increase Energy Recovery



Maximizes Generation of Electricity Riverside, UK 2011



Key Figures

- | Waste capacity 3 * 850 tpd
- | Heat Value 4500 BTU/lb (9 MJ/kg)
- | Thermal capacity 3 * 79.5 MW_{th}

Energy Efficiency

- | Power Generation: 73 MWeI
- | Power Export: 65 MWeI
- | Electrical efficiency: >30/27%

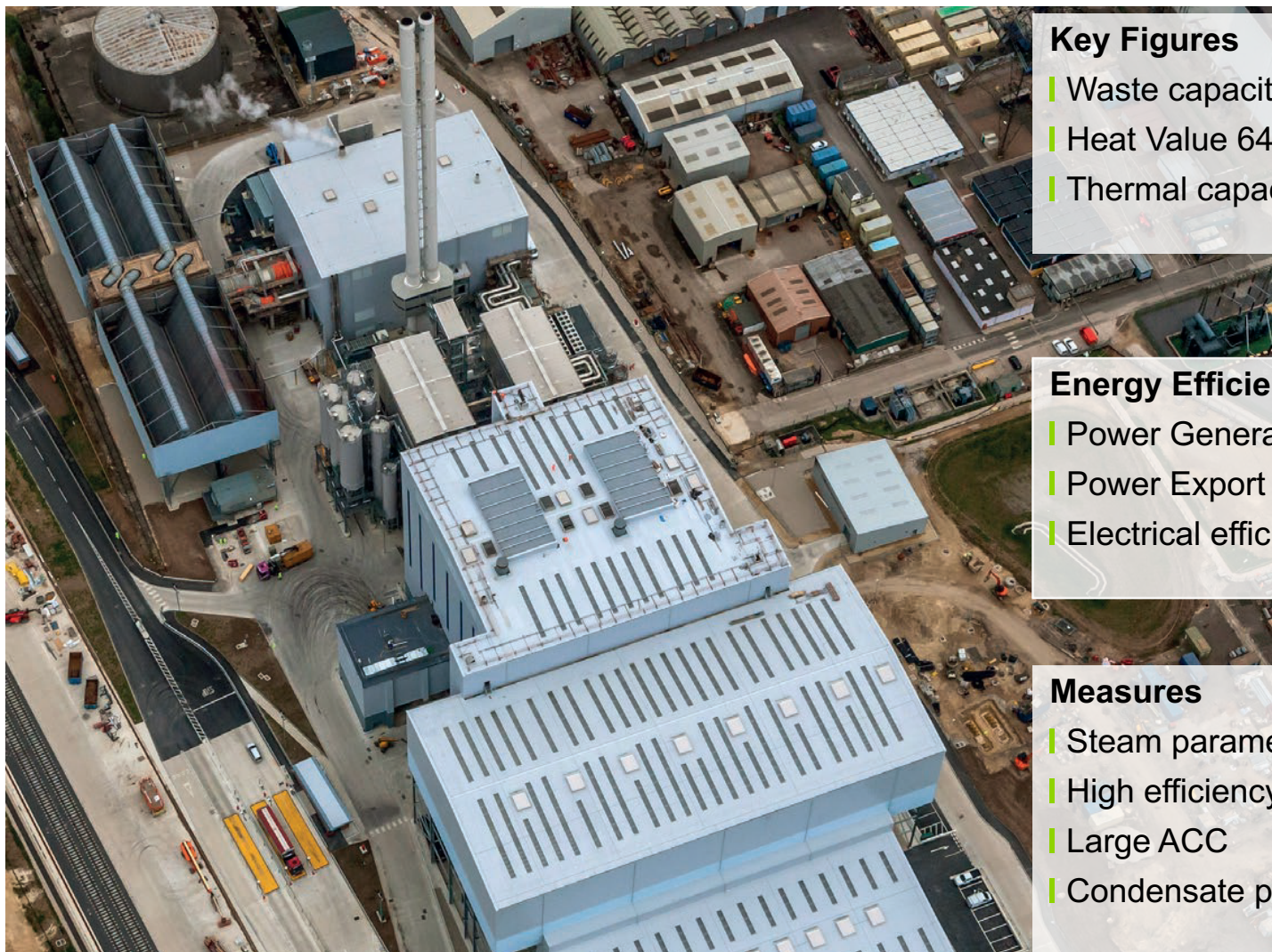
Measures

- | Steam Parameters 1050/800F
- | High efficiency turbine
- | Sea water cooling

Maximizes Generation of Electricity

Ferrybridge, UK, 2015

Hitachi Zosen
INOVA



Key Figures

- Waste capacity 2 * 850 tpd
- Heat Value 6400 BTU/lb (13.5 MJ/kg)
- Thermal capacity 2 * 117.4 MW

Energy Efficiency

- Power Generation 77.1 MWeI
- Power Export 69.4 MWeI
- Electrical efficiency: ~33/30%

Measures

- Steam parameters (1050/805F)
- High efficiency turbine
- Large ACC
- Condensate preheating

Maximizes Generation of Electricity

Dublin, Ireland, 2016



Key Figures

- Waste capacity 2 * 865 tpd
- Heat Value 5400 BTU/lb (11.2 MJ/kg)
- Thermal capacity 2 * 102.5 MW_{th}

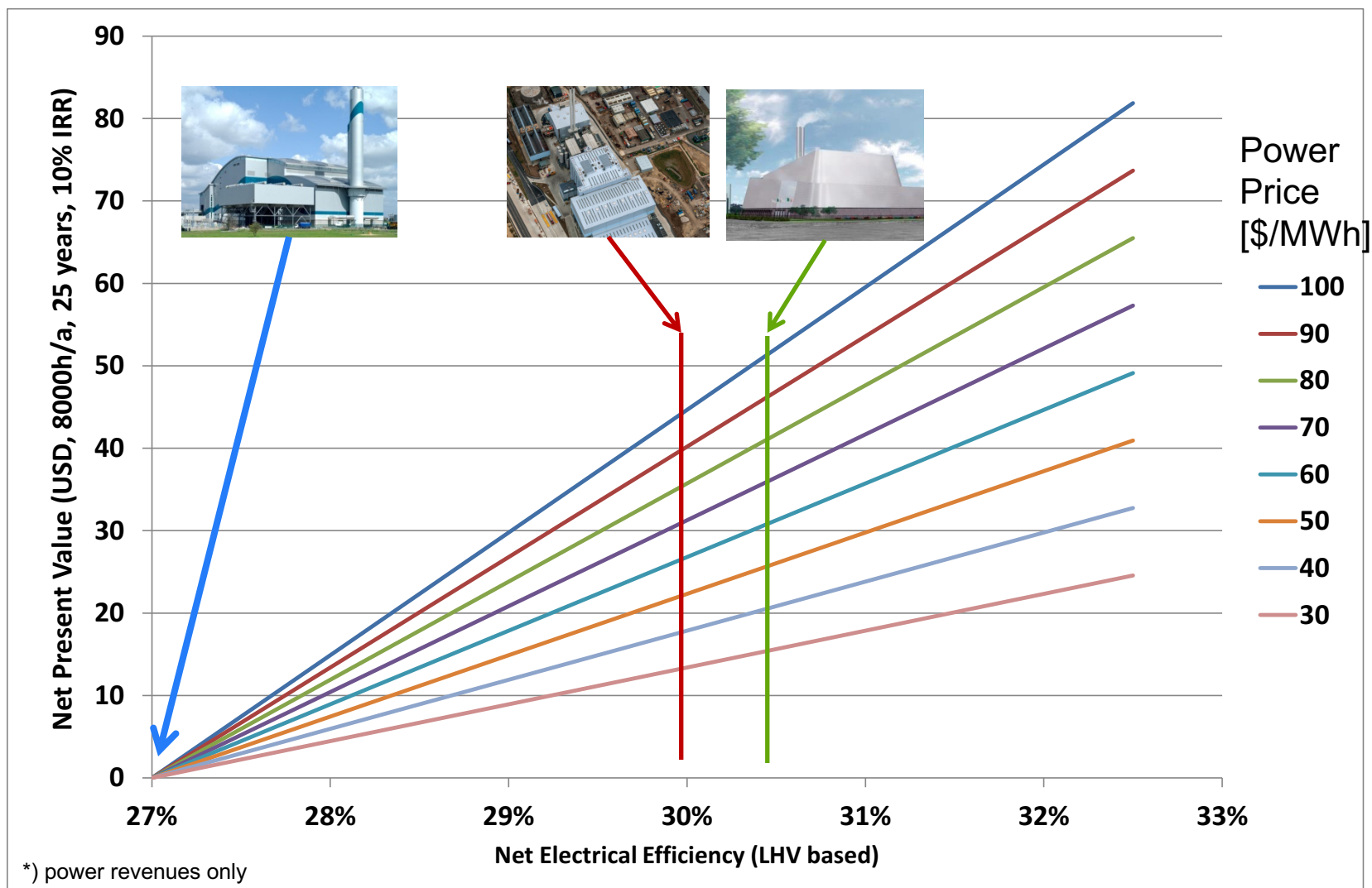
Energy Efficiency

- Power Generation: 68.8 MWeI
- Power Export: 62.3 MWeI
- Electrical efficiency: 33.5/30.4%

Measures

- Steam Parameters 900/830F
- High efficiency turbine
- Sea water cooling

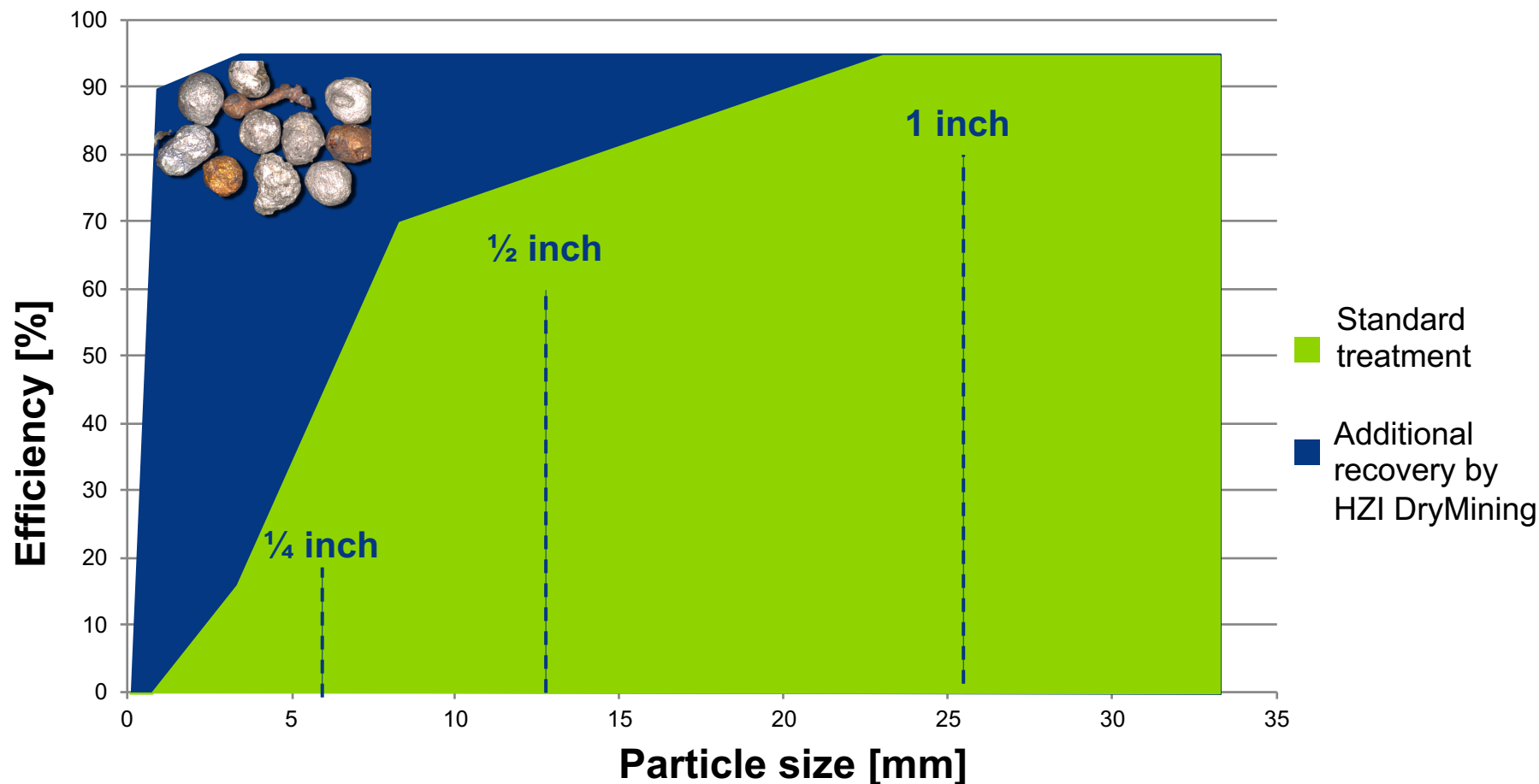
Increasing the Energy Efficiency (Dublin size EfW plant)



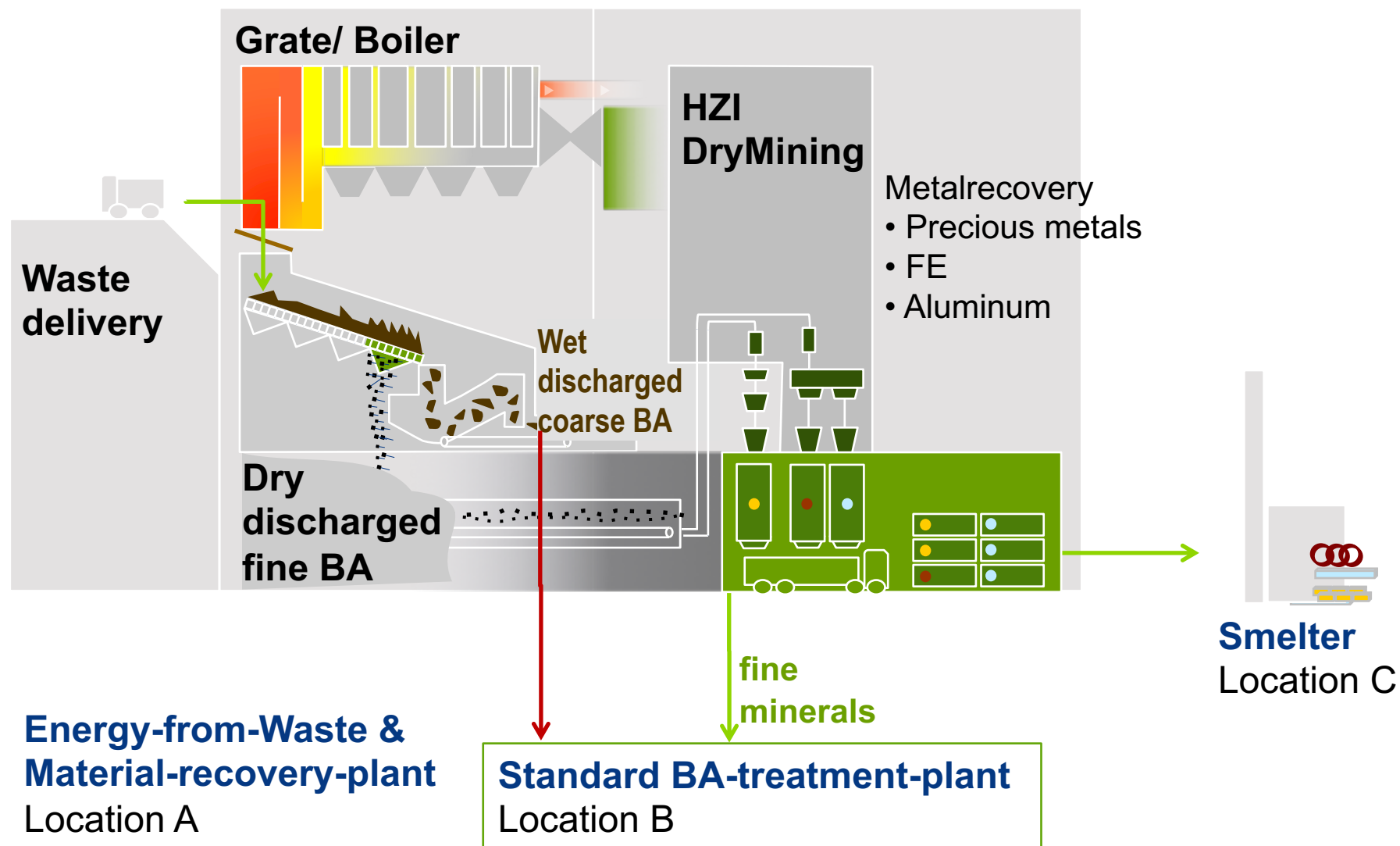
3) Increase Material Recycling: Non-ferrous Metals



Comparison of dry-mechanically treated dry and wet discharged IBA



HZI Grate for Riddlings and DryMining – Recovery at the source



Operating experience KEBAG Emmenspitz

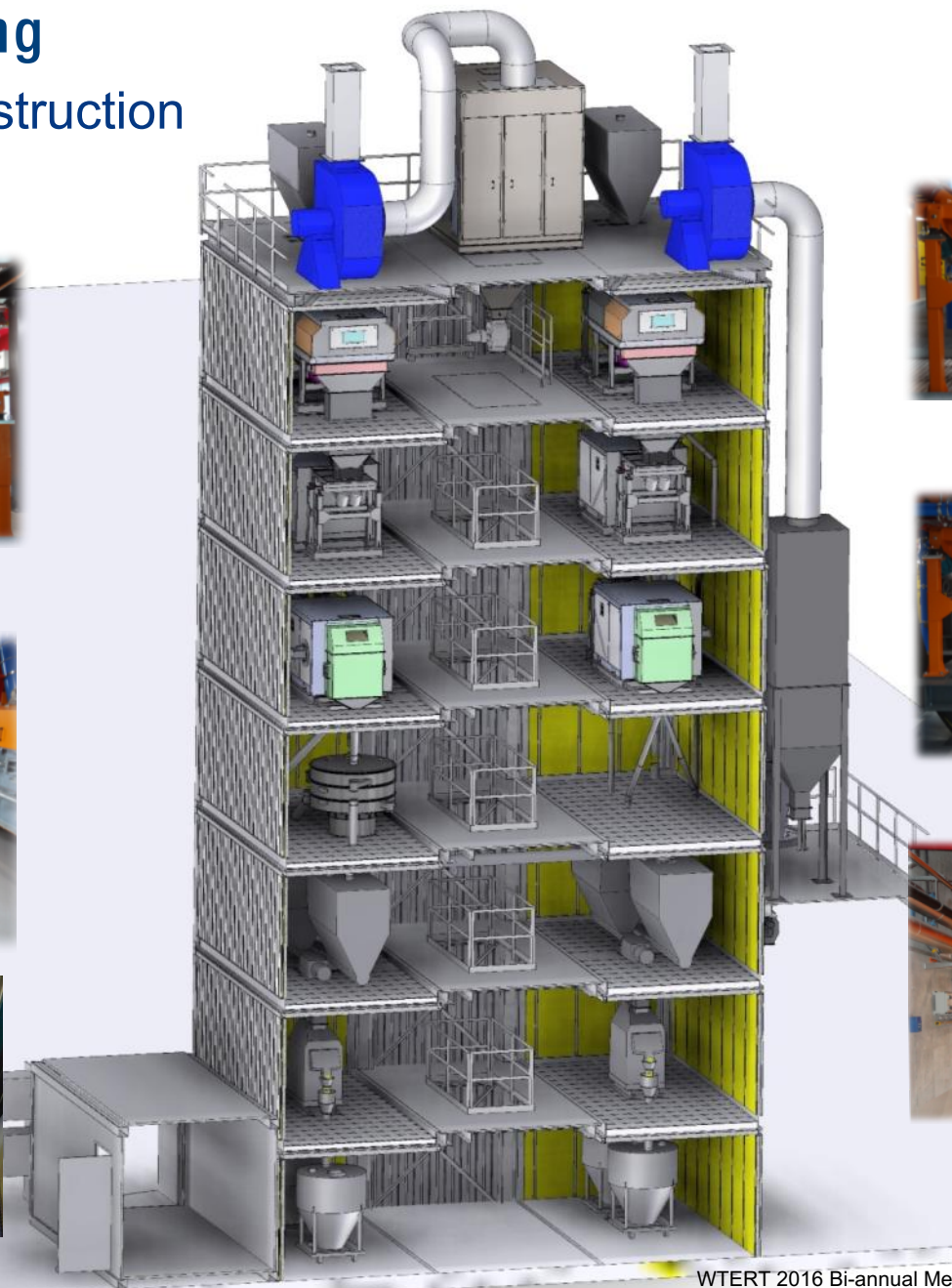
- | TOC: 0.88 %, unchanged
- | Fine-IBA: ~70 % of total IBA < 10 mm
- | Temperature of fine-IBA allows safe conveying and treatment
- | No unusual wear of G4R



HZI DryMining

Modular construction

Hitachi Zosen
INOVA



Commercial Considerations (standard HZI Dry Mining plant)

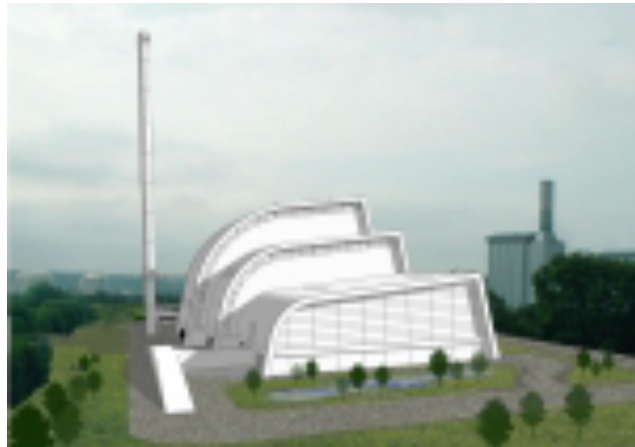
	Central collection	Big EfW-plant	Average EfW-plant	
Waste throughput	1,000,000t/a	700,000 t/a	250,000 t/a	
Total amount dry IBA	200,000 t/a	140,00 t/a	50,000 t/a	≈20% of waste
Dry fine IBA <10mm (from HZI Grate for Riddlings)	60,000 t/a	40,000 t/a	15,000 t/a	≈42 % of dry IBA with x 70% separation efficiency
Recovered NF-metals	3,420 t/a	2,280 t/a	855 t/a	Process efficiency >90% NF predominantly in fine BA
Revenue (low metal prices)	4.0 Mio. \$/a	2.7 Mio. \$/a	1.0 Mio. \$/a	Depends on commodity exchange
Revenue (high metal prices)	7.0 Mio. \$/a	4.7 Mio. \$/a	1.8 Mio. \$/a	
BA minerals dry	56,580 t/a	37,270 t/a	14,145 t/a	
BA humidified	61,106 t/a	40,738 t/a	15,277 t/a	8% humidity

To a large extent additional non-ferrous recovery

Conclusion

- Increasing energy .. ?
and materials recovery ?
while keeping EPC cost down ?

Better & lower-cost



Thank you very much
for your attention

Peter Chromec
Senior Sales Director
+41 44 277 1123
peter.chromec@hz-inova.com