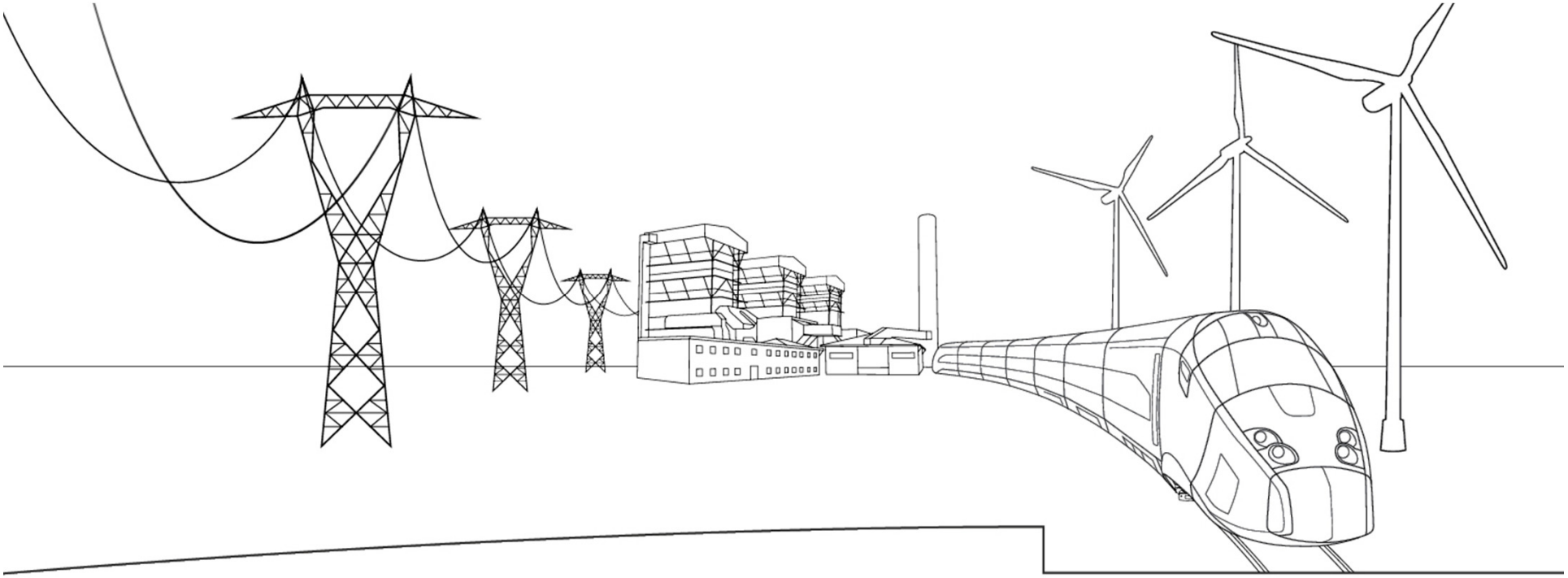

NID™
Modular and Multi-Pollutant Control Technology - Fundamentals and Operational Experience

Jürgen Dopatka, Alstom, US
Jiangtian Zhang, Alstom, CN

Knoxville, TN

March 27, 2013

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Shaping the future

Agenda

- Introduction
- NID Process and Benefits
- Alstom NID Experience
- Conclusion

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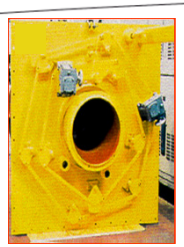
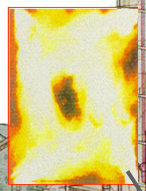
Power Plant Arrangement



Burner NOx Retrofits
- RSFC™
- P2™

Boiler

Burner Systems
- LNCFS
- TFS 2000™
- Fuel Switching



NOx Control

-SCR Systems

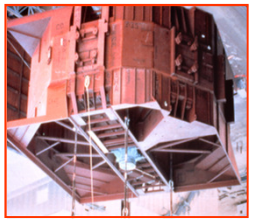
Research and Development
- Air Modeling Capabilities
- CFD Modeling

Steam Turbine and Generator

Coal Pile

Substation Systems

Pulverizer



Air Preheater

Particulate Control
– Fabric Filter
– Electrostatic Precipitator

Flue Gas Desulphurization
– Wet FGD
– Dry FGD
- SDA Spray Drier
- NID

Construction

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Evaluation Criteria for AQCS Equipment

#1 Environmental Compliance

- Removal efficiency requirements
- System reliability, availability, and maintainability

#2 Cost and Schedule

- Initial capital expense and recurring operating expenses
- Delivery and construction time

#3 Footprint and General Layout

- Greenfield and retrofit
- Space requirements
- Layout flexibility

NID Excels in All Three Categories

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Alstom NID Applications

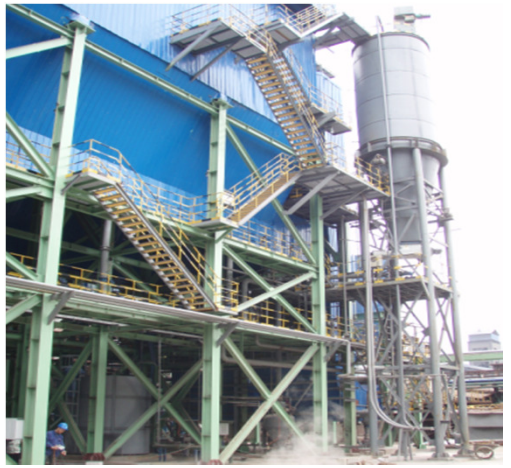
Power

- Fuel: Coal, oil-shale, pet coke
- A total of **12 GW** in operation or currently under construction

Waste to Energy

- Fuel: Various waste types
- Installed base of **over 4 million Nm³/h** or **2.5 million scfm** treated

Industrial



- Application: Iron & Steel
- Installed base of over **1 million Nm³/h** or **0.6 million scfm** treated

Global Reference Base and Broad Applications Portfolio

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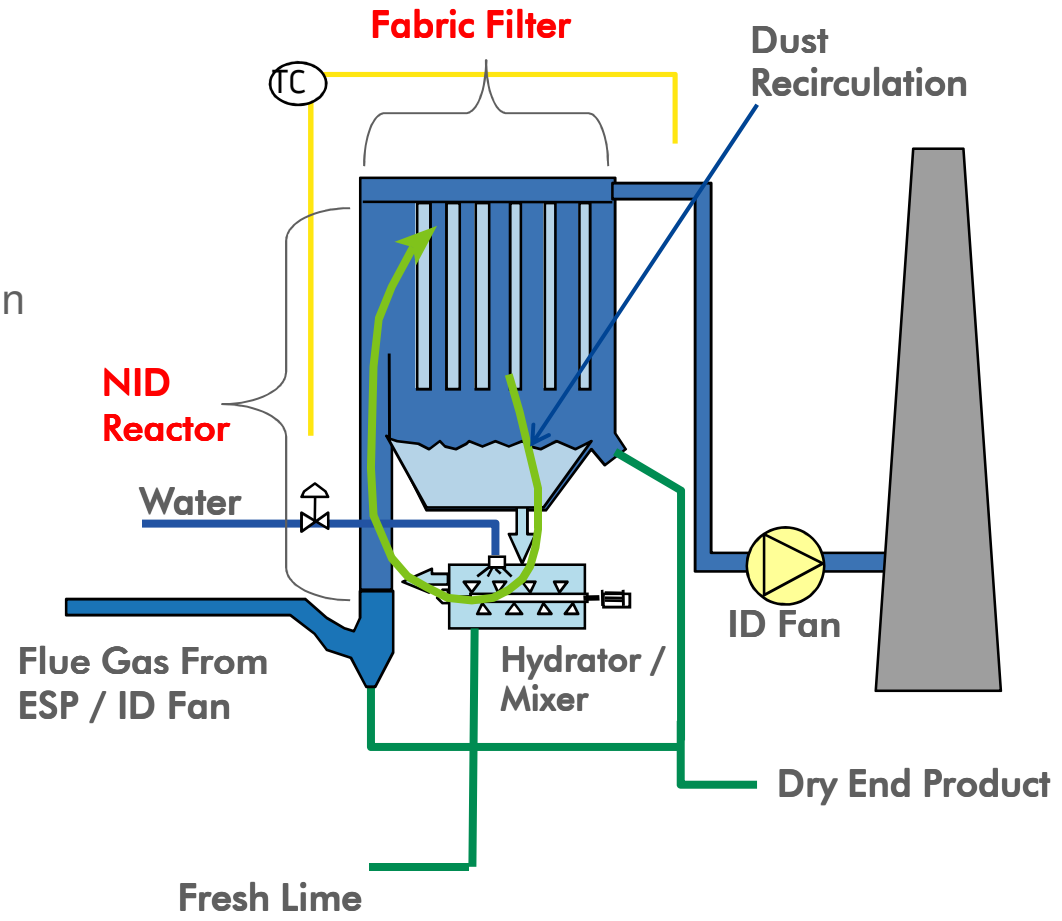
NID Process

NID DFGD Design

- Large gas flow range
- Unitized compartment design
- Compact footprint
- Gas cooling by thin film evaporation
- Very high solids recirculation
- Fluid bed / dust recirculated continuously
- No external hydrator
- No external dust recycle
- No slurry handling
- Free flowing dry end product



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FGD Technology Evaluation Criteria

	WFGD	SDA/FF	NID/FF
Remedy existing PM emission issue	3	1	1
CO_2 capture ready	1	3	2
Load following capability	1	1	1
Byproduct flexibility	1	3	3
Footprint	2	2	1
Water consumption	3	1	1
Fuel flexibility	1	2	2
Re-use existing stack or No GGH	3	1	1
O&M staffing requirements	3	2	1
Project lead time	3	1	1
HAPS capture	2	2	2

1 – Best Score: Product Most Suited

2 – Medium Score: Product Suited

3 – Worst Score: Product Least Suited

Project-specific results may vary depending on applicable criteria and their importance.

NID Scores Best When Evaluated Against WFGD and SDA

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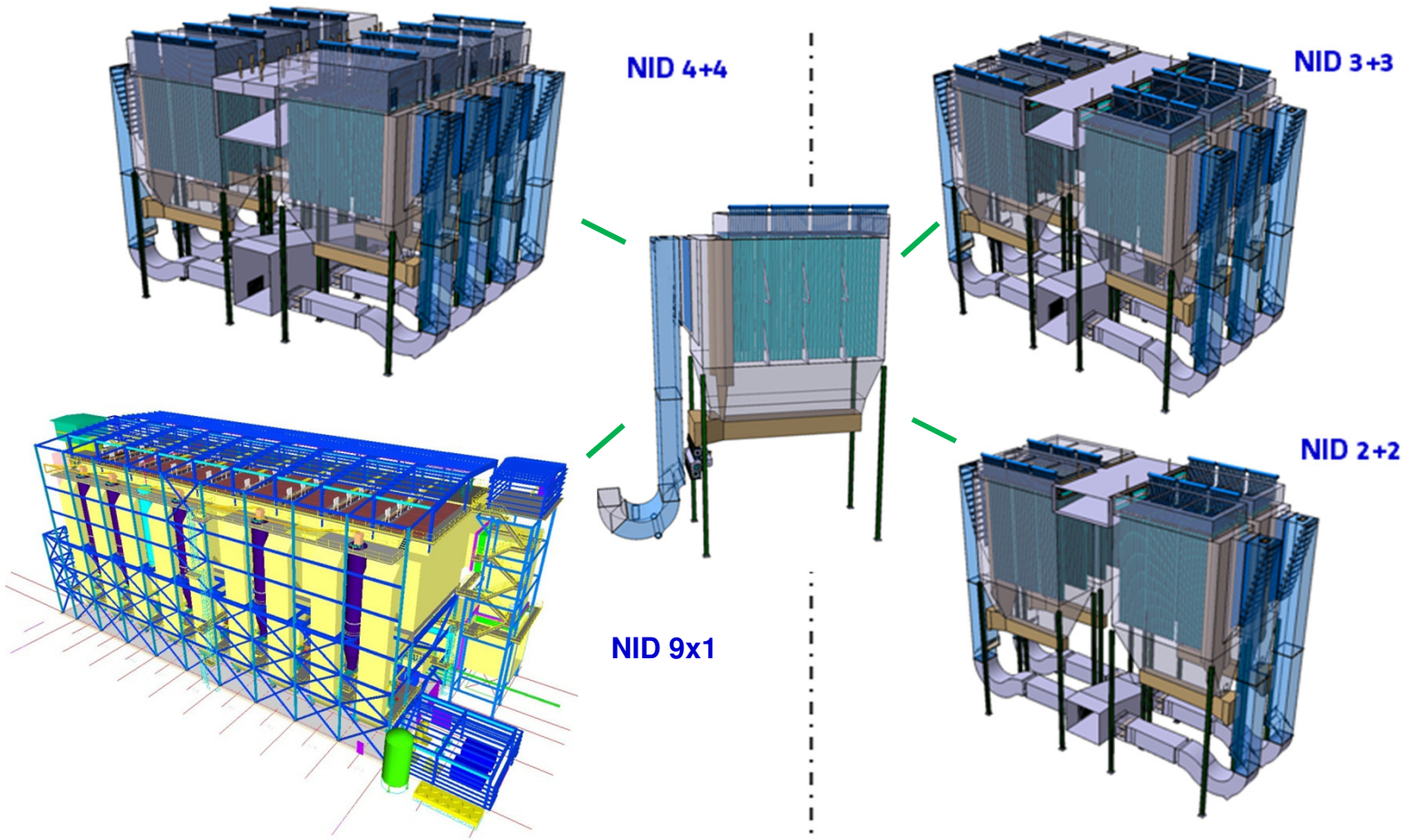
Modular Design



Modularization Offers Design and Layout Flexibility

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Modular Design

- Shop fabrication drastically cheaper than field fabrication

- NID allows high degree of shop fabrication even with truck shipment
  - Reactors
  - Inlet ducts
  - Day silos
  - Mixers
  - Hydrators

- Barge access allows further pre-assembly
  - Fabric filter compartments
  - Inlet/outlet plenums

Reactor Section

Mixer/Hydrator

Shop-fabricated Lime Day Silo

Modularization Lowers Construction Costs

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Key Benefits of NID

- Multi-pollutant control: High efficiency removal of SO_2, SO_3, PM, HCl, and HF
  - SO_2 removal: ≤ 98%
  - SO_3 emissions: < 1 ppm
  - PM (filterable): < 15 mg / Nm^3
- Lime-based semi-dry FGD technology
  - Patented, integrated hydrator/mixer – no slurry handling
  - Zero liquid discharge – no waste water/treatment
  - Low water consumption; ability to use low quality water: CTB, WFGD purge
- Simple, compact design
  - Small footprint offers retrofit advantage
  - Low capital cost
  - Low BOP/construction cost
  - Low O&M cost
- Modular design
  - High reliability
  - Good turndown
  - No scale-up issues
- Fuel flexibility of up to 2.5% sulphur coal or higher

Meeting Most Stringent Regulations at Minimized Cost

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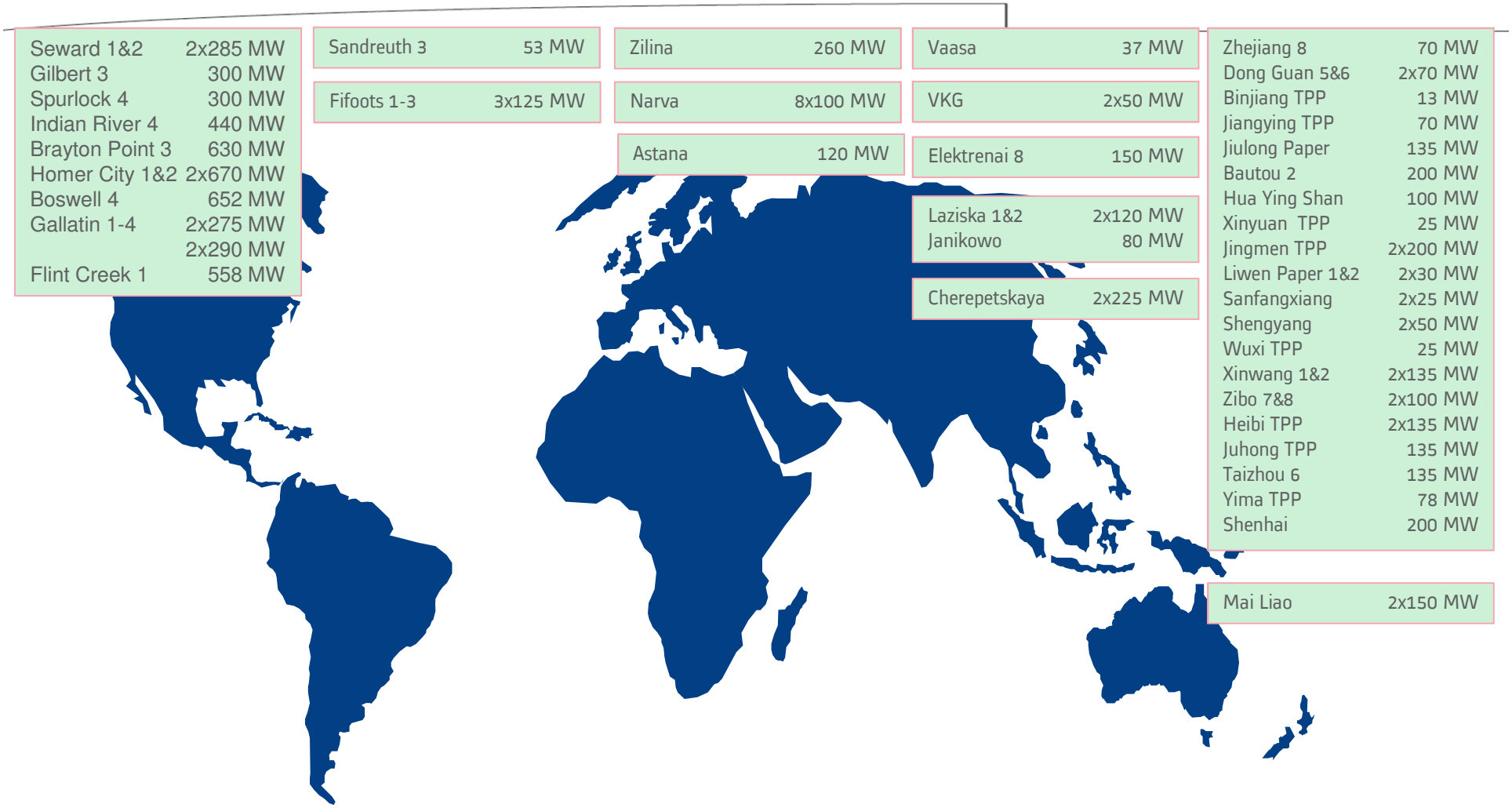
World-Wide NID Installations



Seward 1&2	2x285 MW
Gilbert 3	300 MW
Spurlock 4	300 MW
Indian River 4	440 MW
Brayton Point 3	630 MW
Homer City 1&2	2x670 MW
Boswell 4	652 MW
Gallatin 1-4	2x275 MW
	2x290 MW
Flint Creek 1	558 MW

Sandreuth 3	53 MW
Fifoots 1-3	3x125 MW

Zilina	260 MW
Narva	8x100 MW
Astana	120 MW

Vaasa	37 MW
VKG	2x50 MW
Elektrenai 8	150 MW
Laziska 1&2	2x120 MW
Janikowo	80 MW
Cherepetskaya	2x225 MW

Zhejiang 8	70 MW
Dong Guan 5&6	2x70 MW
Binjiang TPP	13 MW
Jiangying TPP	70 MW
Jiulong Paper	135 MW
Bautou 2	200 MW
Hua Ying Shan	100 MW
Xinyuan TPP	25 MW
Jingmen TPP	2x200 MW
Liwen Paper 1&2	2x30 MW
Sanfangxiang	2x25 MW
Shengyang	2x50 MW
Wuxi TPP	25 MW
Xinwang 1&2	2x135 MW
Zibo 7&8	2x100 MW
Heibi TPP	2x135 MW
Juhong TPP	135 MW
Taizhou 6	135 MW
Yima TPP	78 MW
Shenhai	200 MW

Mai Liao	2x150 MW

Mondi 1&2	2x35 MW

Ras Tanura	6x80 MW

Mindinao 1&2	2x105 MW

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Why Choose Alstom NID?

1. NID surpasses WFGD for low- to medium-sulphur applications by offering
   - lower capital and total lifecycle costs
   - high multi-pollutant removal efficiencies
   - zero liquid discharge (no waste water)
   - cost and schedule advantages of reuse of existing stack without GGH
2. NID outranks competitor DFGD products by offering
   - smaller footprint allowing maximum flexibility for retrofits
   - modular design enhancing constructability and minimizing field-erection, and affording great turndown without gas recirculation
   - integrated hydrator/mixer design slaking CaO internally, thereby eliminating need for slurry handling and separate hydration
3. NID has over 15 years of successful operation in 18 countries and a total of 12 GW of installed base
4. Continuous in-house R&D to help our customers meet tomorrow's ever-more stringent environmental requirements

NID is a great Choice for Flue Gas Desulphurization

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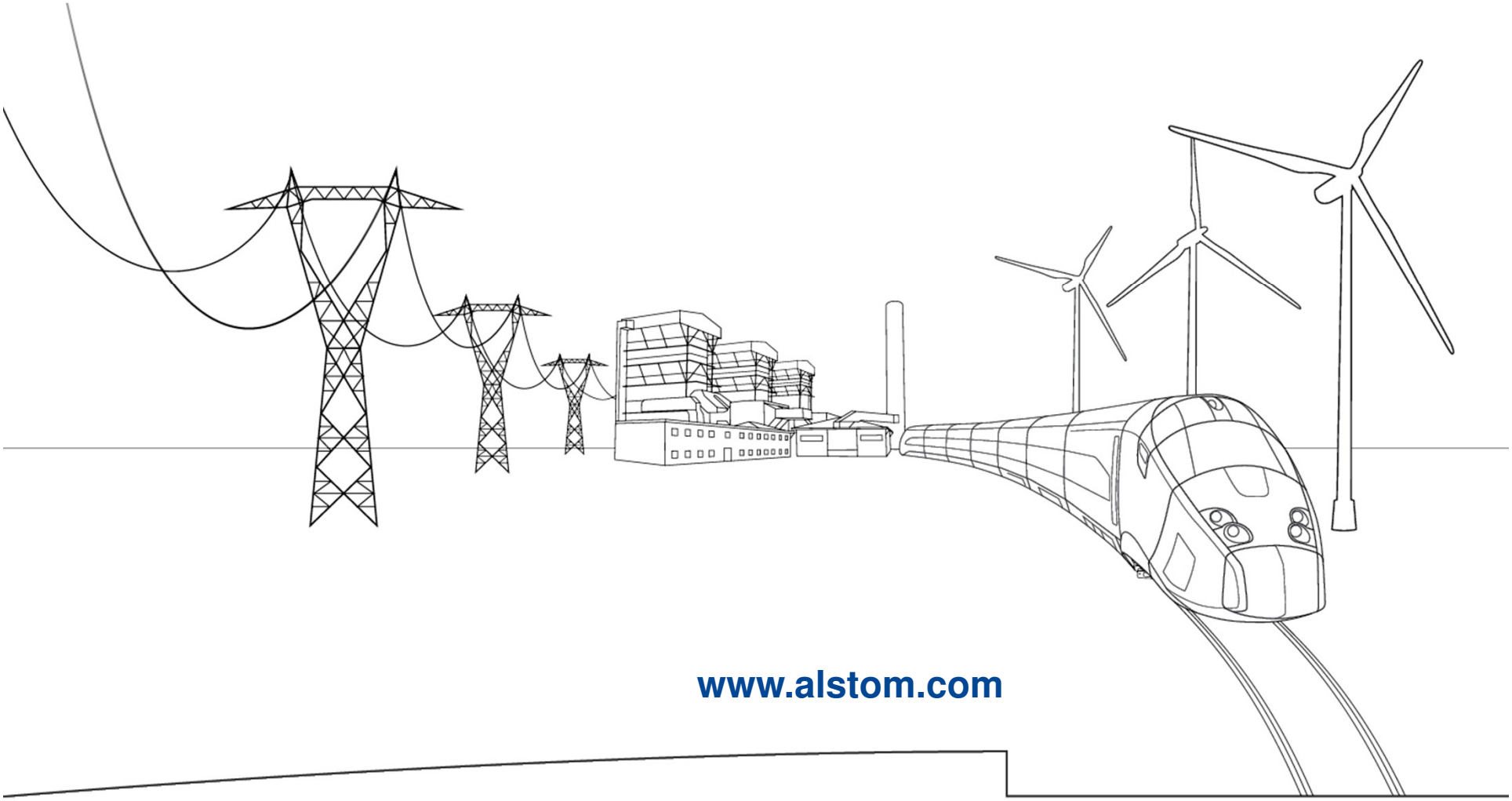

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