

Best Practices in Energy Efficiency in Aluminium Sector- A path for Decarbonization

“Energy Reduction & Decarbonization in
Aluminium Smelter”
21st Nov. 2022





Aditya Birla Science & Technology Co. Pvt. Ltd.

Who we are and what we stand for

ABG's Corporate **hub** of R&D

DSIR
recognition

VISION

To develop technologies and products that differentiate, protect and grow market share and profitability of our businesses.

A **Multi-Disciplinary**

technology Campus with

MISSION

To partner internally with our business units, and externally with premier organizations and institutions to develop leading edge technologies that are value generating to ABSTCPL and our customers

91 people in **R&D** and

14 in Tech Mgt and Admin.

>90% of engagement
with ABG businesses

External Collaboration
aimed towards

10%
engagement

*Building
Technology for
tomorrow*

ABSTC and Its Role in the ABG Technology Ecosystem

Together we Innovate and Create Value

ABSTC Science & Domain Expertise

Promoting Strong Business Collaboration

Scientific Expertise

- 91 Technology staff, 43% PhD's
- Internal PhDs (7*) to develop business critical expertise

Labs

- AS&T Lab
- Organic and Inorganic Chemistry Labs
- Materials Labs
- Fibre Labs

Mini Pilots

- Fibre polymer and spinning
- CB processing
- Chemical scale-up
- Cement processing
- AL downstream
- Solid flow and minerals

Collocated R&D

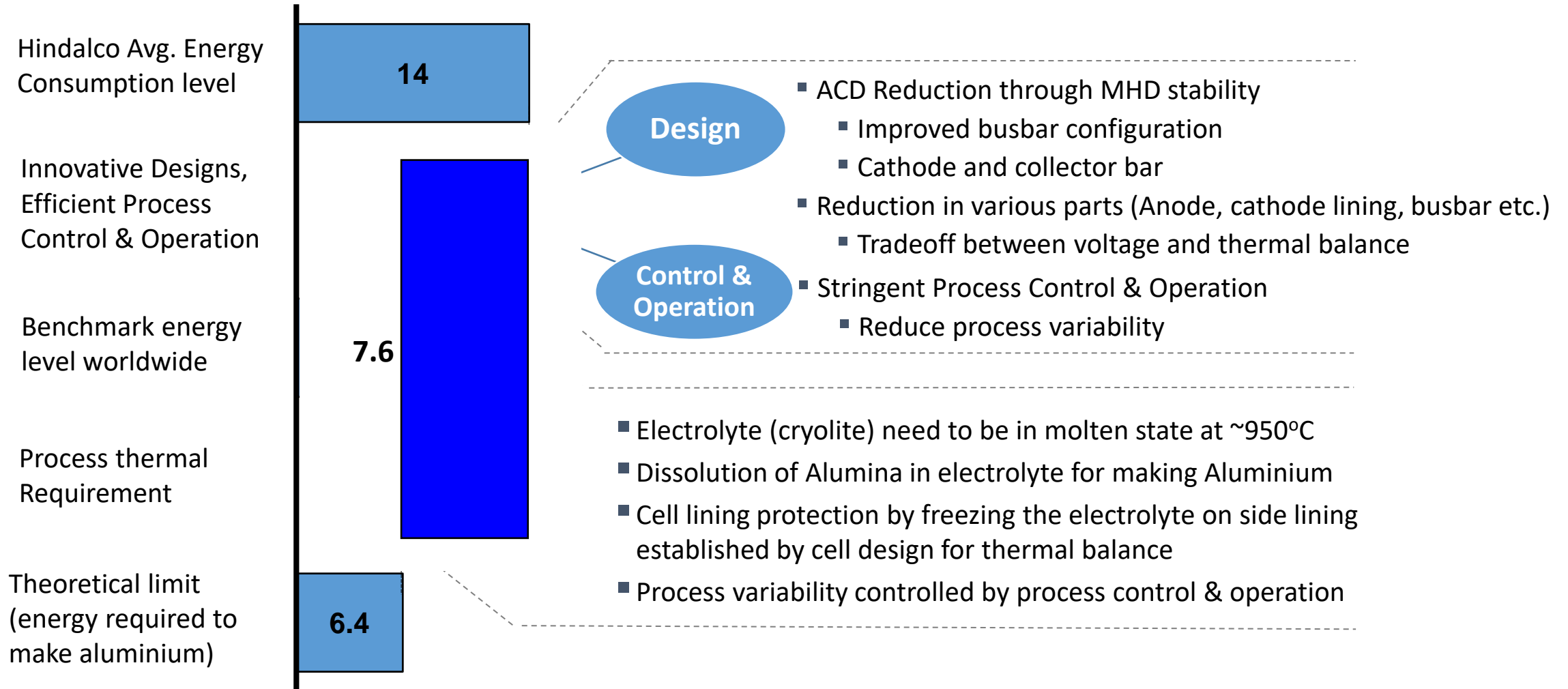
- Pulp & Fibre
- Carbon Black
- UltraTech
- Epoxy
- Paints
- Archives

Developing External Knowledge Networks

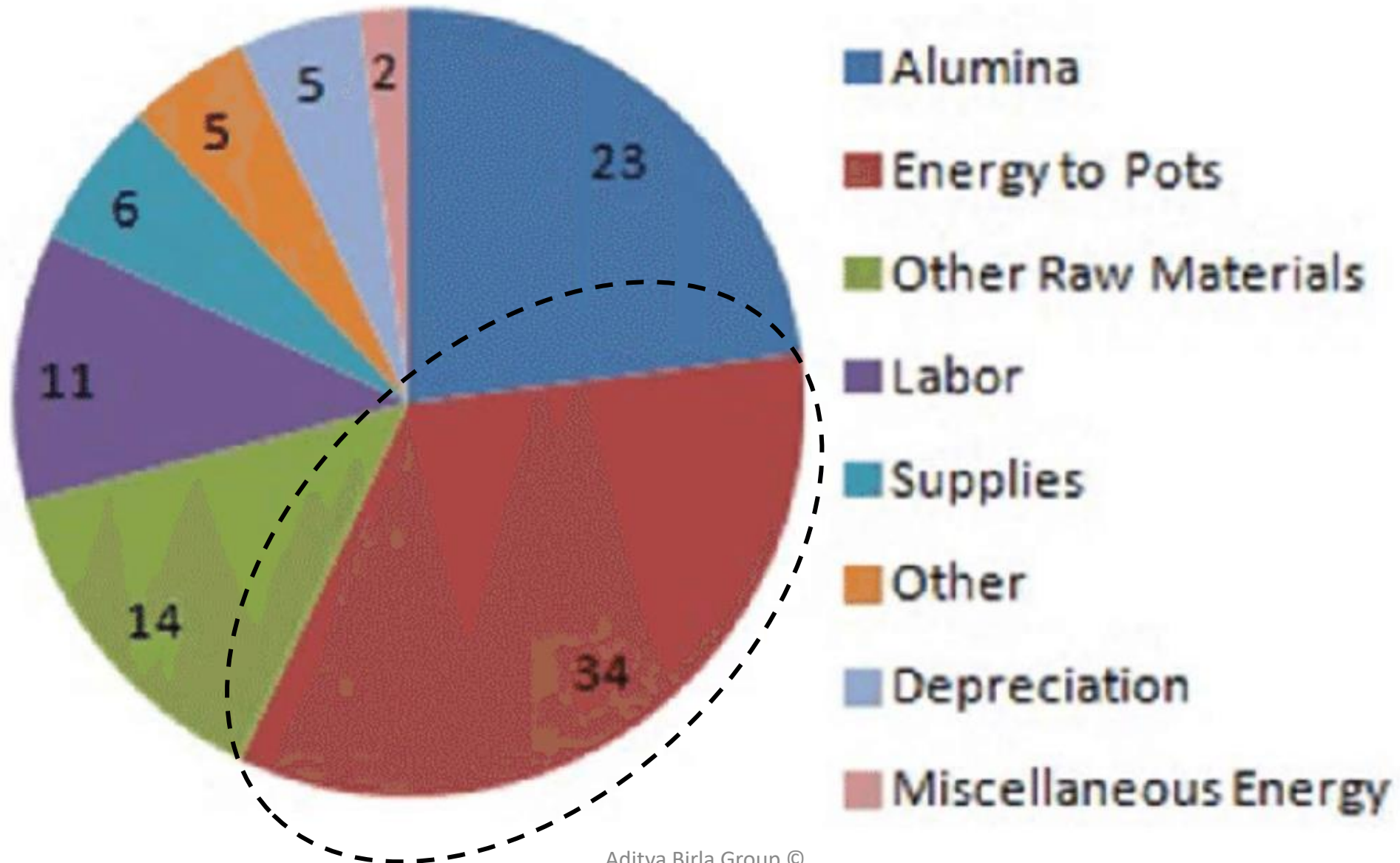
- US & Europe
- India (BITS, IITs, UICT, CSIR)
- Selected Start-ups

Aluminium Smelter: Energy Break-up

Energy Requirement (MWh/ton of Al)



Aluminium Smelter: Typical Cost Break-up



Energy Reduction in Aluminium Smelter

Aluminium Production Energy Consumption attributed to-



Aluminium Smelter Pots



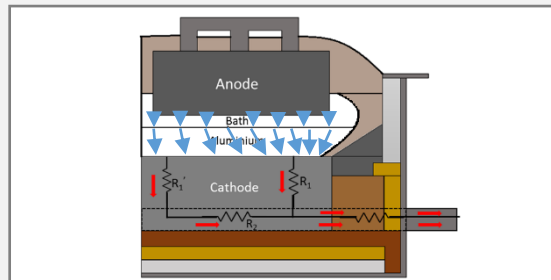
Thermal Power Plant & Utilities

Energy Reduction in Aluminium Smelter

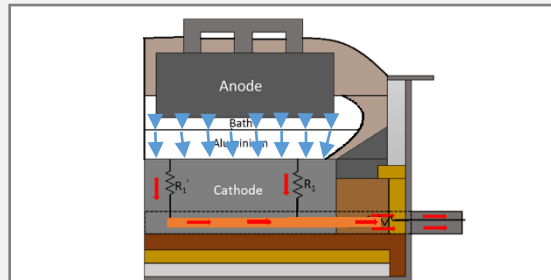
HiPoT Technology (In-house Development) Energy reduction potential by ~600 DC-kWh/t

- Magnetically compensated busbar
- Cu-inserted collector bar
- Improved anode assembly
- PLC based pot control system
- Digital twin of smelter

Total 11 Patents filed for developed technology

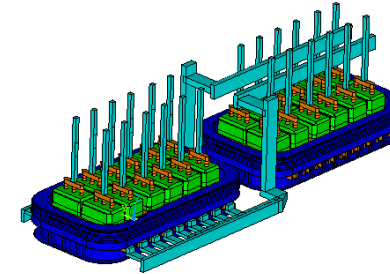


Old

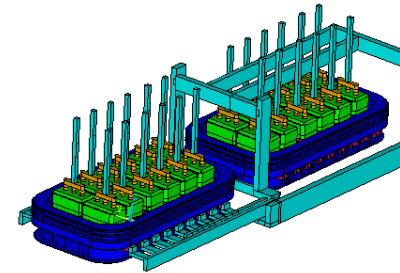


New

Cu-inserted collector bar being implemented in Mahan, Aditya & Hirakud Smelter

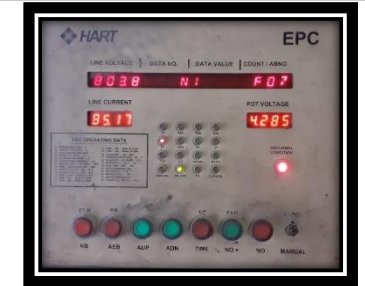


Old



New

Magnetic compensation busbar implemented in 235 kA and tested in 85 kA of Hirakud Smelter



Old



New

Control system advancement for better pot control under trial & implementation at Hirakud Smelter

Captive Power Plants and Utilities

ABG has committed to becoming Carbon Neutral by 2050

1. Use of Renewable Energy:

- ABG is putting up PV Solar power plants to substitute part of Fossil fuel-based energy
- Using CCU for carbon capture

2. Exploring various options for energy substitution

3. Captive Power Plant system optimization

- Benchmarking between identical systems
- Measuring and tracking consumption and upgrading the systems periodically
- Early warning systems, predictive controls
- Using advanced techniques like CFD for optimization

Captive Power Plants and Utilities: Decarb. Potential issues

1. Requirement of Power Quality and Power availability
 - Smelters require steady power round the clock
 - Renewables exhibit start-stops, e.g. due to Cloud Cover in PV Systems output drops.
2. Integrating with Power systems involving multiple sources
3. Quality of fuel and blending affects emissions
4. Supply chain issues alter the fuel mix suddenly.

Thank you!