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IPS 2012: Power Plant O&M Conference

Enhancing Energy Security through Lignite Beneficiation

Ashley Moore| Tuesday 14th February 2012 | All-Energy Conference

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What you'll get from this presentation

- A brief introduction to ECT
- An overview of the global coal scene
- Challenges facing the Indian power sector due to coal supply
- An introduction to lignite beneficiation
- An understanding of our own Coldry technology and how it can help improve energy security
- A snap shot of our lignite-based iron making process under development

Note: Prepared in collaboration with NLC India

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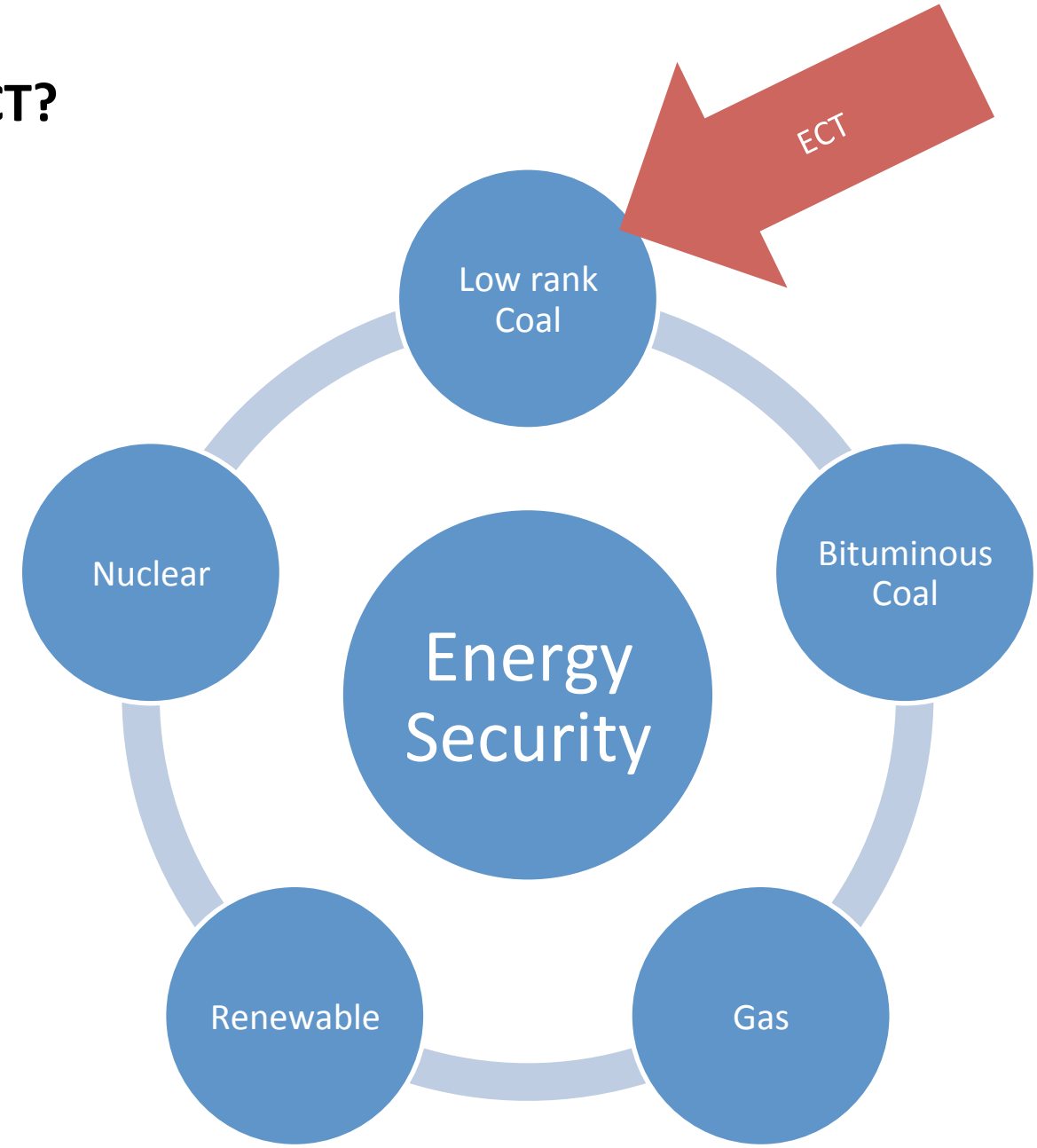
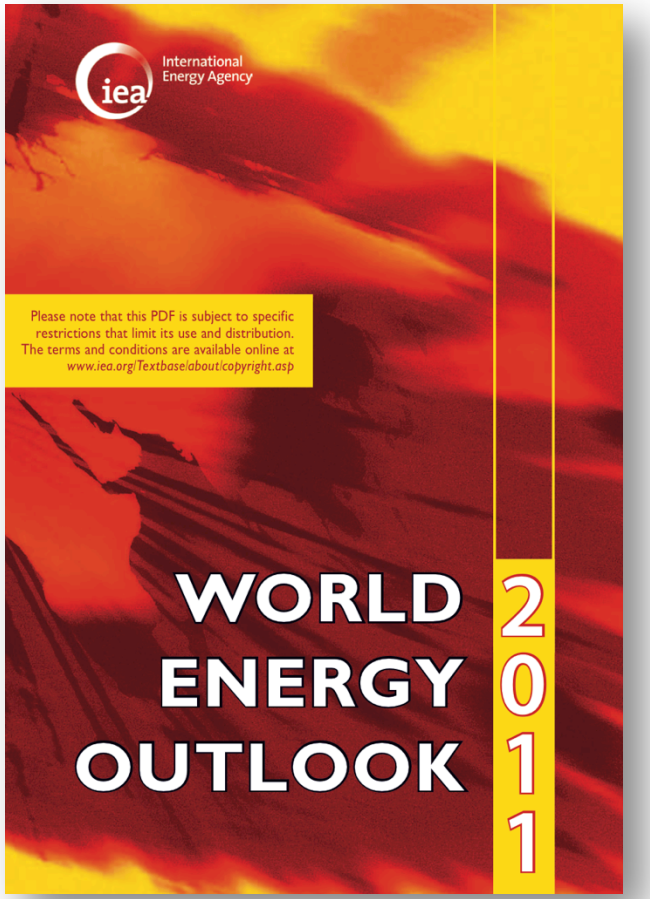
Who is ECT?



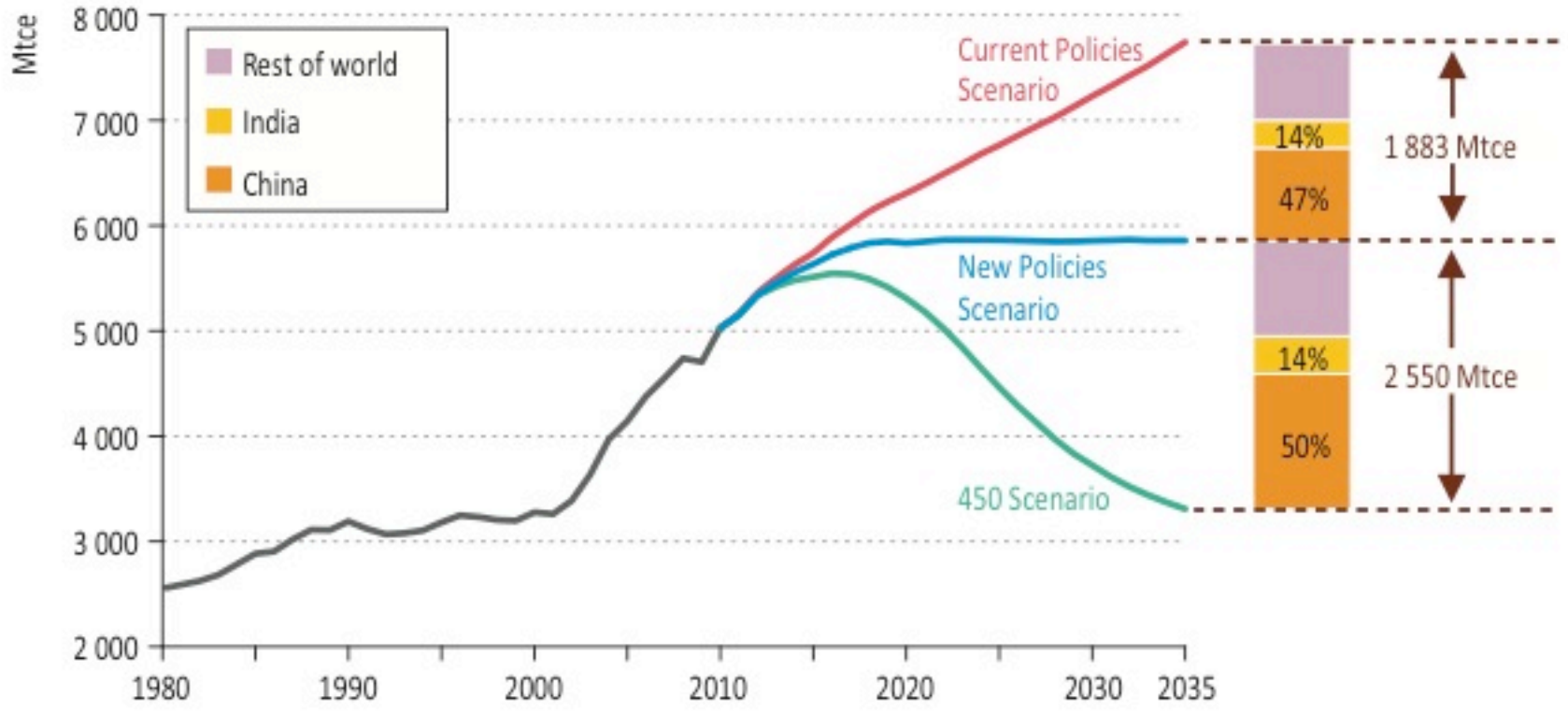
"India is poised to become the world's biggest importer of hard coal soon after 2020, as rapid demand growth outstrips the rise in indigenous production and India's inland transport capacity. Projected imports reach nearly 300 Mtce in 2035 – about 35% of India's hard coal use and 30% of inter-regional trade".

IEA World Energy Outlook
2011, p 397



Global Coal Scene: Projected Demand

Figure 10.2 • World primary coal* demand by region and scenario



*Includes hard coal (coking and steam coal), brown coal (sub-bituminous coal and lignite) and peat.

Source: International Energy Agency, "World Energy Outlook 2011"

Global Coal Scene: Drivers

- Economic Activity - Electricity Demand
- Resource size & location
- Resource cost of production & delivery to market
- Relative fuel price competition
- Geopolitical & regulatory
- China to account for 50% of coal demand growth by 2035

Indian Coal Scene

- Forecast – world's largest coal importer within 10 years
- Surpass the USA as the second largest coal consumer by 2025
- Double coal use by 2035, with 60% of the increase led by power generation
- Imports to increase by 300M tpa, driven by lagging domestic production and internal transport constraints
- Resource – demand point mismatch, logistics challenge

Possible Solutions

- Pay more for bituminous coal,… outbid the Chinese
- Deploy alternative power generation – cost prohibitive
- Do something different – change the rules! Look beyond traditional sources and suppliers of bituminous coal…

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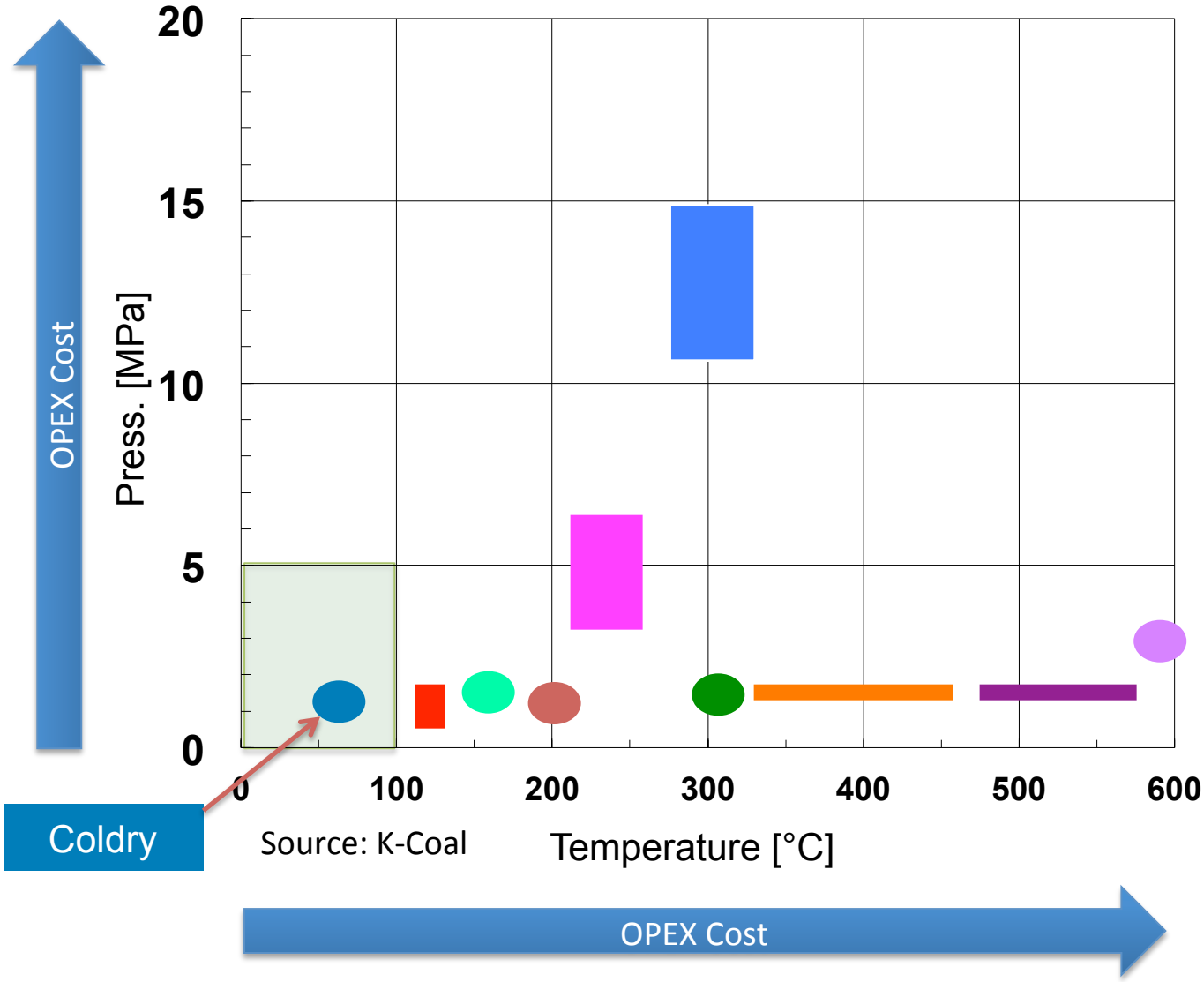
Lignite Beneficiation

- Low-rank coal drying
- Upgrades the calorific value
- Lignite assets cheaper than bituminous coal
- Reduces freight costs
- Some drying processes also reduce spontaneous combustion risk, improving safety

Low-rank coal drying technologies

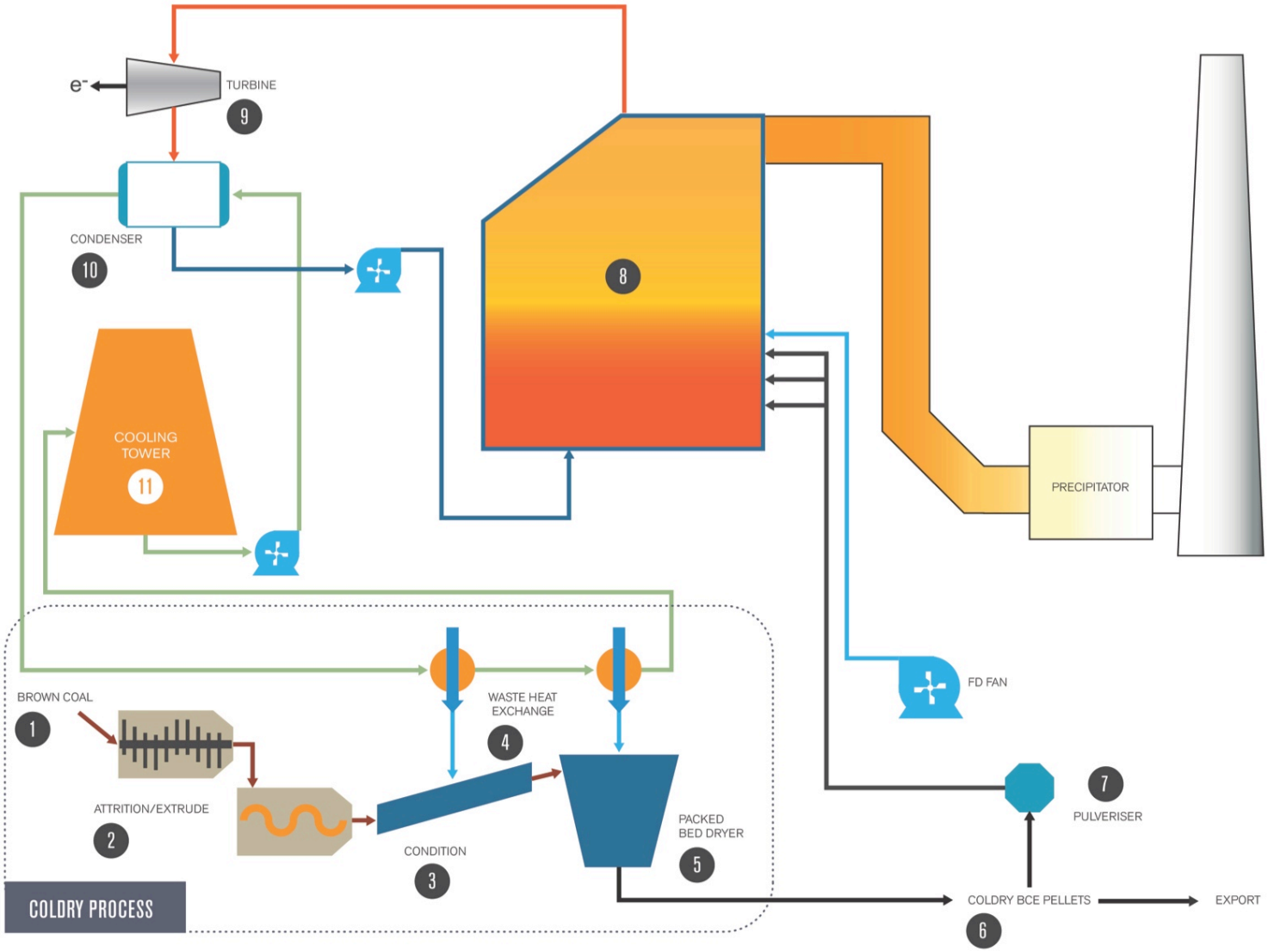


GTLE
STD
UBC
BCB
Fleissner
HWD
GEO-Coal
Syncoal
Encoal
LIMAX

Coldry: How it works

- Brown coal densification
  - Destroy microstructure via mechanical shear
  - Liberate physically and some chemically trapped moisture
- Low temperature (as low as 35°C – 45°C)
- Low pressure
- Waste heat utilisation from host power station reduces opex
- Power station synergies & efficiencies
- Ideally suited to mine-mouth power station deployment, with standalone Coldry Plant design planned for the future

Coldry Solution



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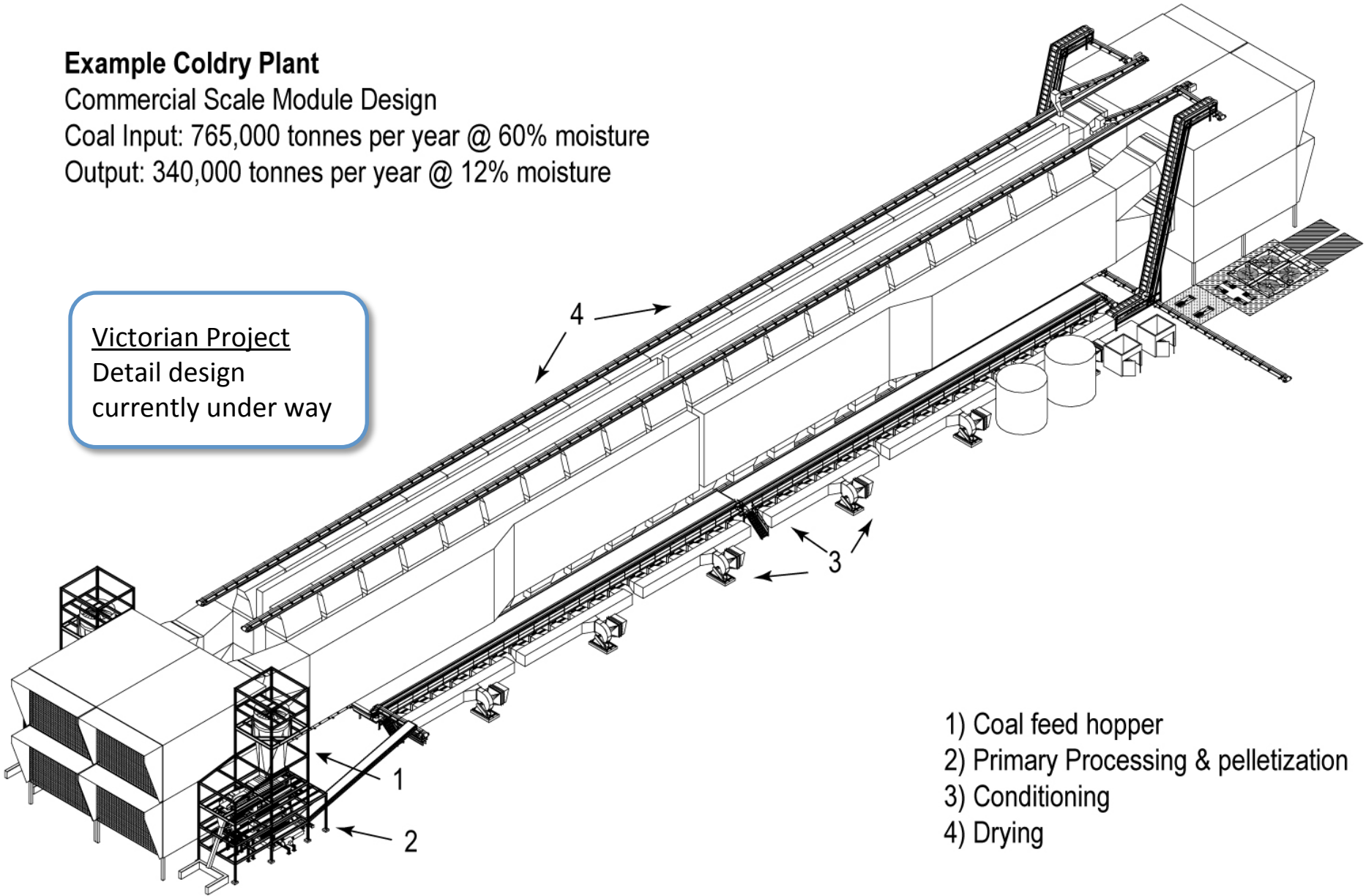
Coldry Solution

Example Coldry Plant
Commercial Scale Module Design
Coal Input: 765,000 tonnes per year @ 60% moisture
Output: 340,000 tonnes per year @ 12% moisture

Victorian Project
Detail design
currently under way



1) Coal feed hopper
2) Primary Processing & pelletization
3) Conditioning
4) Drying

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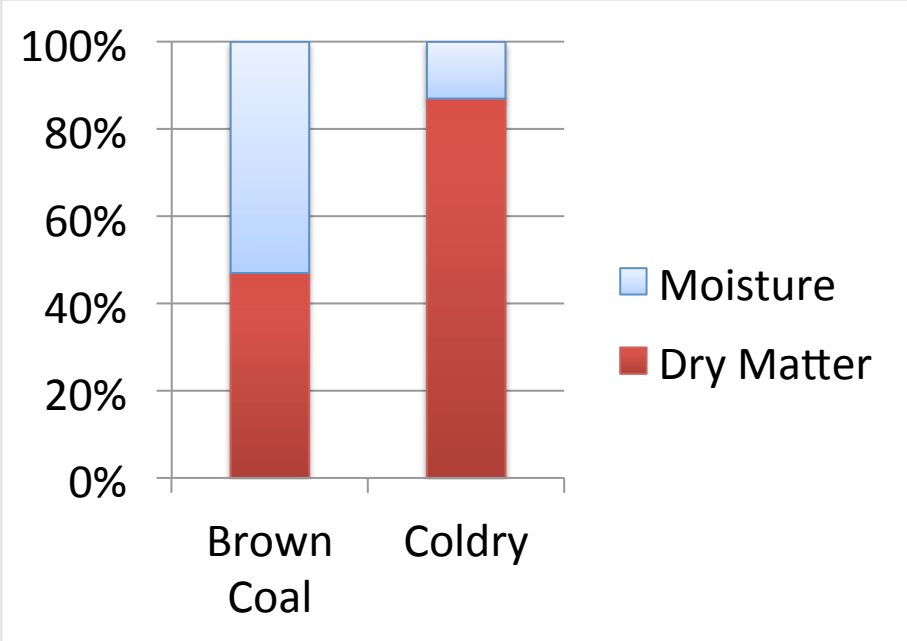
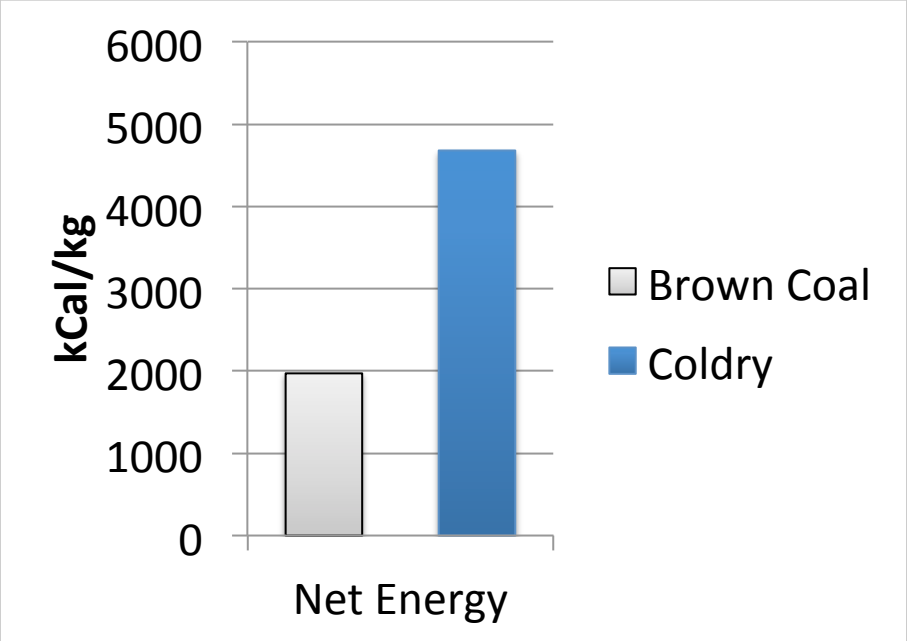
Coldry Product: NLC Lignite





Indicative Business Case: Indian market

- Example 1 million tonne per year plant
- Processing cost per tonne – Rs 1000 (inc. Royalty)
- Value per tonne – Rs 4250 FOB ex origin, Rs 5000 CIF India
- ROI up to 40%
- Payback (simple) ~3years

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MATMOR: Lignite-based iron making

- The process has the following unique features:
  - Brown coal replaces metallurgical coal – significant raw material cost saving
  - Eliminates the need for coke and coking ovens – significant capital saving
  - Works exceptionally well on the harder to reduce magnetite and millscale (Fe_3O_4), without sintering, increasing availability and access to lower cost raw materials
  - Waste stream process – millscale and high-Fe nickel refinery tailings can be processed to recover iron, turning a waste liability into a revenue producing product
  - Iron ore process – high or low grade iron ore can be used, as can lump or fines
  - Patented furnace – the MATMOR retort is designed to utilise the high-volatile content of brown coal to produce a high-quality iron product

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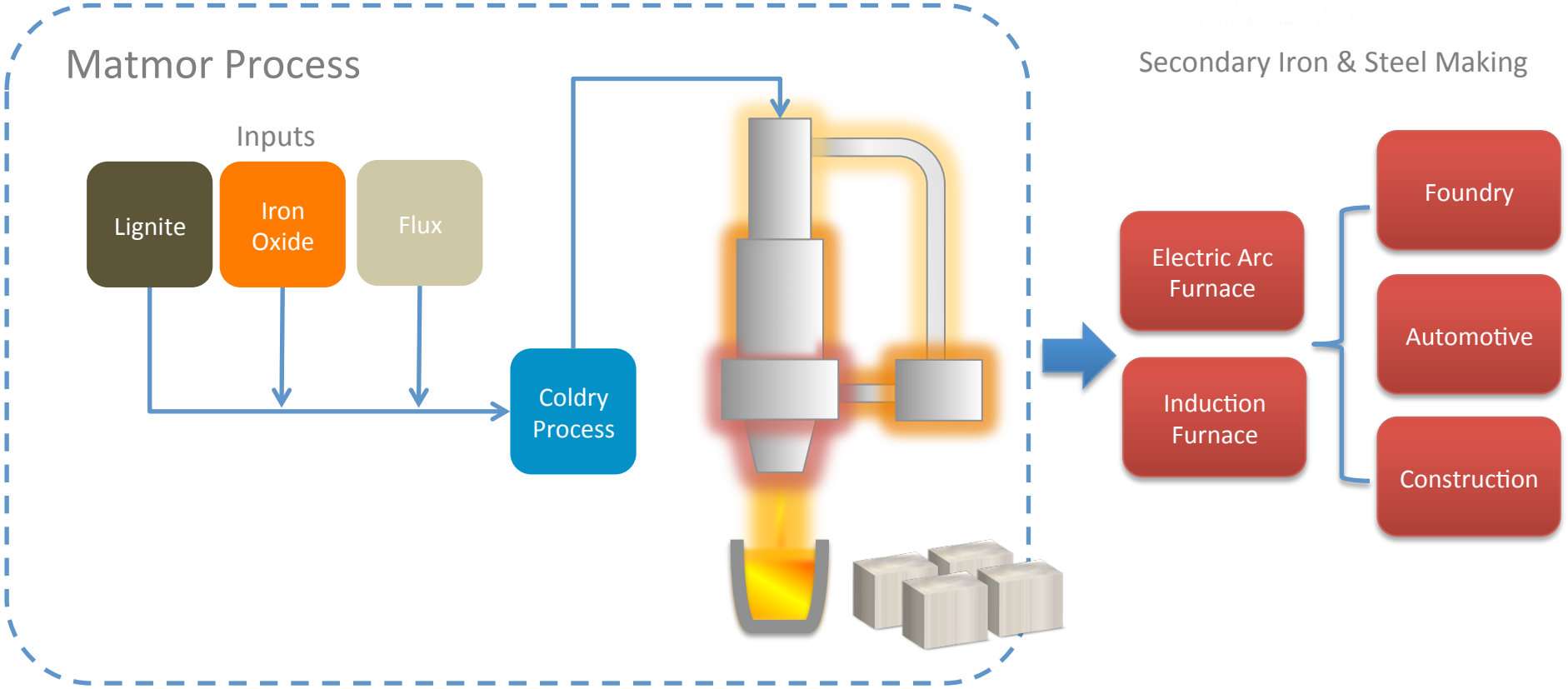
MATMOR: Lignite-based iron making



Summary

- India is facing significant energy security issues
- Lignite beneficiation technology offers significant opportunities to India to access local and foreign resources
- ECT's Coldry technology offers a low-cost solution to low-rank coal drying, reducing exposure to high bituminous coal prices
- ECT's MATMOR technology offers the opportunity to de-couple from expensive metallurgical coal prices while producing a high-quality direct reduced metallic iron product
- ECT's first commercial scale plant design is under way, with the aim to commence production in 2014 in Victoria, Australia
- ECT is working with NLC India to develop the Coldry process for deployment on Indian lignite resources

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Thank you

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