

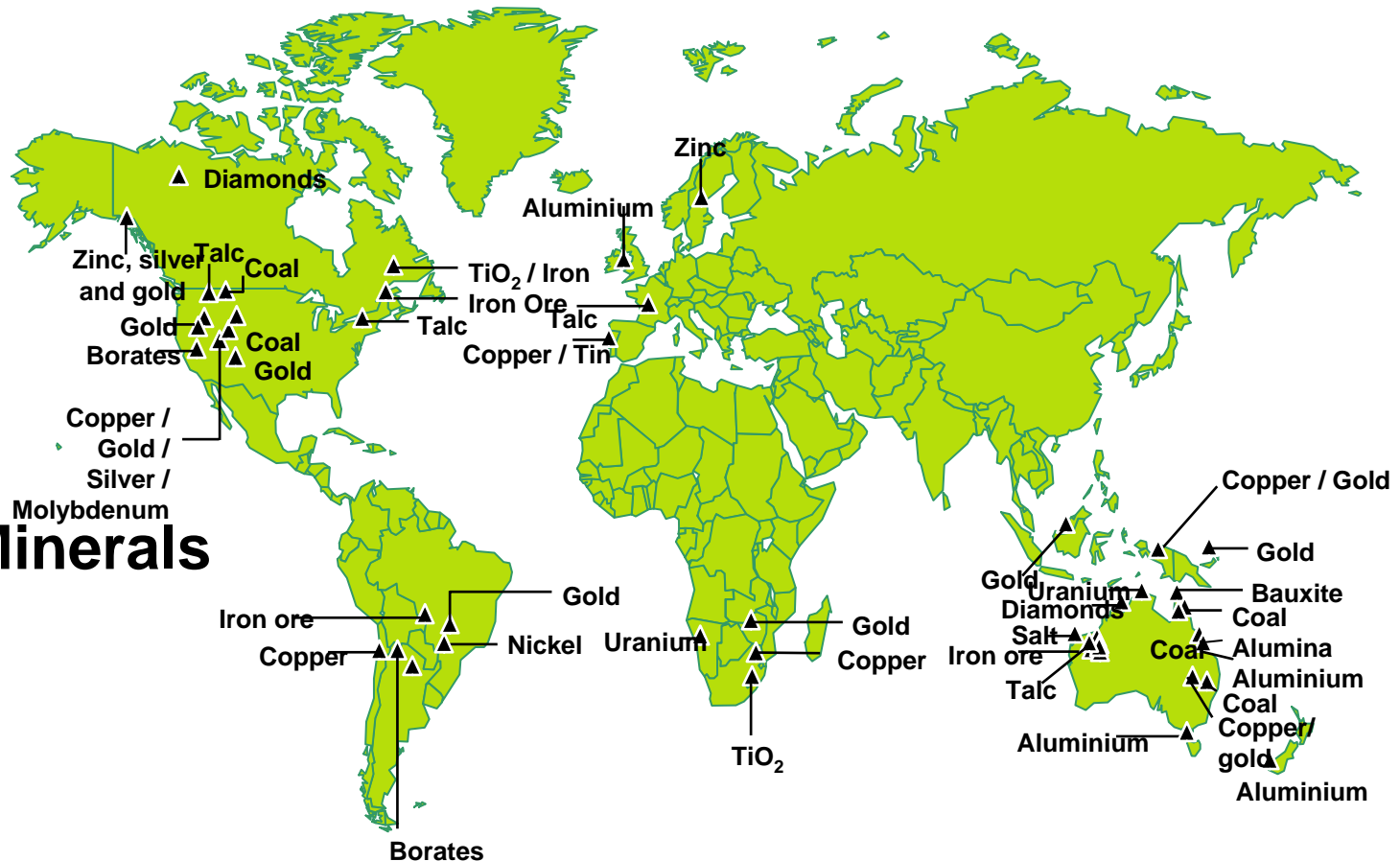
An Energy Suppliers View of the Market

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Global Practice Leader – Innovation
&
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Chief Adviser - Energy**

Rio Tinto Profile

Rio Tinto is a leader in finding, mining & processing the earth's mineral resources.

- Iron Ore
- Energy
- Copper
- Aluminium
- Diamonds
- Industrial Minerals



Partnering with Customers

- Total greenhouse gas emissions (on site & purchased energy) around 27.1 Mt CO₂-e p.a.
- Downstream use of sold energy products a much higher contributor
 - Coal sales 149 Mt in 2005
 - Work closely with customers other key stakeholders to find solutions

1,000 MW
utility

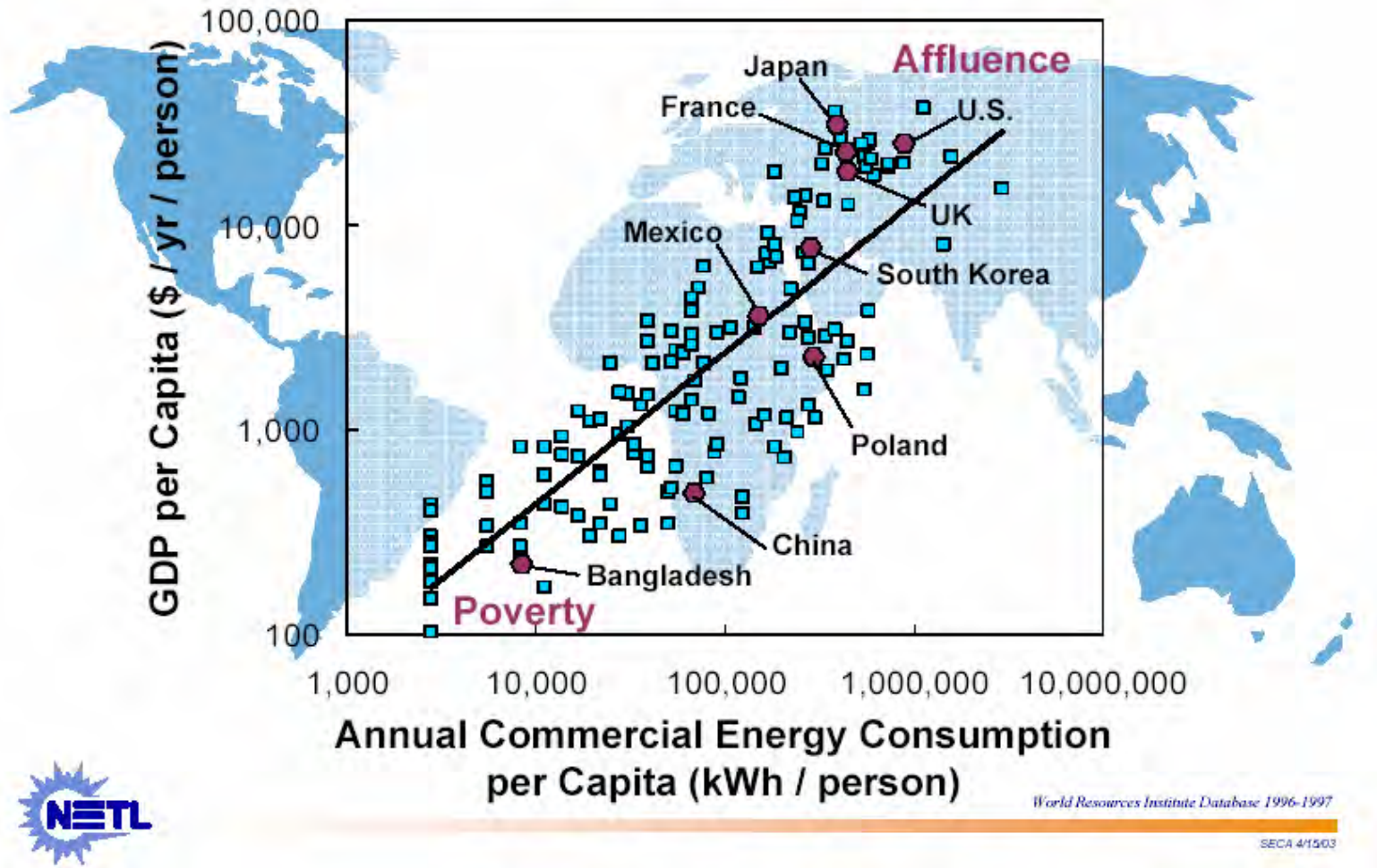


Rio Tinto approach based on fundamental principle that the world needs more energy.

- **Global energy use is projected to increase by two thirds by 2030 & treble by the end of the century.**
- **To meet society's burgeoning demand, every possible source of energy needs to be expanded.**
- **The world needs a whole portfolio of options, including clean fossil, nuclear and renewables.**

Affordable Energy

The World Needs Affordable Energy

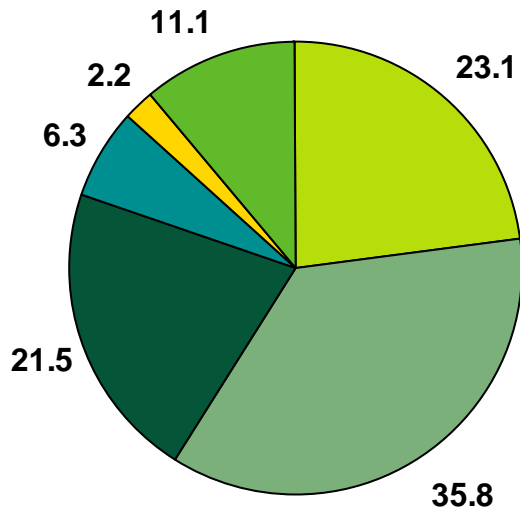


- **In 2005 World primary energy consumption grew by 2.7%, above the 10 year average**
 - Natural gas consumption grew by 2.3%
 - Nuclear power grew by 0.6% (below 10 year average)
 - Hydroelectric generation rose by 4.2%
 - Coal again the fastest growing fuel, with global consumption growing by 5% (twice ten year average)
- **China accounted for more than half of global energy growth**

Rising Demand

World primary energy demand by fuel

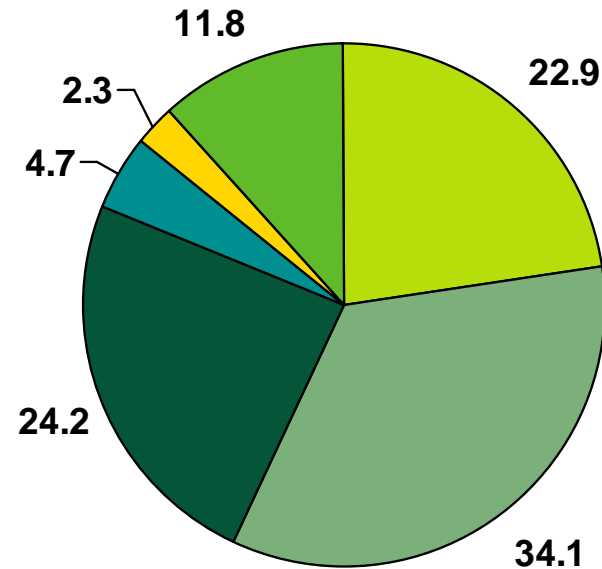
2010



12,200 Mtoe

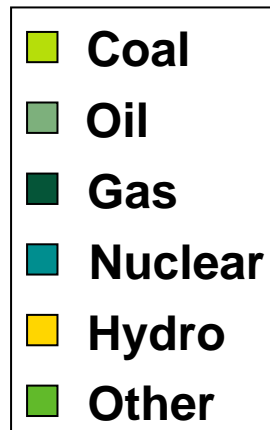
(million tonnes of oil equivalent)

2030



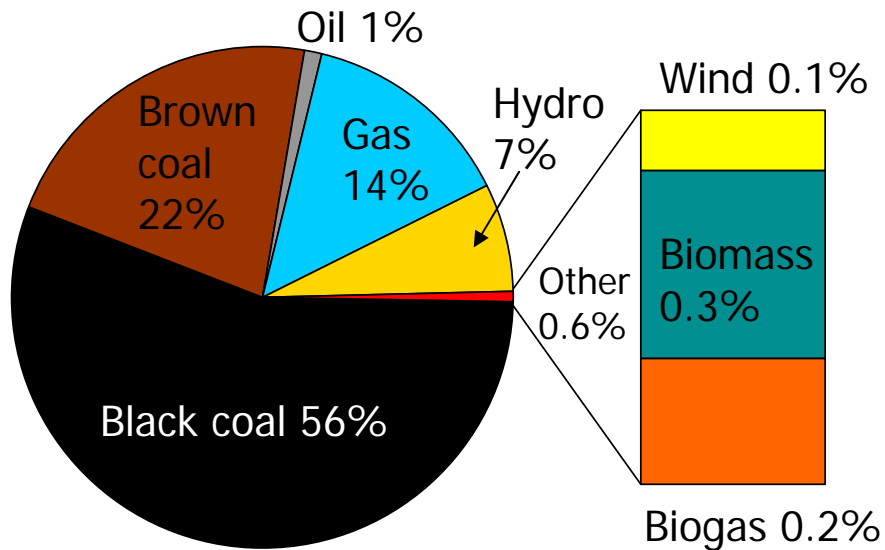
16,500 Mtoe

(million tonnes of oil equivalent)

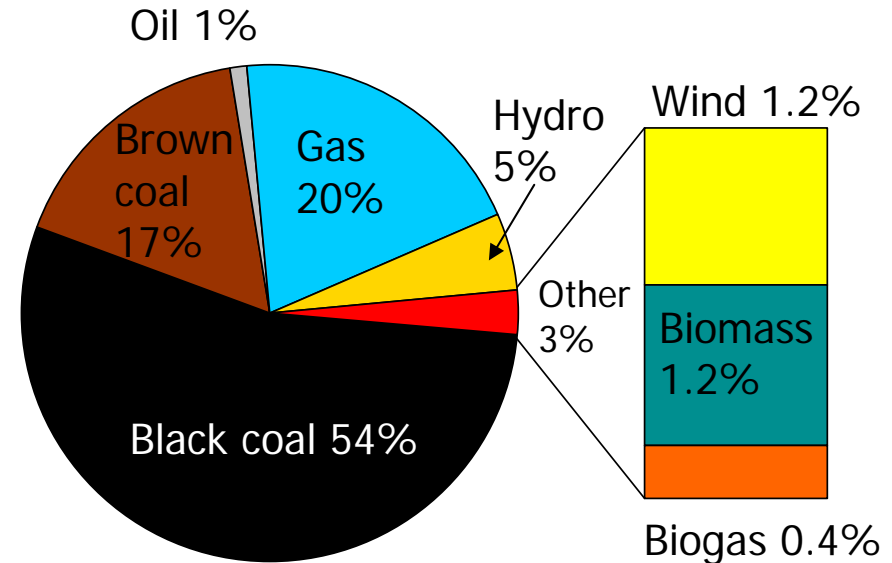


Fuel mix in Australian electricity generation

2001-02

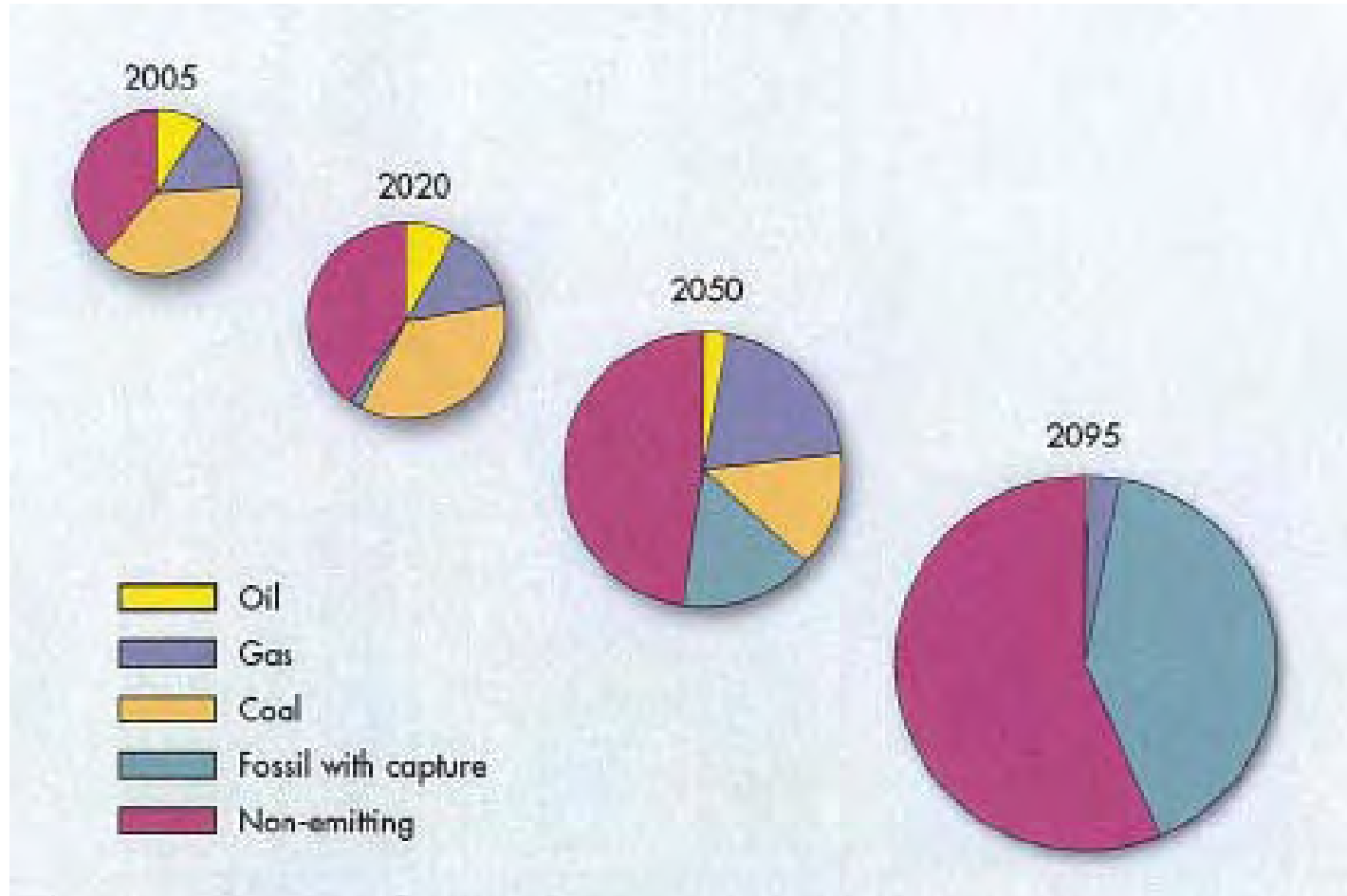


2019-20



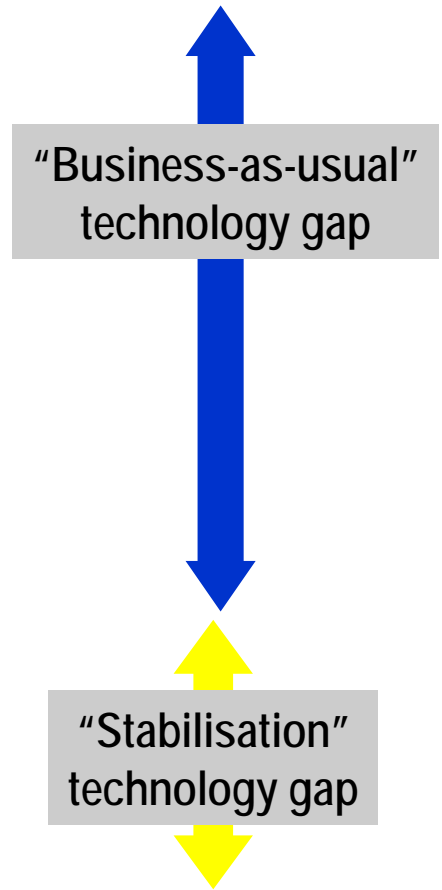
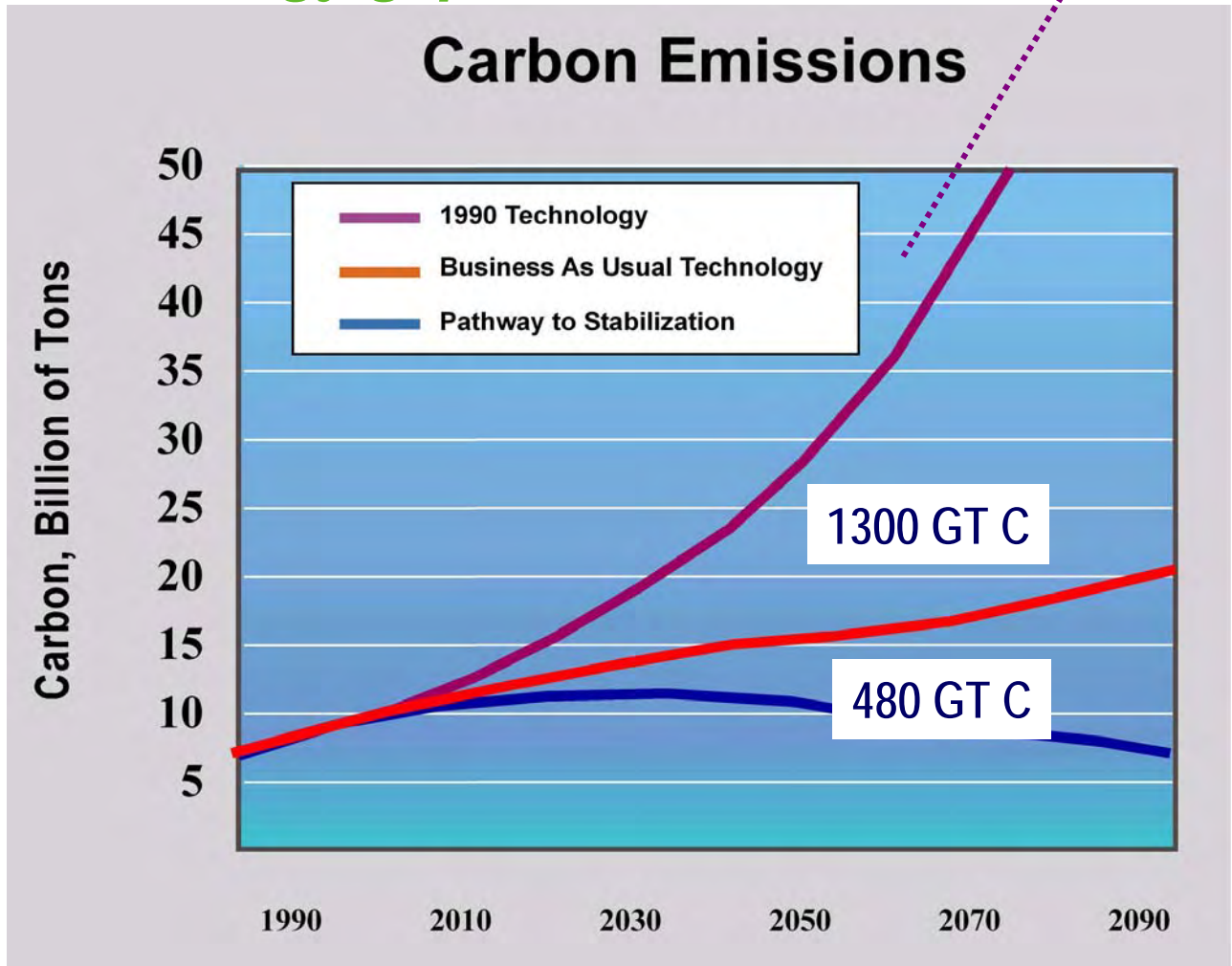
Stabilisation at 550 ppm CO₂

Global Generation to Stabilise CO₂ Concentration @ 550 ppm



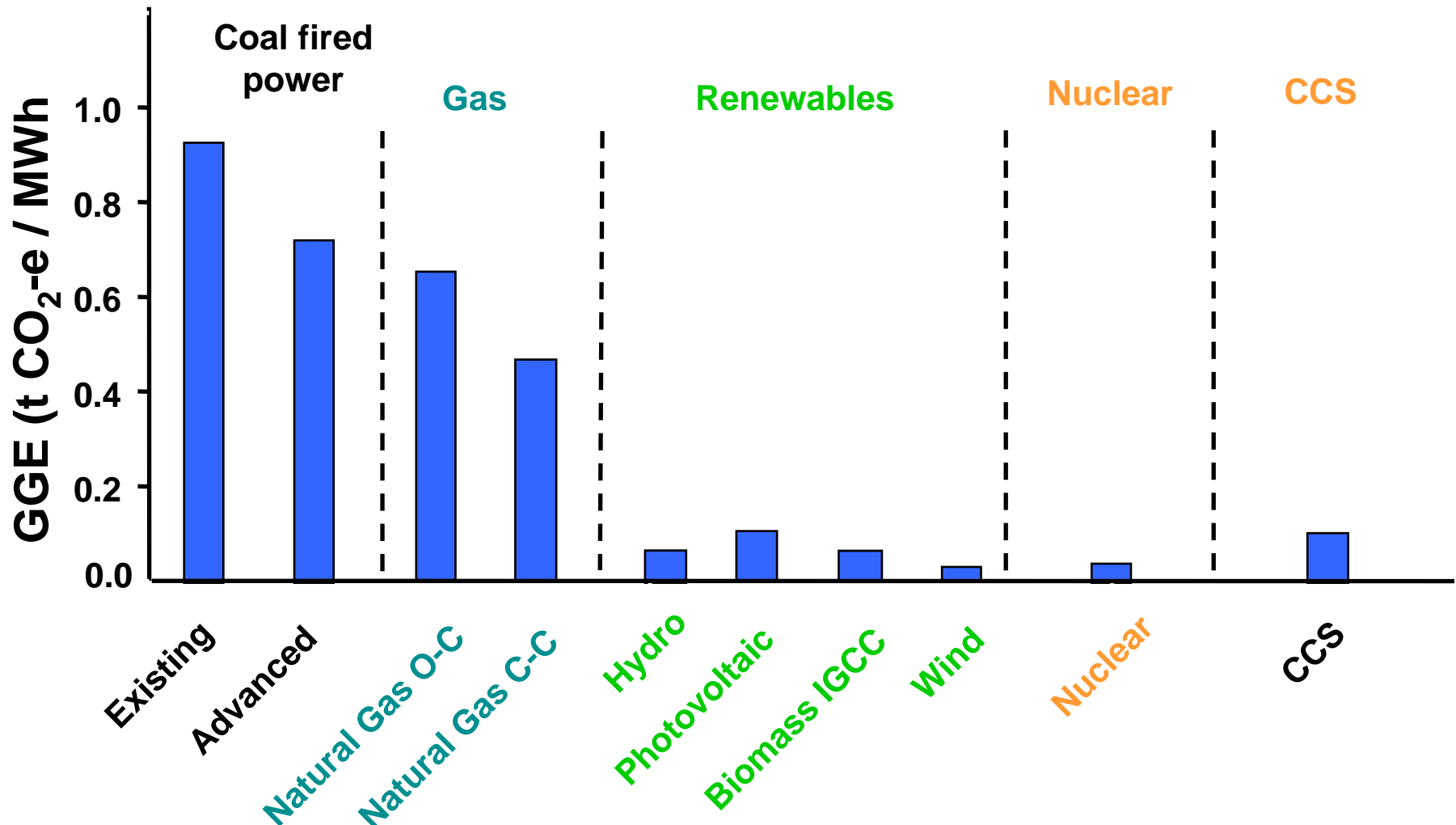
Commitment to Stabilisation

Stabilisation (550 ppm CO₂) requires closing two "technology gaps"



Power Generation Emissions

LCA power generation emissions

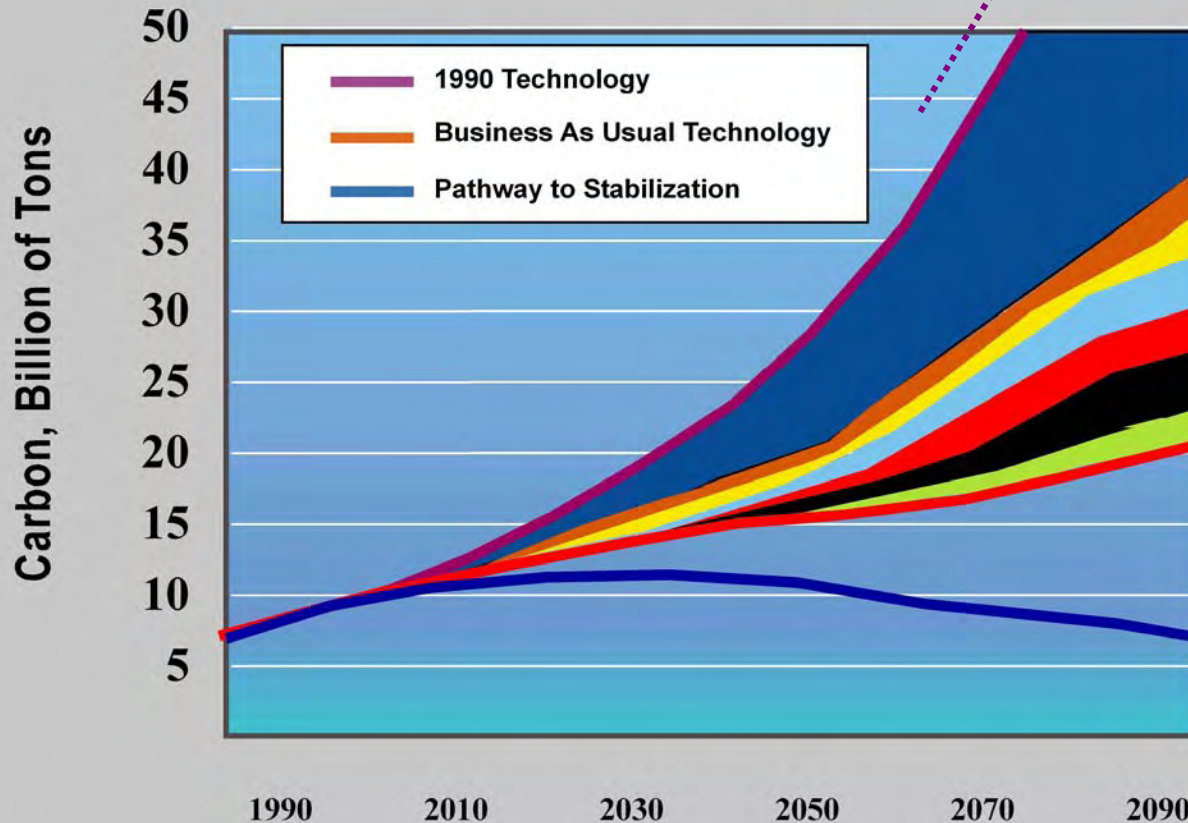


Business as usual gap

Business-as-usual gap

Extraordinary improvement is built in to BAU

Carbon Emissions



"Business-as-usual"
technology gap

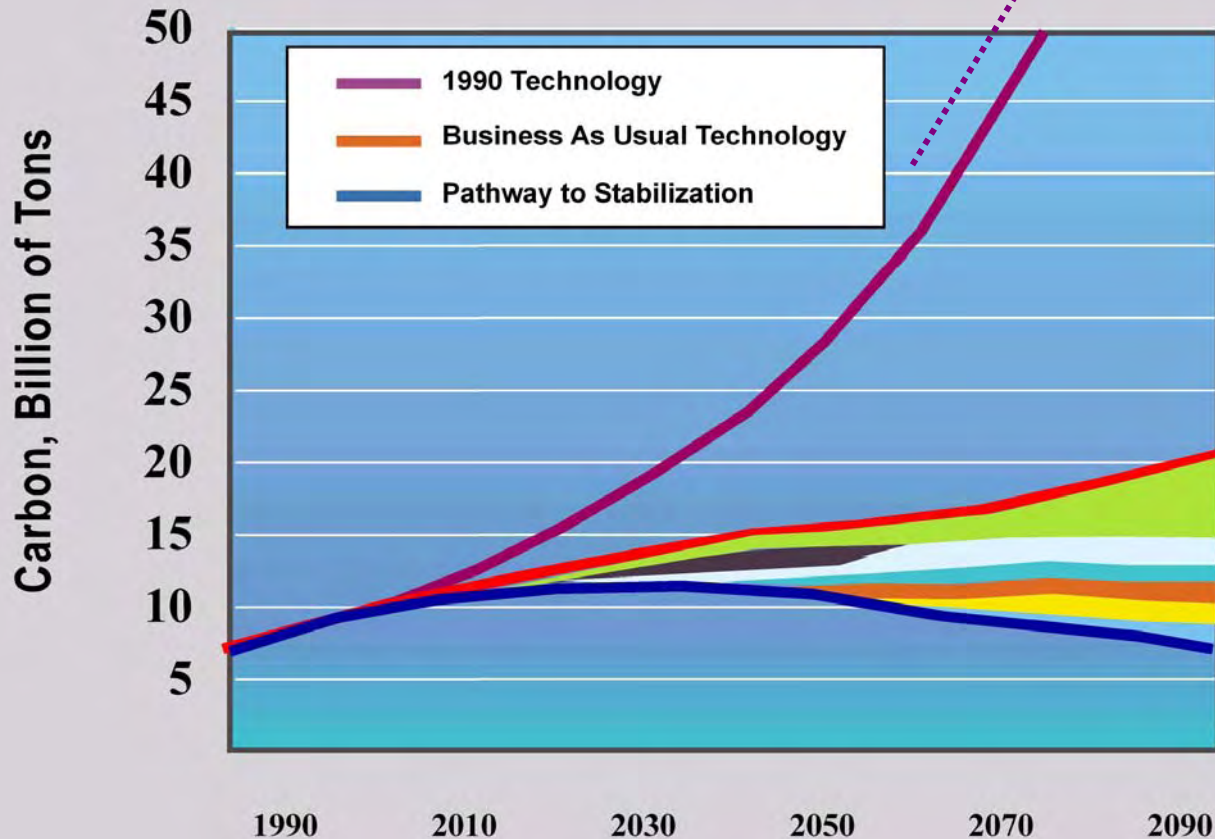
- ← Energy Efficiency & Reduced Demand
- ← Solar
- ← Wind
- ← Advanced Nuclear
- ← Advanced Gas
- ← Advanced Coal
- ← Conventional Biomass

Technology Advances

Stabilisation gap

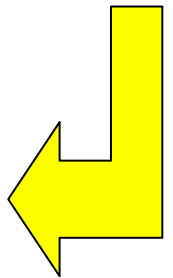
Needs tremendous additional technological advance

Carbon Emissions



"Stabilisation"
technology gap

- Advanced Biomass
- Soil Sequestration
- H2 w/Sequestration
- Fossil Power w/Seq.
- Add'l Solar/Wind
- Add'l Nuclear
- Add'l Efficiency & Reduced Demand

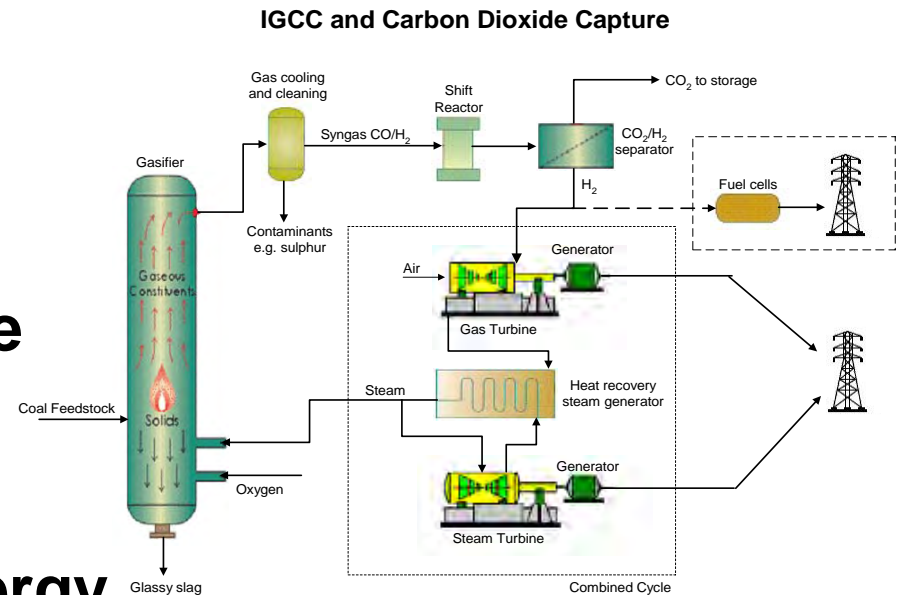


Source: Battelle, 2003

Note: Conceptual Market Penetrations

Rio Tinto working with customers & other stakeholders in several initiatives:

- **FutureGen**
- **Coal 21**
- **ACARP**
- **CRC for Coal in Sustainable Development**
- **The CO₂ CRC**
- **IEA Greenhouse Gas & Energy Management Project**
- **Electric Power Research Institute**



- **Rio Tinto also a major consumer of energy**
- **Focus on reducing energy consumption & GHG emissions:**
 - Rigorous monitoring & reporting
 - Continuous improvements in operating performance
 - Pursuit of step change technology (e.g.: Hismelt[®] & Aluminium Drained Cathode Cell)

Case Study: Aluminium

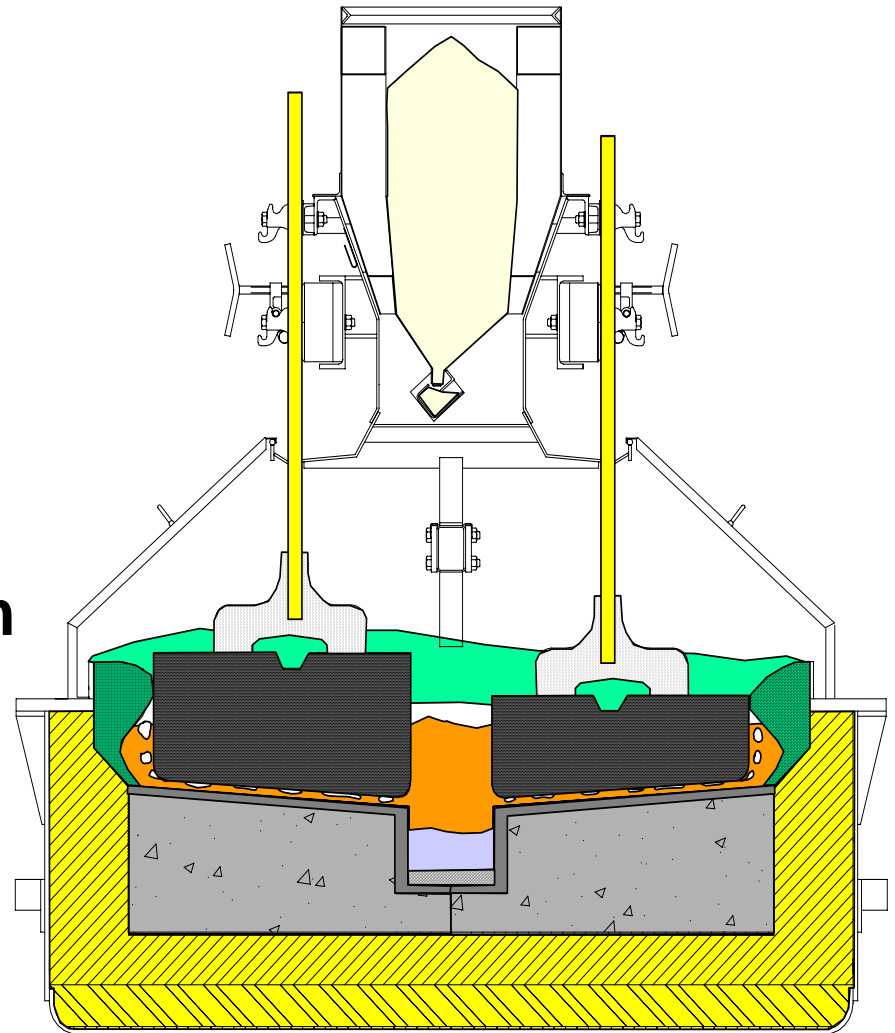
Region (Smelter)	Production ,000 tpa	Source
Queensland (BSL)	500	Coal
Tasmania (Bell Bay)	160	Hydro
New Zealand (NZAS)	322	Hydro
Wales (UK) Anglesea	140	Nuclear



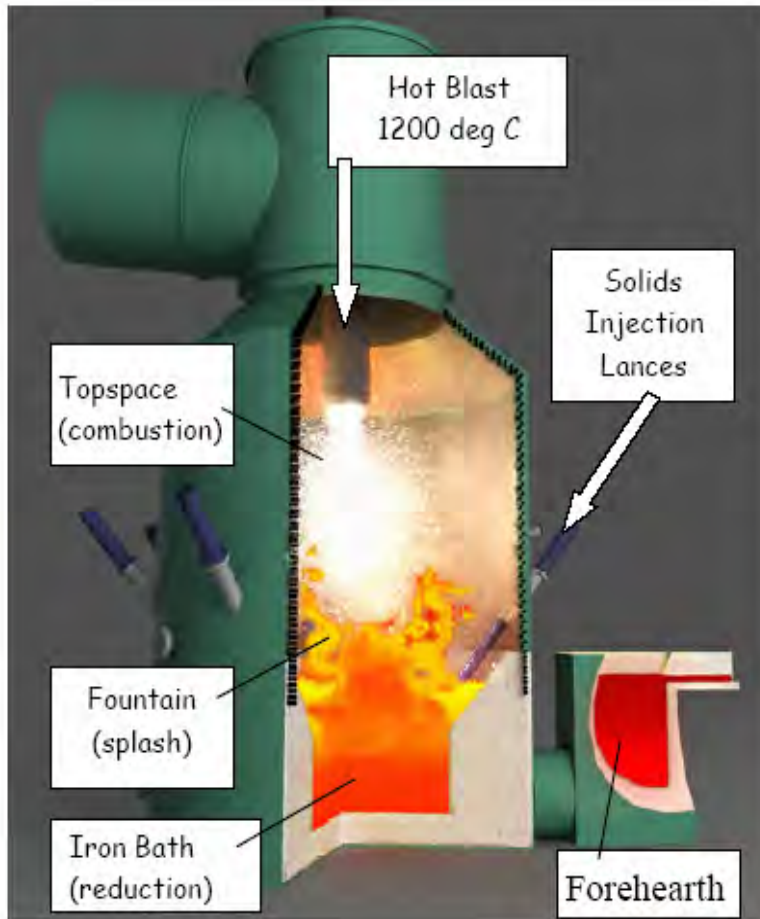
Boyne Smelters, Gladstone, Qld

Potential Outcomes:

- Significant energy savings
- 1.6 t CO₂ / t Al emission savings
- Higher current operation possible
- Reduced CF₄ generation from anode effects



Hismelt[®] Iron Process



Key features:

- Direct use of iron ore fines
- Direct use of coal (non-coking)
- Direct use of reverts
- Fluxes
- Air based
- Enclosed molten bath
- Premium grade product
- Flexible productivity

Technical basis:

- High post combustion
- High heat transfer efficiency

Technology development must accelerate to support increasing energy demand and reduced emissions:

- Need a portfolio of technology pathways, no one solution likely
- Likely to be high dependence on fossil fuels in 2050; carbon capture & sequestration important
- Combined with increased:
 - Renewables, including wind & biofuels
 - Nuclear
 - Efficient use of natural gas
 - Hydrogen & fuel cells

In parallel, continuing focus on reducing energy consumption.