Energy efficiency assessments in design
Seminal decisions and effective processes
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In the business of climate change
“Energy savings of 25 to 37 EJ per year are available based on proven technologies and best practices.”

IEA - 2007
Traditional design process

Lab tests → Scoping study → Prefeasibility study

Bankable feasibility study ← Definitive feasibility study ← Feasibility study

Front end engineering design → Detailed design

Lots of data available → Design decisions made here
Traditional design process

80% of the major design decisions are made within the first 20% of work

Processing route chosen

Major equipment selected

Data available during later design to make decisions on energy efficiency

Changes at this point are very expensive

Conduct energy efficiency assessments as early as possible
Update your financial model
Creating a financial case

Project will have a financial model
How are energy costs treated?
Starting price inflated over time?
Realistic price forecast based on assumptions?
Energy price forecasting

Escalating a current price with inflation will generally understate future energy costs

Inflation in Australia has increased 2-5% p.a. on average

Oil prices have escalated at ~35% p.a. since 1999

• Reality takes into account supply/demand factors
WA natural gas price

Regional variations need to be accounted for

World natural gas prices have decreased since 2008

Prices in WA have increased though and are expected to increase further

In the business of climate change
Clean energy future policy very likely to be implemented

$23/t carbon price will be included as of 1 July 2012

Price will be escalated by 2.5% p.a. Before moving to a market based mechanism

Facilities with (non diesel) direct emissions in excess of 25 kt/a will have a permit liability
What does $23/t CO_2-e add to commodity prices?

- **Gas**: $1.20/GJ
  - Total: $13.20/GJ
- **Electricity**: $20/MWh
  - Total: $120/MWh
- **Black Coal**: $60/t
  - Total: $175/t

In the business of climate change.
Energy efficiency design reviews
Carbon and energy baseline

Energy cost increases are likely to be significant
Carbon will represent an additional cost

Important to define your energy and carbon footprint as early as possible
Include in the financial model – sensitivity analysis
Energy efficiency design reviews

Financial model fully defined
Conduct energy efficiency design reviews
The earlier the better!

Cheaper to make big decisions during the early stages of design:

• In pit crush and convey vs haul
• HPGR vs traditional milling
• Hydromet vs pyromet
• Atmospheric vs pressure leach
• Heat recovery systems
• Pinch analysis
Other opportunities

**Minor equipment**
- VSDs on pumps, compressors, ventilation
- Optimisation of pipe runs to minimise losses and pumping requirements

**Control system changes**
- Conveyor shutdowns
- Soft starters
- Telemetry on underground ventilation
- Expert systems on grinding circuits, EW
Carbon reduction projects

Alternative neutralisation reagents or processes
Fuel switching
Power station design
Renewable energy projects (include RECS in financial model)
Case study

Energy efficiency design review completed for a coal project in Queensland

PFS had been completed at time of design review

Design review completed in a workshop environment with key stakeholders from the entire operation
Case study

Operation split into the following areas:

- Management and Systems – 4 projects identified
- Infrastructure – 8 projects
- Layout – 4 projects
- Ancillaries – 2 projects
- Supply – 1 project
- Technology – 6 projects

25 projects identified in total
3 were in “Leave Behind” category
Conclusions

Ensure energy costs are predicted as accurately as possible
Conduct energy efficiency design reviews as soon as you can
Save money in the long run