



Electricity Sector Prospects: Insights from recent IEA Scenario Analysis

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Topics

- **Energy Technology Perspectives Scenarios**
- **Towards G8 advice for the Aluminium sector**



Energy Technology Perspectives Scenarios

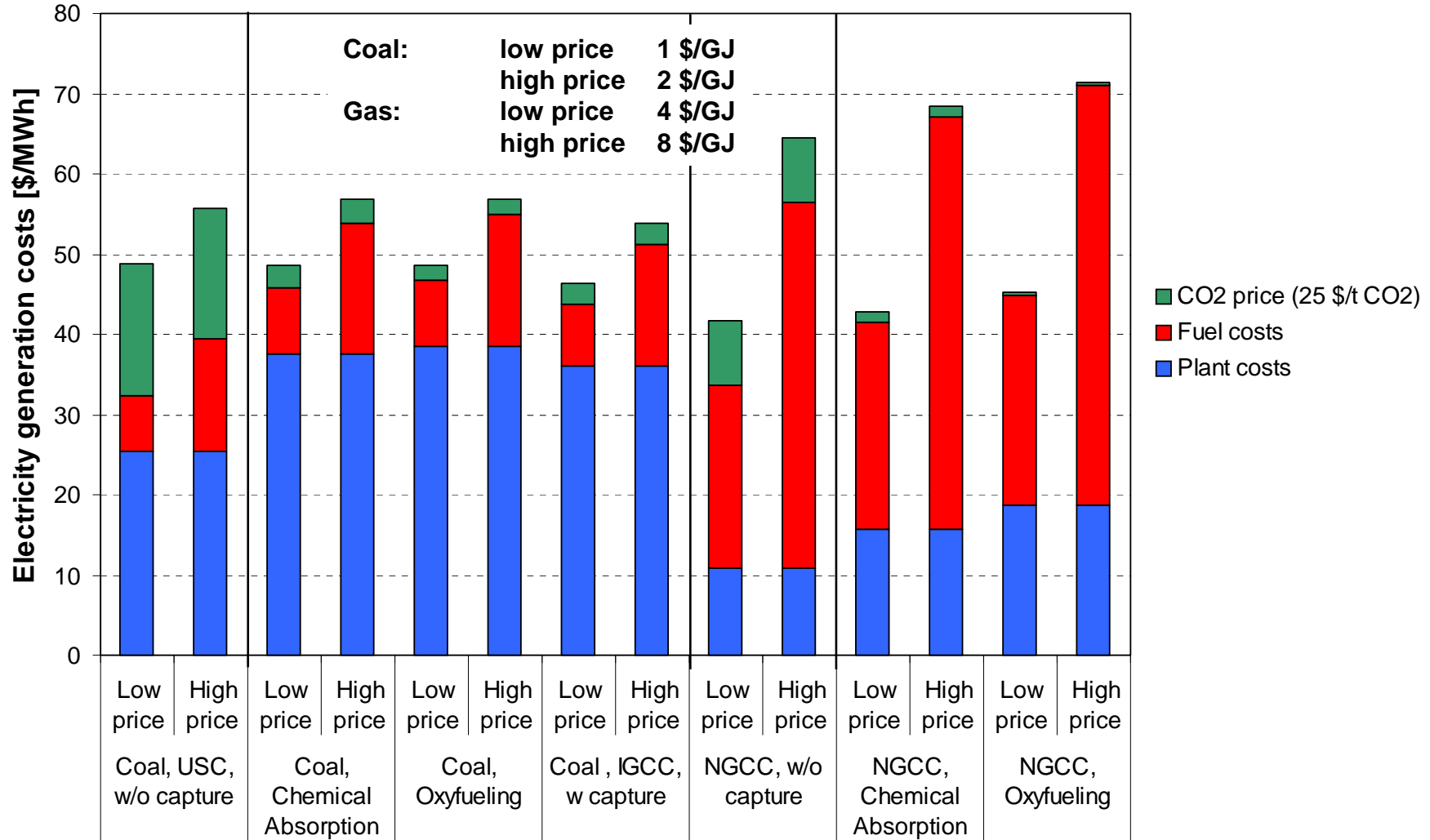


Scenario Analysis

- Scenarios analysed:
 - ◆ Baseline Scenario
 - ◆ Accelerated Technology Scenarios (ACT)
 - ◆ TECH Plus scenario
- ACT and TECH Plus scenarios:
 - ◆ Analyse the impact from R&D, Demonstration and Deployment measures
 - ◆ Incentives equivalent to 25 \$/tonne CO₂ for low-carbon technologies implemented world-wide from 2030 and on
 - ◆ Individual scenarios differ in terms of assumptions for key technology areas



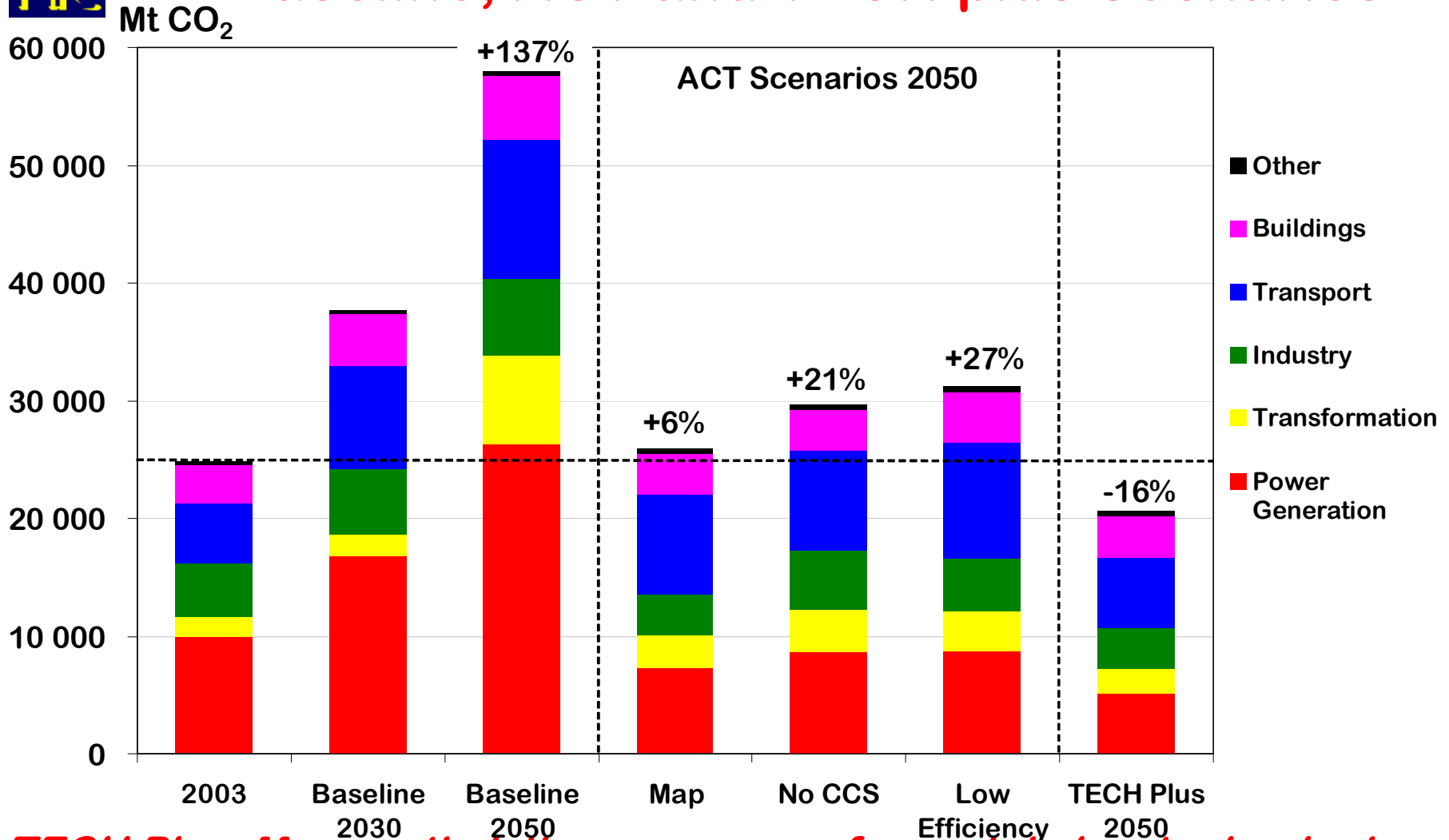
Electricity generation costs of capture plants





Global CO₂ Emissions 2003-2050

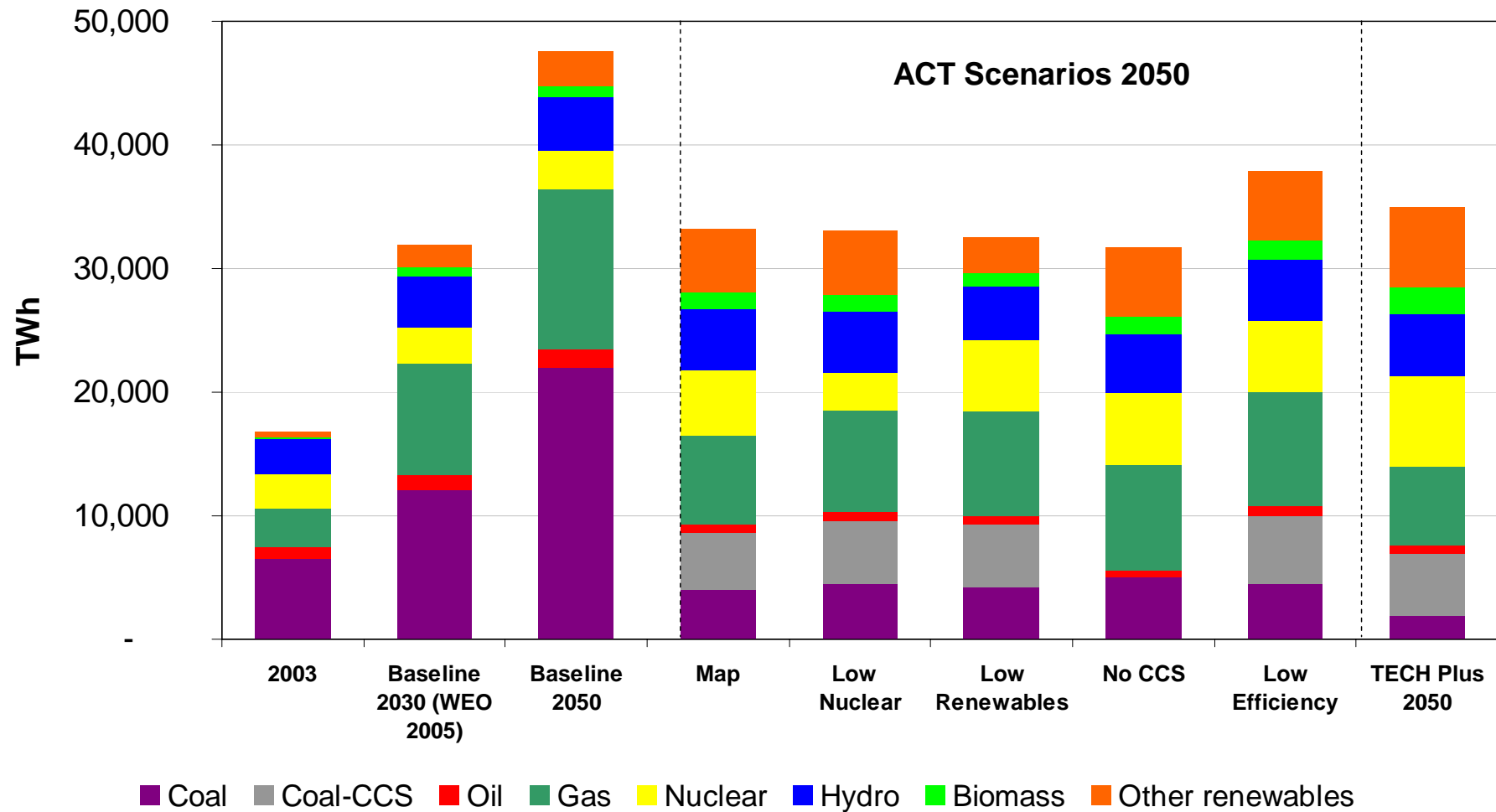
Baseline, ACT and TECH plus Scenarios



TECH Plus: More optimistic on progress for certain key technologies

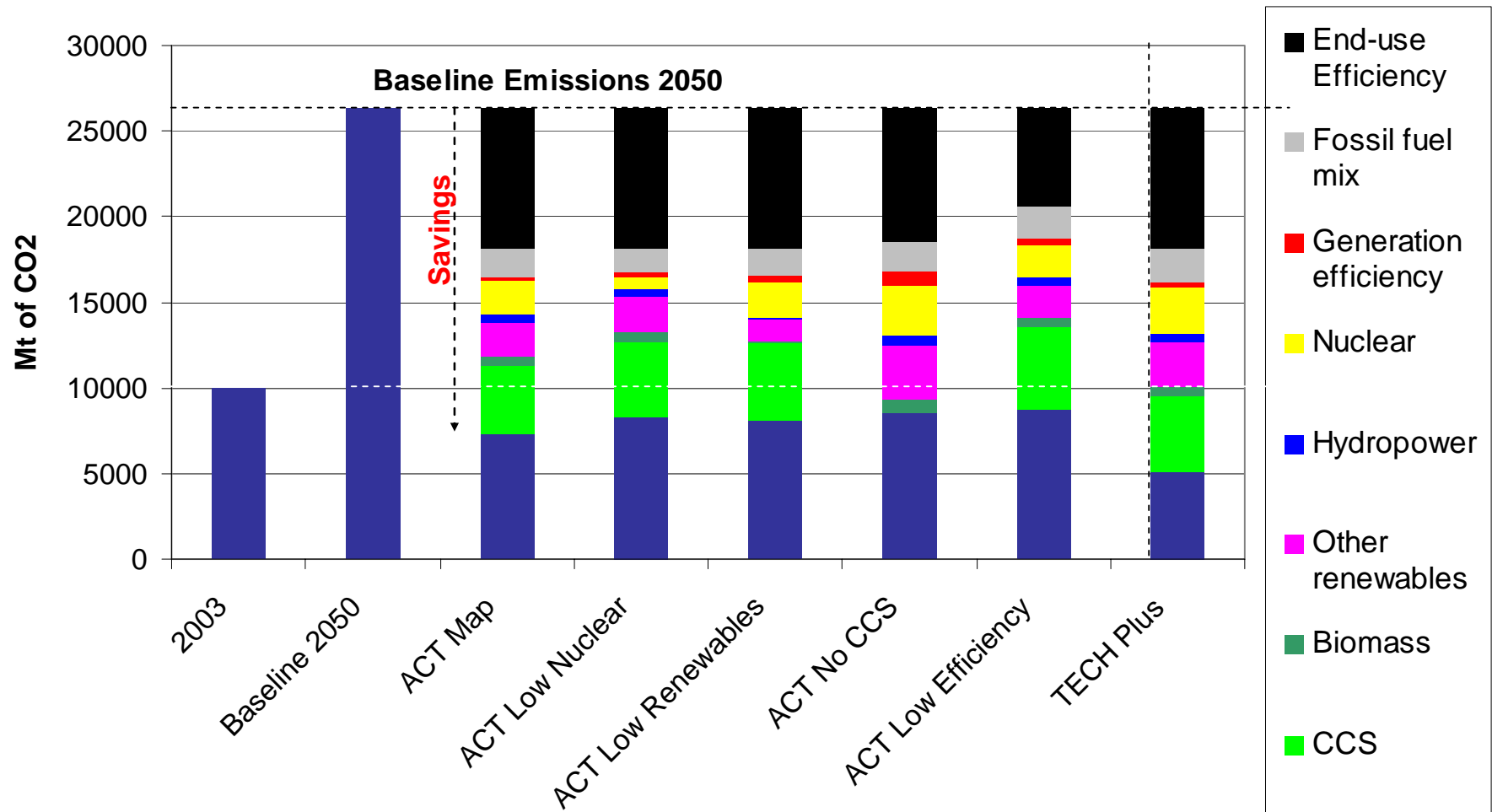


Power Generation





CO₂ Emissions in Power Generation





Conclusions from scenario analysis

- **Electricity generation:**
 - ◆ CCS is crucial for electricity generation from coal in CO₂ constrained world
 - ◆ Renewables can quadruple by 2050
 - ◆ Nuclear can gain more important role in regions where it is accepted
 - ◆ CO₂ intensity ranges from 600 g/kWh in BASE scenario to ca. 220 g/kWh in ACT scenarios in 2050
- **Aluminium production:**
 - ◆ Aluminum industry maintains share of 3% of global electricity demand at roughly tripling of aluminium production by 2050
 - ◆ Indirect CO₂ emissions from electricity in 2050:
 - 765 Mt CO₂ for the Base and 280 Mt CO₂ for the ACT scenario (direct emissions in 2050: ca. 130 Mt CO₂)
 - ◆ Differences in world regions due to variations in electricity mix (hydro/nuclear vs. coal)
 - ◆ Generation costs coal: Efficiency + CCS add 10-20 \$/MWh or 150-300\$/t Al



Towards G8 advice for the Aluminium sector



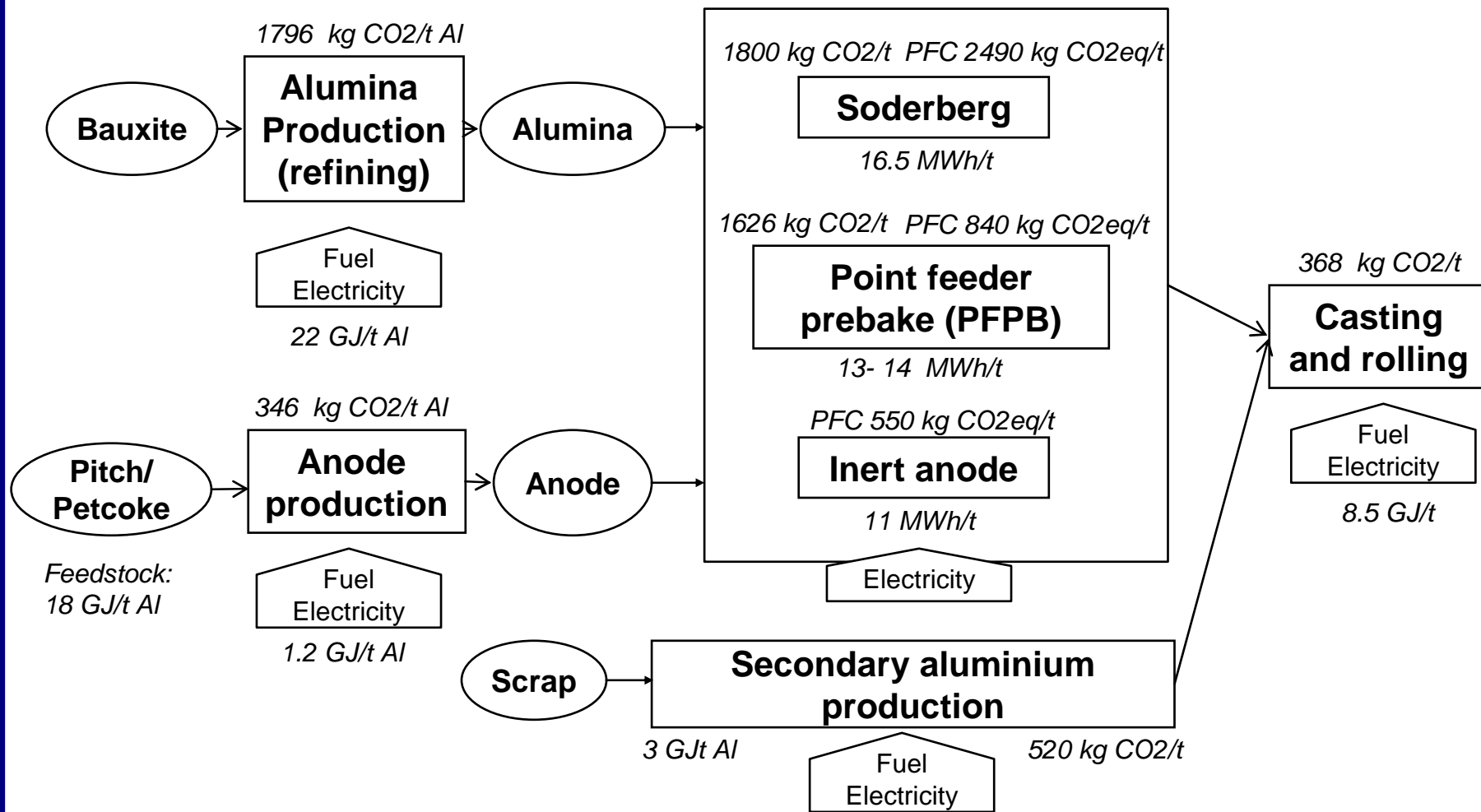
Efficiency potential analysis (new technologies)

- Industrial sector-specific potentials for energy efficiency improvements and CO₂ emissions reductions through 2050
- Framework assumptions:
 - ◆ Economic (GDP, regional demand for products, ...)
 - ◆ Baseline technological situation (incremental technology improvements, continuing capital stock trends, ...)
 - ◆ Potential technological improvements (emerging and breakthrough technologies, implementation rates/limits, capital stock turnover, ...)
- Sectors: Aluminium, Iron and Steel, Ammonia, Other Chemicals/Petrochemicals, and Pulp & Paper.
- Cross-cutting technologies: Combined Heat and Power (CHP) and Boilers and Motor Systems
- Completion – end 2007



Energy demand and direct emissions

Primary aluminium production (Hall-Héroult)





Issues in analysis

- Future technology development
 - Energy efficiency
 - Inert anodes/wetted cathodes
 - Rate of replacement of Soderberg by point feeder prebake (PFPB) smelters
- Role of Soderbake to Prebake smelter conversion
- Intermittent electricity supply from renewables feasible?
- Development of global aluminium production (61.7 Mt/yr at present)
- Potential to increase share of secondary aluminium production
- Relocation caused by GHG mitigation policies



Thank You

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