Energy & Sustainability Partnerships

John Goddard, Manager - Caterpillar Technologies & Solutions Division
DoE DEER Conference, Dearborn, MI
4 August 2008
Caterpillar and the Department Of Energy

• Caterpillar values its long-standing relationship with the DOE

• Caterpillar thanks the DOE for its partnership and commitment to research on leading edge technology programs

• We look forward to continued cooperation as we move forward
A World Leader
Proven Ability to Meet Global Energy Challenges

Tomorrow’s World: Caterpillar Machines & Engines have Powered Much of the World’s Growth and Prosperity

Annual Sales & Revenues ($ B)


1925
$13 Million

2007
$45 Billion
Is this Tomorrow’s World?

- Natural Gas Supply in Decline
- $10.00+ a Gallon Petrol
- 85% of Energy Imported
- Unsecured Supply Of Coal/Petrol
- Gw of Utility Capacity Pending “Decommission”
Growth, Prosperity and Our Energy System

A Key Enabler of Growth & Prosperity - A **Great** Energy System

- Ultra Power Dense
- Cost Effective
- Intermodal
- Secure
- Sustainable
- Ease of Distribution
- Storage Built In “Out of Sight”

Our Challenge – Making it **Sustainable**
Energy System Options…

1. Use Less
2. Find Alternatives

Road Map Moving Forward…
Enable High Efficiency & Alternatives

1. High Impact Focus = (Efficiency, Utilization, Enabling Infrastructure)
2. Address Multiple “System” Level Areas
Success Stories: Coal Mine Methane Project
BHP Billiton’s Appin and Tower Coal Mines - New South Wales, Australia

System Efficiency Is Key Enabler

94 MW of Continuous Electric Power Generation
- 94 Cat G3516 lean-burn, low-emission reciprocating engines
- Over 10 years of operation
- Project has exceeded profit expectations from the sale of electricity

Equivalent to removing 653,372 cars & trucks from the road
Projected 2014 Fuel Burned in Caterpillar Machine Products

**Fuel Burned By One Year’s Sales of Caterpillar Units in One Year (with 2008 technology)**

**2008**
$6 Billion
1.2 Billion Gallons
13 Million Tons CO2
(US$ of Diesel Fuel)

**2014**
$11 Billion
1.7 Billion Gallons
19 Million Tons CO2

“Efficiency is the Largest Ongoing Opportunity”
The Energy Technologies Institute

John Goddard, Manager - Caterpillar Technologies & Solutions Division

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The UK – Living in Tomorrow’s World?

- Natural Gas Supply in Decline
- 80+% of Energy Imported
- Gw of Utility Capacity Pending “Decommission”
- $10.00+ a Gallon Petrol
- Unsecured Supply Of Coal/Petrol
The ETI: Intent - Strengths

- **Desired Intent & Outcomes** –
  60% CO2 Reduction in 2050
  Secure – Sustainable Energy
  Increased Energy R&D Capacity

- **Strengths** –

  *International Partnership – Shared R&D*
  *Technology Aligned with Policy (Government to Industry)*
  *Execution Focus Rather Vs. Advisory or Academic*
  *Partner – Partner Relationships*
Caterpillar’s Significant UK Presence

- 10,000+ Employees
- 18 Major Facilities
- Presence in UK since 1950’s
- A Top-Ten US Manufacturing Investor in UK

Perkins Facilities & Offices
- Peterborough – HQ, Manufacturing
- Manchester – Parts Distribution
- Stafford – Manufacturing
  - Engines

FG Wilson Facilities & Offices
- Larne, N. Ireland – HQ, Manufacturing
  - Generator Sets

18 CAT Dealership Locations
The ETI – Mission and Opportunity

“To accelerate the development, demonstration and commercial deployment of a focused portfolio of energy technologies, which will increase energy efficiency, reduce greenhouse gas emissions and help achieve energy and climate change goals.”

UK CO2 Opportunity
(in %, Dti White Paper)

- Transport: 28%
- Heat: 47%
- Electricity: 19%
- Other: 6%

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The ETI – Collaborative Themes

- Large Scale Energy Supply Technology
- Energy Security of Supply
- End Use Efficiency / Demand Management
- Transport
- Small Scale Energy Supply Technology
- Support Infrastructures
- Alleviating Energy Poverty
“ETI Call” Programme Process

Creation of Programmes Takes 6 – 8 Months

2 – 5 Years

Appraise
Select
Define
Execute
Operate

Gateway Review - ETI Board
Authorisation to Proceed

NPI Ready Energy Technology

Networks
CO2 Capture
Transport
Buildings
Distributed Energy
Offshore Wind
Marine
Goal Alignment - Technology Programmes

**Partner Goals**

Gen 1 –
- Quick Wins - Efficiencies
- Position for Deployment of Low CO2 Power Solutions

**ETI Goals**

Gen 2 & 3
Deploy Technologies for 25% - 60% CO2 Reduction
Driving Stakeholder Technology Deployment

- **Wind - Offshore Data**
- **Marine - Demo**
- **Residen't DE**
- **Fuel Cell CHP**
- **Waste to Energy**

**ETI Projects**

- **CO2 Capture**
- **Marine**
- **Transport**
- **Distributed Energy**
- **Buildings**
- **Networks**
- **Wind**

**ETI Programs**

- **NPI Ready Energy Technology**

**CO2 Impact**

- **Investment**
- **20:1 Leverage Shared R&D**
- **Stakeholder 6Sigma Projects**

**Relevance (to CAT)**

- **BU Input**
Cooperative Research
Building A Sustainable Energy System Together

The Key Enabler of Growth & Prosperity
Making Progress Possible
Caterpillar Leadership in Sustainable Development
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