

HEAVY-DUTY DIESEL ELECTRIC TURBOCOMPOUNDING

James Callas
Caterpillar Inc.

The objective of this recently started program funded by the Department of Energy Office of Heavy Vehicle Technologies and Caterpillar Inc. is to identify, design, and demonstrate cost effective electric turbocompound technologies on a 15 liter heavy duty diesel engine. This presentation will discuss the objectives and timeline of the three year program including history of turbocompounding programs and identified potentials of turbocompounding for reductions in fuel consumption and emissions simultaneously.

The electric turbocompound program objective is to combine a high speed motor/generator with a diesel engine turbocharger to provide "on demand" power to the various parasitic accessories, crankshaft, or to storage where it could be used to spool up the turbo for enhanced engine response. The program risk is viewed as moder-

ate to high due largely to the integration of the turbomachinery and electrical components in a compact, emissions friendly, cost effective package.

The presentation contains historical perspective of past experience at Caterpillar which includes a mechanical turbocompound 15 liter diesel engine that demonstrated in chassis, over the road performance that resulted in fuel consumption improvements of over 5% with turbocompounding power providing in excess of 15% of the total power. Highlights of the DOE LE55 program at Caterpillar will also be shared where mechanical turbocompounding was employed with two stage series turbocharging. Both mechanical turbocompounding systems demonstrated excellent performance; however, the systems were not commercially cost effective.