

# New modular Ecotec engines are more adaptable, efficient

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The new Ecotec 1.5L naturally aspirated engine will debut in the 2015 next-generation Chevrolet Cruze in China.

A new generation of Ecotec small-displacement engines streamlines General Motors' global powertrain portfolio with a modular architecture that broadens its adaptability to global markets and reduces

manufacturing complexity – while offering customers leading-edge efficiency, refinement and durability.

The new engines were developed for GM's global vehicle portfolio and will power many of the company's highest-volume small cars and compact crossovers – including the next-generation Chevrolet Cruze specifically tailored for China, which launches in 2014 as a 2015 model.

By 2017, more than 2.5 million new Ecotec engines are projected to be built annually in at least five manufacturing locations around the globe: Flint, Mich. (U.S.); Shenyang, China; Szentgotthárd, Hungary; Toluca, Mexico; and Changwon, South Korea. The Flint facility alone represents an investment of more than \$200 million in technology and tooling to support the engines' production.

"Transportation solutions vary around the world and GM is committed to developing engines matched to the needs of the regions where they're sold," said Steve Kiefer, GM vice president, Global Powertrain Engineering. "The new [engine](#) family is designed to achieve segment-leading refinement and efficiency, and will make its way into five GM brands and 27 models by the 2017 model year."

The new Ecotec portfolio will include 11 engines, with three- and four-cylinder variants ranging from 1.0L to 1.5L – including turbocharged versions – and power ratings ranging from 75 horsepower (56 kW) to 165 horsepower (123 kW), and torque ranging from 70 lb-ft (95 Nm) to 184 lb-ft (250 Nm). The architecture is also designed to support hybrid propulsion systems and alternative fuels.

The first production applications include a 1.0L turbocharged three-cylinder for the Opel ADAM in Europe, and 1.4L turbocharged and 1.5L naturally aspirated four-cylinder engines for the 2015 next-generation Chevrolet Cruze in China.



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The turbocharged variants enable the engines to deliver the power and torque of larger-displacement engines with the efficiency of smaller engines. For example, the turbocharged 1.0L three-cylinder used in the Opel ADAM makes as much power as the naturally aspirated 1.6L four-cylinder it replaces – with an estimated 20-percent improvement in efficiency.

In fact, the new Ecotec family is on the leading edge of efficiency, with the new 1.4L turbo up to five percent more efficient than the 1.4L turbo engine it will replace. The new Ecotec engines also deliver segment-challenging refinement. Noise intensity is up to 50-percent quieter than Volkswagen's EA211 1.4L four-cylinder and up to 25-percent quieter

than Ford's 1.0L turbo three-cylinder.

## **Clean-sheet design**

The new Ecotec engines represent a clean-sheet design and engineering process, leveraging the diverse experience of GM's global resources. Technologies such as central direct fuel injection, continuously variable valve timing, turbocharging and variable intake manifold airflow help achieve efficiency goals with broad power bands, for an optimal balance of strong performance and lower fuel consumption.

"The new Ecotec architecture represents the most advanced and efficient family of small-car gas engines in GM's history," said Tom Sutter, global chief engineer. "Along with performance and efficiency targets, we've also aimed for segment-leading refinement with low noise and vibration – and we've hit the bulls-eye."

Modularity in parts – such as four-cylinder and three-cylinder blocks – that share bore spacing, bore diameter, liners and other dimensions, reduces complexity while increasing the flexibility to quickly adapt the architecture for new applications.

The new Ecotec engines are calibrated to run on regular unleaded gas – even the high-output turbo variants.

The new 1.4L turbo for the 2015 next-generation Chevrolet Cruze in China is estimated at 148 horsepower (110 kW) and 173 lb-ft of torque (235 Nm). The 1.5L is rated at an estimated 113 horsepower (84 kW) and 108 lb-ft of torque (146 Nm).

In China, Cruze models with the 1.4L turbo engine will also feature an all-new dual-clutch gearbox.

Provided by General Motors

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