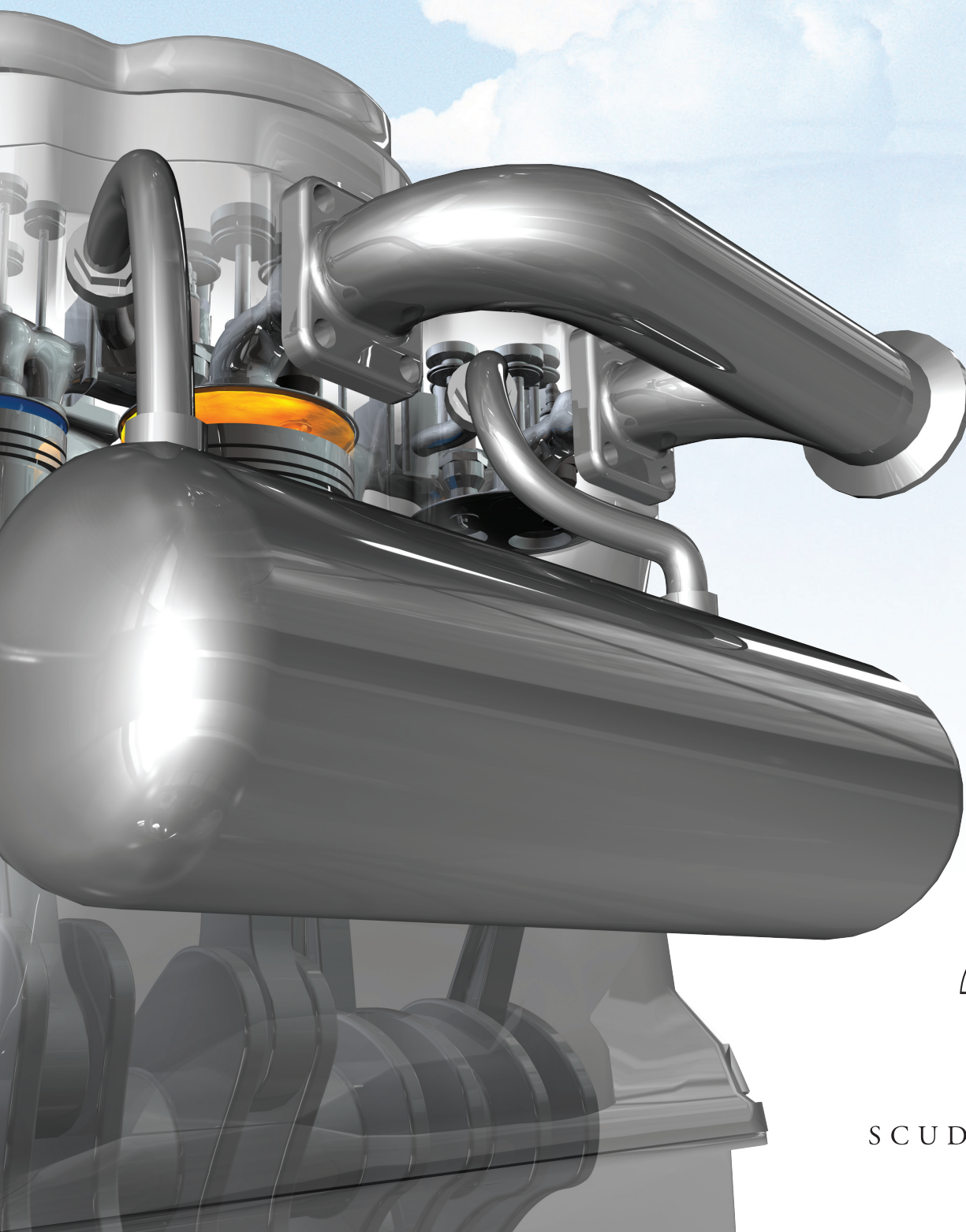


SCUDERI™ Air Hybrid

Hybrid Technology Redefined

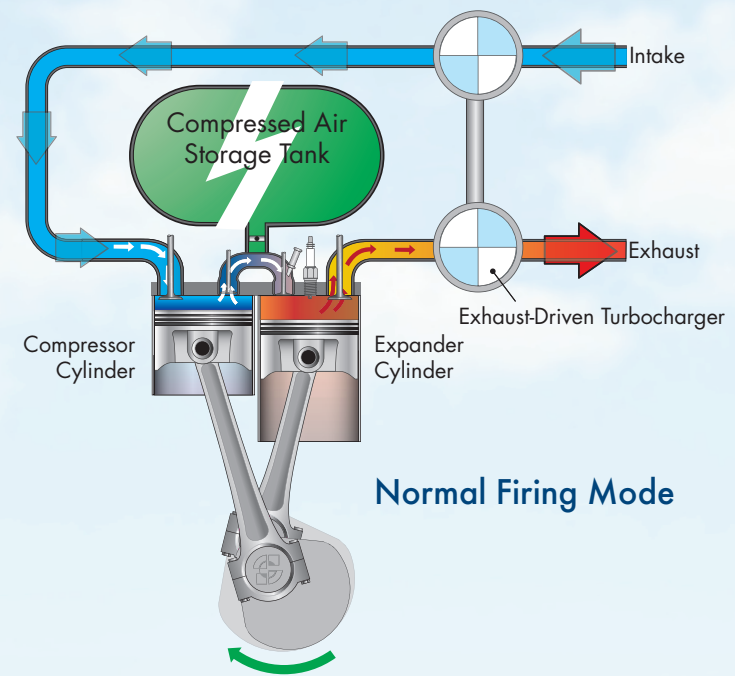


SCUDERI GROUP

hy-brid: something (as a power plant, vehicle or electronic circuit) that has two different types of components performing essentially the same function*

Rather than combining two completely different propulsion technologies to make one hybrid, the SCUDERI™ Air-Hybrid System combines our split-cycle engine technology with an air storage tank—extending the engine’s capabilities—without duplicating its efforts.

By simply adding an air tank and a controllable valve, the SCUDERI Engine becomes a hybrid system that recovers kinetic energy and stores it for later use. When needed, the compressed air is released from the tank, to power expansion with combustion or without combustion.



Normal Firing Mode

bat-ter-y: another name for accumulator**

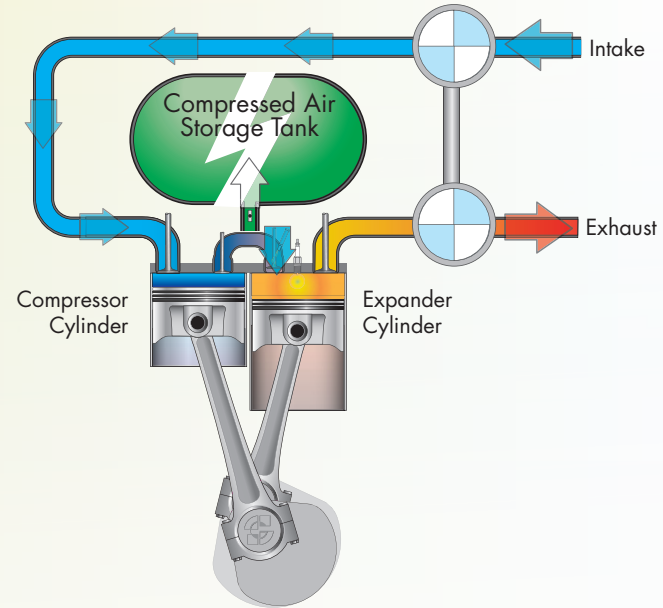
The SCUDERI™ Engine’s split-cycle technology decouples the compression processes from the expansion (combustion) processes. Decoupling the processes enables compression independent of expansion and expansion independent of compression. With the processes decoupled, energy produced by one process can be stored until needed by the other.

The air tank’s purpose is to accumulate and store mass, and when needed, release it to power expansion. When charging or discharging the tank, rate of charge and rate of discharge are only limited by the engine’s capacity to produce or consume the air, and the tank’s storage capacity doesn’t degrade with age or number of charge-discharge cycles. Virtually unaffected by environmental conditions, mass stored in the tank when it’s hot, is still in the tank when it’s cold, and vice versa.

Power—When You Need It

Firing and Charging Mode

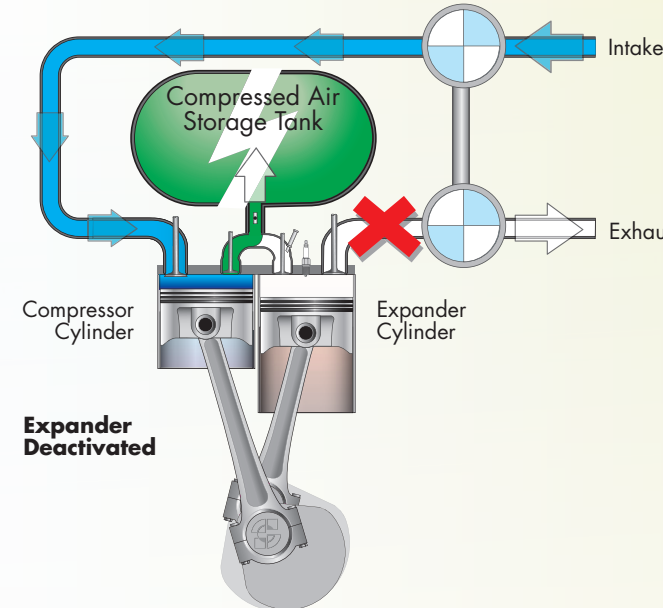
The compressor and expander cylinders are enabled, and the air storage tank is recharged while the expander cylinder is firing—air flows to the air storage tank and the expander cylinder.



Storage—When You Don't

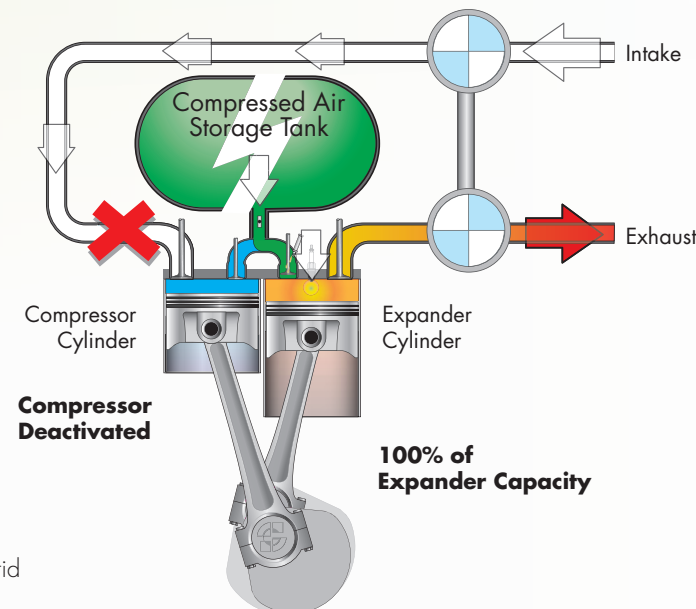
Air Compressor Mode

The expander cylinder is disabled, and the compressor cylinder recharges the air storage tank during downhill operation, braking and deceleration—air flows to the air storage tank without fuel injection or firing.



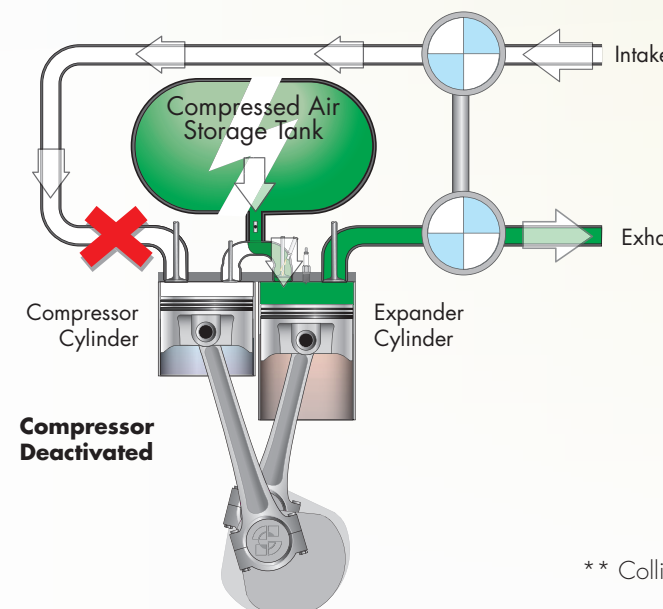
Air Expander and Firing Mode

The compressor cylinder is disabled, and high-pressure air for firing is released from the air storage tank—without airflow to or from the compressor cylinder.



Air Expander Mode

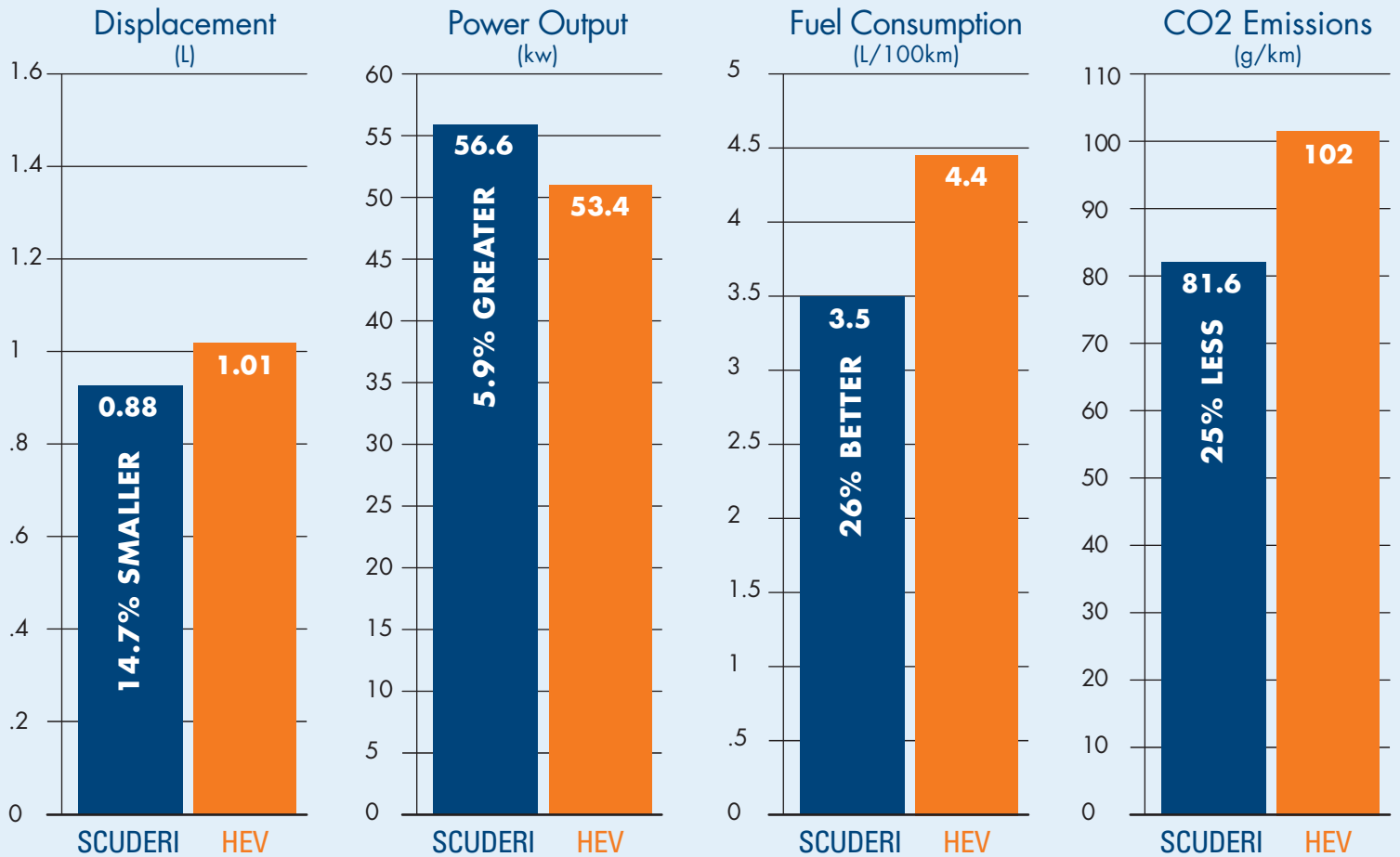
The compressor cylinder is disabled, and high-pressure air is released from the air storage tank to power the engine—without fuel injection or firing.



* www.merriam-webster.com/dictionary/hybrid

** Collins English Dictionary-Complete and Unabridged

SCUDERI™ Air-Hybrid Engine vs. High-Economy Vehicles (HEV)*



A survey of compact/city high-economy cars available in Europe was undertaken:
 All had < 4.7L/100 km fuel economy
 All had < 110 g/km CO2 emissions

An "average" vehicle model was constructed:
 Weight = 950 kg
 Drag Cd = 0.32
 Gears = 5

A SCUDERI Air-Hybrid Engine was sized to provide "average" vehicle performance:
 Average power = 56.6 kw
 Acceleration times
 0 – 60 = ~13.5 s
 50 – 70 = ~13.0 s (5th gear)

* Chart data is a comparison between the SCUDERI Air-Hybrid Engine's survey results and the average of the eight high-economy vehicles' survey results.

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