

Turning complex  
challenges into  
powerful possibilities.

**Nuchar® FuelSorb™**  
**Activated carbon monoliths**



**ingevity™**

# Nuchar FuelSorb carbon monoliths for low pressure adsorbed natural gas (ANG) fuel systems will drive the future of natural gas powered vehicles—providing a safer, more cost effective alternative to traditional high pressure compressed gas systems.

## **Driven by experience**

With over 100 years of experience in activated carbon development, Ingevity is the leading global supplier of activated carbon products used in automotive gasoline vapor emission control systems. Nuchar brand activated carbon products have proven life-of-vehicle performance and have been used for over 40 years in nearly 1 billion vehicles worldwide. With the development of FuelSorb activated carbon monoliths, Ingevity is advancing the technology that will shape the future of natural gas vehicles.

## **Adsorbed natural gas technology**

ANG technology is the high-density storage of natural gas at low pressures (below 1,000 psi) using highly porous activated carbon adsorbents. Under controlled depressurization, the natural gas is released and exits the system in response to the demands of the vehicle's engine using an in-line compressor as the fuel pump.

## **Advantages of low pressure ANG fuel systems over traditional high pressure CNG systems:**

- up to 50 % reduction in the cost of refueling stations
- fuel savings of approximately \$0.10-\$0.15 GGE/DGE
- lower life-of-vehicle costs
- the controlled-release characteristics of ANG offers improved safety





Low pressure ANG technology provides significantly more natural gas storage compared to compressed natural gas below 1,000 psig.

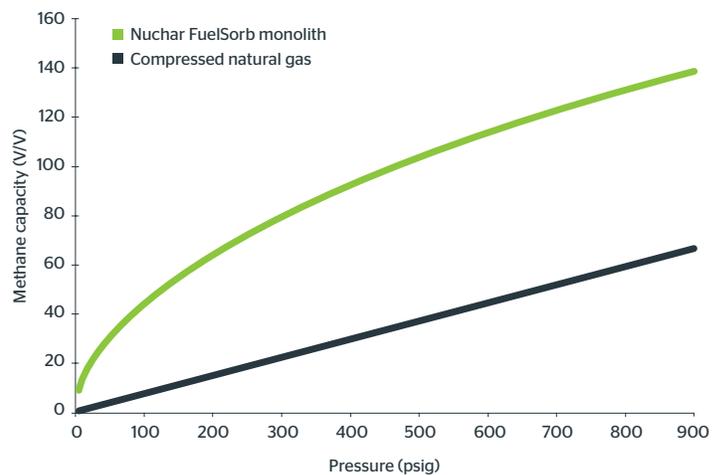
**Natural gas for vehicles CNG vs. ANG—a comparison**

Compressed Natural Gas (CNG)	Adsorbed Natural Gas (ANG)
3,000-3,600 psig	< 1,000 psig
Larger, thick-walled tanks Limited space conformability	Smaller, thin-walled tanks Flexible space conformability
Cost of compression: \$0.30-0.35 per GGE/DGE	Cost of compression: \$0.15-0.20 per GGE/DGE
Fueling infrastructure cost: \$1-2 MM per station	Fueling infrastructure cost: < 50% of CNG station (est.)
Home refueling appliance costs: > \$4,000 per unit	Home refueling appliance costs: < \$2,000 per unit

**Low pressure ANG offers flexible design options**

Low pressure ANG storage systems enables smaller and more comfortable tank designs with thinner walls than traditional CNG tanks. This provides vehicle designers and retrofiters greater flexibility when designing tanks to fit the available space on the vehicle. Greater flexibility on fuel tank location and configuration means usable storage space on the vehicle doesn't need to be sacrificed to accommodate the tank.

**Activated carbon methane capacity**



A single Nuchar FuelSorb activated carbon monolith has over 100 acres of active surface area for natural gas adsorption.



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