

## Technology Optimization of Compressed Natural Gas Home Fast Refueling Units

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**Abstract :** Despite all global economic shifts and the fact that Natural Gas is recognized worldwide as the main and the leading alternative to oil products in transportation sector, there is a huge barrier to switch passenger vehicle segment to Natural gas - the lack of refueling infrastructure for Natural Gas Vehicles. While investments in public gas stations require established NGV market in order to be cost effective, the market is not there due to lack of refueling stations. The key to solving that problem and providing barrier breaking refueling infrastructure solution for Natural Gas Vehicles (NGV) is Home Fast Refueling Units. It operates using Natural Gas (Methane), which is being provided through gas pipelines at clients home, and electricity connection point. It enables an environmentally friendly NGV's home refueling just in minutes. The underlying technology is a patented technology of one stage hydraulic compressor (instead of multistage mechanical compressor technology available on the market now) which provides the possibility to compress low pressure gas from residential gas grid to 200 bar for its further usage as a fuel for NGVs in the most economically efficient and convenient for customer way. Description of working algorithm: Two high pressure cylinders with upper necks connected to low pressure gas source are placed vertically. Initially one of them is filled with liquid and another one - with low pressure gas. During the working process liquid is transferred by means of hydraulic pump from one cylinder to another and back. Working liquid plays a role of pistons inside cylinders. Movement of working liquid inside cylinders provides simultaneous suction of a portion of low pressure gas into one of the cylinder (where liquid moves down) and forcing out gas of higher pressure from another cylinder (where liquid moves up) to the fuel tank of the vehicle / storage tank. Each cycle of forcing the gas out of the cylinder rises up the pressure of gas in the fuel tank of a vehicle with 2 cylinders. The process is repeated until the pressure of gas in the fuel tank reaches 200 bar. Mobility has become a necessity in people's everyday life, which led to oil dependence. CNG Home Fast Refueling Units can become a part for existing natural gas pipeline infrastructure and become the largest vehicle refueling infrastructure. Home Fast Refueling Units owners will enjoy day-to-day time savings and convenience - Home Car refueling in minutes, month-to-month fuel cost economy, year-to-year incentives and tax deductibles on NG refueling systems as per country, reduce CO2 local emissions, saving costs and money.

**Keywords :** CNG (compressed natural gas), CNG stations, NGVs (natural gas vehicles), natural gas

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