



## Case study for cars conversion to natural gas made for Wawa Taxi

### Background

Wawa Taxi is domiciled in Mińska 69 St., Praga Południe district. It is so far the only taxi fleet in Warsaw and in Poland which use natural gas. Wawa Taxi has been present on the market for 15 years in Warsaw, for some 4 years it has been using CNG vehicles – Seat Altea and Seat Altea XL. Total number of vehicles driven under Wawa Taxi brand are 500, now 160 cars are fueled by CNG. Wawa Taxi buys 3-4 CNG taxi cars every 2 weeks and then leased to drivers. Another option for taxi drivers is to buy their own vehicle instead of leasing them from Wawa Taxi. In the future the company is planning to buy solely cars fueled by CNG. All Seats are dual-fuel cars: natural gas-petrol.

The further development of NGV's in Warsaw is hindered by the insufficient number of natural gas filling stations (

**Picture** ). At least 2 new stations, located in different areas of the city would be enough to raise interest in this technology in both private consumers and other fleets. The only one gas filling station in Warsaw is located at Kasprzaka Street owned by PGNiG. The filling station is located in the center of Warsaw - disadvantageous is difficult access due to traffic jams but cars coming from all uptown areas can be fueled, which is an advantage. Cooperation of PGNiG and Institute for Renewable Energy has brought results. PGNiG decided to built second gas filling station which will have 6 fast fuelling points (comparing to 2 fast fuelling points in existing station).

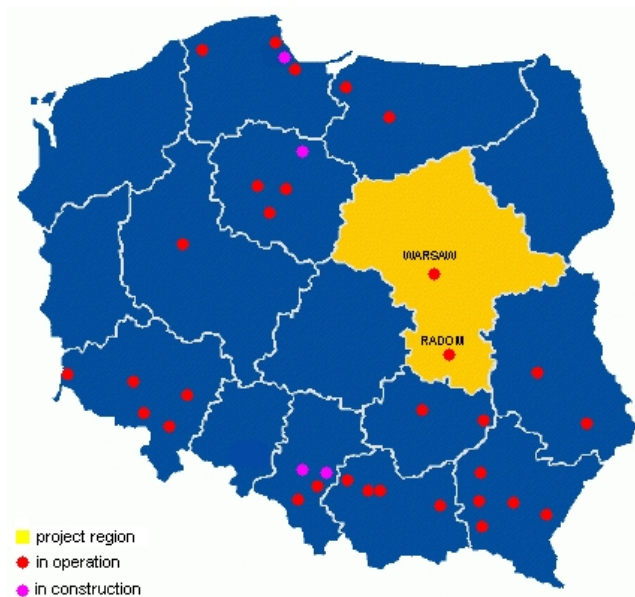
Picture 1. Seat Altea in station at Kasprzaka St.



Picture 2. Containers in luggage compartment



Picture 3. Map of natural gas filling stations in Poland



**Data of gas filling station located in Kasprzaka St., Warsaw:**

- kompresor: Ariel 600Nm<sup>3</sup>/h
- located in urban area
- stand alone station (only natural gas)
- 2 fast fuelling points
- operation hours: 8am – 10pm, 7 days per week
- method of payment: cash, bill of sale
- number of fills: around 100 per week
- number of cars using station: around 200
- owner of the station: PGNiG
- main users: Wawa Taxi, Mazowiecka Spółka Gazownictwa (PGNiG subsidiary)
- type of cars: van, personal cars, buses.

**Technical data of Seat Altea cars:**

- 3 steel containers for CNG located at luggage compartment (Picture 2).
- Automatic switch from petrol to natural gas
- total weight of containers 100 kg (3x33 kg)
- maximum range on containers 150 (if the system is not well adjusted) – 250 km
- engine capacity 1,6 l; 102 HP, optimal work temperature 90C
- maximum speed on CNG 120-130km/h (taxi driver opinion). Maximum speed 180km/h on petrol (official data). The vehicles seem to be petrol vehicles adjusted to natural gas that is why they do not achieve better speed parameters
- very slight changes in engine are required in order to make a dual-fuel car
- average capacity of containers 12m<sup>3</sup> – enough to drive for 180 km (average)
- no technical problems with cars driven by CNG – it operates similarly to LPG cars
- cost of driving 100zł/1000km (around 30EUR)
- cars are marked with a special CNG logo to promote the idea of using ecological energy
- car installations are mounted and serviced by Anlero-Polska domiciled in Warsaw
- Containers are produced by Milmet

Case study has been made with **Tool for economical feasibility of conversion cars to natural gas** made by IEO.

**Outcome of the study in relation to Seat Altea:**

- savings: 6300 PLN after 100 000 km
- car mileage to repayment of costs: 45 748 km
- financial effect after 100 000 km: 6% which means operation of car is costs 6% less than operation of cars fuelled by petrol
- Wawa Taxi should take in consideration another make of car which would be more appropriate as a taxi cab.