

# NYSMART

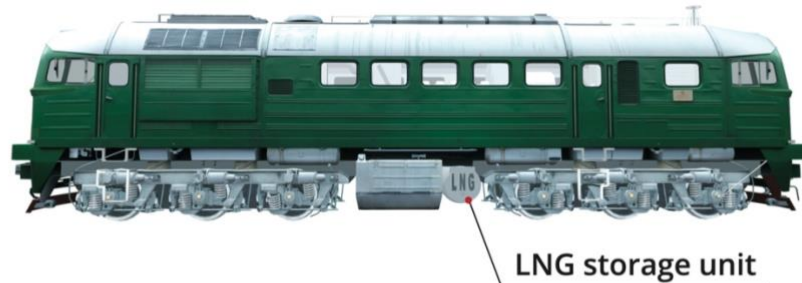
Novel dual-fuel system for modernization of air-polluting diesel locomotives to clean and efficient gas operation

DiGas is a pioneer in dual-fuel systems for diesel engines. NYSMART - patented dual-fuel technology for modernization and upgrade of air-polluting diesel locomotives, to ensure clean and efficient operation. The modular NYSMART can be quickly and simply installed onto any diesel engine. Once installed, our advanced engine management system ensures 30% reduction of fuel costs, delivering rapid payback for the customer; provides torque & performance similar to that of a diesel engine; and delivers and fine Particulate Matter (PM) and NOx emissions reductions of 90% and 30%. The modernization of the locomotive is done with regards to emissions level, engine safety and traction performance.

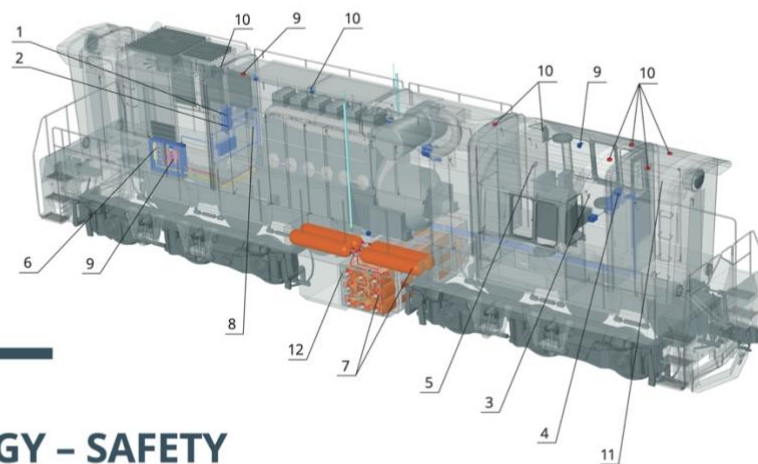
## REFUELING FOR DUAL-FUEL LOCOMOTIVE

- Refueling of diesel: once in 8 days
- Refueling of natural gas: once a day during the break between shifts
- Refueling time for natural gas: <10 minutes
- Stationary and mobile fueling solutions available
- Fueling possible in the place most convenient for the operator
- LNG/CNG fueling infrastructure costs fully covered by natural gas supplier

### M62/ST44



### SM42

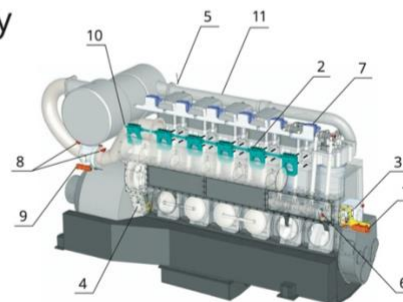


## NYSMART SYSTEM Installed on CHME3/S200 Locomotive

1. Electronic control unit (ECU)
2. Electrical components
3. Emergency power supply unit
4. Locomotive electric motor controller
5. Control panel
6. Gas preparation unit
7. CNG/LNG storage
8. Wire harness
9. Gas leakage detection sensors
10. Fire detection sensors
11. Selector lever position sensor
12. Filling valve: NGV-2

## DIGAS TECHNOLOGY - SAFETY

- Safety verified in a year of operations and in extensive testing, according to highest railway safety standards in cooperation with Kiwa Group
- Safety system comprised of 3 independent yet complementary sub-systems:
  1. **MECHANICAL SAFETY SYSTEM:** manual valves and actuators
  2. **CONTROL SYSTEM:** the controlling unit of manual valves and actuators that prevent from gas leakage and any accidents
  3. **GAS LEAKAGE DETECTION SYSTEMS:** a dedicated complex of fire, smoke, and gas detection sensors



## DUAL FUEL SYSTEM ON K6S310DR ENGINE

1. Electronic governor
2. Sequential phased gas injection units
3. Diesel rack position sensor
4. Crankshaft sensor
5. Thermocouples on each cylinder
6. Camshaft sensor
7. Valve position sensor
8. Air temperature and pressure sensor
9. Air throttling system
10. Gas temperature and pressure sensor
11. Knock sensors

Project funded by European Union's Horizon 2020 research and innovation program under grant agreement No 784620

