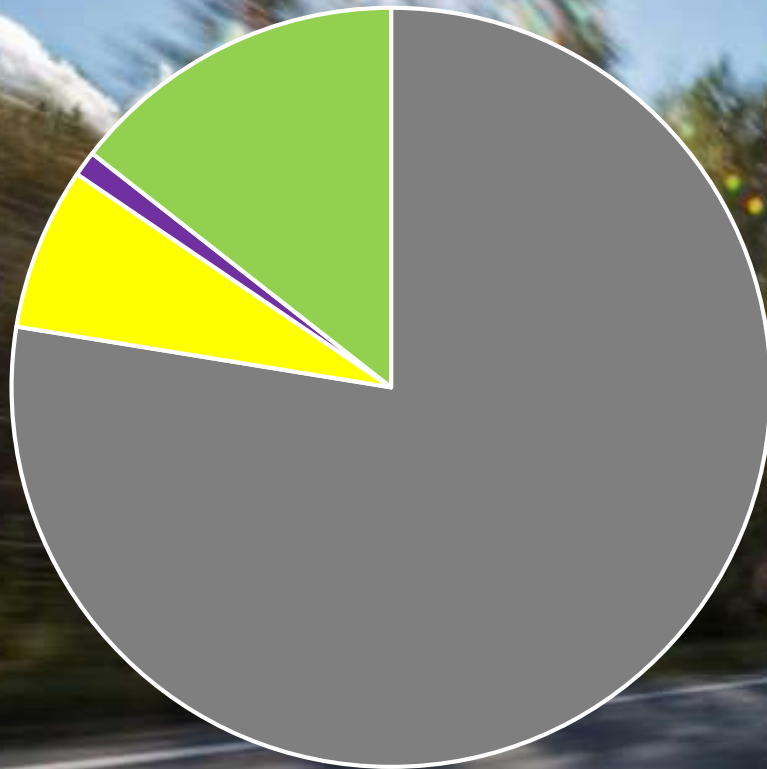




# Scania sales of sustainable solutions alternative fuels - business as usual



Alternative fuel sales 2017: 22%

Goal 2020: 33%

□ Diesel   □ Gas   □ Hybrid   □ ED95, HVO, Biodiesel



# HERE AND NOW SUSTAINABLE SOLUTIONS

## EURO 6 – CLEAN AND LOW CARBON



### BIODIESEL & HVO

Low blends to B100  
Diesel engine

**Up to 90 %  
CO<sub>2</sub> reduction**

*All types of  
applications, including  
long-haulage and  
coaches.*



### ETHANOL ED95

World's No. 1 biofuel  
Diesel engine

**Up to 90 %  
CO<sub>2</sub> reduction**

*Buses, coaches  
waste collectors,  
distribution and haulage  
trucks.*



### BIOGAS & NATURAL GAS

Compressed or liquid  
Otto engine

**Up to 90 %  
CO<sub>2</sub> reduction**

*Buses, coaches  
waste collectors,  
distribution and haulage  
trucks.*



### HYBRIDS & ELECTRIFICATION

Diesel hybrids  
Biofuel hybrids  
BEV Demo tests

**Up to 98 %  
CO<sub>2</sub> reduction**

*City buses,  
waste collectors,  
distribution trucks.*



### BUS SYSTEMS

Bus System packages

Buses  
Service and R&M  
Workshops  
Financing  
ITS and FMS systems  
Ticketing systems  
Alternative Fuels



# Scania ethanol engine, Euro 6

## The cost and energy efficient way to use Ethanol

- **Ethanol fuel ED95**  
Hydrous ethanol (95%) with ignition improver (5%).
- Diesel type (ICE) engine for ethanol with diesel performance
  - ✓ 280 hp and 1250 Nm, bus and truck
  - ✓ 410 hp and 2150 Nm, truck
- After treatment equipment: SCR and particulate filter.
- **Highly efficient diesel combustion**  
Ethanol: up to 43% efficiency  
Diesel: up to 44% efficiency
- **Scania modular system**  
Minor changes to the standard diesel engine.  
Very similar to diesel operation.
- **Proven technology**  
Fourth generation ethanol engine.  
In commercial traffic since 1986.



**Ethanol with diesel efficiency**

# General modifications on a Scania ethanol-diesel engine

3

Larger fuel injection system

4

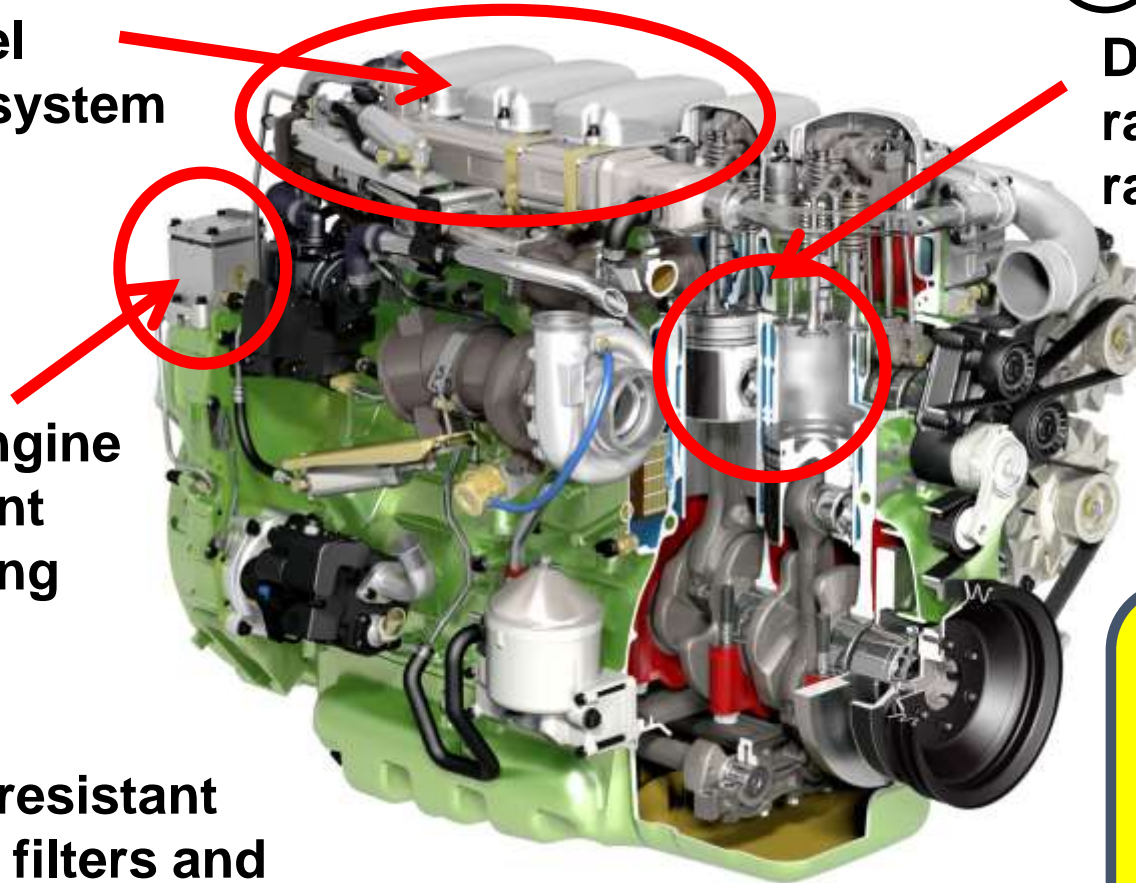
Different pistons to raise compression ratio (28:1)

2

Different engine management programming

1

Ethanol resistant gaskets, filters and sealings



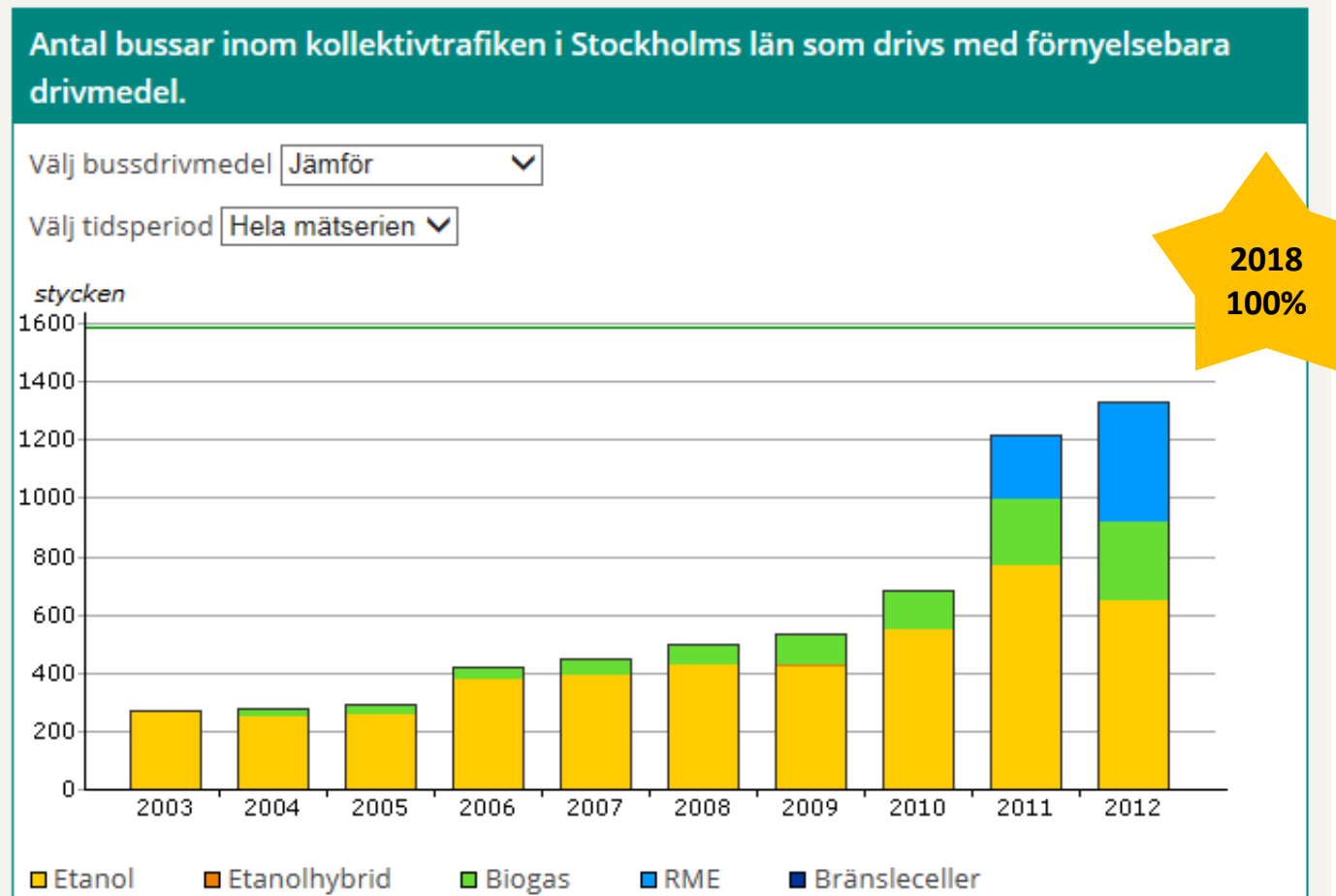
**14**

parts differ  
from the  
diesel engine

# The Stockholm example

## it is not difficult

- Stockholm introduced functional demands for fossil free buses in transport procurement 2001.
- Long term goals was a 50% fossil free bus fleet in 2010 and a 100% in 2020.
- Swift, straightforward and cost efficient transformation, cleaning up the city and dramatically reducing GHG emissions.
- Biogas, biodiesel, HVO, ethanol and biodiesel hybrids – 2 300 buses.
- World's largest biogas bus fleet (~350 buses). Cost/km equal to diesel



Datakälla: Landstingets miljöredovisning



# Buses, trucks and infrastructure for ethanol fuel ED95





# Ethanol ED95 trucks

## 280 and 410 hp

### ■ Finnish Post in good spirits

- Nearly carbon-free bioethanol from domestic waste and residue, such as food waste and animal by-products. (ST1)



### ■ Arla – green milk

- 17 trucks and the World's greenest ethanol, reducing over 90% CO<sub>2</sub>. Extra cost is 0,002 Euro/litre of milk.



### ■ ASKO – largest ethanol fleet

- 40 ethanol trucks

### ■ France – ethanol from wine waste

- Marseille - Grape waste ethanol





# SERVICE INTERVALS ETHANOL ENGINES

**Current engine**

**Oil and filter  
20,000 km**

**Injectors and fuel filter  
40,000 km**

**New xpi-engine**

**Oil and filter  
40,000**

**Injectors and fuel filter  
90,000 km**





# The composition of the ED95 fuel



Component	Content	
	% by weight	% by volume
<b>Ethanol (95 %, hydrous ethano</b> <ul style="list-style-type: none"><li>■ Including denaturants according to local rules</li></ul>	94,0	95,5
<b>Fuel components</b> <ul style="list-style-type: none"><li>■ Ignition improver</li><li>■ Lubricant</li><li>■ Corrosion inhibitor additive</li></ul>	6,0	4,5

- Easy blending process, stable fuel with long shelf life
- Standard ED95 fuelling point available (Quick and independent implementation of fuelling infrastructure possible)
- Four global suppliers of fuel components available



# Ethanol fuel ED95 and infrastructure

## Global suppliers of ED95 and fuel components



Suppliers of ED95 fuel in Sweden



Agro Cleanpower 95

Suppliers of ED95 fuel at other markets





# Scania ethanol specification



**SCANIA** TECHNICAL PRODUCT DATA 2064813  
Requirements Specification  
Ethanol for ED95, ethanol fuel

Approved by: Roger Olsson  
Issued by: Eva Iverfeldt

Checked 1: 6669/jh  
Checked 2: 1  
Info class: S  
Status: 5

Introduced ECO: 493285  
Approved Date: 2011-02-15  
Page: 1 (3)

No. of classified requirements, STD3944 <C>; <M>; No. of regulations, STD4178 <L>;

Requirements Specification  
Ethanol for ED95, ethanol fuel

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3 Changes	3

**1 General**

This specification describes the ethanol to be used in ethanol fuel for Scania dedicated compression ignition engines DC9 E02. The ethanol fuel is designated ED95.

Additives, such as cetane improver and lubricity improver should be added to the ethanol. The additives are specified separately in PD 2064859.

Some countries require producers to denature the ethanol before it can enter commerce as a transportation fuel or blendstock; blenders should follow local rules regarding the concentration and type of denaturant. However, the choice of denaturants must be validated and agreed by Scania.

The ethanol should meet the specified limits before any additives or denaturants are added.

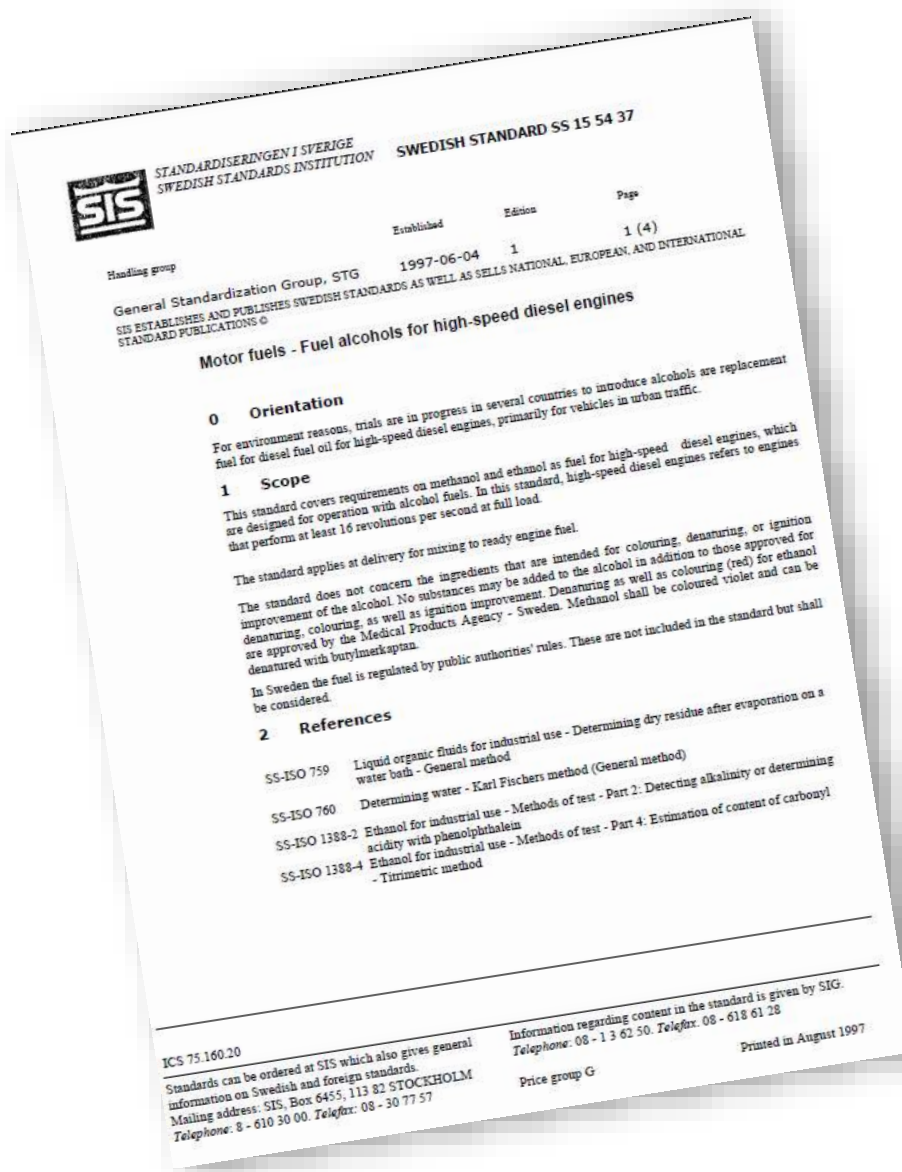
Part number is 2056128.

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SV 1744 01-08 (2006-11-16)

- The hydrous (wet) ethanol needs to fulfil the correct fuel ethanol specification (without denaturants and fuel components).
- Denaturants:
  - Local rules on denaturants vary from country to country.
  - Only use approved denaturants.
- Some important ethanol parameters:
  - Water content
  - Aldehydes
  - Sulphur content
  - Phosphorus
  - Chlorides
  - Dry residue



# Swedish fuel standard - ethanol for diesel engines



- Since 1997 we have a Swedish standard on fuel alcohols for high-speed diesel engines.
- Now also standard in France





## Standard fuelling infrastructure for ED95



- Standard fuelling station for ready-made ED95 fuel.
- Several suppliers in Sweden.
- Preferred supplier is Kjell Anderson Contracting AB in Västerås.
- Wayne produce certified dispenser for ED95.
- Available volumes: 3-60 cubic metres.

# Kjell Anderson Contracting AB

Fuel tank and infrastructure producer



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