Market and Policy Mechanisms for AdBlue® Supply in Europe

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Association for Emissions Control by Catalyst AISBL

Association for Emissions Control by Catalyst (AECC) AISBL

AECC members: European Emissions Control companies

Exhaust emissions control technologies for original equipment, retrofit and aftermarket for all new cars, commercial vehicles, motorcycles and non-road mobile machinery.

Selective Catalytic Reduction (SCR) for reducing Diesel NOx emissions

- Diesels are needed in Europe for low CO_2 emissions and low fuel consumption.
- Use of Diesel Particulate Filters (DPFs) eliminate >99% of the exhaust particles from Diesels.
- Selective Catalytic Reduction (SCR) is a main technology, with NOx adsorbers (LNT), to reduce Diesel engine NOx emissions.
- SCR technology enables a high NOx conversion rate, allowing for low fuel consumption engine design and, consequently, low CO_2 emissions as well as low engine-out particulate levels.
- SCR requires AdBlue® for the supply of ammonia (NH_3) enabling the fast chemical reactions for NOx reduction.

Selective Catalystic Reduction (SCR)

- SCR technology for mobile applications was developed from proven SCR technology in stationary applications.
- SCR is mainstream technology for NOx reduction for HDVs (trucks and buses) since Euro IV (from 2005).
  SCR is in use on Euro IV, Euro V and Euro VI HDVs.
- SCR is mainstream technology for NOx reduction from NRMM (non-road mobile machinery) since Stage IIIB (from 2010).
  SCR is in use on Stage IIIB and Stage IV NRMM engines.
- SCR will be mainstream technology, with NOx adsorber (LNT), for Euro 6 LDVs (passenger cars and commercial vans) and by the implementation of the Real Driving Emissions (RDE) procedure for Euro 6c (in 2017).

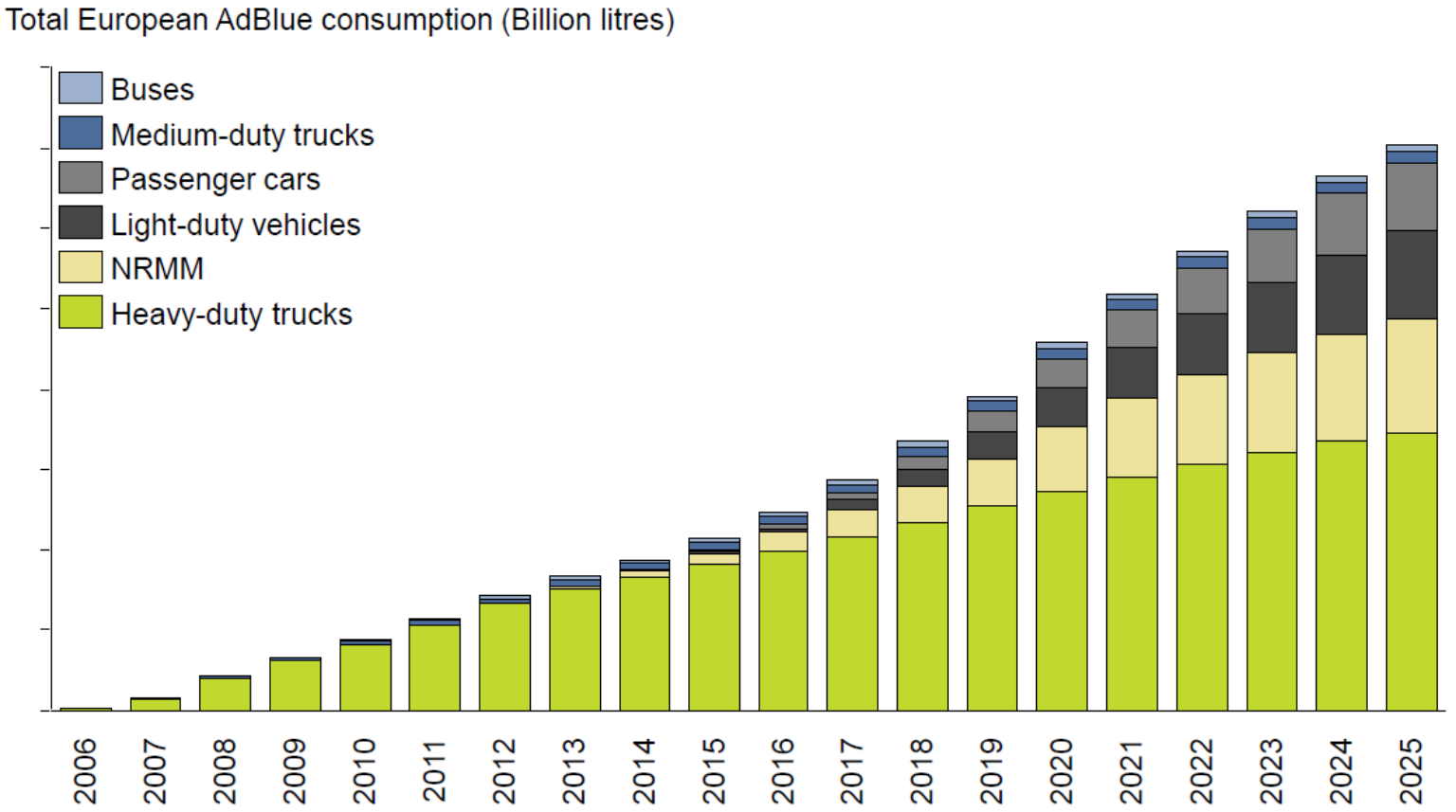
AdBlue® requirements

- High quality urea solution AUS 32 (aqueous urea solution) is defined by the ISO 22241 standard specification for the reduction of NOx of Diesel engines (urea Diesel) in order to assist the related industry to fulfil the requirements of the relevant European emissions legislations.
- The ISO 22241 standard may be purchased from any national standardisation organisation.
- The AdBlue® brand is used in Europe for AUS 32. German VDA is the brand owner of AdBlue®.
- Demand for AdBlue® for cars and LCVs is predicted to escalate over the coming years.
- Customer refill of AdBlue® is needed.
  It must be convenient and it must be easy.

AdBlue® market in Europe

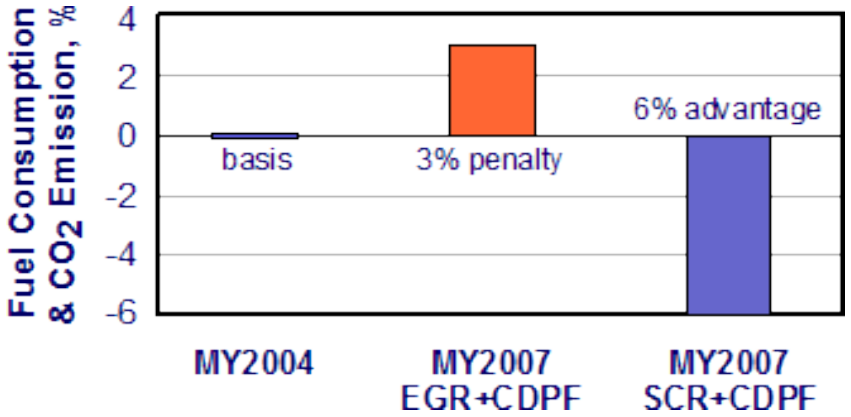
integer

The European base case reaches 7 billion litres by 2025, with the sharpest growth from NRMM and light duty vehicles



SCR/AdBlue® for Heavy-duty Vehicles

Source: DieselNet



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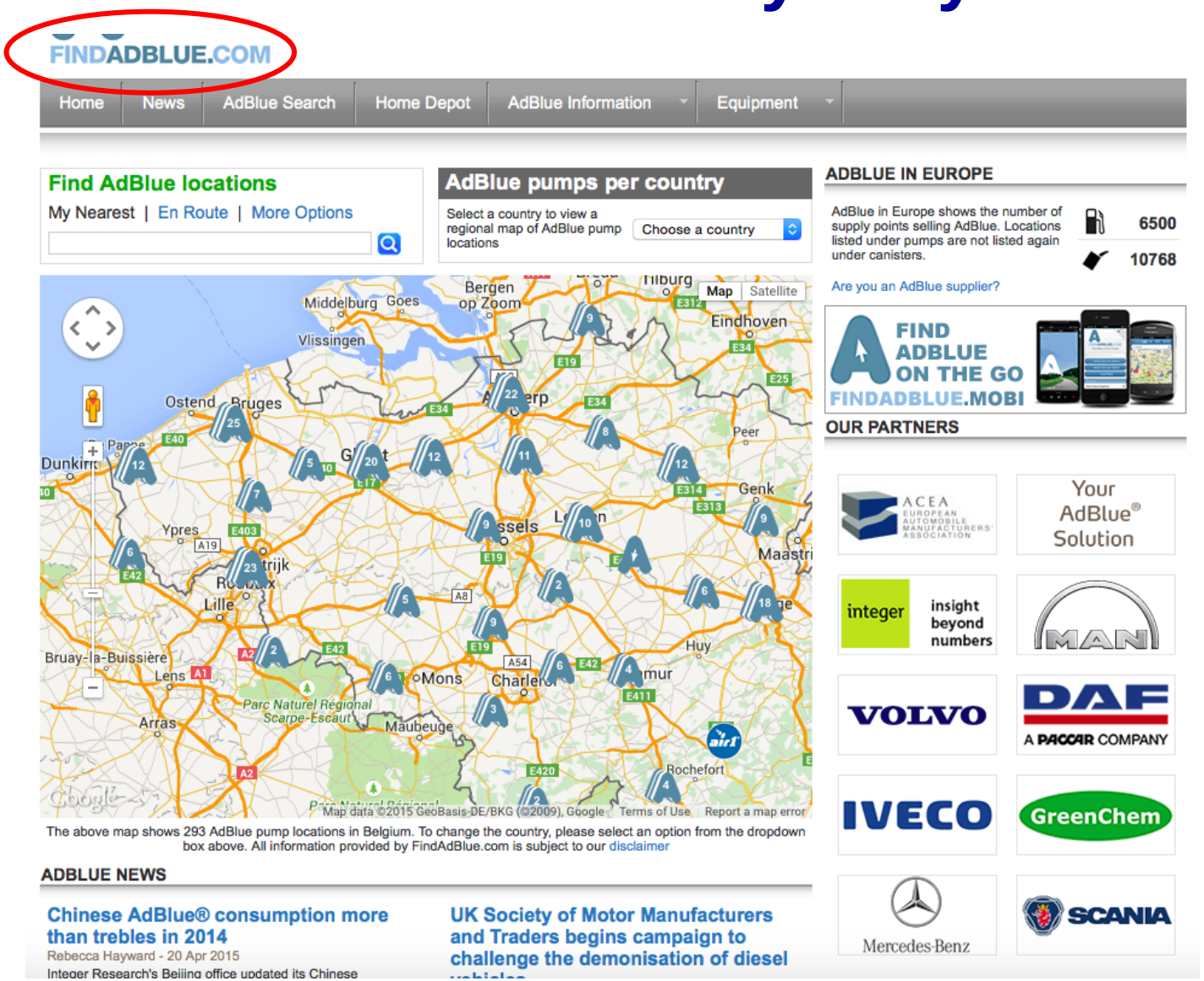
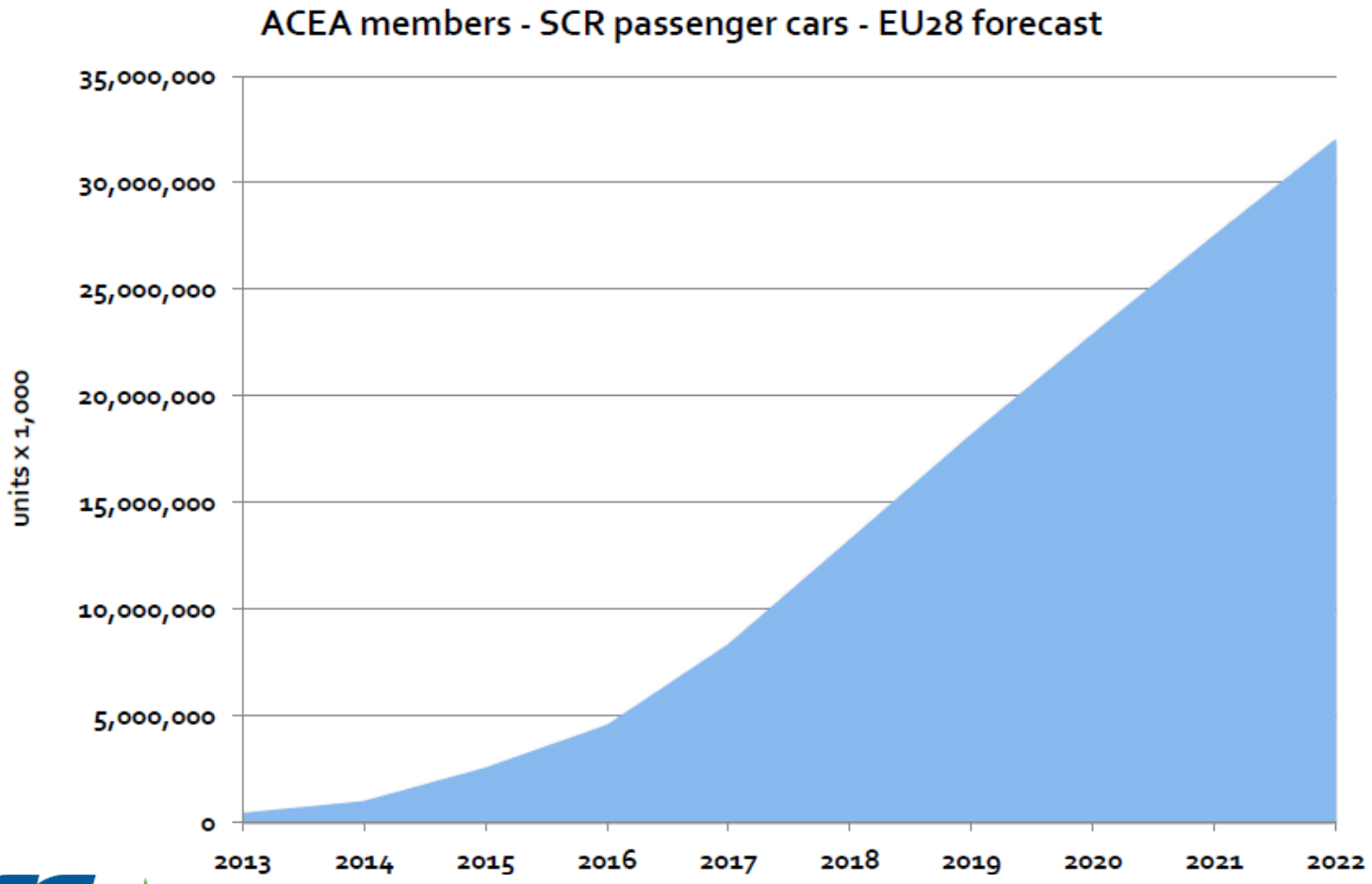


SCR/AdBlue® for Light-duty Vehicles

EU28 FORECAST FOR SCR-VEHICLES



SCR/AdBlue® for Light-duty Vehicles

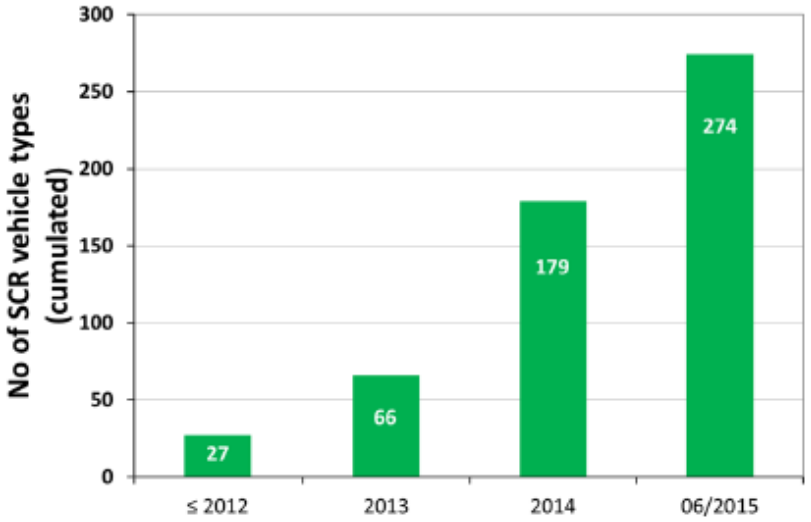
Summary of SCR equiped models

Manufacturer	Model line	Types	1st Launch
BMW Group	5	19	2013
Daimler AG	22	72	2009
Jaguar Land Rover	7	8	2015
Opel Group	6	21	2013
PSA Peugeot Citroën	21	52	2013
Renault SA	2	4	2015
Volkswagen AG	33	96	2009
Total	96 vehicle series	272 individual models	

A remarkable number of SCR passenger car/van models (mostly Euro 6) have already entered the European market.

SCR/AdBlue® for Light-duty Vehicles

Increase in Types



Growth in SCR vehicle types

2012 → 2013: 140 %

2013 → 2014: 170 %
(9/2014: Euro 6 for new series)

2014 → M2015: 50 %
(9/2015 Euro 6 for ongoing series)

Perspective with RDE in mind: The SCR technology will become even a more widespread technology for NOx reduction in diesel passenger cars and vans in the future.

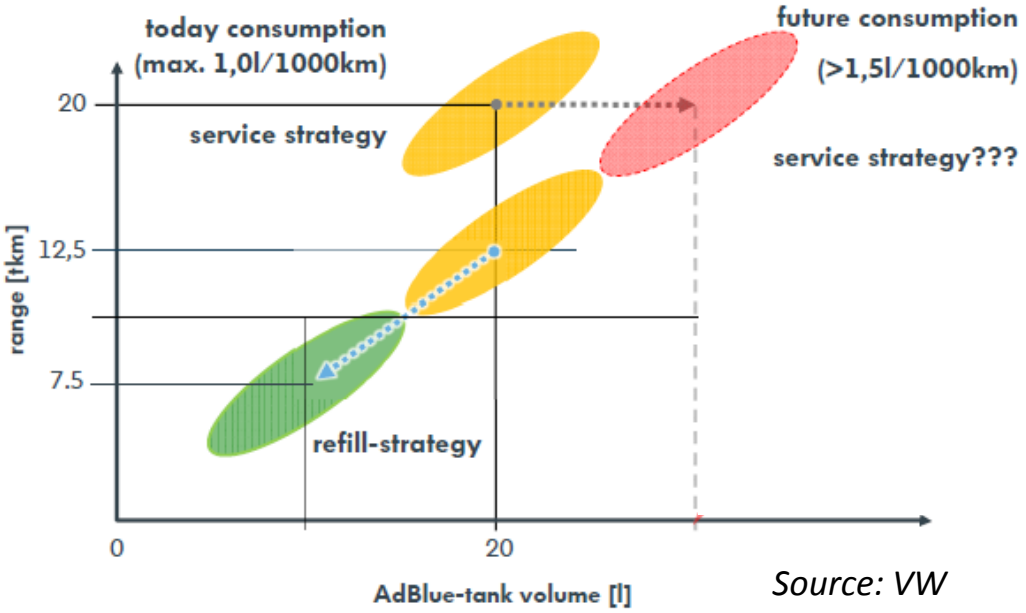
SCR/AdBlue® for Light-duty Vehicles

The requirement

An appropriate and convenient AdBlue® infrastructure for our passenger car and van customers must soon start to be established

AdBlue® consumption and refill

- AdBlue® refill strategies for cars being developed.
- Inter-service refill strategy not possible for the future.
- Expected increase in individual vehicle AdBlue® consumption driven by RDE requirements.



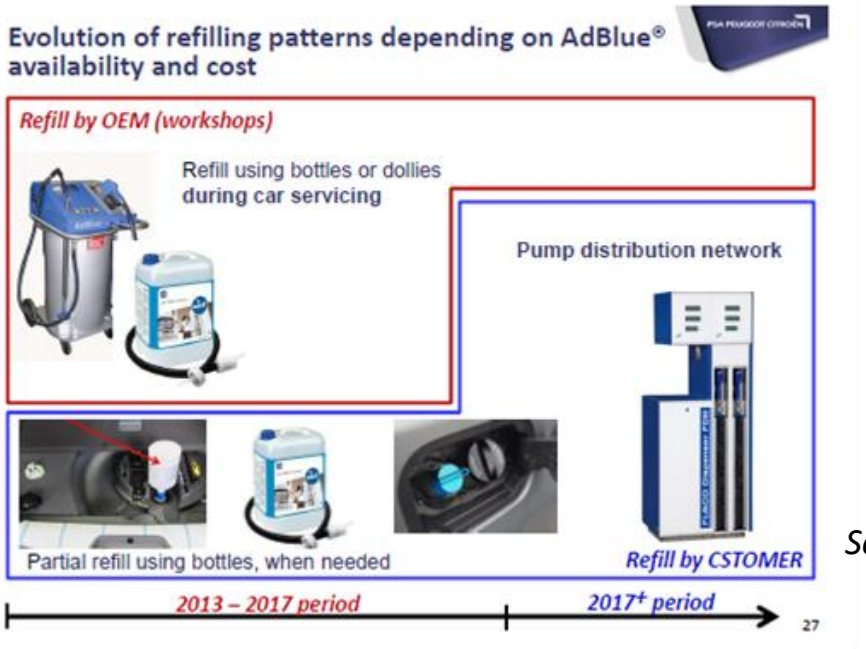
Source: VW

	Low Hypothesis	High Hypothesis
Annual Diesel car sales (PC + LDT) in Europe	7350000	7350000
SCR penetration	70%	90%
Average AdBlue® consumption (in liter for 1000 km)	1,35	2,5
CO_2 benefit	Limited	High
Refilling rate outside OEM network	< 60%	> 75%

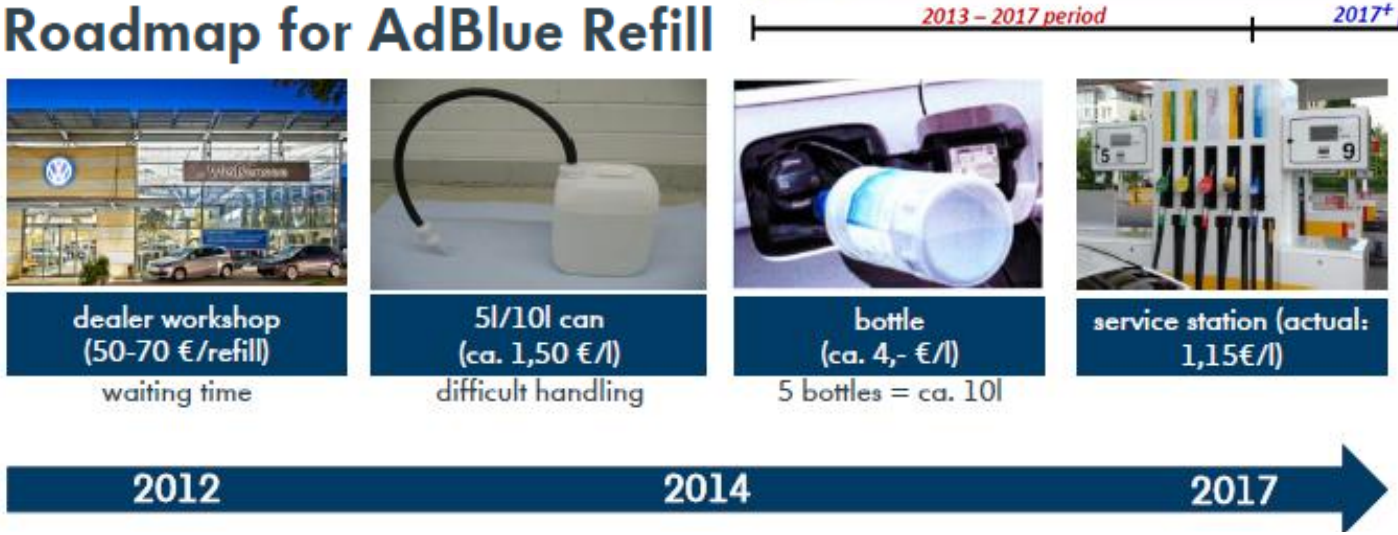
Source: PSA

OEM planning for AdBlue® refill

- Urea tanks designed to accept bottles as an interim solution as well as pump distribution.
- Trend towards low-volume and low-weight parts due to CO_2 reduction.



Source: PSA



Source: VW

OEM planning for AdBlue® refill

Needs for AdBlue® in the market

- Raising customer awareness on AdBlue®.
- Customer access to high quality AdBlue® and convenient refill of AdBlue®.
- Roll-out of convenient AdBlue® refilling at public filling stations (next to the Diesel pump).
- Policy makers demand strict standards for Euro 6 Diesel cars:
  - Policy makers also need to help industry to deliver clean Euro 6 Diesels by taking appropriate steps to encourage AdBlue® refilling at pump station.
  - Fuel suppliers need to take up the challenge of AdBlue® supply.
- Need for anti-tampering controls to ensure that proper quality of AdBlue® is used and that AdBlue® dosing is not modified.
- Need for robust RDE regulation to ensure that real-world emissions performance is maintained.

What is AdBlue®?

AdBlue® is a colourless, synthetically produced 32.5% solution of very pure urea in demineralised water. AdBlue® is non-toxic. You can use any brand of AdBlue® in your car or van, provided it conforms to ISO 22241-1.

Which vehicles require AdBlue®?

AdBlue® is used to help treat the exhaust in diesel cars or vans that are equipped with SCR emission control technology.

What should you watch out for when buying AdBlue®?

Use only branded AdBlue® that is correctly marked and labelled. AdBlue® available at filling stations and from sealed containers should always display the AdBlue® logo.
The quality of AdBlue® is specified by ISO standard 22241-1.

Where can I obtain AdBlue®?

AdBlue® is already available at many European filling stations, vehicle dealers, repairers and motor vehicle accessory stores. If necessary, the local dealer for your make of car will be able to name additional sources of AdBlue®.

Example of refilling with AdBlue® bottle or can:

ACEA

European Automobile Manufacturers' Association
85 Avenue des Nerviens
1040 Brussels – Belgium

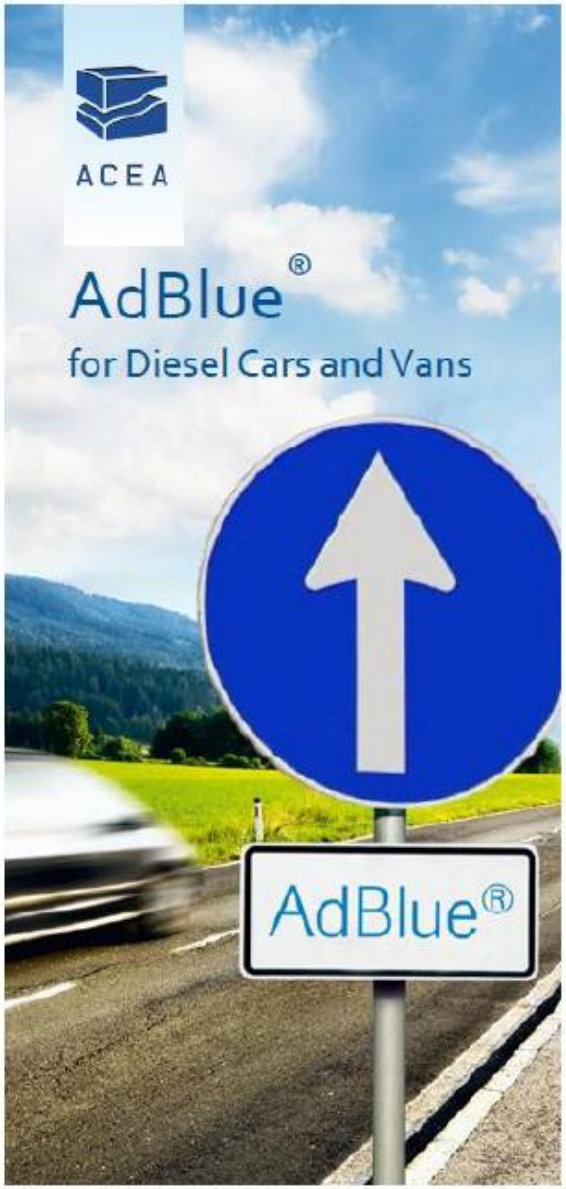
Important:

- AdBlue® is NOT a fuel additive. It is for this reason that the vehicle has a separate AdBlue® tank.
- If you put AdBlue® in your fuel tank by mistake, please do not start the engine but ask a garage for help.
- Put only AdBlue® in the AdBlue® tank. Do not fill the AdBlue® tank with any other liquids!
- Avoid contamination of the AdBlue® and do not mix with other liquids.
- If AdBlue® is spilt, wipe it off and rinse with soapy water.

ACEA

AdBlue®

for Diesel Cars and Vans



AdBlue® supply at the pump station

Thank you for your attention