



**The experiences of
Grazer
Verkehrsbetriebe
with biodiesel**



structure of Grazer Stadtwerke AG

core business

public transport

water supply

information technologies

funeral services

central department

subsidiary companies

advertising

leisure department

funeral services

water supply&services

cable railway

airport Graz

associated companies

electricity supply

gas supply

district heating

heating services

refuse services



Grazer Verkehrsbetriebe

- ⇒ 94,5 mio. passengers
- ⇒ 3,2 mio. km tram- and
8,5 mio. km bus-mileage
~ 3 mio. l fuel per year
- ⇒ 68 trams und 141 buses
- ⇒ 7 tramlines und 25 buslines
- ⇒ linelength of tramnetwork 51 km
linelength of busnetwork 175 km
- ⇒ funicular and lifts
- ⇒ € 41,8 mio. turnover
- ⇒ ~770 employees





biodiesel

- ⇒ **Graz is modelcity for environment-protection**
- ⇒ **for better airquality**
- ⇒ **interest in technical progress**
- ⇒ **image improvement**





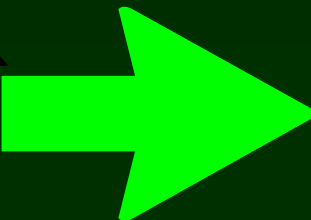
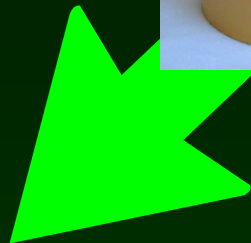
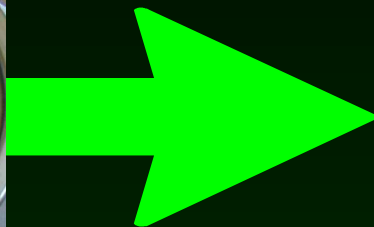
the project

- ⇒ 1994 pilotscheme
- ⇒ 1997 10 buses more
- ⇒ 2000 30% of the fleet
- ⇒ 2003 83% biodiesel buses
- ⇒ 2005 100% of the fleet





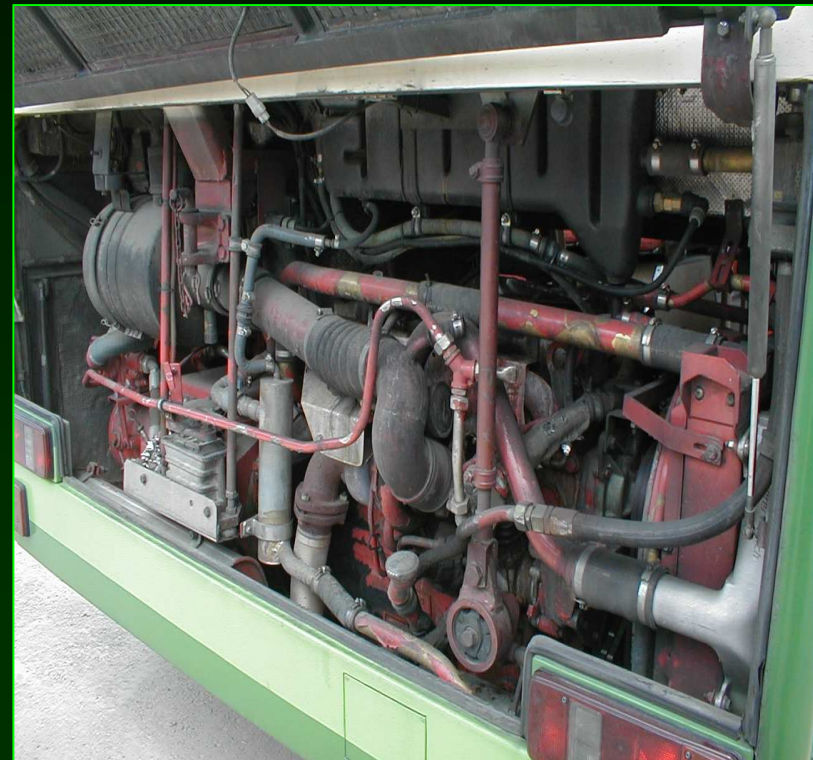
the principle





technical requirements

- ⇒ exchange of fuel hoses and gaskets
- ⇒ check of all parts supplied with biodiesel (heaters)
- ⇒ certification from the engine manufacturer
- ⇒ consent from the producer of the injection pump





results

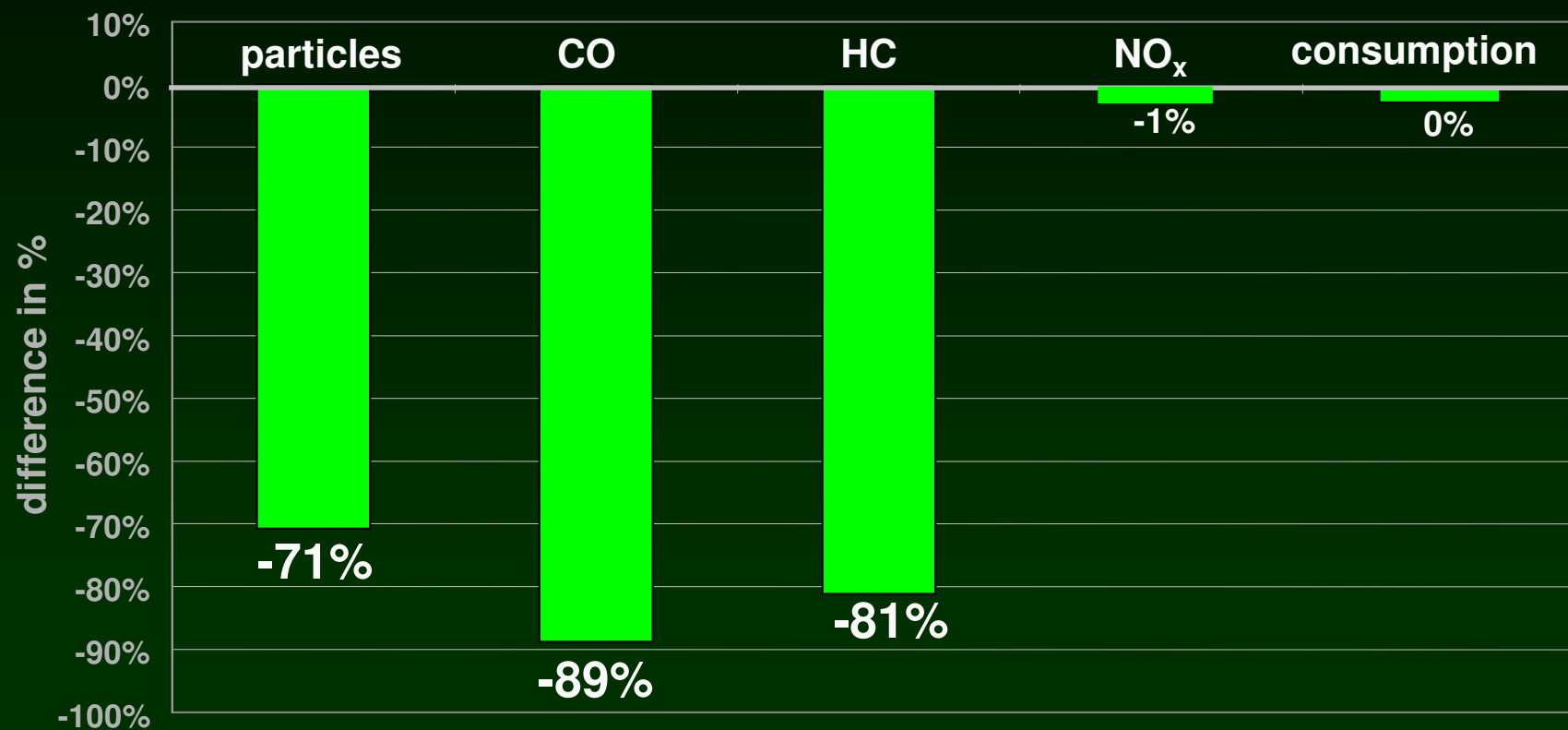
- ⇒ motor oil change every 30.000 km, no special motor oil is needed
- ⇒ no greater wear in the engine
- ⇒ 1/3 fossil diesel oil in winter
- ⇒ 7% higher consumption
- ⇒ biodiesel price is lower
- ⇒ scientific examination





emissions

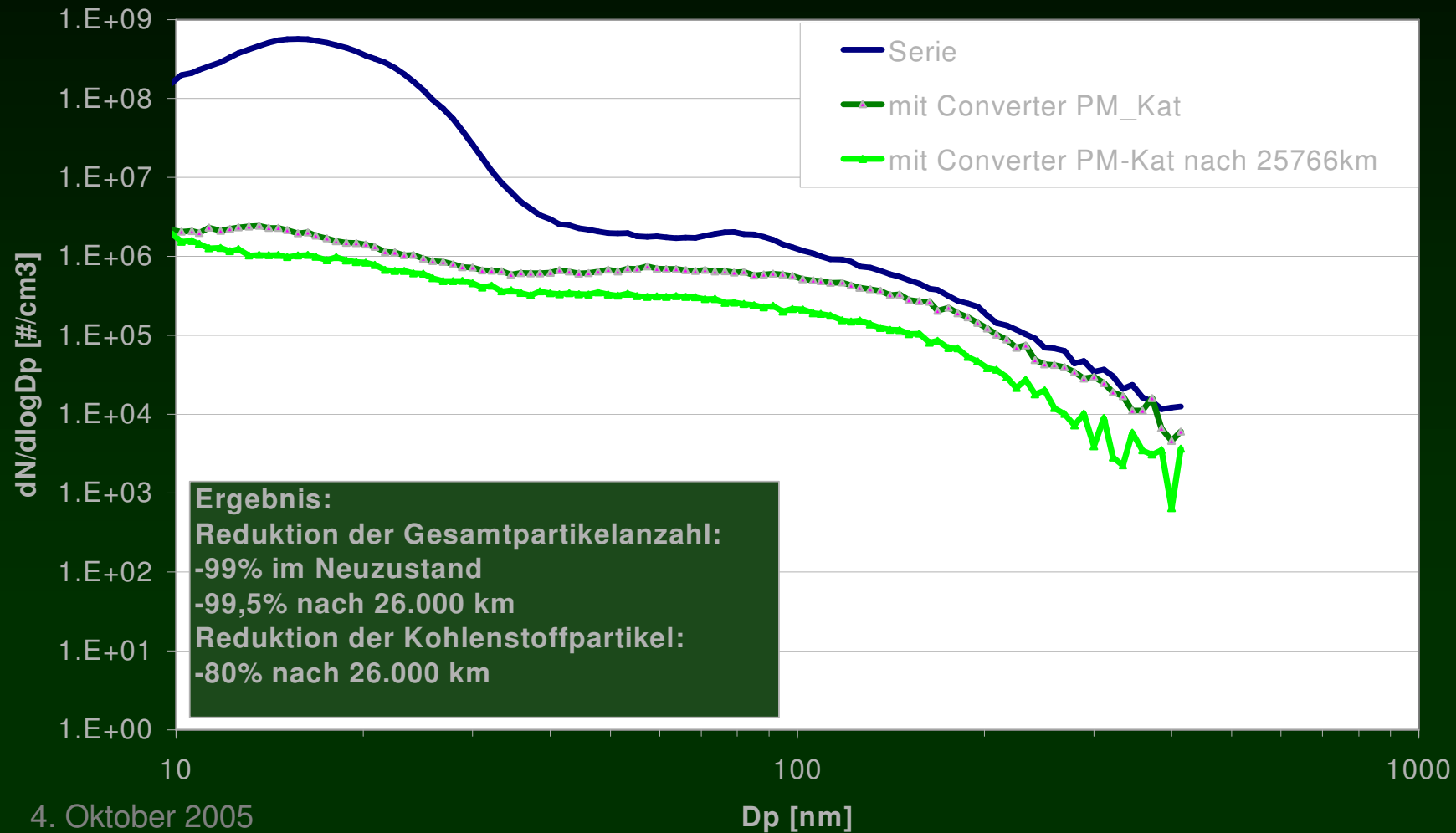
with partikelkatalyst



Mercedes Citaro of GVB, EURO 3, 185 kW with biodiesel, average of 2 real testcycles



particles





advantages

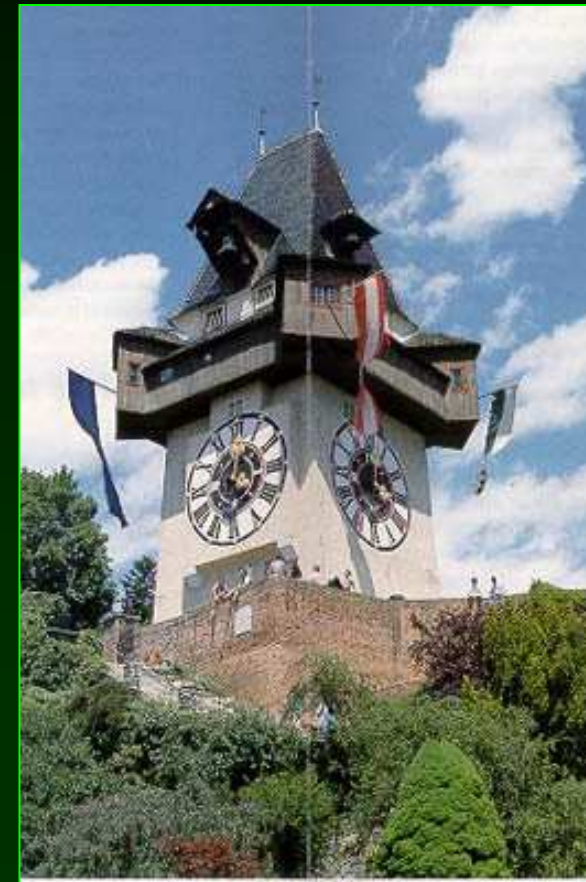
- ⇒ reduction of particle mass is 1,4 t per year
- ⇒ particle katalysts are easier to handle than filters
- ⇒ EURO III engine has EURO IV emission standard
- ⇒ operation with fossil diesel and biodiesel is possible





prospect

- ⇒ equip the fleet with particle katalysts
- ⇒ continue the way to lowest possible emissions
- ⇒ support for other transport companies





Thank you very much for your attention!

