



European Experience Moving to 50 ppm Sulfur

**Christian Küchen, March 18, 2010
Washington, DC**

Motivation

- Strong competition between domestic heating oil and natural gas in many European countries
- Condensing gas boilers became “Standard” in the 1990ies
- Switch from heating oil to gas appliances increased

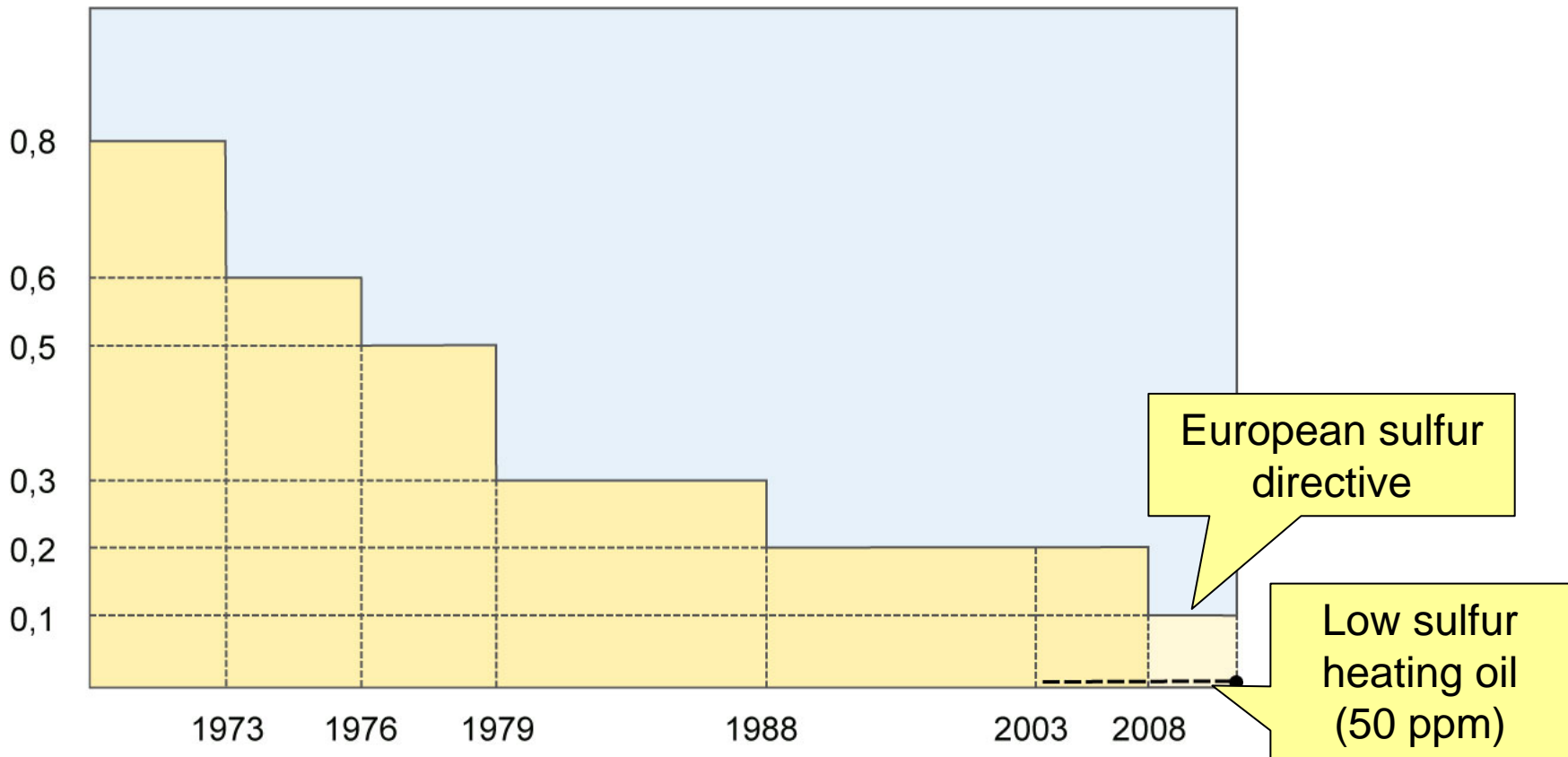
Research project in 2001 and 2002

Determination of relevant sulfur limit of domestic heating oil for the promotion of condensing oil boilers

- Avoid neutralization of condensate
- Reduction of manufacturing cost for condensing oil boilers (same material for heat exchanger as in condensing gas boilers)
 - Testing of different boilers and fuels (Sulfur content: 10, 50, 100, 150, 200 ppm)
- Sulfur < 50 ppm fulfils the requirements
- Standardisation of low sulfur (< 50 ppm) Heating oil in 2003 in Germany (no European Standard)
 - Additional requirement for lubricity (as in Diesel fuel)

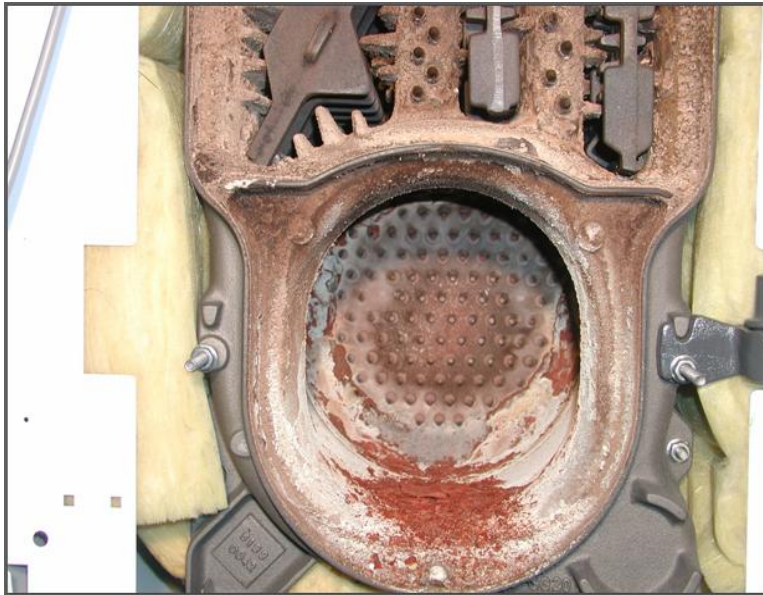
Development of Maximum Sulfur Content in Domestic Heating Oil (DIN 51 603-1)

(% m/m)

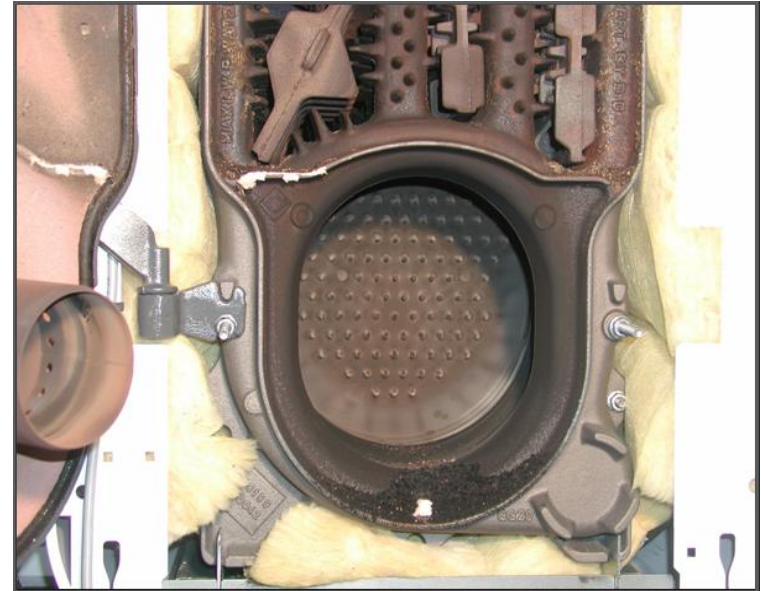


Economic advantages in not condensing boilers

**Domestic heating oil
1700 ppm sulfur**



**Domestic heating oil
43 ppm sulfur**



Increase of annual efficiency by reduction of deposit formation

2007: Joint Memorandum of Understanding German Federal Government and Petroleum Industry

Joint Memorandum of Understanding

**German Federal Government
and Petroleum Industry**

**Energy Conservation and CO₂ Reduction
Through the Widespread Market Introduction of
Ultra-low Sulfur Heating Oil and Oil-fired
Condensing Technology**

Berlin, 15 January 2007

Gemeinsame Erklärung

**von Bundesregierung
und Mineralölwirtschaft**

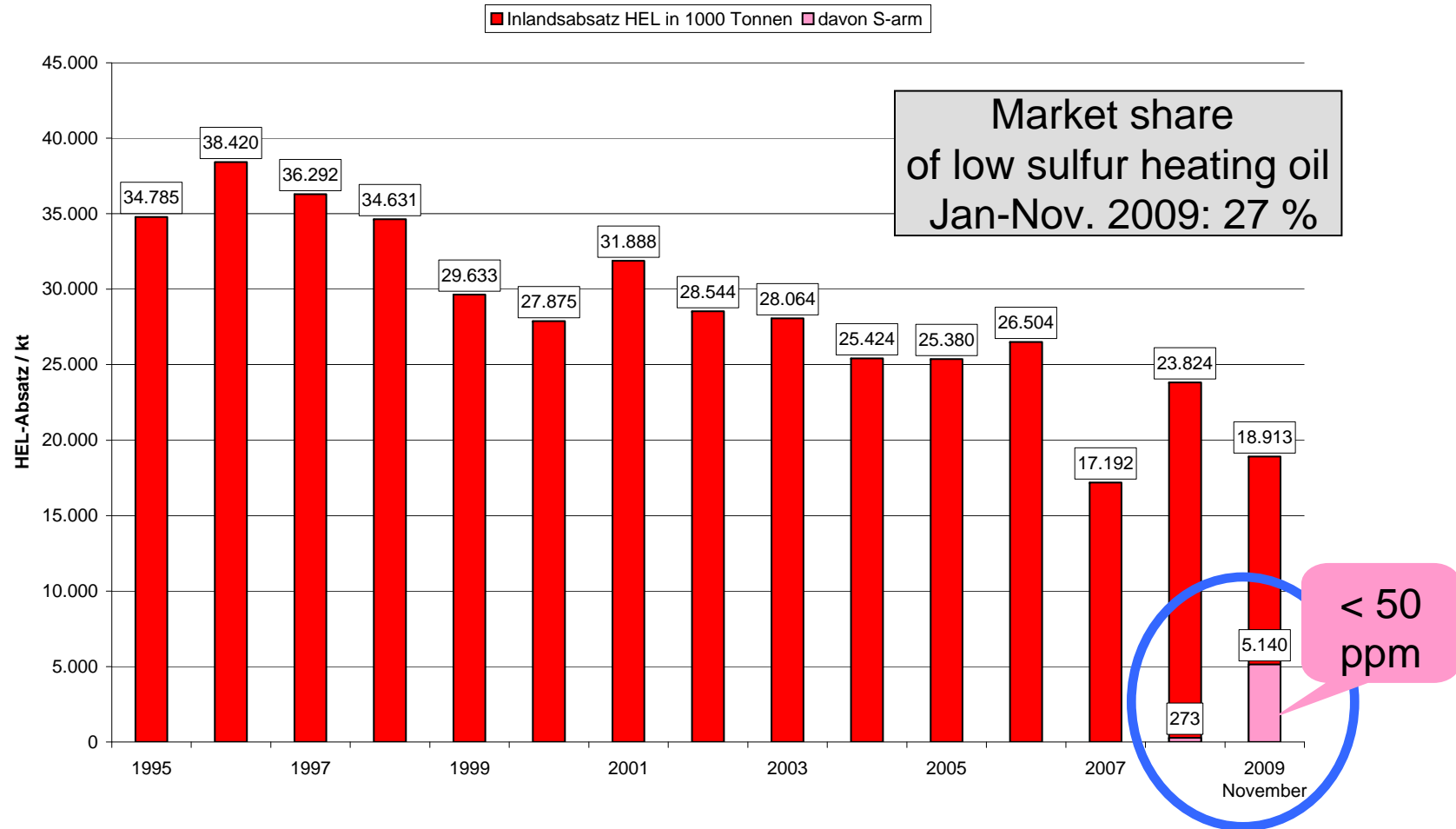
**„Energieeinsparung
und CO₂-Minderung
durch breite Markteinführung
von schwefelarmem Heizöl
und Öl-Brennwerttechnik“**

Berlin, 15. Januar 2007

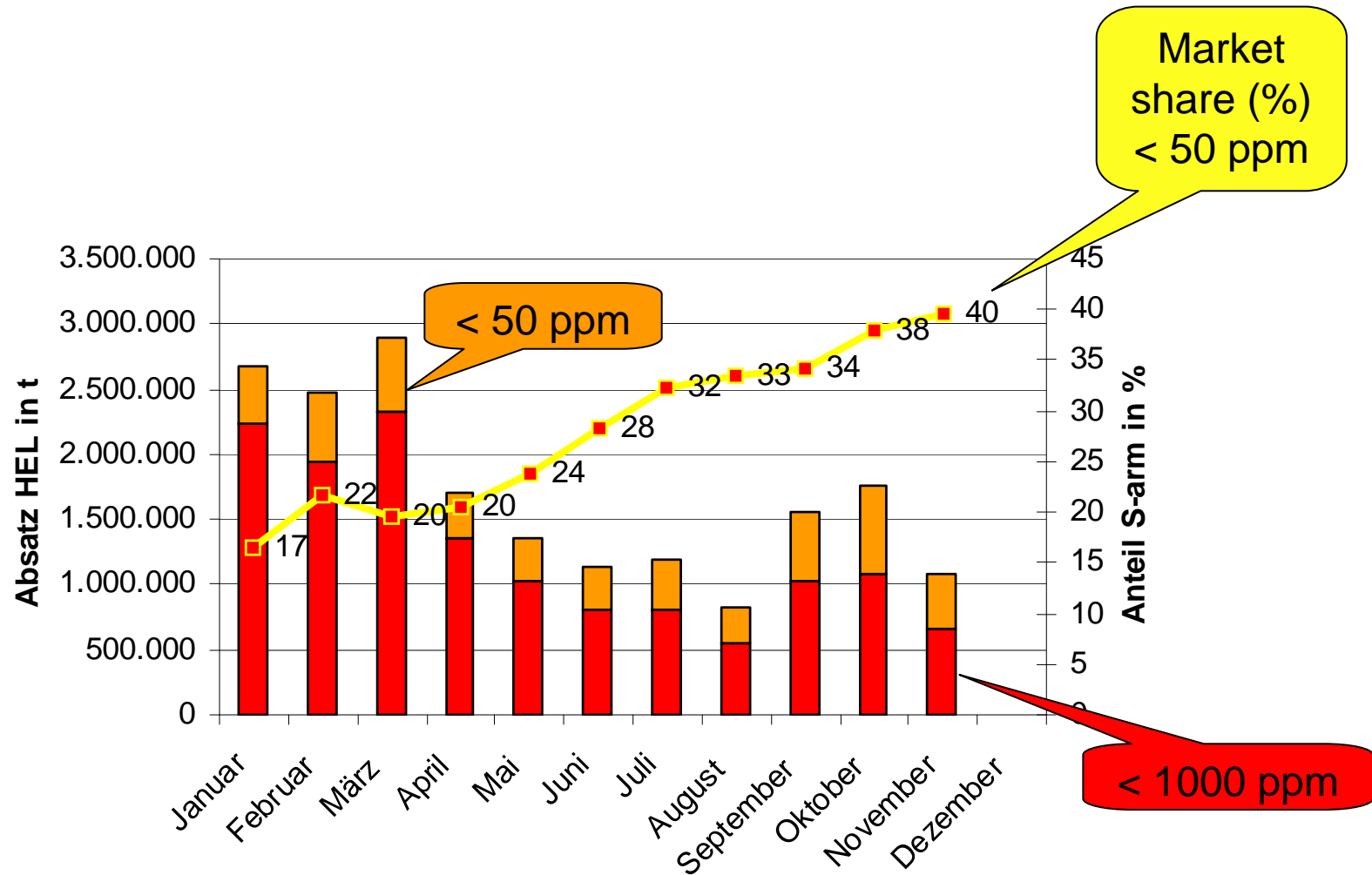


Sales of domestic heating oil (1995-2009)

Higher Tax for 1000 ppm Heating oil from Jan 2009 (+ 1,5 Cents/liter)



Sales of Domestic Heating Oil in Germany 2009

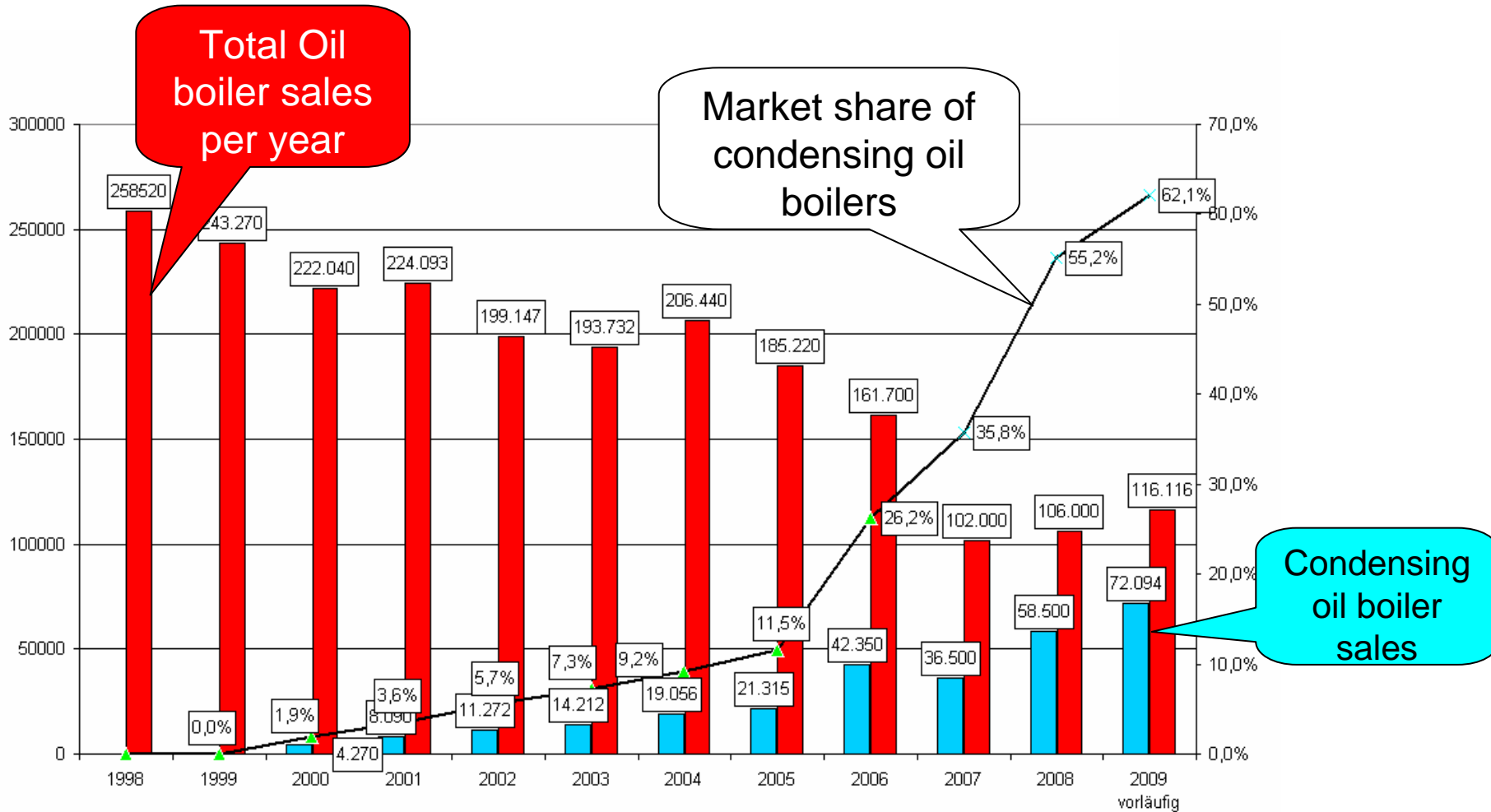


All leading manufacturers offer condensing oil boilers

Some ceased manufacturing not condensing boilers



Development of oil boiler sales in Germany 1998 - 2009



Other European Countries

- Similar development regarding fuel and boilers as described in Germany:
 - Austria
 - Switzerland
- Similar development regarding fuel quality
 - Finland (Scandinavia)
- Slower introduction of condensing oil boilers with no or small amount of low sulfur heating oil
 - France
 - Belgium, Luxemburg
- Kerosene as heating fuel in U.K. (legal obligation for condensing boilers)