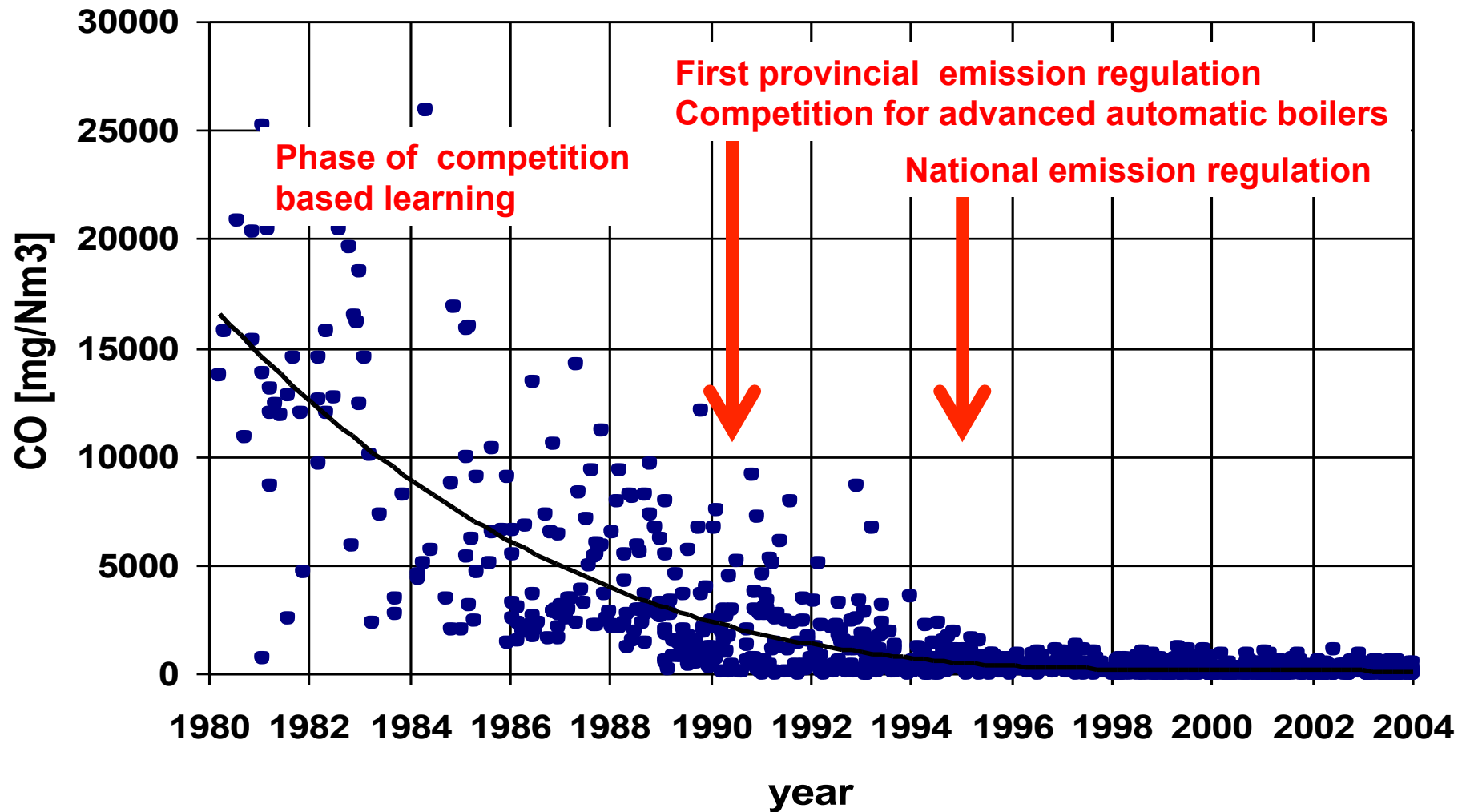


**Market impacts of emission and
efficiency standards – the Austrian
experience**

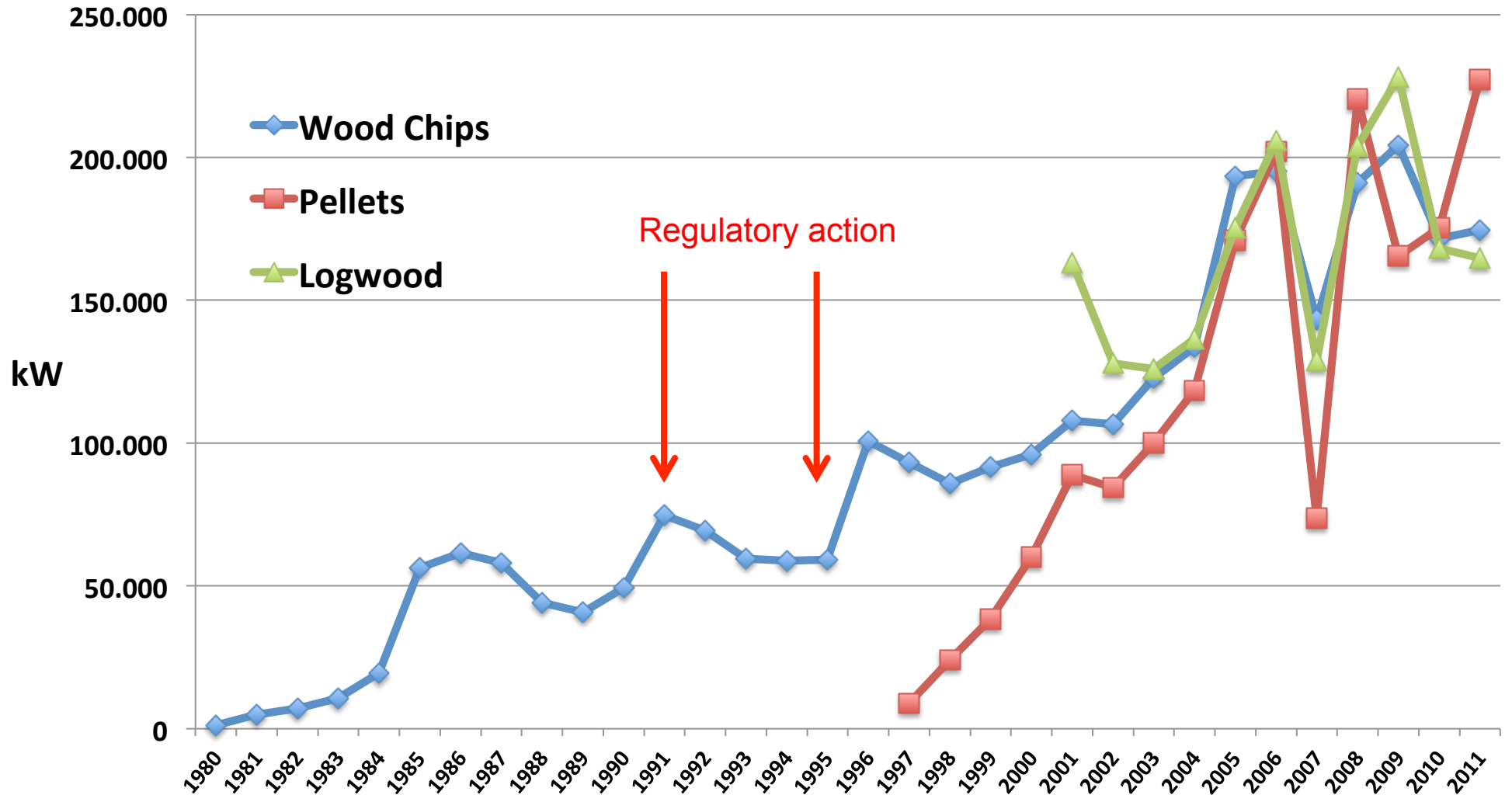
The situation in Austria in the 1980s

- » Significant amount of traditional use of wood for heating
- » Testing of wood boilers in a national laboratory is established – competition on quality established
- » Early 1990s: first province introduces stringent regulation for wood boilers and obligation for type approval of new models
- » 1991: public competition for biomass boilers leads to key innovations
- » 1995: national regulation introduced

The Austrian wood emission learning curve



Annually Installed Capacity of Small Scale Biomass Furnaces in Austria



First Conclusions

- » Long term market trend was not adversely impacted by emission regulations
- » Regulations pushed poor performers towards compliance
- » Pellets as new fuel created a strong kick for market development
- » Long term learning curve led to international technology and market leadership for Austrian boiler manufacturers

Note: all improvements in emissions were due to primary measures – improvement of the combustion process !

- » Downward draft and staged combustion (logwood)
- » Properly designed combustion chamber: temperature, residence time and turbulence
- » Electronic control of combustion air
- » Stable bed of embers, proper dimensioning of grate
- » Engineering services for constructing state of art wood combustion systems are available on the market: e.g. www.bioenergy2020.eu

What is the impact of stringent emission regulations on costs?

- »» Development costs for a pellet furnace model complying with current emission standards: 1,3-1,9 Mio \$ (approx. 1/3 for outsourced technical design)
- »» Development costs for logwood gasification furnace: 700.000 - 900.000\$
- »» Impact on production costs: logwood gasification furnace will cost twice as much as conventional natural draft model

The development of emission limits in Austria and expected EU regulations (values in lb/ MMBtu)

	automatic		
	AT 1995	AT 2012	EU 2017
CO	1,10	0,55	0,55
CxHy	0,09	0,04 (0,07)	0,02
Dust	0,13	0,04 (0,07)	0,04
(Values in bracket for wood chips boiler)			
	manually stoked		
	AT 1995	AT 2012	EU 2017
CO	2,43	1,10	0,77
CxHy	0,18	0,07	0,03
Dust	0,13	0,07	0,07

EU 2017: Expected Ecodesign measures 4-6 years after adoption of LOT 15

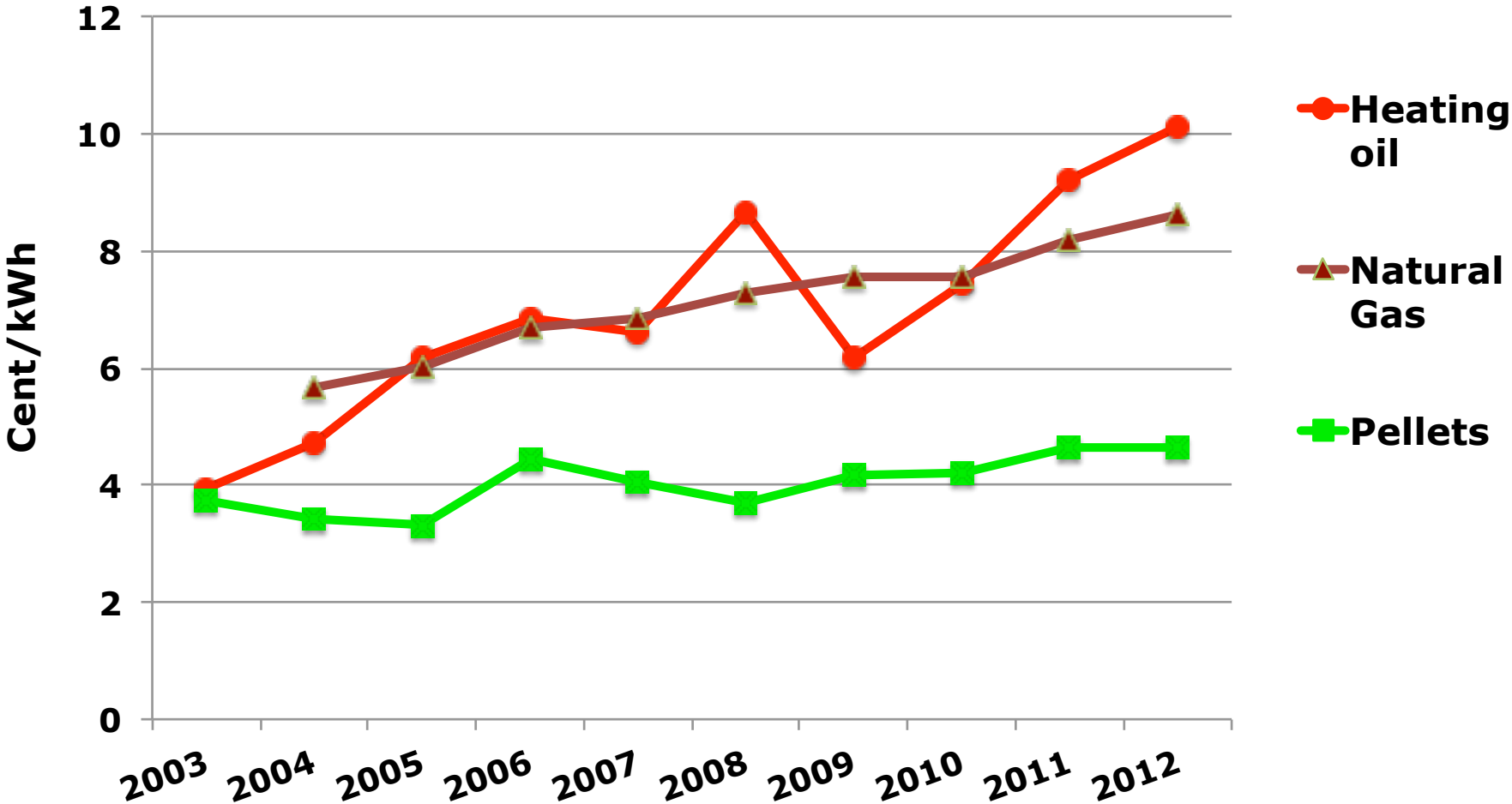
One thing that should definitely NOT be introduced

- » Requirement for secondary cleaning devices (precipitator, catalyst)
- » Primary measures can lead to extremely low levels of emissions and improve efficiency at the same time
- » Secondary cleaning devices add very significant investment and operation costs
- » Excessive requirements for new equipment can significantly slow down replacement of highly polluting old devices – significant net disadvantage!

Why should we use wood fuels at all?

- » > 90% GHG savings compared to fuel oil
- » Significantly lower environmental hazards in fuel procurement
- » Contribution to rural economies and national economy
- » Security of energy supply – it is much more efficient to reduce oil dependence with solid biomass than with liquid biofuels
- » Significant savings for consumers

Average annual prices for heating fuels in Austria



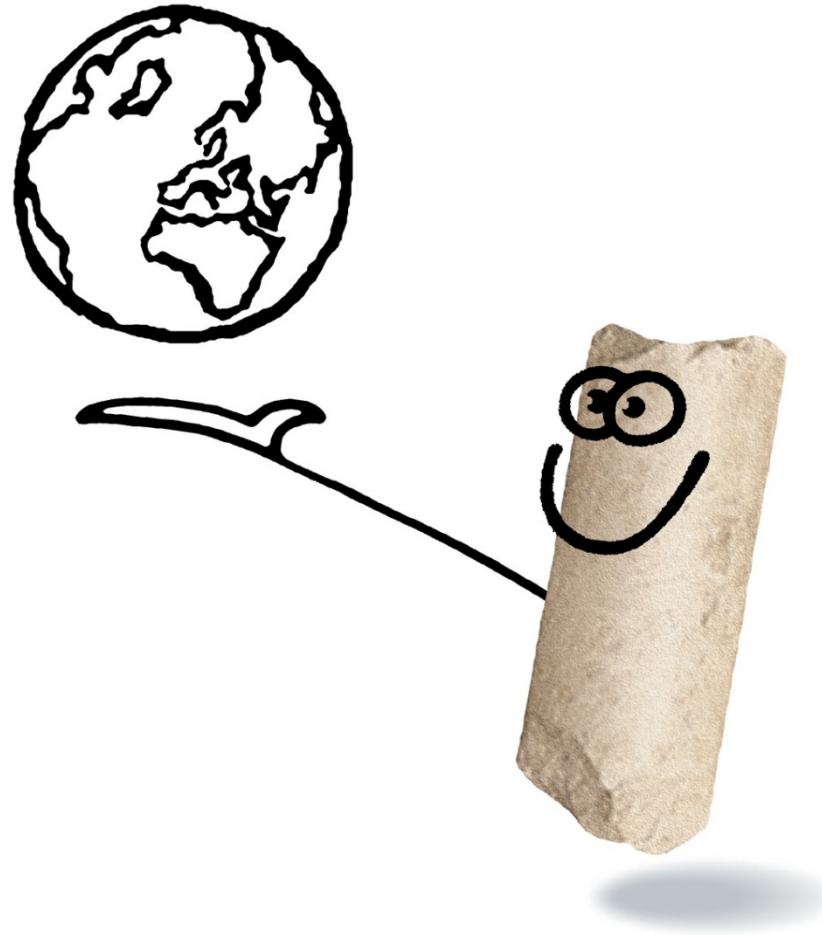
Sources: e-control, IWO, Pellets proPellets Austria; September 2012

Policy suggestions

- » Explicitly positive approach towards wood fuel use with state of the art equipment
- » Emission requirements in line with European regulations
- » Requirement for type approval based on measurements in an accredited laboratory
- » Publication of the measurement results
- » In Minnesota recently a lab was established to test biomass furnaces: IRETI, University of Mankato

Conclusions

- » Emission and efficiency standards did not have a negative impact on long term market development in Austria
- » They need to be reasonable however and set requirements, that can be met by primary measures (enhanced combustion)
- » Harmonisation of requirements with EU regulations would benefit technology transfer and speed up improvements of air quality in the US



Thank you for your attention!