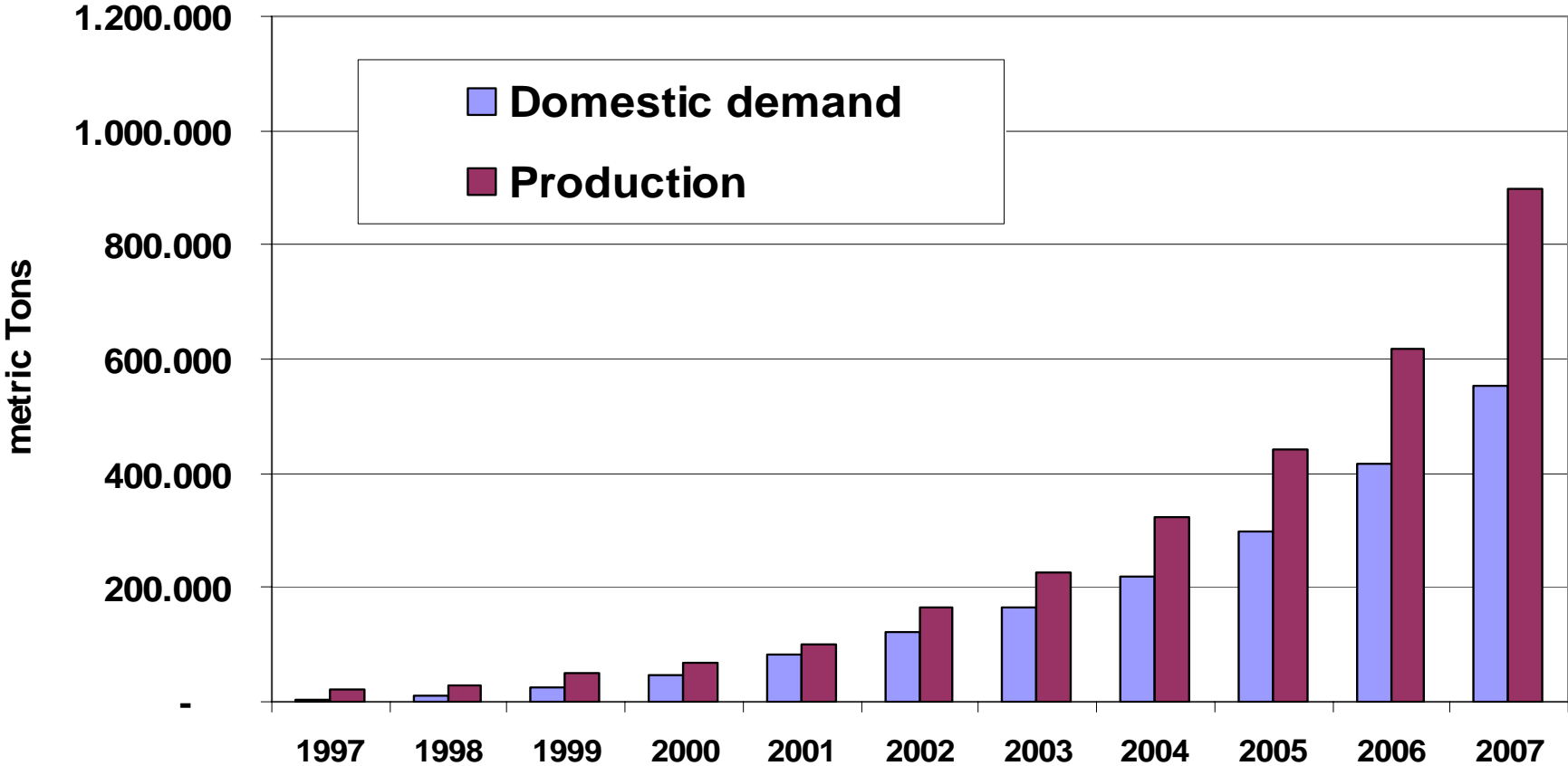


**Situation and potential of biomass energy in Europe -
The example of wood pellets**

Christian Rakos: proPellets Austria

Pellet business in Europe is growing very fast

Production and demand for Pellets in Austria



Why are pellets so successful?

- »» Low cost & low energy demand method for conversion of biomass to high quality fuel
- »» Significant economic benefits – no/low need for subsidies
- »» Fully developed and reliable technology
- »» Very positive consumer response: pleasant fuel!
Safe, not smelly, local produce, comfortable use, environmentally friendly, economic

Technologies for residential use of pellets in Europe

- » Pellet burners: conversion of existing oil boilers
- » Pellet boilers: specialised for pellet fuel
- » Pellet stoves – space heaters
- » Pellet stoves – central heating
- » Integrated Systems – Energy Cabin

Pellet burners



**Advantages: automatic operation
and low conversion costs:
> 3000€**

**Disadvantage: frequent
maintenance, lower efficiency than
dedicated pellet boiler**

Pellet boilers

- » automatic feeding, ignition and cleaning of heat exchangers
- » Ash removal 1-4 times per heating season
- » > 90% efficiency & very low emissions (ca.20 mg CO/m³)
- » Disadvantage: significant investment costs: >10.000 €



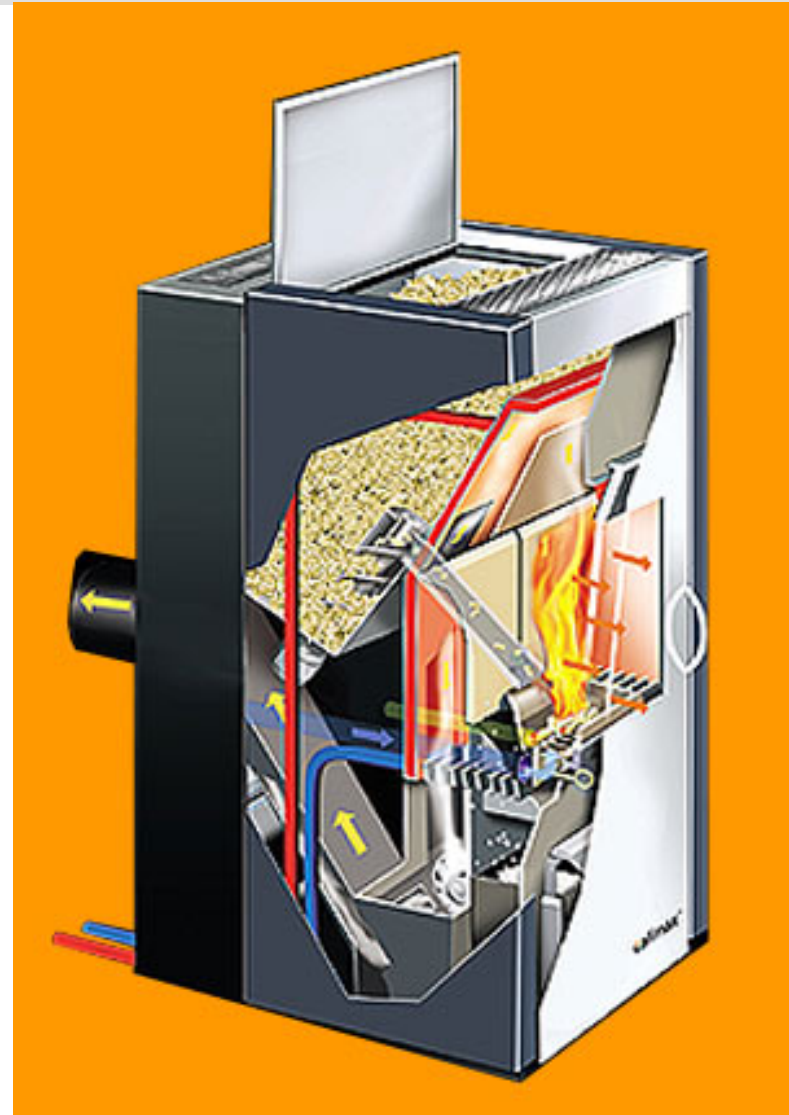
Pellet Stoves: room heater

- » filled with bagged pellets
- » Electric ignition
- » fully automatic operation, 85-90 % efficiency
- » Ash removal every 1-2 weeks
- » Costs > 2000€



Pellet stove – central heating device

- » Distribution of heat via hot water radiators
- » Heat loads up to 12 kW = 40.000 Btu/hr
- » Automatic fuel feeding from bulk storage possible
- » No need for boiler room
- » Cost > 5000€

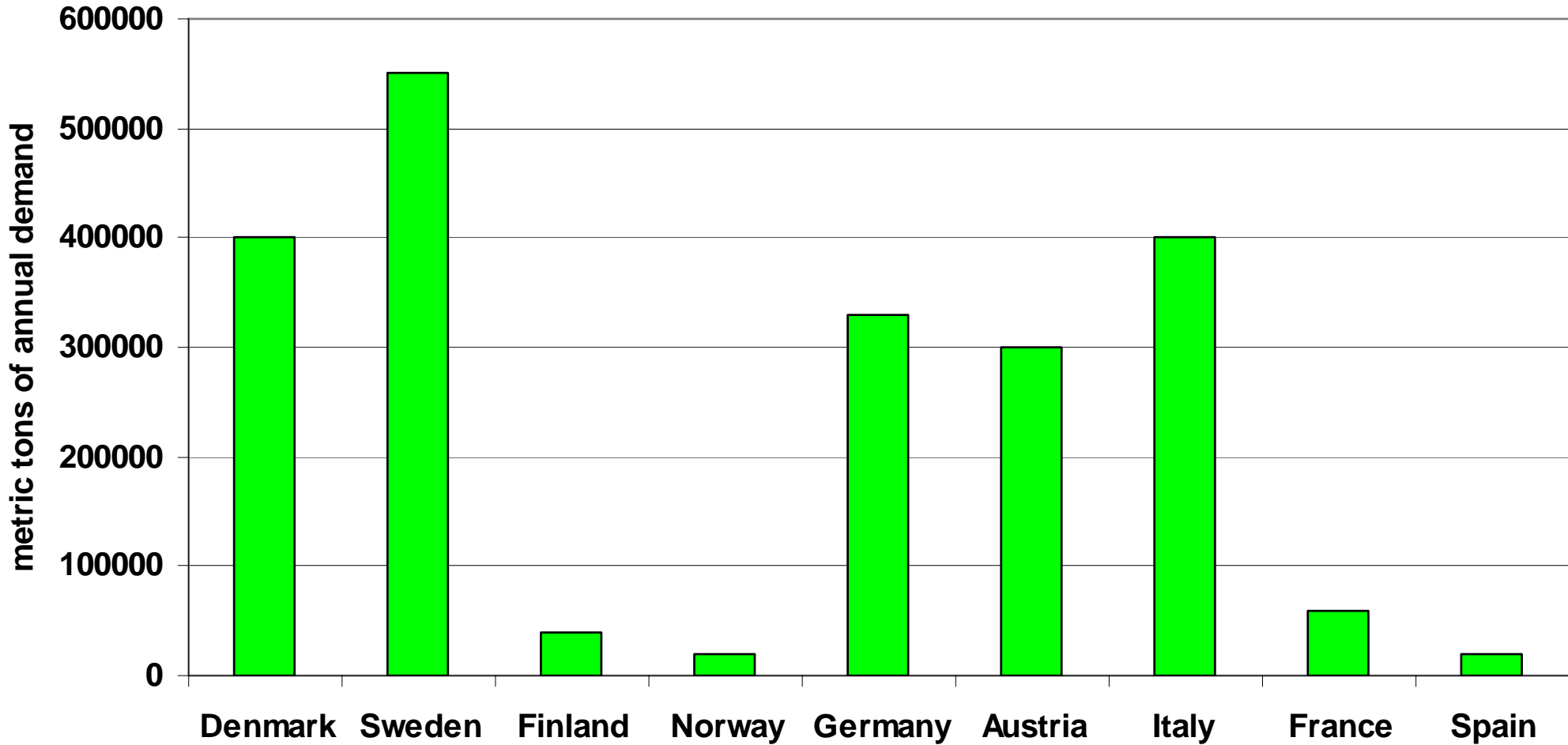


Fully integrated renewable energy system: Fuel storage + pelletboiler + solar thermal system (Energy Cabin)

- » 30- 300 kW pellet boiler
- » Pellet storage
- » 12 m² flat plate solar collector
- » Storage tank for hot water
- » For individual houses, groups of houses or large buildings
- » Including solar cooling option
- » Installation time upon delivery: 2 hours!
- » www.energycabin.com



European markets for residential pellet heating



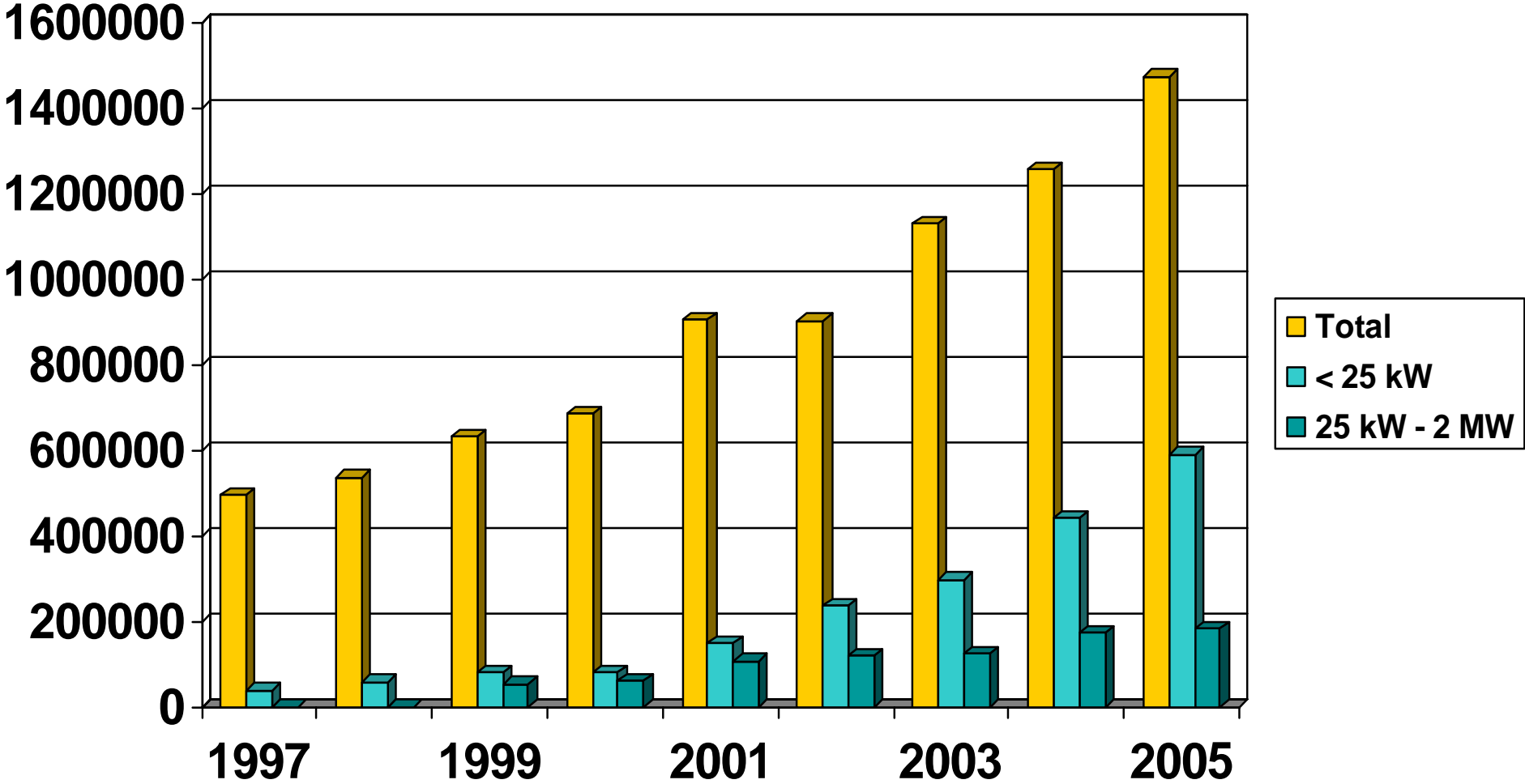
Conclusions from this figure

- » Significant differences even between similar countries (Sweden, Norway, Finland)
- » Supportive policies (e.g. energy taxation) were critical for current market development!
- » Many countries have still small markets in a very early development stage
- » Early development stage and high growth potential = big business opportunity !!

The Swedish pellet market

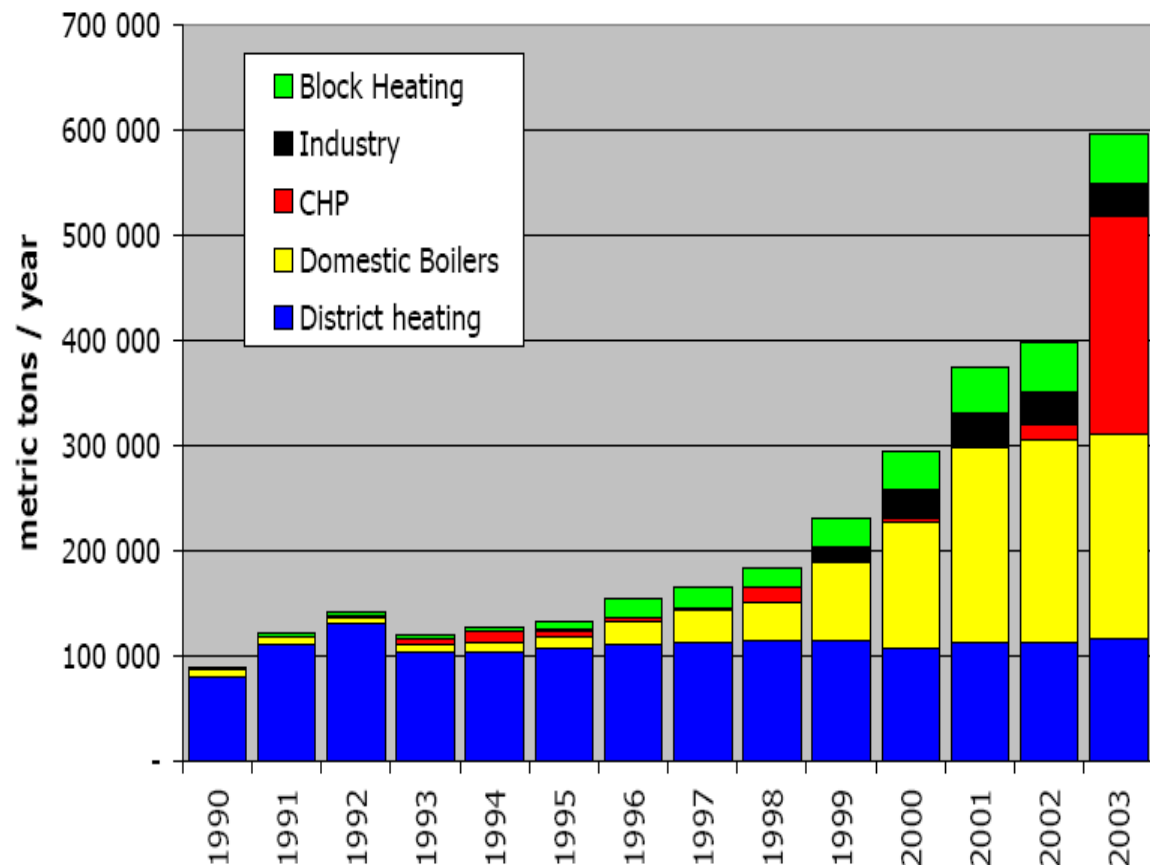
- » Largest pellet market in Europe
- » Market driver: energy taxes
- » Pioneering role, especially in use of pellets in large CHP plants and in the development of pellet burners (technology leadership)
- » Residential heating mostly based on pellet burners attached to oil boilers
- » Pellet boilers starting to enter the market

Pellet sales in Sweden (t)



The Danish market

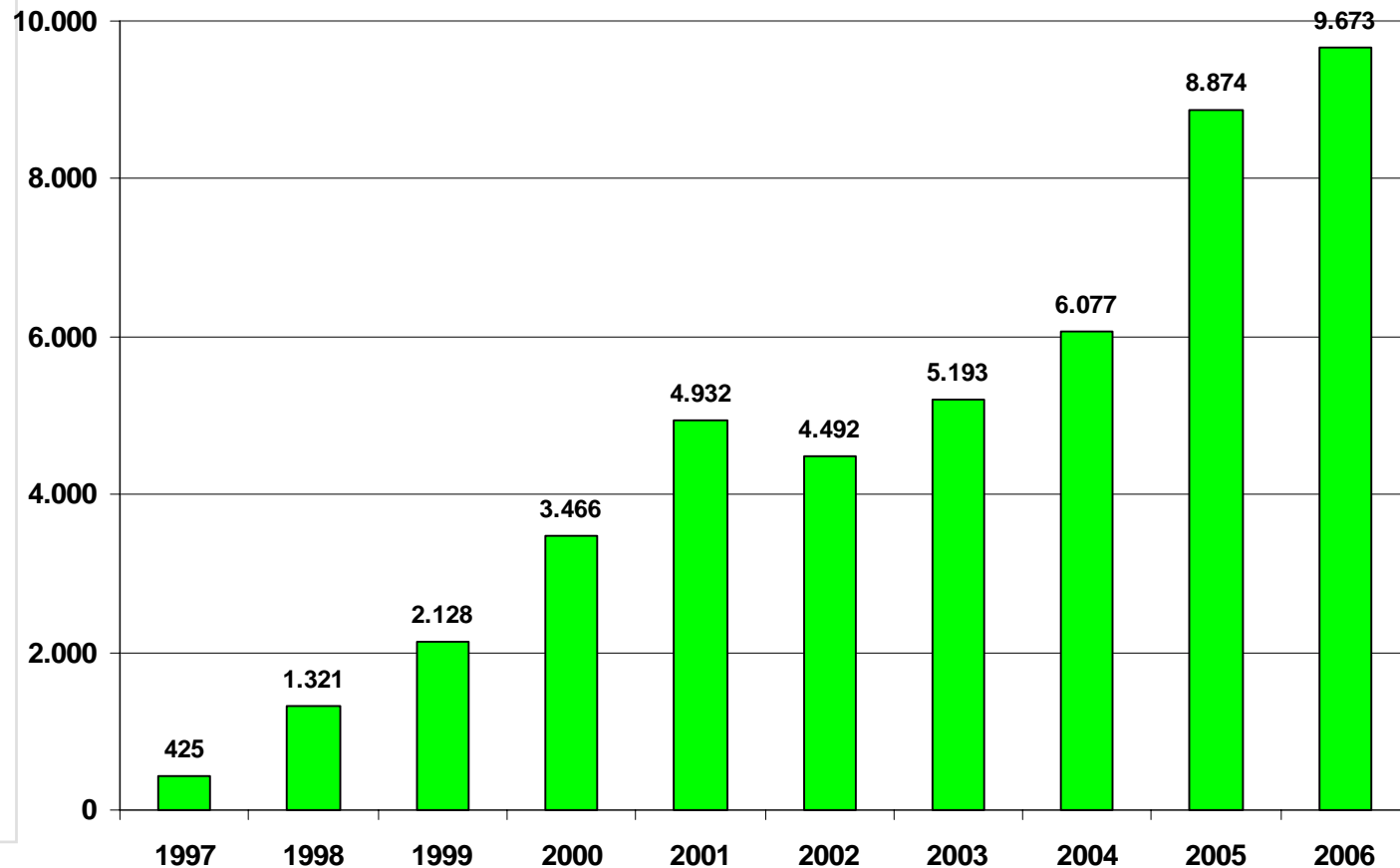
- » Significant pellet demand in small and medium scale district heating systems
- » Market growth of domestic boilers interrupted by adverse policies (discontinued investment support)



The Austrian pellet market

- » Pioneering role and market leadership in residential pellet boilers
- » Pellet boiler sales exceeded oil boiler sales in 2005
- » Growing sales of pellet stoves and pellet central heating stoves

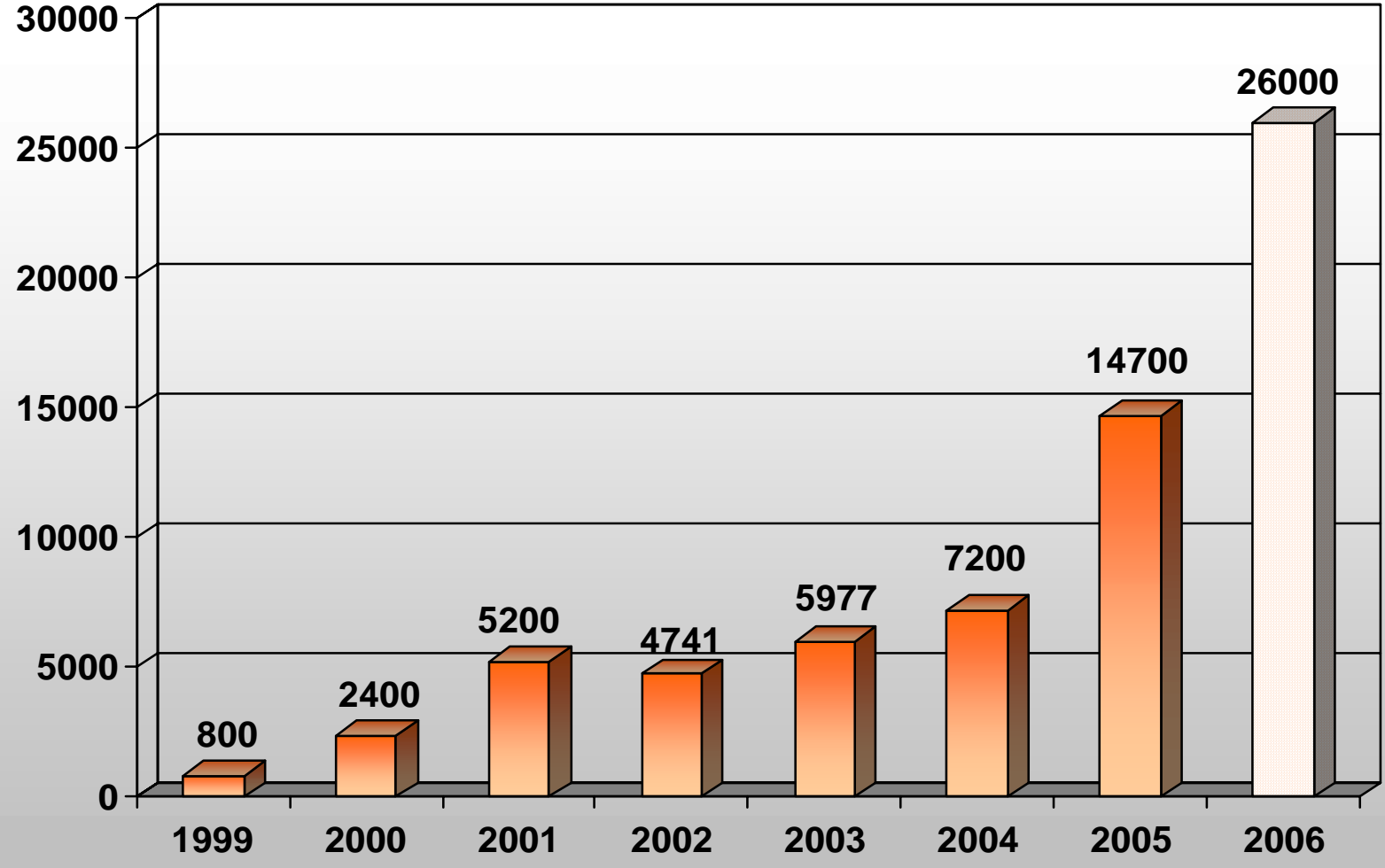
Annually installed Pelletboilers in Austria



The German market

- » Impressive growth: 800 boilers were sold 1999
- » By now largest pellet boiler market in the world
(expected sales 2006: 26.000 units)
- » Products predominantly from Austria

Pellet boiler sales in Germany



The Italian market

- » The largest pellet stove market in Europe
- » Estimated sales 2006: 100.000 pellet stoves
- » Trend towards pellet central heating stoves
- » Small domestic pellet production – significant pellet imports

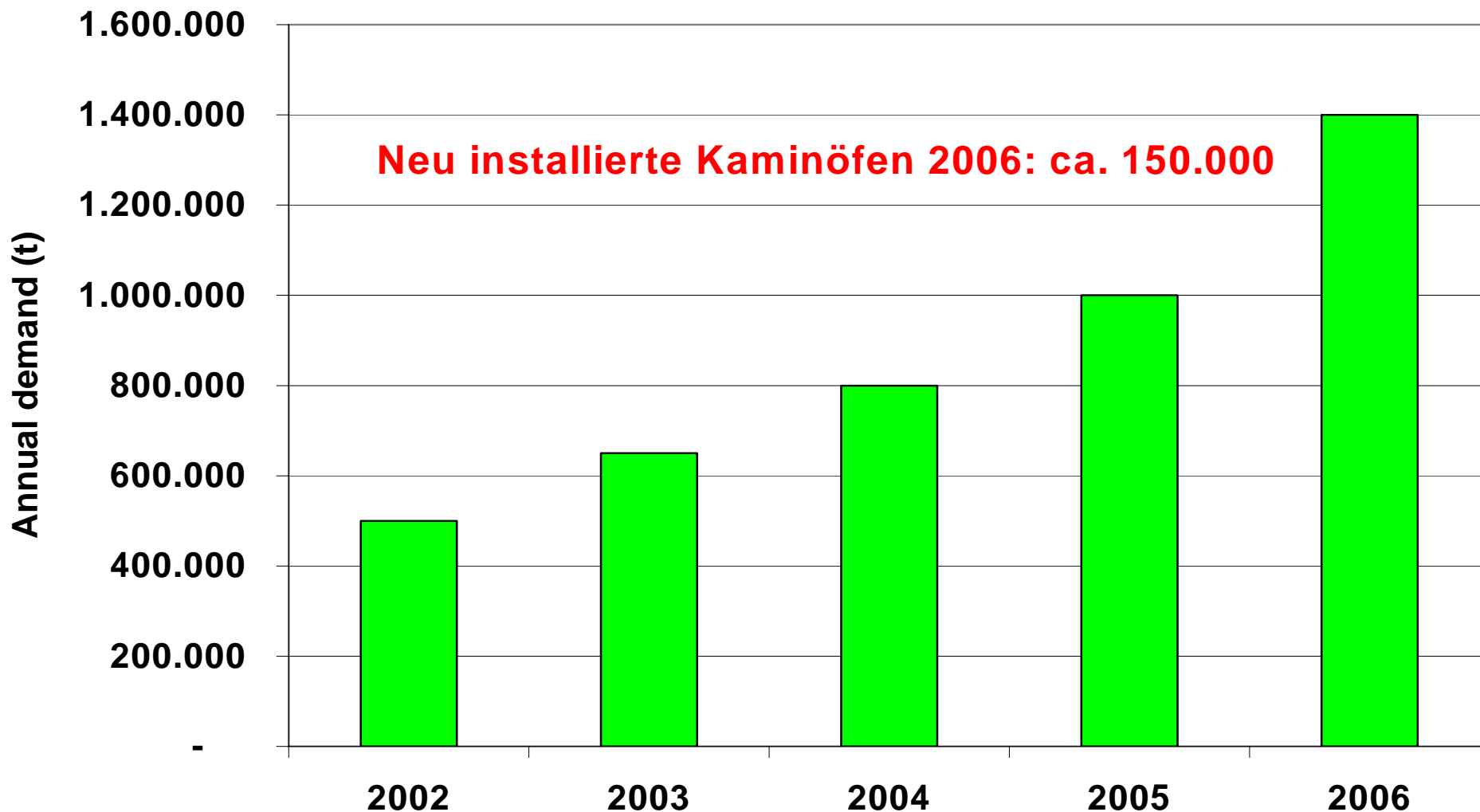
Markets with significant promise in the future

- »» France !!
- »» UK, Ireland, Netherlands (pellet stove markets due to mild atlantic climate)
- »» China: plans announced to use 50 Million tons of pellets by 2020
- »» USA !! Today a stove market but potentially a boiler market

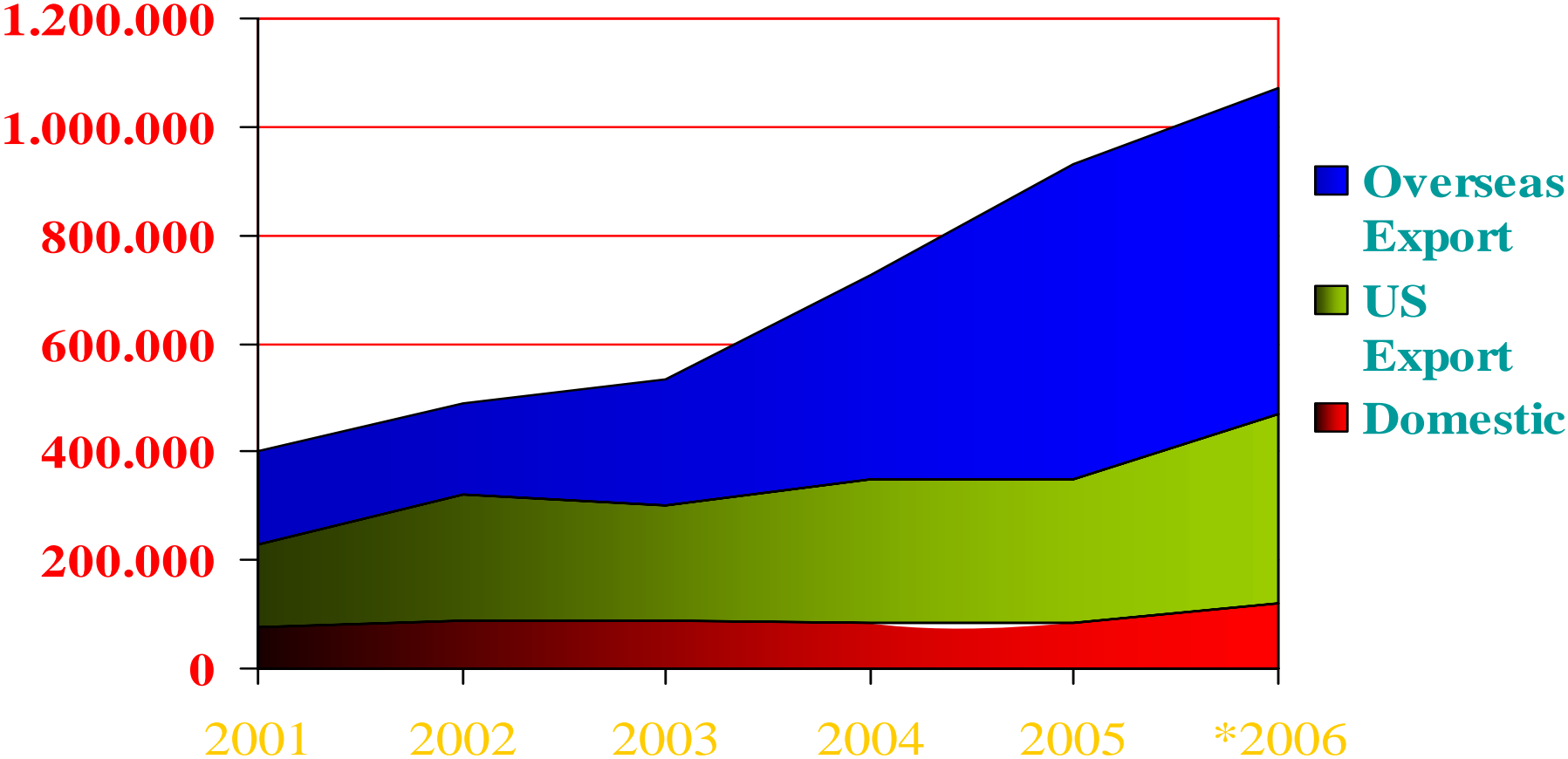
France – an excellent example for comprehensive political support

- » Reduced VAT rate for wood fuel 5,5% instead of 19,4%
- » Reduced VAT 5,5% rate for district heat (biomass) and for biomass boilers
- » Income tax refund for investment: 50% of investment costs
- » Installer qualification & certification scheme „Qualibois“ starting nationwide 2007
- » Public relations campaigns
- » Efficient program management by natl. Energy Agency ADEME

Development of US Pellet demand

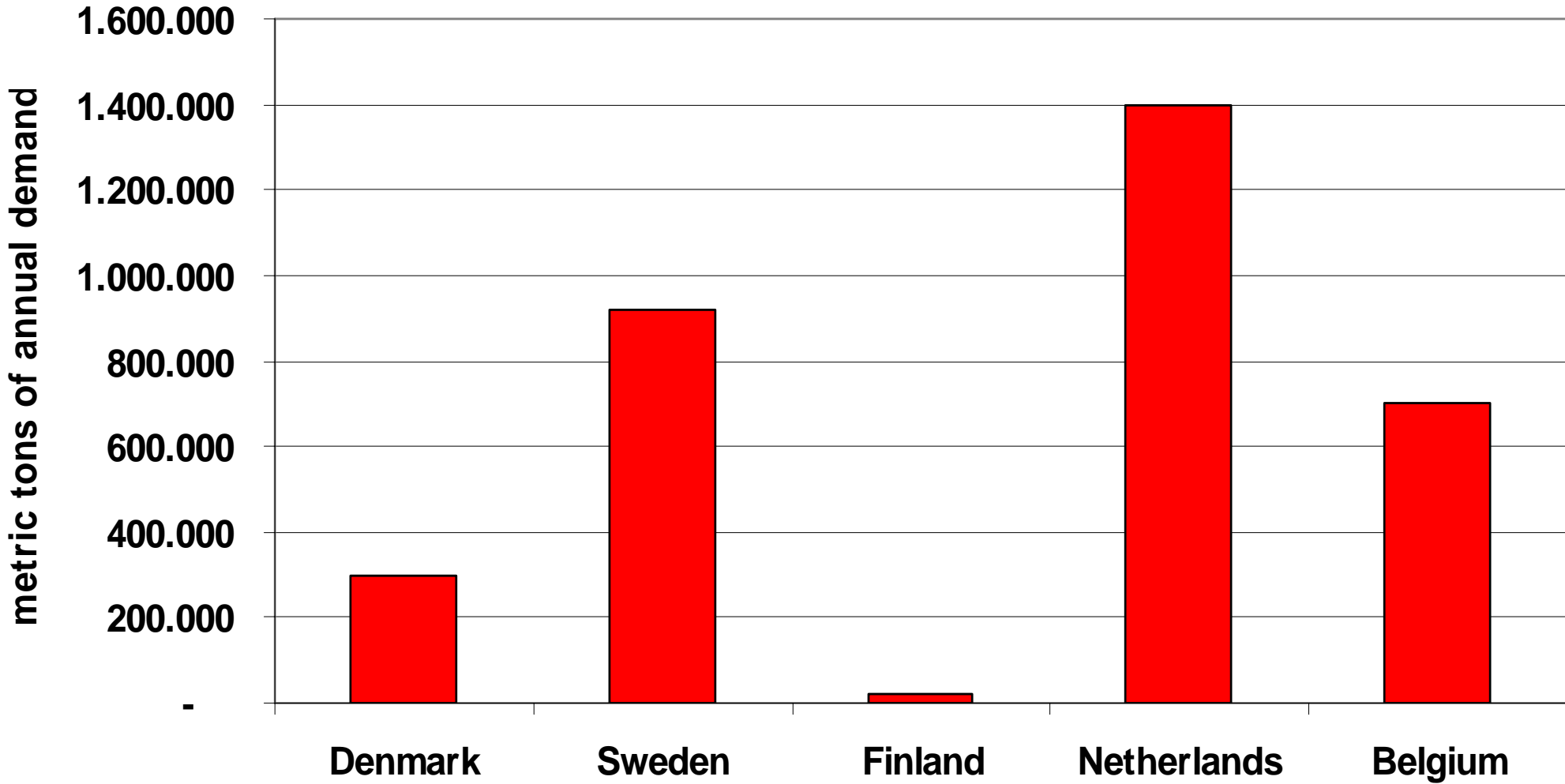


Development of Canadian pellet production



Source: John Swan, Canadian Pellet Association

Pellet use in power plants in Europe



Why are pellets used in power plants?

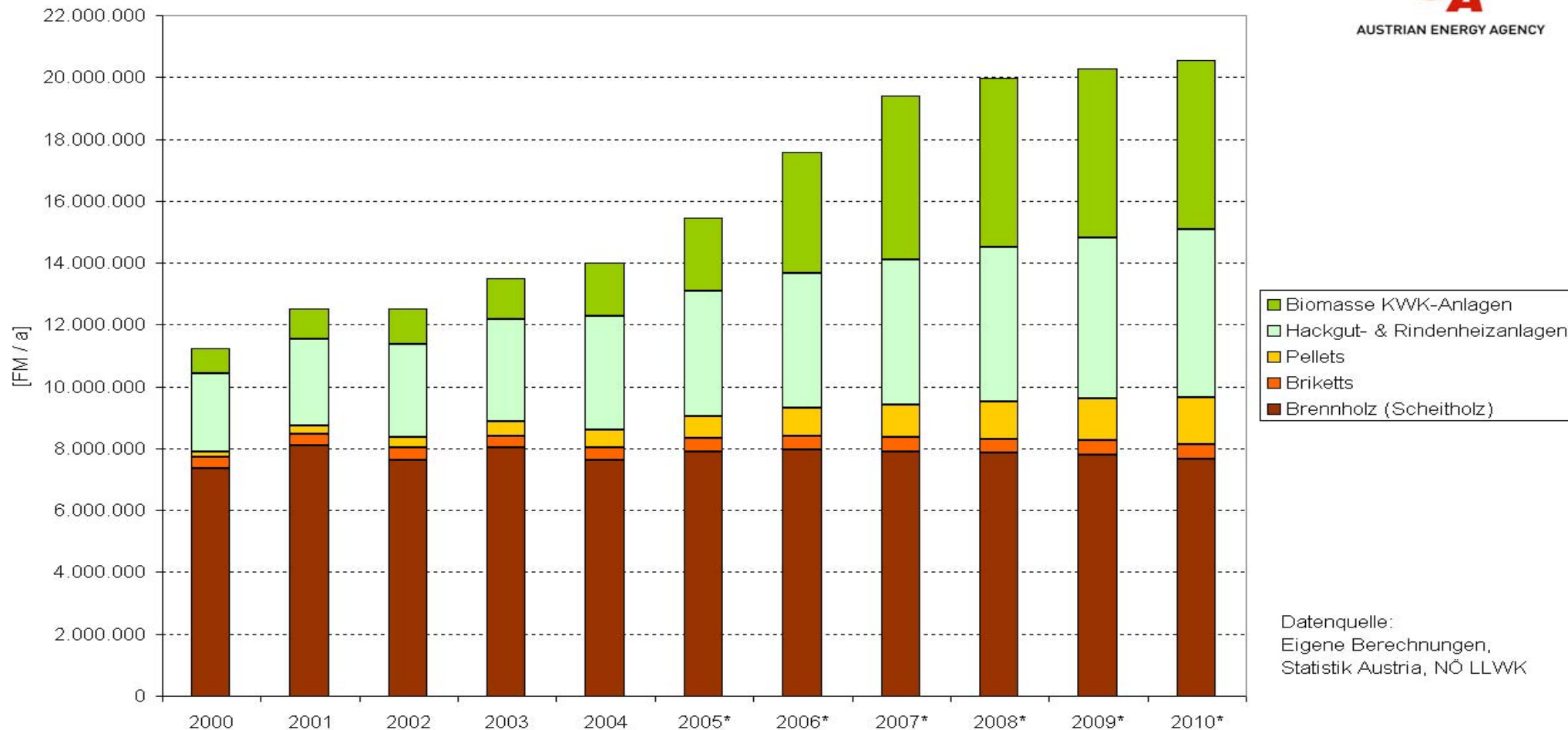
- » Strong financial incentives for the production of green electricity
- » Very low investment needed to cofire pellets in a coal fired power plant
- » Further significant increase of pellet use in UK power plants expected
- » Power plants create a very large demand for pellets and stimulate investment in production
- » Eventually pellets will all end up for residential heating (much more economic!)

What is the potential for pellet production in Europe?

- » There is no meaningful answer to this !
- » Key issue is competition for raw materials and agricultural cropland
- » Who is going to win this competition?
- » The long term potential for pellet use is significantly larger than the biomass available
- » The question is: in which direction will policies drive biomass: fuels, electricity or heat?

Demand for wood fuels in Austria

Abschätzung des Holzbedarfs für die energetische Verwertung in Österreich
 (* Prognose 2005 bis 2010)



Datenquelle:
 Eigene Berechnungen,
 Statistik Austria, NÖ LLWK

At present policies are driving biomass towards electricity and fuels – is this meaningful?

Subsidy requirement for renewable **heat:**

- » e.g. 3000.- € investment support for pellet boiler
- » Produced energy in 15 years: 450 MWh
- » **Subsidy : 6.- €/ MWh**
- » **NO CARBON CREDIT**

Subsidy requirement for renewable **electricity:**

- » **60 – 100.- €/ MWh** depending on country & technology
- » Plus CARBON CREDIT **25.- €/ MWh** (assuming 30.- €/ t CO₂)

In terms of costs and energy efficiency biomass heat applications are clearly preferable !

»» Example energy yield per ha:

- SRC, Miscanthus to heat : 50.000 kWh / ha
- SRC BTL: 20.000 kWh / ha (?)
- Biodiesel from rapeseed: 15.000 kWh / ha
- SRC to electricity: 10.000 kWh / ha

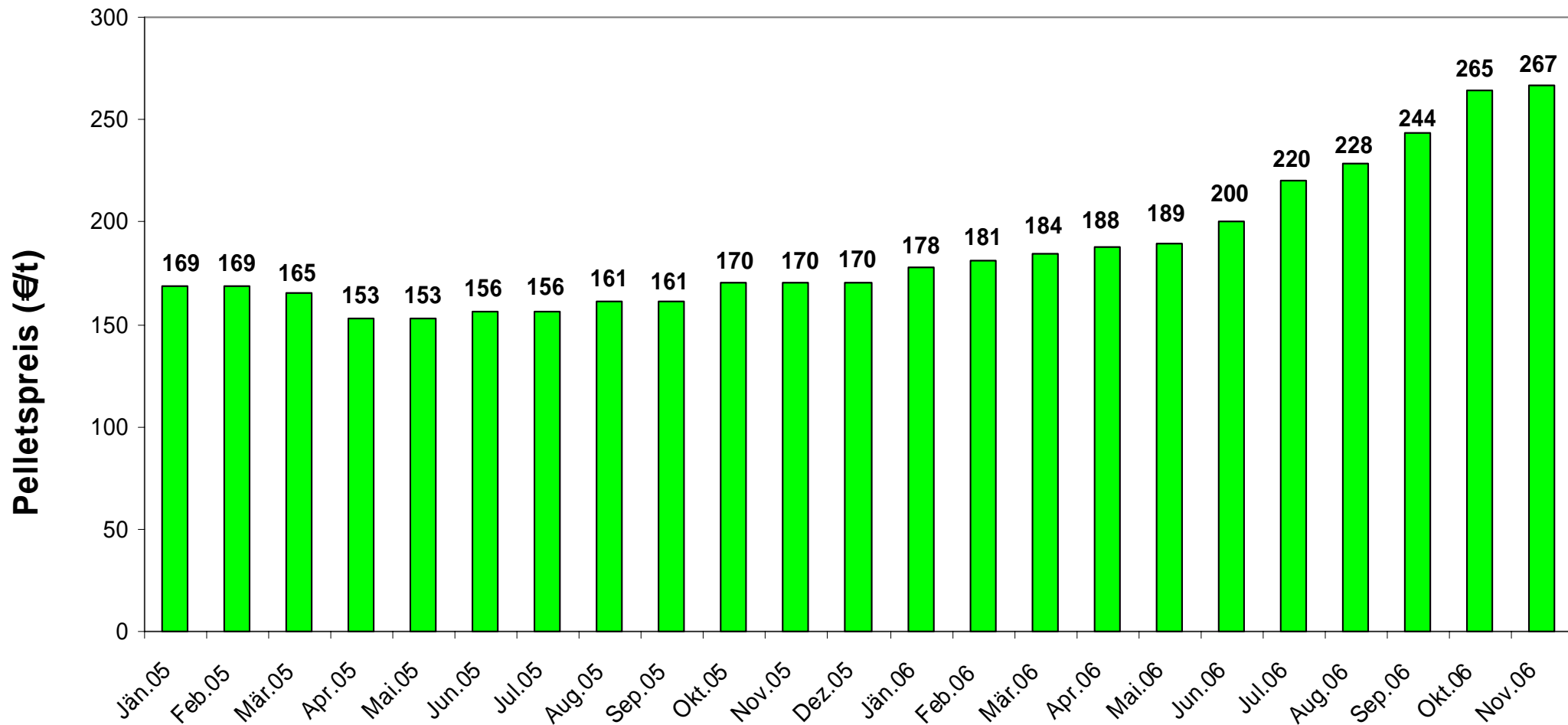
»» Required subsidy level

- SRC to heat: 3-6.- € / MWh
- SRC to Electricity: > 60.- €/MWh
- Biodiesel: approximately 50.- € / MWh

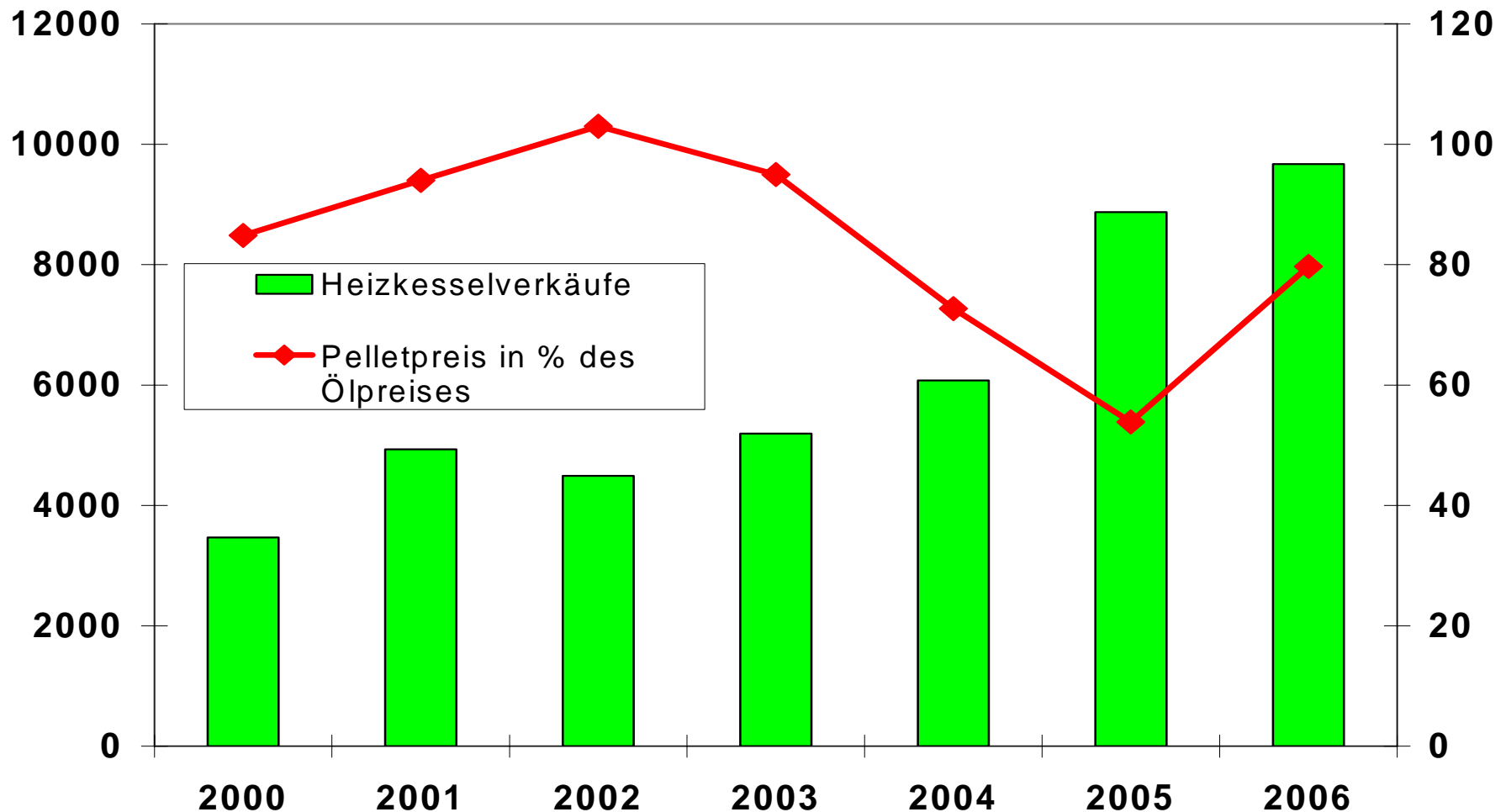
Current developments of the
Austrian pellet market –
getting the feet back to the ground

Development of pellet prices in Austria

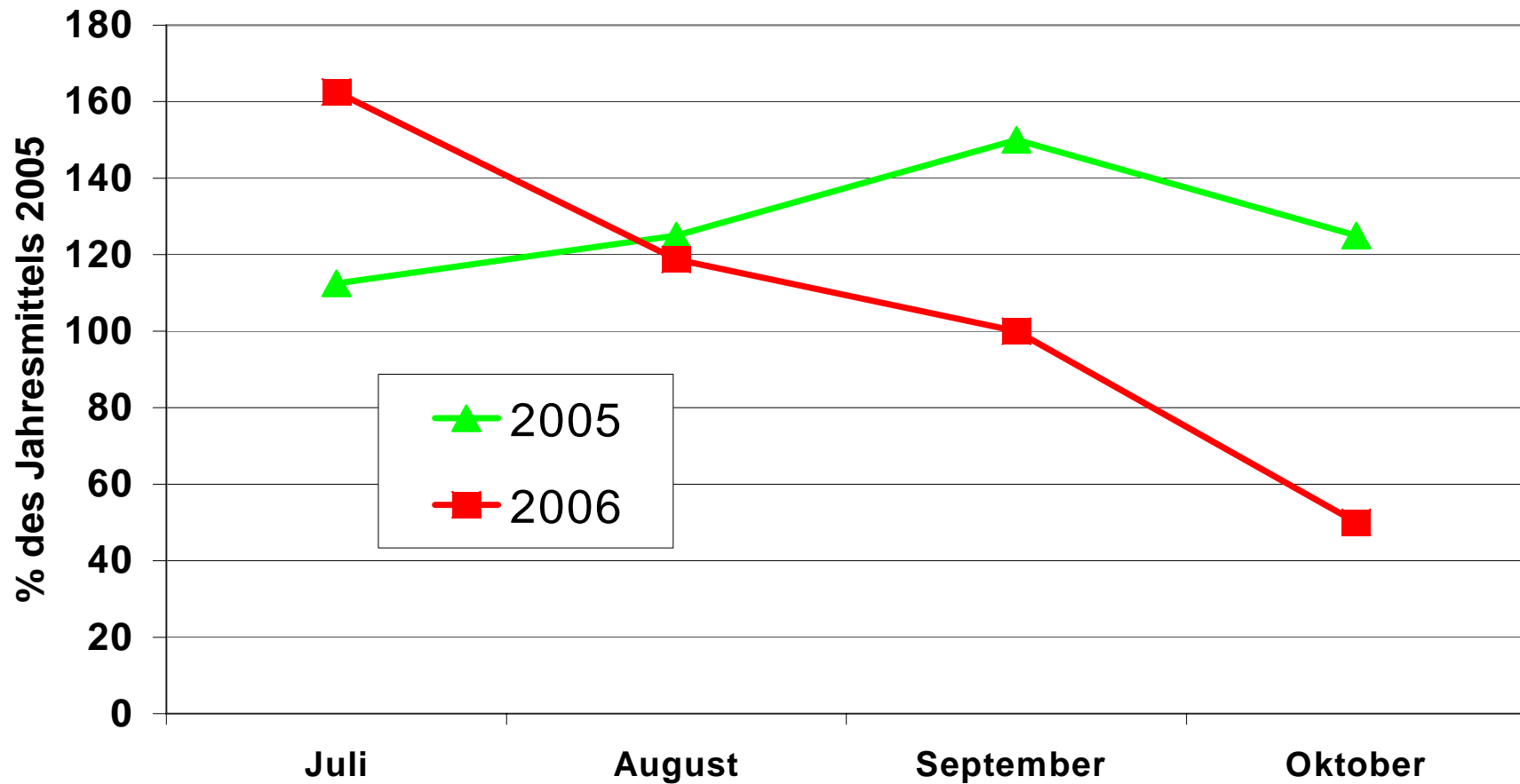
Pelletpreisentwicklung 2005 - 2006



Price relation between pellets and oil vs. pellet boiler sales



Recent development of pellet boiler sales



Conclusions 1

- » It is not so easy to establish a balanced growth of pellet demand & supply
- » Supply security and relative price stability are key issues that need to be solved
- » This is particularly difficult in an early phase of market development

Conclusions 2

- » Pellets have a great promise to become a key biomass product for the energy market
- » At present lack of support systems for RES heat are creating misbalanced development of renewable energy use in Europe
- » We need a more level playing field to ensure efficient biomass use in EU
- » Carbon credits also for small scale applications !
- » We need a RES heat directive!