

Oxy-fuel glass melting in the Nordic countries and the Baltic states

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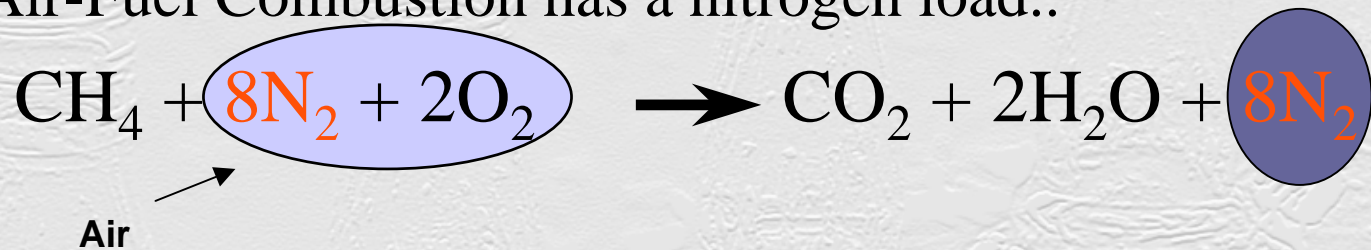
Topics

- General characteristics of oxy-fuel melting
- Oxy-Fuel applications overview
- Glass Industry overview
- Oxy-Fuel technology status of application
- Future potential

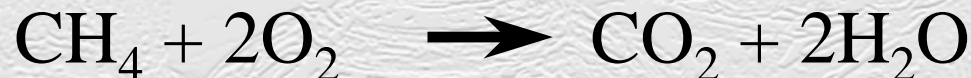
General Characteristics

oxy-fuel combustion

- Air-Fuel Combustion has a nitrogen load..



- Oxy-Fuel Combustion

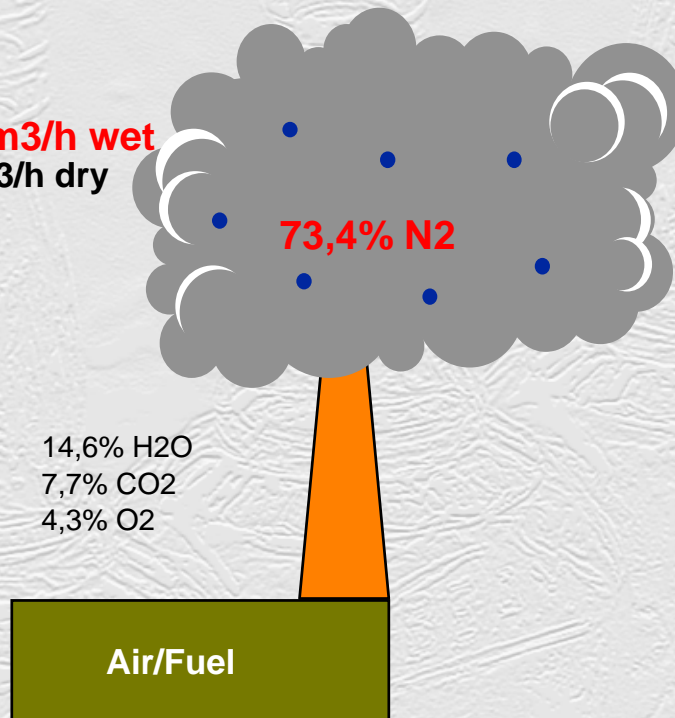


Higher partial pressure of 3-atomic gases
 $\text{CO}_2, \text{H}_2\text{O} \rightarrow$ better heat transfer

General Characteristics

oxy-fuel combustion

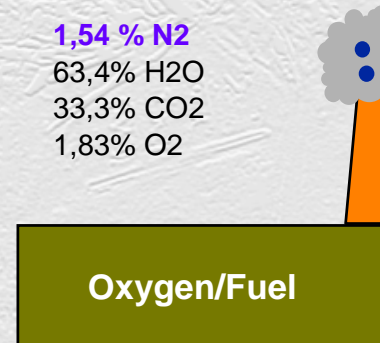
13611 Nm³/h wet
11623 Nm³/h dry



25%- 55% energy saving

● = unit NO₂

2197 Nm³/h wet
805 Nm³/h dry



General Characteristics

summary

- **Fuel savings**
- **Low NO_x, CO₂, Particulate emissions**
- **No heat recovery device needed for high efficiency or much smaller if used**
- **Higher productivity/quality**
- **Much smaller or no filter**
- **Less investment**
- **Reduced noise level possible**
- **Flexible operation**
- **Less exhaust gas volume**
- **Smaller gas velocities**
- **Easy to reach higher temperatures**

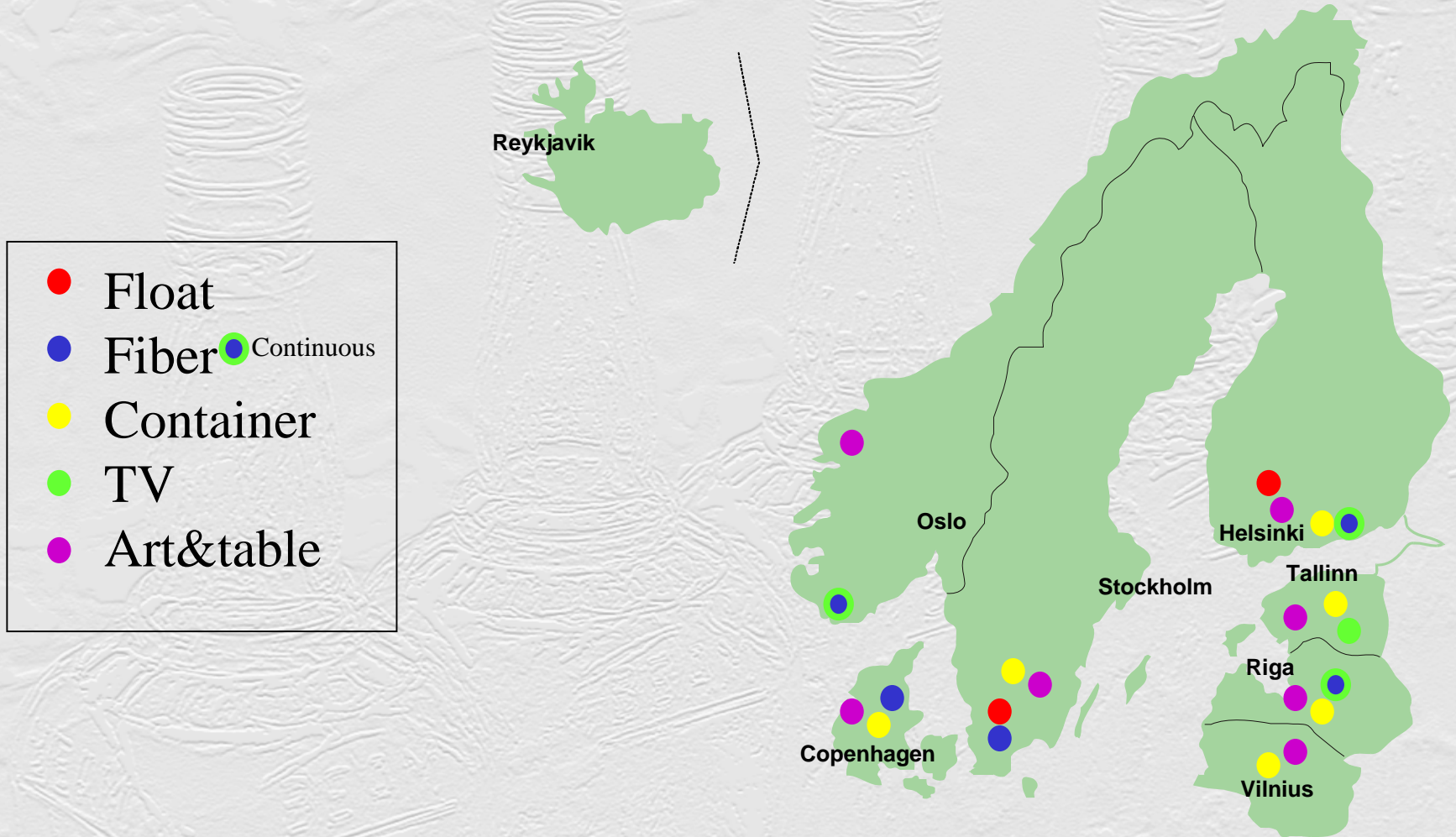
Additional knowledge needed

- **Refractory material choices**
- **Furnace construction/insulation**
- **Furnace & Combustion control**

Oxy-Fuel applications overview

- **O₂-enrichment** of combustion air
 - is in fact removal of nitrogen
- **Oxygen lancing**
 - angles, distances, velocities etc
- **Supplemental oxy-fuel burners**
 - additional energy without increasing furnace pressure/exhg. vol.
 - flexible option to localize energy boost/replace energy
- **Oxy-fuel combustion to 100%, All Oxy Fuel**
 - No air used, dedicated oxy-fuel burners

Glas Industry overview



Glass Industry overview

Market overview 2005

Float glass

Pilkington - Sweden
Pilkington - Finland

Continuous fibre

EOCF Birkeland - Norway
Valmiera - Latvia
Ahlstrom - Finland

Container glass

Rexam - Sweden
Rexam - Denmark
OI Kahrulan Laasi - Finland
OI Järvakandi Klaas - Estonia
Aleksotas - Lithuania
Panevezys - Lithuania

Isolation glass fibre

Isover (E-furn) - Sweden
Isover - Denmark
Isover - Finland

TV glass

Ekranas - Lithuania

Art & Table glass

Many....
None mentioned none
forgotten.

Status of application

oxygen for glass melting

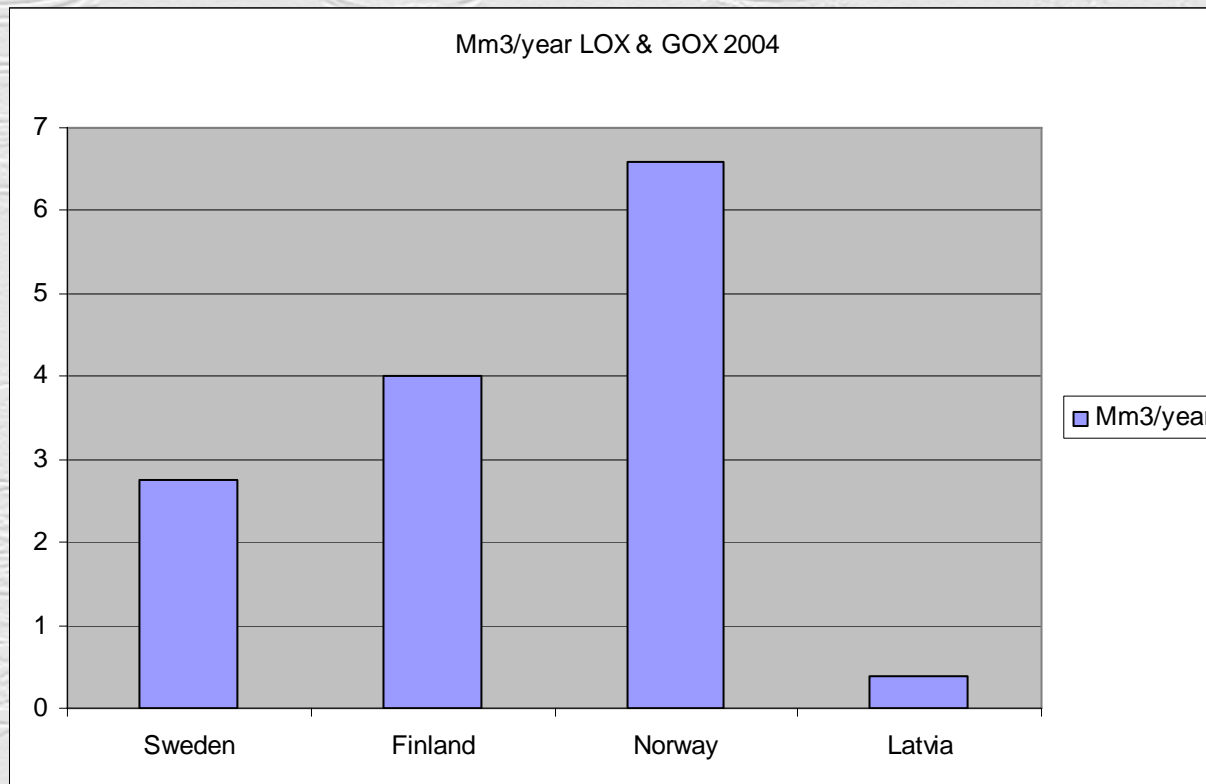


- 100% OF
- Boosting
- Enrichment



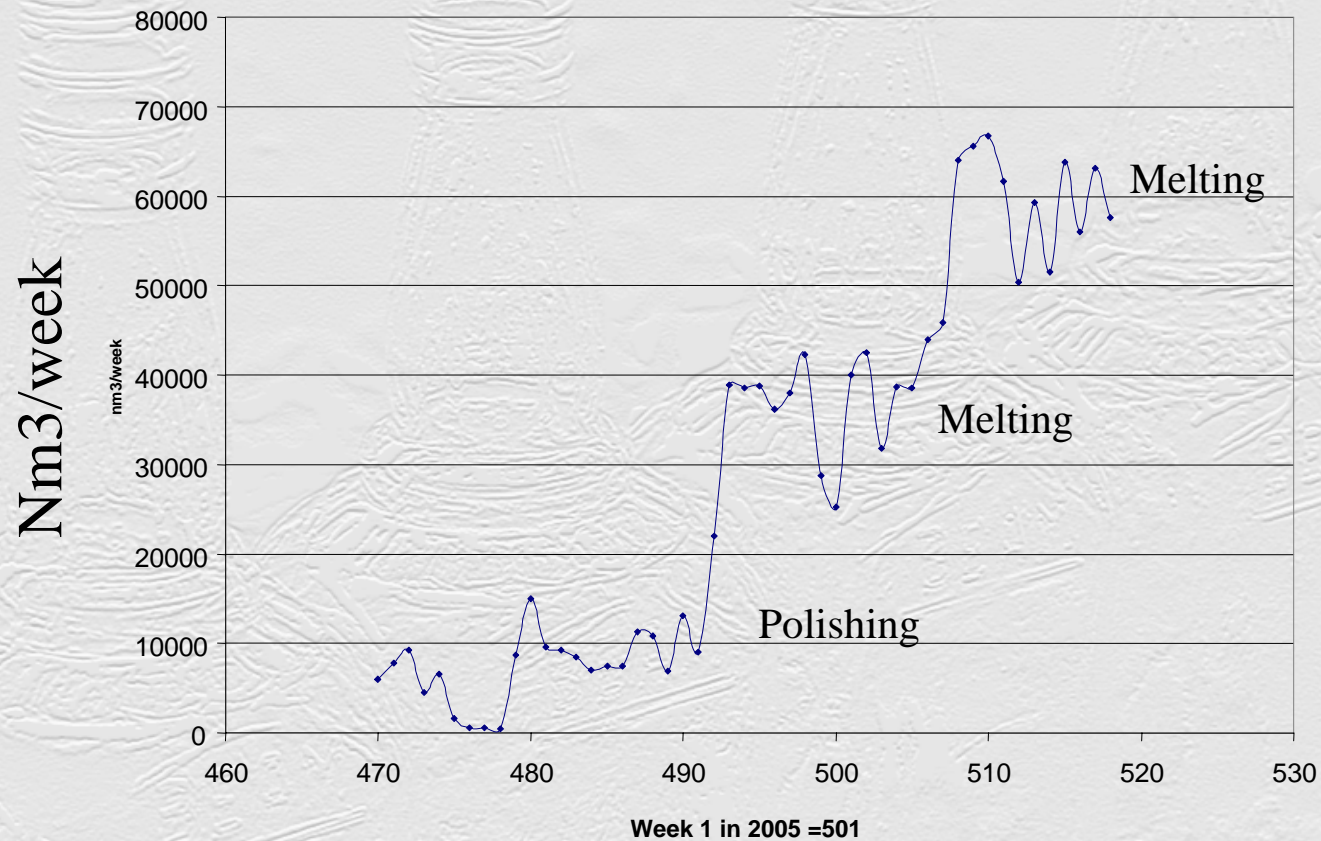
Oxygen volumes

Corresponding to about 9,3 MW

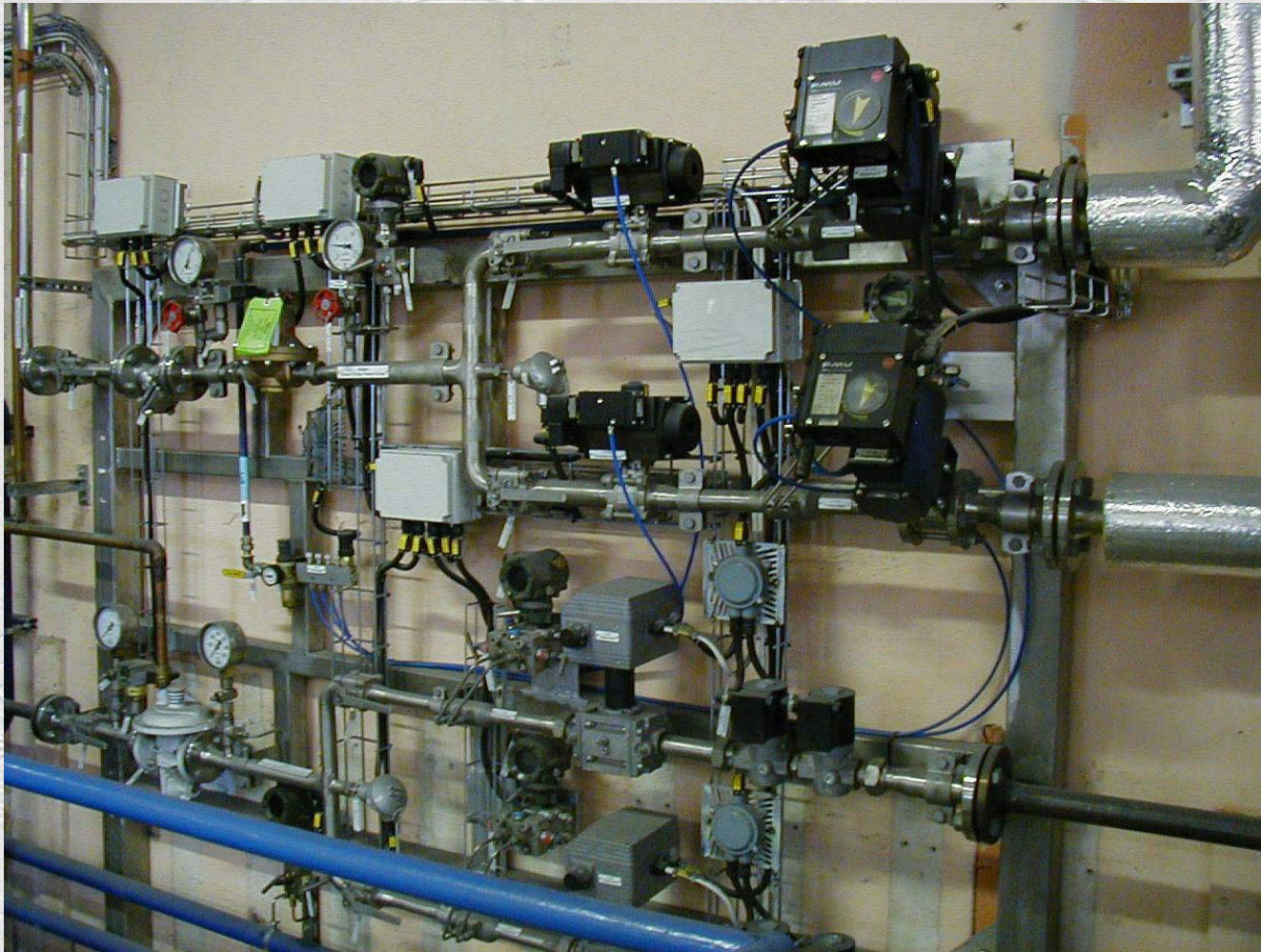


LOX-volume in Orrefors

the last 48 weeks



Oxy-Fuel in Orrefors



Future potential

- Large remaining potential at...
 - 3 Fiber producers, 1 TV-panel, 2 Float
- Also Oxy-Fuel pot furnaces
- Flameless combustion also in glass melting
- Increasing fuel prices
- Increasing CO₂-taxes
- Alternative fuels - gasification
- Increasing environmental demands

Oxy-Fuel in Pot-Furnaces

Used during melting phase. Some cases in Italy



END