

# **Role of District Heating & Cooling and Emissions Trading in Expanding Use of CHP**

**Mark Spurr**

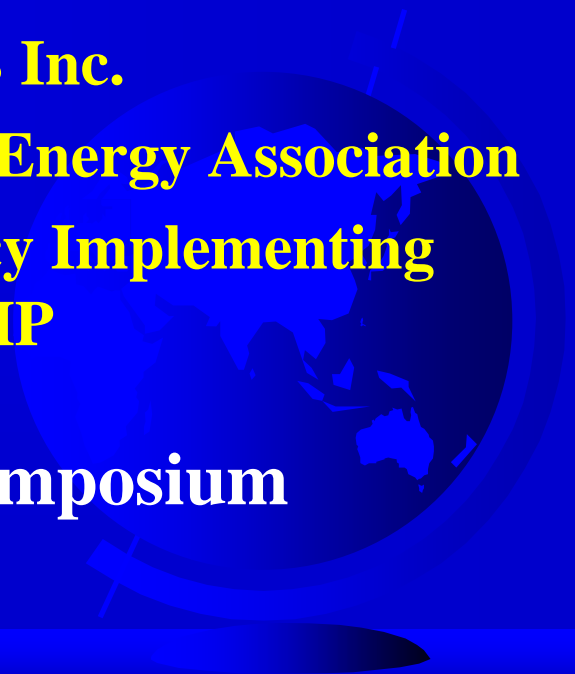
**Vice President, Kattner/FVB Inc.**

**Legislative Director, International District Energy Association**

**Consultant, International Energy Agency Implementing  
Agreement on DHC/CHP**

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# Agenda

- District heating and cooling (DHC) today
- DHC as climate change strategy
- Emissions trading scheme design



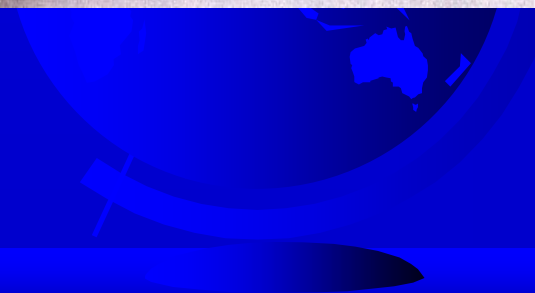
# District Heating and Cooling Today

- European Union
  - Increased 31% in last decade
  - Growth in district cooling
  - Trend toward CHP and biomass
- Central/Eastern Europe/FSU
  - Regulated design and lack of market context
  - Upgrade of physical and institutional infrastructure



# District Heating and Cooling Today

- North America
  - Older steam systems
  - Significant institutional use
  - Thermal sinks for new CHP
  - Recent growth in cooling
- Asia
- Middle East



# DHC Offers Important Opportunities for GHG Reductions

- Existing DHC used as thermal sink for CHP
- New DHC integrating loads to optimize CHP
- DHC as community energy broker, distributing excess thermal output from CHP or:
  - Industrial waste heat
  - Community biomass
  - Natural sources of thermal energy
- Flexible infrastructure for transition to renewables



# Market Liberalisation Hurts

- Transnational power market is depressing the value of power, priced on short-run marginal costs
- High gas prices squeeze the spark spread
- No corresponding market for environmental externalities
- Emissions trading can provide a solution if properly implemented



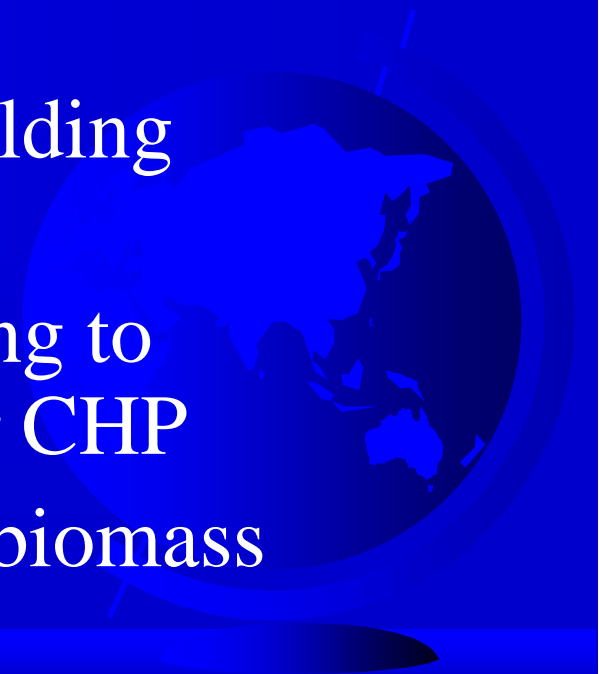
# Market Liberalisation Helps

- DHC boosts power grid reliability by:
  - Generating power at load centers through CHP
  - Delivering cooling energy through district cooling rather than power grid
  - Shifting demand to off-peak periods through thermal storage
- District cooling helps position buildings for competitive power market
  - Value of peak power will increase
  - Flat power load reduces power costs in competitive market
  - District cooling reduces flattens the building load profile

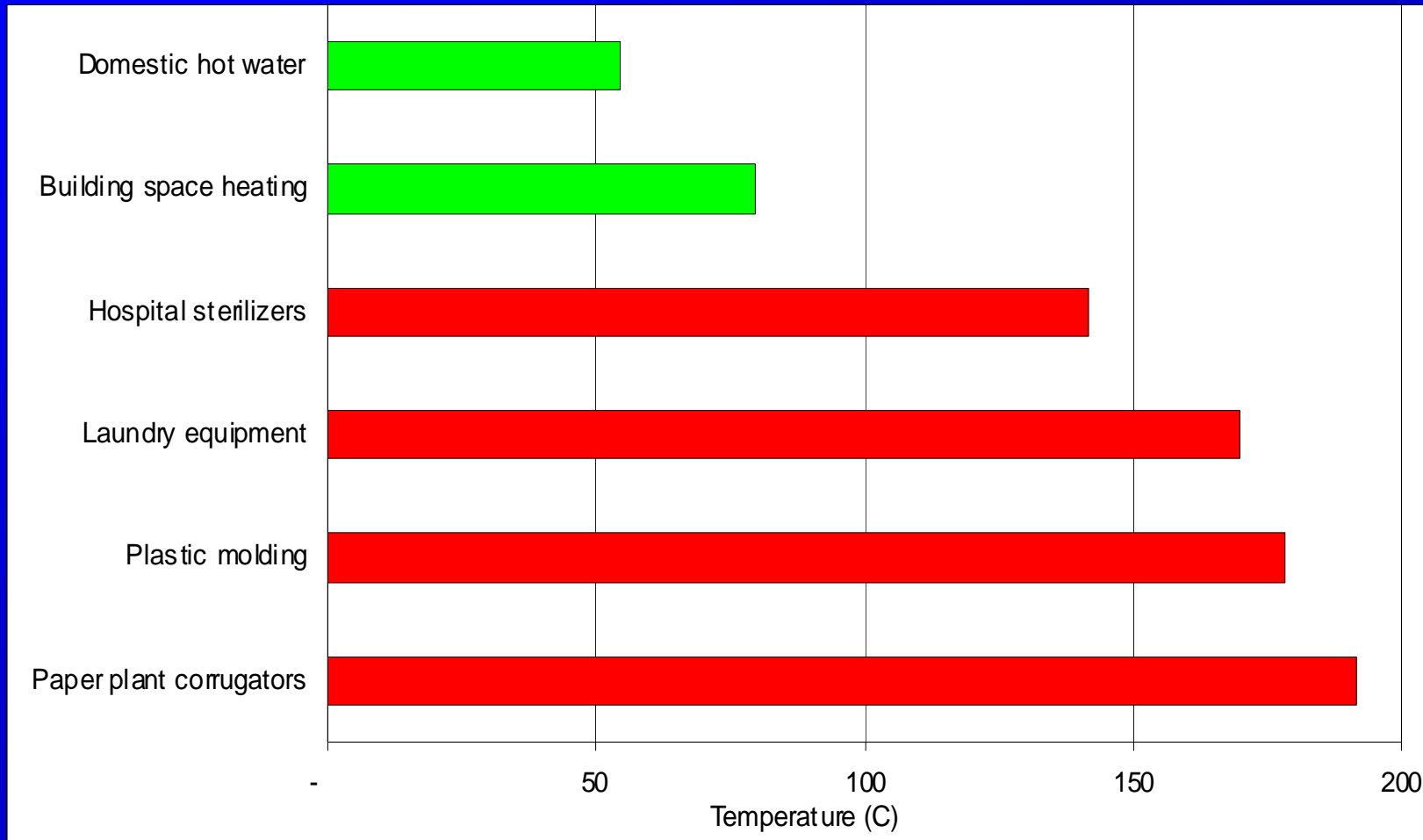


# DHC is an important CHP opportunity

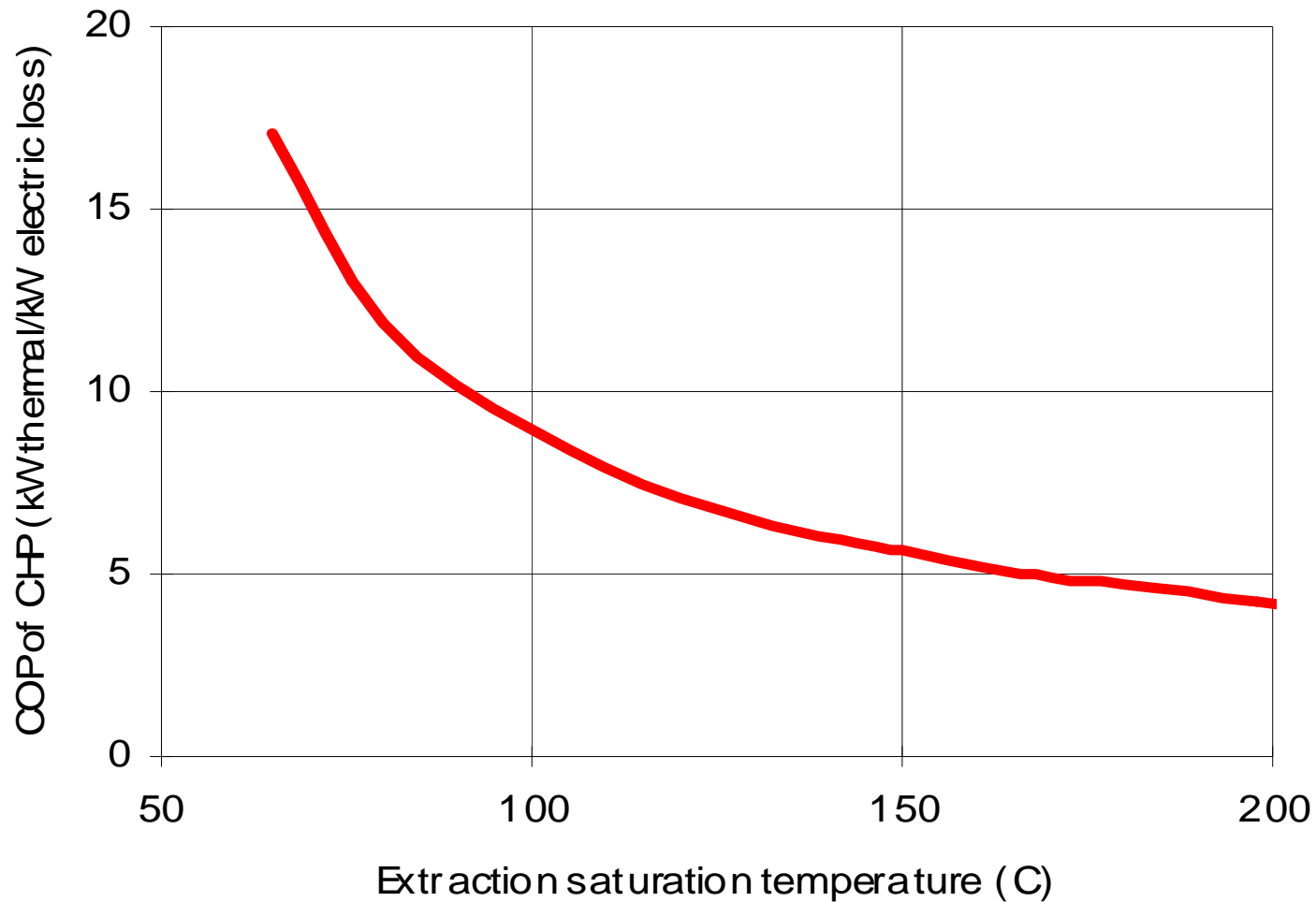
- Low-temperature thermal sink
  - Efficient CHP
  - Higher power output
- Low-carbon options for building heating
- Combine heating and cooling to provide high load factor for CHP
- Flexibility for transition to biomass



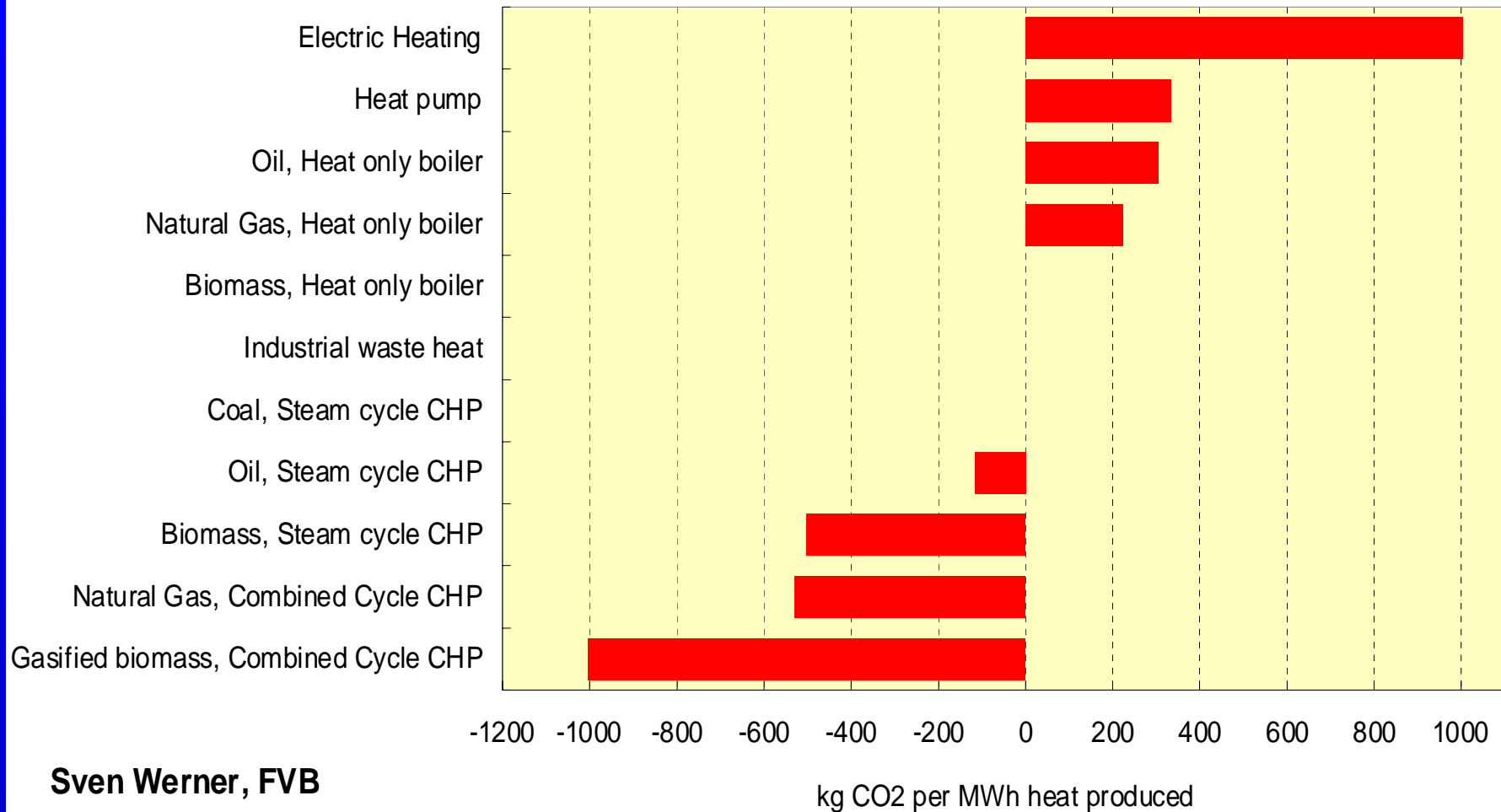
# DHC accesses low-temperature heat sinks



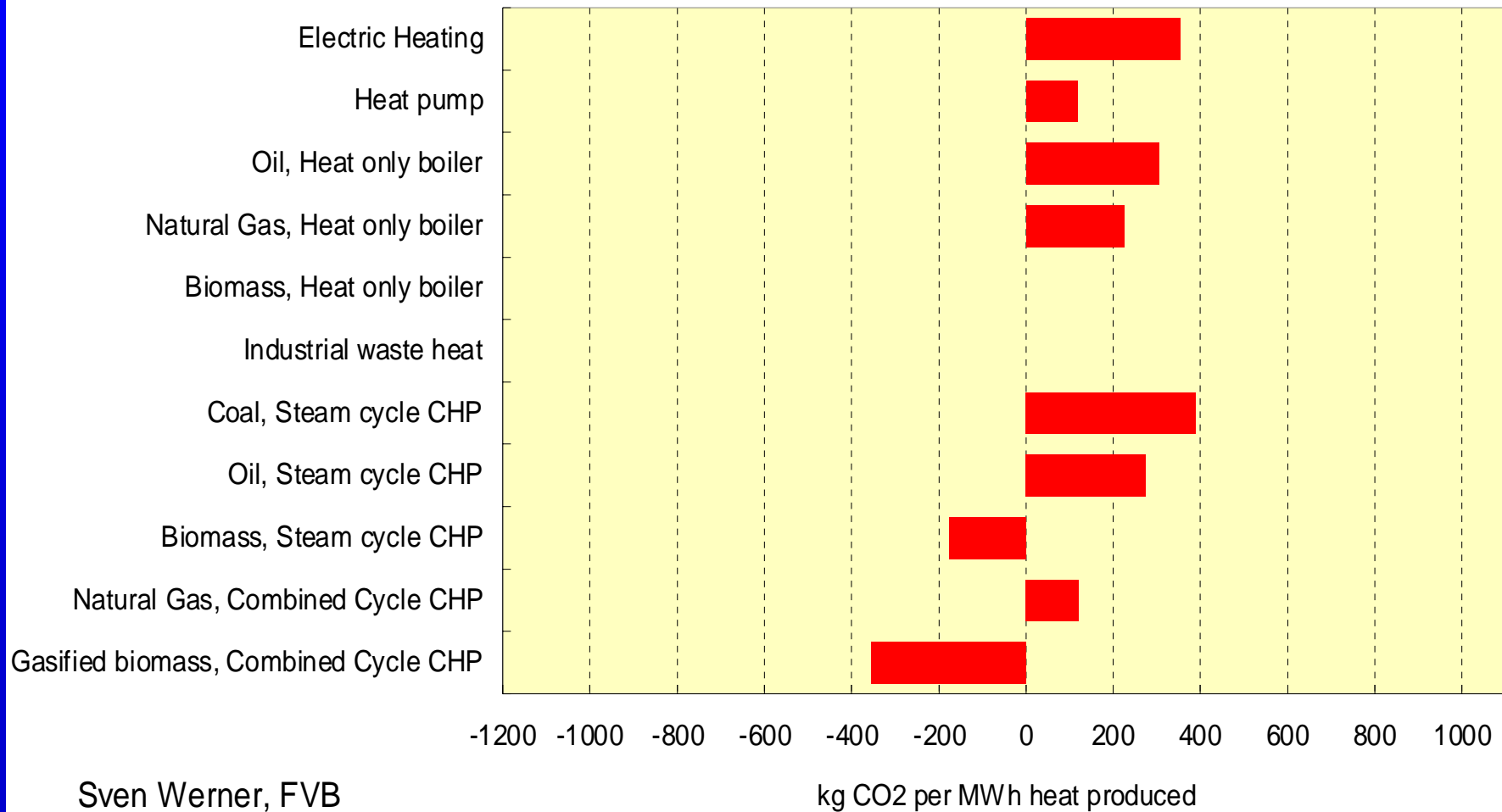
# CHP Power Output Higher with Low-Temperature Heat Sinks



# CO<sub>2</sub> Emissions From Heating Options with Current Marginal Power

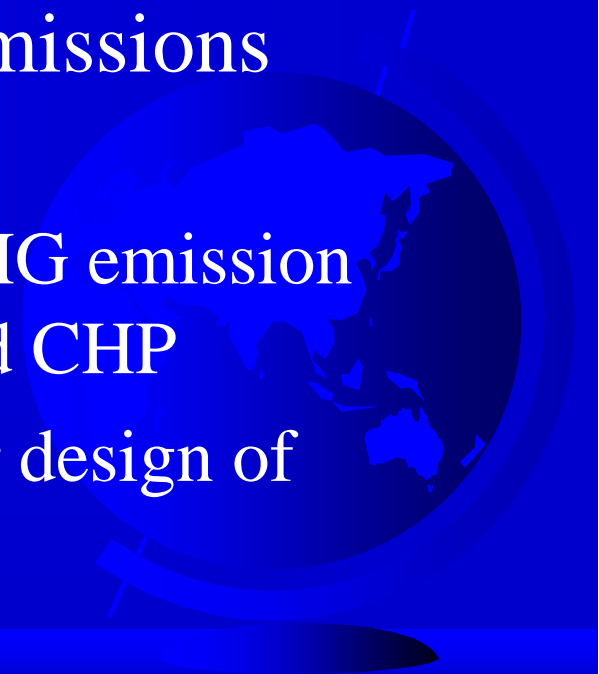


# CO<sub>2</sub> Emissions From Heating Options with Future Marginal Power



# International Energy Agency project

- Implementing Agreement on DHC Including Integration of CHP
- Project on DHC/CHP benefits in greenhouse gas policy and emissions trading
  - Analyze and communicate GHG emission reduction benefits of DHC and CHP
  - Develop recommendations for design of GHG trading programs



# Emissions Trading

- Status of trading schemes
  - International
  - EU
  - Denmark
  - UK
- Sectors covered in trading scheme
  - Broad coverage increases benefit of trading
  - Common EU scheme needed due to integration of energy markets
  - Strong policies and measures in non-trading sectors



# Emissions Trading Program Issues

- Allowance allocation
  - Grandfathering
  - Benchmarking
  - Auction
- Size threshold
  - CHP plants – need flexibility on size threshold
  - Incorporate building emission impacts of DHC
- Ownership issues



# Conclusions

- DHC offers significant GHG reductions
- DHC is particularly important as a low-temperature heat sink for CHP
- Emissions trading can help facilitate CHP and DHC
- Need to consider DHC and CHP in designing emissions trading schemes



**Thank you for your attention!**

**Questions?**

**Contact information:**

**Mark Spurr**

**Phone 612-607-4544**

**Fax 612-338-3427**

**E-mail [mspurr@kattnerfvb.com](mailto:mspurr@kattnerfvb.com)**

