

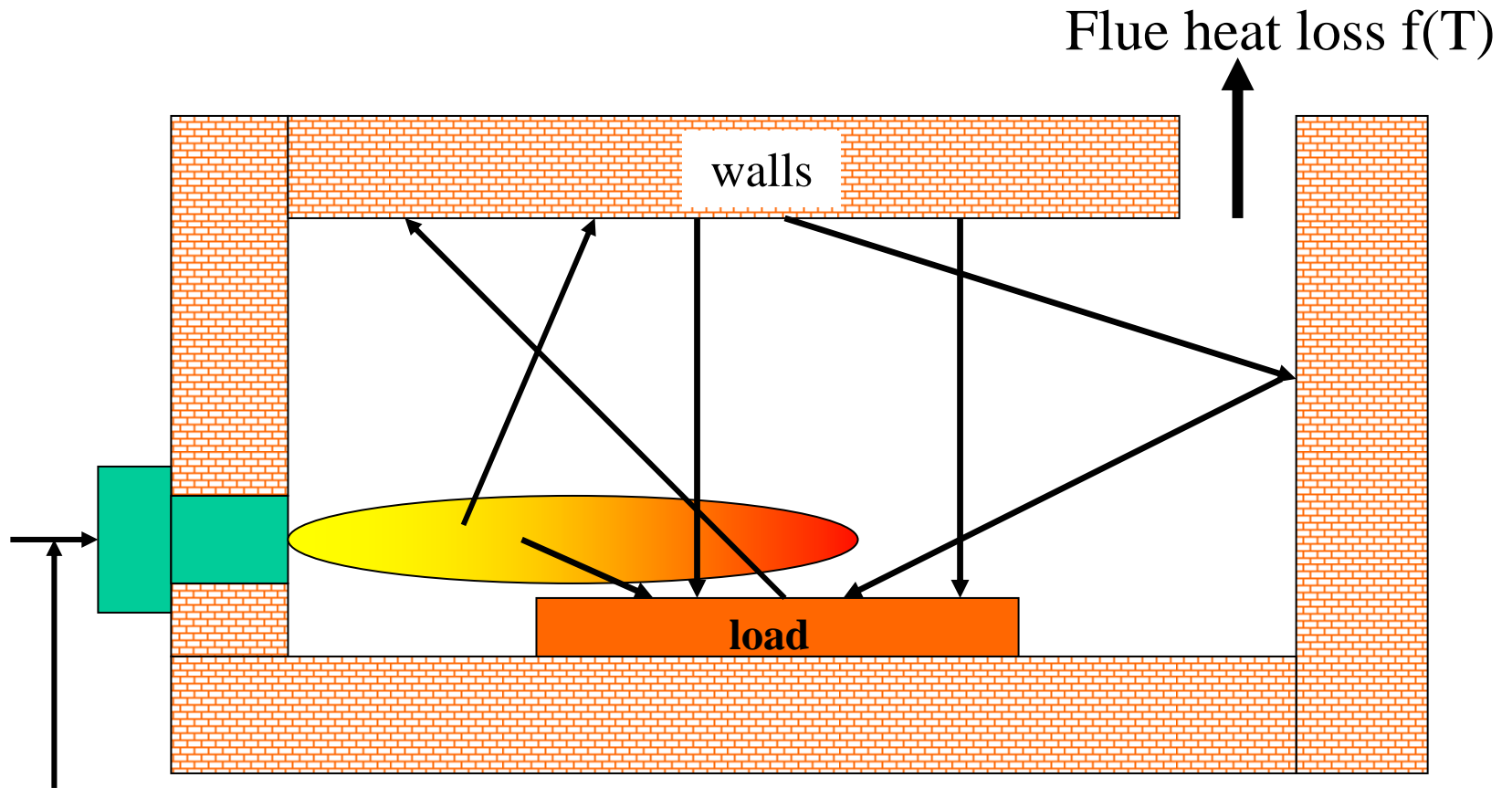


Application of NASA High Emissivity Coating Material to Furnaces

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Radiation Heat Transfer in a Furnace Enclosure



Wall emissivity

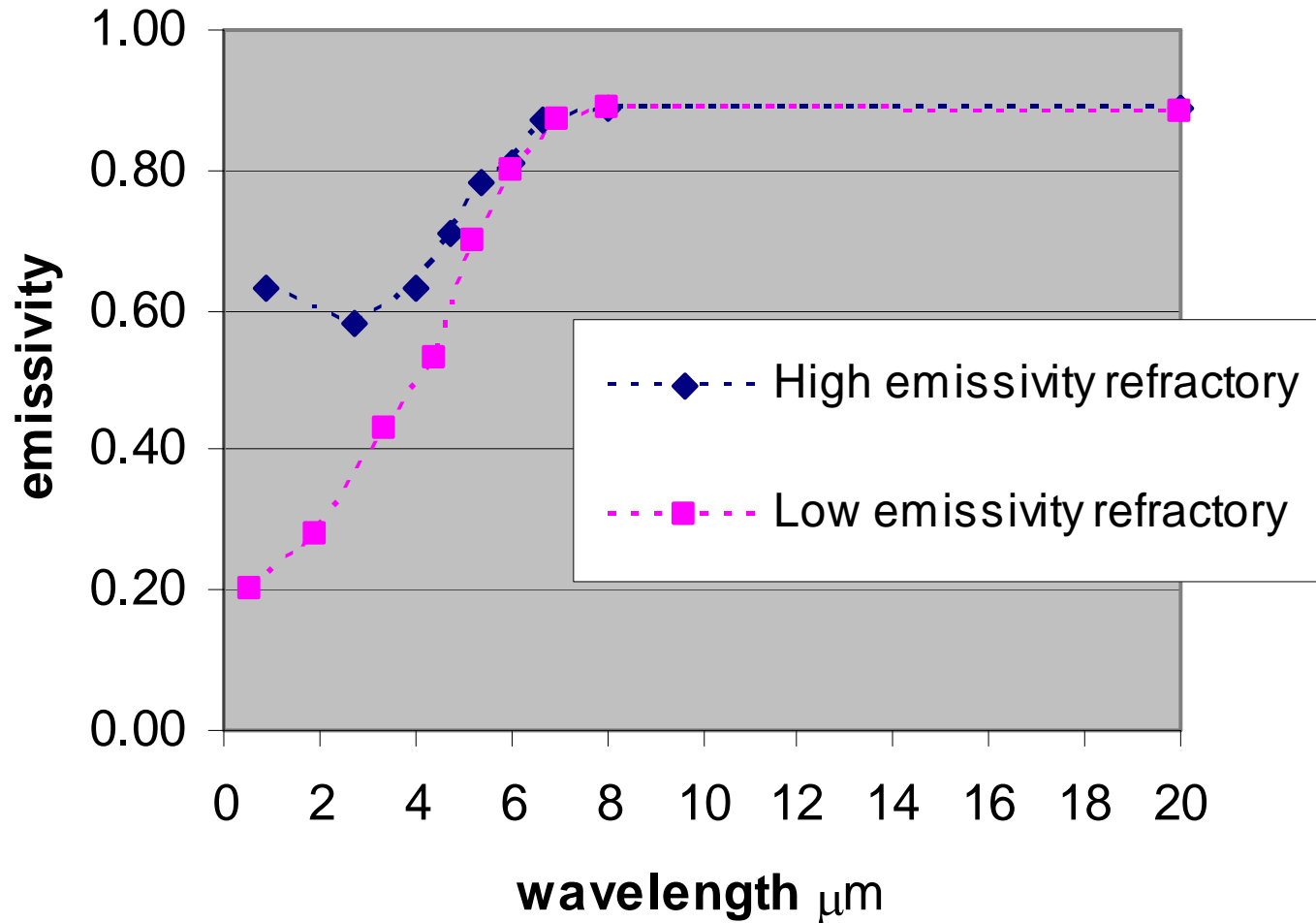
- Proprietary high emissivity furnace wall coatings have been available since 1980's
 - Claimed to save energy by increasing radiant heat transfer
 - Little experience of use in UK to date
- New coating material now available in UK
 - 'Emissield' high ϵ coating from Wessex Inc.
 - Coating developed by and licensed from NASA

Radiant Section of a Reformer Furnace

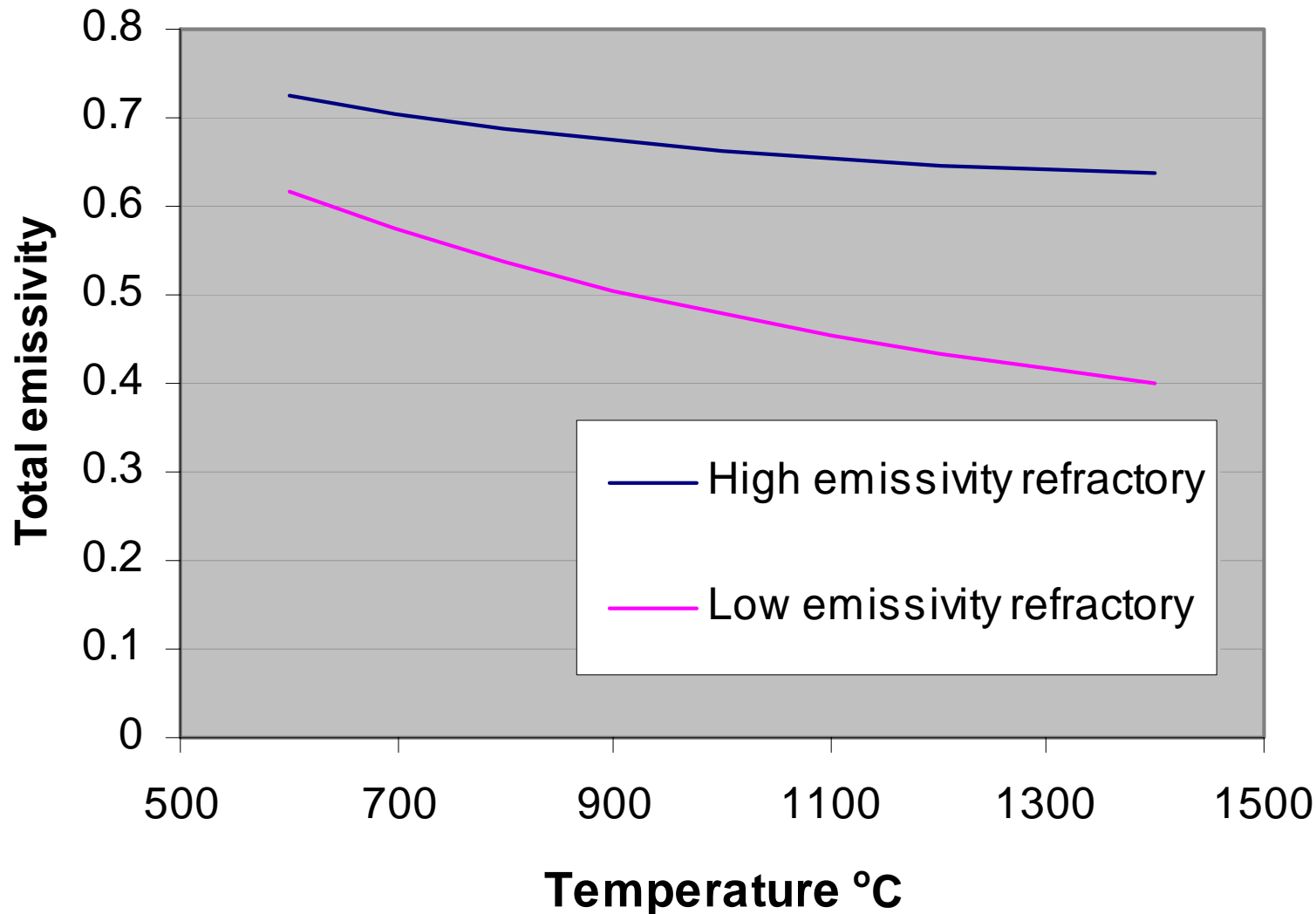
- Modelling study to compare the effect of emissivity of two different refractory linings
- Parameters:
 - Output 7.5 -12 MW
 - Temperature 950°C
 - Methane combustion



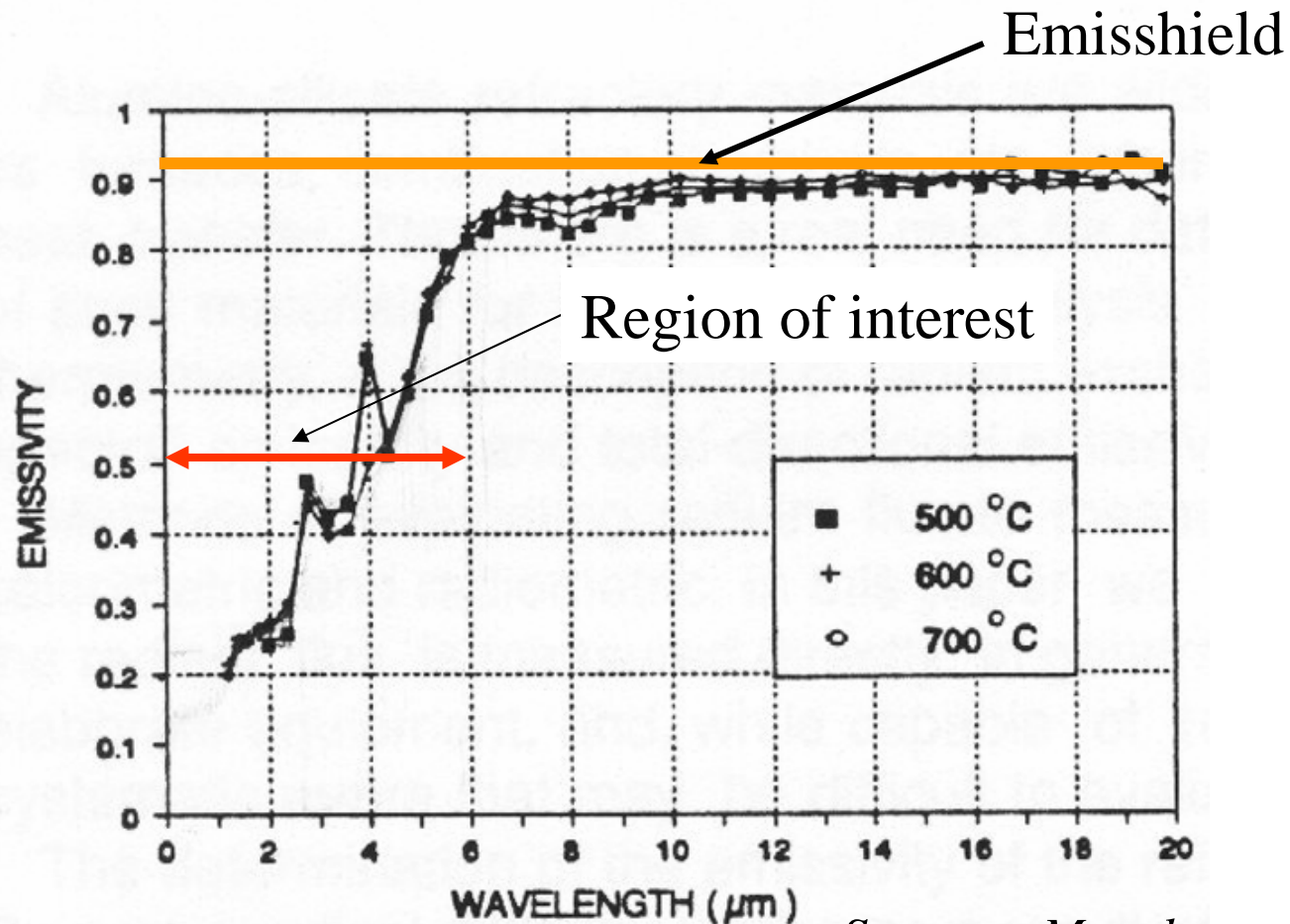
The emissivities of two furnace refractories



The total emissivity of the refractory.



Spectral emissivity measurements have shown that conventional furnace linings have low emissivity at high T
 ϵ can be <0.5 at 1000°C



Source – Manchester University

Increasing emissivity can result in larger increase in plant capacity:

Wall ϵ	Fuel input MW	Heat output MW	Efficiency % net	Mean gas T°C	
0.5	13.93	5.7	41.12	1200	12% increase output at same efficiency
0.9	15.54	6.389	41.12	1200	
0.5	15.95	6.389	39.98	1222	2.6% reduction in energy at same output
0.9	15.54	6.389	41.12	1200	

Conclusions

- Increasing emissivity can provide small, but cost effective energy savings
- Increase in maximum plant capacity may be more significant economically
 - Leads to significant indirect energy savings