

BASA NJENGO MAGOGO

Laboratory controlled Quantitative information about the reduction in air pollution using the BNM methodology and its applicability to low smoke fuels

Presentation for
Fossil Fuel Foundation of South Africa
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Overview

- Introduction
- Experimental
- Results and conclusions
 - Emissions
 - Cost savings

Introduction

- 42 Mton of coal is used by households in South Africa that causes many health problems especially respiratory conditions
- Possible ways to alleviate the problem
 - Electrification
 - Low smoke fuels
 - Low smoke appliances
 - Basa Njengo Magogo

First: add coal



Second: add paper



Third: add wood and extra coal



First 10 minutes with chimney

- BNM method



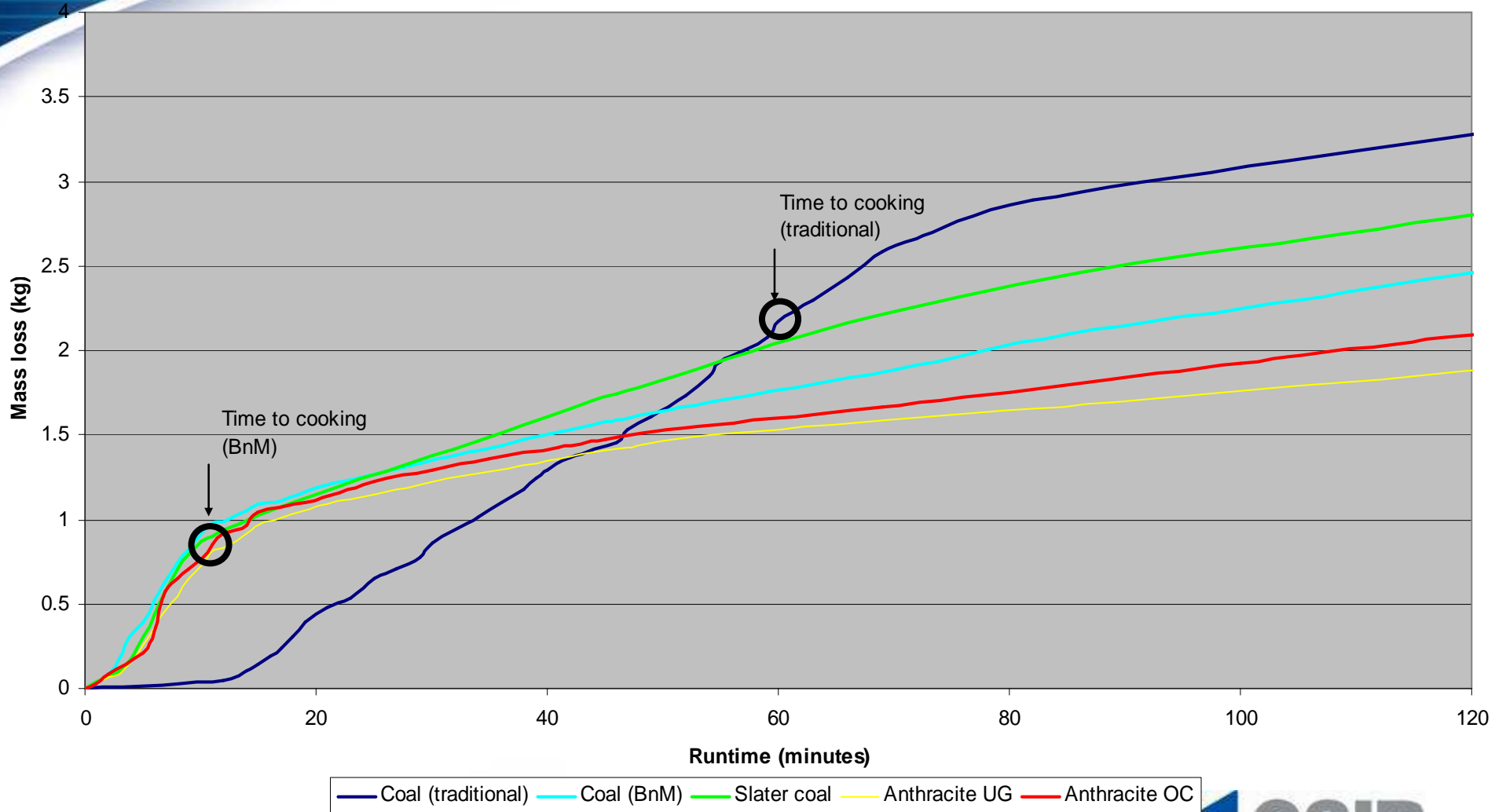
- Traditional method



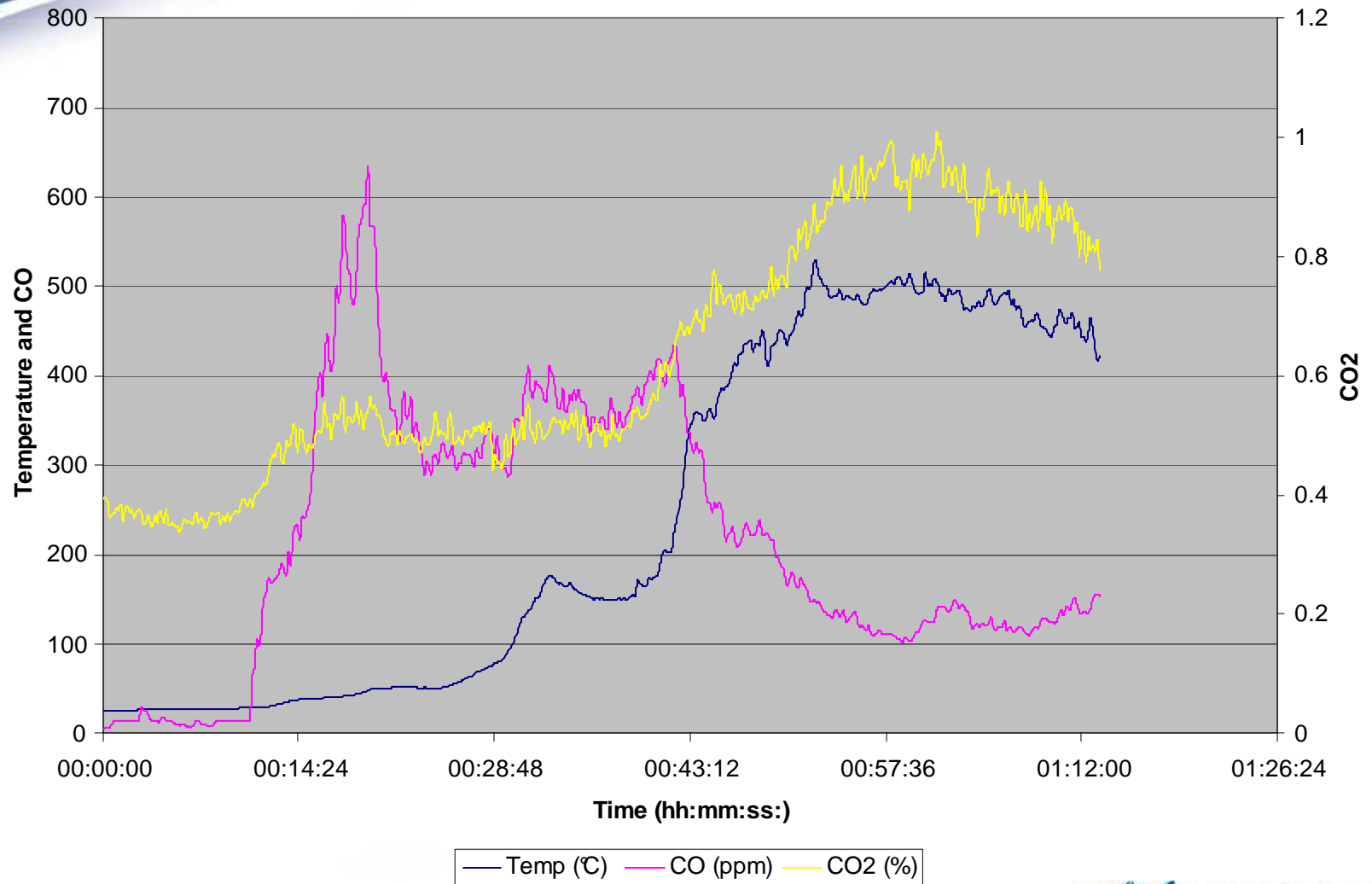
Fuel analysis

<u>Proximate</u>	Coal	Anthracite UG	Anthracite OC	Slater Coal	Wood
Gross Calorific value (MJ/kg)	25.08	30.60	30.85	29.57	17.18
Ash (%)	17.90	10.20	8.50	14.00	7.10
Volatile matter (%)	23.50	12.00	10.60	18.40	5.10
Fixed carbon (%)	55.30	76.60	79.10	65.60	68.70
H2O (%)	3.30	1.20	1.80	2.00	19.10
Total Sulphur (%)	0.53	1.60	1.93	1.90	0.05
<u>Ultimate analysis</u>					
Carbon(%)	65.44	76.02	72.18	72.18	46.02
Hydrogen(%)	3.31	3.42	3.74	3.74	5.21
Nitrogen(%)	1.50	2.08	1.93	1.93	0.69
Sulphur(%)	0.53	1.60	1.93	1.90	0.05
Oxygen(%)	8.02	3.50	4.25	4.25	35.83

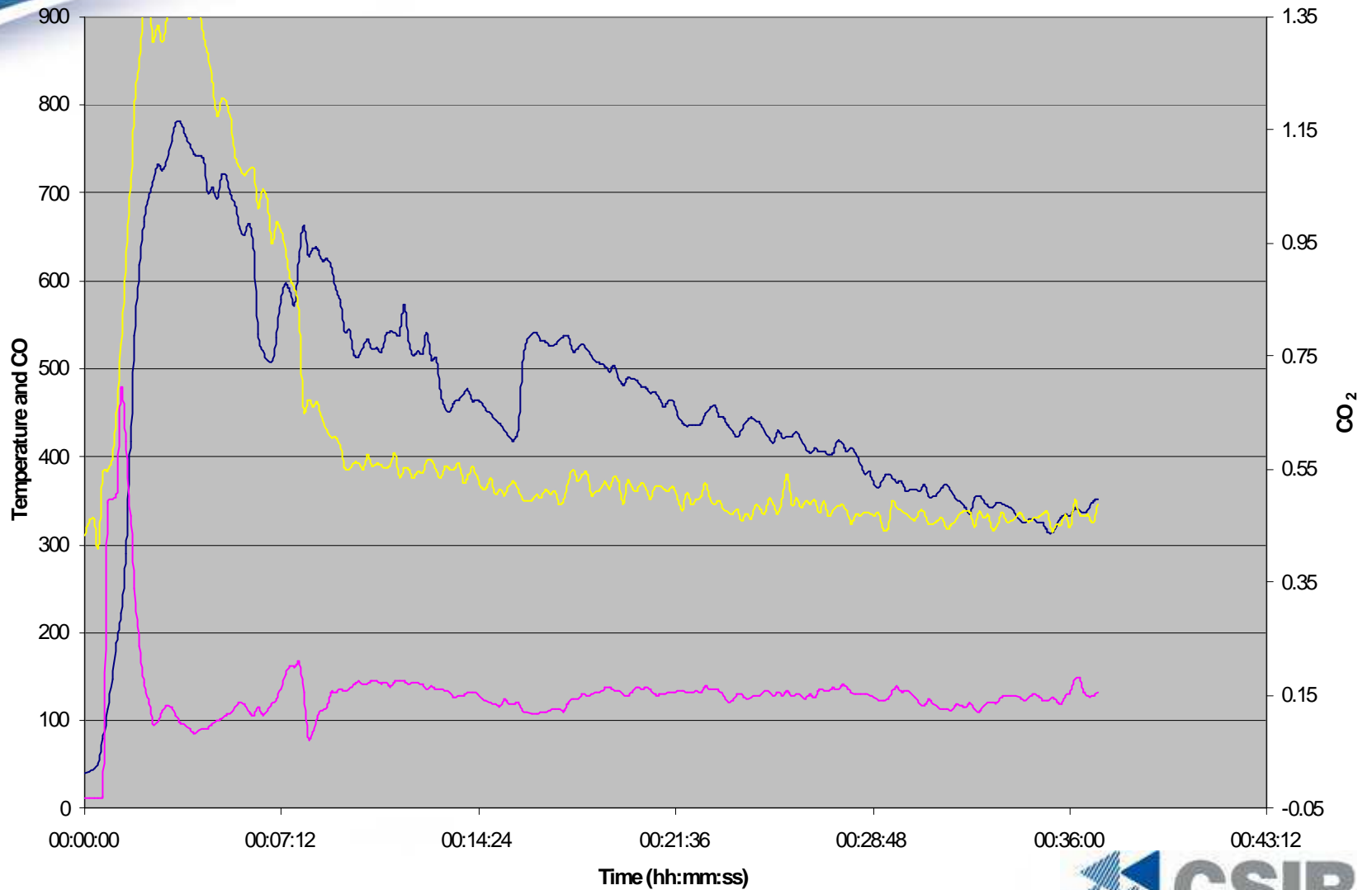
Mass loss vs. Time over two hours



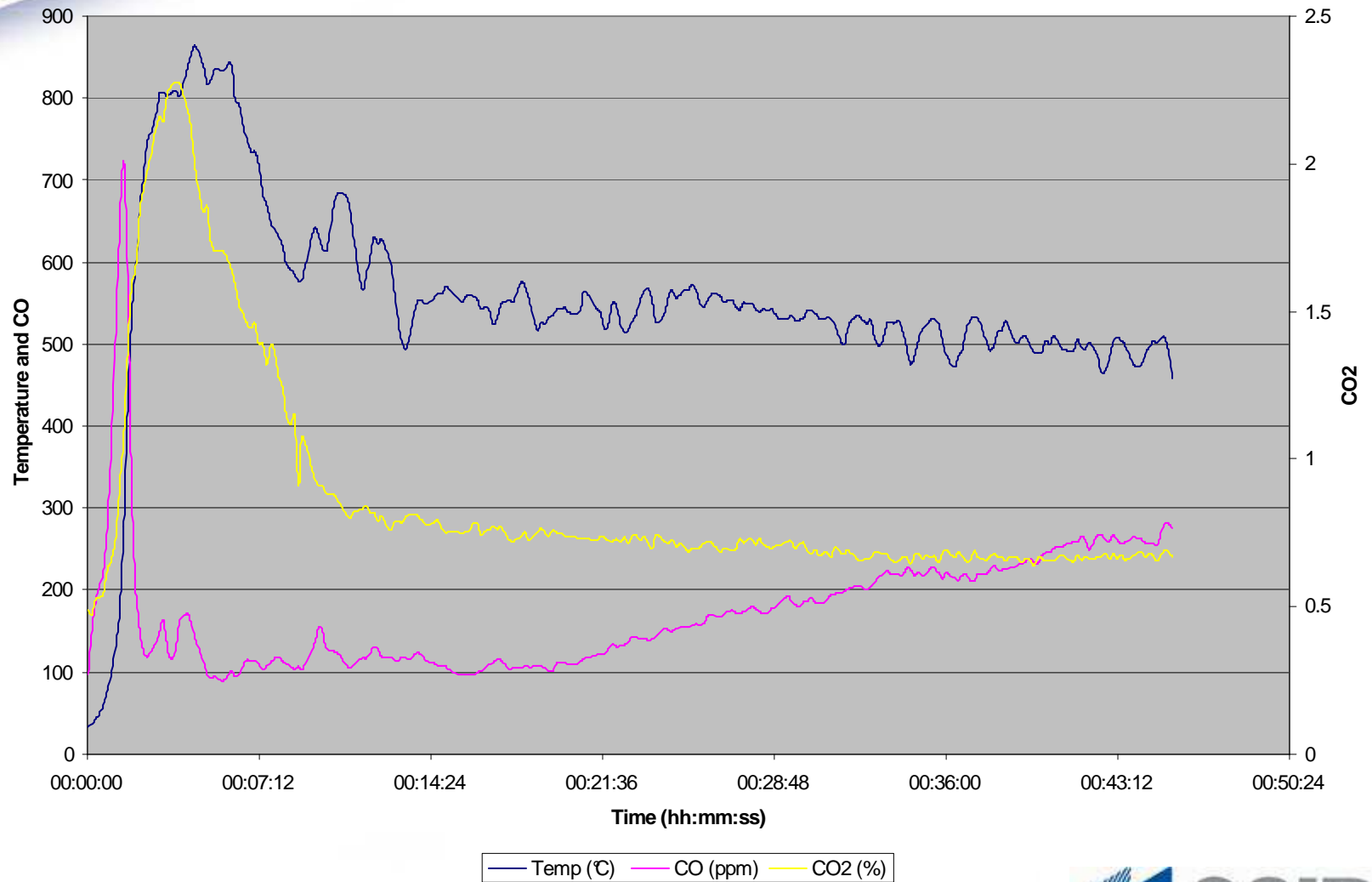
Coal (traditional)



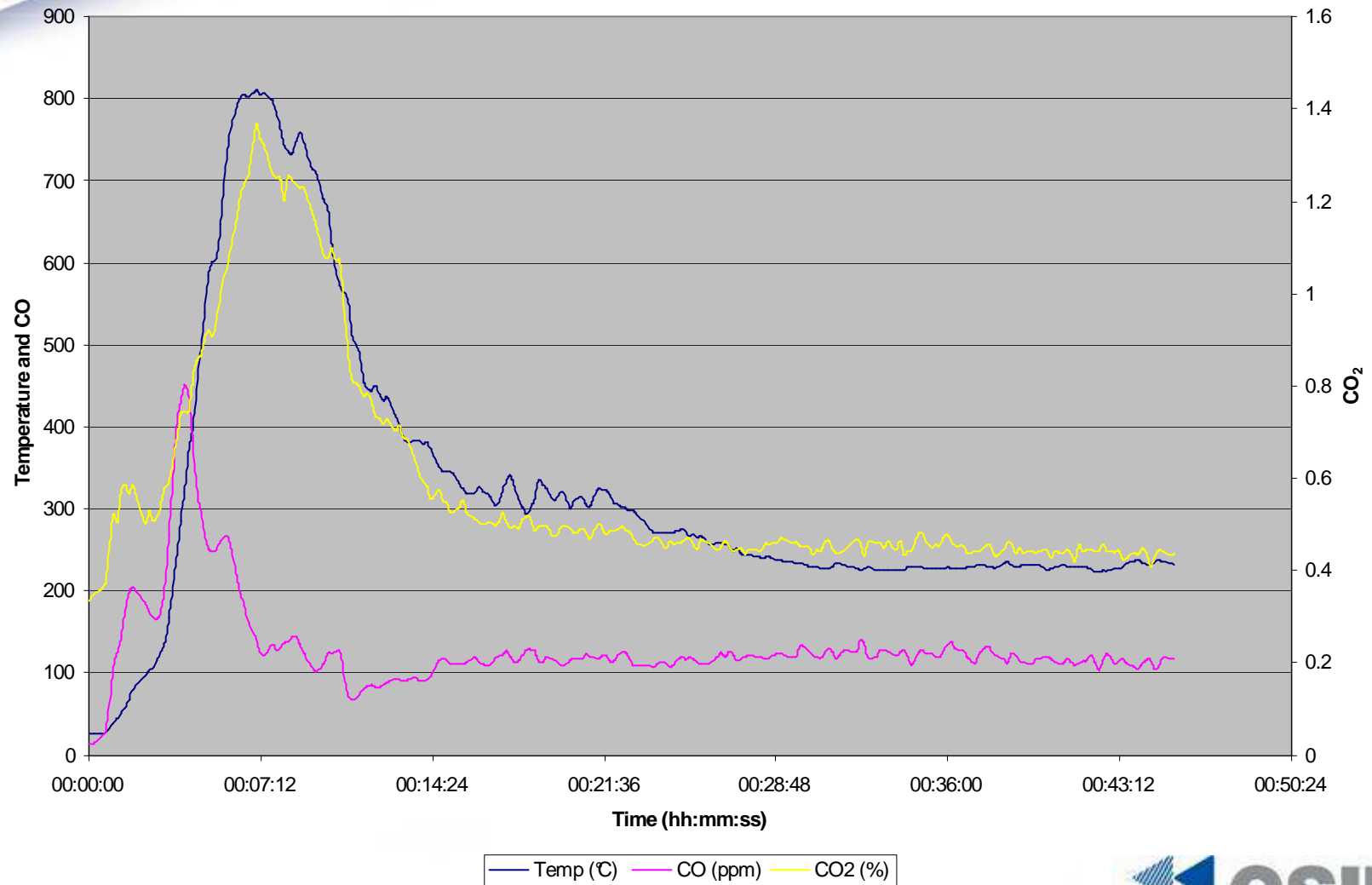
Coal (BNM)



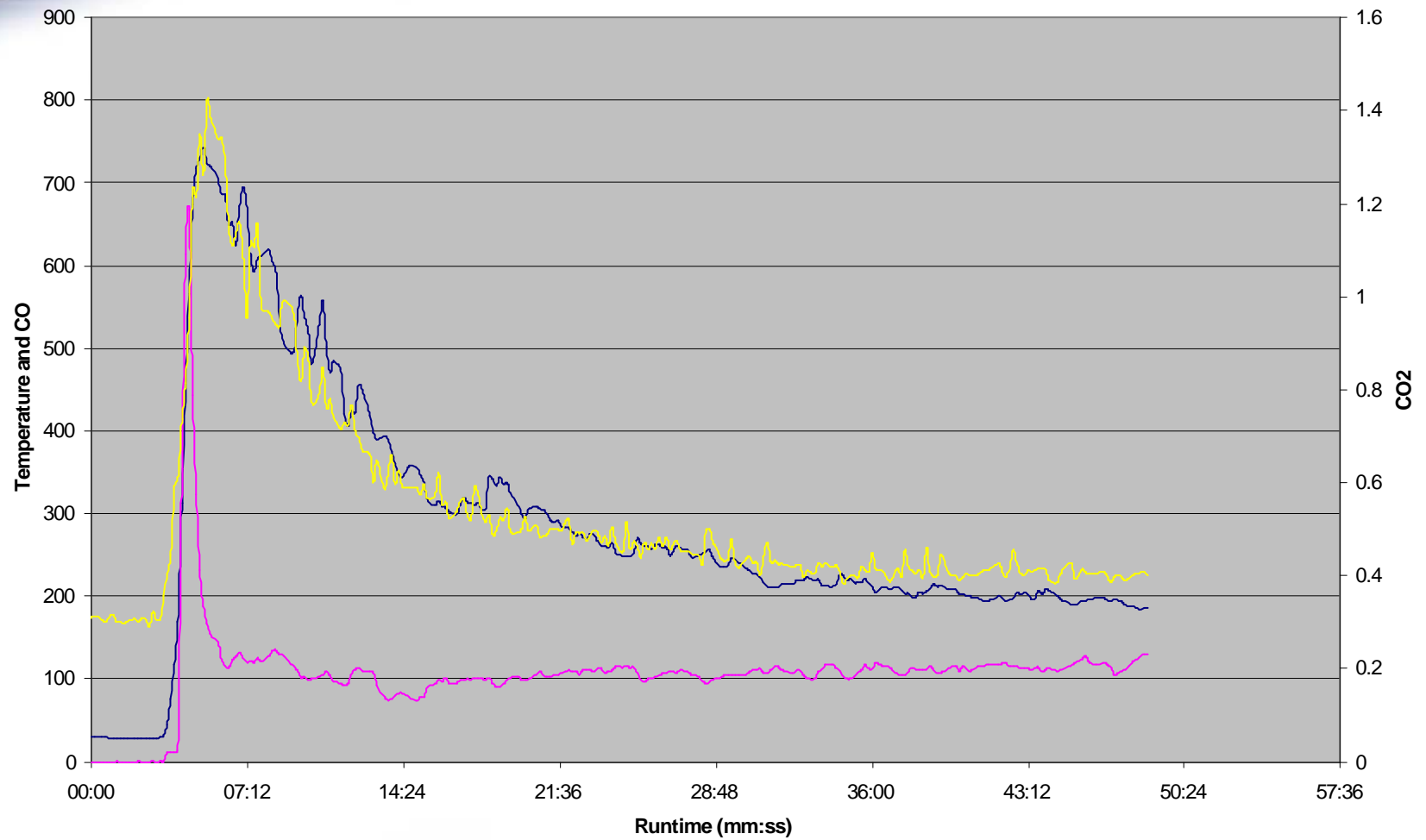
Slater coal (BNM)



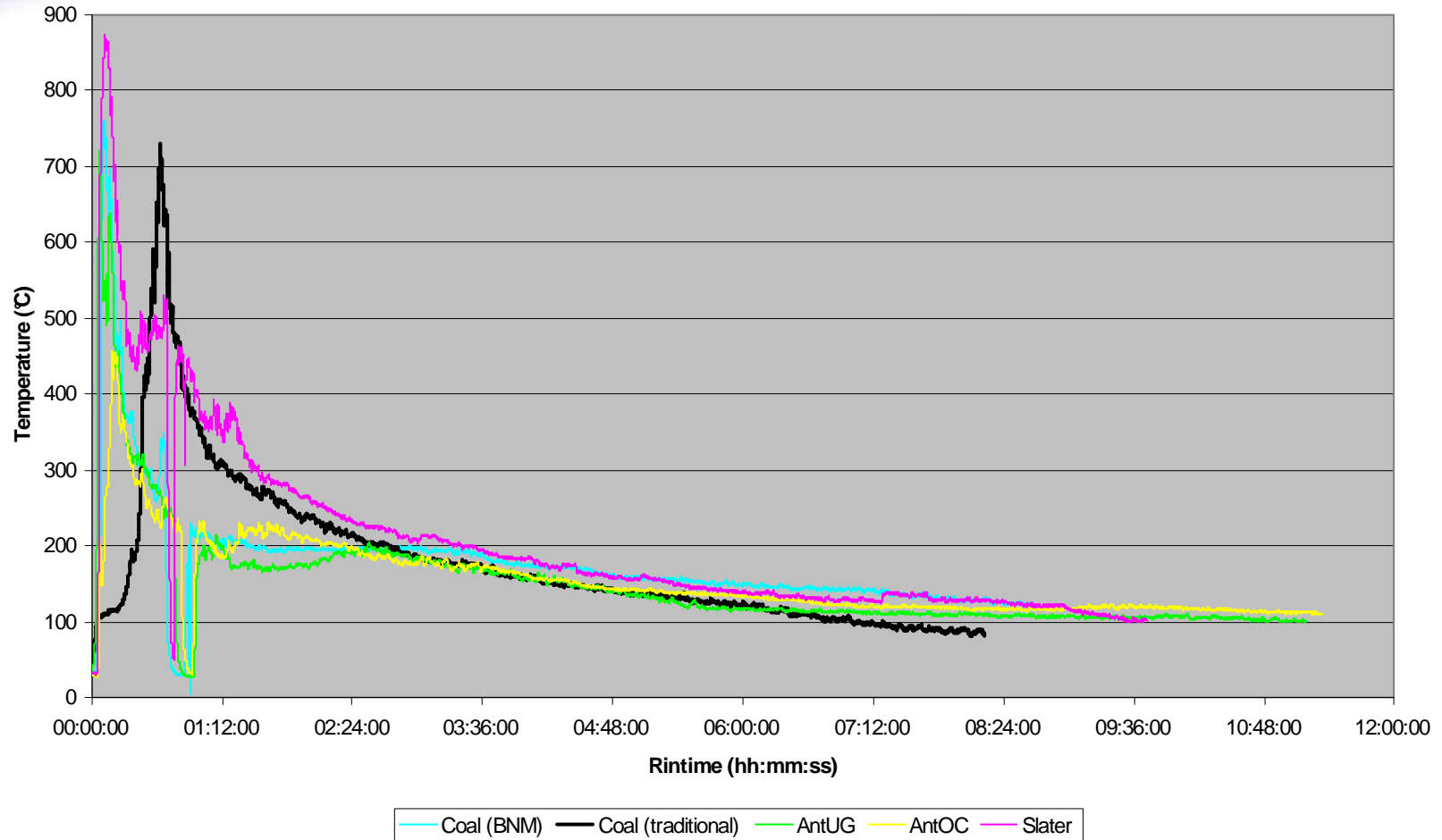
Anthracite UG (BNM)



Anthracite OC (BNM)



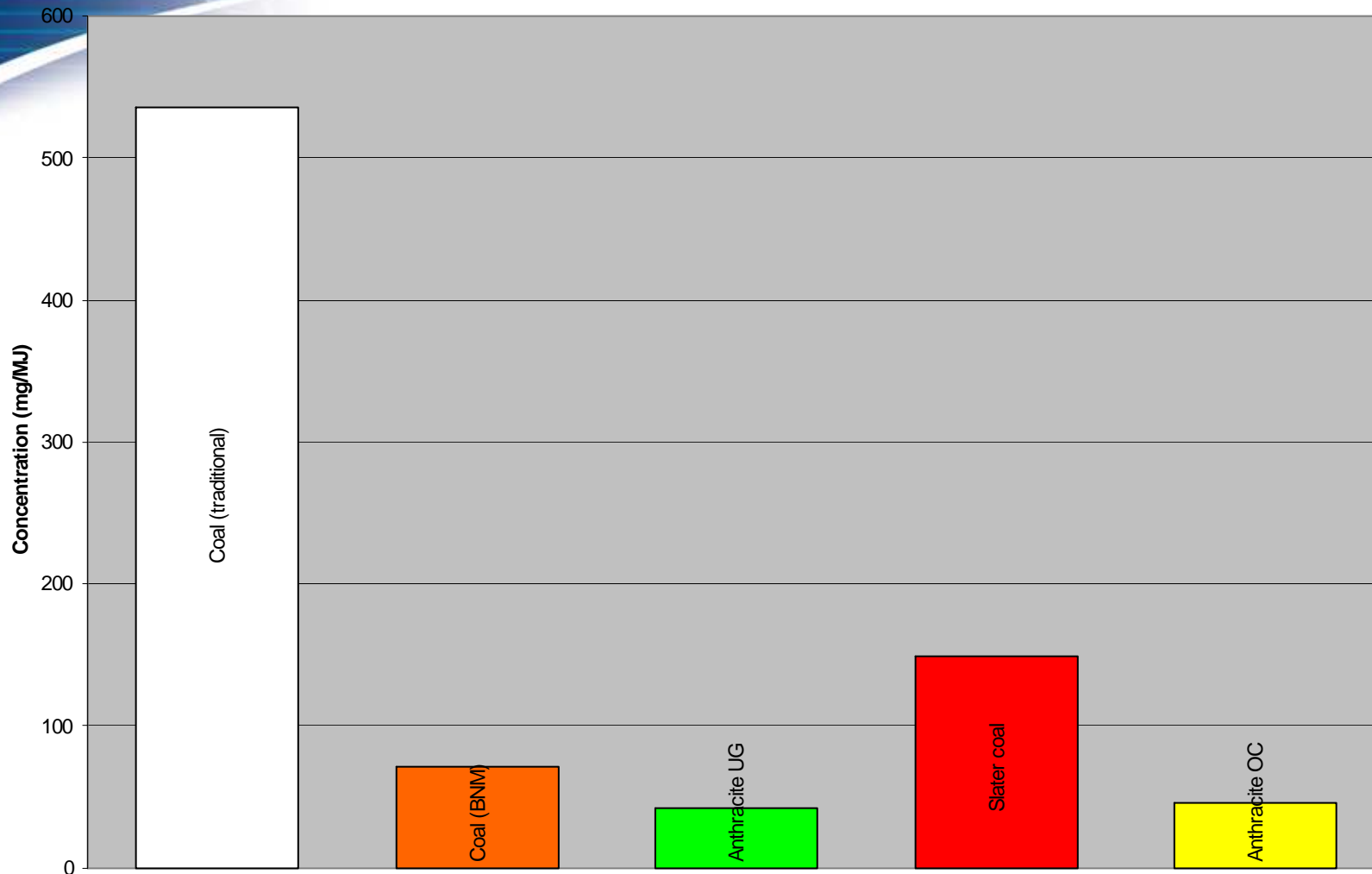
Temperature combination of the 5 runs



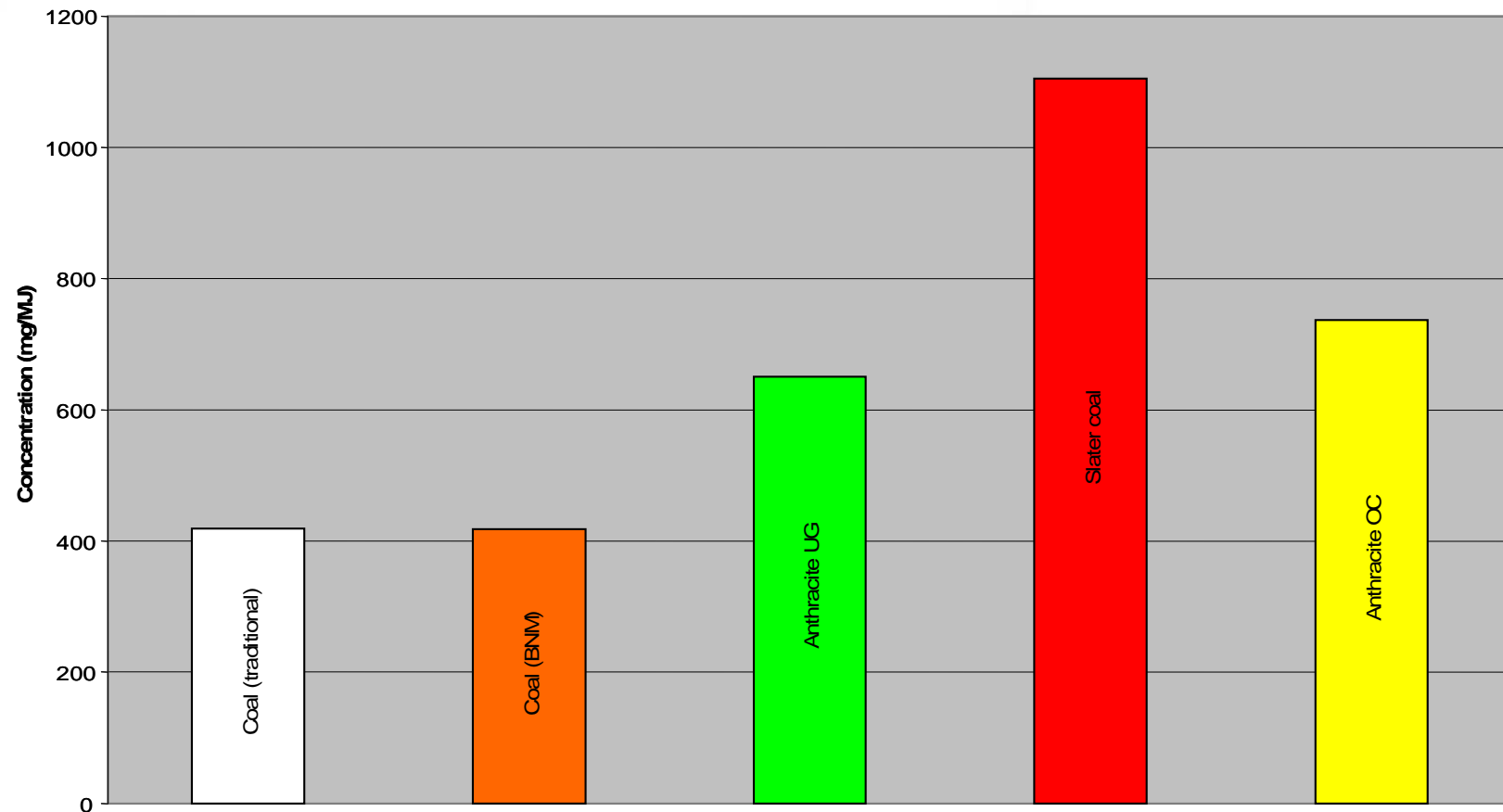
Summary of emission results

	Solid concentration (mg/MJ)	SO ₂ emitted (mg/MJ)
Coal (traditional)	536	418
Coal (BNM)	71	417
Anthracite UG	42	702
Anthracite OC	46	736
Slater coal	149	1104

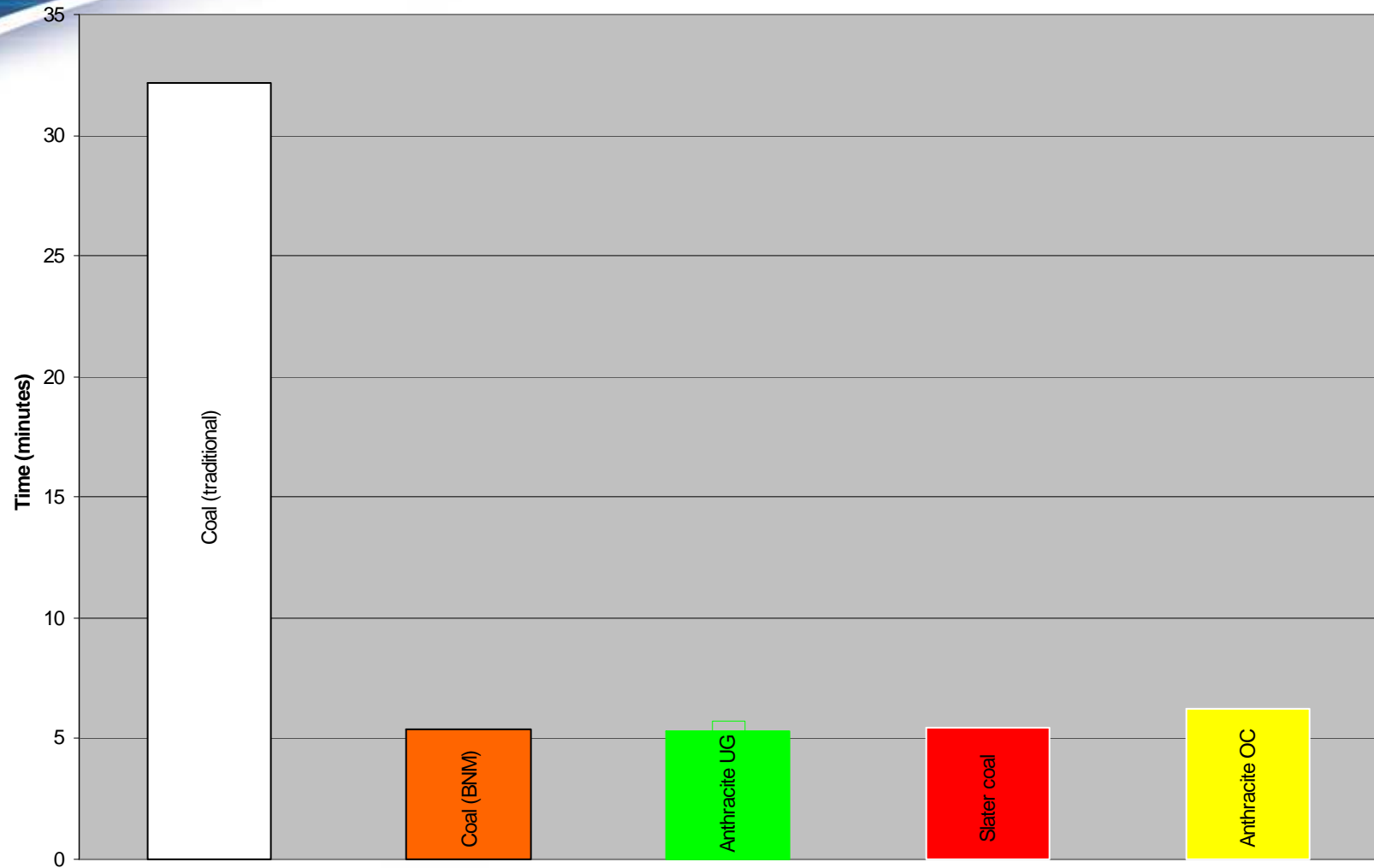
Particulate emissions



SO₂ emissions



Time to cooking temperature



Cost saving

- **The BNM method of ignition uses approximately 1.2 kg (20 %) less coal to reach cooking temperature than the traditional method.**
- **At a cost of approximately R0.93 per kilogram of coal this translates into a cost savings of approximately R30 per month.**
- ****South Africa produces 246 million tons of coal and uses 178 million tons per year (2.5 million tons for household use).**
- **A 20 % saving in coal cost translates to ~370 million rand per year.**

- ****<http://www.nationmaster.com/country/sf/Energy>**
- ***http://www.worldenergy.org/wec-geis/publications/reports/pedc/cases/south_africa.asp**

Acknowledgements

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THANK YOU FOR YOUR ATTENTION