

# Impact of Biodiesel on Cad Cell Performance

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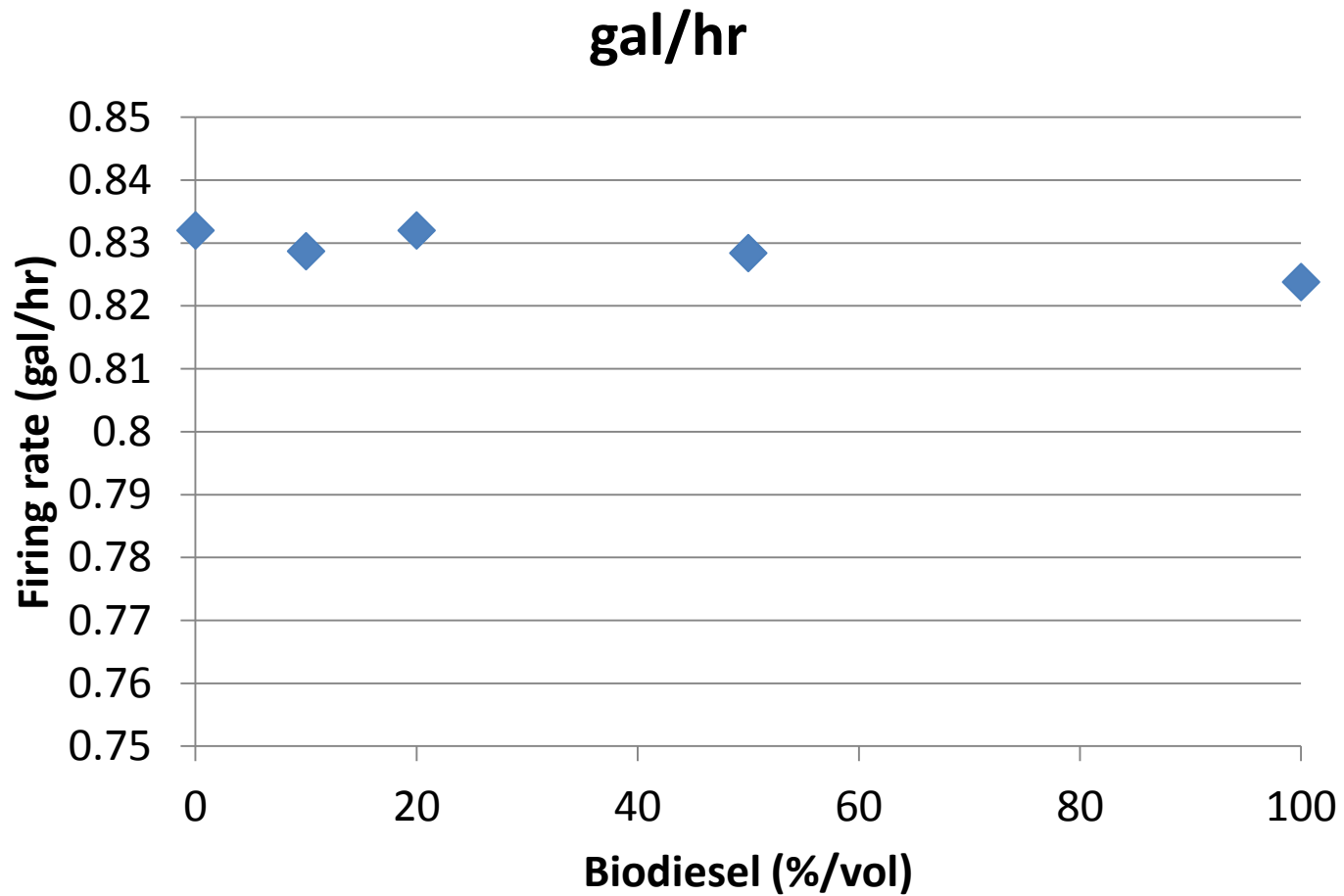
Technical Workshop  
Sept. 19, 2017

1. NORA Intern – State University of New York at Stony Brook

## Tests in 2015 at BNL

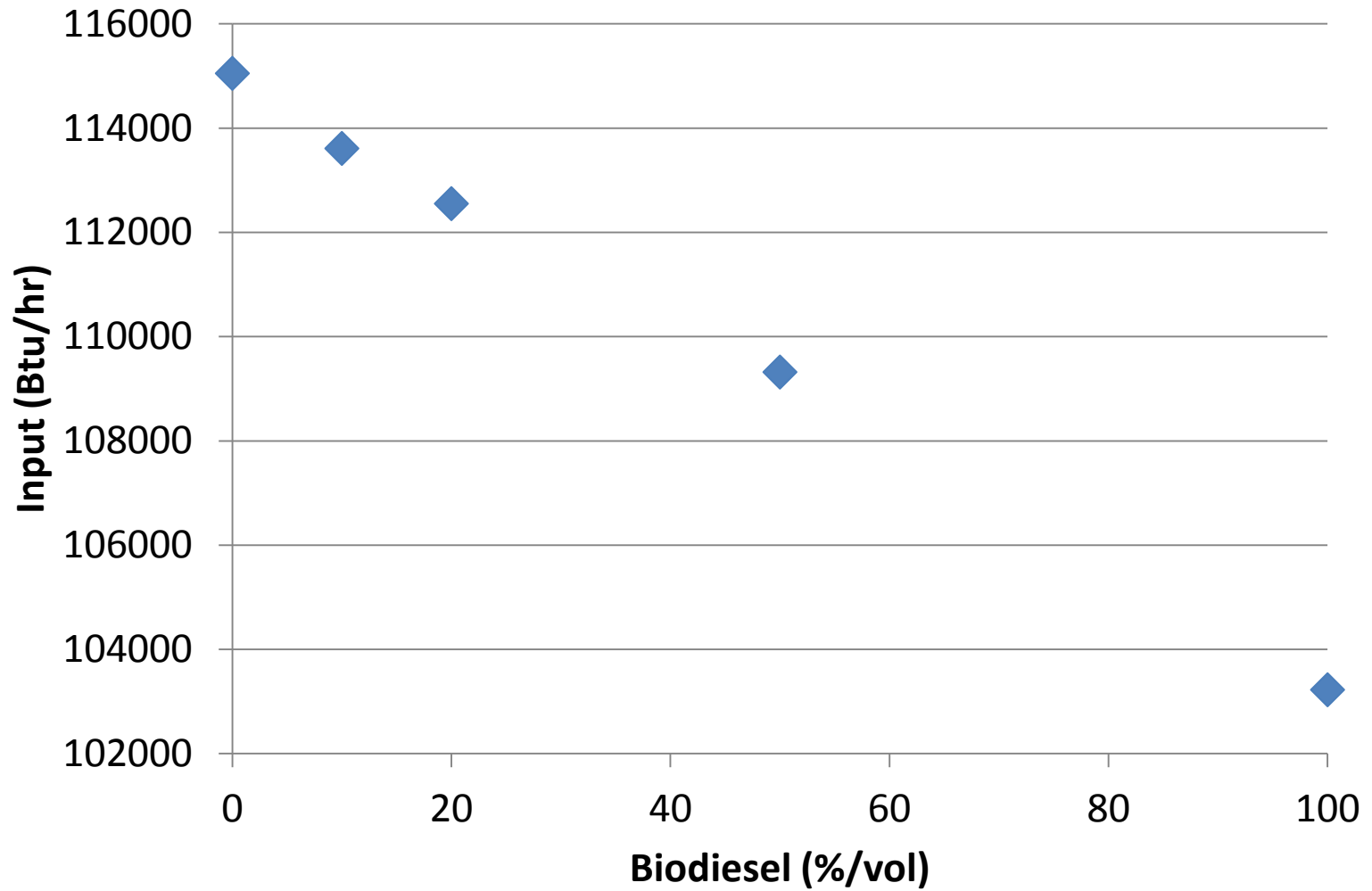
- Biodiesel provided by Hero BX, with detailed analysis.
- Test done in two phases
  - Fix air shutter and vary biodiesel blend level
  - At B100, adjust air shutter (excess air) to evaluate cad cell resistance with a re-tuned burner

# Tests in 2015 at BNL

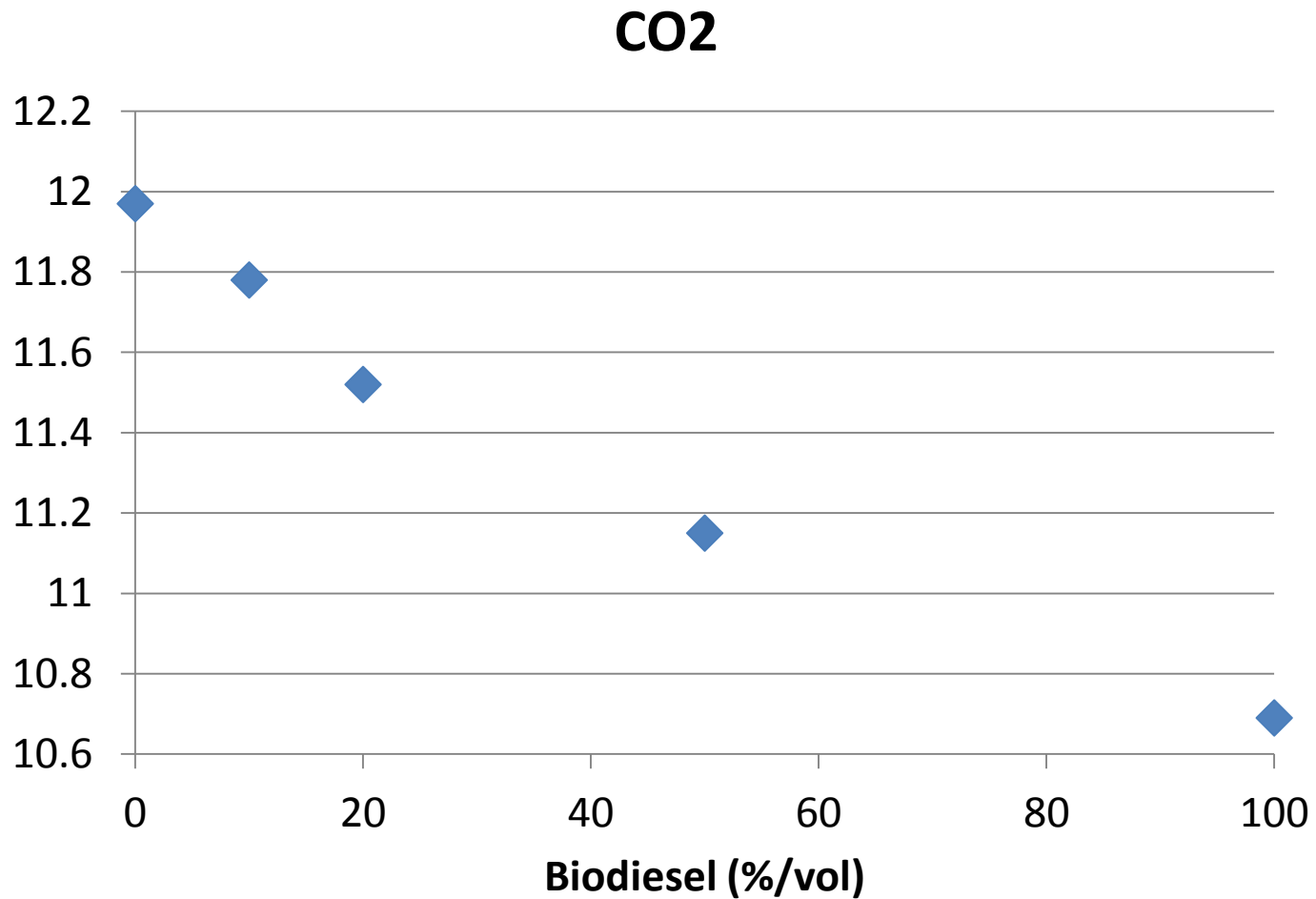


# Tests in 2015 at BNL

## Heat Input Rate

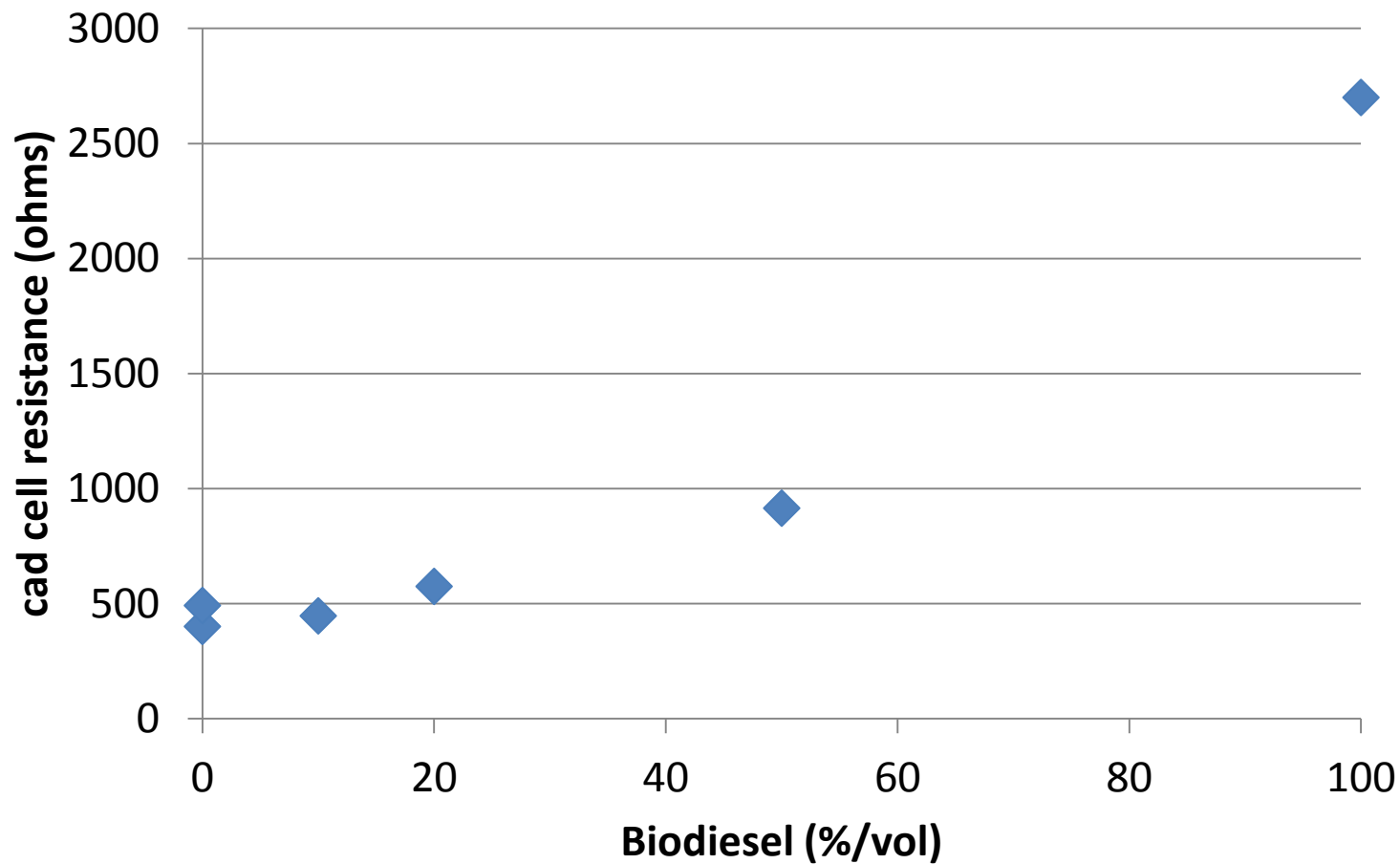


# Results – Tests at BNL in 2015



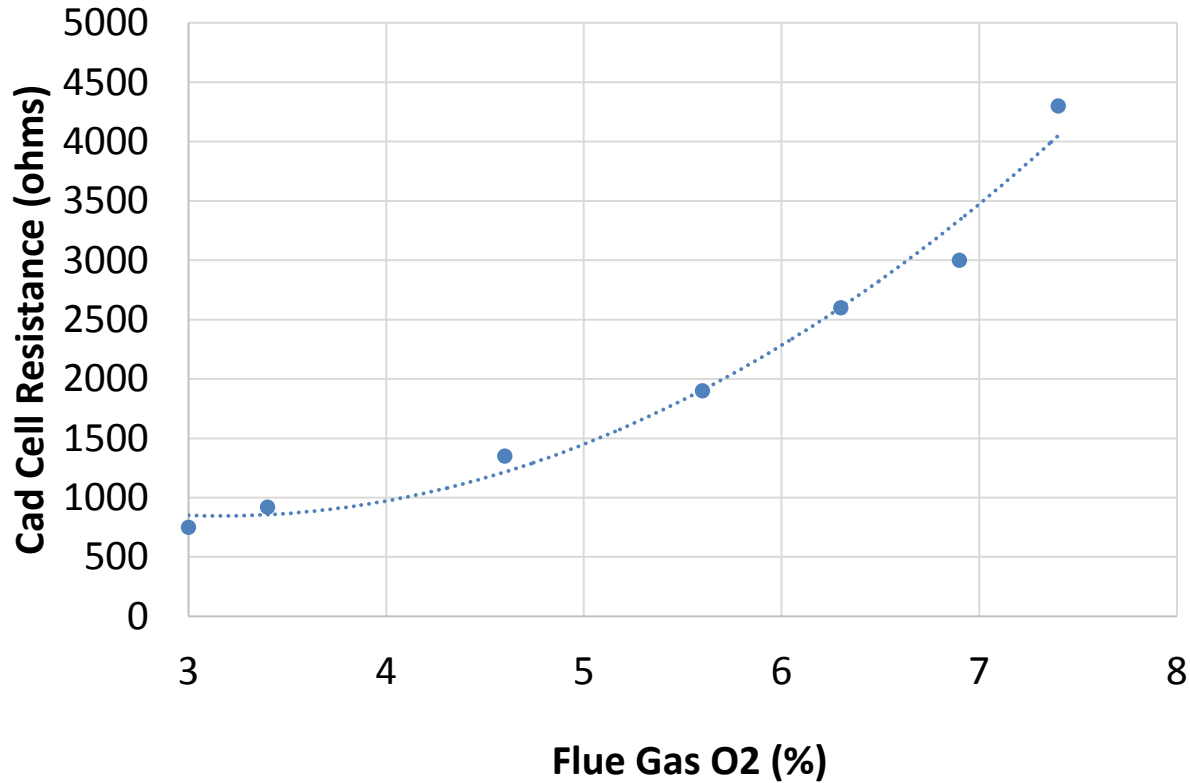
# Results – Tests at BNL 2015

## Cad Cell



# Results – Tests at BNL in 2015

## Cad Cell - B100

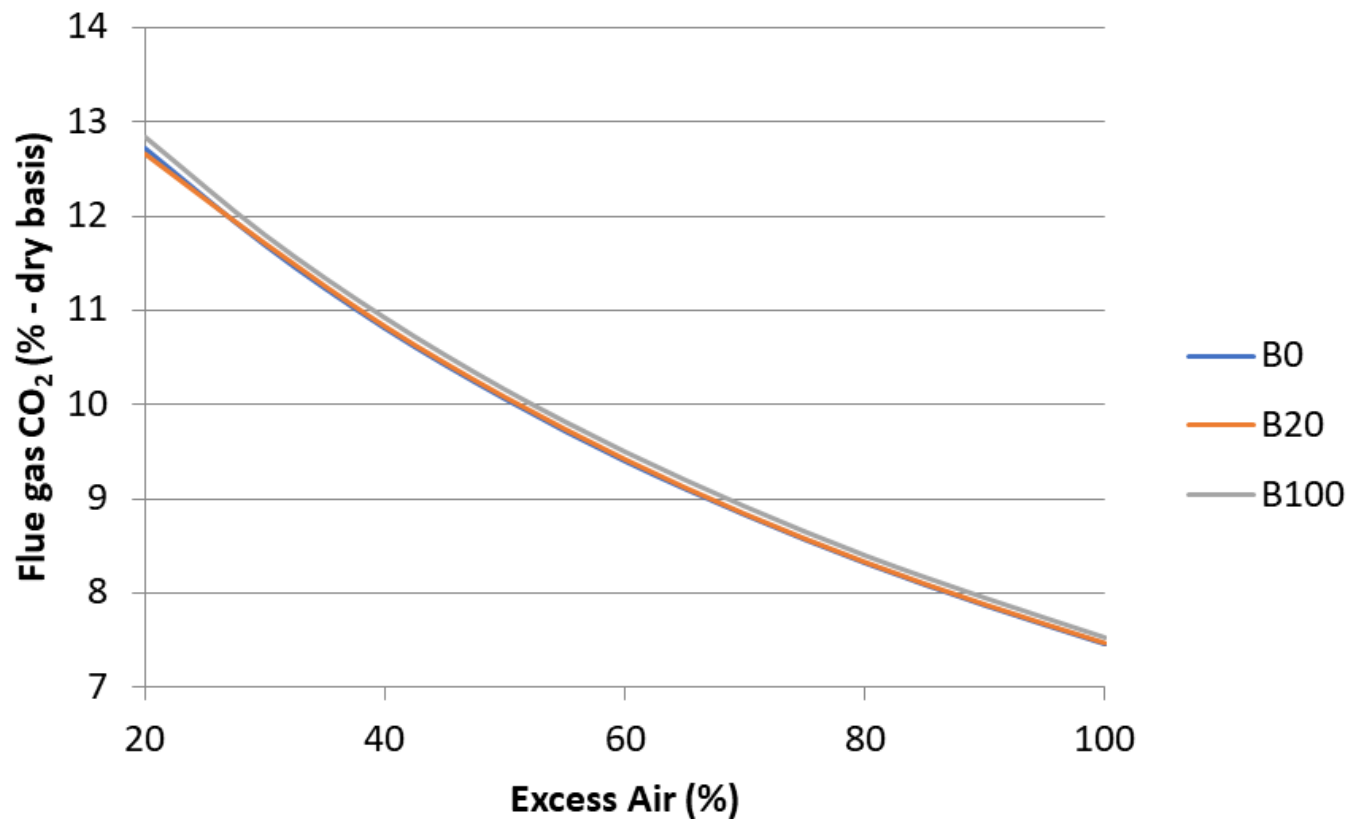


## Tests at NORA 2017

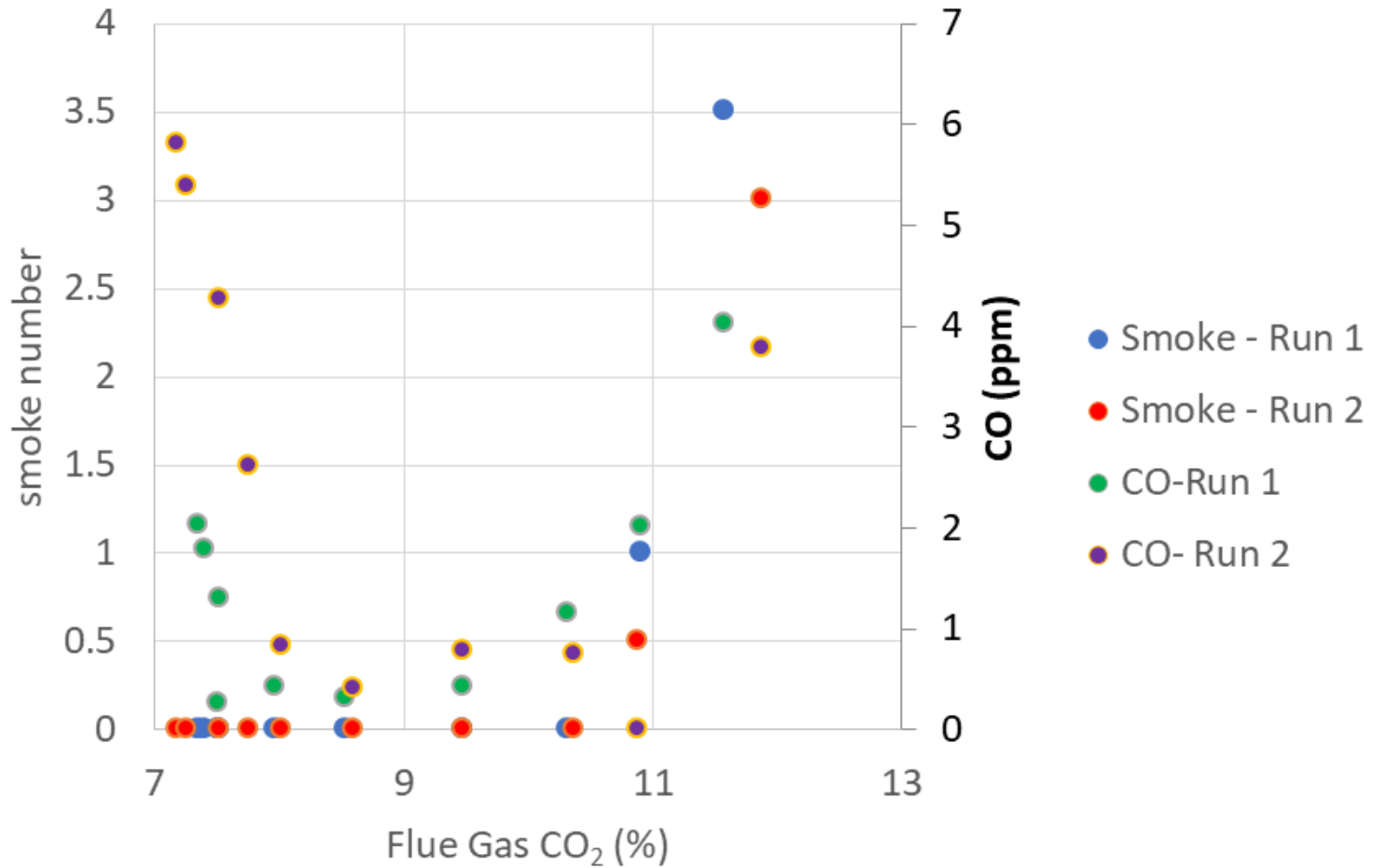
- Two Biodiesel (B-100) samples provided by REG with analysis. One from soy, one from tallow.
- B0, B20, and B100 fuels tested with each.



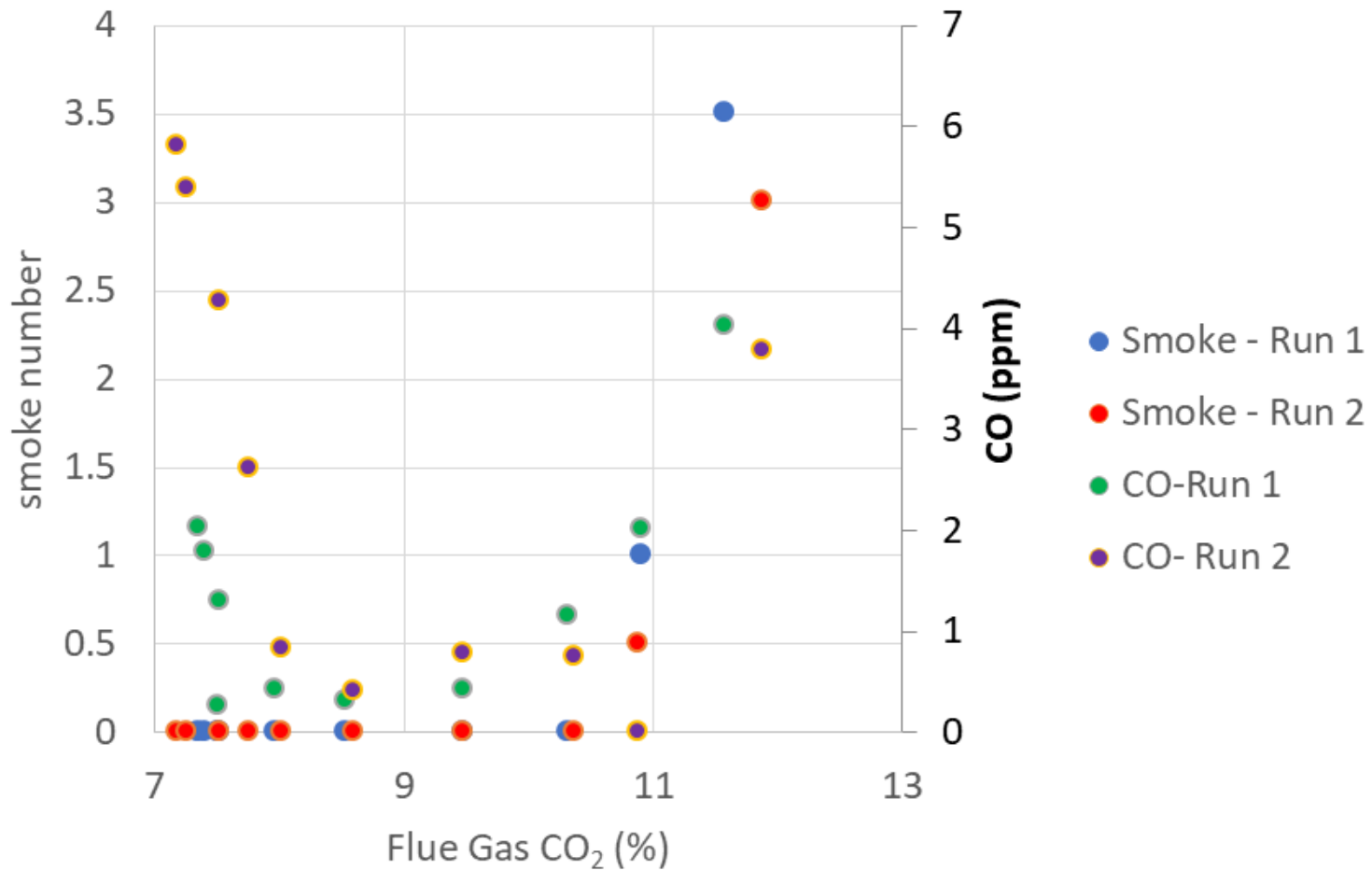
# Results – Tests at NORA 2017



# Results – Tests at NORA 2017

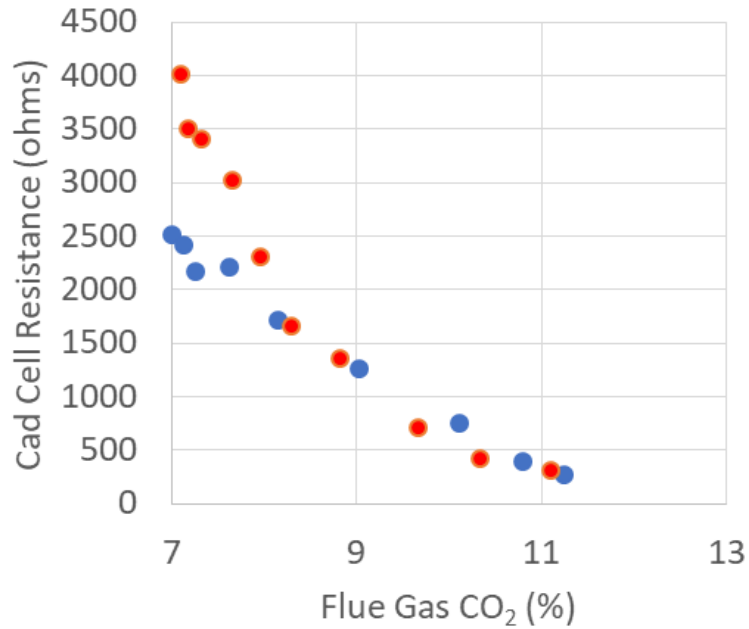


# Results – Tests at NORA 2017

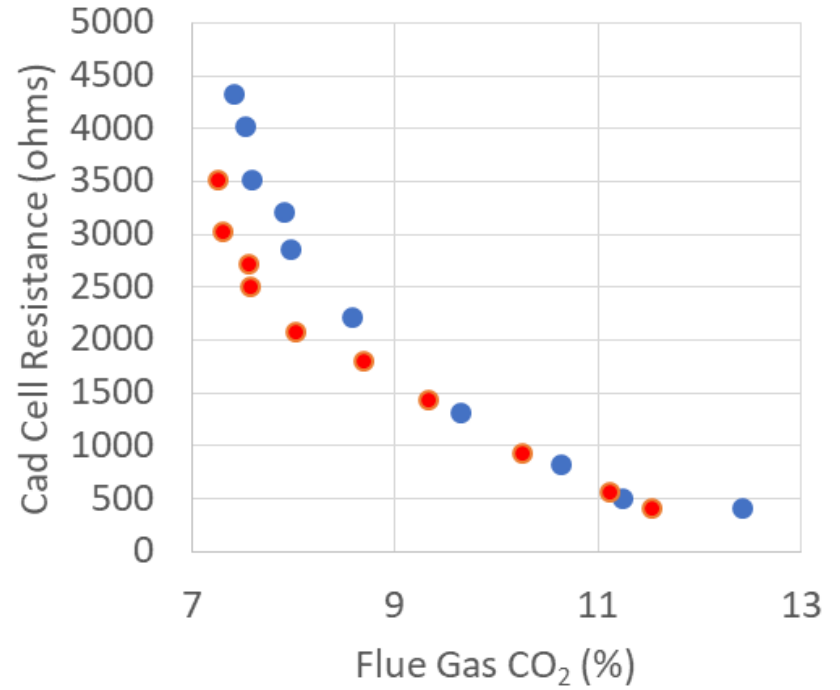


Base No. 2 petroleum heating oil

# Results – Tests at NORA 2017



Soy B100



Tallow B100

## Results – Tests at NORA 2017

Fuel	Average cad cell resistance at 11% CO <sub>2</sub>
B0	145
B20 Soy	167
B20 Tallow	163
B100 Soy	391
B100 Tallow	843

## Results – Tests at NORA 2017

Fuel	Average CO <sub>2</sub> at 1600 ohms (%)
No. 2 oil	Target ohms not obtained
B20 Soy	8.2
B20 Tallow	7.5
B100 Soy	8.3
B100 Tallow	9.0

For this burner primary control, the manufacturer's instructions recommend that the cad cell resistance in steady state should be under 1600 ohms.

## Conclusions – Tests at NORA 2017

- Tests with B0, B20, and B100 completed with soy and tallow-based biodiesel in a conventional burner;
- Generally performance trends similar;
- At high excess air cad cell resistance becomes high and fluctuates strongly;
- All fuels tested provided cad cell resistance under the recommended 1600 ohms in steady state at 11% CO<sub>2</sub>;
- The tallow-based biodiesel showed higher cad cell resistance than the soy-based biodiesel at the B100 level.