

Laboratory commissioning, testing, and measurement validation training in Uganda

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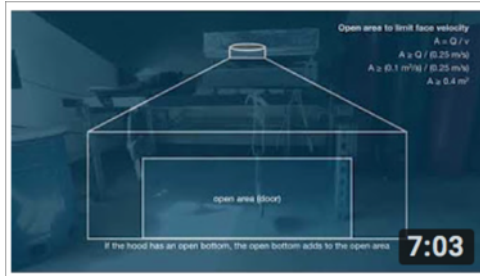


An Educational, Online Video Training Course to Improve Biomass Cookstove Research



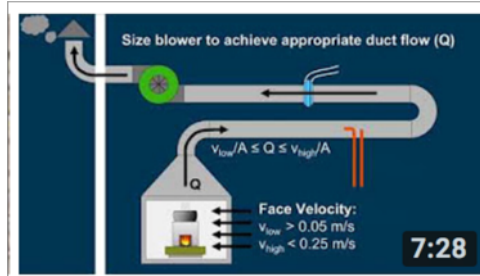
7:21

01 Introduction: LBNL Course on Laboratory Testing of



7:03

02 The Hood: LBNL Course on Laboratory Testing of



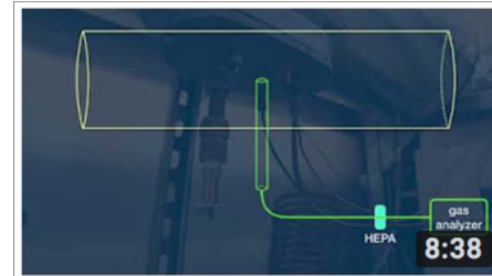
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03 The Duct: LBNL Course on Laboratory Testing of



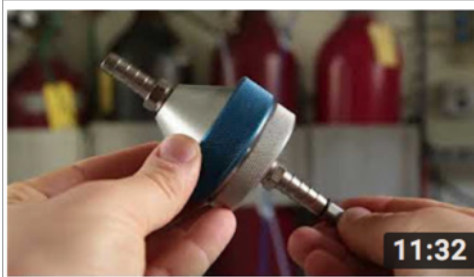
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04 Measuring Fuel and Water: LBNL Course on



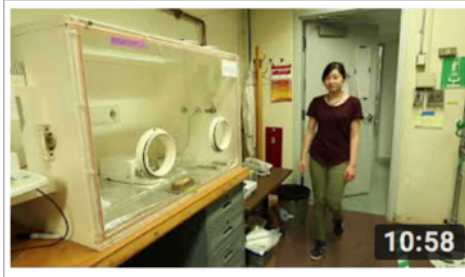
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05 Sampling Gases: LBNL Course on Laboratory Testing



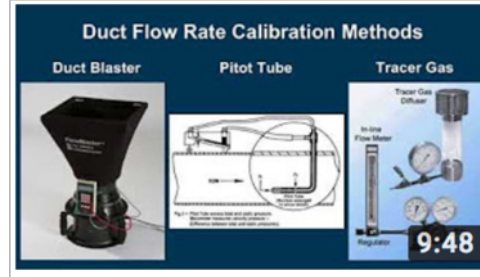
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06 Sampling Particles: LBNL Course on Laboratory Testing



10:58

07 Weighing Filters: LBNL Course on Laboratory Testing



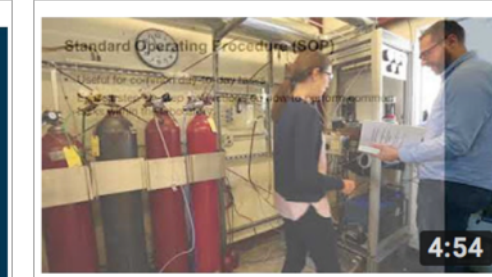
9:48

08 Commissioning and Calibration: LBNL Course on



13:46

09 Advanced Lab Topics and Real-Time Aerosols: LBNL



4:54

10 QAP and SOP: LBNL Course on Laboratory Testing

cookstoves.lbl.gov/techtransfer

OBJECTIVE OF TRAINING COURSE
**PROMOTE ROBUST DATA COLLECTION IN COOKSTOVE
RESEARCH AND TESTING CENTERS AROUND THE WORLD**

1. THE PLAN

5-day training course June 18-22, 2018



Seven participants from CREEC and CIRCODU

Before the training

- Screened applicants
- Evaluated facility capabilities and accuracy
 - Submitted test data and report
- Asked participants to watch videos and select top 3 priorities
- Developed agenda, lessons, datasheet, sample QAP, and evaluation forms
- Confirmed facility could obtain necessary equipment
 - Calibration CO and CO₂
 - Dry Ice
 - Projector & whiteboard



Training program overview

1. Introduction and Fundamentals
2. Sampling Emissions and Quality Assurance Plan
3. Gas Analyzers and Duct flow Rate Calibration
4. Data Analysis, Final Project Overview, Wood-Stove Test Demonstration
5. Final Project (collect and analyze experimental data)



How we evaluated success

- Pre and post course evaluations
- Daily evaluations on course material
- Verbal feedback after each lesson
- Follow up evaluation and data request ~1 month after training course



2. THE REALITY

*“The best-laid plans of mice and men often go awry”
- Robert Burns*

Upon arrival (2 days before training started)



Broken Pump

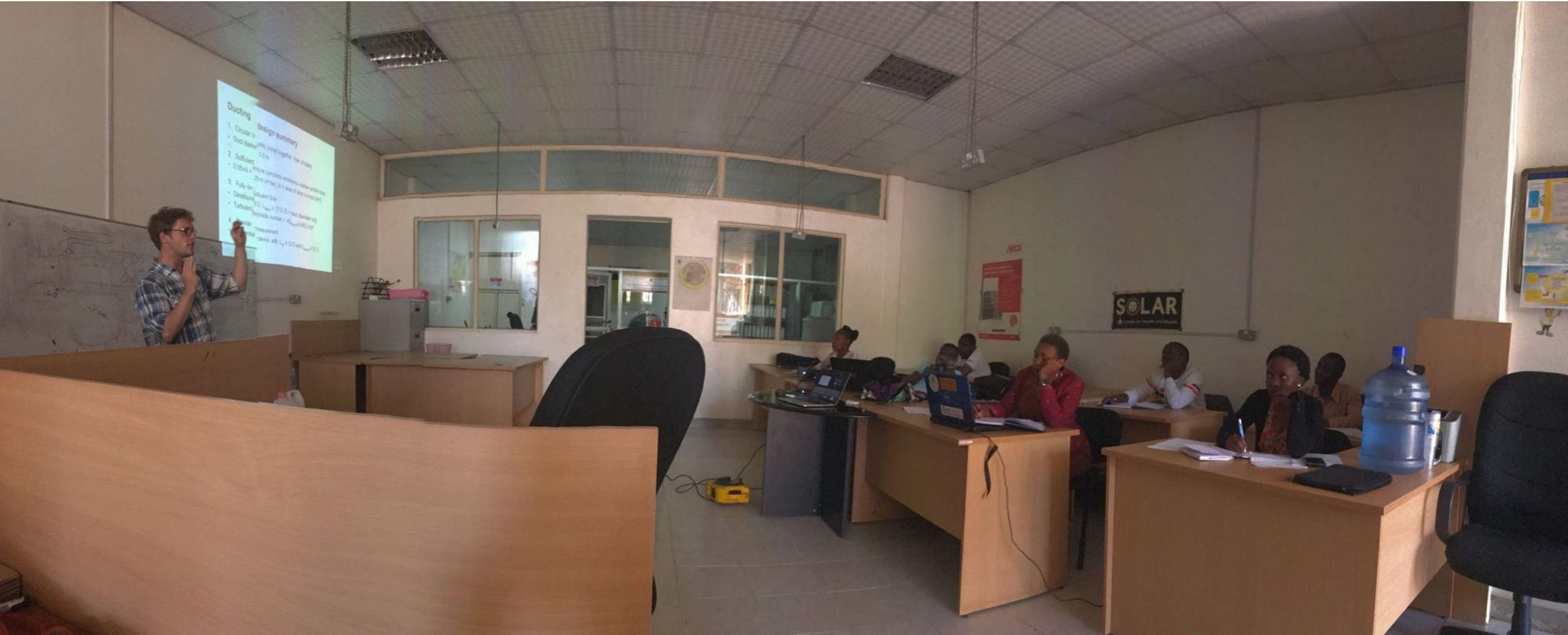


Incorrect CO₂ analyzer
(0-25% +/- 0.5%)



Incorrect and empty
calibration gases

Training Days 1, 2, and 3: Classroom delays...



Needed more time to cover lessons

Day 4: Experimental delays...



Clogged flow grid



Broken wires

Day 5: More experimental delays (but we did collect data!)



Clogged PM sample port



Successful stove test!!

What really happened

Actual Schedule

1. Introduction and Fundamentals
2. Sampling Gas Emissions
(lesson plan ran very long)
3. Sampling PM Emissions and Gas Analyzer Calibration
4. Duct flow Rate Calibration and Quality Assurance Plan
(equipment broke)
5. Fixed equipment and collected data

Planned Schedule

1. Introduction and Fundamentals
2. Sampling Emissions and Quality Assurance Plan
3. Gas Analyzers and Duct flow Rate Calibration
4. Data Analysis, Final Project Overview, Wood-Stove Test Demonstration
5. Final Project (collect and analyze experimental data)

2. SUCCESSES AND LESSONS LEARNED

Success!!

- Participants could identify and fix errors independently
- Group engaged in lessons and problem solving
- Positive written and verbal feedback on course
- Follow-up demonstrated course material was retained



Lessons Learned

- Plan for at least two weeks for training
- Be prepared for everything to break and for schedules to be delayed
- Have several backup plans for the lessons and equipment
- Do not expect to cover everything



Takeaways

- 5-days is not enough
- Training was more successful due to equipment failures
- Training stressed importance of validating equipment measurements
- Follow-up confirmed calibration information was retained
- Slow down and ask lots of questions



Acknowledgements

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2018 Cookstoves Group

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