

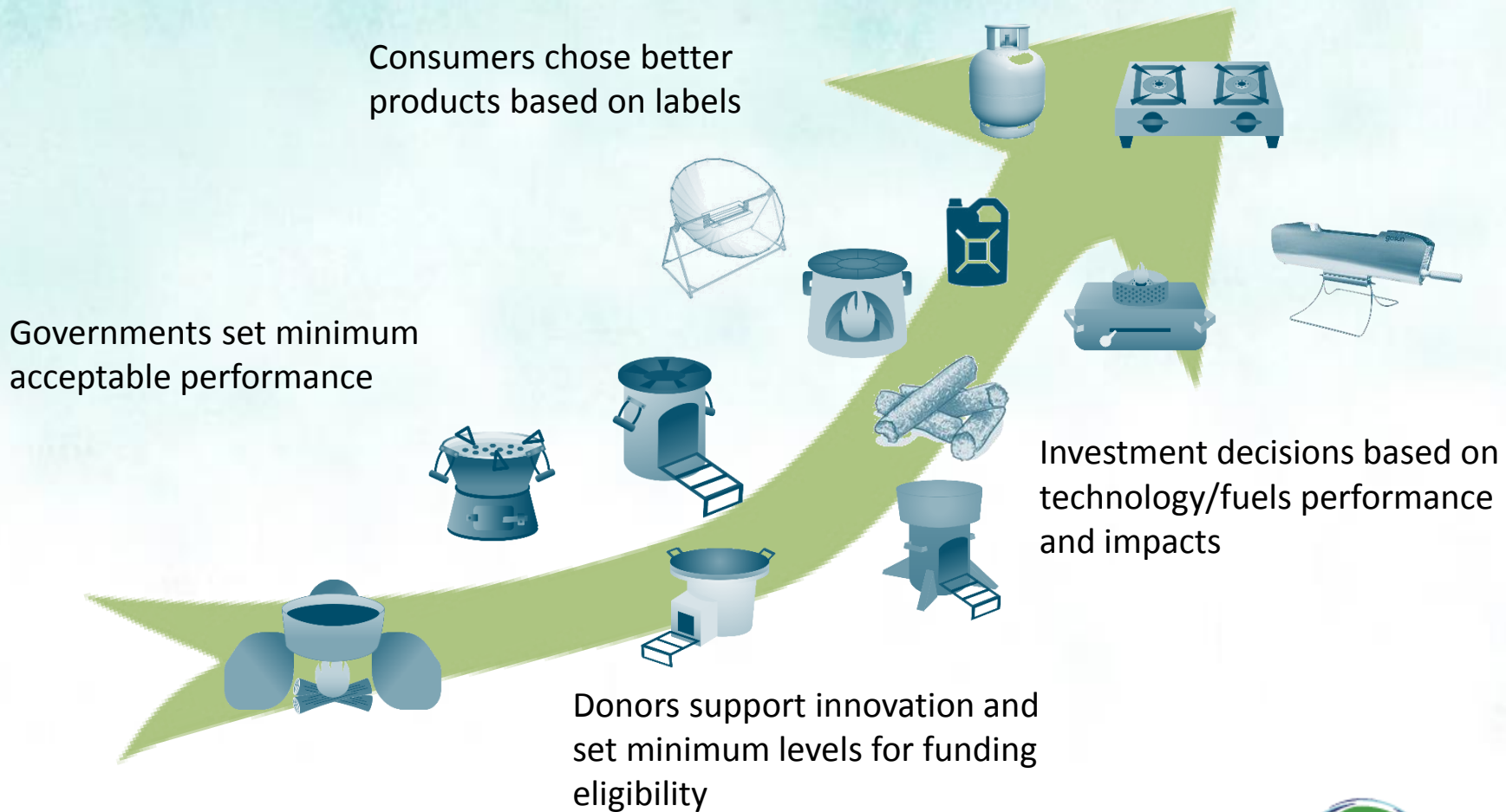


Driving the Market to “Clean” and “Efficient”: Summary and Characterization of Cookstove Technologies

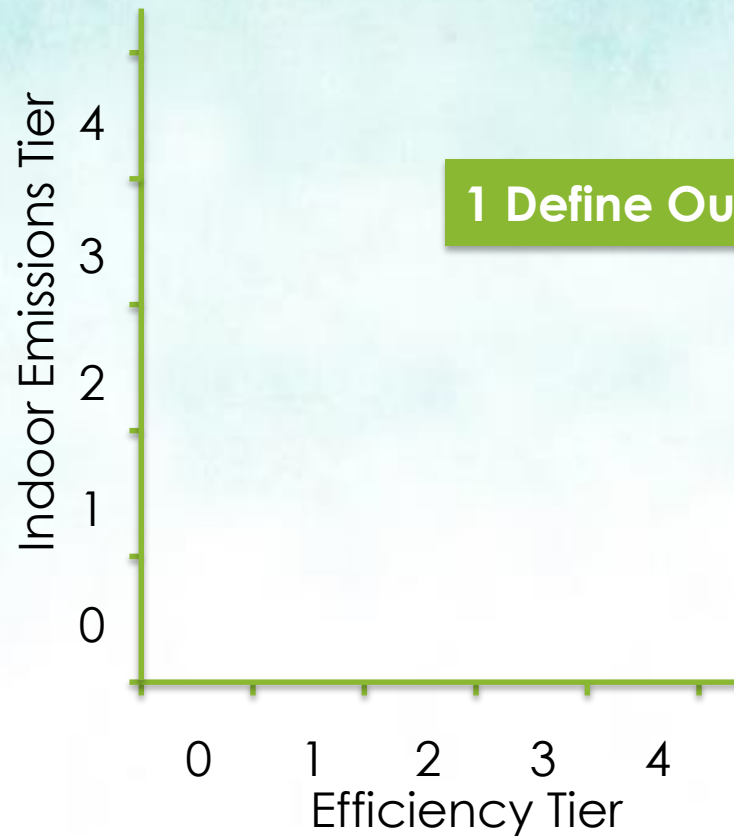


Donee Alexander, PhD
Program Manager, Environment and Health

Driving towards “clean” and “efficient”

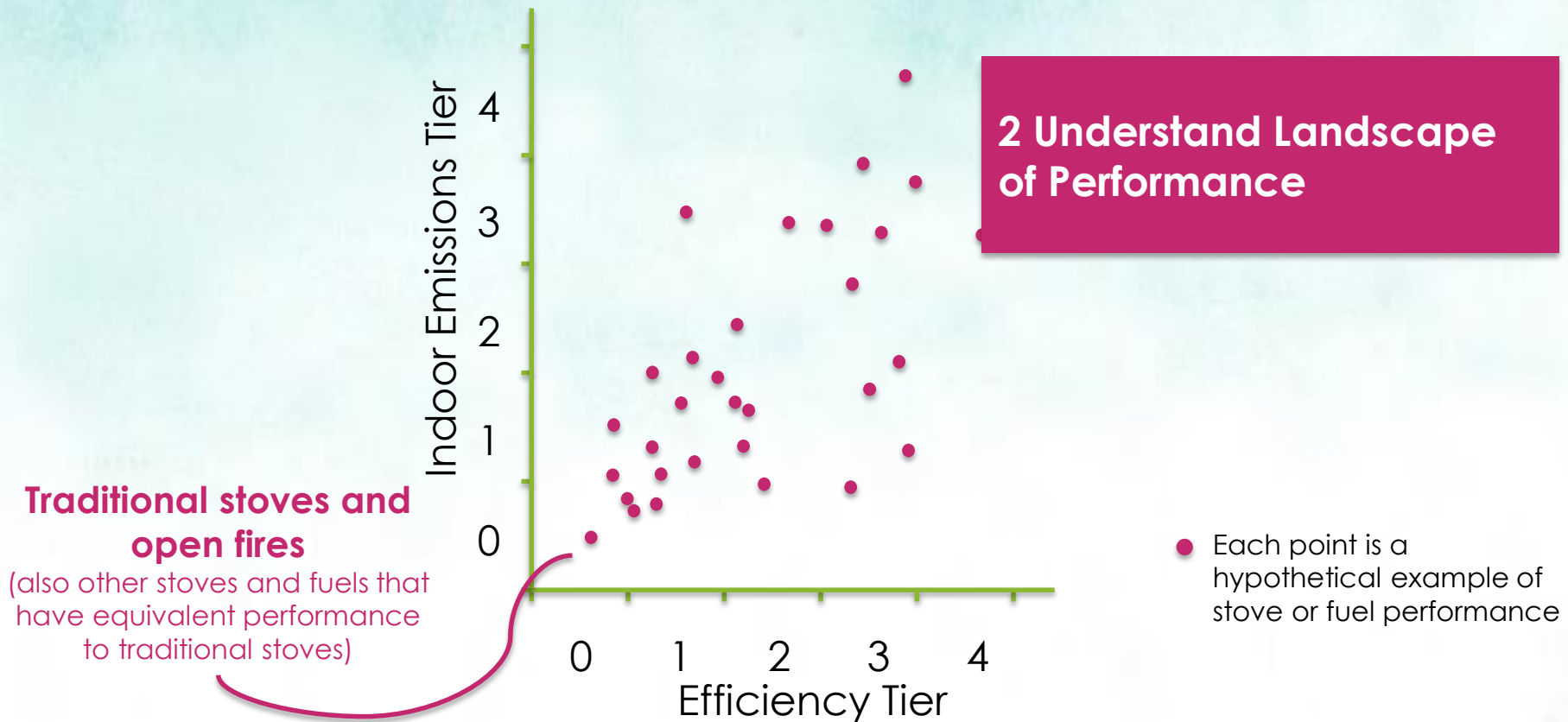


What does “clean” and “efficient” mean?



<http://cleancookstoves.org/technology-and-fuels/standards/iwa-tiers-of-performance.html>

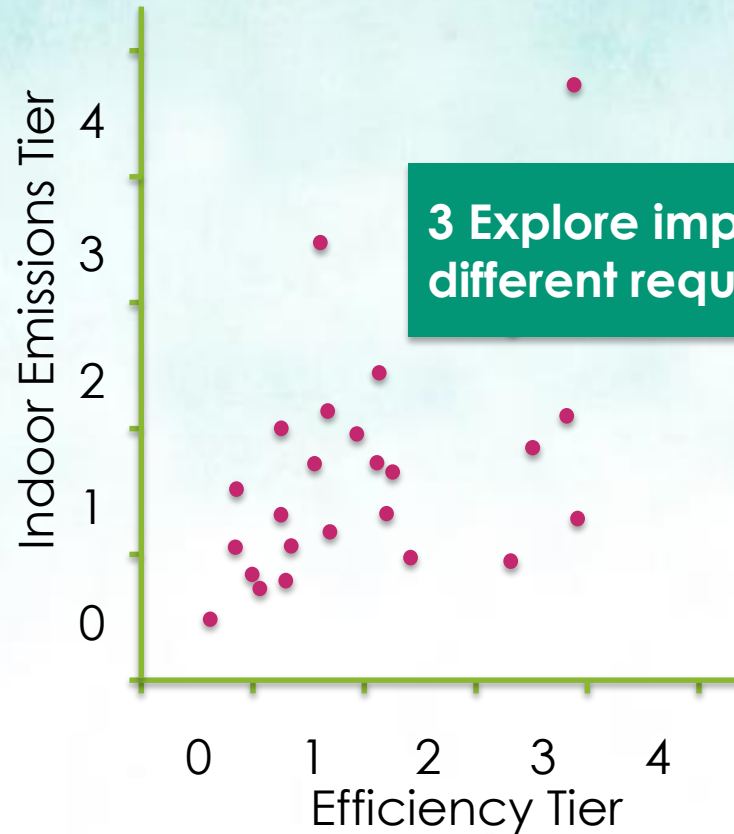
What does “clean” and “efficient” mean?



<http://cleancookstoves.org/technology-and-fuels/standards/iwa-tiers-of-performance.html>

What does “clean” and “efficient mean?

Benefits for health, climate



3 Explore impacts/tradeoffs with different requirements

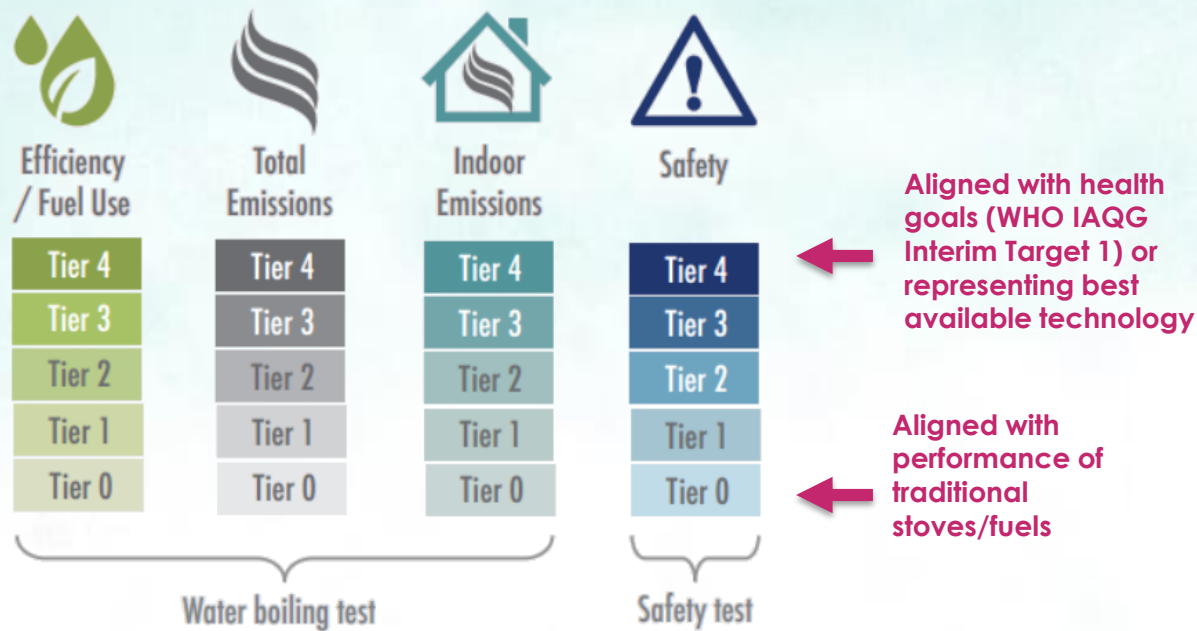


Benefits for environment, climate, time saved

<http://cleancookstoves.org/technology-and-fuels/standards/iwa-tiers-of-performance.html>

“Clean” and “Efficient”

“**Clean**” and “**efficient**” are embedded into the Alliance’s goal for 2020 and defined based on ISO IWA Tiers.



- ISO International Workshop Agreement was developed in 2012 approval from 90 experts from over 20 countries.
- Use based available standards to date while continuing to improve standards

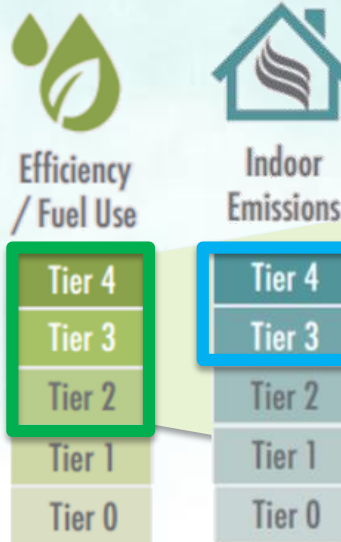
“Clean” and “Efficient”

Quantitative Values

PM2.5 emissions: mg/min

Thermal efficiency: 38%

Categories

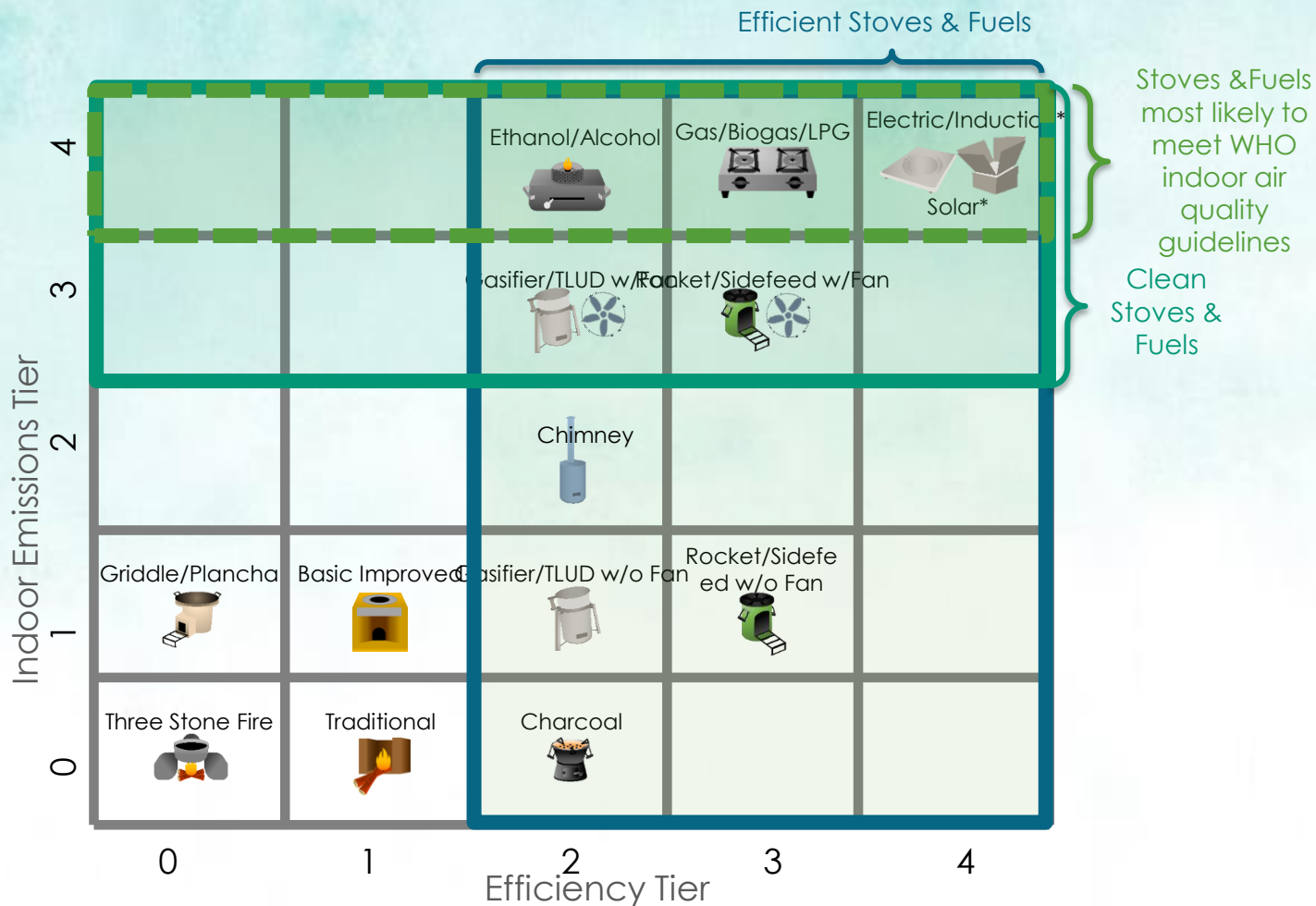


Broad Terms

“clean”

“efficient”

The Landscape of Technologies, Fuels, and Performance

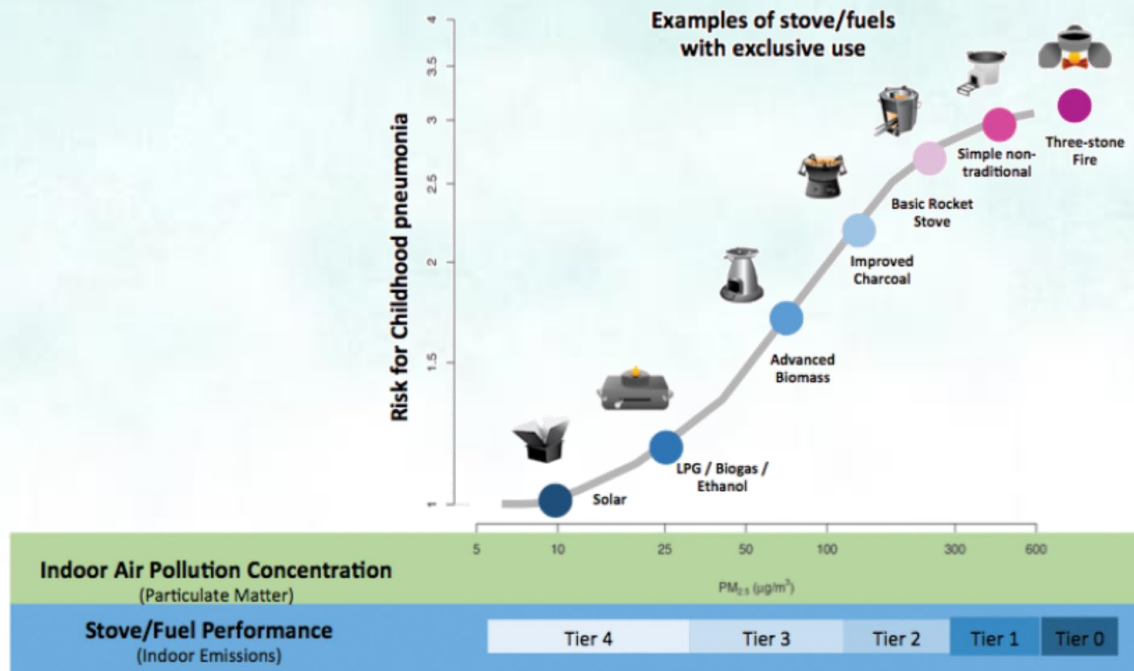


For more performance information, visit <http://catalog.cleancookstoves.org>



Public Health Impacts Driven by Exposure, not Emissions

Linkages between Stove Performance and Health



The linkage between emissions and indoor air pollution is based on a computational model (Johnson et al. 2011). Stoves and fuels within a category have a range of emissions performance (<http://catalog.cleancookstoves.org>), and the exposure-risk response curve also has variability (Burnett et al. 2014). This graph is estimated by combining these datasets and will be confirmed by research in progress.

For more information, visit
<http://catalog.cleancookstoves.org>



User Behavior: Time Activity Patterns and Proximity to Sources

Household Air Pollution

Ambient Air Pollution

Competing Source of Pollution (Smoking, ETS, Incense, Occupational and Neighborhood Exposures etc)

Emissions from All Stoves and Fuels



Estimating Exposures is a Complex Process

Are We Getting Clean Enough to Impact Child Survival?

Principal Investigators

D Jack, Columbia U and KP Asante, Kintampo Health Research Center

Sample Size

1415

Technologies Assessed

Open fire, BioLite stove, LPG



Outcomes Measured

Birthweight, childhood pneumonia



Principal Investigators

J Tielsch, Johns Hopkins U and S Khatri, Nepal Nutrition Intervention Project

Sample Size

4200 Envirofit in Phase 1; 1900 LPG in Phase 2 (randomized from Envirofit group)

Technologies Assessed

Open fire, Envirofit chimney stove, LPG



Outcomes Measured

Adverse pregnancy outcomes, ALRI



Principal Investigators

S Olopade, U Chicago and O Ojengbede, University College Hospital, Ibadan

Sample Size

300

Technologies Assessed

Open fire, kerosene, ethanol



Outcomes Measured

Birthweight, intrauterine growth restriction



- Much of earlier research did not focus on very clean stoves
- Preliminary results from research on truly clean cooking and child survival in Ghana, Nepal, and Nigeria are promising

→ **When people have access to very clean fuels, they prefer to use it every day, and they stop using lesser technologies**

→ 80% of women receiving ethanol stoves in Nigeria gave away their kerosene stoves

→ **'Intensive' adoption of clean fuels can bring exposures down to WHO air quality guideline levels**

→ **Substantial reductions in pneumonia expected even after controlling for increased vaccine coverage**

2 Understand Landscape of Technologies, Fuels, Performance

Challenges:

This is about more than just performance...

Need to consider other technology factors, current state of market



Meeting user needs

Level of usage



Current scale

Potential to scale



Affordability

Current products available

Technologies need to be used to achieve impact



Product
Performance
/Quality

x



Adoption/
Use

x



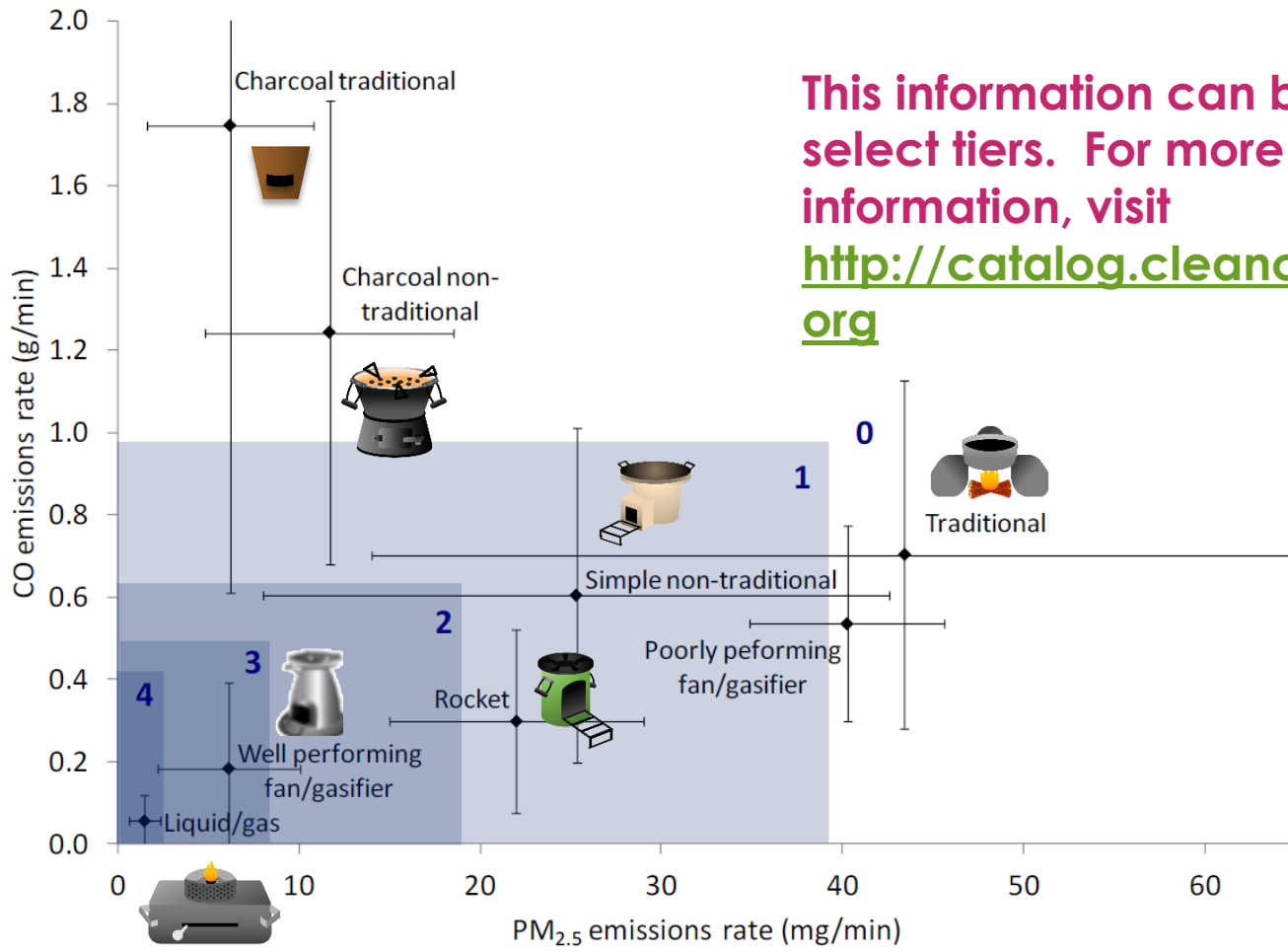
Scale

=>

Level of
Impact

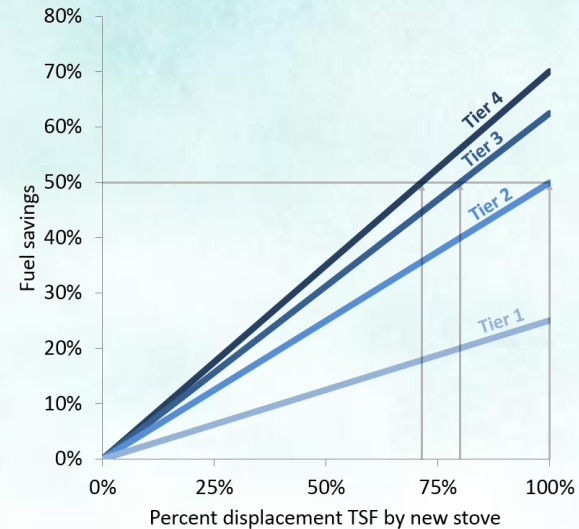
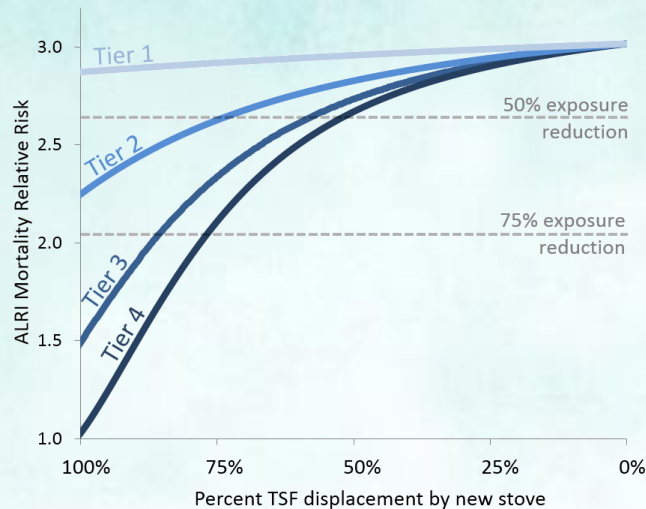
Additional background slides

Testing the range of performance by stove/fuel category - Emissions



This information can be used to select tiers. For more information, visit <http://catalog.cleancookstoves.org>

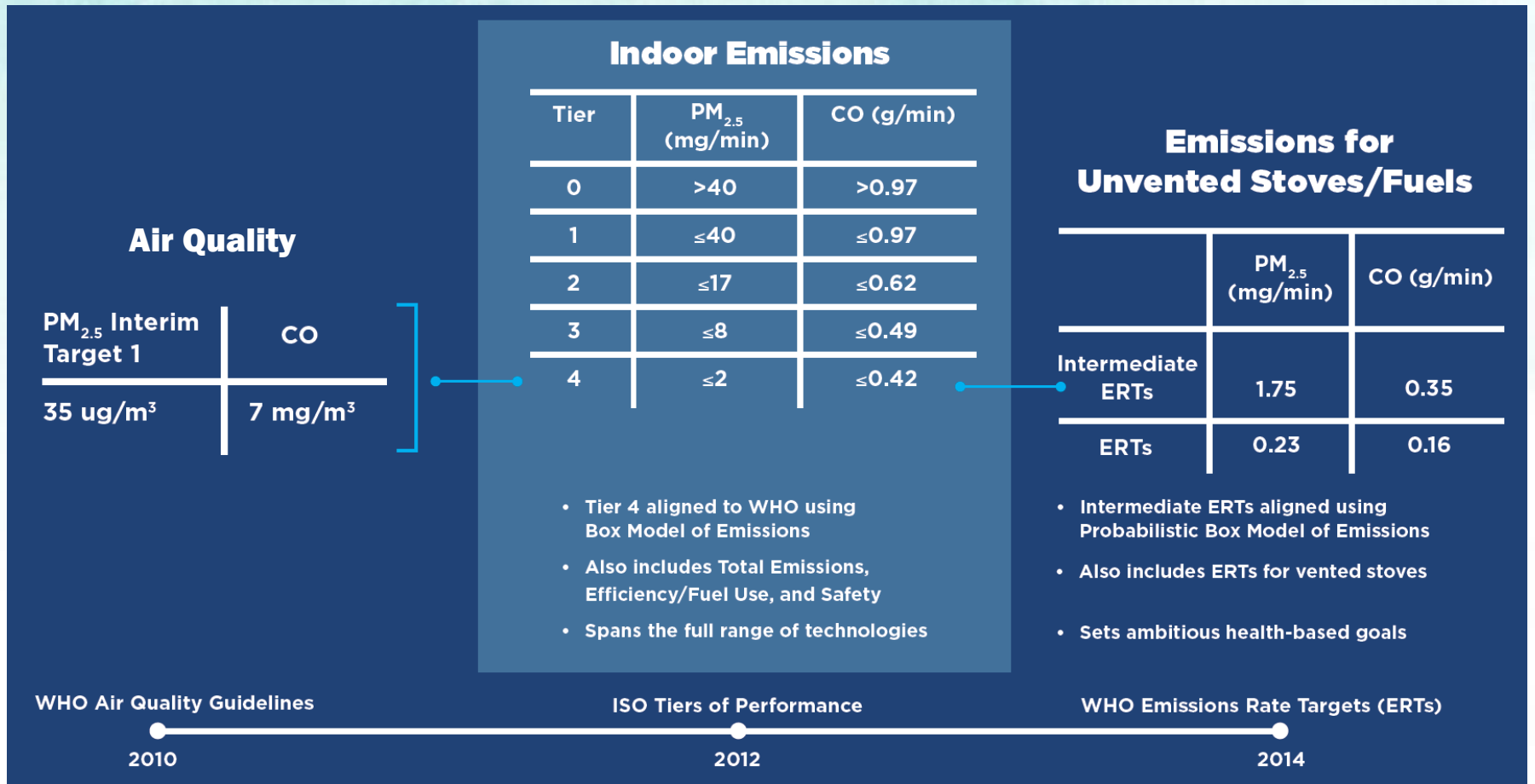
3 Explore impacts/tradeoffs with different requirements



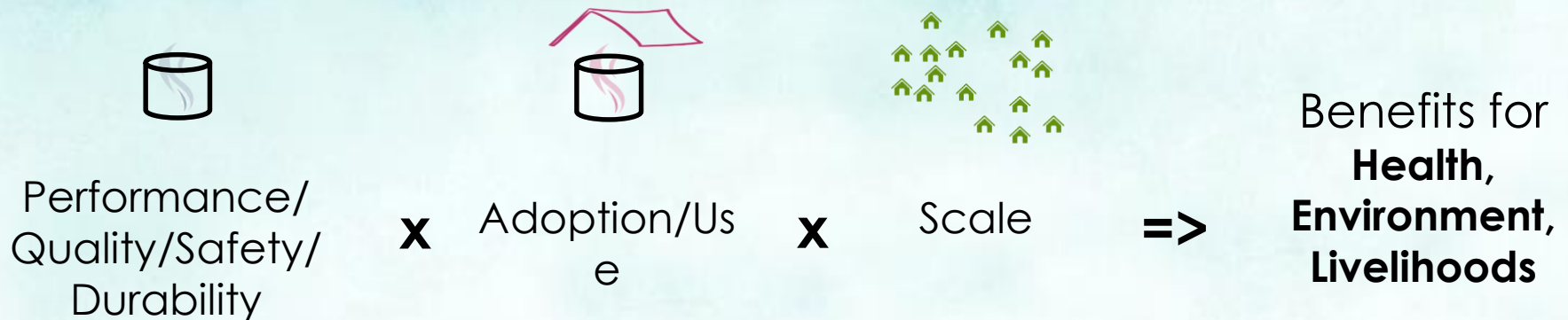
- Exposure-response data comes from health studies of ambient air pollution, second hand smoking, and RESPIRE study in Guatemala
- Reduction in health risk is seen at all performance and usage levels, but higher performance and higher usage and TSF displacement leads to greater impacts

Johnson and Chiang, Environmental Health Perspectives 2015
Smith, Bruce et al., Annu. Rev. Public Health 2014

ISO IWA Tiers and WHO Guidelines and Emissions Rate Targets



Getting to 100M by 2020: Breaking Down the Alliance's Goal



100 million households adopting clean and efficient cookstoves/fuels

Always critical and will be influenced by performance goals

Focus of our discussion today

How can we optimally drive the market towards the cleanest and most efficient technologies and

fuels!