



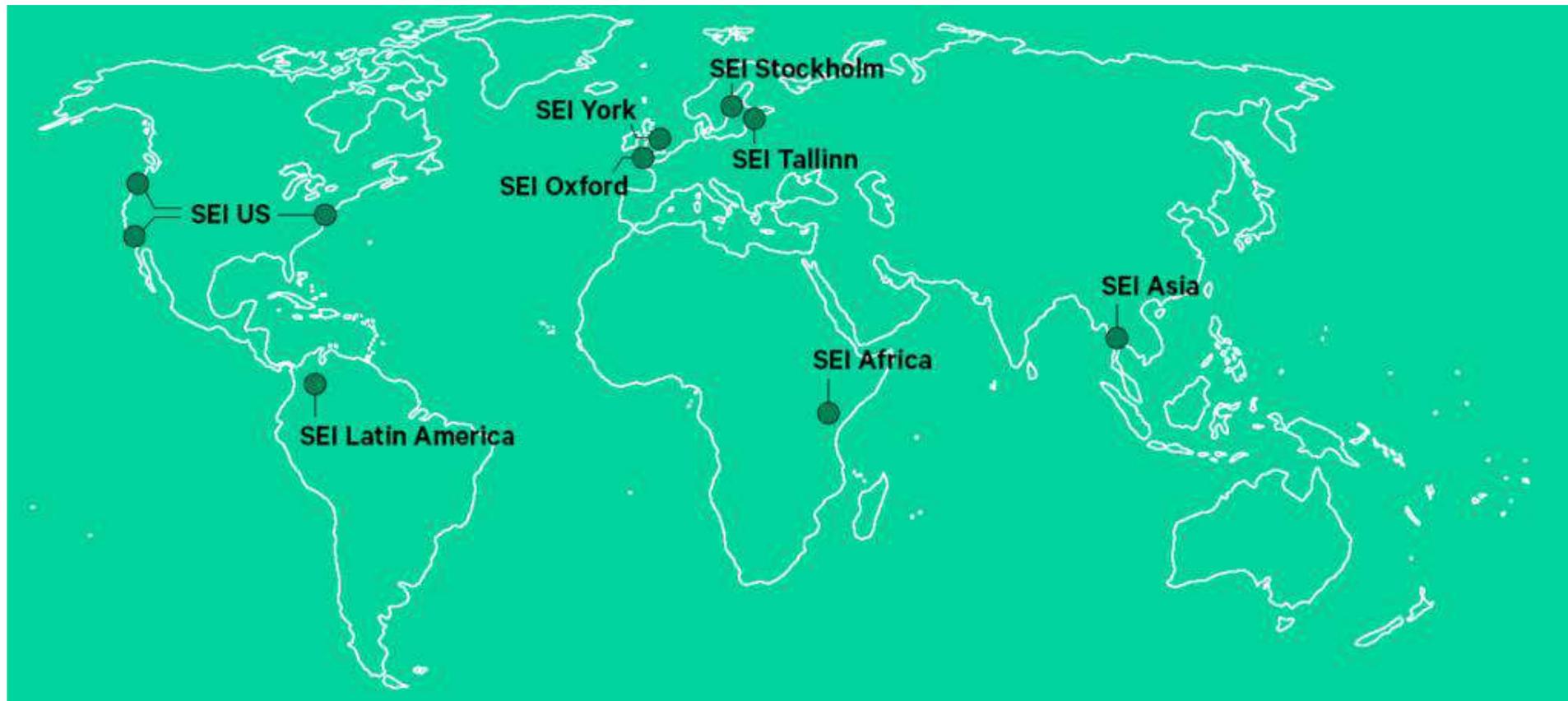
# Energy Access & SDGs: minimising trade-offs and exploiting co-benefits and synergies

Presented at the NAVIGATE/ENGAGE expert workshop  
on Modelling and Assessment of Impacts, Adaptive  
Capacity, and Interactions with Sustainable  
Development Goals in IAMs

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Stockholm Environment Institute



- SEI founded in 1989 from predecessor: **Beijer Institute**
- Based on 1972 UN Conference on the Human Environment (came to be known as the **Stockholm Conference**).
- **Energy Access** work at SEI has been ongoing since the Beijer era in the 1980s and has included use of multiple tools and methods; with some special focus in Eastern/Southern Africa



# Access to clean energy links to multiple SGDs

## Clean Cooking Is Integral to Achieving Many Global Goals



**1 NO POVERTY**  
Clean cooking is part of basic services necessary to lead a healthy and productive life and saves households time and money.



**2 ZERO HUNGER**  
Efficient cookstoves reduce the amount of fuel needed to cook, thus reducing the burden on families who would otherwise have to collect it, buy it, or trade their food for it. Emissions of short-lived climate pollutants from inefficient cooking also hamper agricultural productivity.



**3 GOOD HEALTH AND WELL-BEING**  
Reducing smoke emissions from cooking decreases the burden of disease associated with household air pollution and improves well-being, especially for women and children.



**4 QUALITY EDUCATION**  
Children, especially girls, are often kept out of school so that they can contribute to household tasks, like cooking and collecting fuel.



**5 GENDER EQUALITY**  
Unpaid work, including collecting fuel and inefficient cooking, remain a major cause of gender inequality.



**7 AFFORDABLE AND CLEAN ENERGY**  
Clean cooking is essential to addressing energy poverty and ensuring sustainable energy security for billions of people.



**8 DECENT WORK AND ECONOMIC GROWTH**  
Energy access enables enhanced productivity and inclusive economic growth. The clean cooking sector offers many job opportunities.



**11 SUSTAINABLE CITIES AND COMMUNITIES**  
Clean cooking addresses household and ambient air pollution, resource efficiency, and climate vulnerability.



**13 CLIMATE ACTION**  
Up to 25% of black carbon emissions come from burning solid fuels for household energy needs. Clean cooking solutions address the most basic needs of the poor, while also delivering climate benefits.



**15 LIFE ON LAND**  
Up to 34% of woodfuel harvested is unsustainable, contributing to forest degradation, deforestation, and climate change.

<https://unfoundation.org/blog/post/my-connection-to-clean-cooking/>

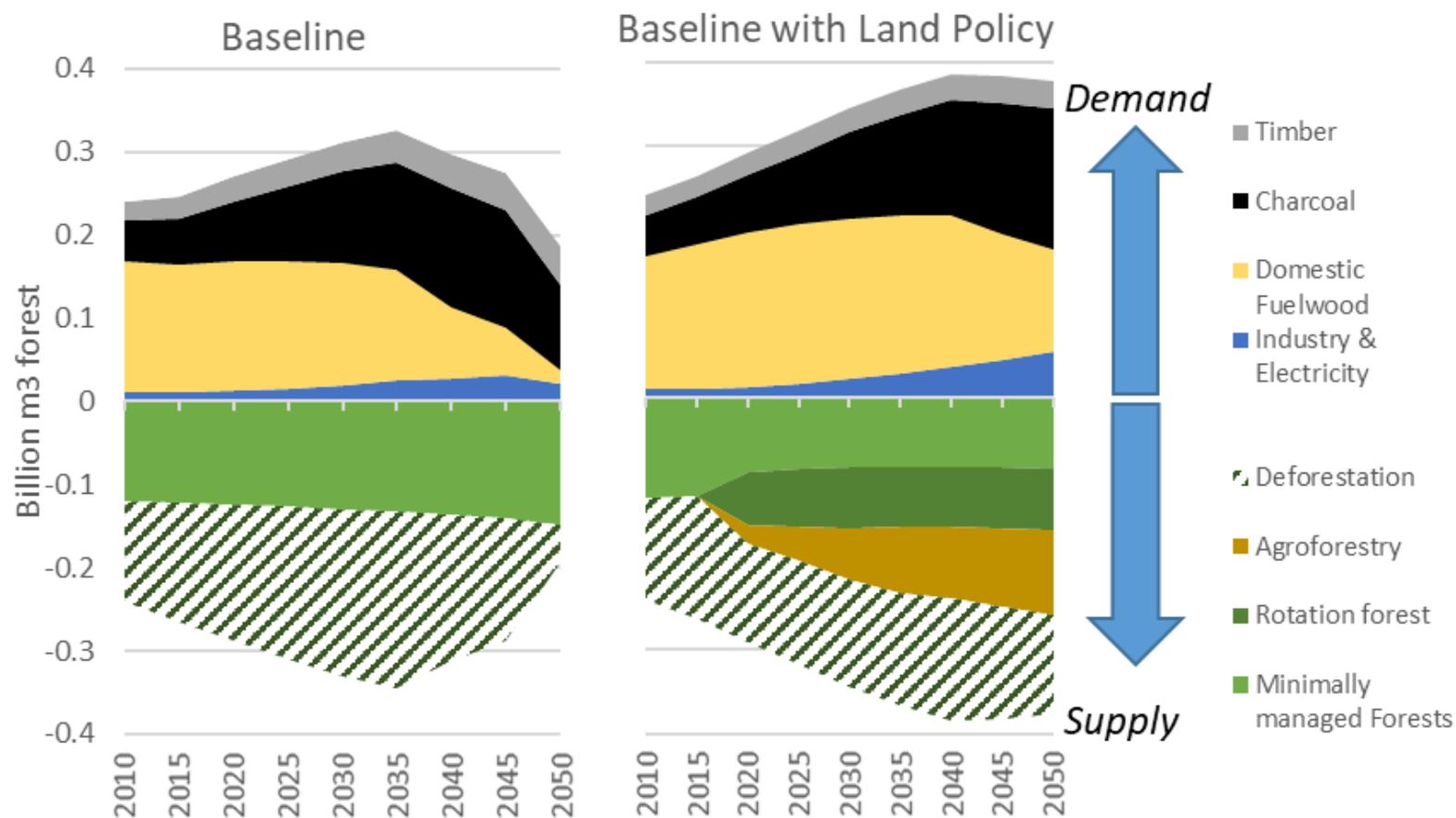
# Integrated policy assessment and optimization over multiple SDGs in Eastern Africa

## Achievement & cost-effectiveness of subsidies with & w/out Land Use Policy

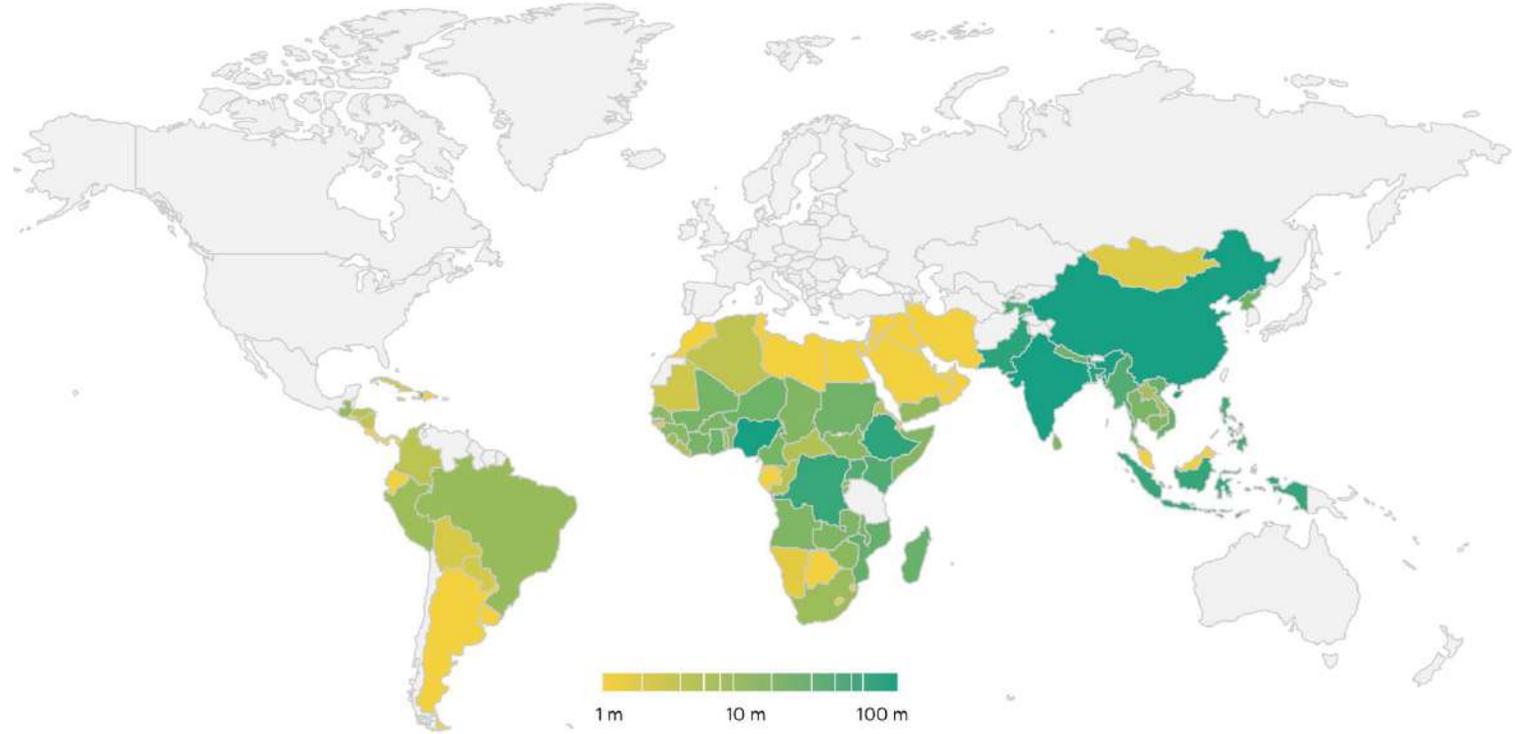
	No Land Use Policy			Sustainable Land Use Management policies			Market/spatial Constraints
	Energy Access	Health	Climate	Energy Access	Health	Climate	
Biogas	+++	+++	+++	+++	+++	+++	Density of cows and/or feedstock
LPG	+	++	+	+	++	+	Market/finance capacity
PV + electric stove	+	+	++	+	+	++	Market/finance capacity
Bioethanol	+	+	+++	+	+	++	Industrial development
Improved charcoal kiln and stove	+	0	+	+	0	++	Land degradation
Marketed fuelwood + Improved stove	-	-	0	-	--	+	in areas of biomass scarcity

# Integrated policy assessment and optimization over multiple SDGs in Eastern Africa

Both forest stock AND biomass use increases with Sustainable Land Use Policy!!



# Population without access to clean cooking fuels and technologies



<https://www.iea.org/reports/sdg7-data-and-projections/access-to-clean-cooking>

## Energy Access: the Scale of the Problem

- One in three people worldwide lacks access to clean household fuels\*
- 3.8 million people die annually from household air pollution (HAP)
- Combustion of HH fuels and LUC from woodfuel harvesting contribute ~2% of anthropogenic forcing each year

# 1. Indonesia's "Zero-Kero" program

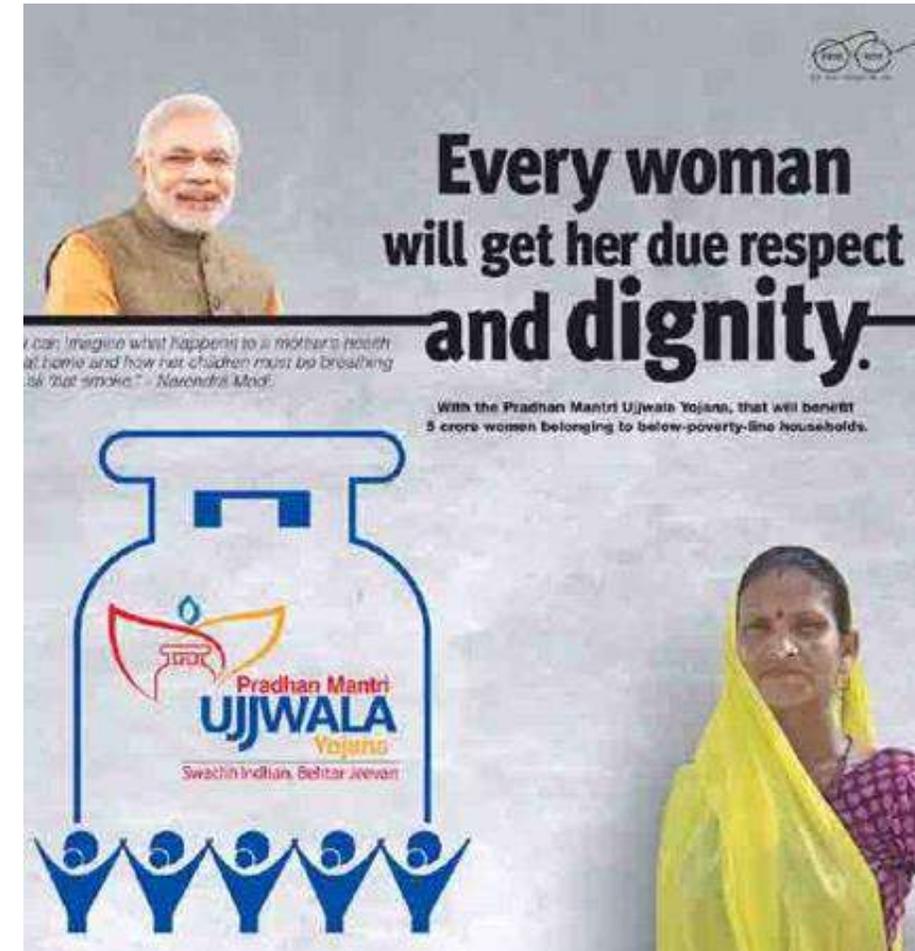
- Reduce the cost of subsidizing kerosene
- Massive shift from kerosene to LPG
- USD 15 billion savings from 2006-2016
- Costs continue to rise leading to calls for further subsidy reform
  - Shift from universal subsidies on 3kg cylinders
  - Limit access to poor households



Source: IISD 2021

## 2. India's "PMUY" scheme

- Targeted women in "BPL" HHs
  - Covered upfront and ongoing costs
  - Linked to biometric IDs and bank accts
  - Given as after-purchase rebates
- Reached 80 million HHs in ~3 years
- One study of few use LPG exclusively
  - 28% used enough LPG to cook most meals
  - 24% didn't purchase a single refill



# Are household energy policies successful?



Takeaways from 100+ household energy policies and 30+ evaluations...

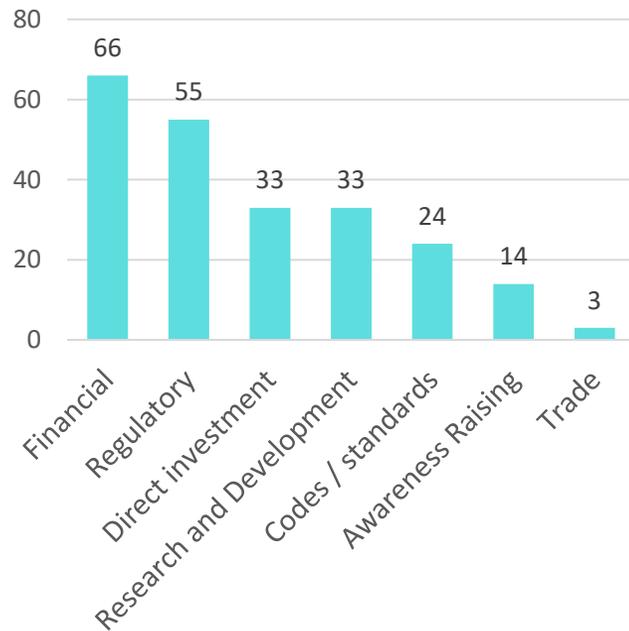
# Additional resources

- Taylor, et al. (2020). Modelling stakeholder agency to investigate sustainable charcoal markets in Kenya. *Env Innovation & Societal Transitions* <https://doi.org/10.1016/j.eist.2019.10.001>
- van de Ven, et al. (2019). Integrated policy assessment and optimisation over multiple sustainable development goals in Eastern Africa. *Environmental Research Letters* <https://iopscience.iop.org/article/10.1088/1748-9326/ab375d/meta>
- Gasparatos, et al. (2018). Survey of local impacts of biofuel crop production and adoption of ethanol stoves in southern Africa. *Nature Sci Data* <https://www.nature.com/articles/sdata2018186>
- Kar et al. “Using Sales Data to Assess Cooking Gas Adoption and the Impact of India’s Ujjwala Programme in Rural Karnataka.” *Nature Energy*, <https://doi.org/10.1038/s41560-019-0429-8>.
- Islam, et al.(2021), “In-use emissions from biomass and LPG stoves measured during a large, multi-year cookstove intervention study in rural India” *Science of The Total Environment* <https://doi.org/10.1016/j.scitotenv.2020.143698>
- Jürisoo et al. (2017) “Beyond buying: The application of service design methodology to understand adoption of clean cookstoves in Kenya and Zambia” *ERSS* <https://doi.org/10.1016/j.erss.2017.11.023>
- WHO Household Energy Policy Repository - <http://www.householdenergypolicies.org> (launches on Sept 29)

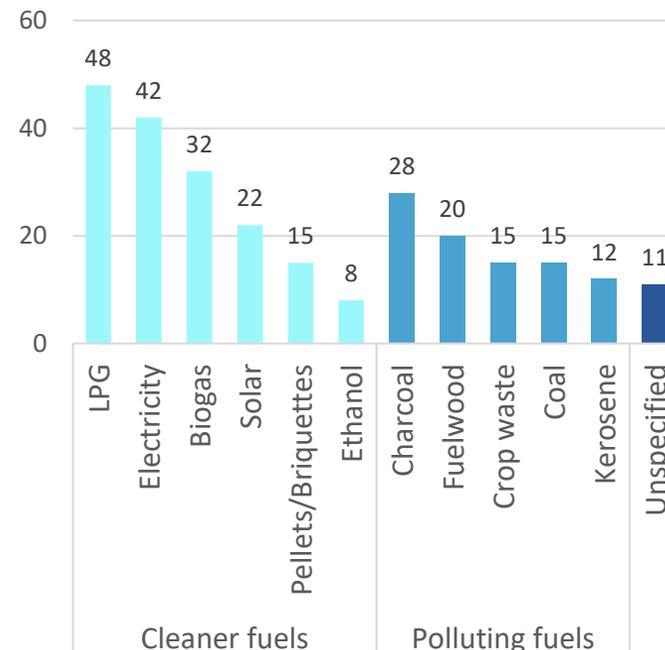
# Extra slides

# What do current policies try to achieve?

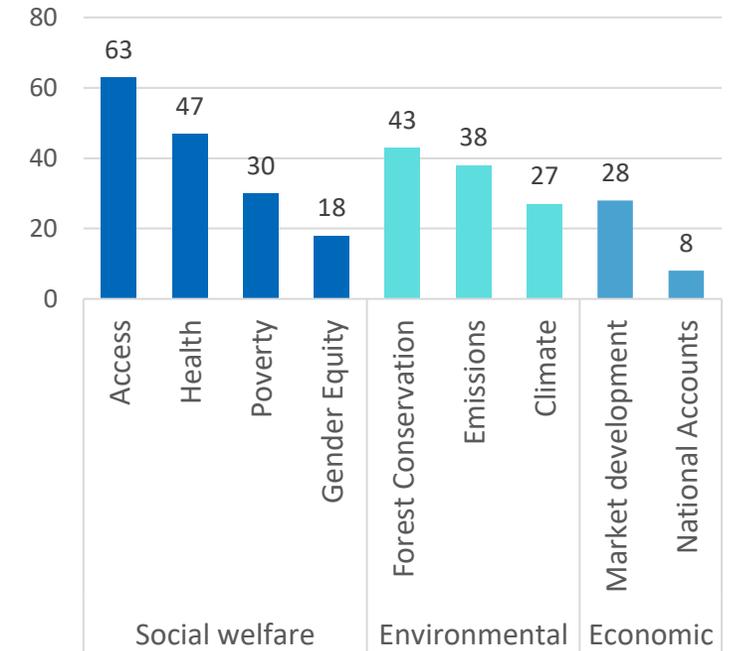
- 124 policies from 34 countries
  - 31 evaluations
- } more of both will be added through a user-interface



policy mechanisms



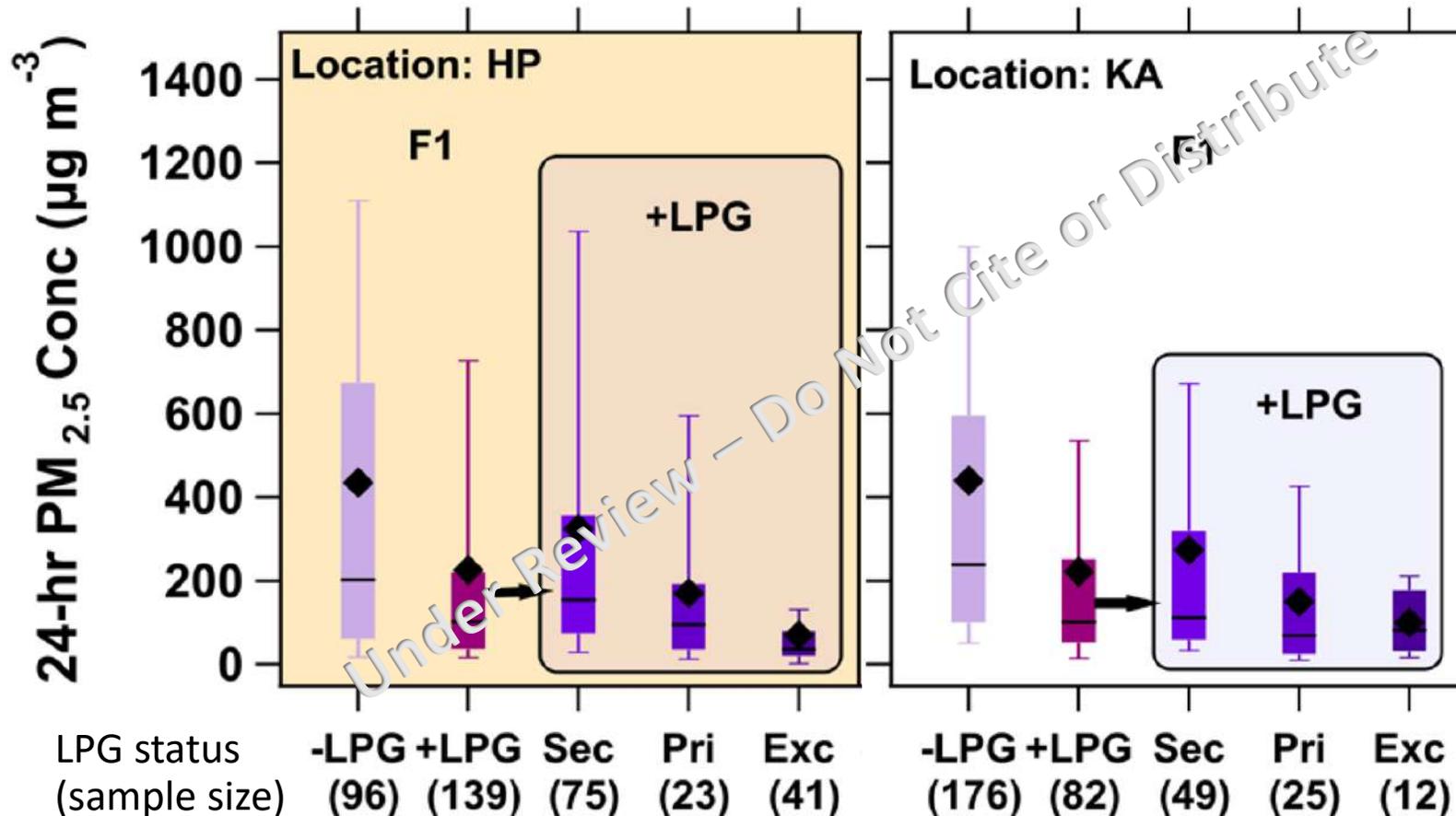
energy carriers



desired outcomes

# Health risk varies with intensity of LPG use

## 24-hour PM<sub>2.5</sub> in houses in North and South India



Differences in PM<sub>2.5</sub> between solid fuel and LPG users

- Secondary users: no. sig diff.
- Primary users: 50-60% lower
- Exclusive users: 80-90% lower

*Health risks persist until households achieve near-exclusive use (true for any clean fuel intervention)*

## WHO Household Energy Policy Repository

A compilation of policies promoting access to clean energy for household cooking, heating, and lighting

<input type="text" value="Search"/> <span>🔍</span> <span>ℹ️</span> <span>☰</span> <span>🗑️</span> <span>⬇️</span> <span>🖱️</span>					
Title	Description	Country	Policy Type	Energy Use	Technolo...
<a href="#">Bangladesh - Country Action Plan for Clean Cookstoves (2013)</a>	This Action Plan identifies key barriers to large-scale adoption of clean stoves and fuels, describes desired outcomes, and lists 32 potential interventions, 10 of which	Bangladesh	Regulatory, Research and Development, Financial	Cooking	Stove
<a href="#">Bangladesh - Power and Energy Sector Strategy Paper (2018)</a>	This strategy paper provides an overview of policies and strategies for Bangladesh's	Bangladesh	Financial	Cooking	Stove
<a href="#">Plan d'Actions National des Energies Renouvelables (PANER) 'National Renewable Energy Action Plan' (2015)</a>	The PANERs are established by the ECOWAS Member States, in conformity with the model which was developed by	Benin	Research and Development, Financial	Cooking	Cookstove, Stove
<a href="#">Plan d'Actions National des Energies Renouvelables (PANER) 'National Renewable Energy Action Plan' - improved cookstoves (2015)</a>	Targets for household cooking energy - Share of the population using improved cookstoves (there are two different targets	Benin	Research and Development, Financial	Cooking	
<a href="#">Plan d'Actions National des Energies Renouvelables (PANER) 'National Renewable Energy Action Plan' - effective carbonization (2015)</a>	Targets for household cooking energy - Proportion of charcoal produced by efficient carbonization technologies (there are two different targets listed in the	Benin	Awareness Raising/Beh... Change	Cooking	Cooker, Cookstove, Solar