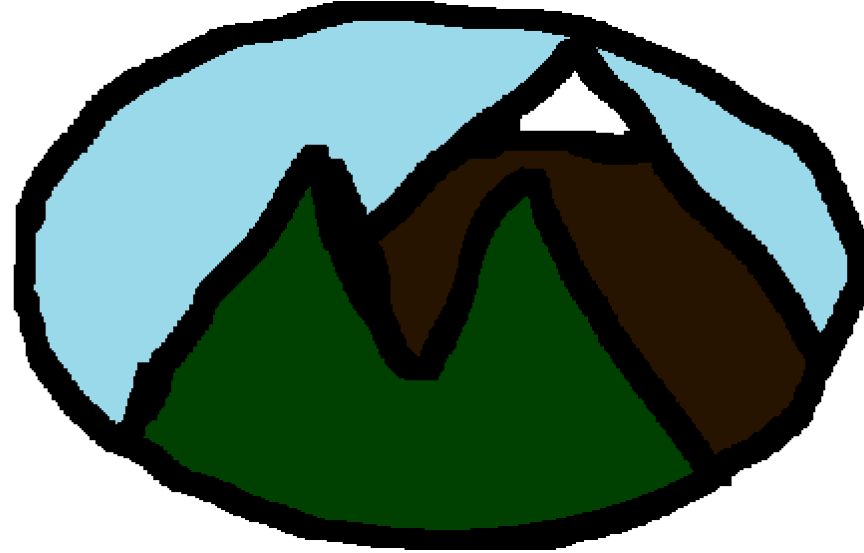


Biogas Project



Mountain Air Engineering
www.mtnaireng.com
Oregon, USA

Current biogas activities:

1. Maintenance and repair of existing biogas systems
2. Biogas performance monitoring platform
3. Cold-climate anaerobic digesters

Mountain Air Engineering Projects in Nepal



- Wood stove field emission measurements in Far West (2015-2016)
- Brick kiln emission measurements: training, equipment, and support for ICIMOD (2016)
- Wood stove lab testing: training, equipment, and support at RETS and CRT/N (2015-present)
- Field measurements of biogas and LPG stove emissions in Kavre (2017-2018)
- Biogas system performance monitoring (2017–present)



Maintenance program for biogas systems in Kavre, Nepal

Common biogas system problems:

- Gas Leaks
- Clogged stove
- Water in gas pipeline
- Solid sludge buildup
- Broken digester inlet or outlet

Sensors are used for system checks:

- Biogas flow and pressure**
- Stove emissions
- Biogas composition
- Sludge composition
- Digester temperature
- Methane leakage emissions

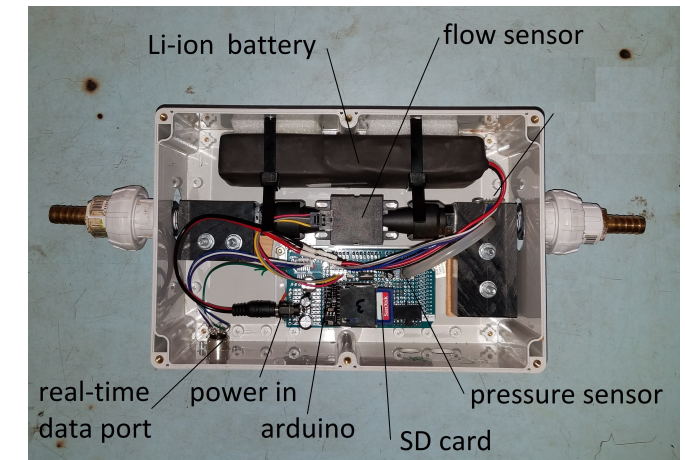
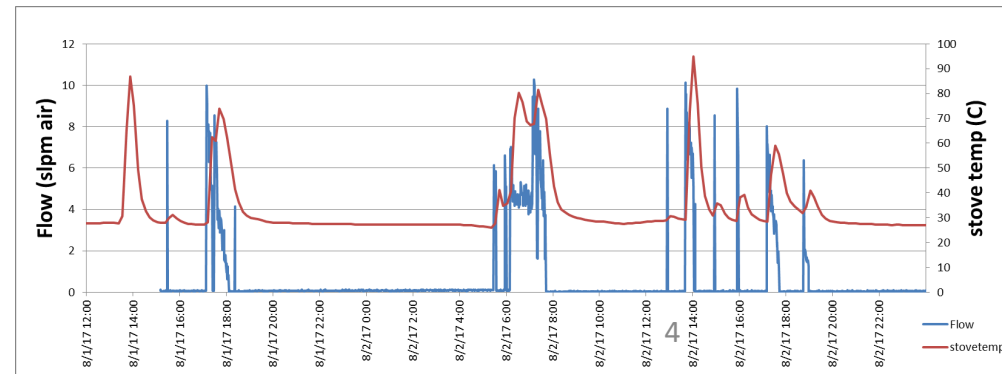
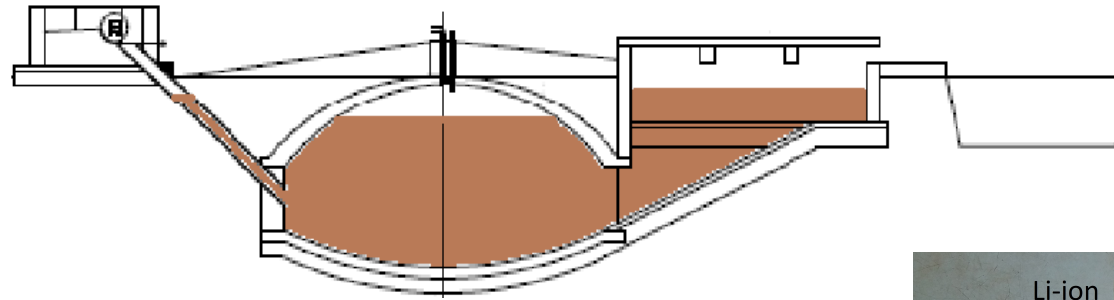
Other useful tools:

- Soap bubble test
- Long pole
- Surveys/Interviews
- Visual inspections

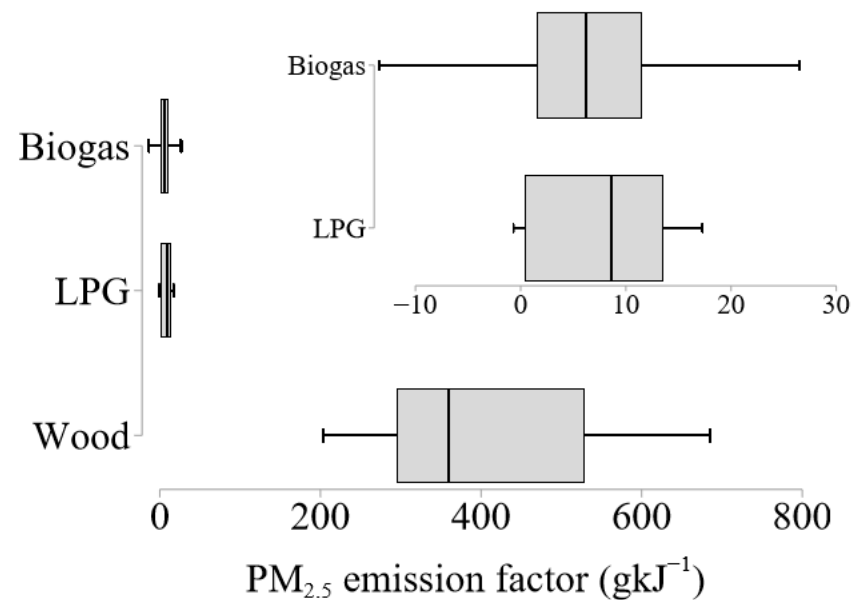
Good mixer

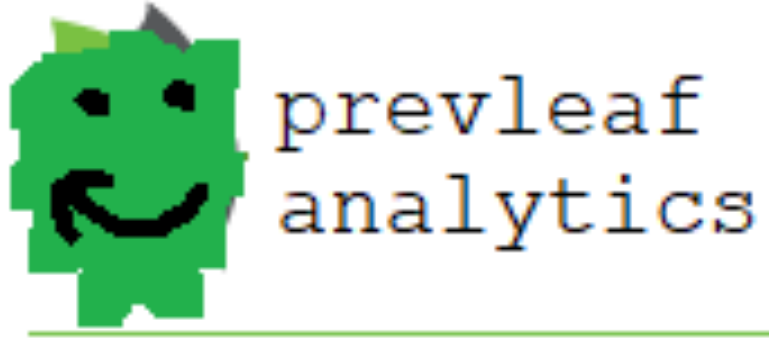
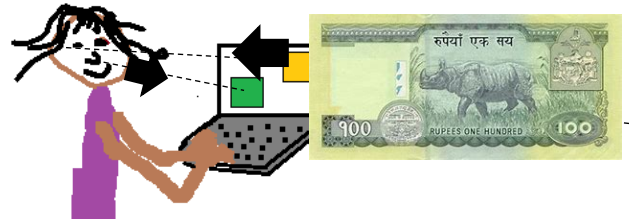
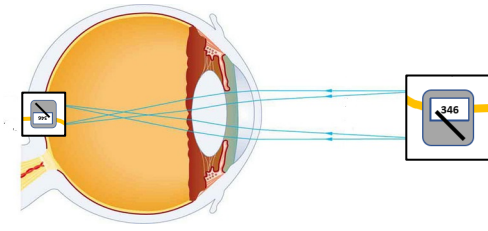


Broken mixer

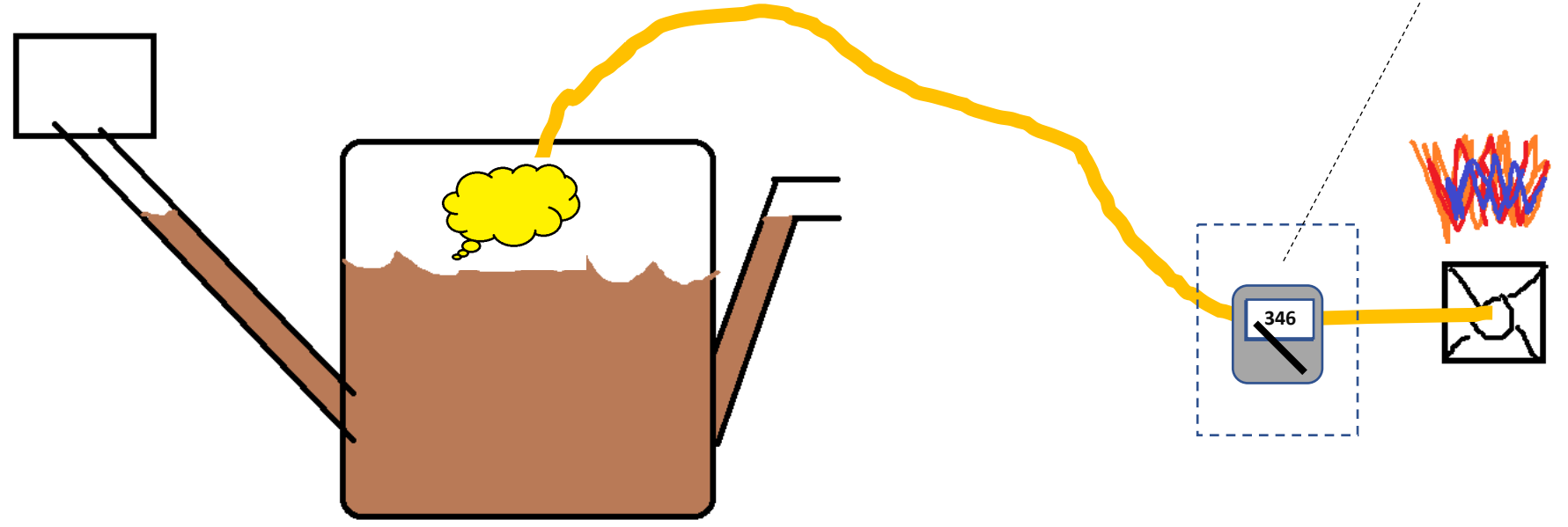
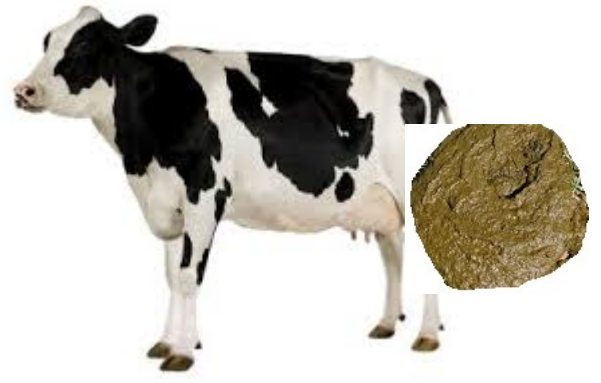
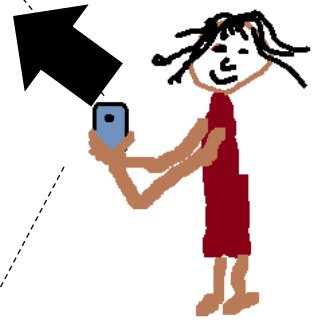


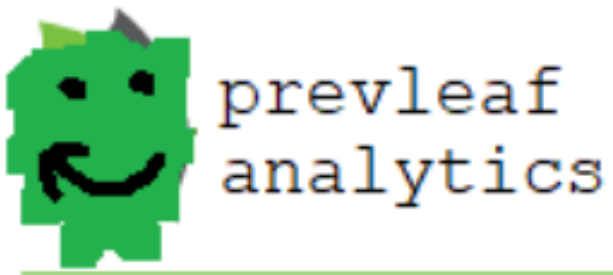
Biogas Stove Emissions in Kavre





Get paid as you go





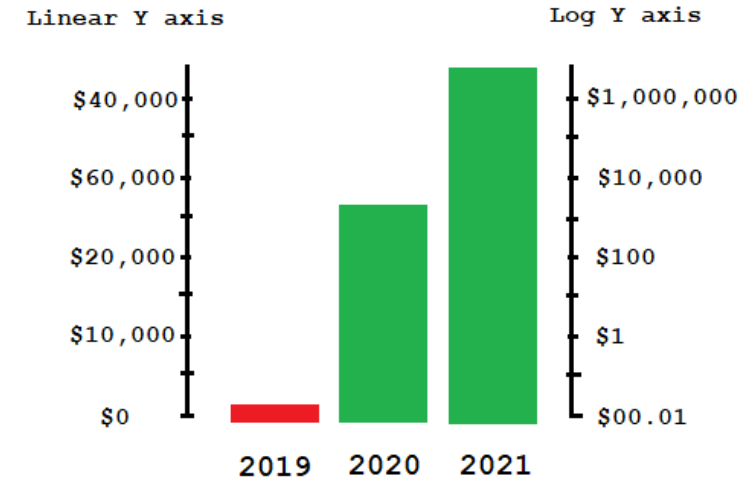
Diaphragm gas meter
\$50 USD in Nepal



Current Progress

Meters installed: 1
Cost: \$1500

Projected Growth



Reference: Cloud-based pressure logger



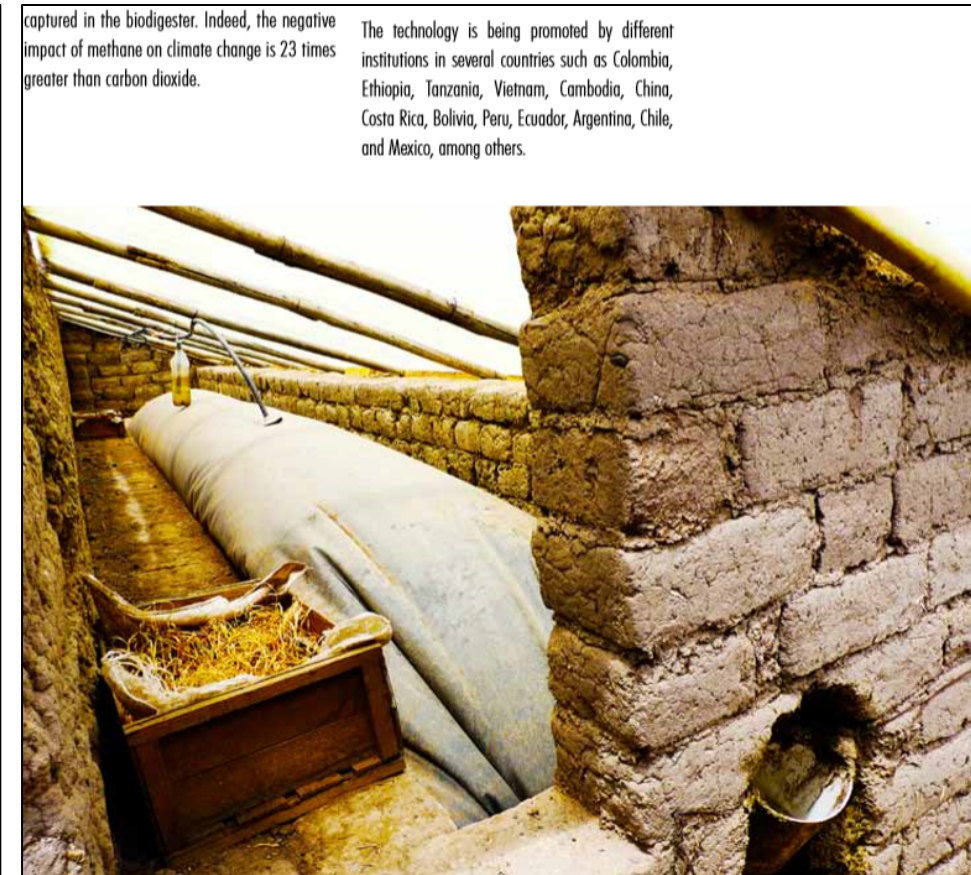
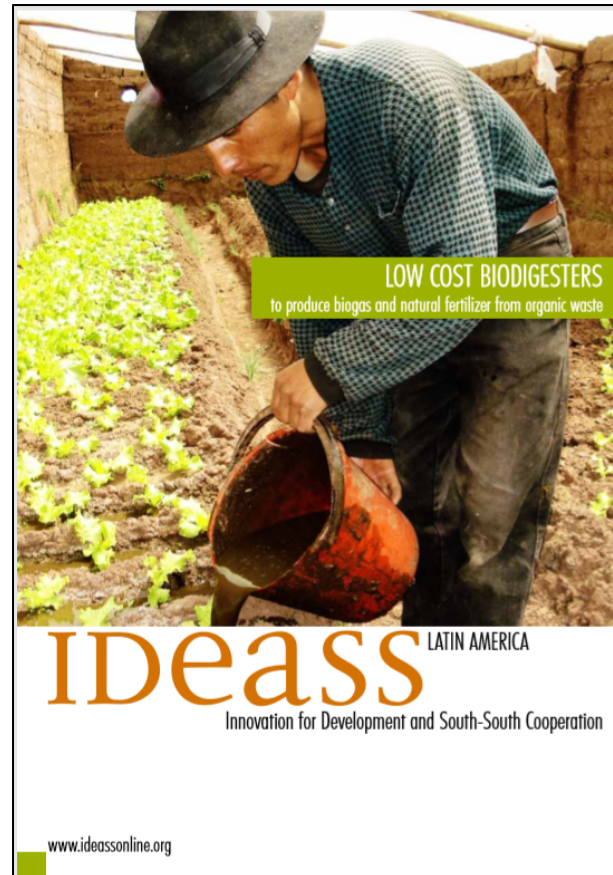
A Smart Biogas node installed near Arusha, Tanzania.

Source: <https://www.connectedenergy.net/smart-biogas>

Cold Climate Biogas Digester Feasibility Study

Potential advantages of bag digester:

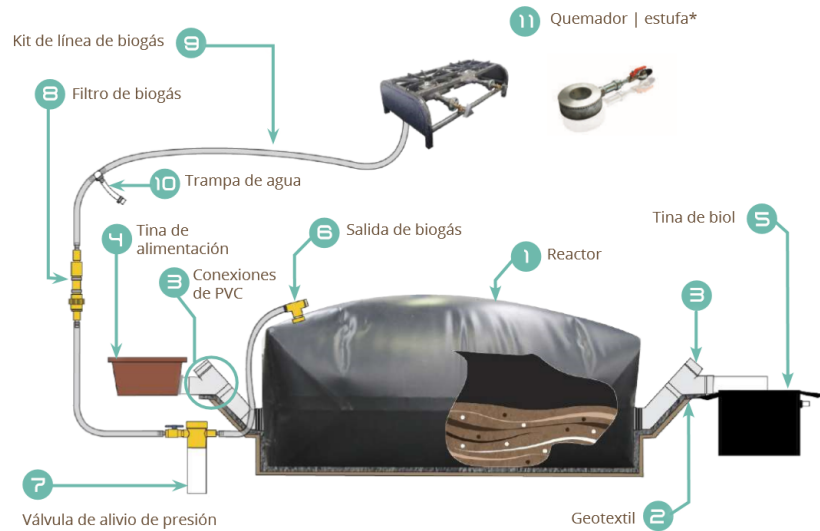
- Higher temperature = more gas biogas production
- Larger inlet accepts mixed feedstock
- Easier to transport
- Lower methane leakage



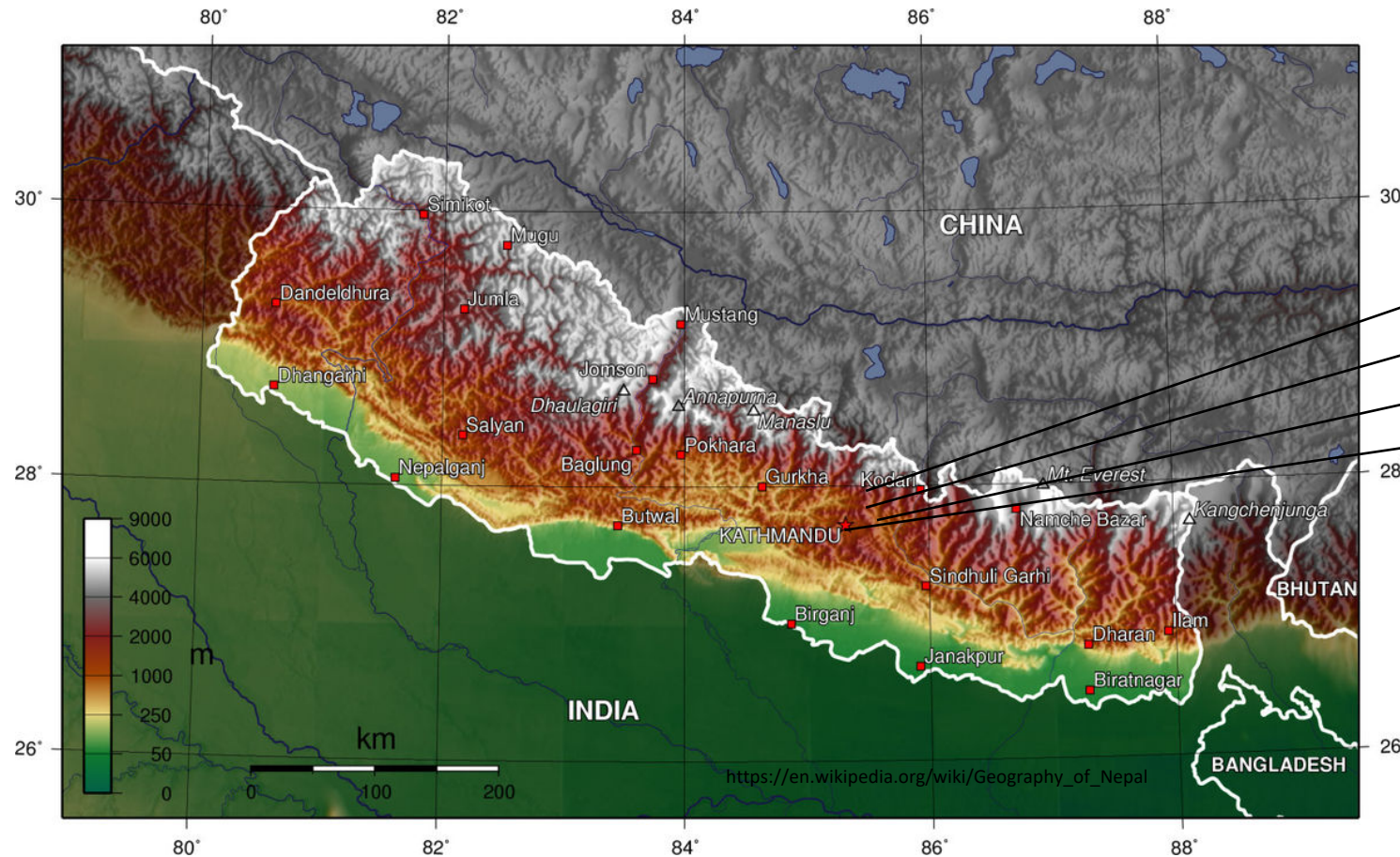
Cold Climate Biogas Digester Feasibility Study



COMPONENTES



Cold Climate Biogas Digester Feasibility Study



Temperature logger sites:

- Kutumsung (2470 m)
- Thotungdanda (2210 m)
- Takebesi (950 m)
- Kathmandu, RETS (1400 m)
- Cottage Grove, Oregon, USA (240 m)

Cold Climate Biogas Digester Feasibility Study

Geocene Dot



HOBO Pendant



Tunel (hoophouse) in Nepal



Next steps:

- Find participants for pilot project
- Install insulated bag digester systems in Nepal and USA
- Monitor systems with prevleaf sensing platform
- Scale up

Thanks
ryan@mtnaireng.com