Clean Air with Improved Agricultural Crop Residue and Biomass Management

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Manila, Philippines

Possible Solutions on Biomass Managements or Biomass Pelletization for Cleaner Air

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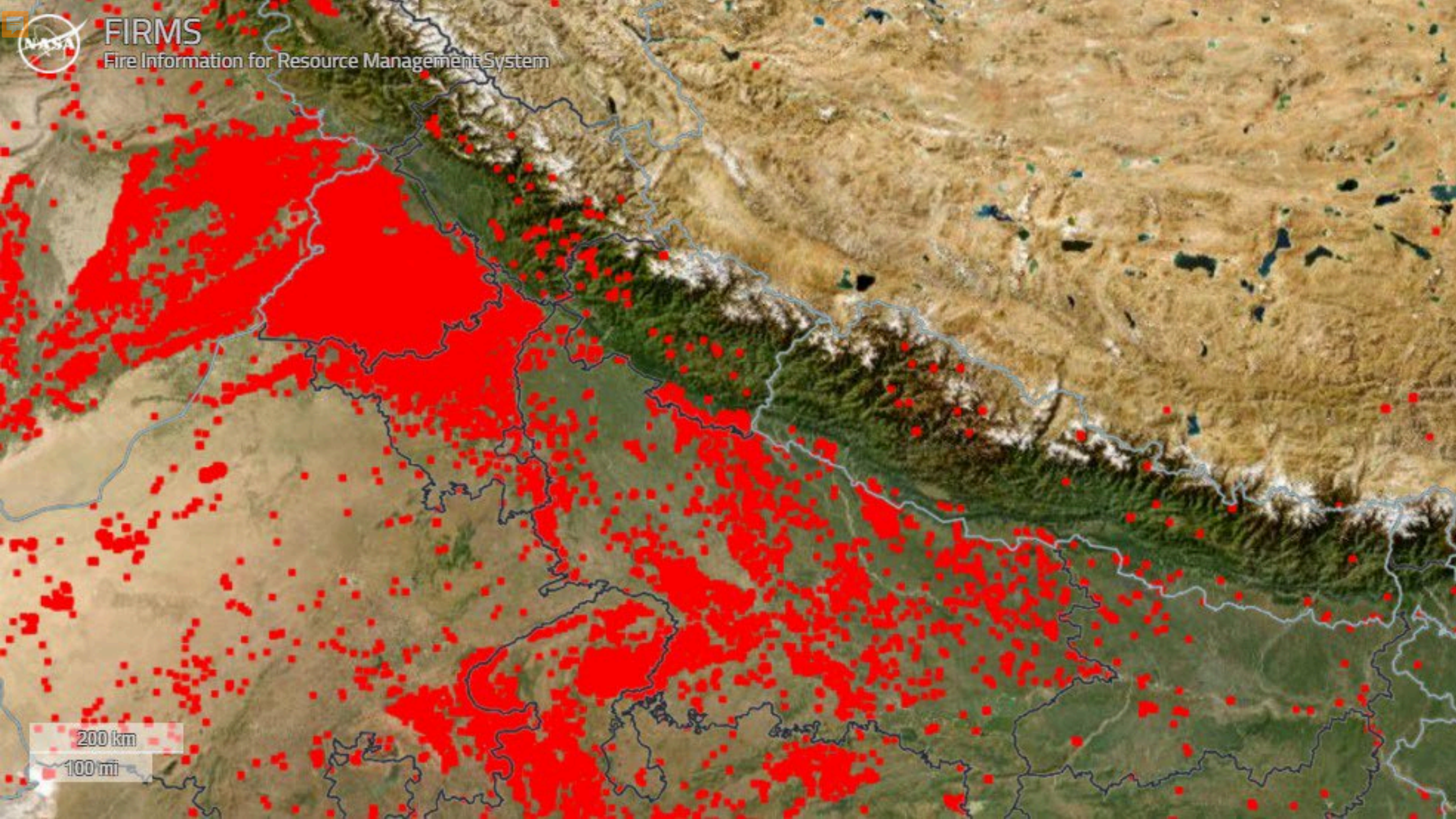
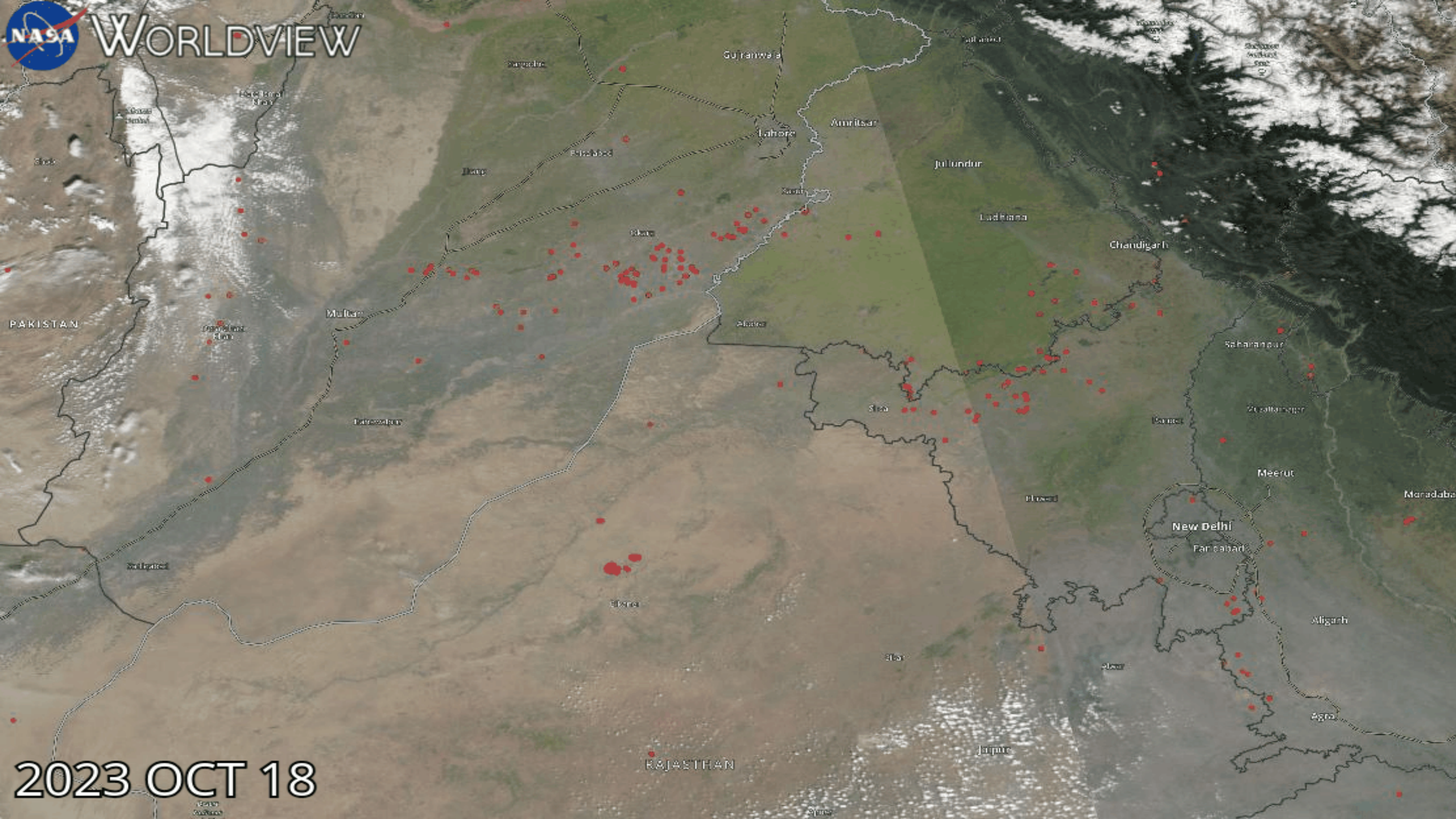
Open Burning

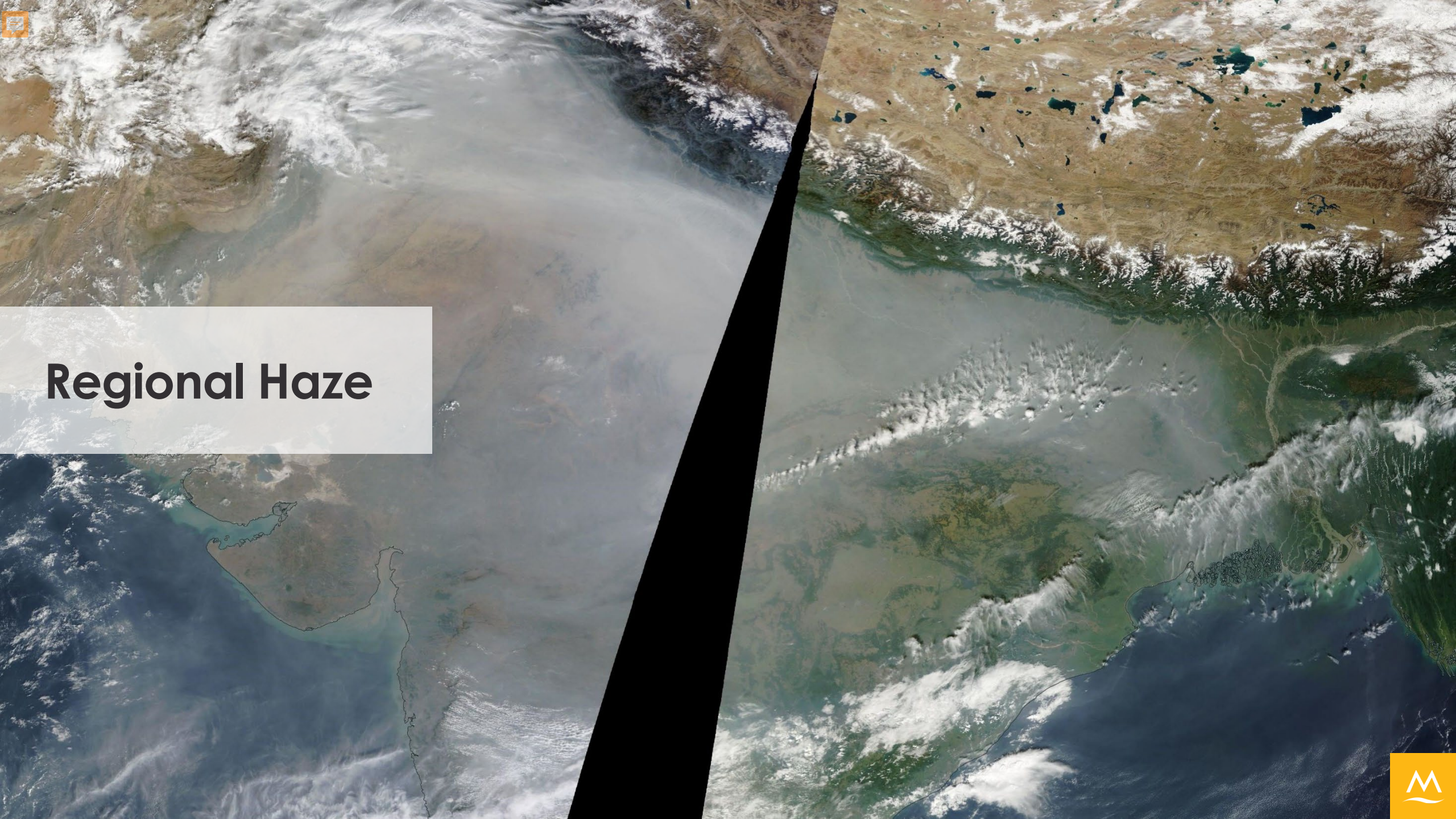
- Burning stubble prior to next planting of crop
- Clearing unwanted weeds in field
- Tight harvest schedule
- Limited manpower
- Crop stubble unaddressed by agri-mechanization
- Steady decline of animal husbradry
- Lack of straw management system
- Shift in energy use

Impacts

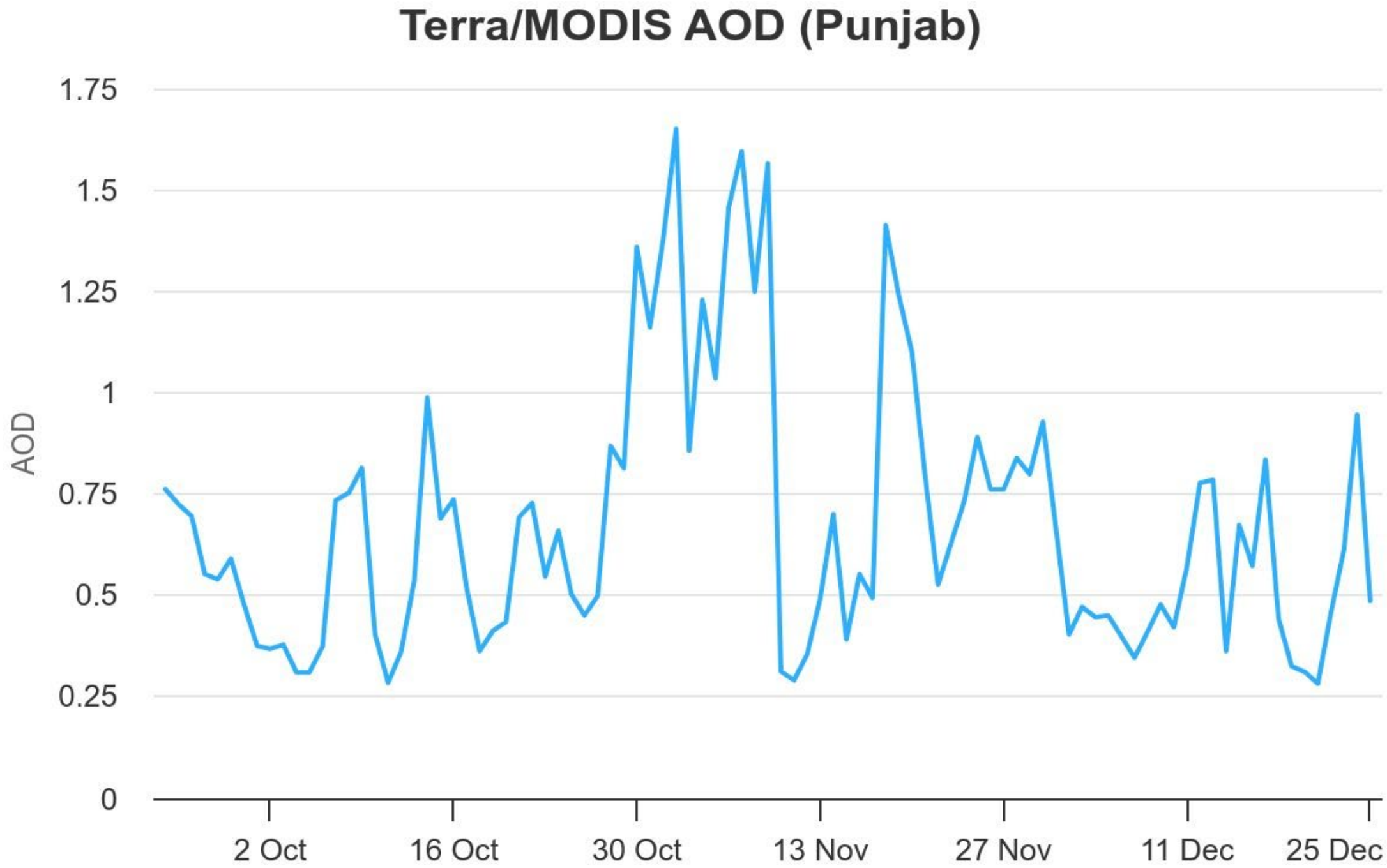
- Higher mortality from respiratory illness among young and elderly
- Possibility of accidents due to visibility
- Impact on aviation
- Release of air pollutants
- Decrease soil fertility
- Greater fertilizer use (~25%)
- Contributing to regional haze

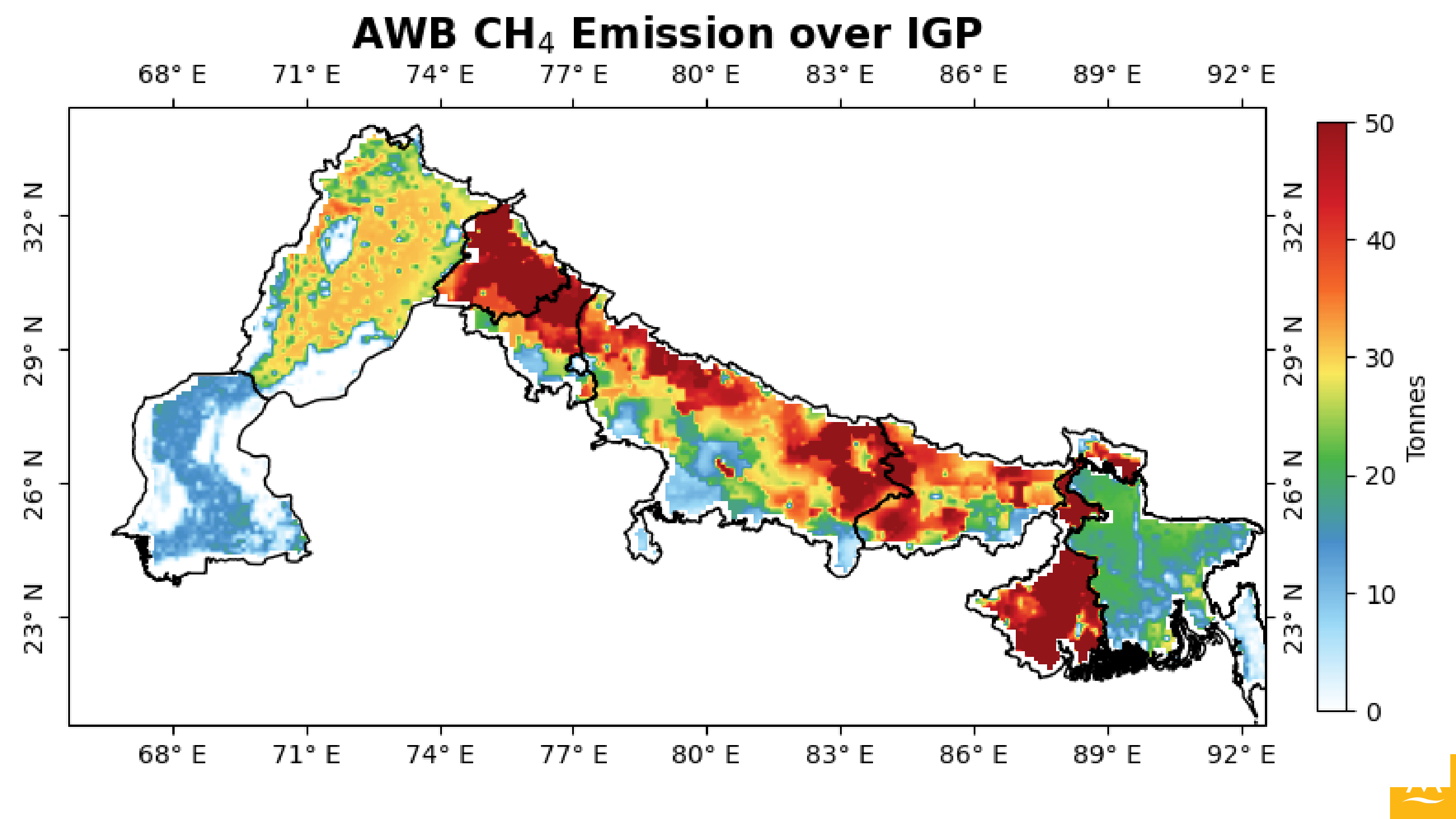

FIRMS
Fire Information for Resource Management System
200 km
100 mi


NASA WORLDVIEW
Gujranwala
Lahore
Amritsar
Jalandhar
Ludhiana
Chandigarh
Faisalabad
Multan
PAKISTAN
Saharanpur
Meerut
Moradabad
New Delhi
Faridabad
Aligarh
Agra
Jaipur
RAJASTHAN
2023 OCT 18

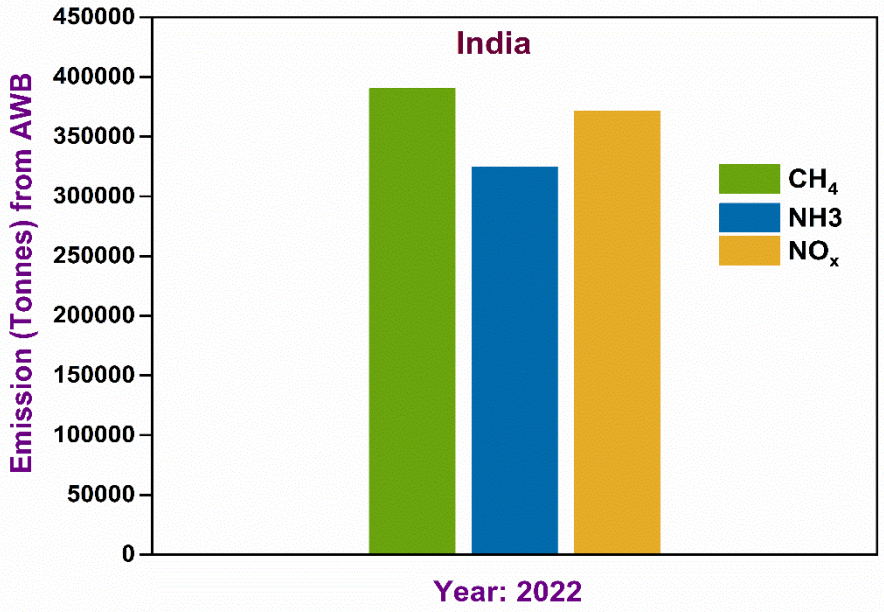


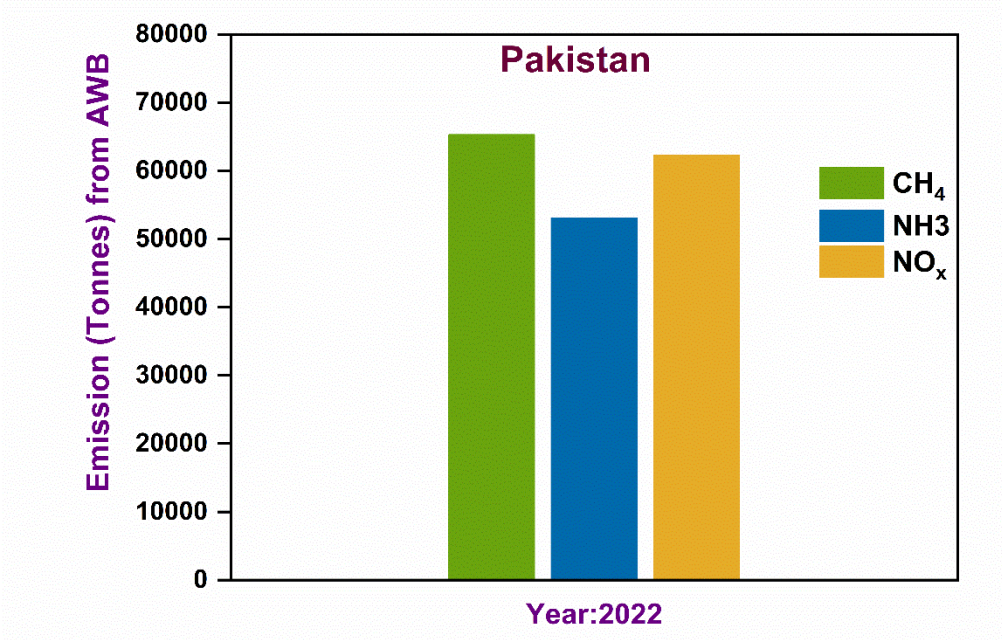
Regional Haze

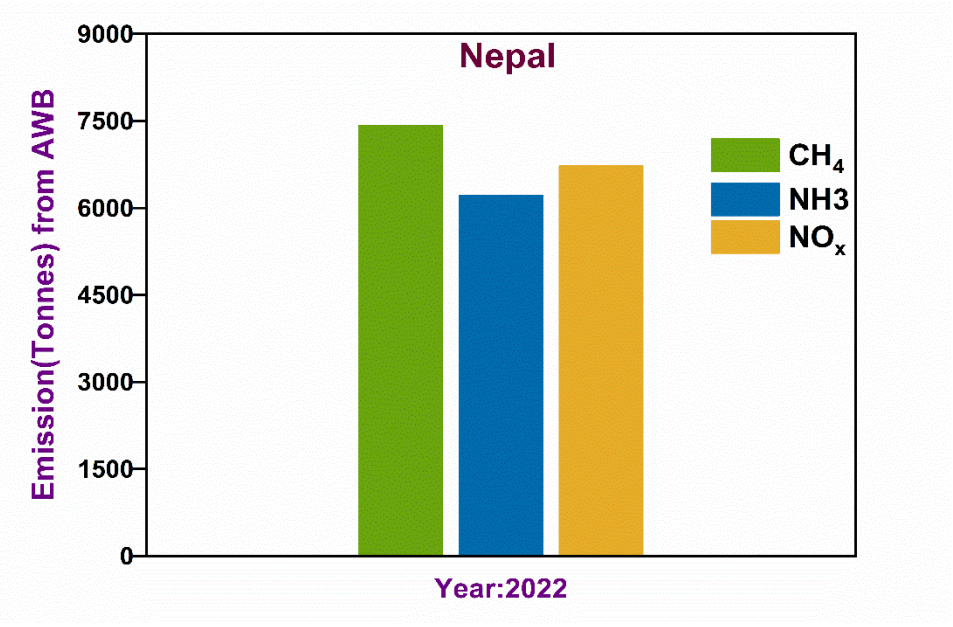

Terra/MODIS AOD (Punjab)
AOD
1.75
1.5
1.25
1
0.75
0.5
0.25
0
2 Oct
16 Oct
30 Oct
13 Nov
27 Nov
11 Dec
25 Dec

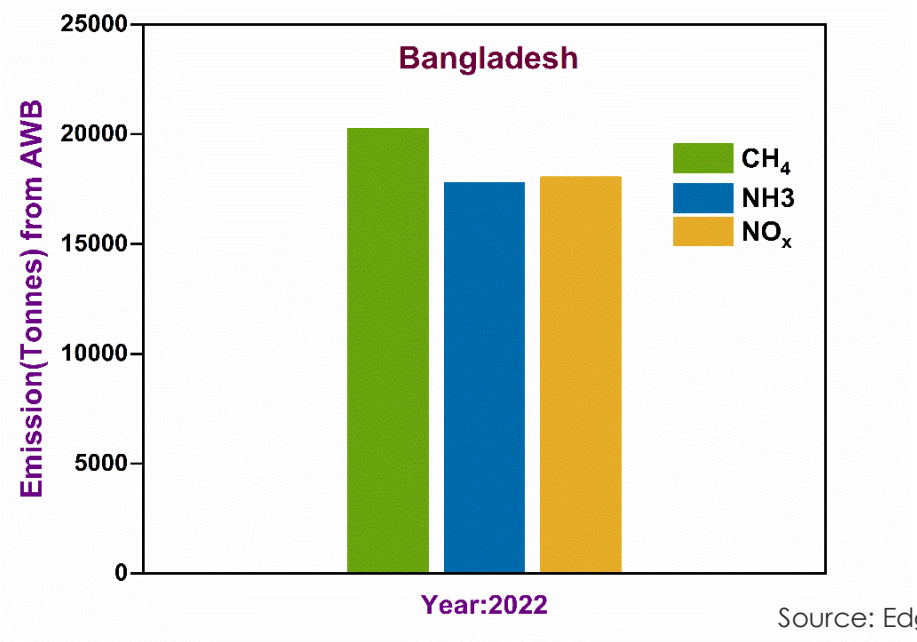

AWB CH_4 Emission over IGP
68° E
71° E
74° E
77° E
80° E
83° E
86° E
89° E
92° E
32° N
29° N
26° N
23° N
Tonnes
50
40
30
20
10
0

Methane Emission from AWB









Source: Edgar V8.1

Project Area

Project is focused on reducing air pollution and greenhouse gas emissions in the Indo-Gangetic Plain (IGP), which includes India, Bangladesh, Pakistan, and Nepal, by developing, piloting, and upscaling a regionally appropriate crop residue pelletization

Project Components

1. Develop a Regionally Fit Framework for the use of pelletization of crop residue

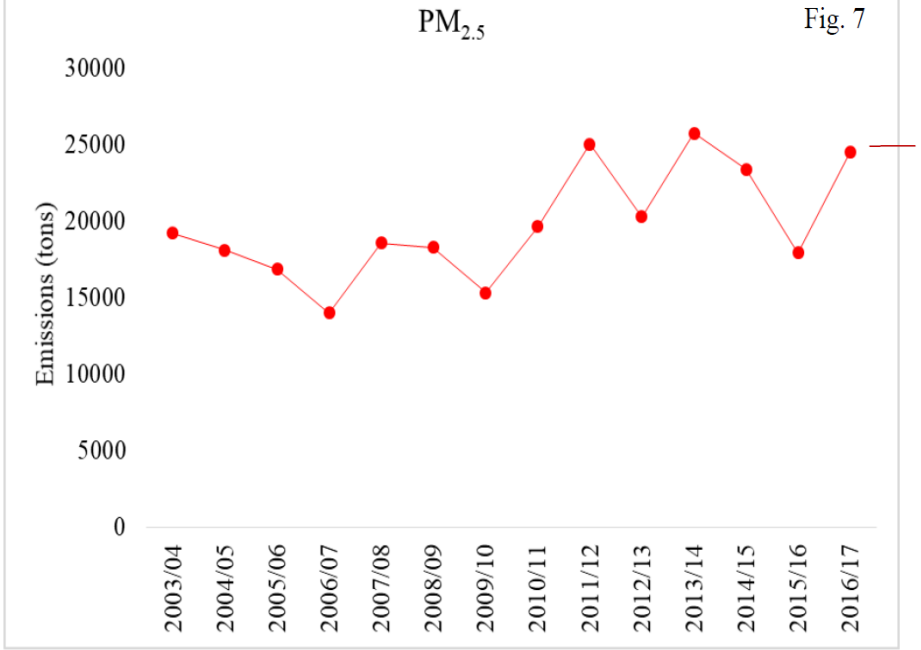
2. Enabling policy and fostering practice environment

3. Outreach and knowledge dissemination

Mainstreamed Gender Equality and Social Inclusion

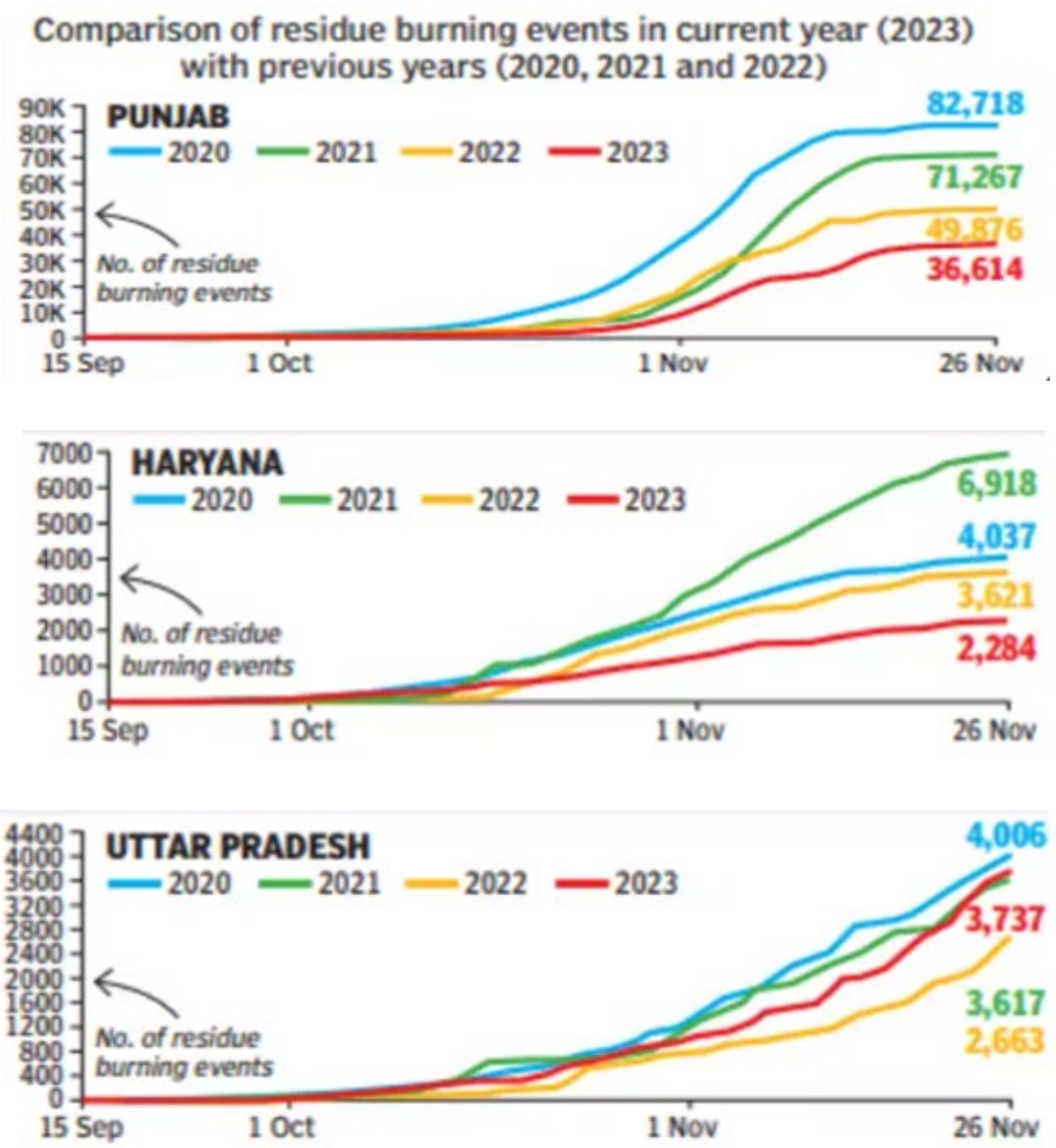
Dhaka Consultation

Residue Burning



Likewise, trends of CO_2, CO, BC, CH_4, SO_2, NMVOC, NO_x, OC, and NH_3 increased by 27% from 2003 – 2017.

Source: Das etal,2020



Source: Indian Agricultural Research Institute

Energy Audit in Brick Kilns

Coal

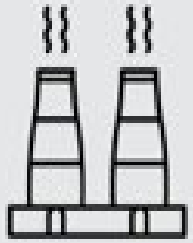
Pellet

Pellet Mixed with Coal

Energy Inputs

- Chemical Energy in Fuel
- Energy in Air
- Energy in Green Bricks

Energy Audit



Brick Kiln

Energy Outputs

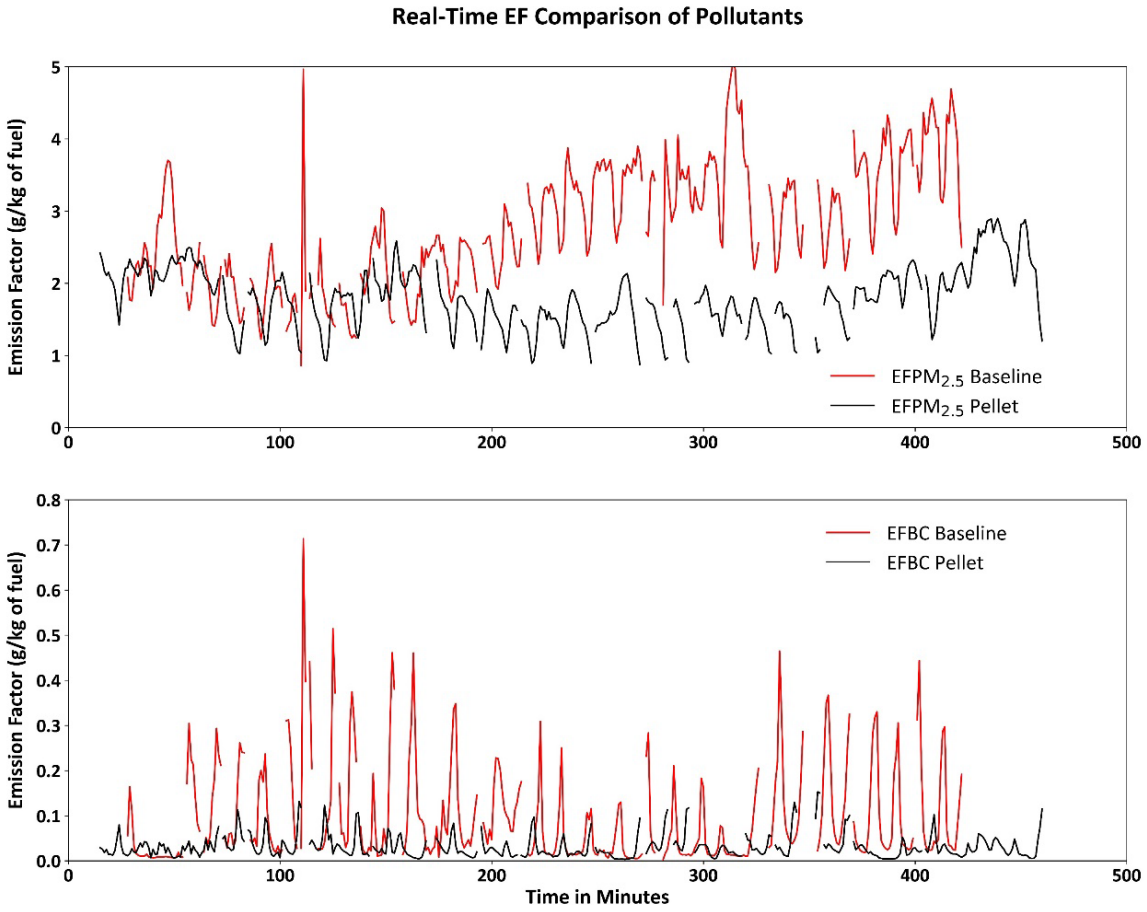
- Energy Required for Green Brick Transformation
- Dry Flue Gas Heat Energy Loss
- Radiation Heat Energy Loss
- Convection Heat Energy Loss
- Heat Energy Loss from Bricks

Results	Kiln A 100% Coal Based	Kiln B 75% Coal Based	Kiln C 100% Pellet Based (Press Mud & Paddy Straw)
Kiln Efficiency	64.56%	65.60%	59.61%
SEC	0.92 MJ/kg fired bricks	0.8 MJ/kg fired bricks	0.87 MJ/kg fired bricks

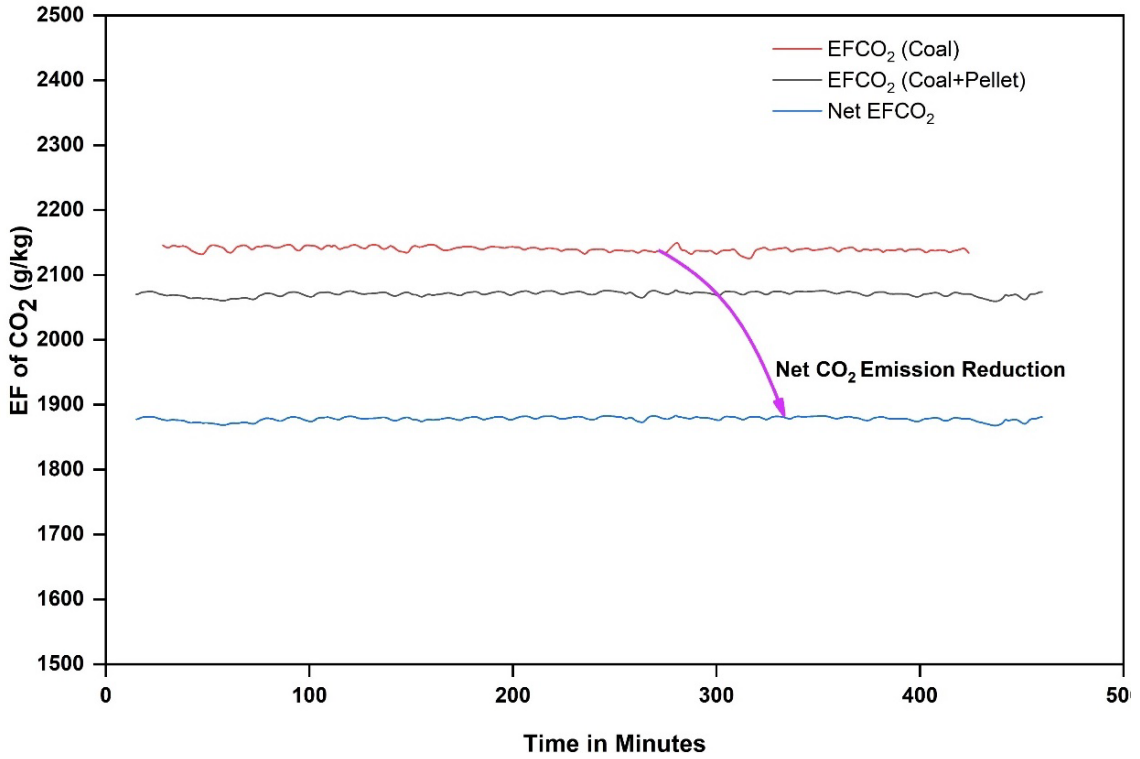
Kiln efficiency was found to be better with the mixed fuel type of kiln with less energy consumption

Pellet Application

Experiments with Pellet Application in Brick Kiln



Biomass pellets made of saw dust and rice straw was used to substitute the coal by 18% energy demand in the kiln.



CO2 emission reduction was found to be ~ 12% from the pellet application

Applications

Thank you