

Open Burning of Biomass and Possible Solutions



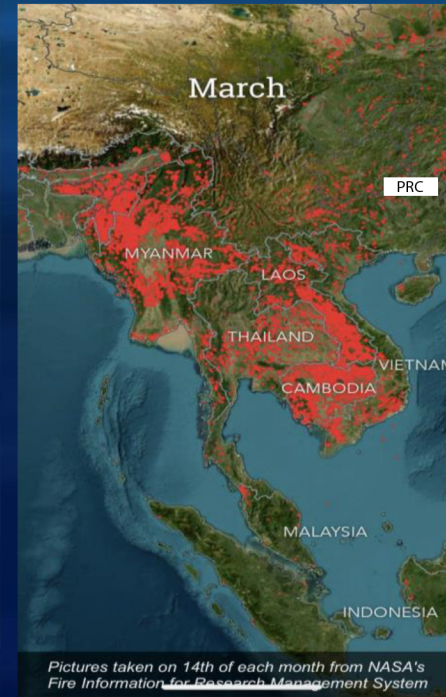
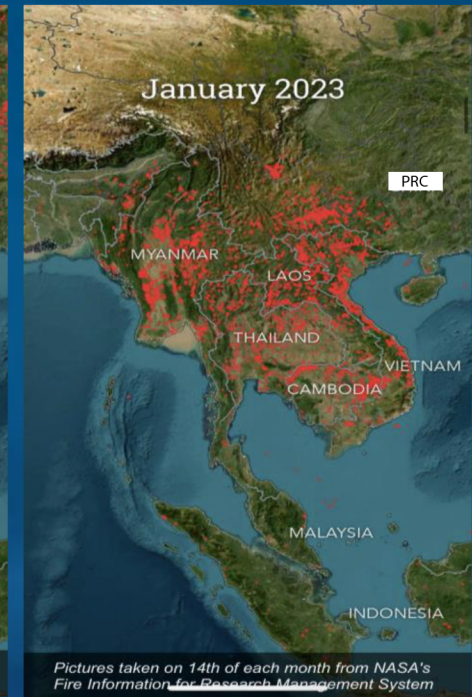
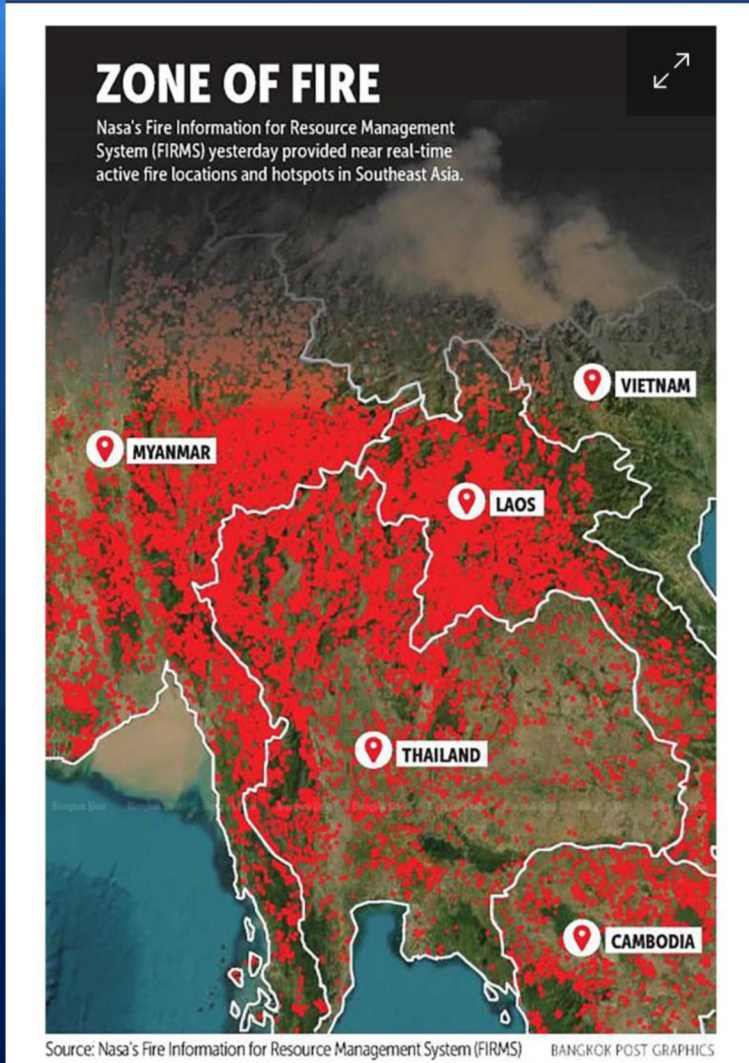
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Hotspot Counts

NOAA-20 Satellite with VIIRS Sensor



Source: NASA active fire data

Biomass Open-burning in Thailand



Burning of Solid Waste

- Burning of open-dumped garbage
- Burning of trash and plant residues



Burning of Agricultural Residues (during and after harvesting)

- Rice
- Sugar Cane
- Corn/Maize



Forest Fire

- Slash and burn agriculture
- Wild animal hunting
- Wild mushroom and plant harvesting



Land Clearing Fire





Photo by Dr. Pongsakorn Sangsuan
Chiangmai Paramotor Club



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Why do people burn?

- **Cost saving**
- **Time saving**
- **Less labour intensive**
- **Traditional attitudes, practices, and believes**



Possible Solutions to Reduce Open Burning of Biomass

Review of Existing Good Practices to Address Open Burning of Agricultural Residues



By

Dr. Supat Wangwongwatana

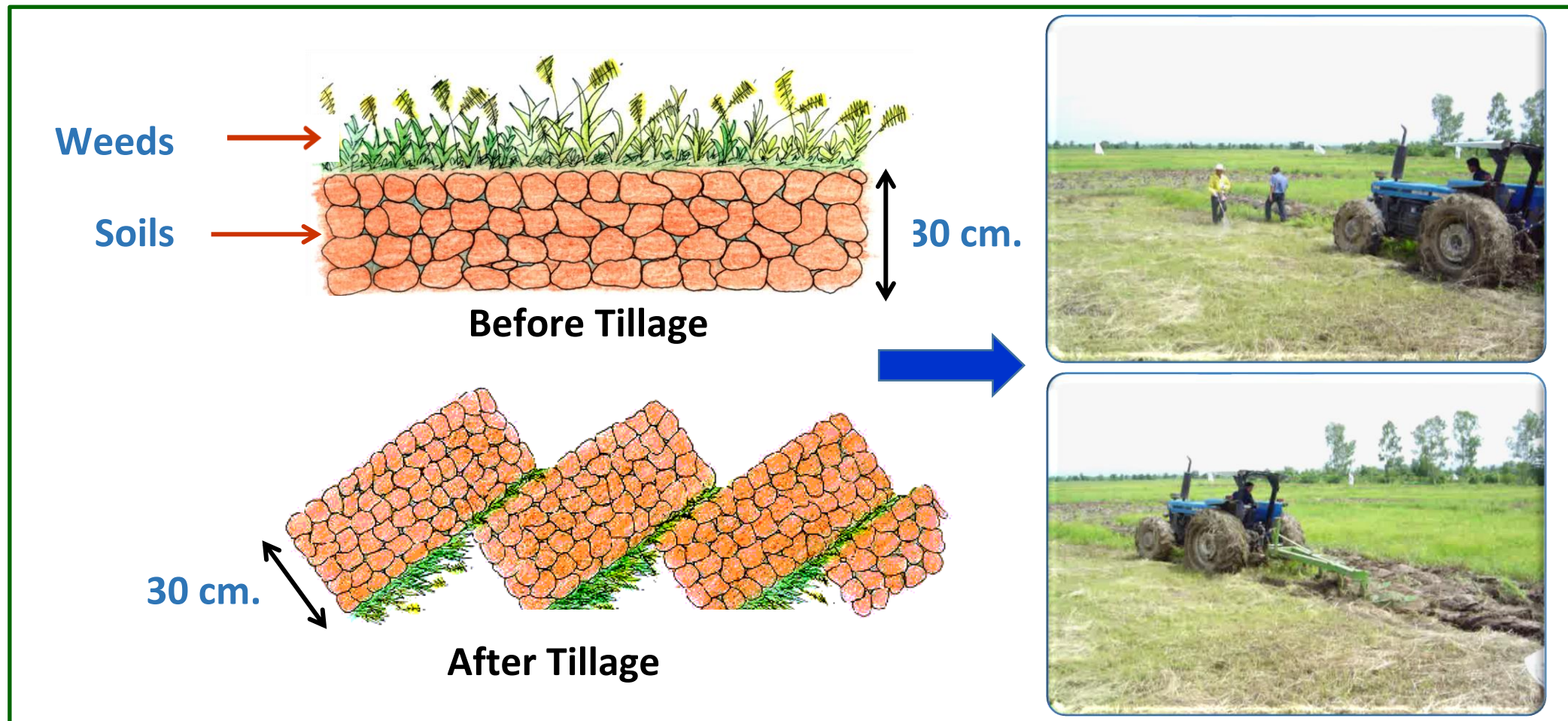
for

United Nations Environment Programme

August 2020

Solutions to Agricultural Residue Open Burning in Thailand

Promoting non-burning agricultural practices Stubble ploughing in rice cultivation



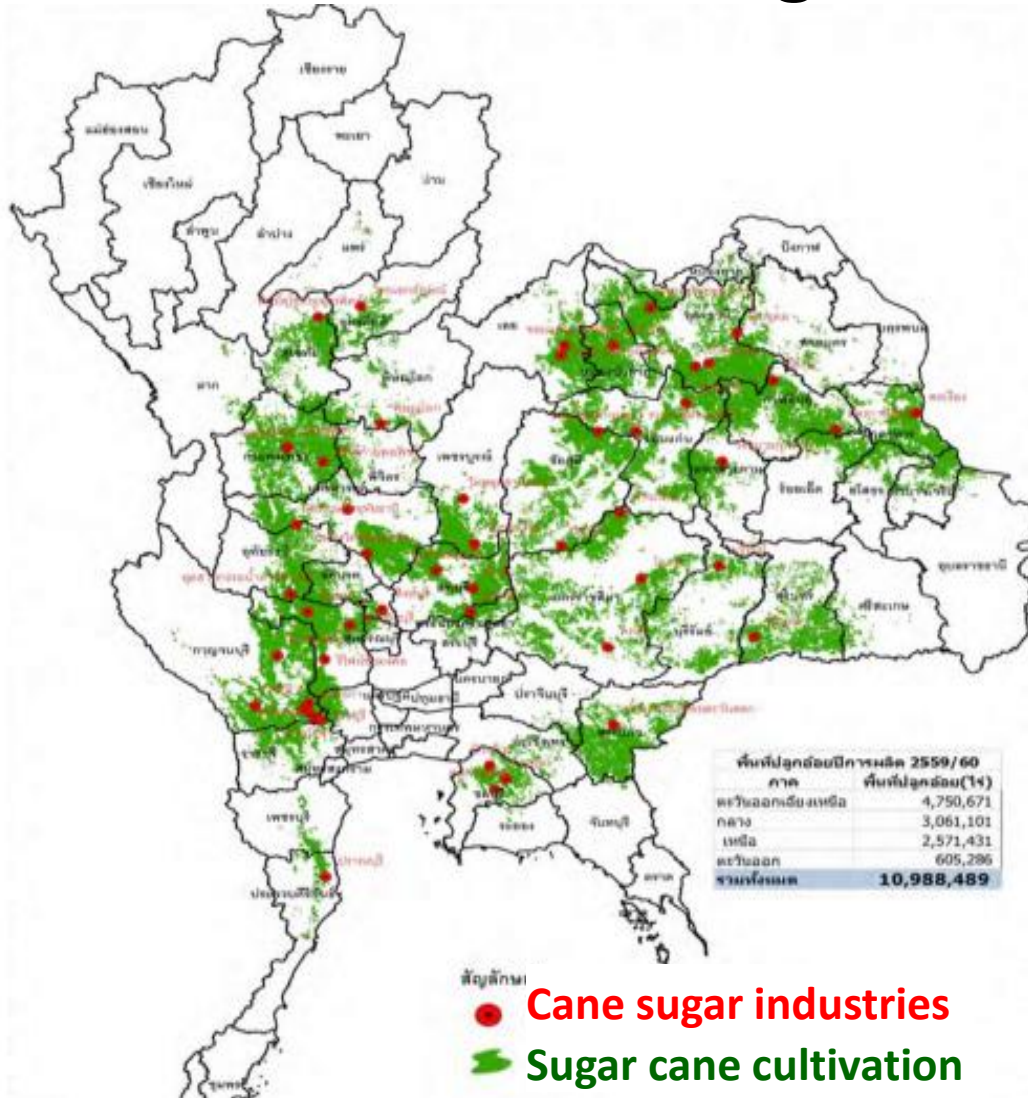
Stubble Ploughing using Simply Tractors with Improved Plough (Mouldboard ploughs)



Solutions to Agricultural Residue Open Burning in Thailand

Promoting non-burning agricultural practices

- Non-burning sugar cane harvesting using cutting machine
- Capital investment for machine
- Machine sharing center
- Price incentive for non-burned sugar cane

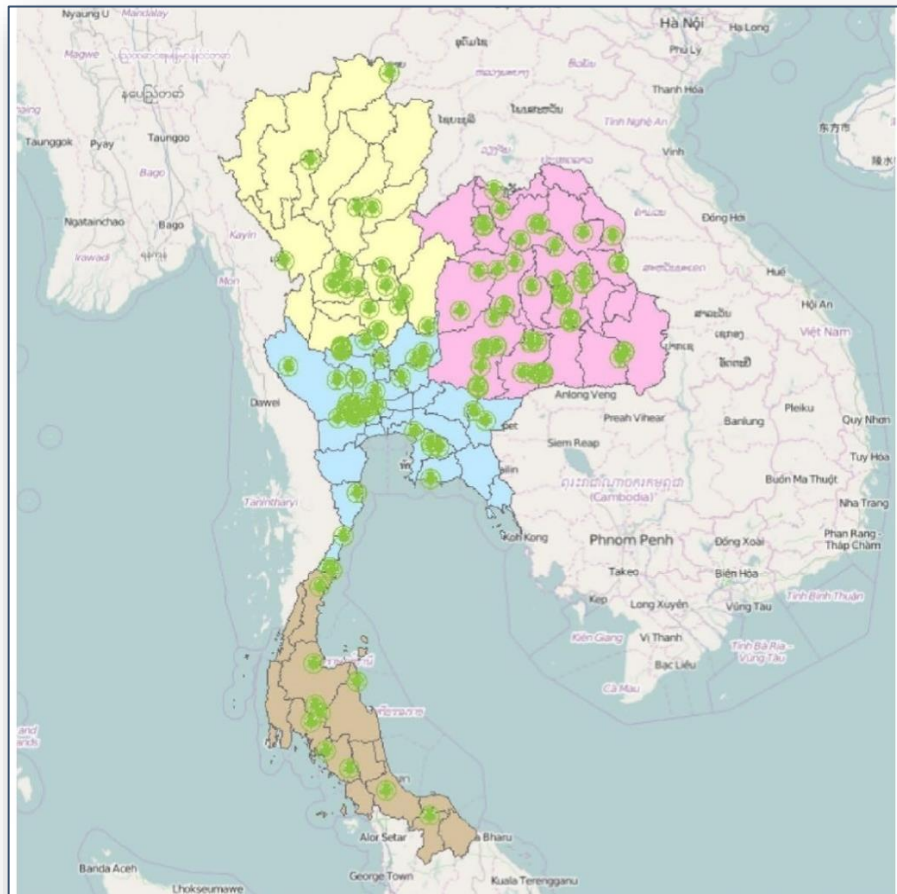


Solutions to Agricultural Residue Open Burning in Thailand

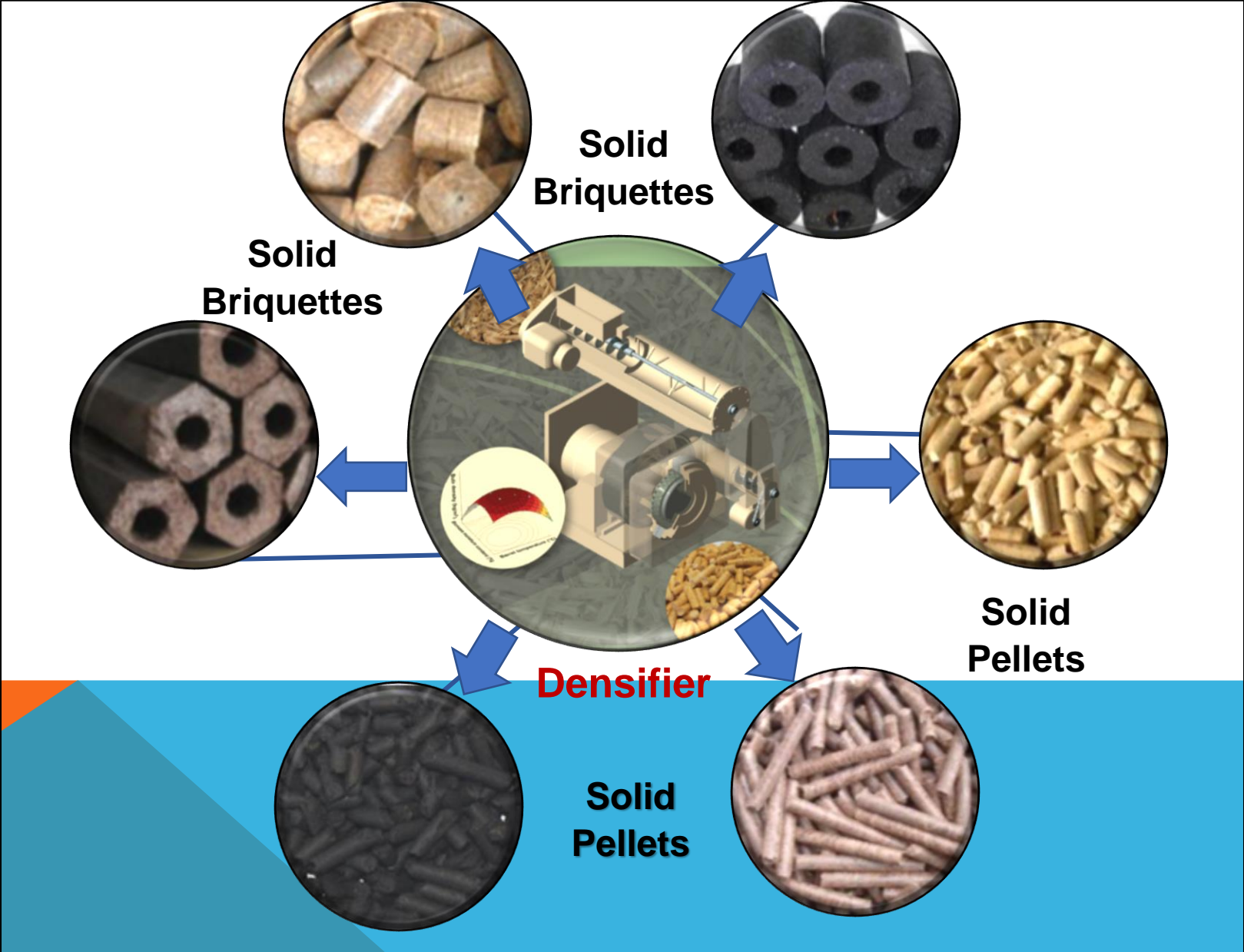
Waste-to-Energy Policy with Feed-in-Tariff (FIT)

AEDP2018 (2018-2037): 5,786 MW from bio-mass

Rice Husk Power Plant



Densification of Biomass Residues into Solid Pellets as Residue-Derived Fuels



Utilization of Crop Residues for Other Uses

- Producing organic fertilizer
 - Organic compost
- Use as animal fodder
- Other purposes: soil mulching material in vegetable production



Materials for soil mulching materials



Livestock feed and bedding

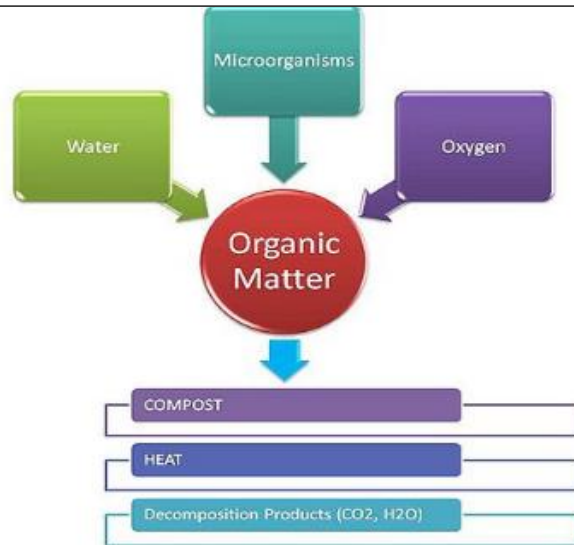


Cultivation of mushrooms



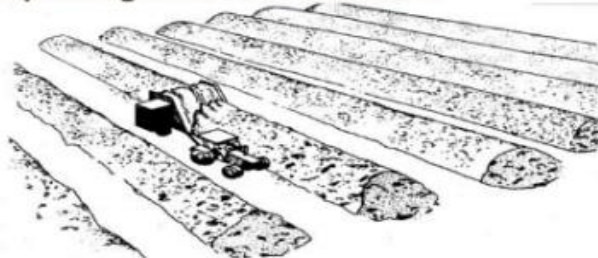
Composting and compost from agricultural residues

Aerobic Composting Process

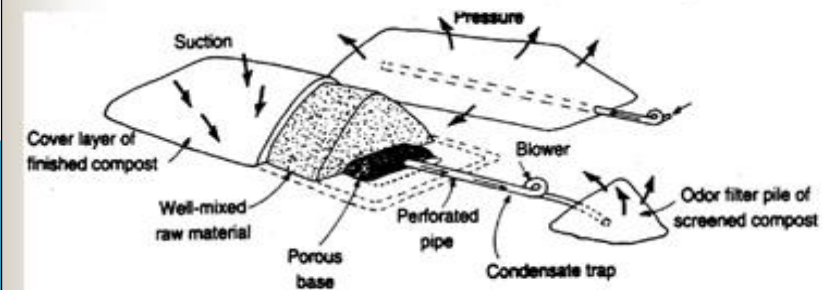


Windrow Composting

- Materials mixed and formed into windrows
- Windrows 7' -8' wide, 5' - 6' tall, varying lengths
- Compost turned and mixed periodically
- Aeration by natural/passive air movement
- Composting time : 3 - 6 months

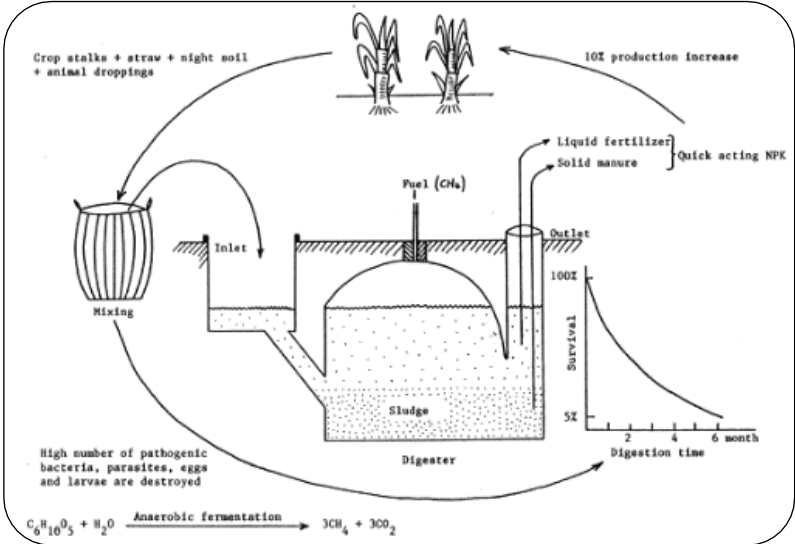


Aerated Static Pile Composting

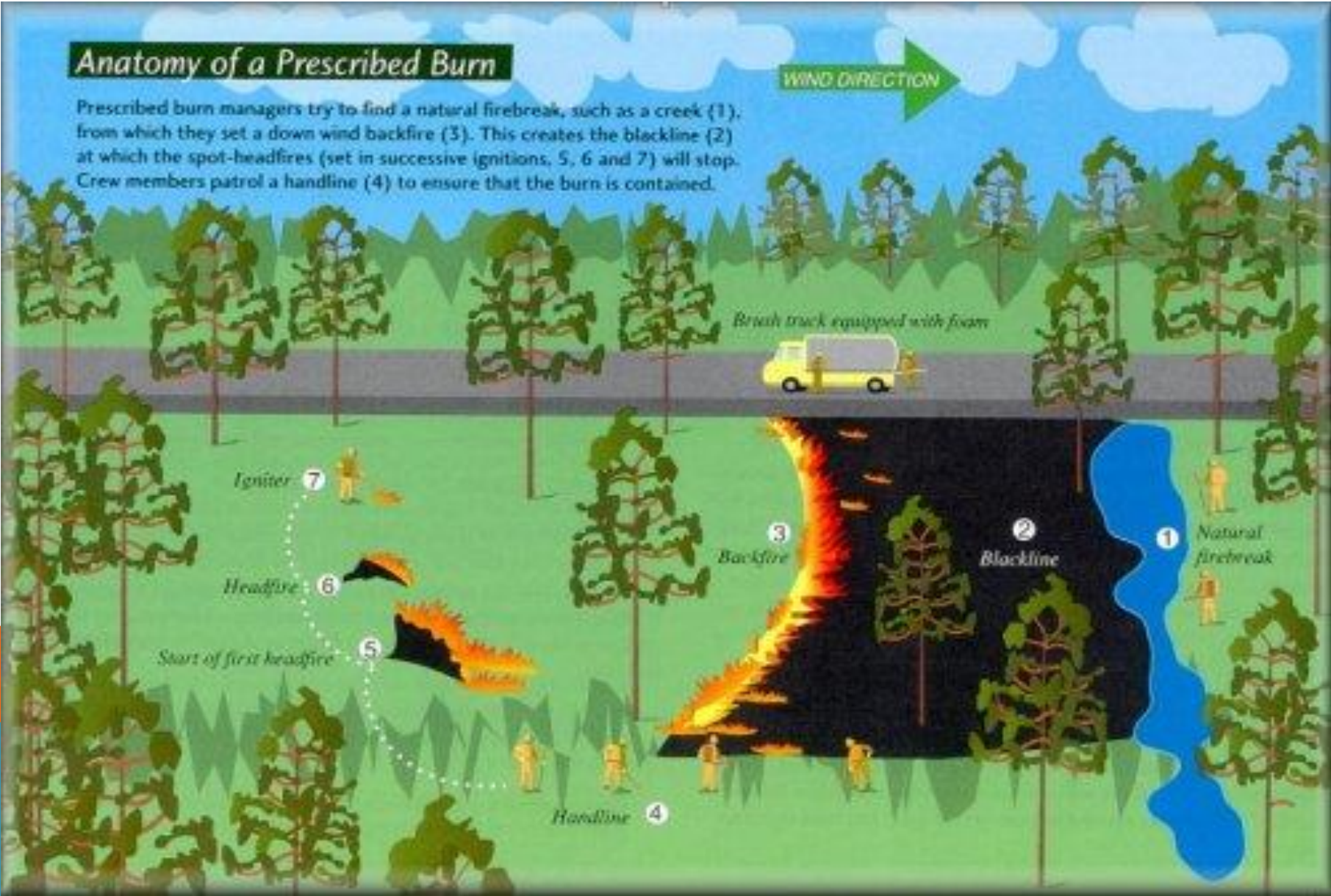


- Mixed materials built on bed with aeration pipes embedded
- Aeration by mechanical blowers
- Composting for 21 days, followed by curing for 30 days
- Often used in biosolids (sludge) composting

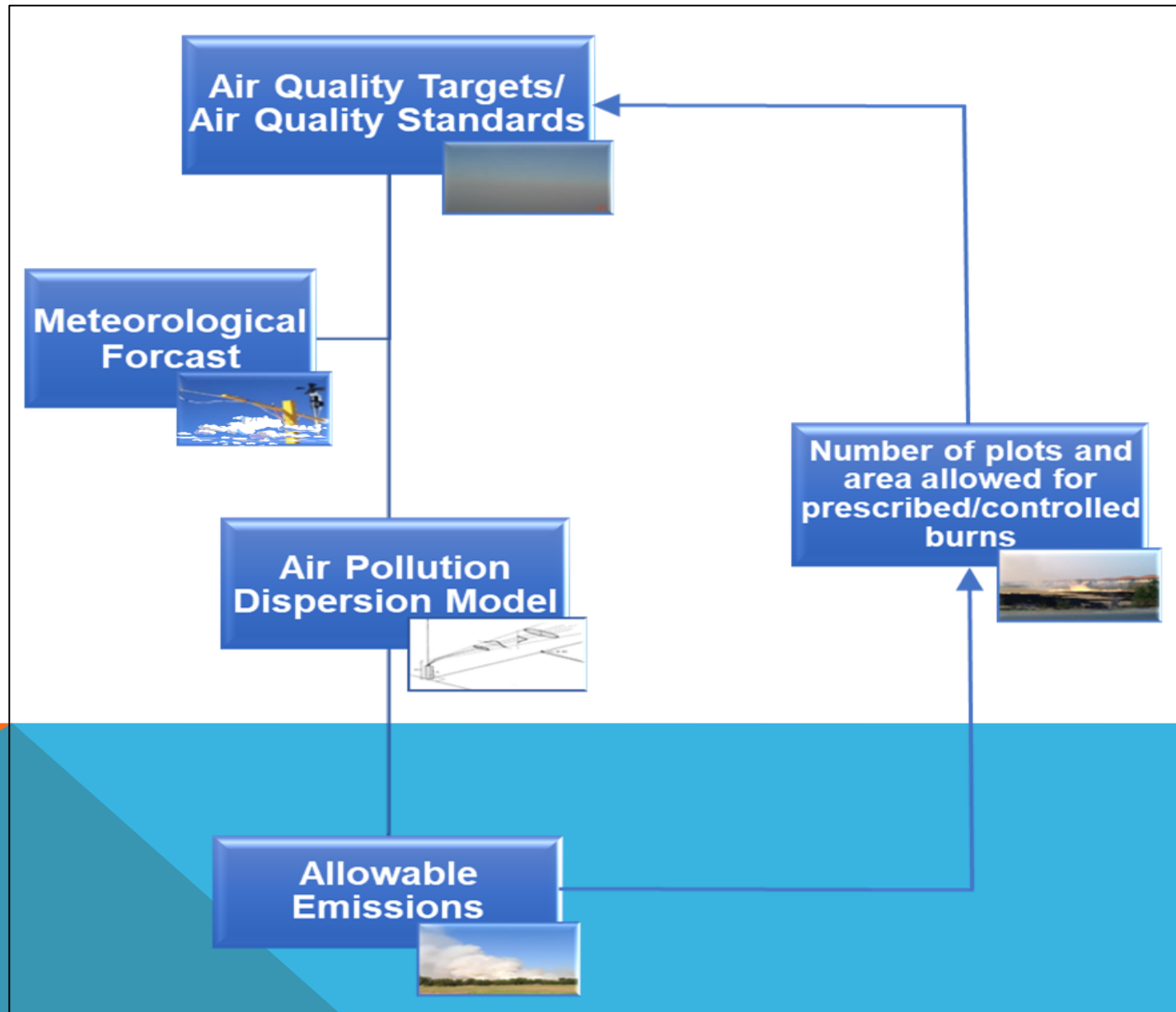
Anaerobic Composting Process



Anatomy of a Prescribed/Controlled Burn of an Agricultural Field



Management of Prescribed/Controlled Burning



Other Alternative Uses of Agricultural Residues



Materials for soil mulching materials



Livestock feed and bedding



Cultivation of mushrooms



Composting and compost from agricultural residues

IKEA FÖRÄNDRING Household Products made from Rice Straw



Promotion of Non-Burning Agricultural Practices in Thailand

Reducing open burning in agricultural areas

- Educating farmers
- Establishing non-burning agricultural practice village network
- Establishing agricultural machinery sharing system
- Campaigning for non-burning agricultural practices
- Prohibiting open burning of agricultural residues



Implementation Challenges

- **Banning open burning vs control and management of open burning.**
- **Machines are expensive.**
- **Taking a long time for farmers to change attitude, behaviour and practices.**
- **Financing non-burning technologies and practices.**
- **Difficulty in collecting and transporting agriculture residues.**
- **Pollution problem from biomass power generation.**

Multiple Benefits from Open-burning Reduction

Emission Reduction

- PM
- BC
- CO₂

Air quality benefits

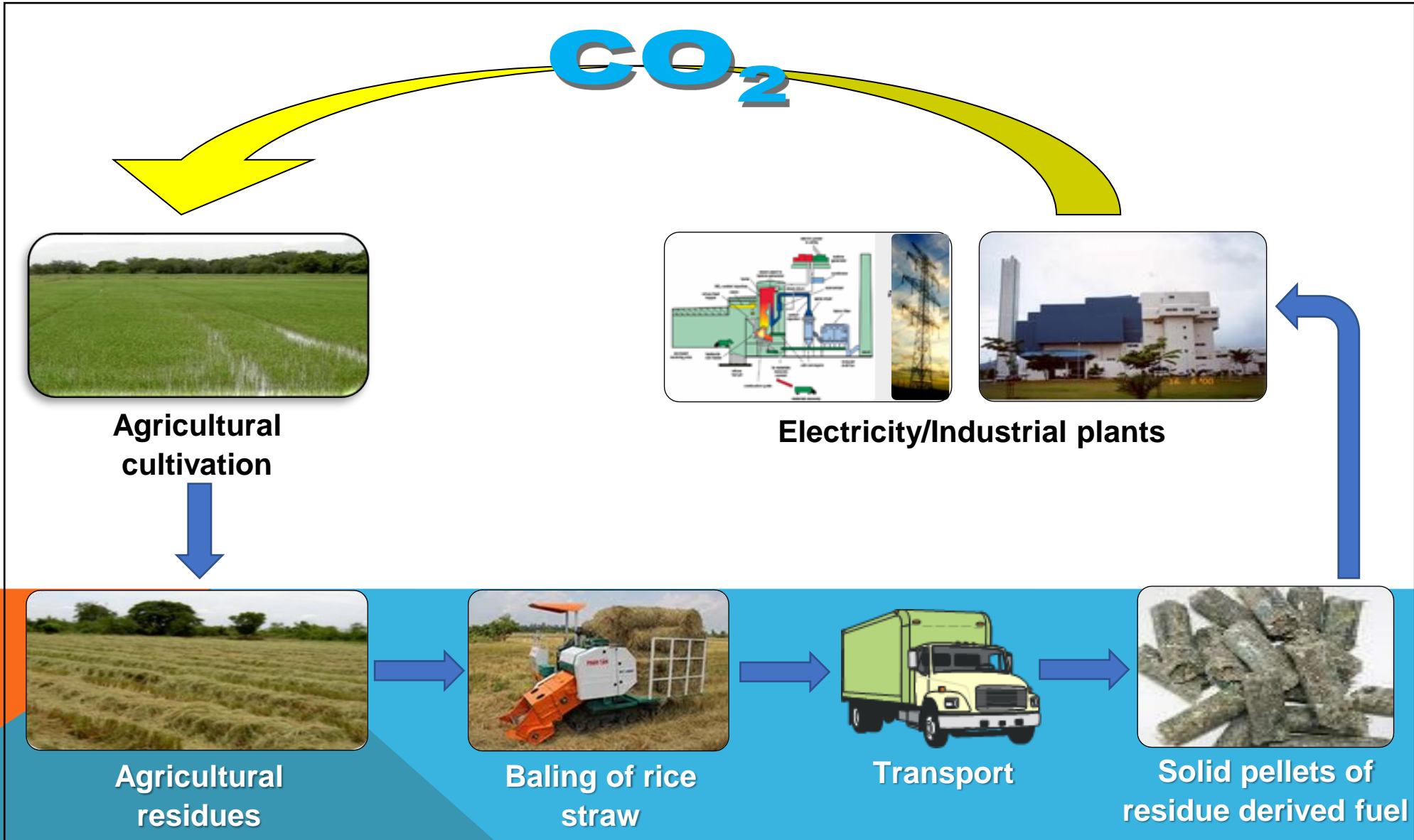
Climate benefits

Environment benefits

Health benefits

- Reducing mortality
- Reducing morbidity

Climate Benefits

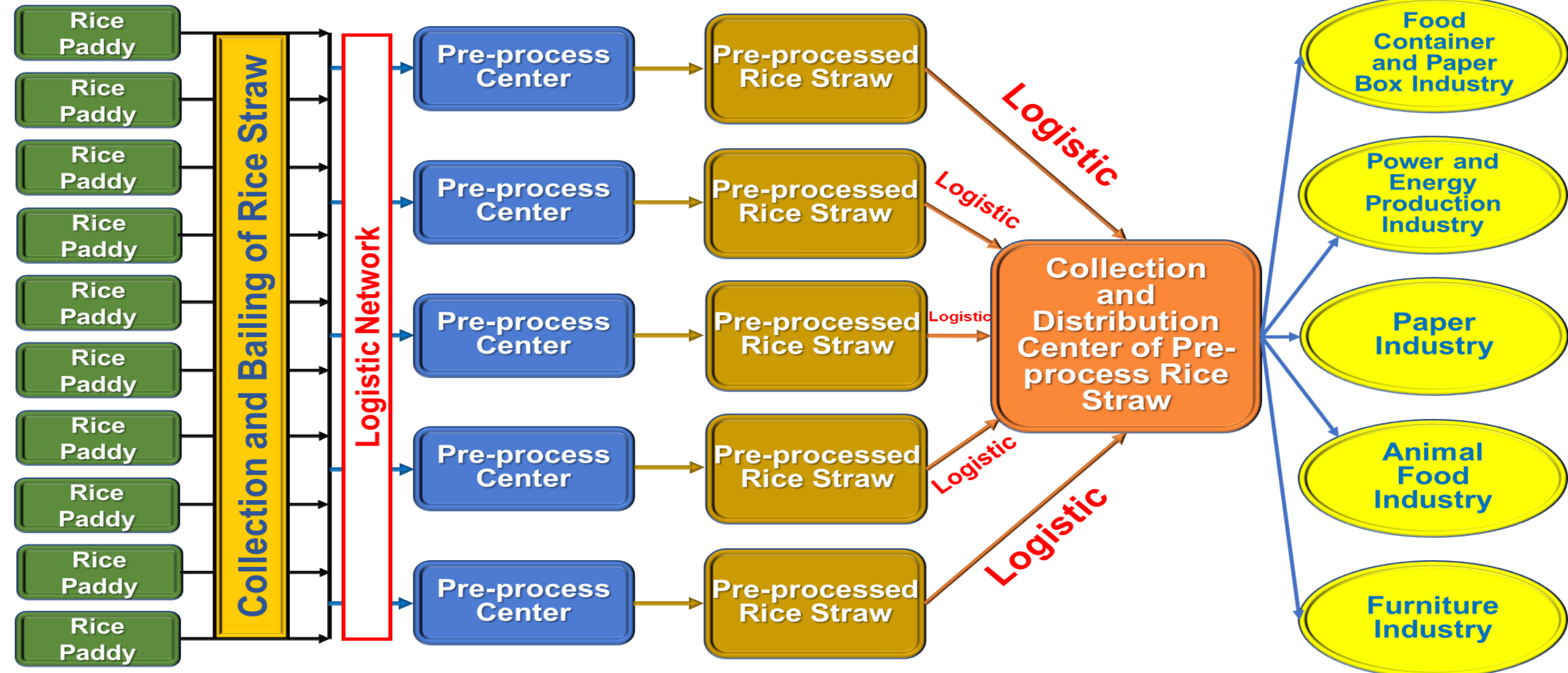


Value Chain Creation for the Utilization of Rice Straw/Biomass

Collection of Rice Straw

Transportation and Pre-processing of Rice Straw

Utilization of Pre-processed Rice Straw



Thank you for your attention

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