Methane to Markets

Country Resource Assessments: Support for Livestock and Agro-Industrial Waste Program Development

M2M Expo 2010 in India

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Agenda

- Objectives and Methodology of a Resource Assessment
- The India Resource Assessment
- Overview of Resource Assessments for other countries

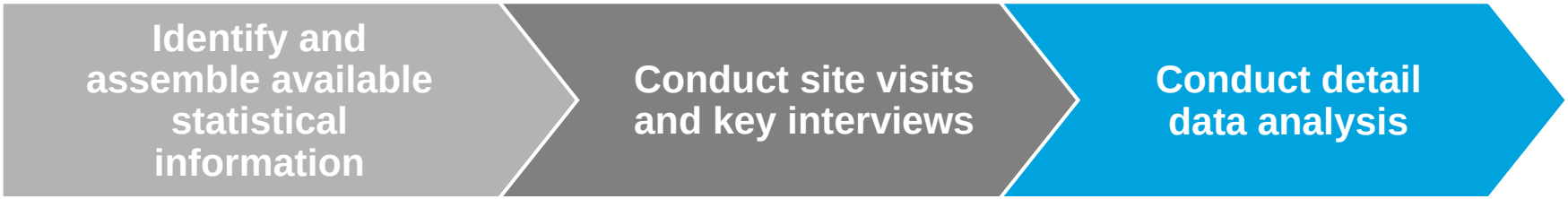
Objectives of Resource Assessment

- Identify and characterize the potential for methane emission reduction consistently;
- Assess country market opportunities;
- Identify location of opportunities;
- Prioritize opportunities.

Assessments provide a basis for a country specific emission reduction strategy and implementation plan.

Developing a resource assessment

RAs are developed in a step-by-step approach.



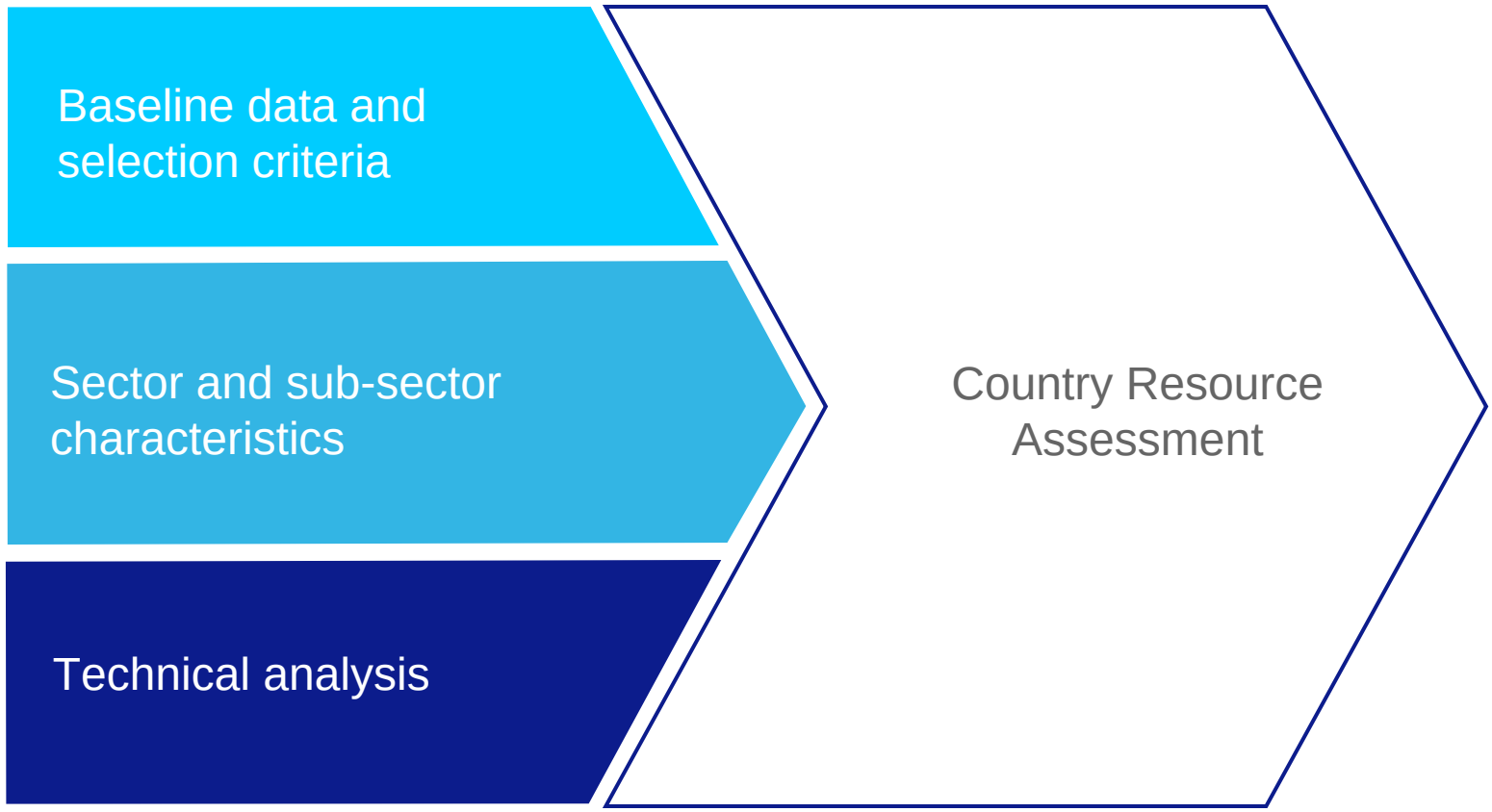
- Country profiles
- Global databases and publications (e.g., FAO)
- Country reports on livestock and agro-industry
- Multilateral banks studies (e.g., WB, IADB, ADB)

- Based on major sectors identified
- Representative sites
- Key players from each sector
- Associations (national and regional)

- Based on insights and information from key players
- Industry-specific databases and publications
- Sector-specific information from key government institutions

Elements of a resource assessment

Resource assessments contain three main elements



Baseline information and selection criteria

Methane to Markets

High, medium and/or low baseline emissions are highly dependent on:

- waste management practices (not all wastes generate methane)
- characteristics of the waste (not all wastes are created equal)
- local climate characteristics

Selection Criteria

- High volumes of wastes going to lagoons or surface impoundments
- Energy intensive
- Geographic distribution (particularly for centralized AD systems)

Potential sectors

Livestock

- Dairy farms
- Swine farms

Agro-industries

- Slaughterhouses
- Sugar refining
- Ethanol distilleries
- Beer production
- Starch production
- Fruit processing
- Other food processing (dairy products, vegetable oil, etc.)

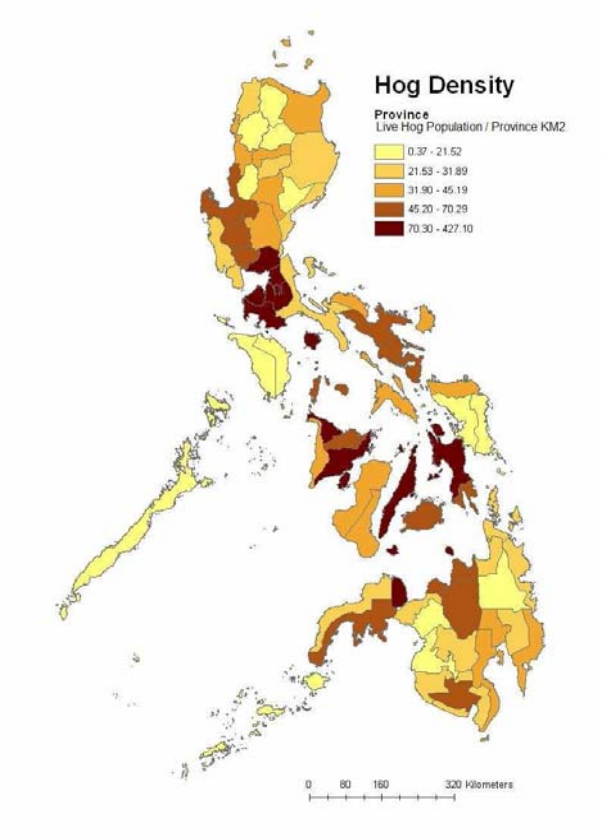
Sectors and sub-sectors characteristics

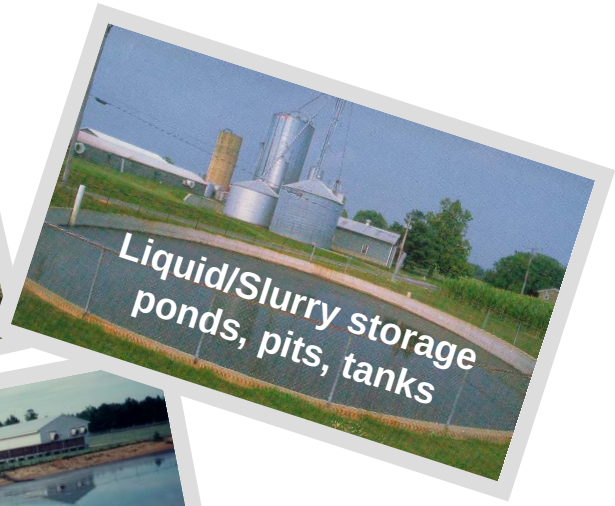
Size of sector, scale of operations and their geographic location

- Number of animals, tons/year, etc.
- E.g. Swine sector in the Philippines

Waste characteristics, handling and management

- M^3/animal/day, m^3/ton of product
- COD, BOD_5





Technical analysis

- Emission reductions and fuel replacement potential relative to IPCC methodologies
  - Ranking of resources relative to their baseline emissions, emissions reduction, and energy production potential
- Technology options
  - Types of AD systems and gas use processes based on sector, waste type, scale, and other variables such as temperature, organic loading rate, etc.
  - Cost of technology
- Opportunities for developing centralized and/or co-mingling projects, to the extent reliable data are available

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Acknowledgments

We would like to acknowledge the following institutions for their contributions to the India Resource Assessment.

FICCI – Federation of Indian Chambers of Commerce & Industry, http://www.ficci.com/

MNRE – Ministry of New and Renewable Energy, http://mnes.nic.in/

TERI – The Energy and Resources Institute, http://www.teriin.org/

Sectors identified

Sectors with potential for methane emissions reduction

- Dairy farm (milk production)
- Sugar and distilleries
- Tapioca and corn starch
- Fruit and vegetables

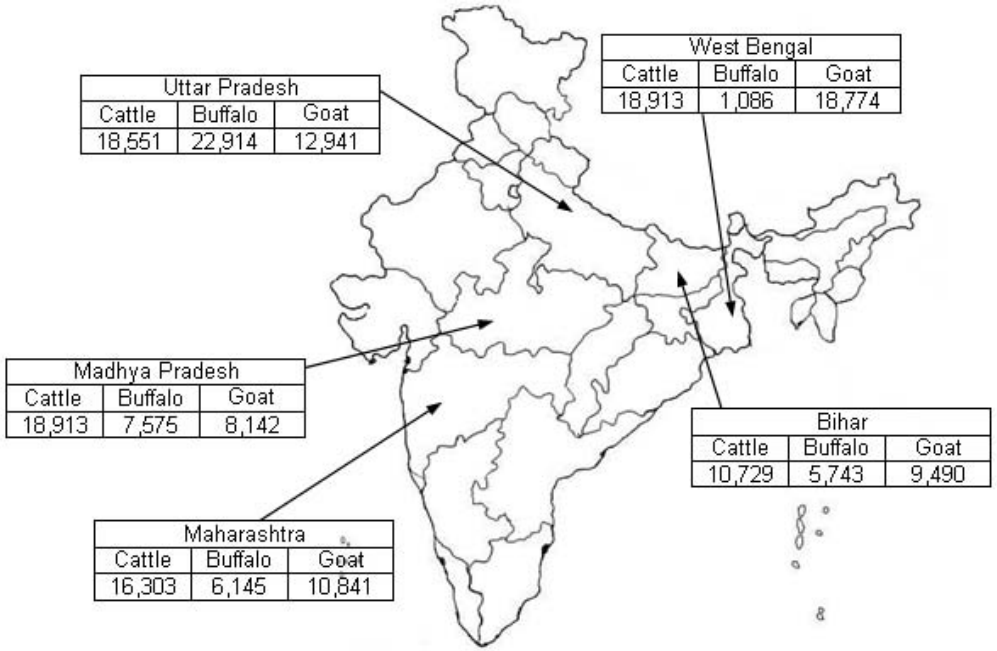
Sectors with lower potential for methane emissions reduction

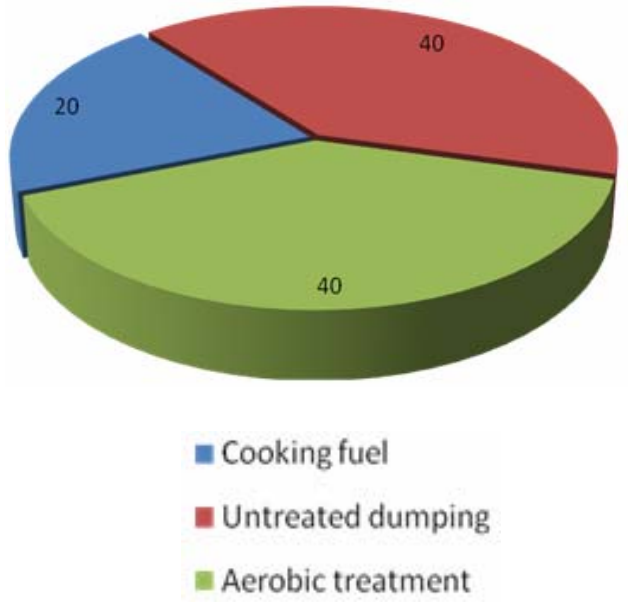
- Slaughterhouses (in urban centers)
- Poultry (solid waste)
- Grain processing (solid waste)
- Edible oil (solid waste)
- Milk processing

Dairy farms ~ 4.3 million ton CO_2e/yr

World's largest milk producer:
109 million tons of milk

- Dairy cattle: 102,700,000
- Dairy buffalo: 80,030,000
- ~32% of medium-large holdings





Sugar and distilleries ~ 1.1 million CO_2e / yr

Sugar

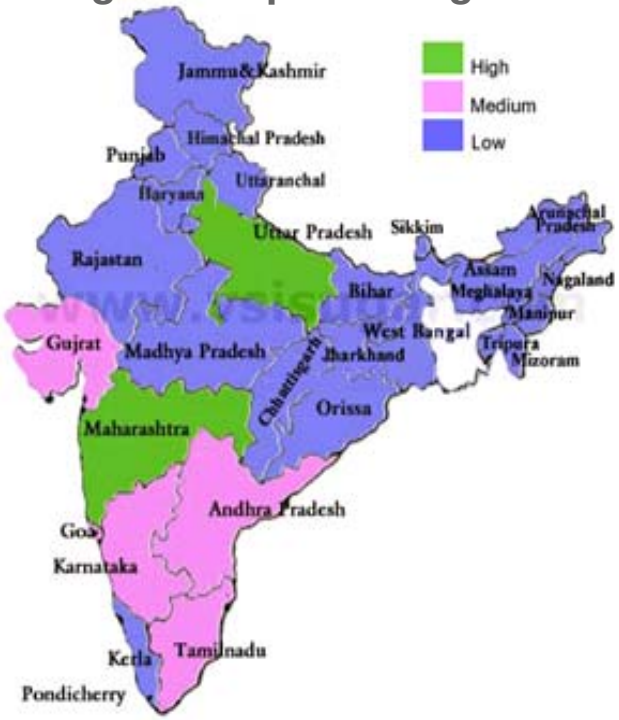
- World's 2nd largest sugar producer
- ~350 million tons sugarcane / year*
- ~22 million tons sugar / year
- WW: 11 m^3/ton**
- COD: 3.2 kg/m^3**
- WMS: about 5% use open lagoons

Distilleries

- ~3 million m^3 ethanol / year
- WW: 12 m^3/m^3**
- COD: 110 kg/m^3**
- WMS: about 5% use open lagoons

* FAOSTAT 2008 ** IPCC default value for sugar refining

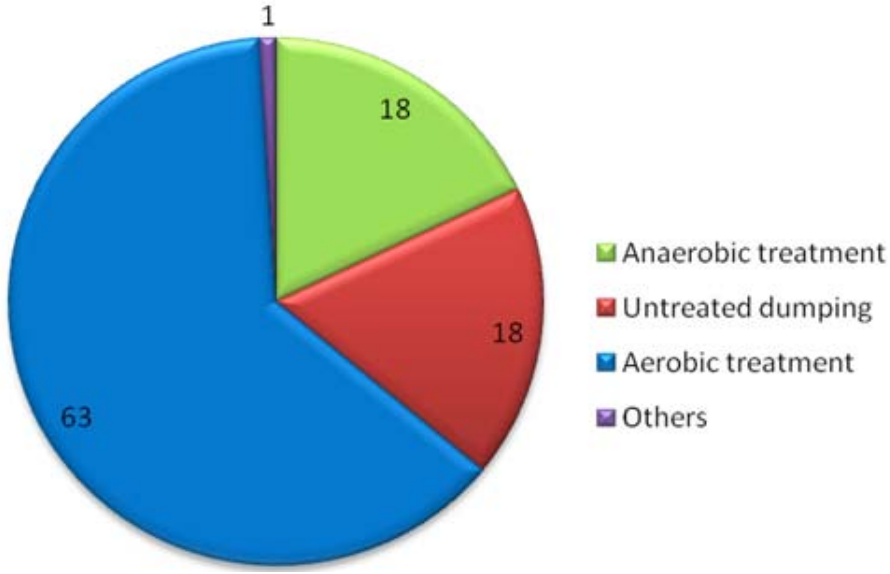
Sugarcane producing states



Source: http://www.sisugar.com/india/statistics/world_indiasugar.htm

Fruit and vegetables ~ 127,000 ton CO_2e / yr

- 8.4% of the world's production (2nd vegetable, 3rd fruit)
- P ~ 142 million tons/yr of vegetable and fruit*
- Less than 2% of vegetables are commercially processed
- Andhra Pradesh, Uttar Pradesh, Gujarat, Maharashtra, Karnataka (Citrus fruits, Grapes, Mango), Tamil Nadu (Guava, Banana, Mango), West Bengal (Brinjal, Cabbage, Potato, Mango), Himachal Pradesh and Jammu and Kashmir (Temperate fruits Apple, Pear, Plum, Peach).
- WW ~ 20 m^3/ton**
- COD: 5 kg/m^3**



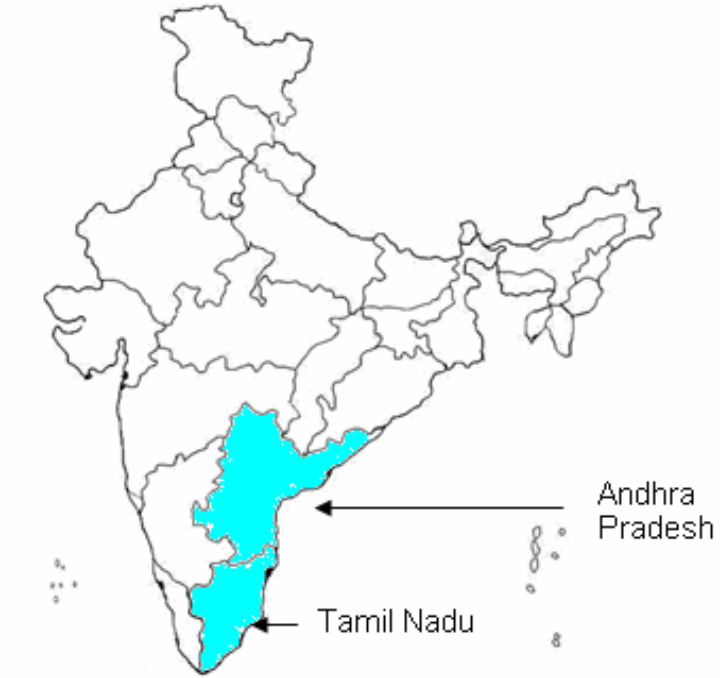
* FAOSTAT 2008

** IPCC default value for Vegetables, Fruits and Juices

Starch ~ 121,000 ton CO_2e / yr

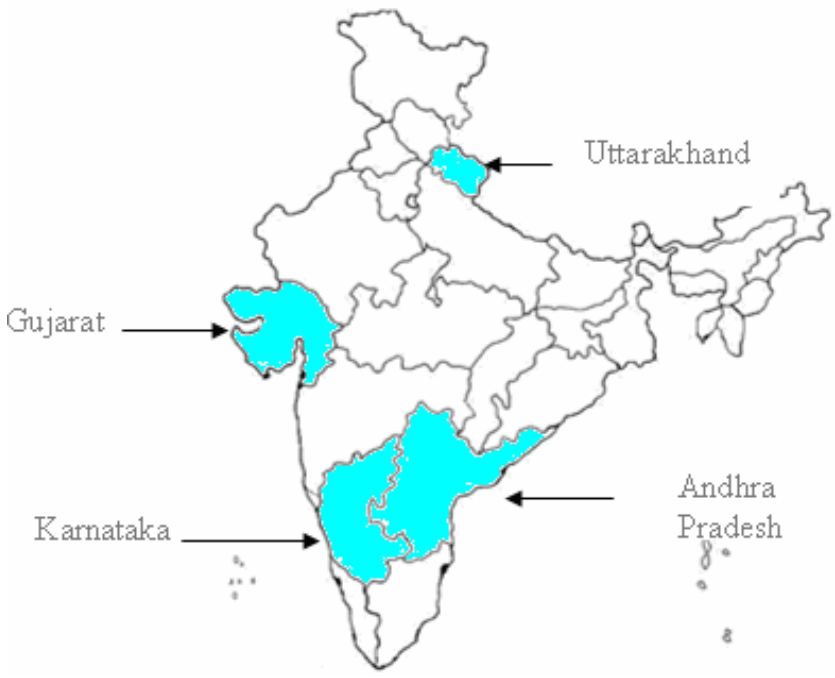
Tapioca starch

- P ~ 100,000 tons/yr of tapioca starch
- WW ~ 30 m^3 / ton of starch produced
- COD ~ 6 kg/m^3
- WMS ~ 17% of production using lagoons



Corn starch

- P ~ 1,200,000 tons/yr of corn processed for starch production
- WW ~ 8.3 m^3 / ton of corn processed
- COD ~ 15 kg /m^3
- WMS ~ 14% of production using lagoons



Methane to Markets

Summary

Sector	Estimated Methane Emissions (MT CH_4/yr)	Carbon Emissions Reduction (MT CO_2e/yr)	Fuel Replacement Offsets (MT CO_2e/yr)	Total Carbon Emissions Reduction (MT CO_2e/yr)
Dairy cattle	173,455	3,642,560	686,054	4,328,614
Distillery	38,729	813,313	153,183	966,495
Sugar	6,915	145,223	27,352	172,575
Fruit and vegetables	5,096	107,018	20,156	127,174
Starch (corn + tapioca)	4,858	102,016	19,214	121,230
Total	**229,054**	**4,810,130**	**905,959**	**5,716,089**

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Resource Assessment country status

Completed

- Argentina – July 2009
- Colombia – June 2009
- Philippines – July 2009
- Thailand – September 2009

Underway

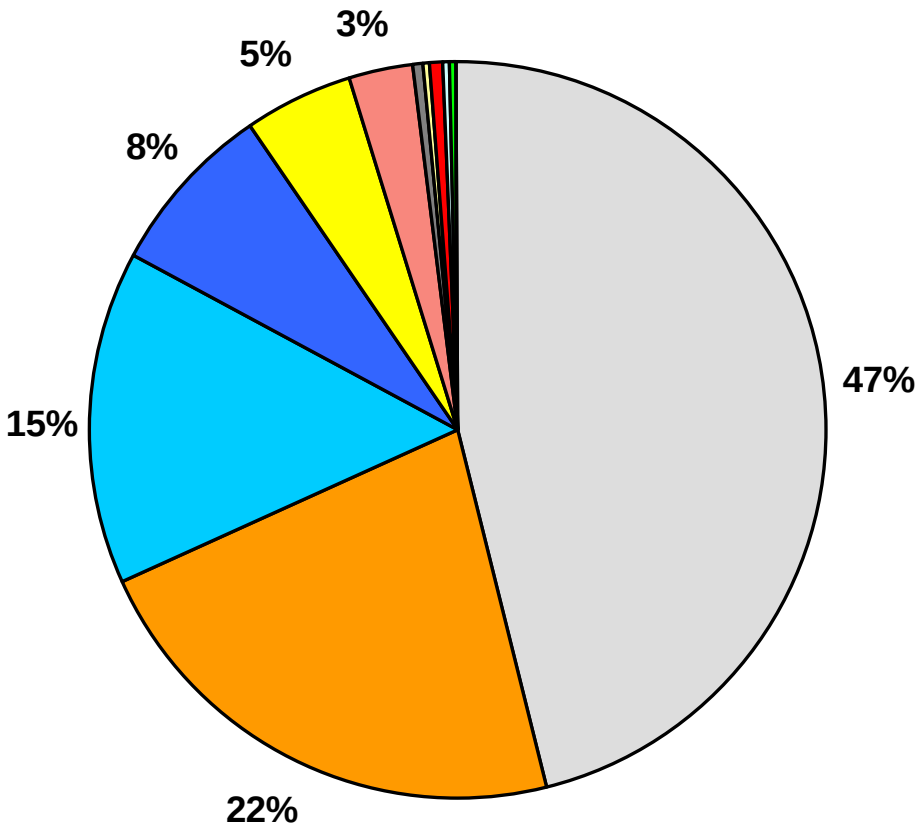
- China
- Korea

Nearly completion

- Brazil
- Ecuador
- India
- Mexico
- Vietnam

All sectors

Sector	Total Carbon Emissions Reductions (MT CO_2e/yr)
Swine	20,410,282
Sugar + Ethanol	9,653,784
Dairy	6,545,798
Slaughterhouse	3,390,043
Tapioca Starch	2,139,124
Palm Oil	1,218,701
Rubber	197,526
Coconut processing	191,000
Beverages	186,781
Fruit and vegetables	127,174
Citrus	104,400
Shrimp processing	20,017
Total	**45,549,016**



Summary of key issues

- Availability of data – need to validate the data through different processes
- Flexibility is important when following RA approach - each country is different.
- Ensure local team is involved - understanding of local context is key.
- IPCC methodology is key in identifying emission reduction potential and for comparison to country inventories - the RA provides a Tier 2 method that is robust and closer to project level.
- Follow the wastes with high organic content.
- Understand which are the key drivers (e.g., energy use, carbon credits, emission reduction).
- Replication is essential, even though stand alone projects might be feasible.

Thank you!

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