

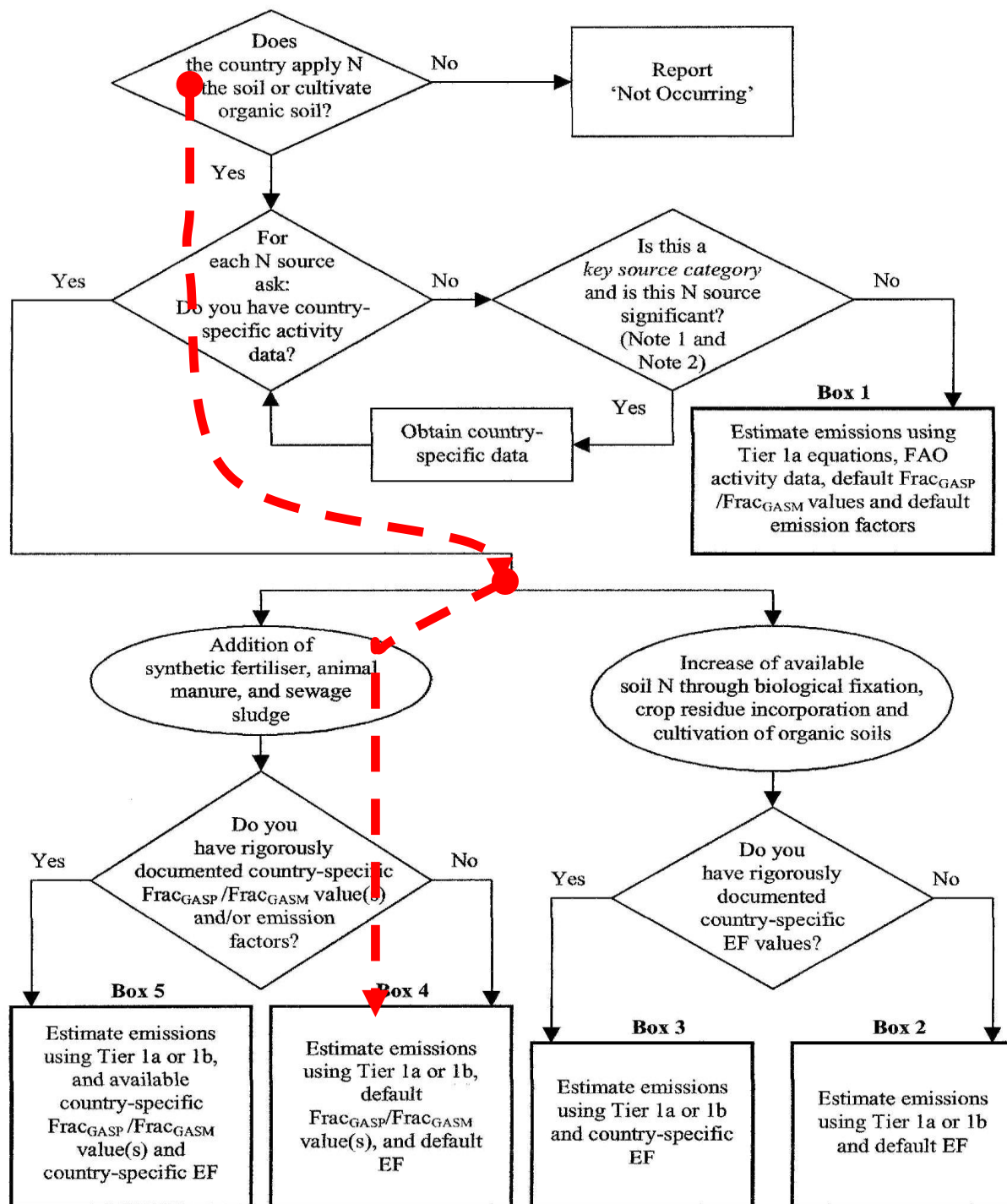
N₂O EMISSION FROM AGRICULTURE SOILS IN THAILAND

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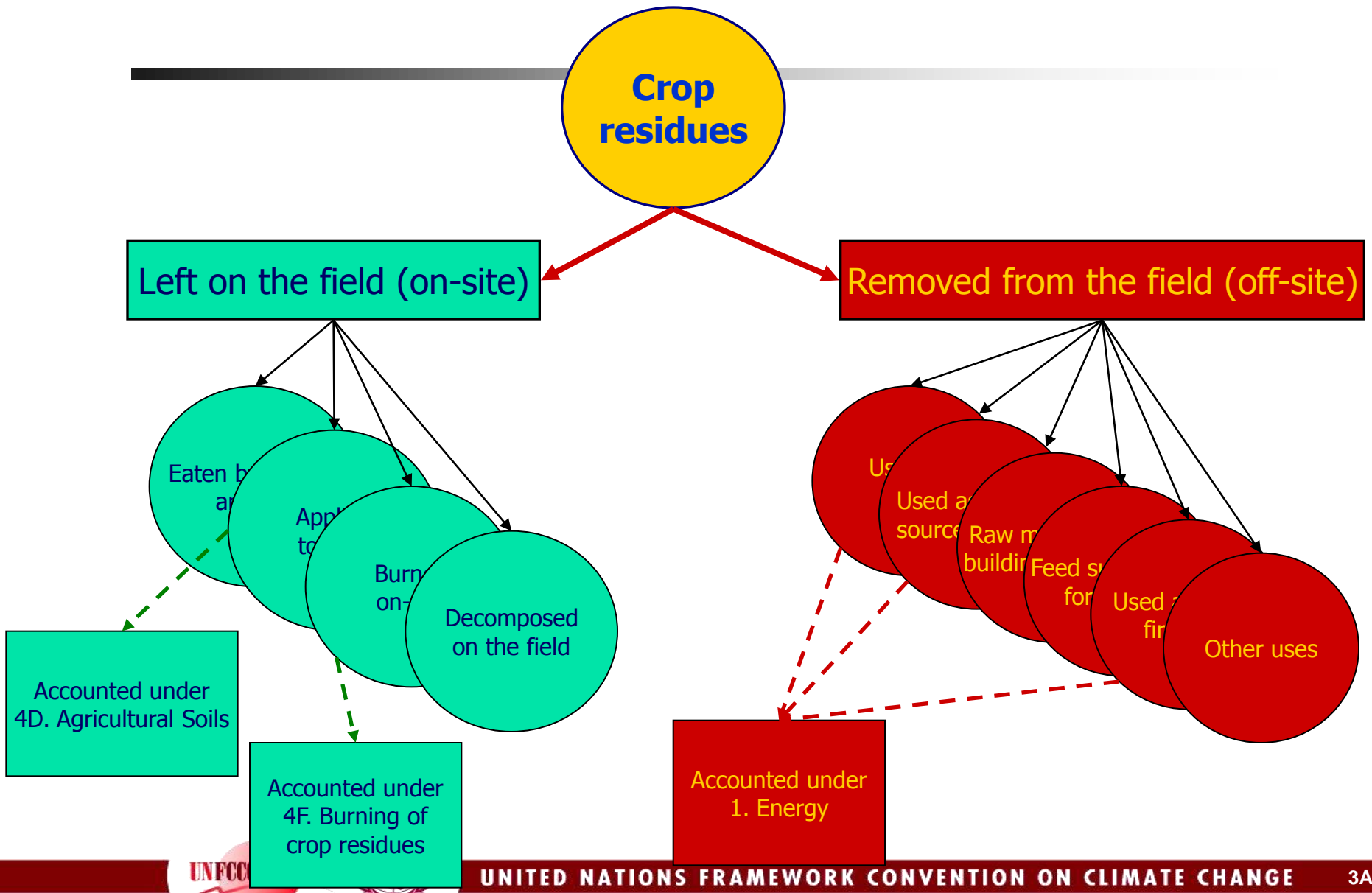
DECISION TREE: Direct N₂O emission from Agricultural Soils



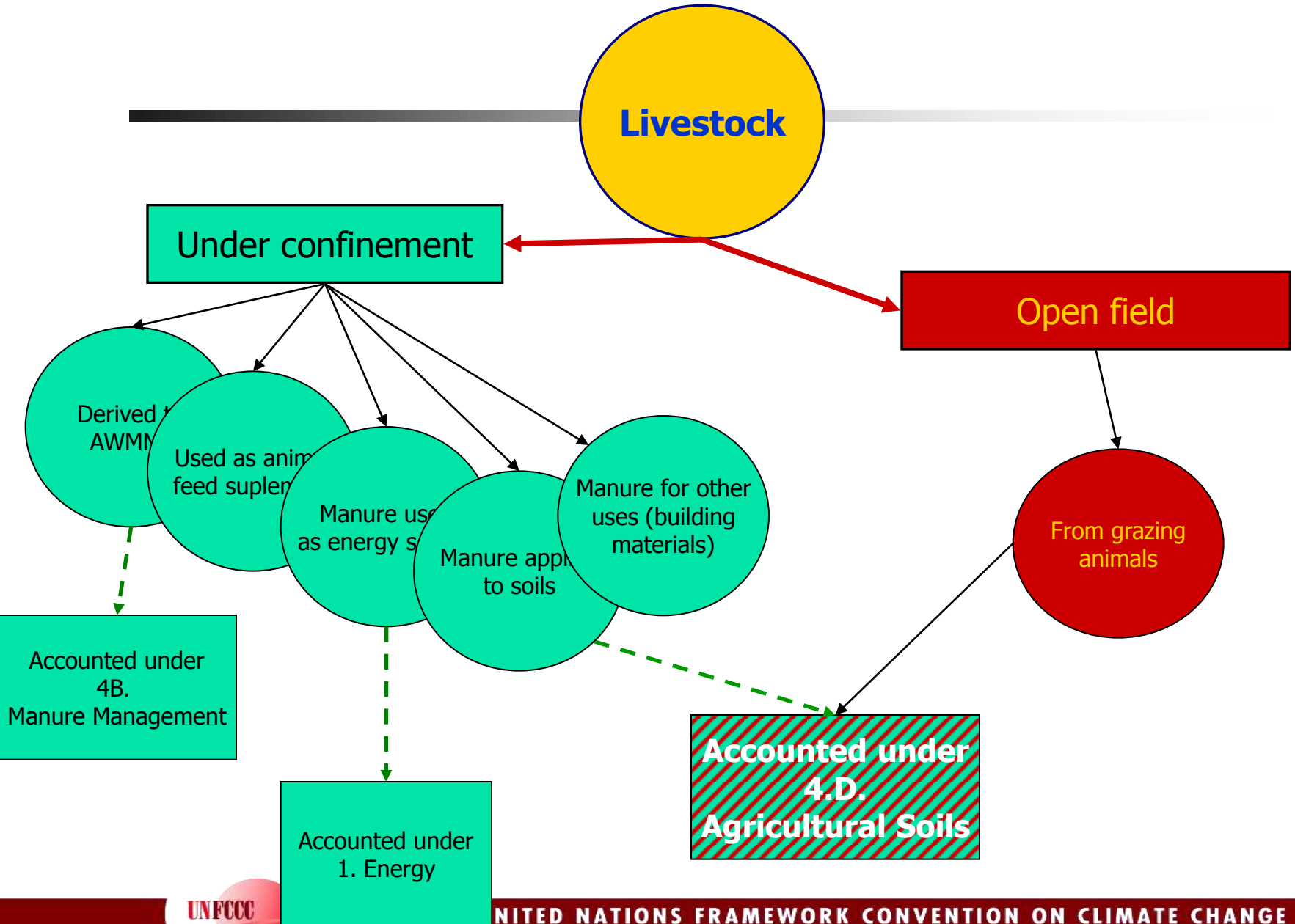
AGRICULTURAL SOILS

- N inputs (origin of direct N₂O emissions):
 - ✓ ■ application of synthetic fertilizers (FSN)
 - ✓ ■ application of animal manure (FAM)
 - ✓ ■ Grazing animal
 - ✗ ■ cultivation of nitrogen-fixing crops (FBN)
 - ✓ ■ incorporation of crop residues into soils (FCR)
 - ✗ ■ soil N mineralization due to cultivation of organic soils (FOS)
 - ✗ ■ other sources, such as sewage sludge

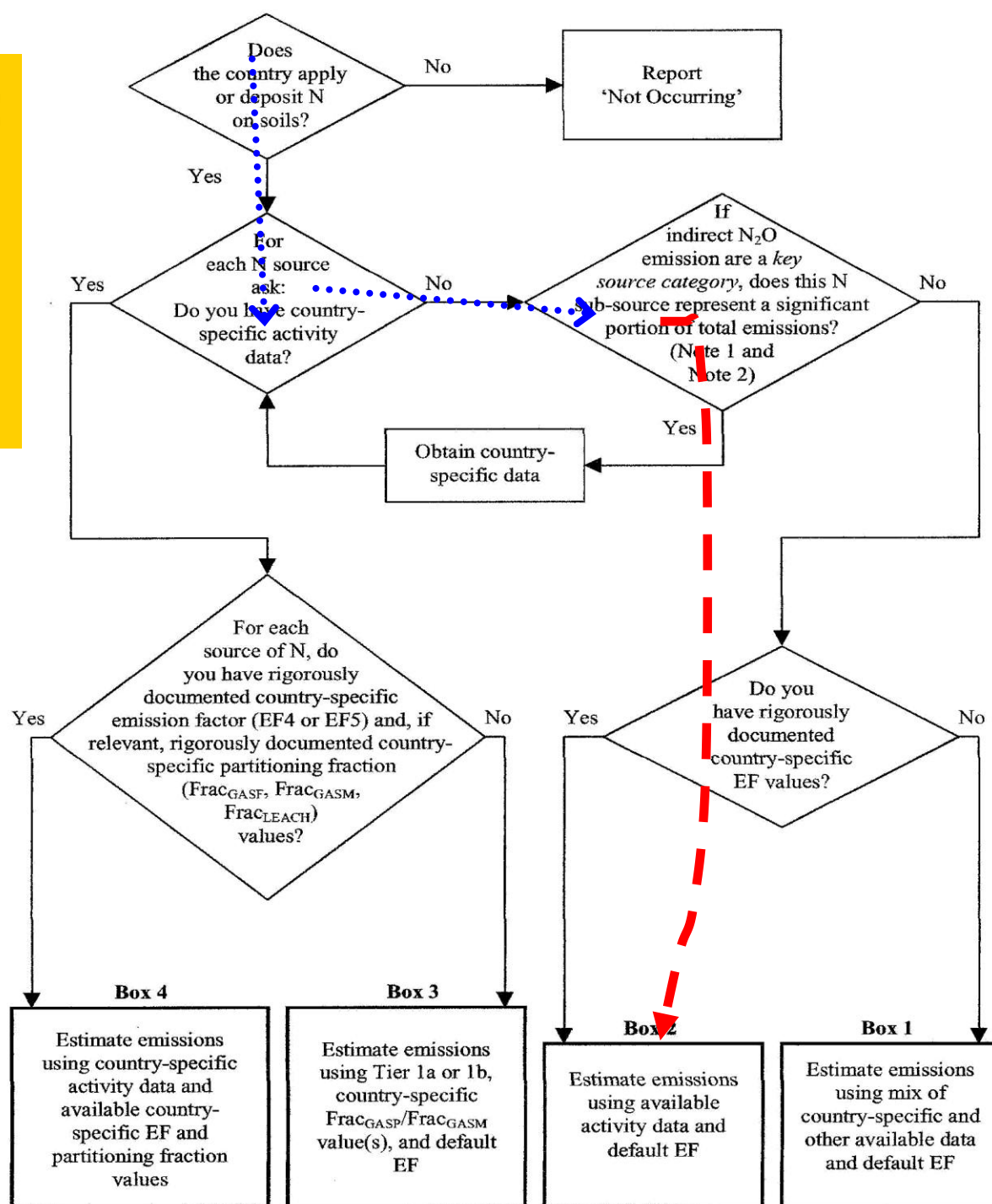
CROP RESIDUES MASS BALANCE



ANIMAL MANURE MASS BALANCE

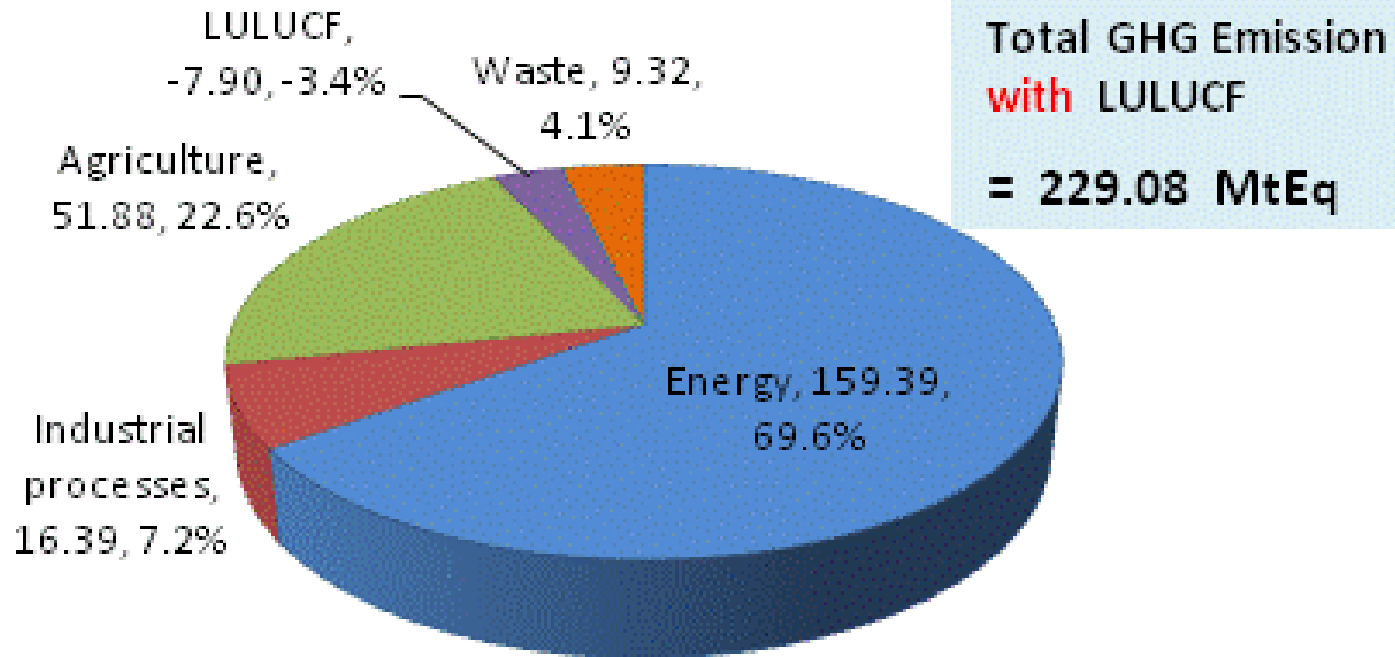


DECISION TREE: Indirect N₂O emission from Agricultural Soils



National total including LULUCF = 229.09 Mt CO2 eq

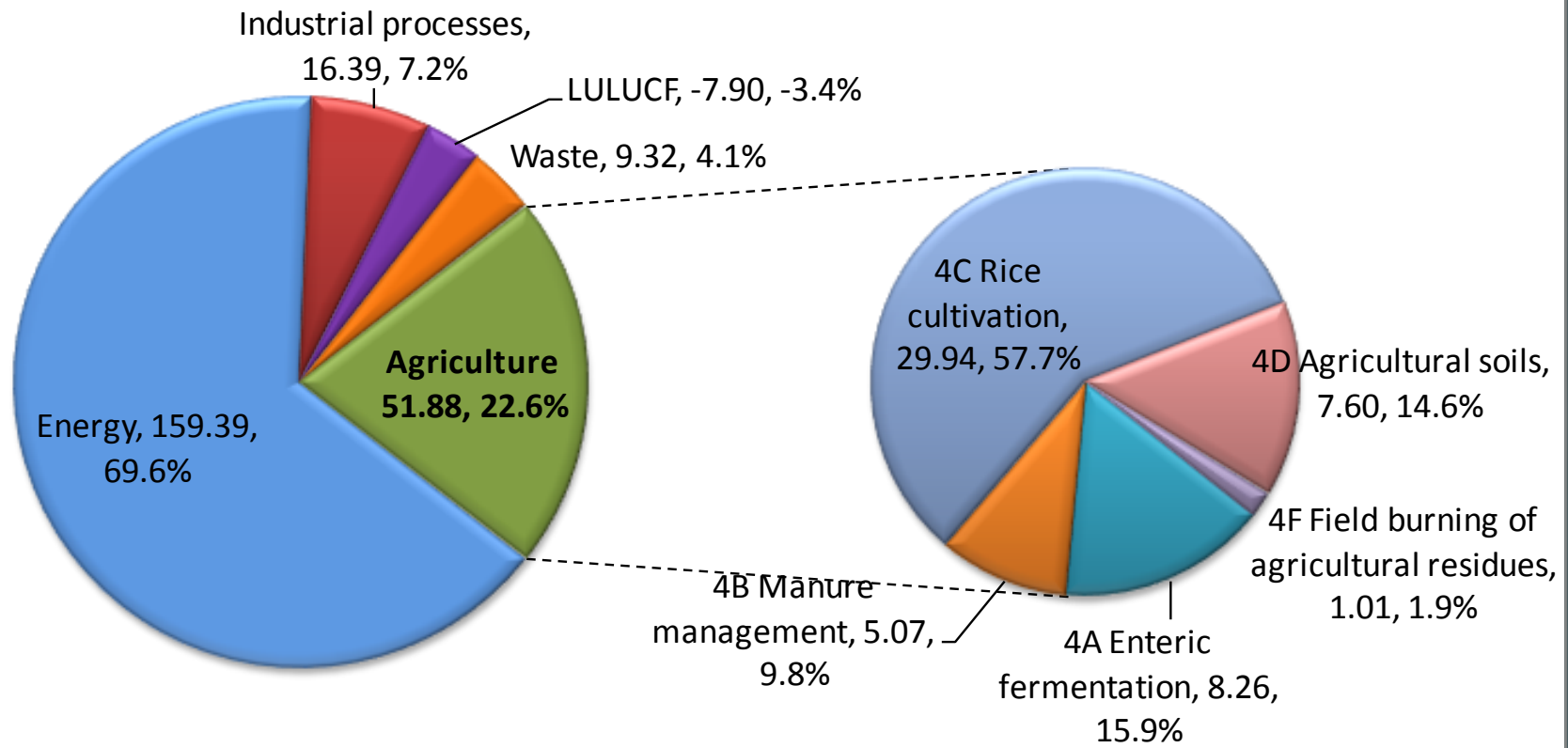
GHG emission in 2000 (Mt CO2 eq, %) - by sector



$$\text{LULUCF} = -13.35(5a) + 44.47(5b) - 39.02(5c) \text{ Mt} = \text{SINK} - 7.90 \text{ Mt Eq}$$

EMISSION IN 2000 FROM 'AGRICULTURE' (MT CO₂ EQ,%)

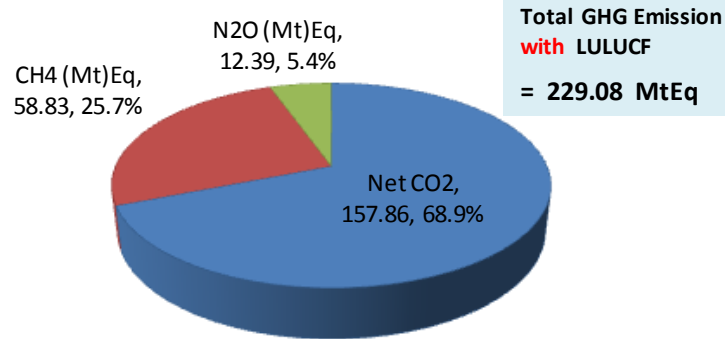
Emission in 2000 by 'Agriculture' (Mt CO₂ eq, %)



Total GHG Emission with LULUCF = 229.08 MtEq

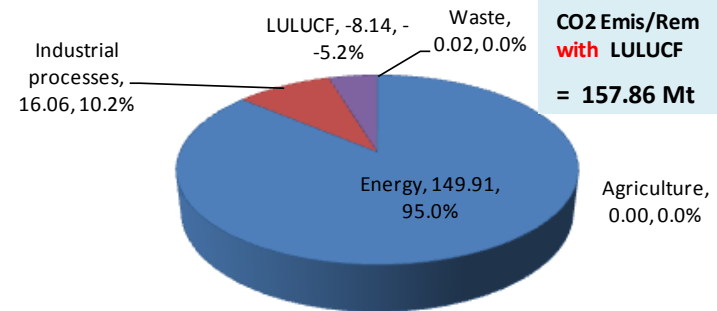
Share of GHG type by sector

GHG emission in 2000 (Mt CO₂ eq) - by gas type



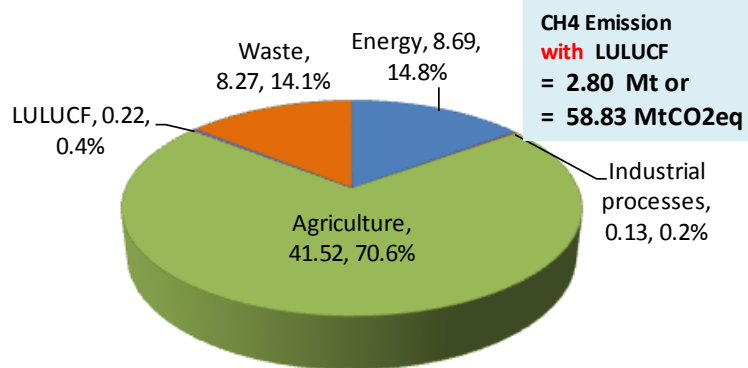
In yr 2000, F-gas = 0 Mt CO₂ Eq

CO₂ emission in 2000 (Mt CO₂ eq) - by sector

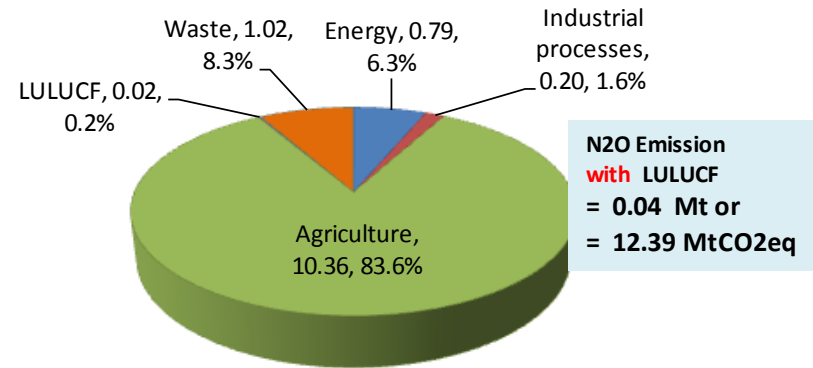


LULUCF CO₂ = -44.23 (emis.) + 52.37 (rem.) = **SINK -8.14 Mt CO₂**

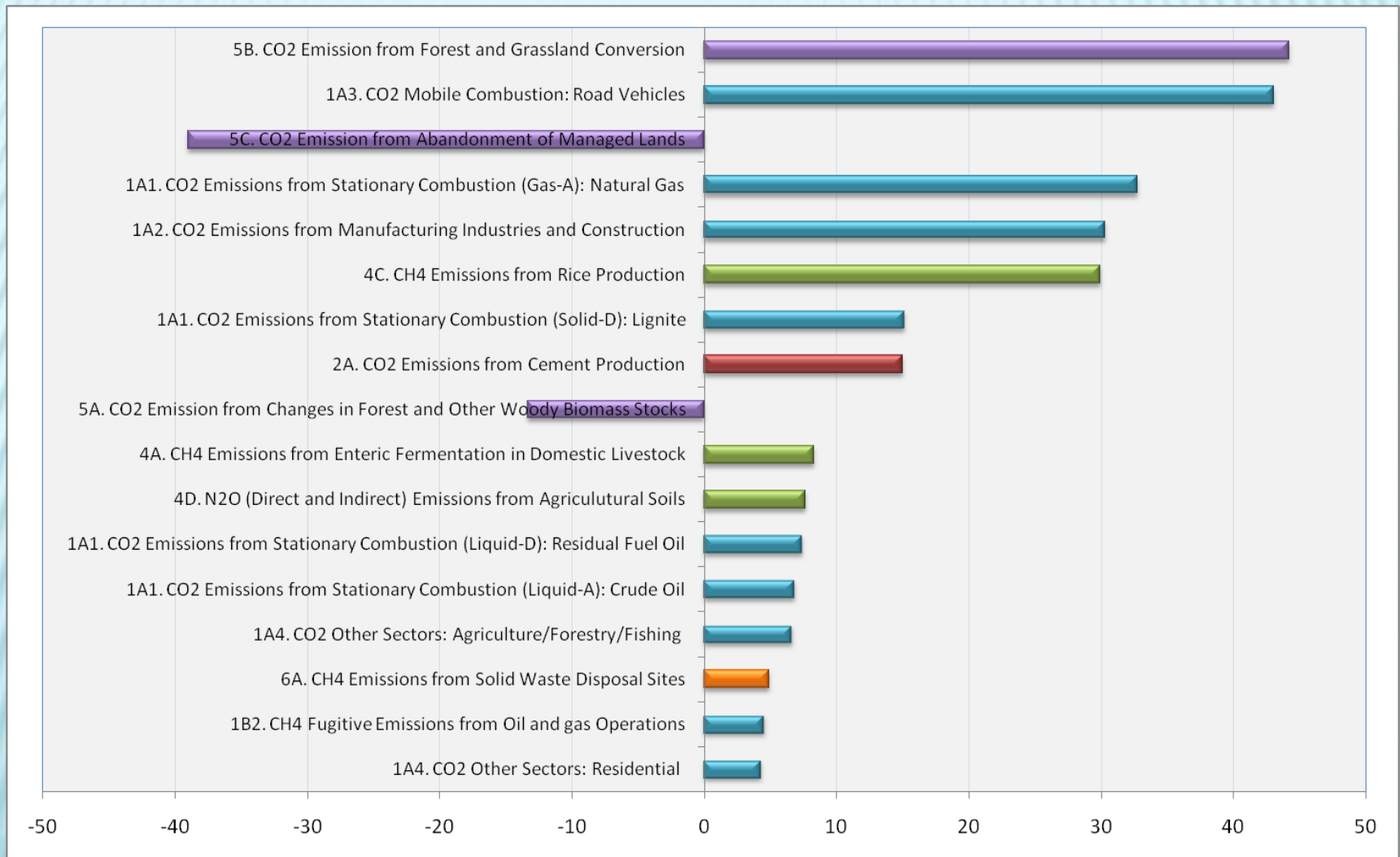
CH₄ emission in 2000 (Mt CO₂ eq) - by sector



N₂O emission in 2000 (Mt CO₂ eq) - by sector

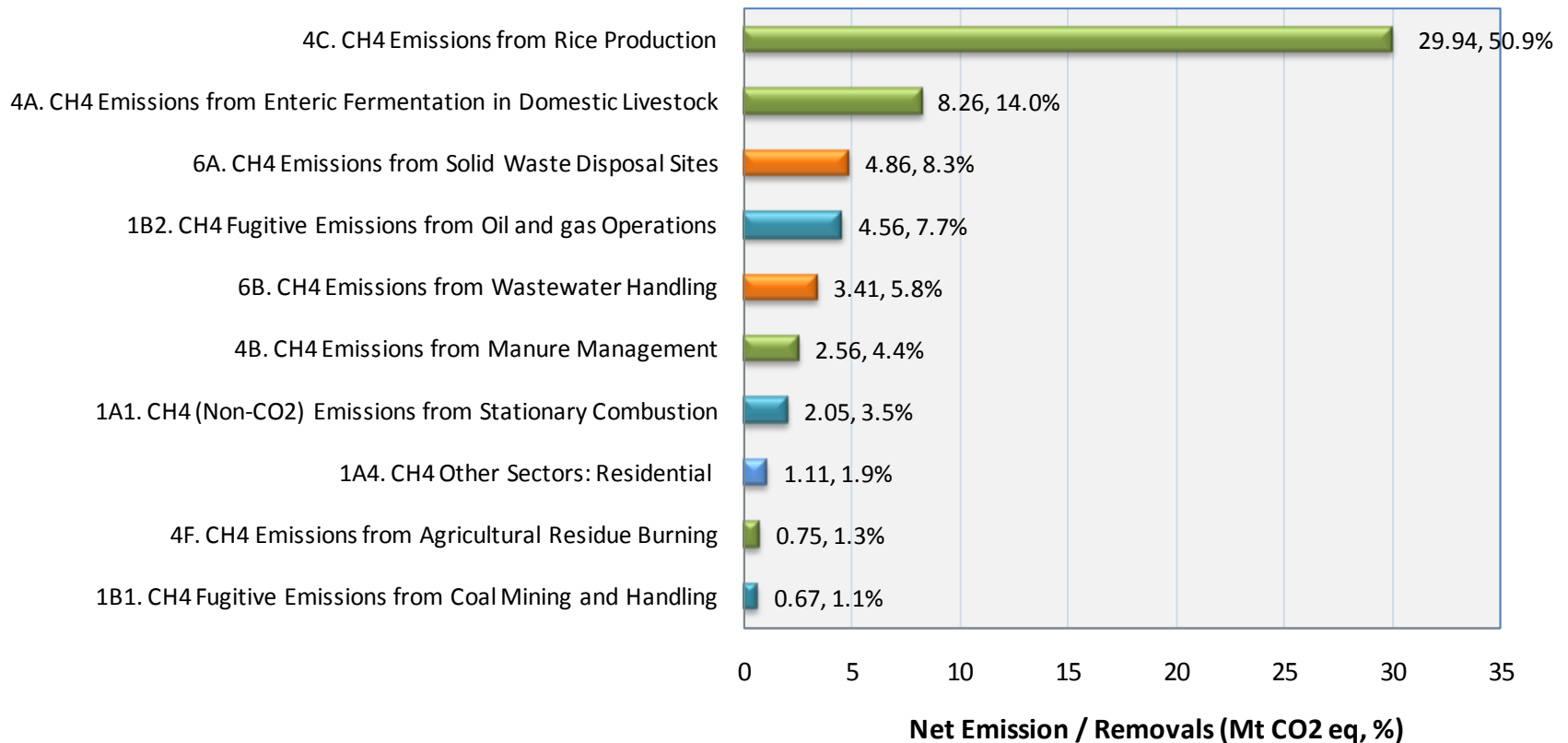


EXAMPLE OF KEY CATEGORIES ANALYSIS



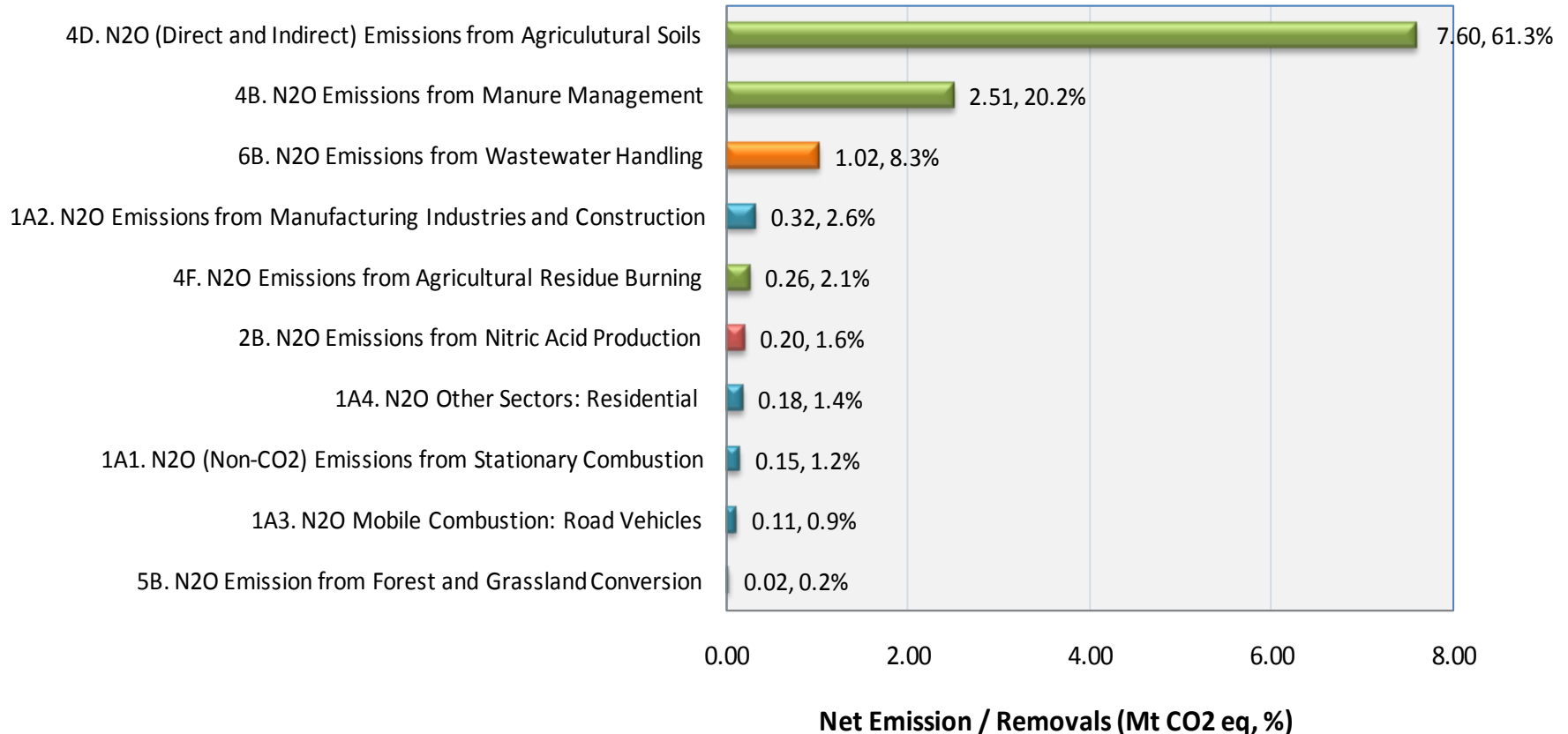
Key Categories: CH₄

**Key source category of CH₄ emission in 2000 : 58.83 MtCO₂ eq (or 2.80 Mt CH₄)
(Top 10 category / total contribution = 99.5%)**

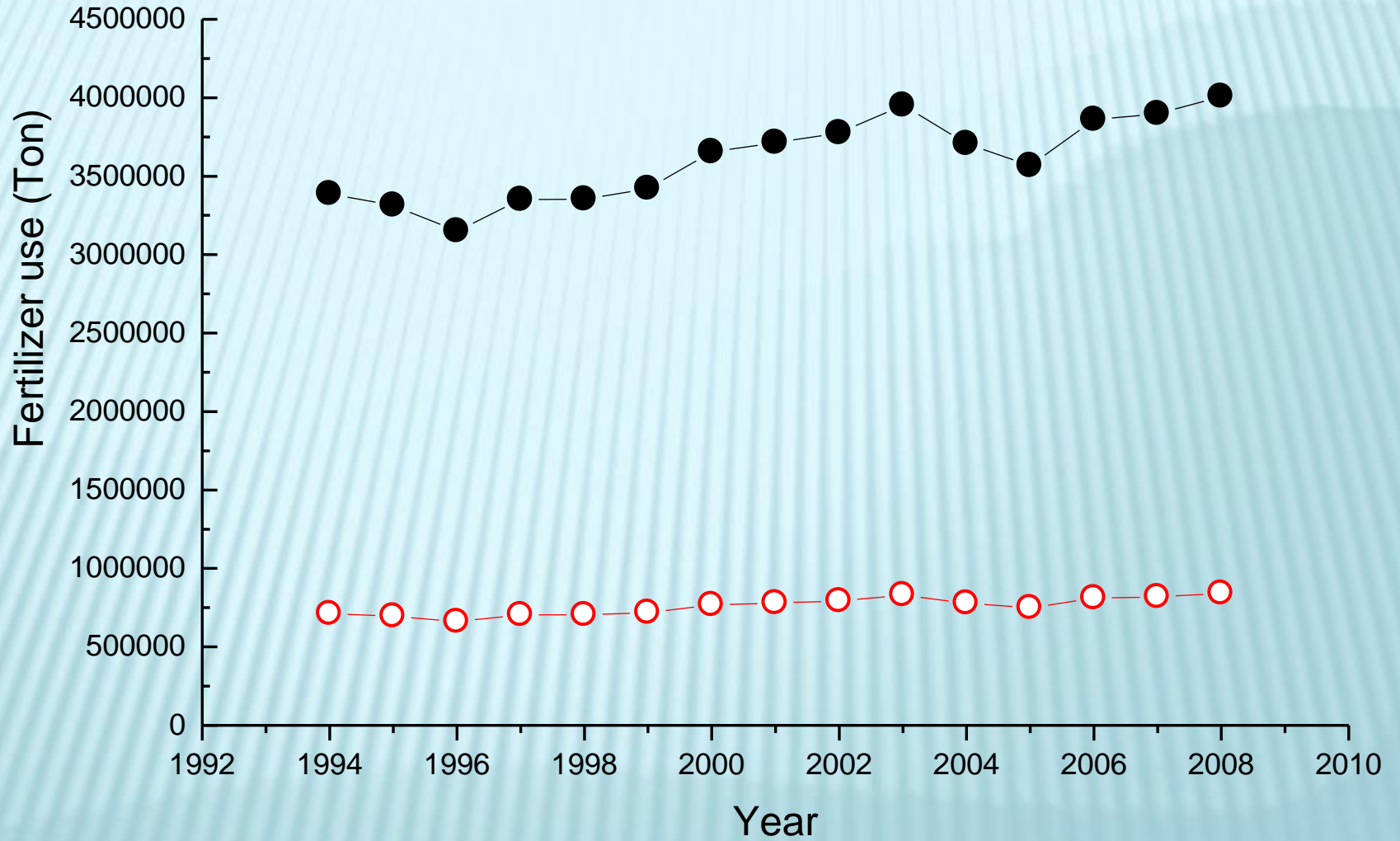


Key Categories: N₂O

**Key source category of N₂O emission in 2000: 12.39 MtCO₂ eq (or 39.98 Gg N₂O)
(Top 10 category / total contribution = 99.8%)**



—●— Total use —○— N fertilizer



USE RATE—PADDY FIELDS

- × Data use, Cultivation area
- × Application rate
 - + 266 kg/ha for first crop
 - + 352 kg/ha for second crop

Fertilizer	Use portion (%)	
	Central region	Northeast region
16-20-0	55.50	31.03
46-0-0	41.63	5.17
16-16-8	2.39	50.00
16-12-8	—	8.62
15-15-15	0.48	3.45
16-8-8	—	1.73

ACTIVITY DATA

Year	Total fertilizer (Ton)	N fertilizer (Ton)	N fertilizer (Ton)	
			Rice	Others
2000	3,654,794.00	767,506.74	419,234.33	348,272.41
2001	3,713,328.00	779,798.88	438,316.56	341,482.32
2002	3,775,529.00	792,861.09	440,189.98	352,671.11
2003	3,952,356.00	829,994.76	453,764.92	376,229.84
2004	3,708,000.00	778,680.00	450,796.89	327,883.11
2005	3,567,000.00	749,070.00	454,569.94	294,500.06

ที่มา: สำนักงานเศรษฐกิจการเกษตร, 2550

F_{CR}

Crop type	Annual Production	Residue to Crop Ratio	Total nitrogen entering the soil
	(Gg)		(Kg N)
Year 2000			
Major Rice	19,788	0.75	4,229,685.00
Minor Rice	5,156	0.75	0.00
Maize	4,639	0.89	13,211,872.00
Canes	54,052	0.3	3,972,822.00
Cassava	19,064	0.14	9,848,462.40
Sorghum	148	0.81	287,712.00
Peanut	132	1	403,920.00
Soybean	312	2.02	2,571,379.20
Mungbean	226	2.1	1,258,639.20
Year 2000			35,784,491.80

ที่มา: สำนักงานเศรษฐกิจการเกษตร, 2550

INDIRECT EMISSION

Fraction loss as NO_x + NH₃

Nitrogen source	N inputs	Fraction loss as NO _x +NH ₃	Total loss
	(Kg N)		(Kg N)
Synthetic N	767,506,740.00	0.1	76,750,674.00
Animal manure	537,101,086.60	0.2	107,420,217.32

Loss via leaching and run-off

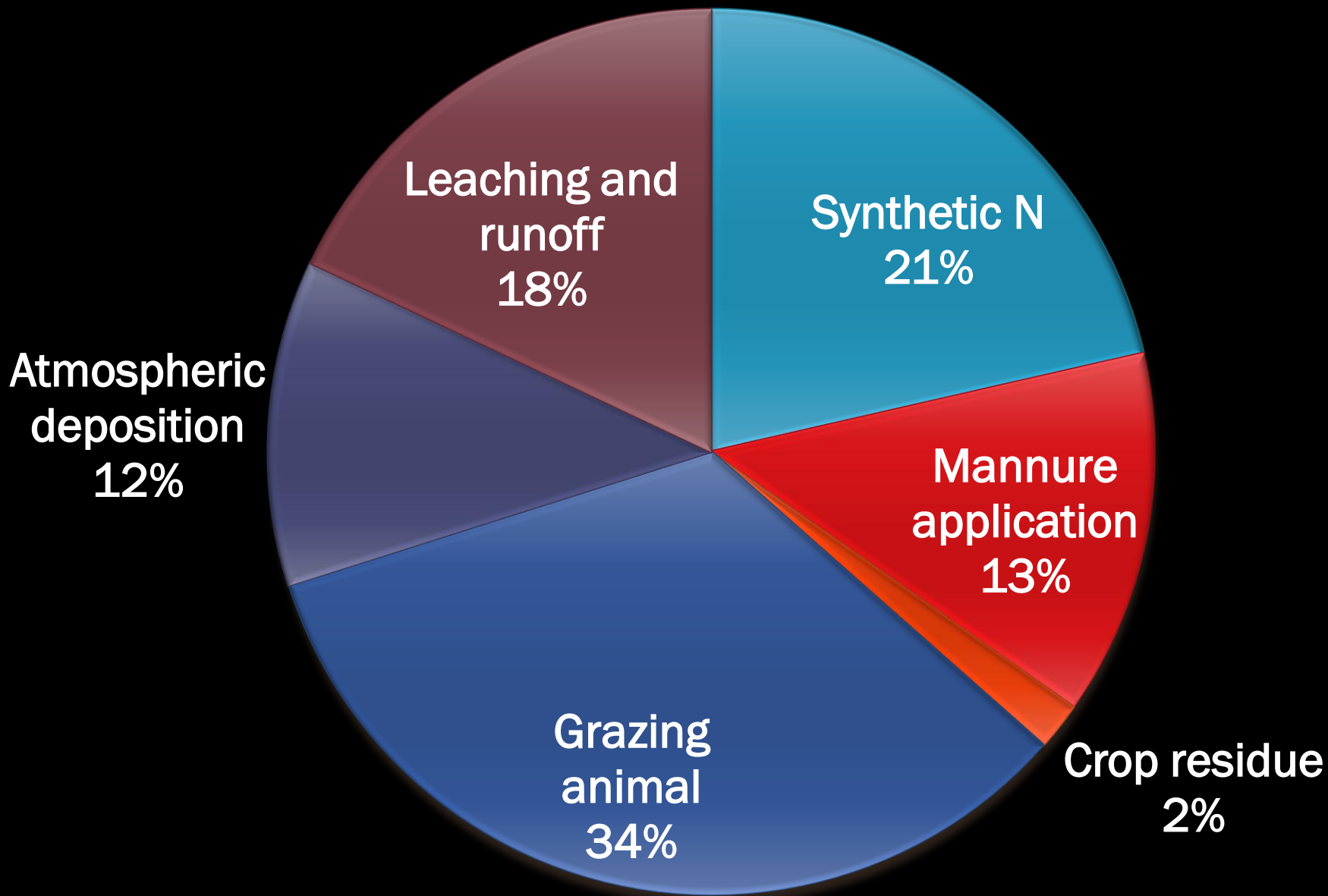
Nitrogen sources	Total amount of nitrogen input	Fraction loss via leaching & run-off	Total nitrogen loss
	(Kg N)		(Kg N)
Synthetic N	767,506,740.00	0.3	230,252,022.00
Animal manure	537,101,086.60	0.3	161,130,325.98

EMISSION FACTORS

Source Category	Default EF	EF range
4D1. Direct emission		
4D1.1 Emission from chemical fertilizer	0.01	0.003-0.03
4D1.2 Emission from paddy field	0.003	0.00-0.006
4D1.3 Manure application to soil	0.01	0.003-0.03
4D1.4 Crop residue application	0.01	0.03-0.003
4D1.5 Grazing animal	0.02	0.007-0.06
4D2. In direct Emission		
4D2.1 Emission from atmospheric deposition of NO_x and NH₃	0.01	0.002-0.05
4D2.2 Emission from leaching and runoff	0.0075	0.0005 - 0.025

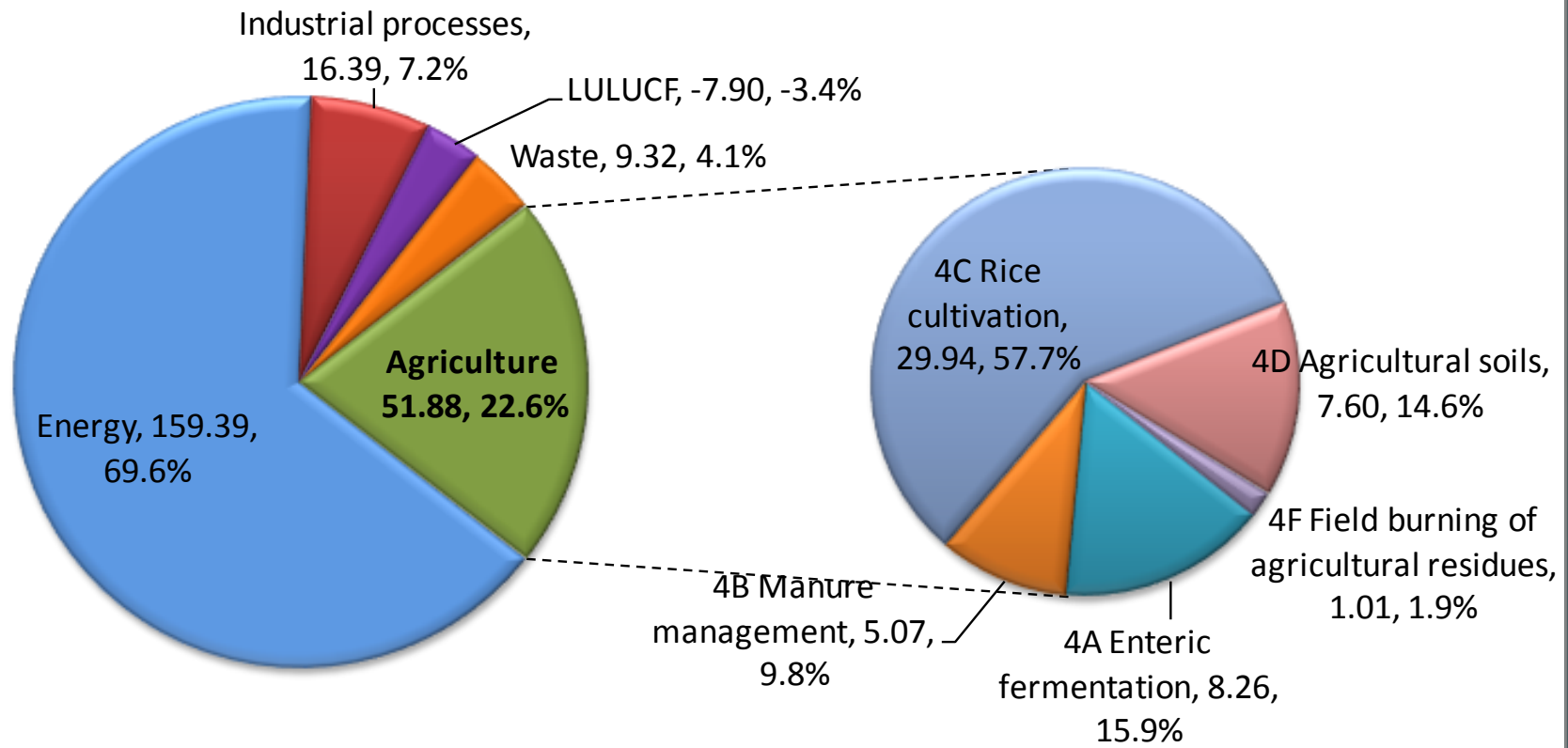
N₂O EMISSION

Source of N ₂ O	Amount (GgN ₂ O)
Direct	
Synthetic N fertilizer	6.10
Animal manure N	3.79
Crop residue N	0.50
Grazing animal	9.57
Direct emission total	19.96
Indirect	
Deposition of NO _x and NH ₃	3.38
Leaching and runoff	5.12
Indirect emission total	8.50
Grand total	28.46



EMISSION IN 2000 FROM 'AGRICULTURE' (MT CO₂ EQ,%)

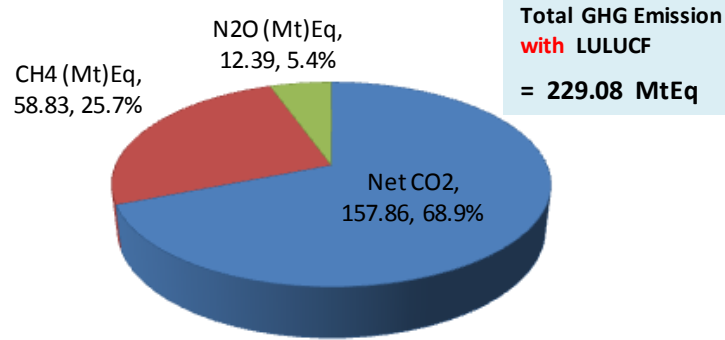
Emission in 2000 by 'Agriculture' (Mt CO₂ eq, %)



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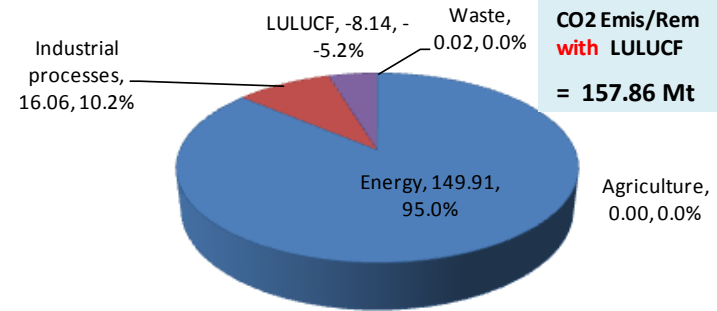
Share of GHG type by sector

GHG emission in 2000 (Mt CO₂ eq) - by gas type



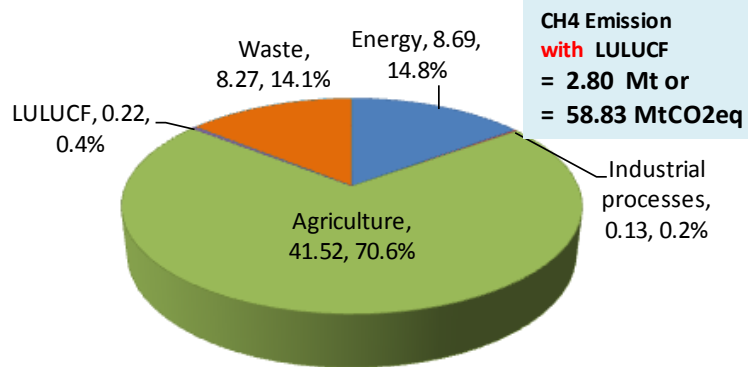
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CO₂ emission in 2000 (Mt CO₂ eq) - by sector

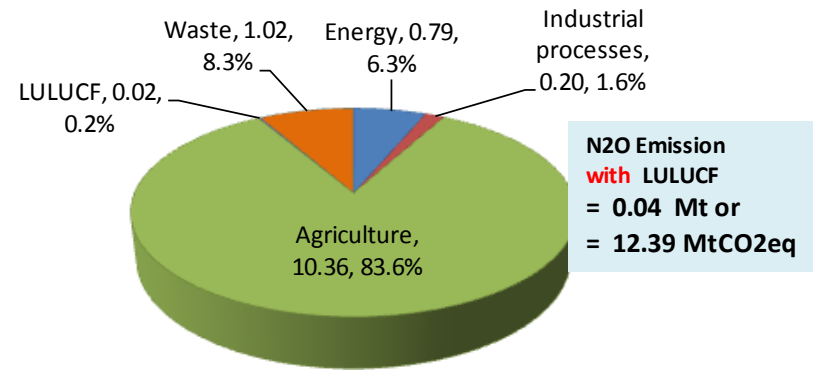


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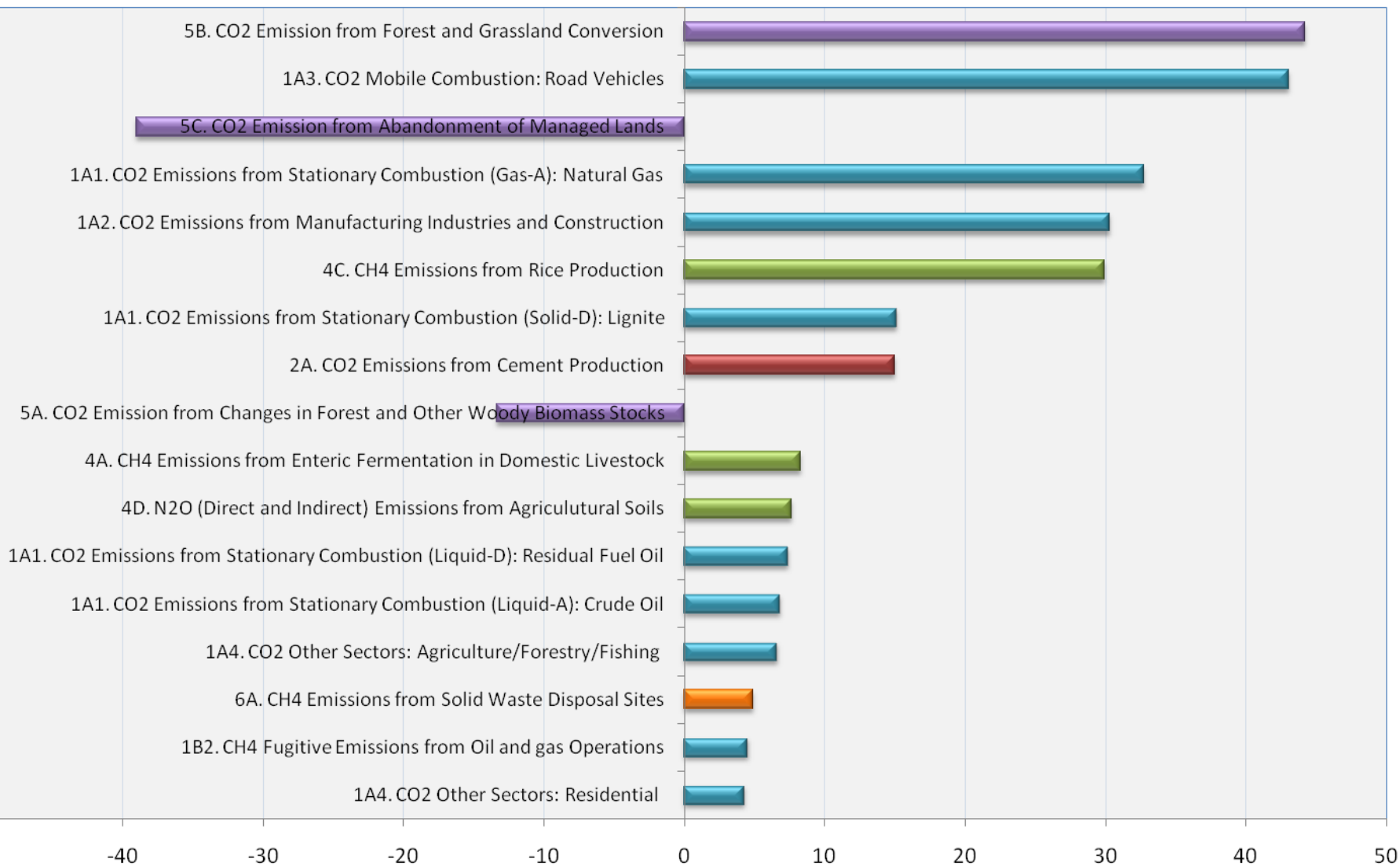
CH₄ emission in 2000 (Mt CO₂ eq) - by sector



N₂O emission in 2000 (Mt CO₂ eq) - by sector



KEY CATEGORIES ANALYSIS



Thank you