AGRI-I
Agricultural
Greenhouse Gas Research
Initiative - Ireland

Sustainable Nitrogen Fertiliser
Use & **D**isaggregated
Emissions of **N**itrogen

New emissions profile of Irish agriculture and abatement potential

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Project Objectives

- AGRI-I: Refine N_2O Emission Factors
    - Fertiliser   √
    - Dung/urine   √
    - Soil type/land-use √
    - Incorporate mitigation into inventories   √
- SUDEN: Assess impact on
    - Agronomic Yield   √
   - NH_3 emissions   √

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IPCC Good Practice

- The largest sources accounting for 95% of emissions are key sources
- Higher tier methodologies should be used for Key Sectors
- Resources are focused on sources with significant impact on total emission estimate
- Best use of available resources
- Reduce uncertainties as much as practical
- **Tier 1** are simple methods with default values
- **Tier 2** are similar but with country specific emission factors and other data
- **Tier 3** are more complex approaches, possibly models. However should be compatible with lower tiers.
- Higher Tiers - need peer-reviewed science

Inventory Refinement

- Currently use Tier 1 emission factors for N_2O

- Tier 1 does not dissaggregate in terms of N type, soil type, rate or timing

- Tier 1 PRP does not differentiate between dung and urine

Irelands Agricultural Emissions Profile
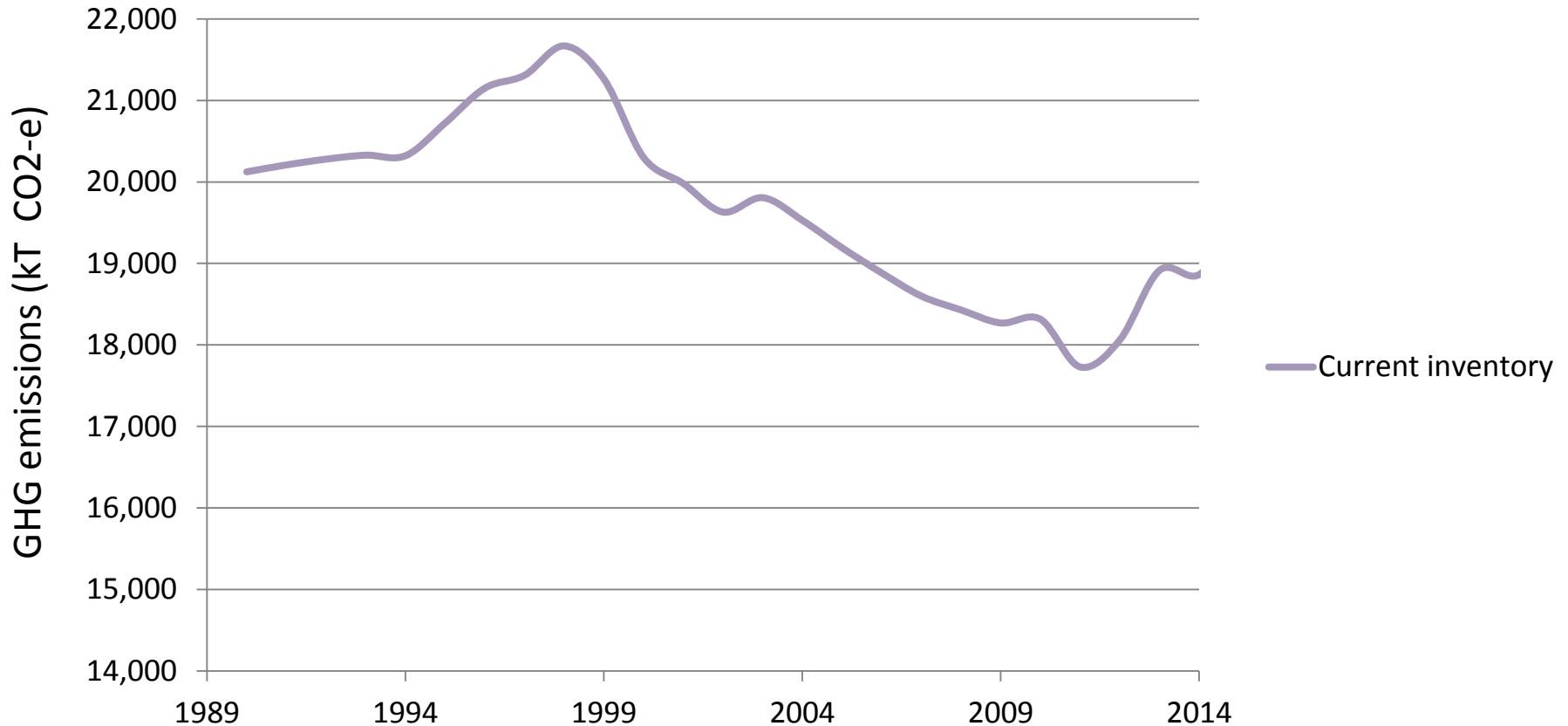
National Tier 2 N$_2$O Emission Factors

Tier 1 (default):

Fertiliser = 1%

Pasture, range and paddock = 2%

Grassland	EF %
CAN	1.49
Urea	0.25
Urea+NBPT	0.4
Urea+NBPT+DCD	0.11
Dung	0.31
Urine	1.18
Arable	**EF %**
CAN	0.35
Urea	0.27
Urea+NBPT	0.2
Urea+NBPT+DCD	0.16

2.74

0.40

0.87

0.18

0.31

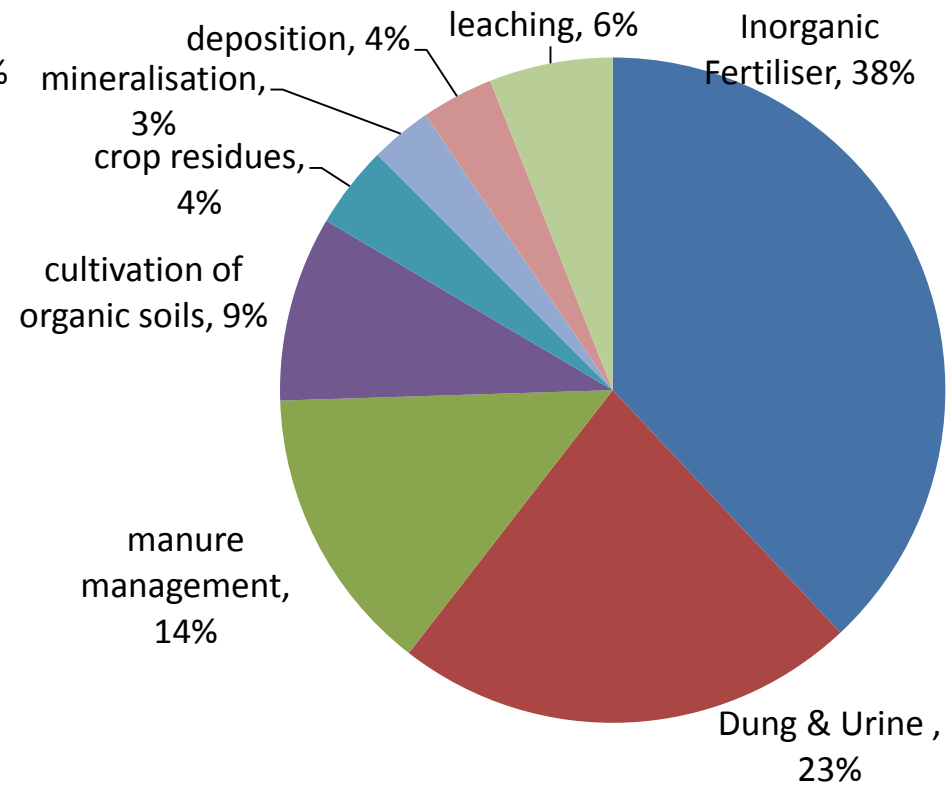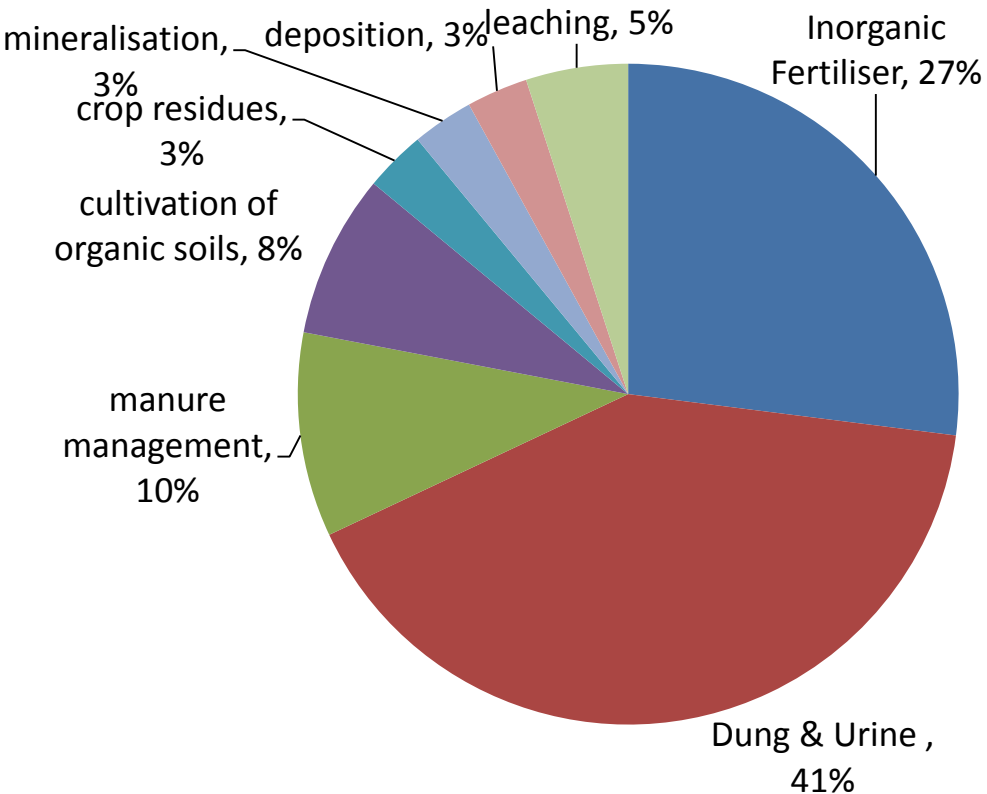0.72

2.52

Harty et al. 2016 *Science of the Total Environment* 563, 576-586

Krol et al. 2016 *Science of the Total Environment* (accepted)

Roche et al. 2016 *Ag. Ecosystems Environ. (in review)*

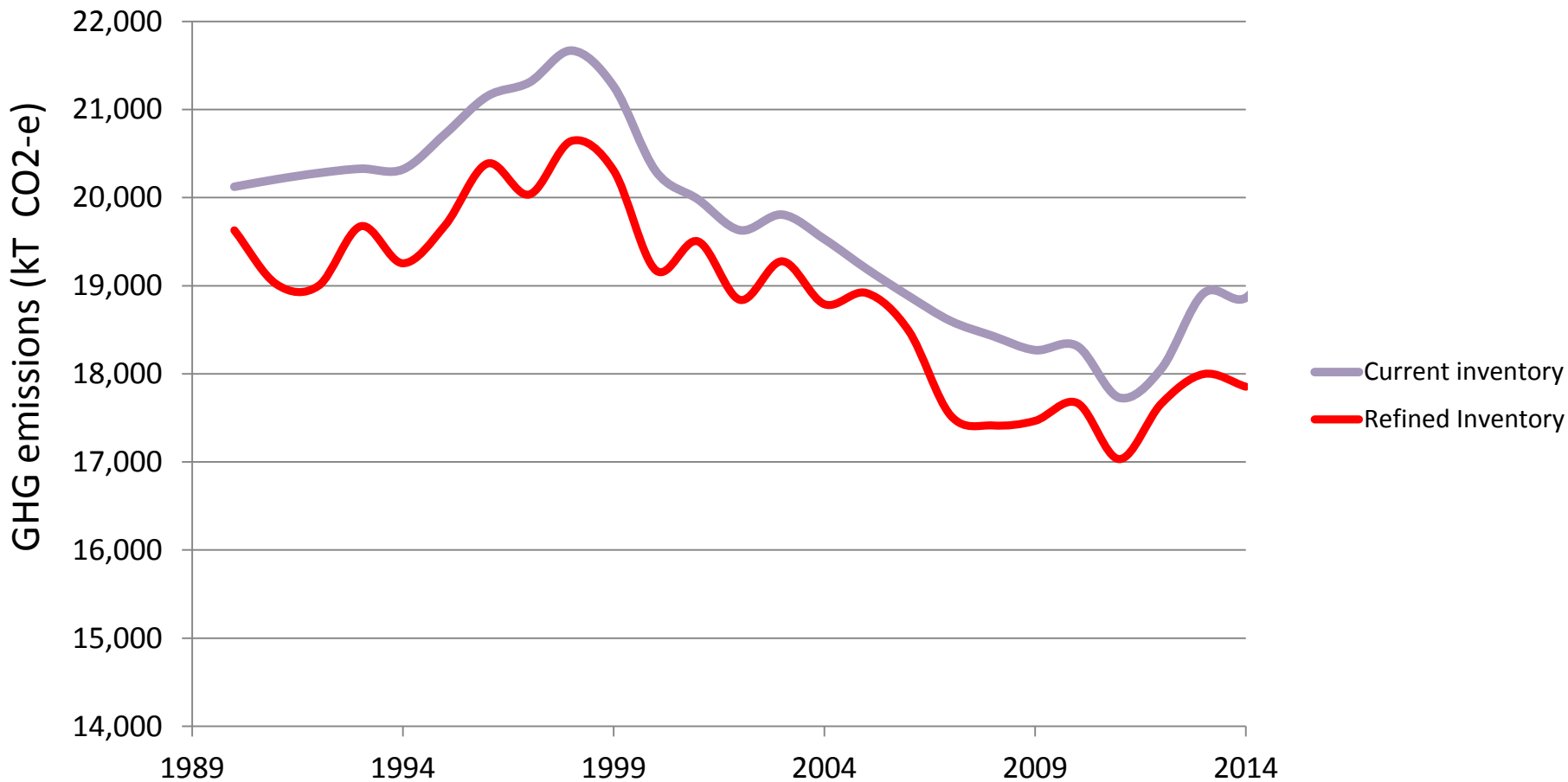Forrestal P.J. 2011

Forrestal P.J. '11

Current emissions & Tier 2 emissions profile

Inorganic fertiliser – share of emissions increases from 27% to 38%
Pasture, Range and Paddock (Dung/urine) – share decreases from 41% to 23%

Left pie chart: Inorganic Fertiliser, 27%; Dung & Urine, 41%; manure management, 10%; cultivation of organic soils, 8%; crop residues, 3%; mineralisation, 3%; deposition, 3%; leaching, 5%

Right pie chart: Inorganic Fertiliser, 38%; Dung & Urine, 23%; manure management, 14%; cultivation of organic soils, 9%; crop residues, 4%; mineralisation, 3%; deposition, 4%; leaching, 6%

Impact of Tier 2 N$_2$O on emissions profile

Potential to reduce emissions

- Moving to higher Tier N_2O reduces net emissions by 0.75 million tonnes CO_2-e

- Shifting 45% of CAN to a stabilised urea product = Reduction of 0.77 million tonnes CO_2-e

- Dissaggregation of dung and urine will allow for feed strategies to be included

- Shifting urea to a stabilised product will reduce ammonia emissions by 3 kT NH_3 - 25% of total potential abatement

Thank you for your attention

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For more information: www.agri-i.ie