



N₂O emissions from Australian Agriculture

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Australian Government
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Points to be covered in this talk

- Australia's position on GHG /CC
- Importance of N₂O in agriculture
- Estimates of N₂O in agriculture
- Processes & factors affecting N₂O emiss's
- AGO investment in R&D
- Outcomes for Australian Government

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Australian governments position on greenhouse gas emissions

- Achieve Kyoto target of greenhouse gas emissions - 108% of the 1990 levels during the 2008-2012 commitment period
- Aim for a strong and internationally competitive economy with a lower greenhouse signature

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Keeping in mind that

- Australia has significant and vulnerable ecosystems



- This global problem cannot be solved by Australia alone

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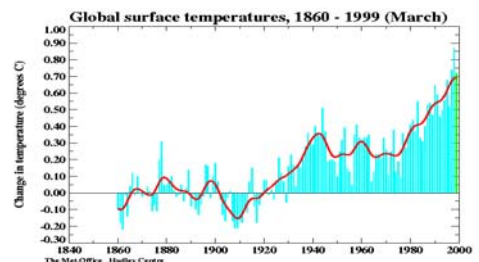
Australian Government Commitments

- Party to UNFCCC
 - Committed to annual emissions reporting (National Greenhouse Gas Inventory)
- Active member of the IPCC
 - Contributes to the state of knowledge about climate change

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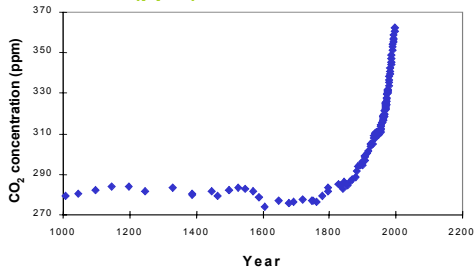
Global Warming



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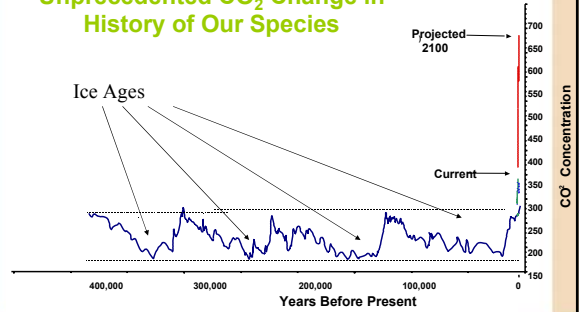
Atmospheric Carbon Dioxide Concentrations (ppm) 1000-1999 AD



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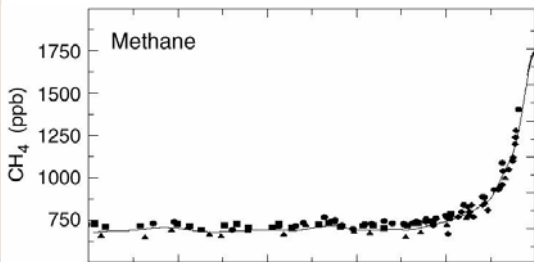
Unprecedented CO₂ Change in History of Our Species



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Atmospheric Methane Concentrations (ppb) 1000-1999 AD

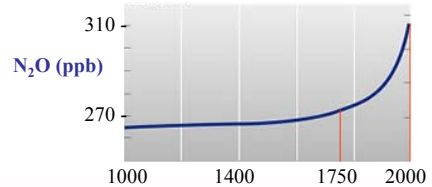


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Importance of N₂O

- N₂O has increased in the atmosphere from 270 to 318 ppm since 1750



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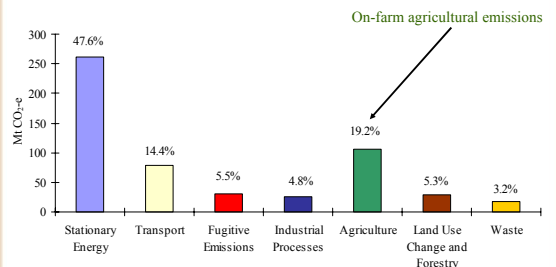
To meet our global commitments Australia needs:

- Robust and reliable emissions data from agricultural industries to feed into the NGGI
- A clear understanding of the major sources of emissions from agriculture
- An understanding of the BMP's that lead to a lower greenhouse signature

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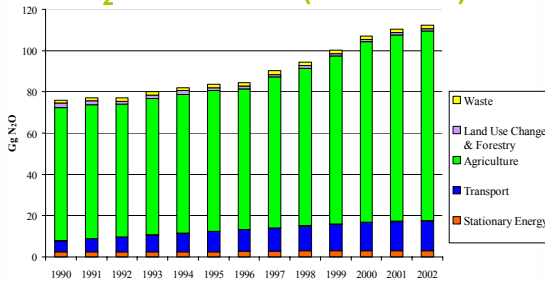
Emissions by sector



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N₂O emissions (1990-2002)



Importance of N₂O

- N₂O has a global warming potential 310 times that of CO₂

[GWP: CO₂ = 1 , CH₄ = 21 , N₂O = 310]

Radiative forcing = atmospheric lifetime, + relative warming effect

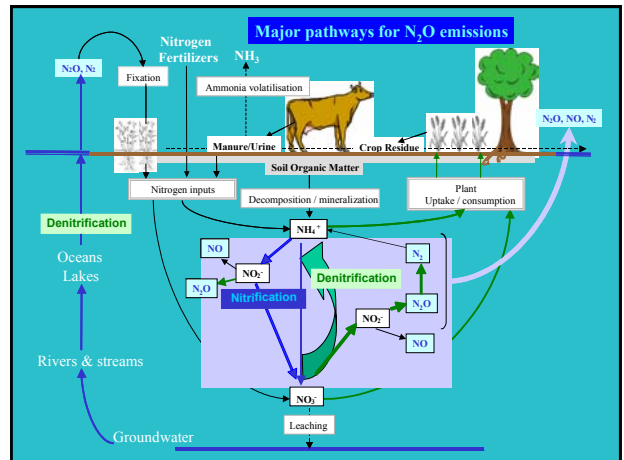
- N₂O has an atmospheric lifetime of ~114 yrs



Current estimates of N₂O

- About 80% of Australia's total N₂O emissions are derived from Agriculture (IPPC)
- There are few estimates of N₂O emissions for Australian Agriculture.
- Even fewer studies compare management practice with N₂O emissions
- Current calculations estimate that 1.25% of inorganic N inputs to soil are lost as N₂O

(There is still much uncertainty in the estimates)



Major processes resulting in N₂O emissions from soil

- High rate of mineralisation of SOM
- Low rates of nitrate leaching
- Inefficient use of N by plants
- Highly denitrifying soil conditions



Factors affecting N₂O emissions in soil

- Soil tillage
- Soil moisture (60% wfps optimum)
- pH (for denit'n 5.8 – 6.8 optimum) & temperature
- Available C
- Physical properties (texture, structure)
- Cation exchange capacity
- Microbial populations





Current state of play

- The impact of most of these factors are unknown wrt N_2O emissions
- Fundamental emissions of N_2O for different crops is largely unknown
- The effect of management practice on N_2O emissions is unknown



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AGO investment

- To obtain fundamental N_2O emissions data for a range of crops and practices in Australia
 - Life cycle assessment (wheat, maize, cotton)
 - Open path Laser & FTIR technologies
 - Satellite and transcontinental measurements

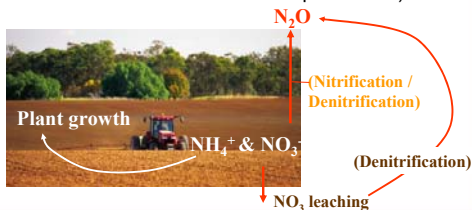


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Multiple benefits of reducing N_2O emissions

- Emissions of N_2O represent a loss in productivity (up to 50% of N lost could be used for production)



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Opportunities

Improved efficiency of nitrogen cycling can be achieved through:

- Improved N management
 - Slow release N fertilisers, coated fertilisers, organic fertilisers, more timely application
- Use of denitrification inhibitors
- Improved soil management
 - Tillage, soil moisture, pH, organic matter

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Outcomes for AGO

- Improved productivity
- Reduced greenhouse signature
- Improved H_2O quality
- Better accounting procedures
- More vibrant rural communities

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In summary

- Australian agriculture can play an important role in reducing GHG emissions
- Reducing N_2O emissions will bring a win-win for industry and government
- Emissions of N_2O must be seen as a part of the whole life cycle in producing food and fibre

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Not the end



“we have only just begun”

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Australia-China Climate Change Workshop

The Australia-China Climate Change Partnership

- Established in October 2003
- Emphasis on practical action to address climate change

Workshop objectives

- Climate policy discussions between Australian and Chinese officials
- Build connections between Australian and Chinese industries with an interest in greenhouse issues
- Facilitate the development of commercial opportunities with a greenhouse benefit

When and where

- Beijing, 13–15 September 2004

Information about participation

- Paul Locke, Australian Greenhouse Office.
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