

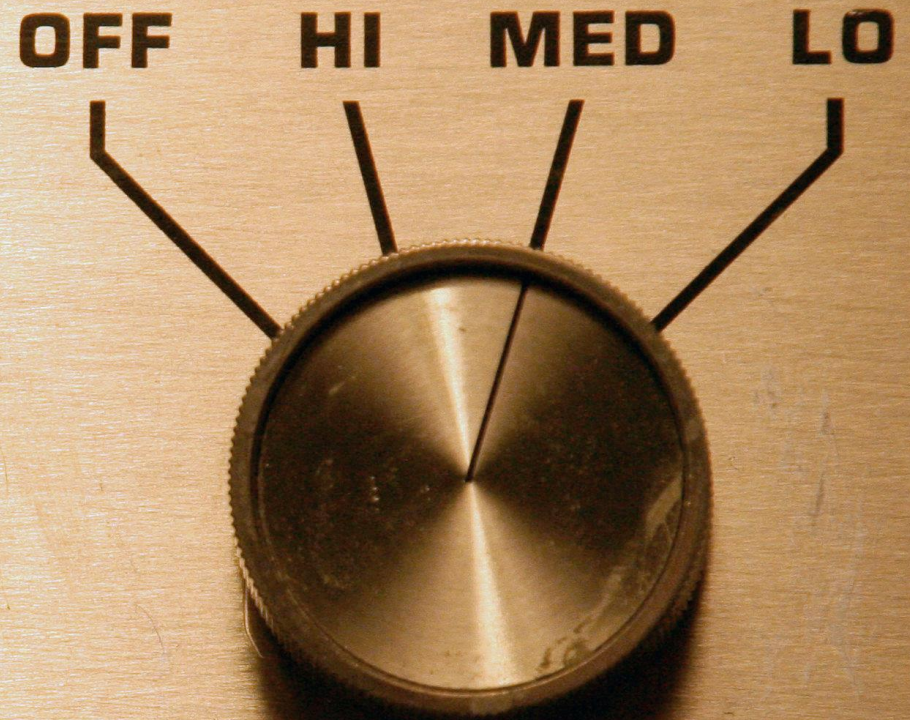
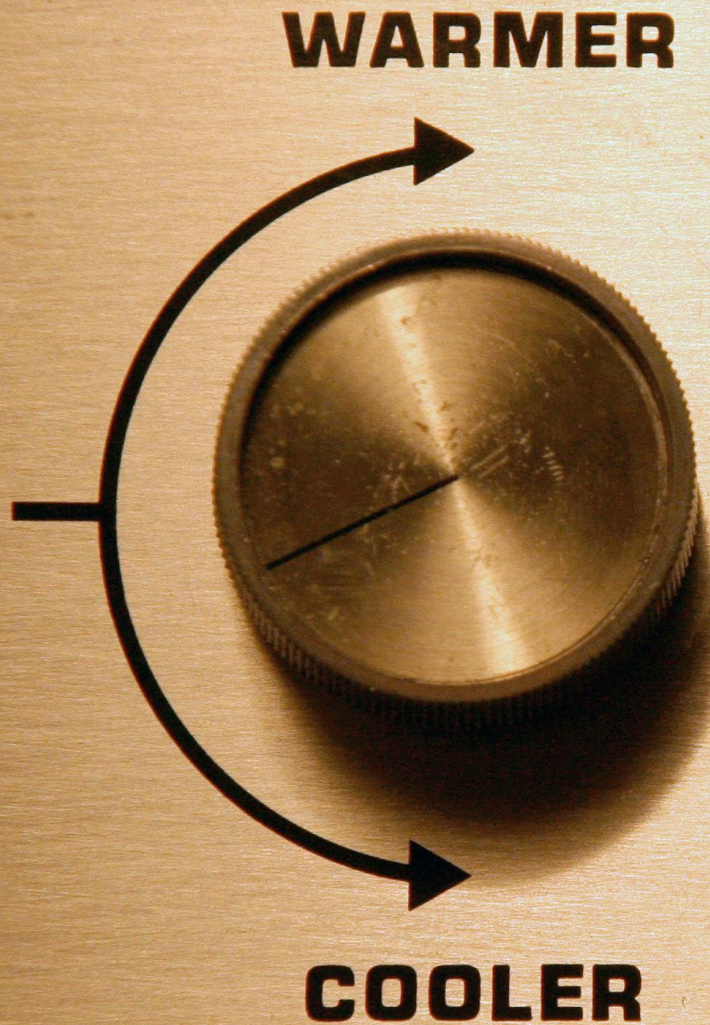
DANGER

THINK  
THEY'LL  
PAY  
ATTENTION  
TO US  
NOW?

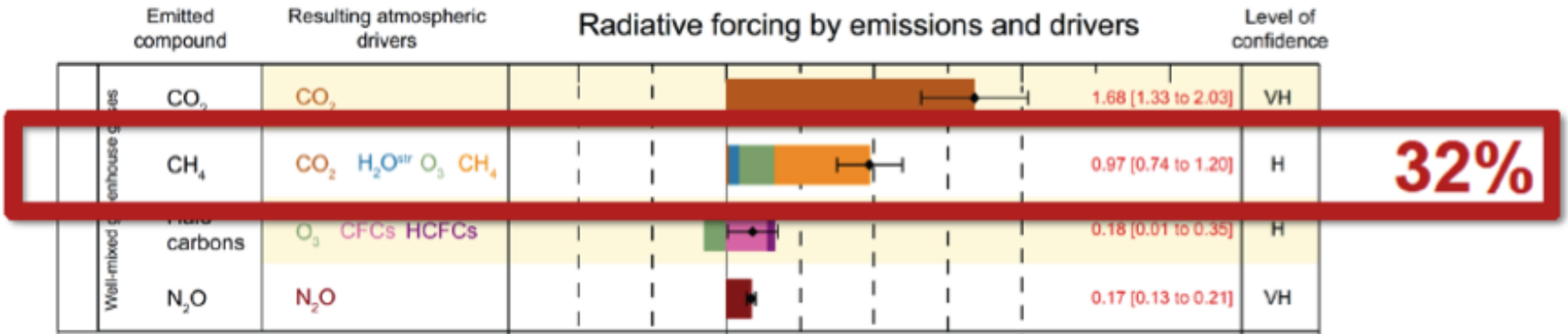
climate  
change

CHAPPATCE

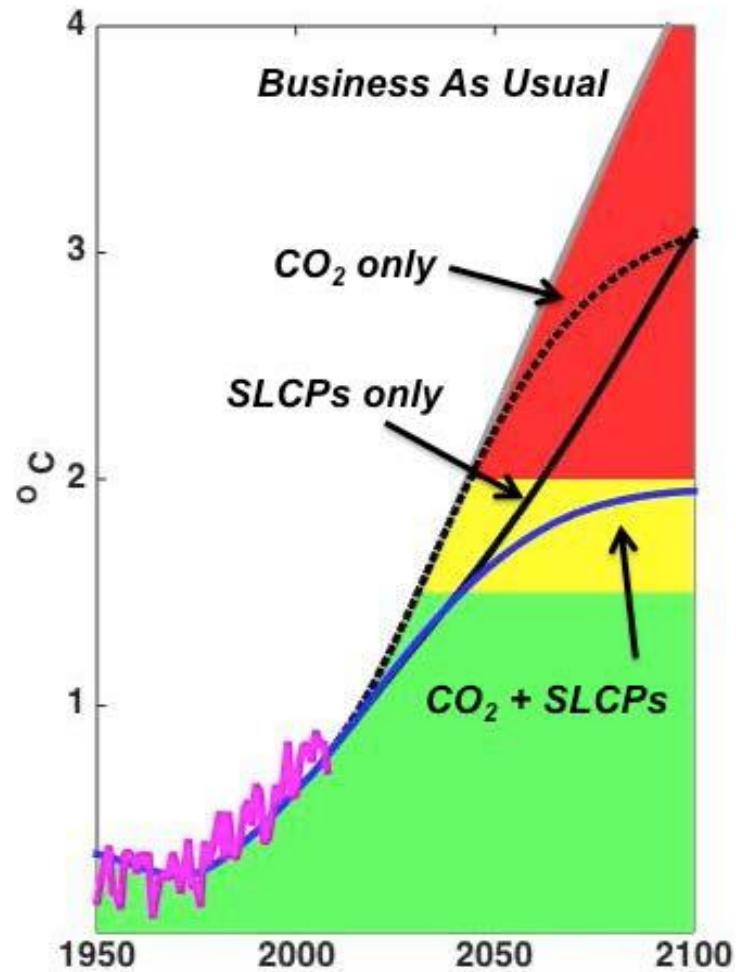
# Two knobs



# One third



# Bending the curve



# Climate Implications of Methane

KG FOR KG METHANE TRAPS

**84X** MORE HEAT OVER 20 YEARS

CO<sub>2</sub>

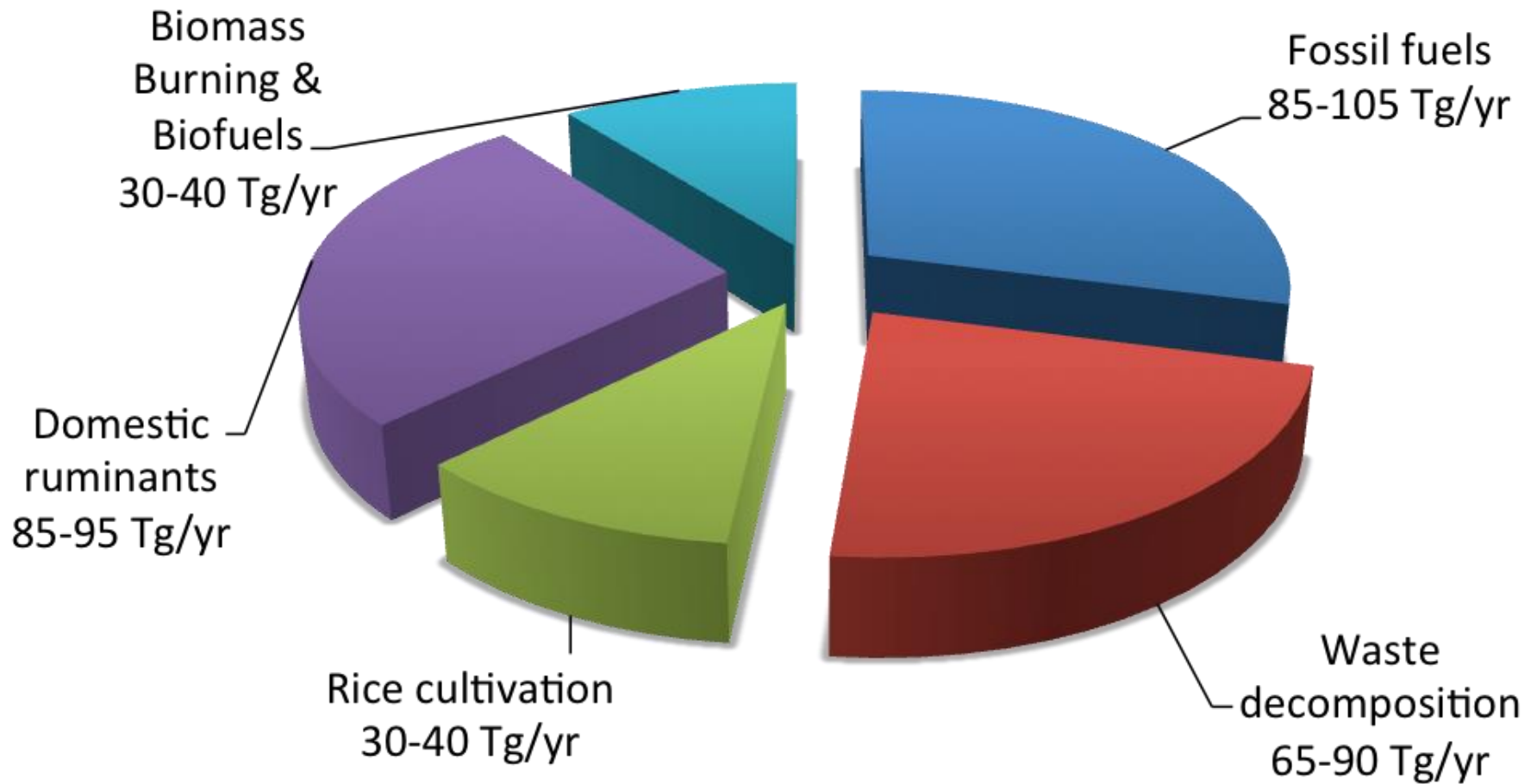


CH<sub>4</sub>



About **25 percent** of the man-made warming we are experiencing today is caused by methane.

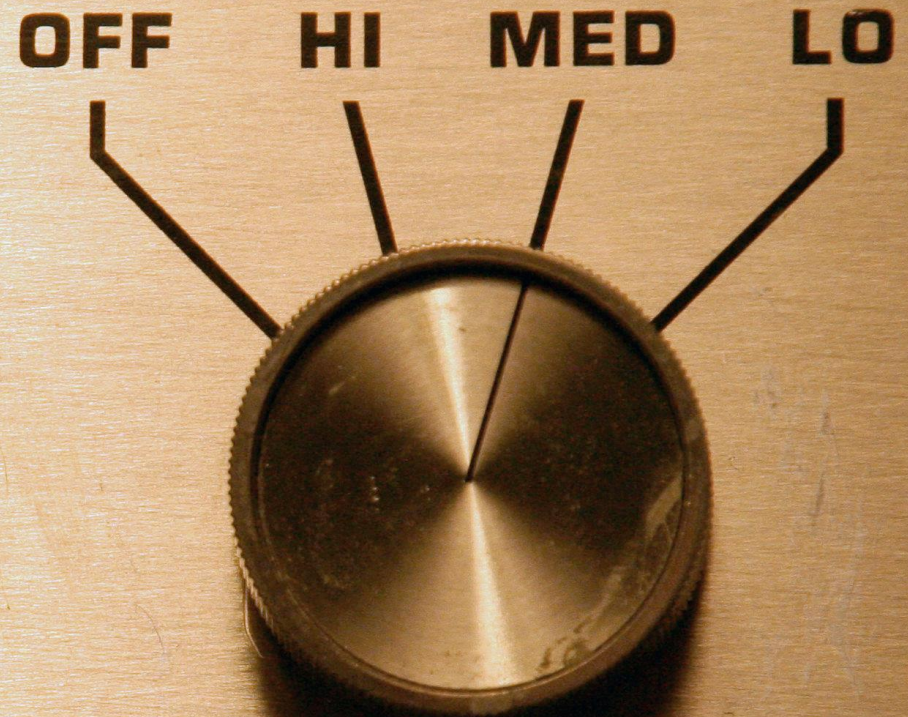
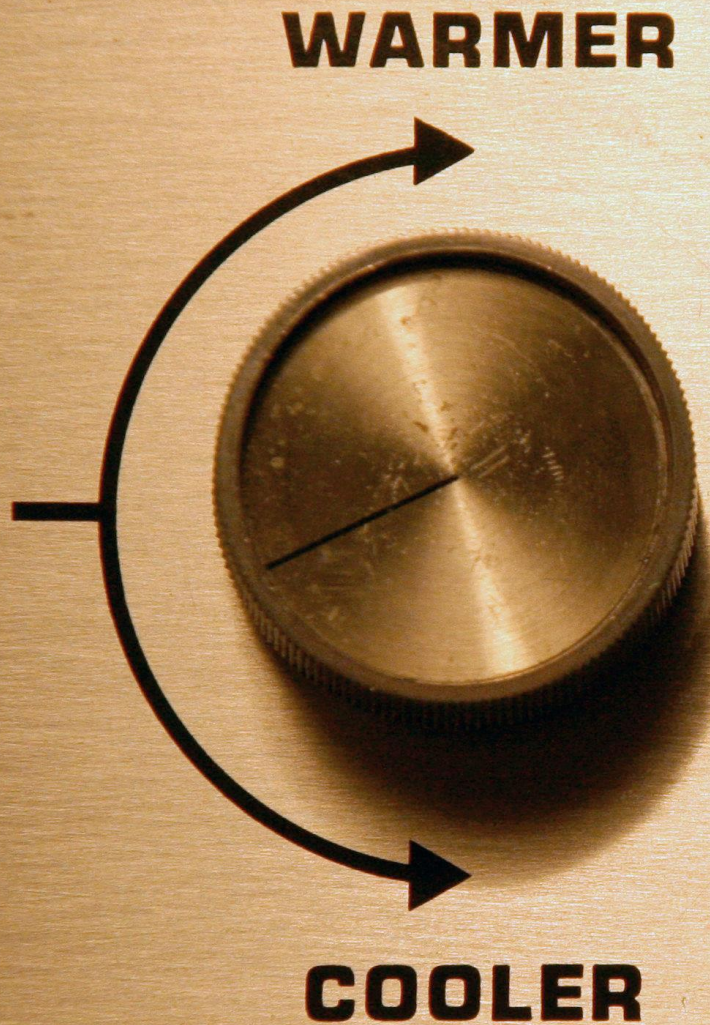
# Anthropogenic methane sources



# 5 priorities

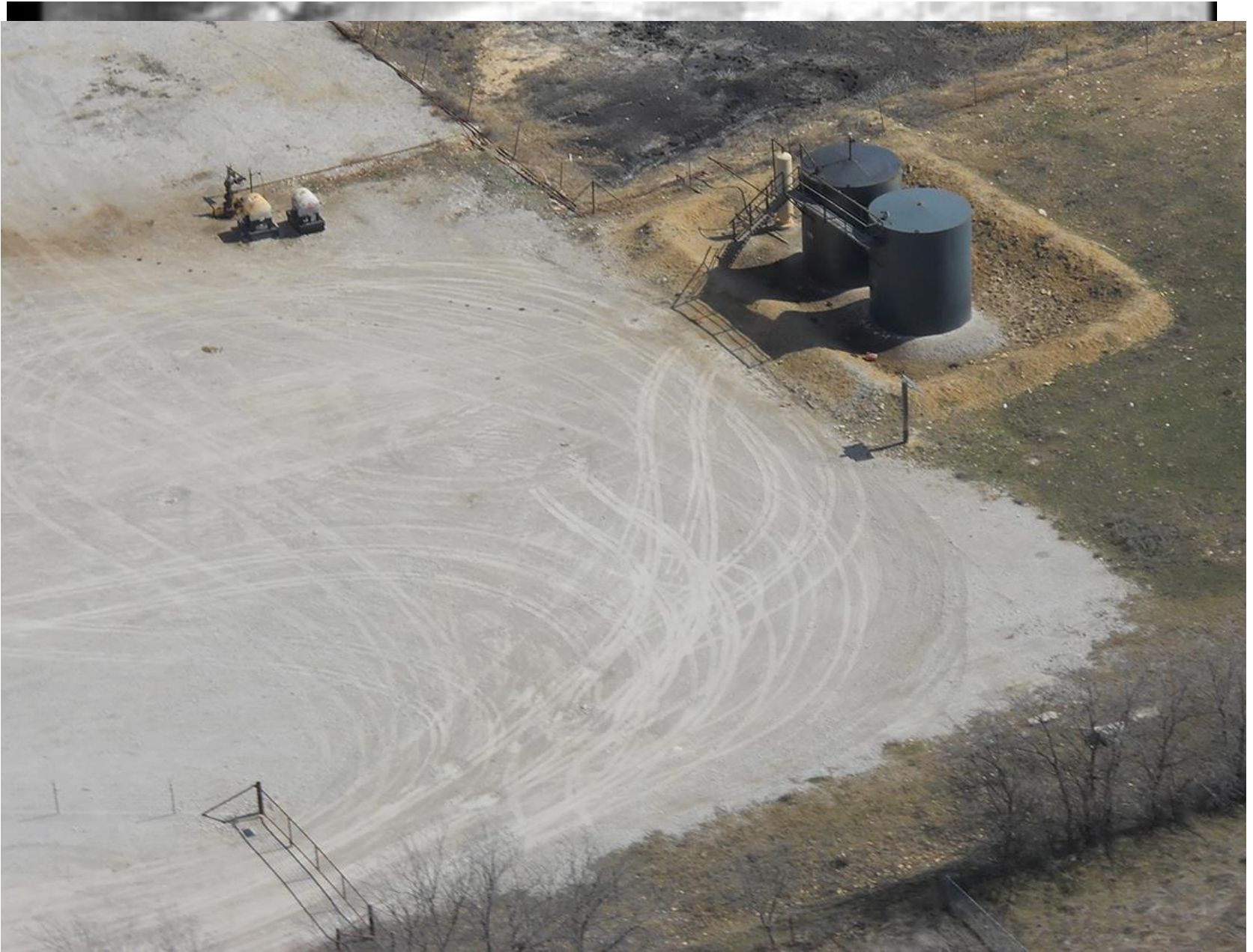
1. Put a price on methane
2. Most rapid progress in oil and gas
3. Landfill programs doable
4. Potential in agriculture
5. Better data for all

# Two knobs





# Fresh facts on emissions from oil&gas

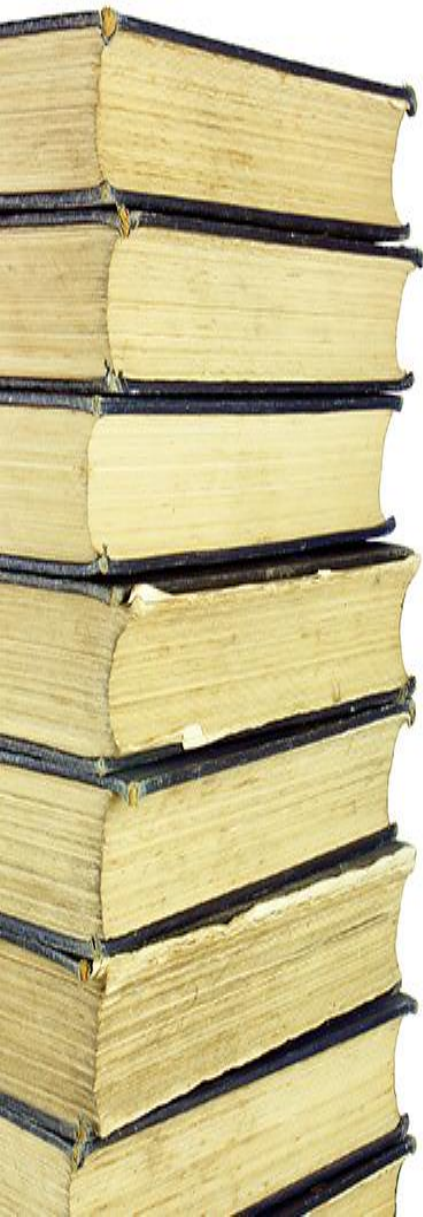






# 24 Published Studies Thus Far...

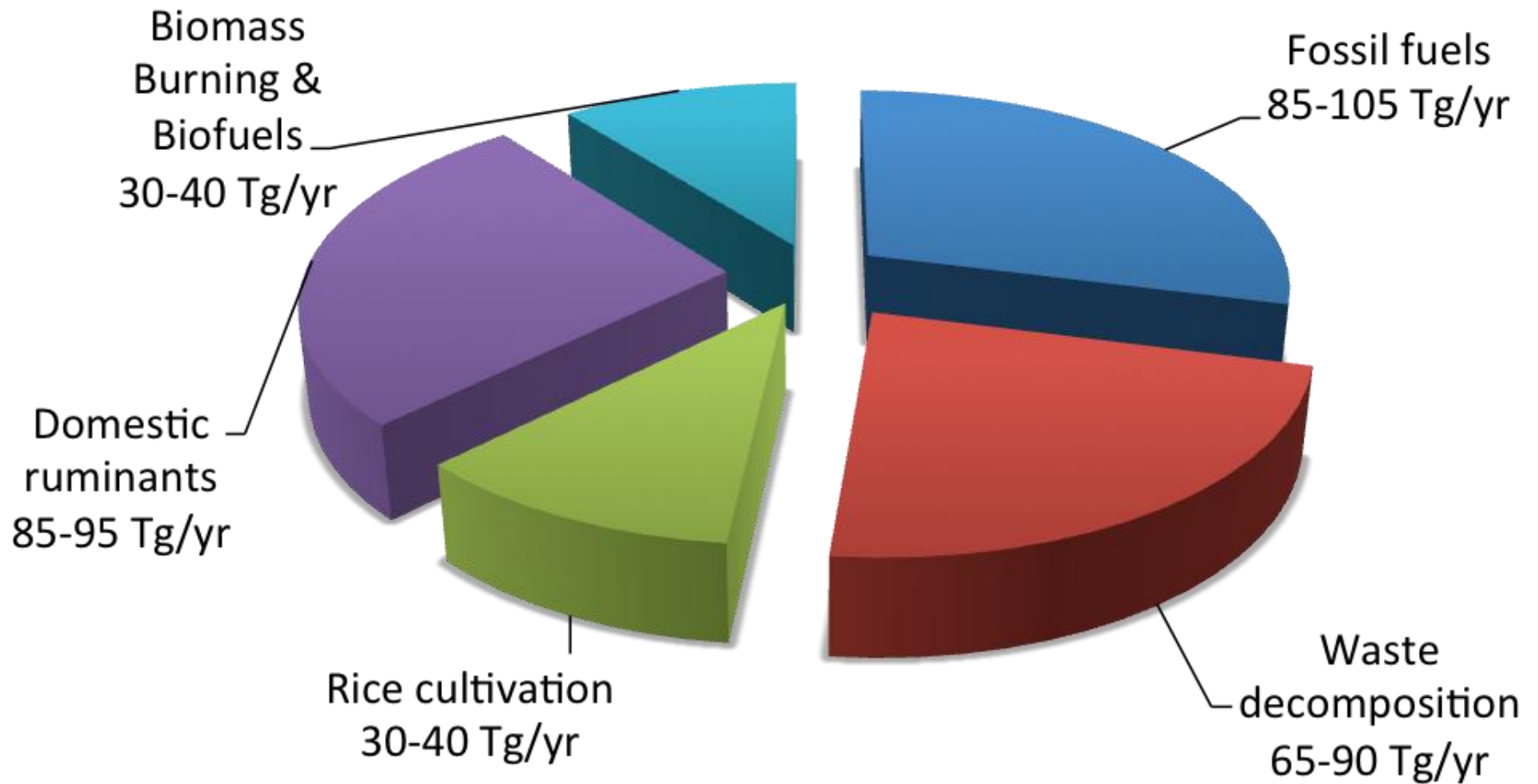
1. **December 2013:** UT Production study: <http://www.pnas.org/lookup/doi/10.1073/pnas.1304880110>
  2. **May 2014:** NOAA DJ Basin Flyover: <http://onlinelibrary.wiley.com/doi/10.1002/2013JD021272/pdf>
  3. **November 2014:** HARC/EPA Fence-line study: <http://pubs.acs.org/doi/abs/10.1021/es503070q>
  4. **December 2014** UT Pneumatics Study: <http://pubs.acs.org/doi/abs/10.1021/es5040156>
  5. **December 2014** UT Liquid Unloadings Study: <http://pubs.acs.org/doi/abs/10.1021/es504016r>
  6. **January 2015:** Harvard Boston Urban Methane Study:  
<http://www.pnas.org/content/early/2015/01/21/1416261112>
  7. **February 2015:** CSU Transmission and Storage study: Measurement paper:  
<http://pubs.acs.org/doi/abs/10.1021/es5060258>
  8. **February 2015:** CSU Gathering and Processing study: Measurement paper:  
<http://pubs.acs.org/doi/abs/10.1021/es5052809>
  9. **March 2015:** WSU Local Distribution study: <http://pubs.acs.org/doi/abs/10.1021/es505116p>
  10. **May 2015:** CSU Gathering and Processing study, Methods paper: <http://www.atmos-meas-tech.net/8/2017/2015/amt-8-2017-2015.html>
  11. **July 2015:** CSU Transmission and Storage study National results paper:  
<http://pubs.acs.org/doi/abs/10.1021/acs.est.5b01669>
  12. **August 2015:** CSU Gathering and Processing study CSU Gathering and Processing study National results paper:  
<http://pubs.acs.org/doi/abs/10.1021/acs.est.5b02275>
- Barnett Coordinated Campaign Papers (July 2015)**
13. **Overview:** <http://pubs.acs.org/doi/abs/10.1021/acs.est.5b02305>
  14. **NOAA led Top-down study:** <http://pubs.acs.org/doi/abs/10.1021/acs.est.5b00217>
  15. **Bottom-up inventory - EDF:** <http://pubs.acs.org/doi/abs/10.1021/es506359c>
  16. **Functional super-emitter study - EDF:** <http://pubs.acs.org/doi/abs/10.1021/acs.est.5b00133>
  17. **Michigan airborne study:** <http://pubs.acs.org/doi/abs/10.1021/acs.est.5b00219>
  18. **WVU compressor study:** <http://pubs.acs.org/doi/abs/10.1021/es506163m>
  19. **Princeton near-field study:** <http://pubs.acs.org/doi/abs/10.1021/acs.est.5b00705>
  20. **Purdue aircraft study:** <http://pubs.acs.org/doi/abs/10.1021/acs.est.5b00410>
  21. **Aerodyne mobile study:** <http://pubs.acs.org/doi/abs/10.1021/es506352j>
  22. **U of Houston mobile study:** <http://pubs.acs.org/doi/abs/10.1021/es5063055>
  23. **Picarro mobile flux study:** <http://pubs.acs.org/doi/abs/10.1021/acs.est.5b00099>
  24. **Cincinnati tracer apportionment:** <http://pubs.acs.org/doi/abs/10.1021/acs.est.5b00057>



# Lessons Learned from the Studies

1. Oil and gas methane emissions are higher than conventional estimates suggest;
2. Heavy-tailed distributions;
3. Reducing emissions is straightforward and cost-effective; and
4. Regulations work to narrow the range of performance amongst companies.

# Anthropogenic methane sources



# Two knobs

