Written evidence from the Anglian Water Services Limited (MET0048)

- We recognise that methane is the second most important greenhouse gas at a global level, and plays a significant role in climate change, causing 25% of global warming. Cutting methane emissions is one of the fastest and most cost-effective ways to limit global temperature rise, especially in the shorter term.

- Defra recently commissioned a Rapid Evidence Assessment: *A review of the measures to reduce Greenhouse Gas (GHG) Emissions from the wastewater treatment sector, including the benefits and costs - WT15130* (https://randd.defra.gov.uk/ProjectDetails?ProjectId=20451). Part 2 of the report relates to municipal wastewater and several of the conclusions are very relevant to the committee.

- **A short summary of key points from the report is included in Appendix 1. The key issues of note for this inquiry is that:**

    - Direct emissions from water need to be included in methane emissions measurement, in accordance with 2019 IPCC guidelines. (Receiving water CH4 emissions are currently excluded from the GHGI (and CAW) but provided in Table 6.3 of the 2019 IPCC Refinement).
    - Successful mitigation will require consistent policy and approaches, informed by quality assured emissions quantification.

- Anglian Water's direct methane emissions (scope 1) total 33,600 tonnes of CO_2e/year (based on 100-year Global Warming Potential), and now account for just under 10% of our overall reported greenhouse gas emissions following significant reduction over 15 years. 60% of this is concentrated at just 10 sites from our bioresources operation where anaerobic digestion is used, presenting a strong opportunity and case for further cuts.

- We have a robust record of accomplishment in reducing methane emissions and have made huge strides over the last 15 years by investing in and pioneering the application of advanced anaerobic digestion technology. Using our present day and industry standard carbon accounting methodology, this investment has resulted in approximately 55,000 fewer tonnes of CO_2e being emitted per year, compared with the previously employed and less sustainable conventional treatment it has replaced. This reduction is over one and half times our current annual reported methane emissions, illustrating the impact and effectiveness of the investment.

- We have proposed an ambitious and systematic reduction or in some cases, elimination, of our remaining methane emissions from our bioresources operation in our recently published business plan for the period between 2025 and 2030 (https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/our-plan-2025-to-2030-pr24/), where we propose to invest £153m in further mitigation of operational greenhouse gas emissions. The approach is to

further maximise further collection and utilisation of methane in plant such as combined heat and power (CHP), heat boilers and in the future to biomethane injection to the gas grid or use as renewable fuel for transport, increasing the yield of renewable energy and reducing the marginal abatement cost of the investment. Mitigation activity will include:

  - Minimise leakage even further using approaches utilised in the oil and gas industry.
  - Maximise any remaining methane harvesting and utilisation.
  - Optimise connection of methane generating plant to the biogas system.
  - Extraction of dissolved methane using vacuum degassing, and transfer to the biogas system to significantly reduce the release of residual methane.

- We are founding members of an international collaboration named Climate Action on Process Emissions (CAPE) with other leading and purpose driven utilities, including PUB Singapore, VCS Denmark, Metro Vancouver, and Helsinki Water.

- The forecast methane reduction from the proposed investment is 11,000 tonnes of CO_2e/year, represents a 33% reduction from 2020 levels by 2030, exceeding the target of the Global Methane Pledge. We are actively investigating technologies and process changes through our research and innovation activity to outperform this forecast, and availability of additional funding would allow even deeper cuts in emissions.

Appendix 1 Selected evidence from Defra Rapid Evidence Assessment: A review of the measures to reduce Greenhouse Gas (GHG) Emissions from the wastewater treatment sector, including the benefits and costs - WT15130

For CH_4, we find no current evidence for improved quantification beyond the current UK GHGI method (relying on the water industry Carbon Accounting Workbook). Tier 2 and 3 methods are recommended - as are being developed in other countries - and in alignment with IPCC guidance. Examples include the voluntary programme in Sweden and the recent Danish review of 69 biogas sites with recommended national CH_4 EFs (Fredenslund et al., 2022; Holmgren M. A., 2019). These would provide facility- and sector-level baselines of CH_4 emissions, which have been shown to be variable and facility specific – with facility level monitoring key for understanding of technical, cost and safety considerations; and

Whilst not a significant source relative to others, there is a need to include direct emissions from the receiving water bodies for CH4, in accordance with 2019 IPCC guidelines. Receiving water CH_4 emissions are currently excluded from the GHGI (and CAW) but provided in Table 6.3 of the 2019 IPCC Refinement (D. Bartram, et al. 2019).

Key mitigation opportunities for CH_4 requires an understanding of actual emissions through monitoring at facility-level. No sector 5D1 monitored evidence exists and quantification of CH_4 is not presently undertaken. Quick wins through leak detection and repair (LDAR) and baselining through facility-level quantification is requisite and possible with existing technologies (Clauß, et al., 2019). Research and innovation

(R&I) funding should focus on establishing LDAR and site quantification methodologies, supporting accreditation standards, data sharing, monitoring, verification and reporting (MVR). Innovative investment in a CH_4 programme with science-based methods to provide benchmarking will drive cost effective mitigation with techno-economic and environmental evaluation. Further key conclusions and recommendations for CH_4 are:

1. LDAR programme: Implementation of an effective site-level LDAR programme in conjunction with site-level quantification. LDAR allows immediate mitigation, while site-level quantification will support GHGI improvement and prioritisation. Both elements are likely to be required to support industrial Emissions Directive (IED) compliance, but this should be considered holistically – with reference to environmental, social and economic considerations. Understanding the magnitude of emissions across sites will support cost effective mitigation. Mitigation plans should be developed as part of the NMP. This should reflect draft EU CH4 regulation (EU, 2022) and sectoral programmes (e.g., voluntary programme in Sweden) which can provide proactive LDAR (Holmgren, Hellstrom, & Petersson, 2012; Holmgren M. A., 2016; Holmgren M. A., 2019);

2. No need to wait to mitigate: There is significant opportunity to reduce N2O and CH4 emissions today without the need to wait for outcomes from a NMP or methodology framework or certification development. However, monitoring may be required to support cost-effective decision-making. Work in Denmark has used site-level monitoring to identify and implement quick win mitigation and to price up emissions benefit versus capital cost for tank covering and delivered mitigation through replacement of pressure relief valves. Local community air quality and health and safety impact should also be considered;

3. Cost data for mitigation of CH_4 is limited. A very recent (not yet published in peer reviewed literature) study in Denmark developed EFs and mitigation strategies for 18 facilities, 11 of these being aerobic digestion (AD) facilities at municipal WwTW's (Fredenslund et al., 2022). For the WwTW facilities, estimated costed works resulted in an average abatement cost of approx. 2 This project is undertaken by Jacobs with partners. A review of the measures to reduce GHG emissions from the wastewater treatment sector £270/tCO2e (range -£2,200 to +£3,900/tCO2e) derived for 20-year net present value (NPV) (Fredenslund et al., 2022). The Water UK Route map suggests abatement costs from a range of £10 to -£100 (operational optimisations) to greater than £1,000 tCO2e (alternative treatment processes) for mitigation of CH_4 (and N_2O) over a 10-year NPV and 10-year abatement potential. These lack an evidence base and require redevelopment, ideally informed by actual monitoring data. Societal costs may provide comparison for use in policy considerations. These have been revised in an interim update in US Federal agencies work recently - societal costs per metric ton of methane range from US$2000 - US$3900 (2020) to US$3800 – US$8200 (2050) based on 2.5% discount rate or 95%ile of 3% discount rate with evidence these likely under-estimate costs (IWG, 2021);

4. Structured interviews conducted showed that emissions monitoring and mitigation strategies are, in limited cases, being implemented in the UK. This includes proactive LDAR and consideration of abatement including tank covering and treatment, vacuum extraction for fugitive CH_4 capture and use or removal and process optimisation for CH_4 production. To deliver mitigation

solutions, this requires to be scaled and founded upon consistent approaches, informed by quality assured emissions quantification; and

5. Existing short-to-near-term research needs and associated short-term funding should support LDAR, the NMP and framework development for consistent, cost-effective mitigation.