



Gas Shrinkage Forum: NAEI Intro

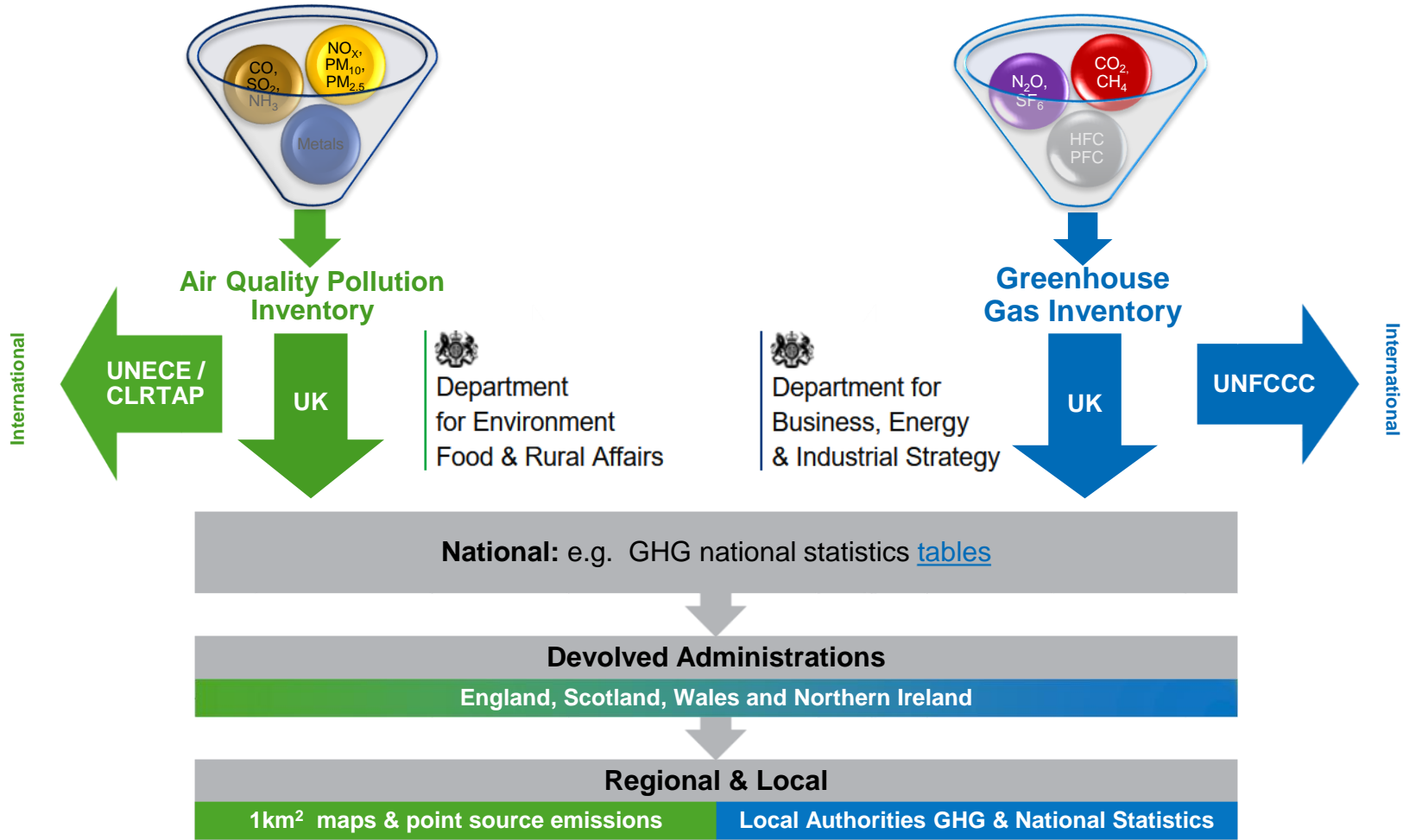
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Quick intro

- Glen Thistlethwaite, NAEI Technical Director, Ricardo
- Ricardo are under contract (to 2025) to DESNZ to deliver the National Atmospheric Emissions Inventory (NAEI) which includes the UK GHG inventory
- We've been accessing the gas leakage data via requests direct to each GDN for many years, but there is greater focus from DESNZ now on the underlying model – data, assumptions, documentation etc.
- *(Part of wider DESNZ work to understand and address science and modelling risks.)*
- We'd like to request access to populated versions of the SLM for a recent year, to improve spatial resolution and enable some degree of QA of the model, to better understand risks.

National Atmospheric Emissions Inventory: main outputs



Other submissions / tasks

- Technical support to UK Government steering committees (DESNZ, Defra)
- [Default emission factors for UK Emissions Trading Scheme \(ETS\)](#)
- Analysis of UK ETS data for the DUKES team; work with the EEP team to understand DUKES vs GHGI differences; direct support to policy teams.
- [Transport emissions support for DfT statistics](#)
- Devolved Administration inventories: Scotland, Wales, N Ireland
- [Conversion factors for domestic company emissions reporting \(e.g. SECR\)](#)
- Local Authority GHG inventories; National Parks data.
- [LULUCF data /analysis for the DESNZ Land Use and Bioenergy Science team](#)
- Emission maps with resolution 1km² → air quality modelling / health impacts
- [Participation in reviews under the UNFCCC, CLRTAP \(of UK, of other countries\)](#)
- NAEI website maintenance; responding to public enquiries
- [Support to other UK UNFCCC submissions, e.g. National Communications](#)
- Various air quality pollutant emissions reporting outputs, including projections
- [Day to day ad-hoc support for Government users of NAEI data](#)

NAEI emission estimation methods (1)

Scope

- All anthropogenic emission sources: energy (combustion, fugitives), industrial processes & product use, agriculture, land use change & forestry, waste management
- All UK territorial emissions (*production based, not consumption based*)
- Many pollutants per source category: all GHGs, priority AQ pollutants (e.g. NO_x, PM_{2.5}, NMVOCs), heavy metals, Persistent Organic Pollutants (PCDD/Fs, PAHs) ..
- Long time series of data: 1990/1995 base year for GHGs, 2005 for AQ pollutants

Methods

- Consistent with prevailing international guidelines
 - 2006 IPCC Guidelines (and the 2019 Refinement to those guidelines)
 - EMEP/EEA Guidebook (for AQ pollutants)
- Resources prioritised to Key Source Categories (**high-emitting sources, those that affect the UK trends**)
 - Simpler methods for minor sources (e.g. use default emission factors)
 - “higher tier” methods for key sources (UK-specific factors, models)
 - Minimise inventory uncertainty as efficiently as we can

NAEI emission estimation methods (2)

Data Sources

- **National statistics:** **DESNZ energy stats**, DfT transport stats, ONS production stats, HMRC data, Defra agricultural stats, FC forestry stats, Defra waste stats ...
- **Industry-specific statistics / trade associations:** ISSB, MPA, UKPIA, CIA, UKWIR...
- **Regulatory reporting mechanisms:** UK Emissions Trading Scheme, IED/PRTR, EEMS and PPRS, **OFGEM RIIO-2** ...
- **Literature and research sources:** EF libraries, one-off research e.g. fuel sampling and compositional analysis

Data Quality Objectives

- **Transparency; Accuracy; Consistency** (across the time series); **Completeness; Comparability** (with other country submissions to the UNFCCC/UNECE)
- *“To minimise uncertainty and ensure that inventory estimates are neither over- nor under-estimated as far as can reasonably be judged”*

→ **Annual programme of continuous improvement**



Inventory Quality Assurance

- Annual expert reviews (UNFCCC); bilateral / peer reviews; UK inventory steering committees (pre-submission sign-off)
- Inventory verification studies: InTEM, AQ modelling (PCM) ..

Drivers for UK inventory Improvement

- **DESNZ science team** lead to drive down uncertainties
 - Net Zero
 - Carbon Budgets
 - UNFCCC / UNECE reporting (includes methane, NMVOC)
- Oil and Gas industry-specific drivers / focus
 - Global Methane Pledge, OGMP 2.0
 - Marcogaz model
 - Measurement campaigns / projects
 - Super-emitters
 - [Recent 2-year inventory improvement on upstream oil and gas]
- Risks associated with NAEI models → QA of underlying models
 - Documentation (transparency)
 - Accuracy, Completeness, Consistency
 - Representative of UK circumstances
 - Risk of duplicating emissions data from other sources? (e.g. PI)

Downstream gas shrinkage and leakage

- NAEI uses the GDN data from the [Shrinkage and Leakage Model](#)
 - ✓ Specific to UK pressures, network materials, components
 - ✓ Annual activity data on network upgrades
 - ✓ High (spatial) data resolution within the model (but not in outputs to DESNZ)
 - ✓ Consistent approach across the network, used for OFGEM reporting under price control regulations (RIIO-2)
 - ✗ We don't have much in the way of **documentation** of the model, or the underlying evidence to inform Emission Factors (e.g. per AGI type - range, variability, uncertainty)
 - ✗ Methods (e.g. AGIs) based on old data (2003/4) – **validation, improvement?**
- The NAEI spatial disaggregation of the UK network totals is based on a proxy dataset (gas consumption patterns) as we don't receive spatially resolved data
- Development of the DPLA? SLM improvements in the meantime?
- Measurements indicate mis-matches, NAEI vs field observations
 - Not unexpected
 - Aim to improve NAEI spatial resolution
 - How to identify & quantify super-emitter sources

Can we get access to populated versions of the model per GDN?

- QA of the model
- Understanding of scope, risk of gaps / double-counts
- Improve our understanding of uncertainty of the outputs
- Improve the quality of the UK submissions to UNFCCC, UNECE
- Enable DESNZ to determine next steps
- Spatial information and information per sub-source (e.g. per AGI type, including locations) will help improve NAEI emission maps (for modelling community)

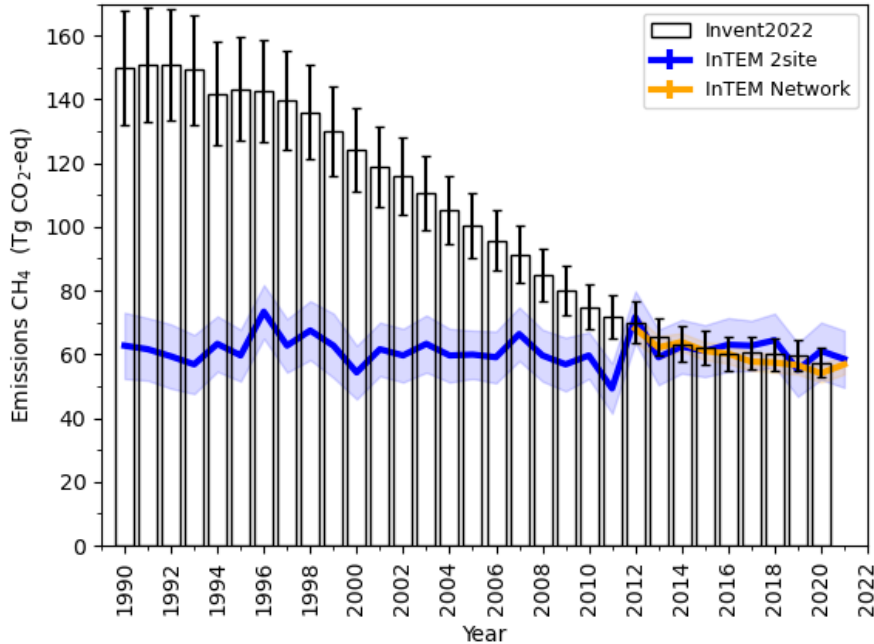
Other related considerations

- Can we access more highly resolved data on the fossil/bio split of gas in the supply network?
 - Currently only national data on transfers of biogas to the network
- Ofgem – DESNZ have similar data requirements → Data Supply Agreement?
 - Reduce burden on industry reporting
 - Greater consistency

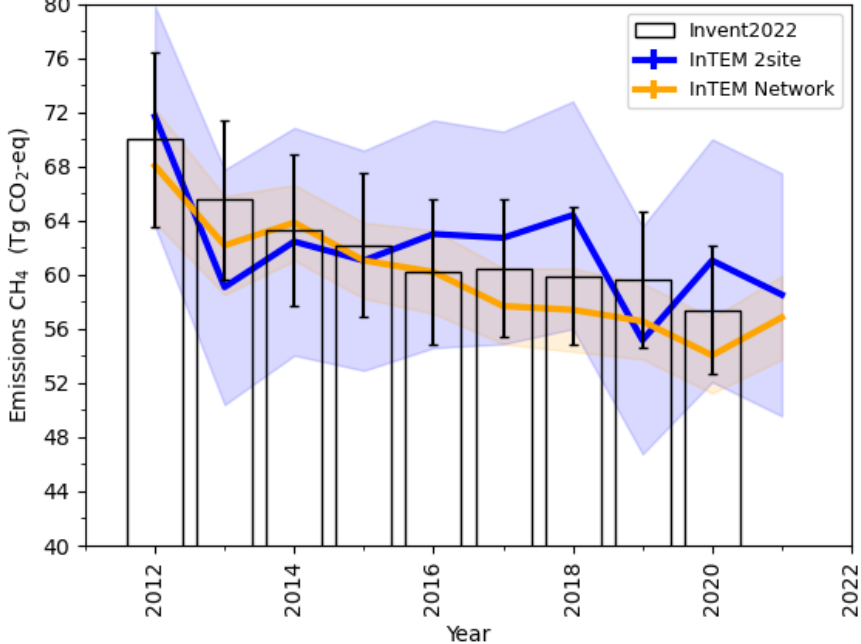
Other slides if useful / time



Inventory verification: methane (1)

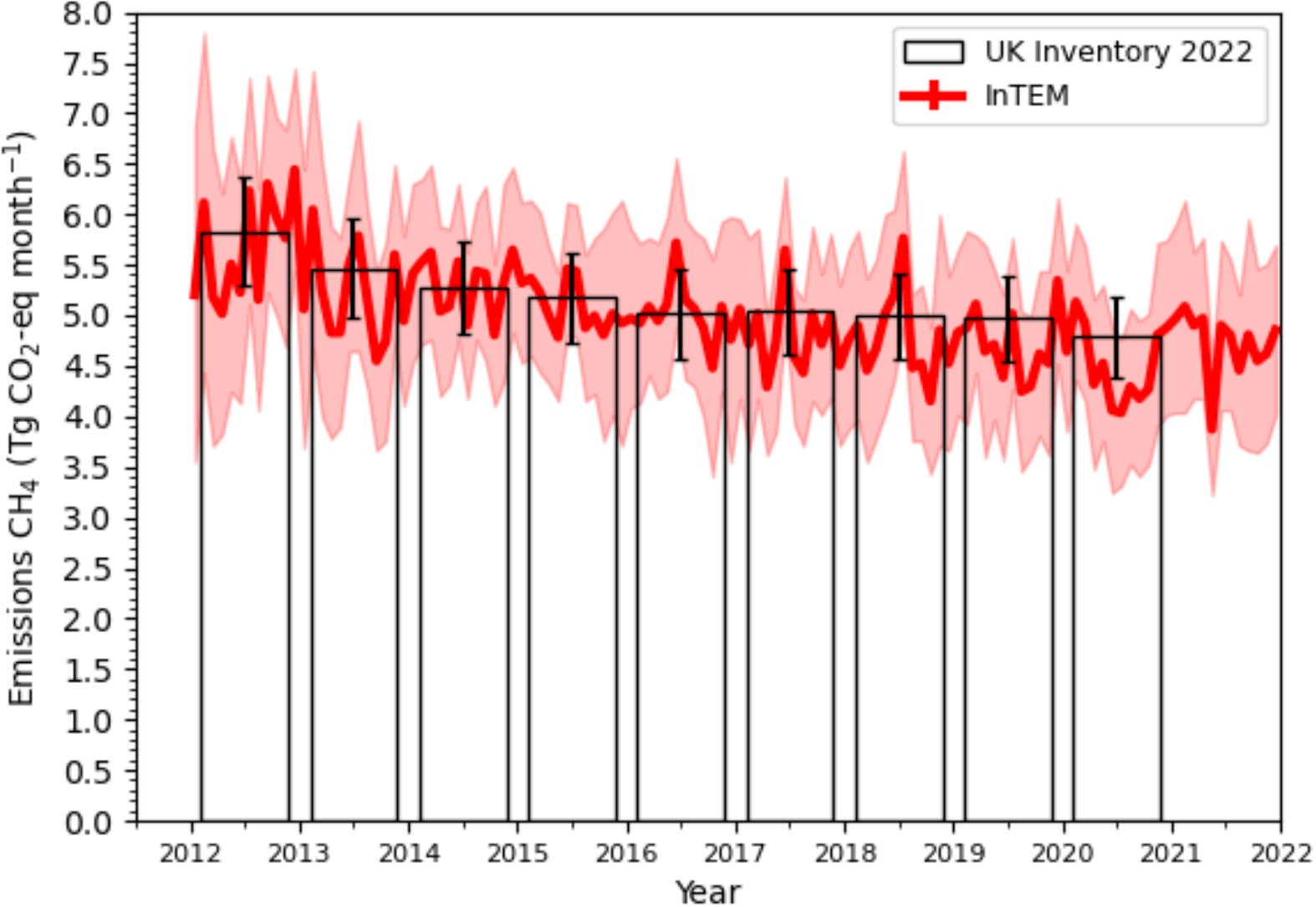


(a) 1990-2021



(b) 2012-2021

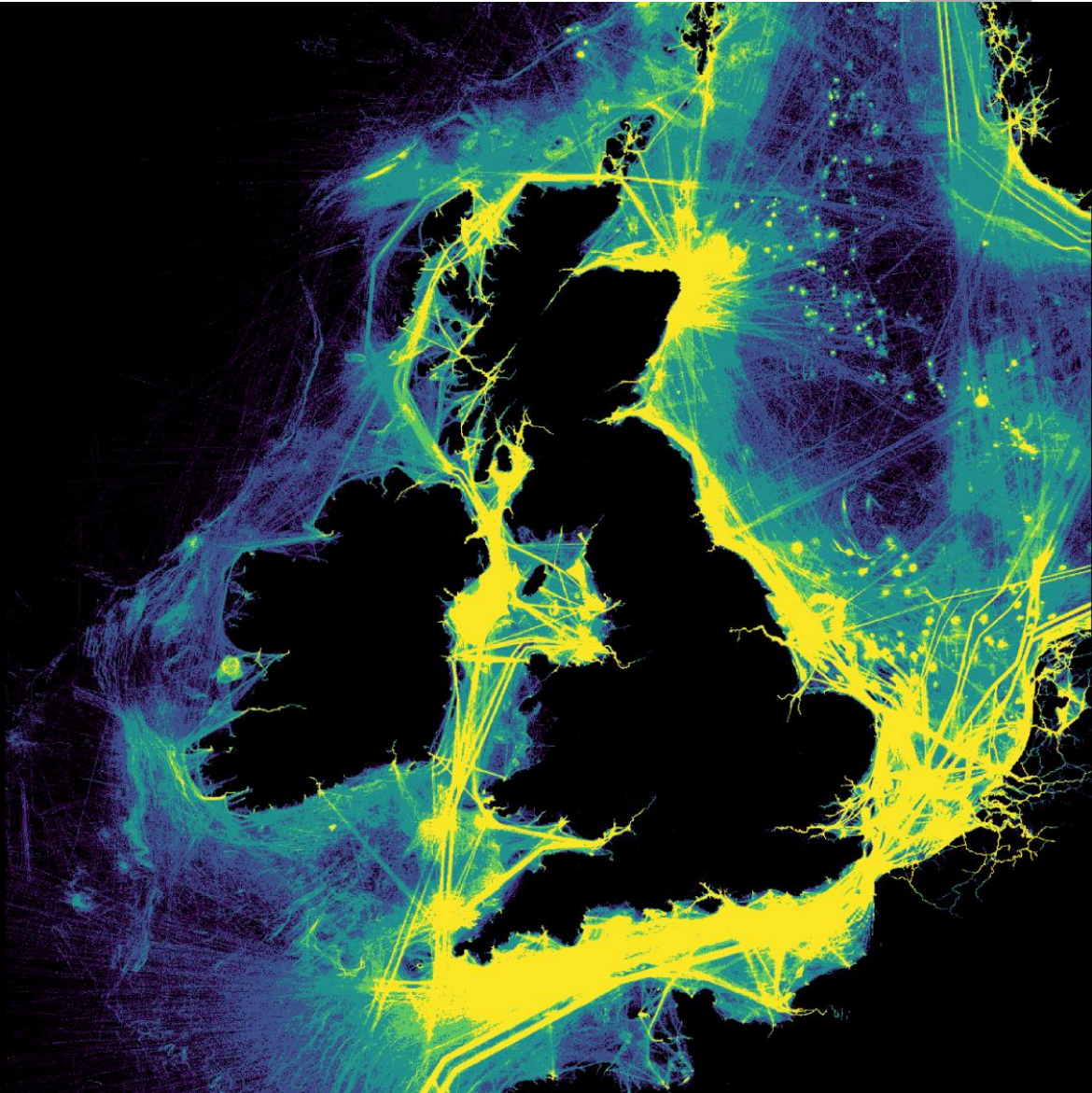
Inventory verification: methane (2) – monthly data





Thank you for your time

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fit for the future

