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CarbonQuanDRIs and Other Thoughts

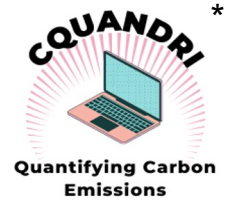
Carbon Aware Networks Workshop
Oxford, 2023-09-19

Paul Shabajee

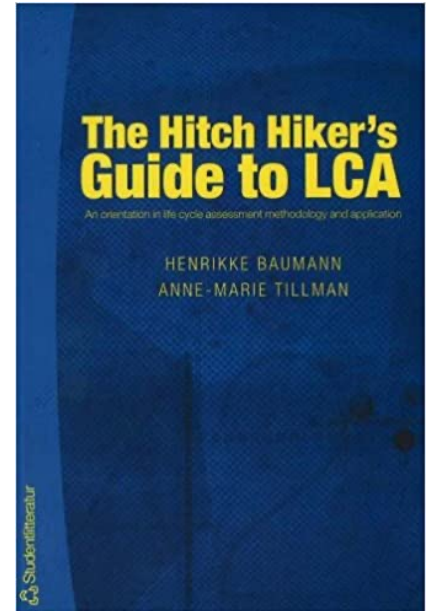
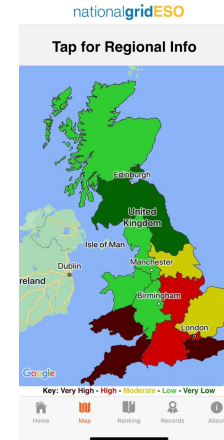
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Two Points of Interest to Pick Up in Later Sessions & Conversations

1. From Electrical Energy to Carbon Emissions

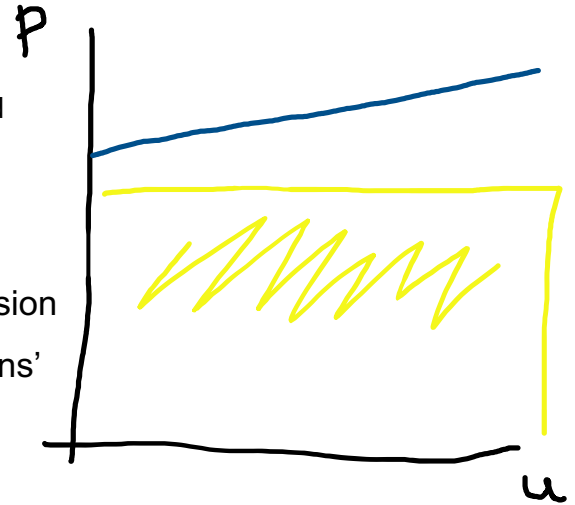


- What is the Electricity GHG Emissions Factor (kgCO₂e/kWh)?
- But what precisely is the question?
 - Average Emissions Factor (e.g. annual, daily, ... half hourly)
 - Operating Margin ('next kWh') Emissions Factor
 - Short-Run Marginal Emissions Factor
 - Long-Run Marginal Emissions Factor
 - ...
- Additionally
 - Geographic Scope: Local, Regional, National, ...
 - Temporal Scope: 'Now'? Last year? Later Today? Next week? Next Year? Half-hourly Over the Next 8 Years? ...
 - Scope of Emissions: Burning fuel, Embodied (of what), T&D losses, Well to Tank, ...
 - How are Emissions Modelled?
 - 'Market based' (including renewable purchases) Vs Location Based ?
 - ...
- Is the data available in order to estimate the emissions factor?



2. Attributional Vs Change-based Metrics

- GHG Assessment Standards & Reduction Target Setting Programmes are Currently 'Attributional'
 - Incl. Corporate Accounting/Reporting and Product (Goods and Services) Footprinting
- Services that use networks are allocated a share of emissions
 - Retrospective
 - 100% of estimated emissions are allocated
 - Allocation to services currently (generally) by share of total data-volume transferred
 - Average kWh/GB over the period
 - And then \times (kgCO₂e/kWh emissions factor) to get kgCO₂e
- Attributional kWh/GB metric doesn't reflect causal consequences on emissions from changes (e.g. service design, policy, ...) and causes confusion
- Need metrics that reflect 'real-world' emissions changes due to 'interventions'
- So ...



Need More Detailed Systemic Modelling

- But ... that's quite complicated :- (e.g. ...
 - There are a myriad of factors that are part of those systems
 - Technological & Complicated Nature of Many Digital Services
 - Economic / Business Models / Regulatory
 - Social / Behavioural
 - Political
 - Ethical
 - Methodological
 - ...
 - When modelling, we often find ... the simple question we thought we were asking, is not as simple as it at first seemed