



Setting baselines for new market-based mechanisms: Case studies from the cement and power sectors

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Side Event “Top-down, Bottom-Up or In-Between – What Future for the Carbon Market?”

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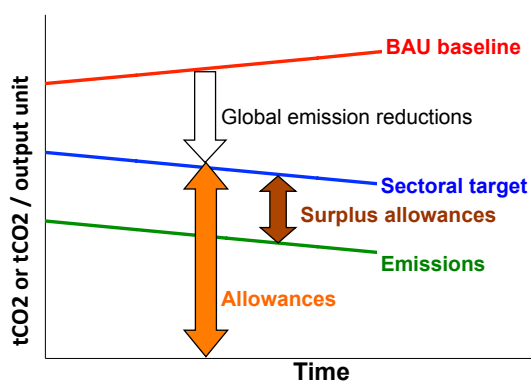
New market-based mechanism

- Sector-level coverage
 - Sectoral crediting
 - Sectoral trading
- Baseline should depict the future BAU emissions path
 - To be projected on the basis of technical-economic data
- Baseline different to the sectoral target or crediting threshold
 - Target or threshold have a political component to them

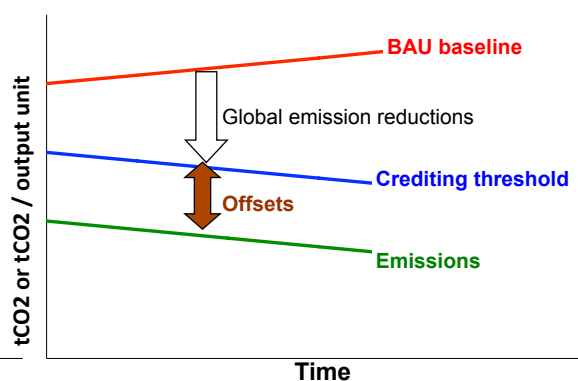


New market-based mechanism – Theory

Sectoral trading



Sectoral crediting

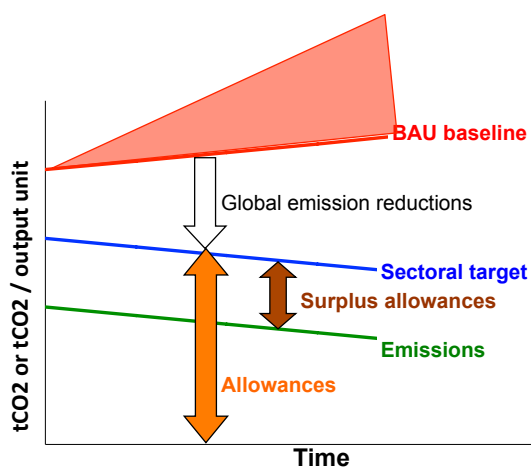


Source: Adapted from Aasrud et al. (2010)

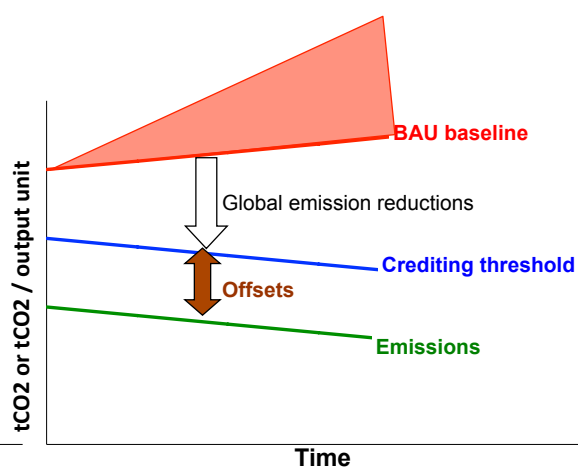


New market-based mechanism – Reality

Sectoral trading



Sectoral crediting



Source: Adapted from Aasrud et al. (2010)

→ Conservativeness of baseline
→ Stringency of target / threshold



What needs to be considered?

Baseline scope

- What activities the baseline will cover
 - A “sector” → different definitions possible
 - Some sectors are heterogeneous
 - Product
 - Process
 - Time
 - Space
- Ideally, include a whole sector, but taking into consideration its structure
- In general: the **more disaggregated**, the **more accurate** the baseline, but the **less incentives / flexibility** for broader mitigation actions, and the **more data-intensive**



What needs to be considered?

Reference data

- Ultimately, all baselines base on historical data
- But different ways to use it:
 - **PAST performance** of covered activities as the baseline, e.g.
 - A single historical time period
 - The average emissions level over several historical time periods
 - Or projection of **FUTURE projections** as the baseline, e.g.
 - Linear extrapolation of past emissions trend
 - Projection based on expected changes in growth rates of sector
 - Projection incorporating effects of expected changes in other variables (technological, economic, demographic factors)
- If no historical data: parameters based on manufacturers' specifications or default emission factors



What needs to be considered?

Dynamics and updating

- Used to incorporate effect of future changes in conditions affecting the sector
 - **Fixed** baseline:
 - Eg. 20% best emissions performance of all steel plants in the country over the period 2005-2010
 - Could include an autonomous emissions improvement factor (emission levels decline at a rate of 1% emissions each year)
 - **Dynamic** baseline:
 - Calculated anew each year as the sector progresses: e.g. 3-year rolling average emissions level of all steel plants in the country
 - Updating: every few years the baseline (or parameters within it) is updated; should not be used to “relax” the baseline
- Need to **weigh speed of changes** in the sector, with **cost** of revisions, and **investment certainty**



What needs to be considered?

Metrics

- **Absolute** baselines: Total emissions in the sector
 - Assumptions about expected future level of activity in the sector
 - Expected growth in production / demand drivers uncertain
 - May lead to hot air
- **Indexed** or relative baselines: Emissions per unit of output
 - May not lead to net reduction in emissions if growth of sector is larger than gains in efficiency / relative emissions
- **Technology-based** baselines: level of penetration of desired technology
 - Reduced MRV costs
 - Can then be transformed to emission reductions – higher uncertainty



What needs to be considered?

Conservativeness and stringency

- Of the baselines – technical analysis
- Of the target – political component



Cement sector case study



Cement sector in India

- Data from the WBCSD's Cement Sustainability Initiative
 - Years 1990, 2000, 2005-2010
 - Coverage around 50% of Indian cement production; growing over time
 - Information on emissions from calcination and fossil fuel combustion
 - No information on indirect emissions from electricity consumption
 - Data aggregated for the whole sector; not for each plant
- Socioeconomic data and industry statistics
 - GDP, GDP per capita, population from WDI
 - Future projections from EIA's International Energy Outlook
 - Historic cement production from Indian Cement Manufacturers' Association
- Generated projections of sectoral emissions levels up to 2030

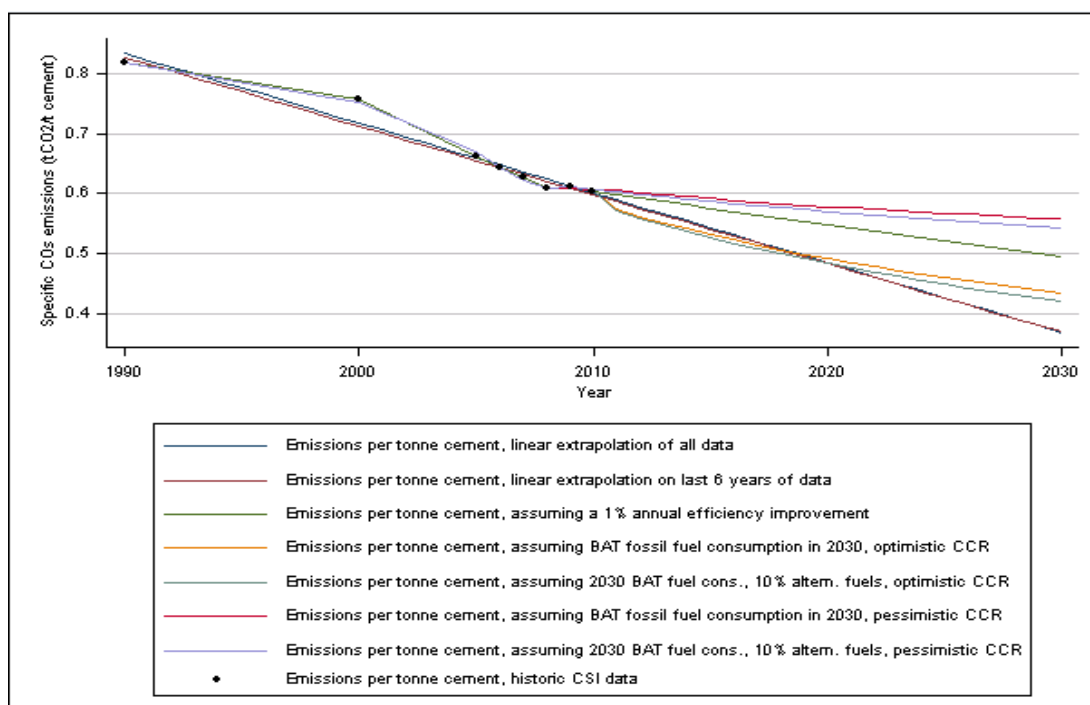


Indexed baselines

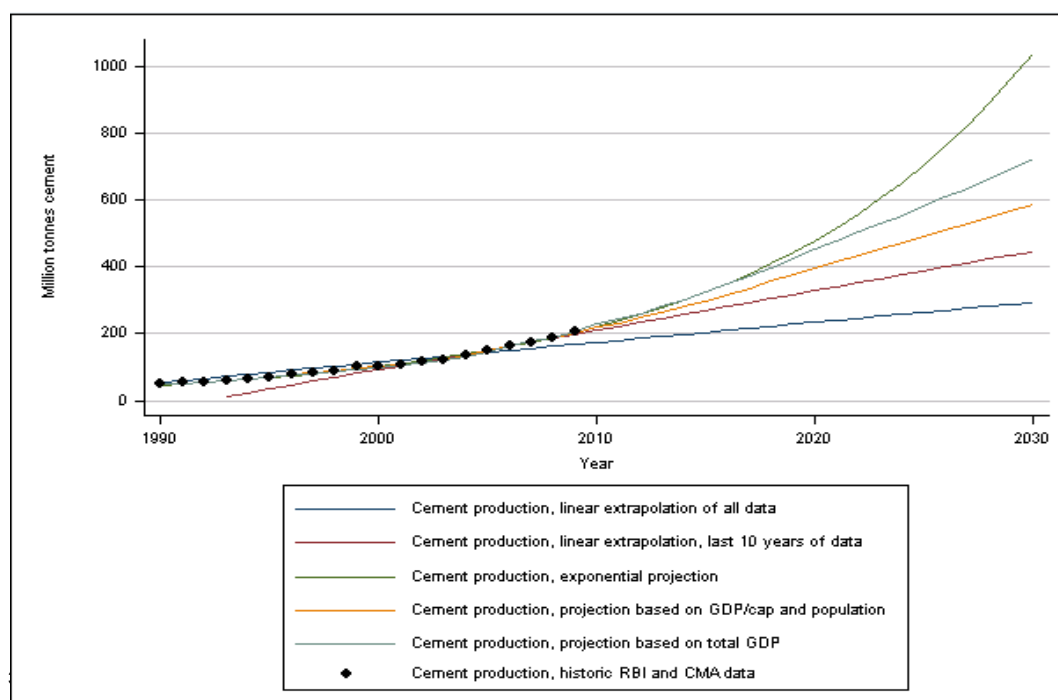
- Different **projections** used:
 - Linear extrapolation of historic emissions, all data
 - Linear extrapolation of historic emissions, last 6 years
 - Linear projection assuming 1% annual improvement in performance
 - Projections assuming different scenarios for future fuel consumption, cement-to-clinker ratio, use of alternative fuels
 - Role of main factors influencing emissions
 - Thermal efficiency in clinker production process
 - Type of fuel used
 - Blending ratio of clinker to other cementitious materials



Indexed baselines

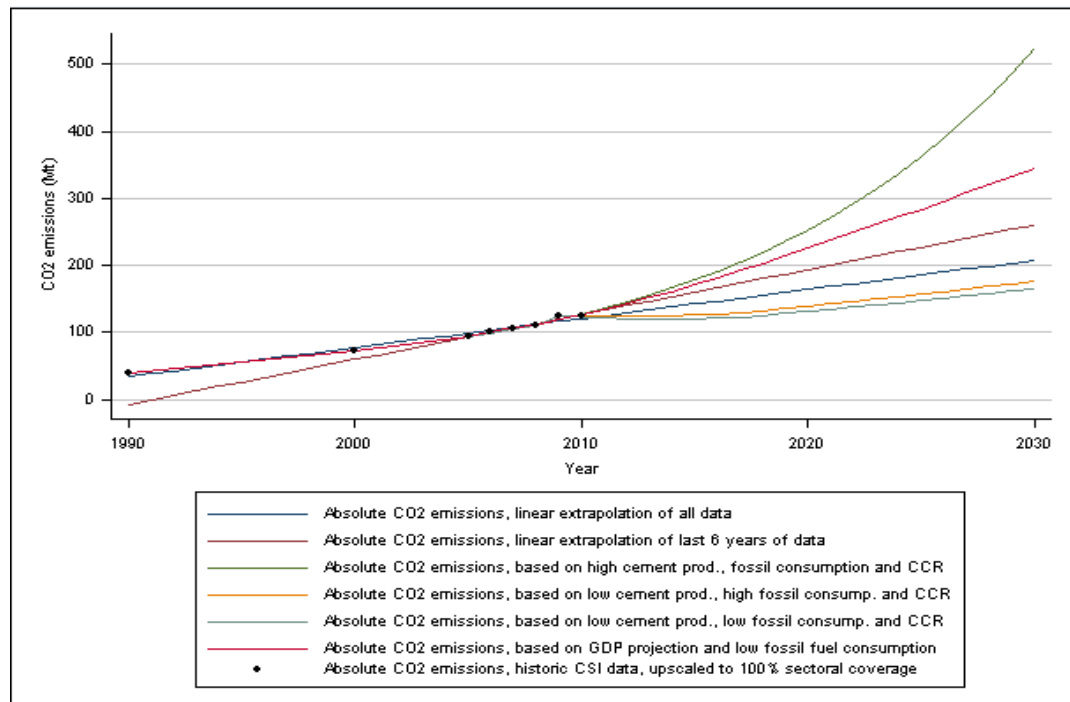


Cement production

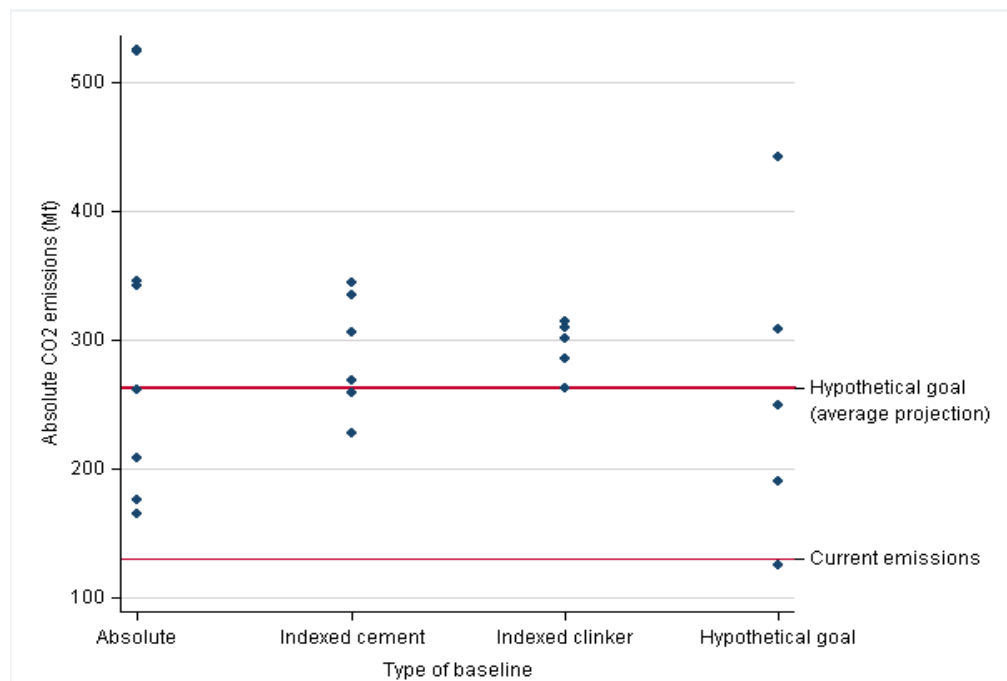




Absolute baselines



Comparison





Lessons for baseline setting

- **Scope:**
 - All plants in the system should ideally be included
 - Baseline can be aggregation of projections for sub-sectors / products
 - **Transparent:** about real trends, e.g. for different types of processes
 - **Flexible:** allows for reductions from changes in the sector structure
 - Not yet granted with current data



Lessons for baseline setting

- **Reference data:**
 - Different types of projections yield different results
 - **Transparency** and **sensitivity analysis** crucial
 - Consideration of **drivers** of emissions important
 - Understand implications of projections (e.g. need for blending materials for cement)
 - Avoid unrealistic projections
 - **Balance:** the more drivers, the more assumptions, the less transparency
 - The longer the **timelines of historical data**, the better results
 - **Information** on vintages, capacities, fuel types, technologies used helpful to model drivers of emissions accurately → ideally at plant level
 - Pre-implementation phase to gather data



Lessons for baseline setting

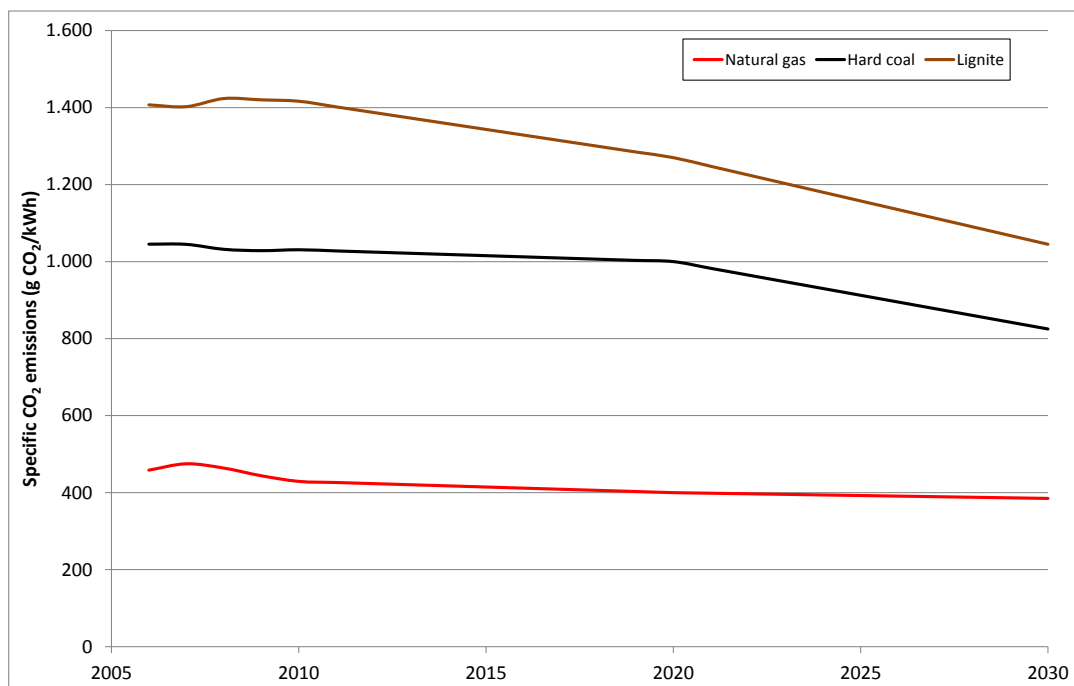
- **Dynamics and updating:**
 - Baselines should be valid for as long as possible
 - Certainty for investors
 - Updating necessary to strengthen the baseline
- General: **ex-ante agreement / guidance** on:
 - Methods for projections
 - Metrics
 - Standard parameters (emission factors, demographic and economic data and projections)
 - Sensitivity analysis



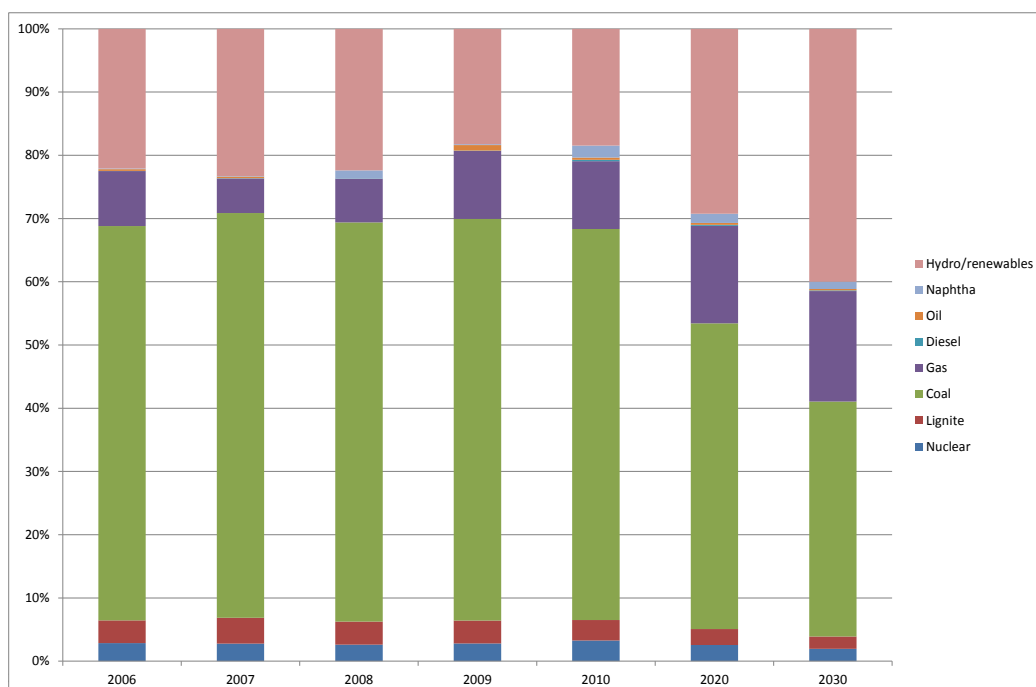
Power sector case study



Projections of specific CO₂ emissions per plant type

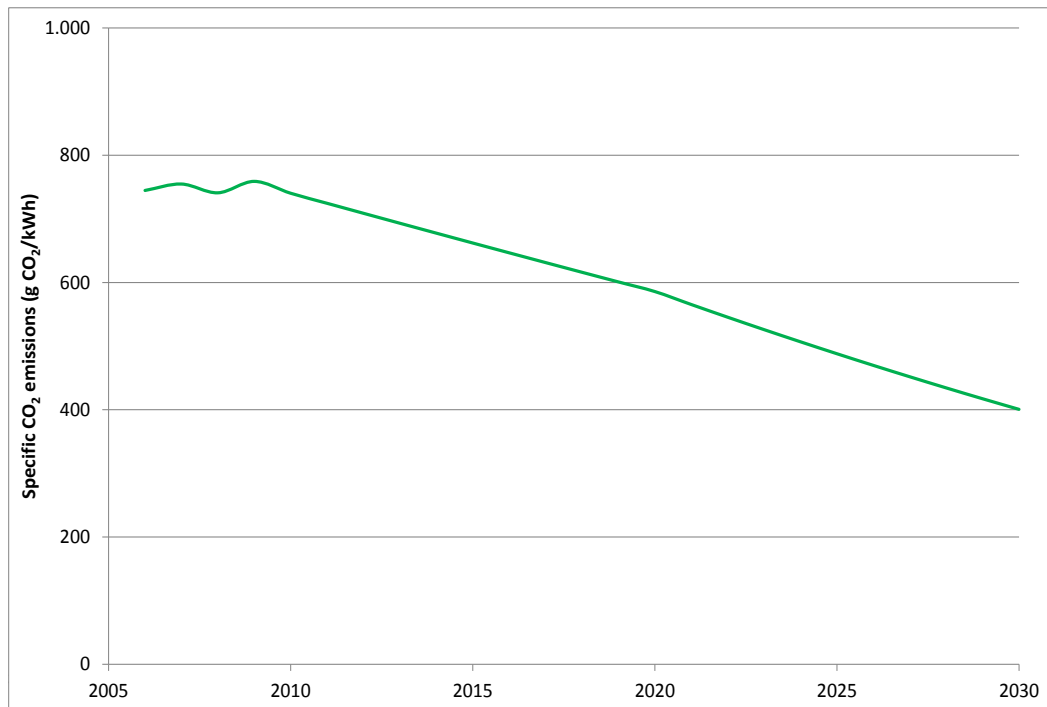


Projections of fuel mix





Indexed baseline



Absolute baseline

