

Carbon Pricing for New England

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Disclaimer

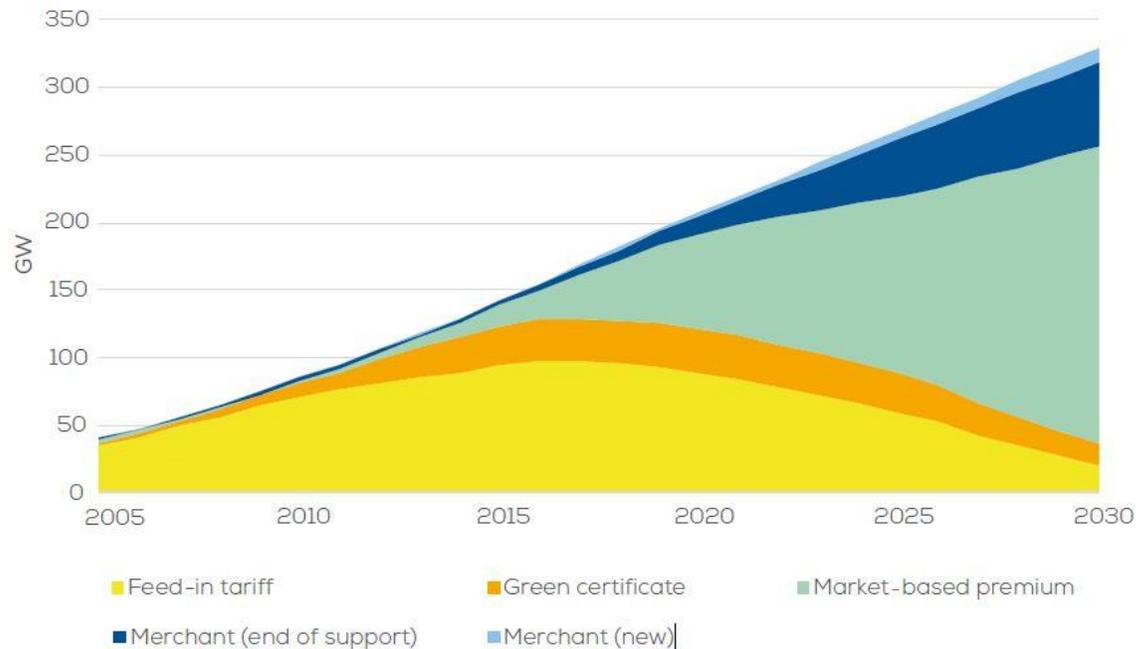
Much of the material presented herein is included in the Analysis Group, Inc. June 2020 report, Carbon Pricing for New England, Context, Key Factors, and Impacts. This report was prepared at the request of the New England Power Generators Association, but is an independent report by Joseph Cavicchi and Paul Hibbard of Analysis Group, Inc. and the report's analysis and conclusions reflect the independent judgment of the authors alone, and do not necessarily align with NEPGA or NEPGA's members.

The full report is available at: <https://www.analysisgroup.com/Insights/publishing/carbon-pricing-for-new-england-context-key-factors-and-impacts/>

Experience with markets that include the cost of carbon is evolving:

- In western Europe state supported long-term renewable resource contracts are expiring over the next several years creating demand for innovative generation resource financial hedging arrangements that will become more important as renewable resource costs decline.

Type of support used on the total cumulative EU wind capacity to 2030



- Wind farms relying on feed-in premiums and contracts for differences will represent the majority of assets with almost 230 GW or 67% of the total European capacity. This capacity will be partially exposed to the market.
- In 2030 fully market-exposed wind capacity could represent 90 GW, most of it being older projects no longer receiving financial support.

Source: WindEurope, The value of hedging: New approaches to managing wind energy resource risk, November 2017.

Experience with markets that include the cost of carbon is evolving:

- Similar to the US, corporate PPAs that provide innovative generation resource financial hedging arrangements are becoming more important as renewable resource costs decline.

Figure 4: European PPA deal flow

Source: *inspiratio* | *dataLive*, July 2019

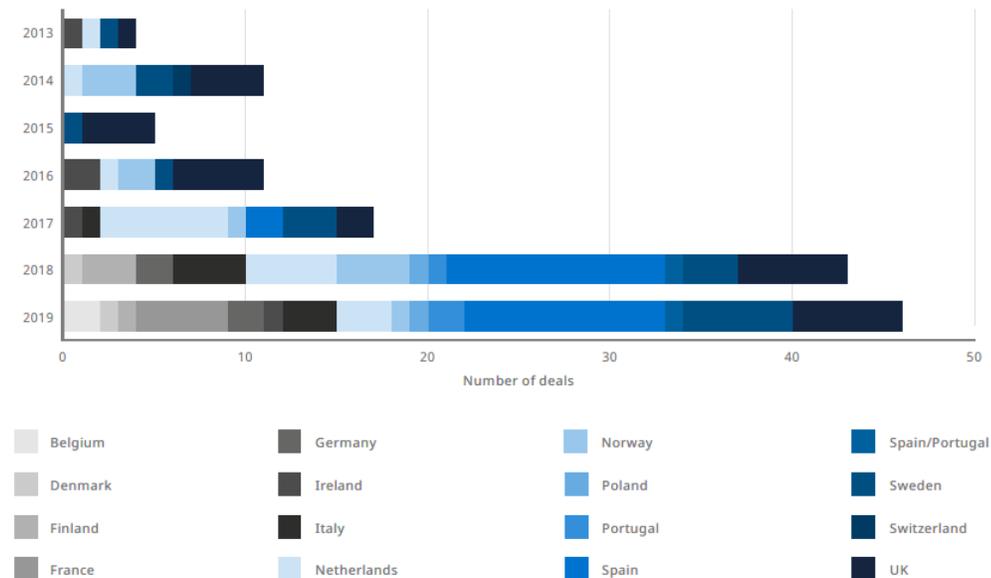
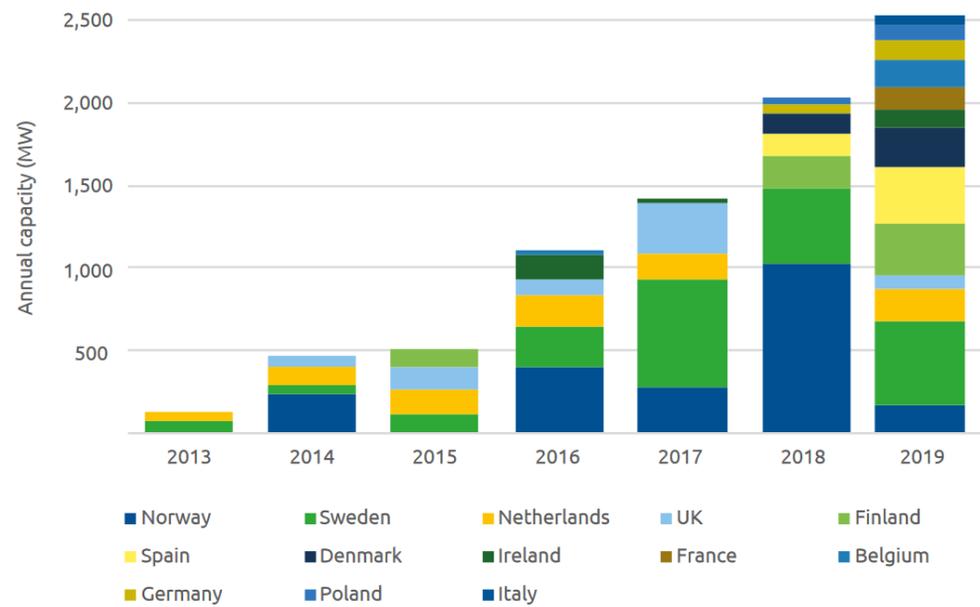


FIGURE 1
Corporate PPAs by year and country

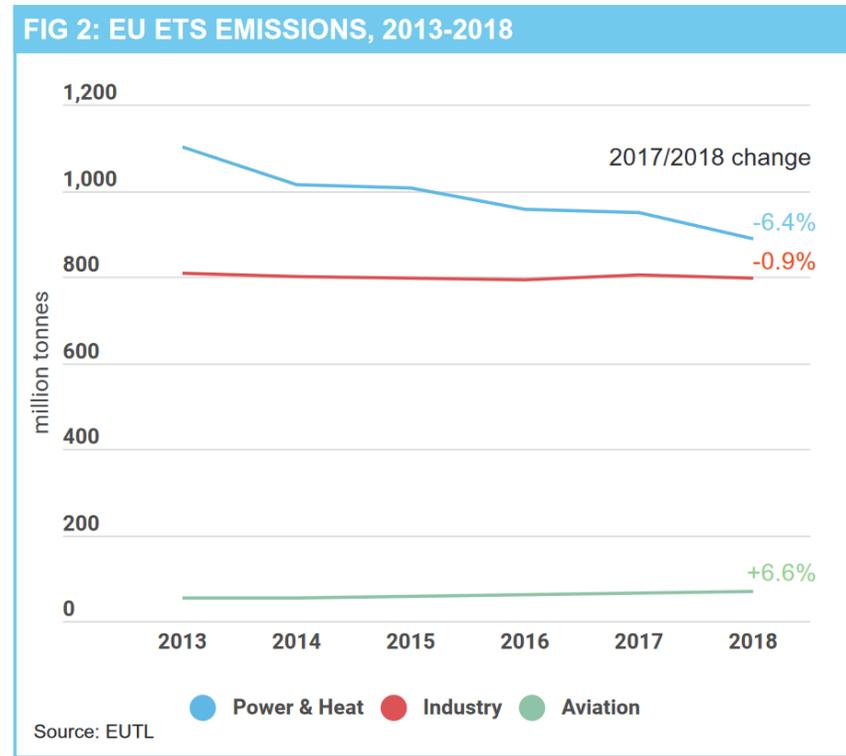
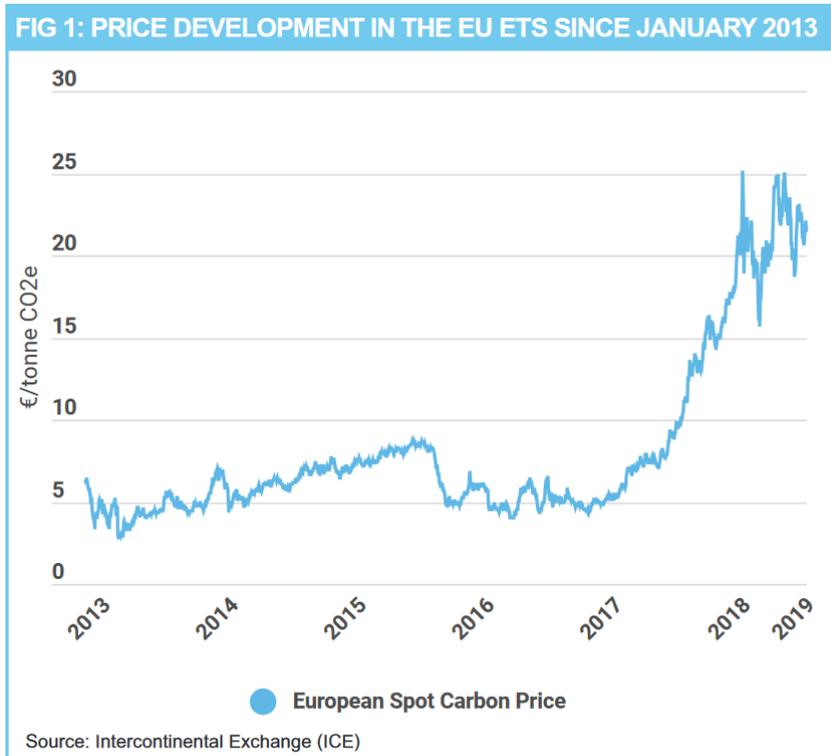


Source: WindEurope

Sources: Europe's Subsidy-free Transition – The Road to Grid Parity, DLA PIPER, December 2019.
Introduction to Corporate Sourcing of Renewable Electricity in Europe, Re-Source, January 2020.

Experience with markets that include the cost of carbon is evolving:

- Increased recognition that carbon pricing levels must be high enough to incentivize efficient decision making and support innovation.



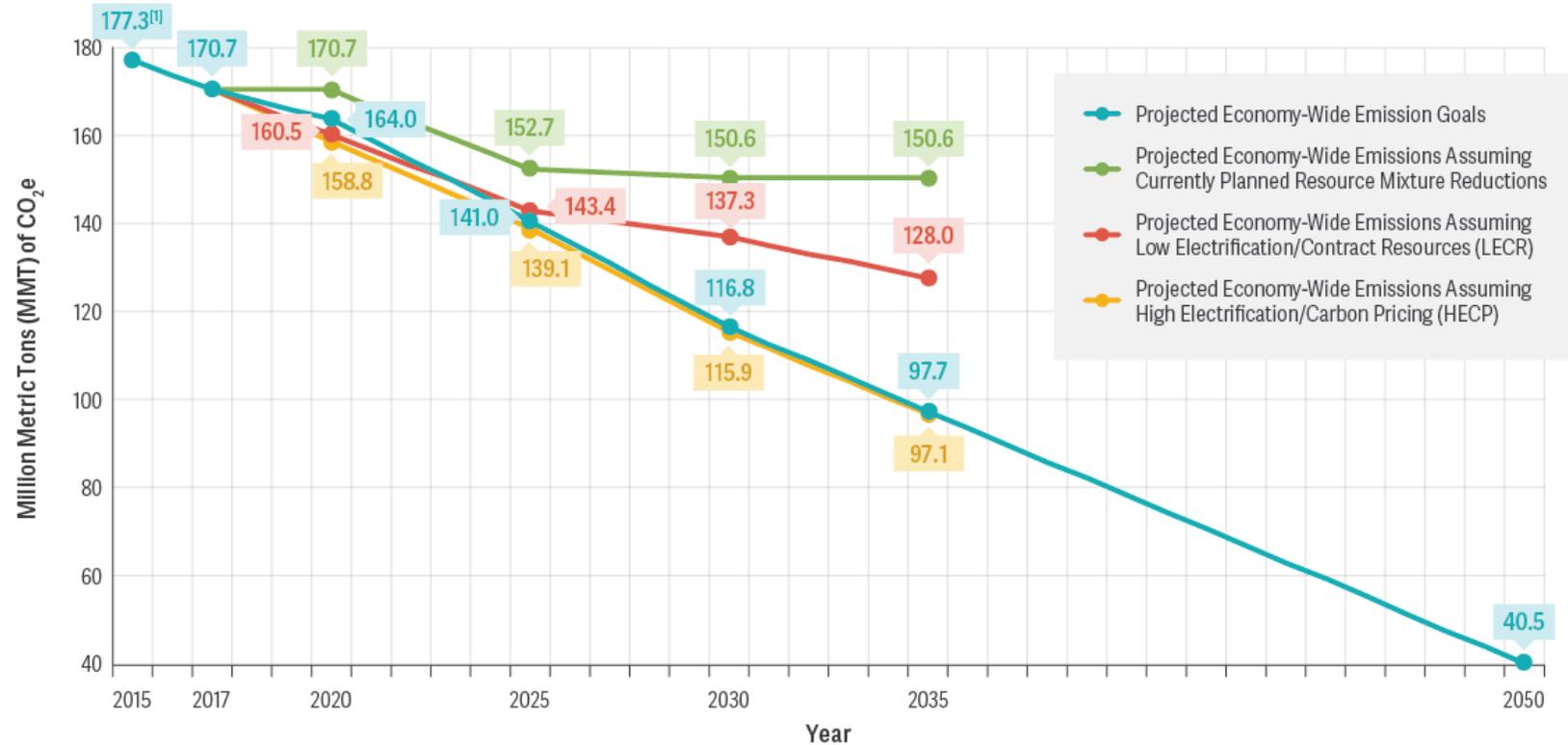
Source: Mazzoni, M., Ruf, P., The European Carbon Market: The Impact of Higher Carbon Prices on Utilities and Industries, ICIS, May 2019.

AG Report: Key Findings

- Achieving greenhouse gas emission (GHG) reductions on the trajectory envisioned by New England states requires significant growth in the use of electricity for transportation and heating.
- An effective multi-sector price on carbon can help guide the region through a challenging transformation:
 - Provides appropriate price signals to energy consumers that allows for a more accurate assessment of the trade-offs when assessing electricity as a fuel for transportation and heating as opposed to fossil fuels.
 - Signals to investors in low and zero-emission technologies a commitment to incorporate the social costs of continued reliance on fossil fuels.
 - Allows for technology-neutral competition among both existing and new zero-emission resources in the electric sector, providing incentives to minimize costs and pursue innovation.
 - Provides a platform for private investments in innovative approaches to reduce GHG emissions.
 - Reduces incentives for future state directed investments in zero-emission resources.
 - Avoids the potential for stranded investment costs that can result when long-term contract prices are likely to no longer be economic.
- A progressively increasing price on CO₂ emissions that falls in a range of \$25–35/short ton CO₂ in 2025 and \$55–70/short ton CO₂ in 2030 and 2035 can support market-based investment in clean-energy technologies going forward.

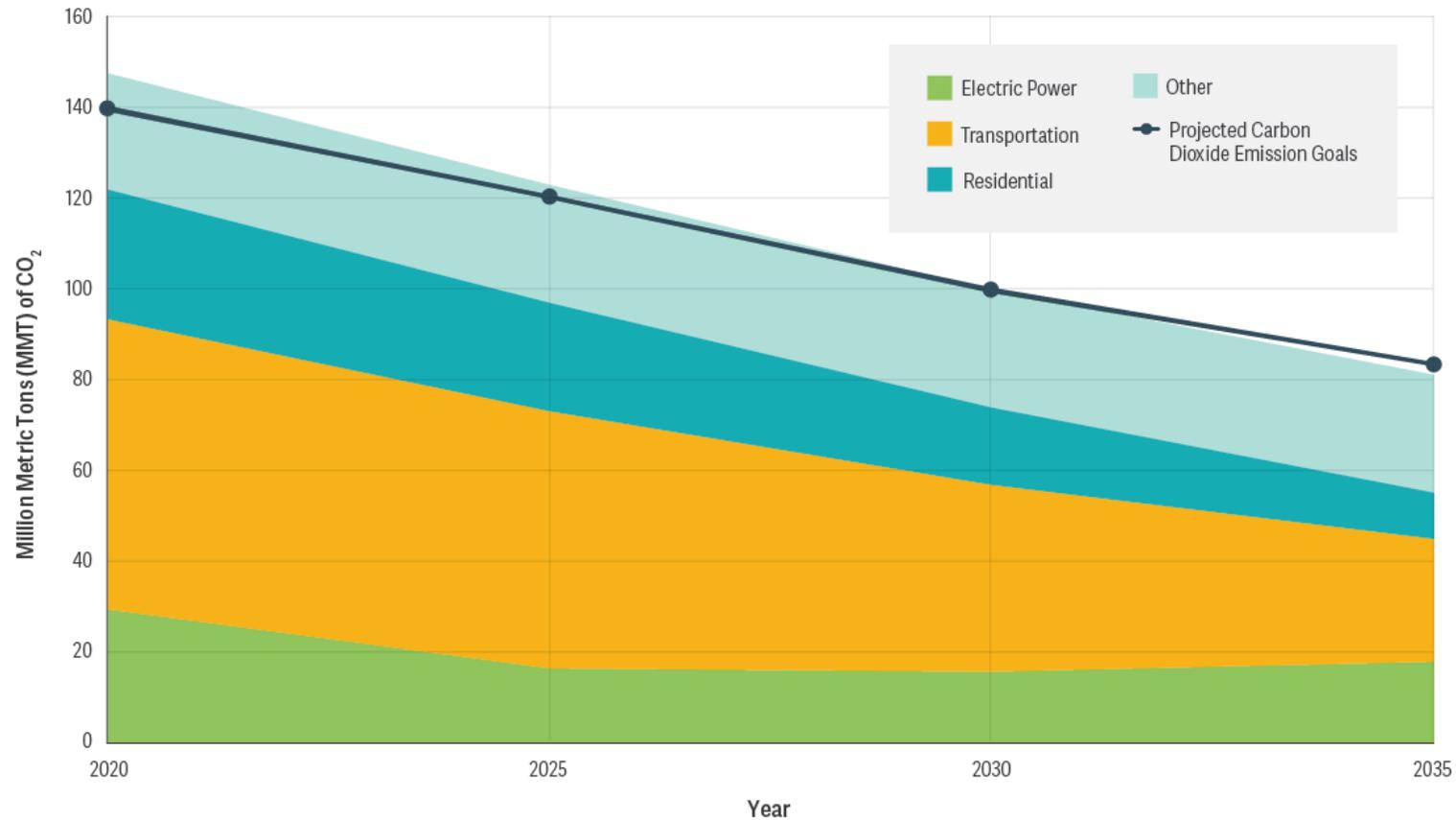
AG Report: Key Findings

New England Emission Reduction Standards Compared with Power Sector Emission Reductions from Currently Planned Renewable Resource Additions and Increased Electrification



AG Report: Key Findings

Projected CO2 Emissions Changes by Sector: High Electrification



AG Report: Key Findings

Estimated Average Annual Consumer Energy Costs for Households that Adopt Electric Vehicles and Convert Home Heating System from Fuel Oil to Electric Heat Pumps



Implementation: The Pathway to Efficient Decarbonization

- The pathway will be the most important driver of the cost, technological, and reliability challenges customers and industry stakeholders face. The transformation will:
 - Require investments in transportation, heating, and power system infrastructure
 - Accelerate the development and commercialization of a wide array of energy-related technologies and services.
 - Change the location, size, fuel needs, and operational characteristics of the power supply infrastructure.
- The implementation of an effective multi-sector price on carbon can help guide the transformation:
 - The key considerations associated with the introduction of a multi-sector carbon price are well understood.
 - Regional agreement is critical to develop a framework upon which carbon prices can be established.
 - The disposition of the carbon revenues requires careful evaluation.
- New England's GHG reduction objectives can be met more efficiently with effective multi-sector carbon pricing.