Meeting Long-Term GHG Targets Through De-Carbonization of End Use

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International PHE Forum

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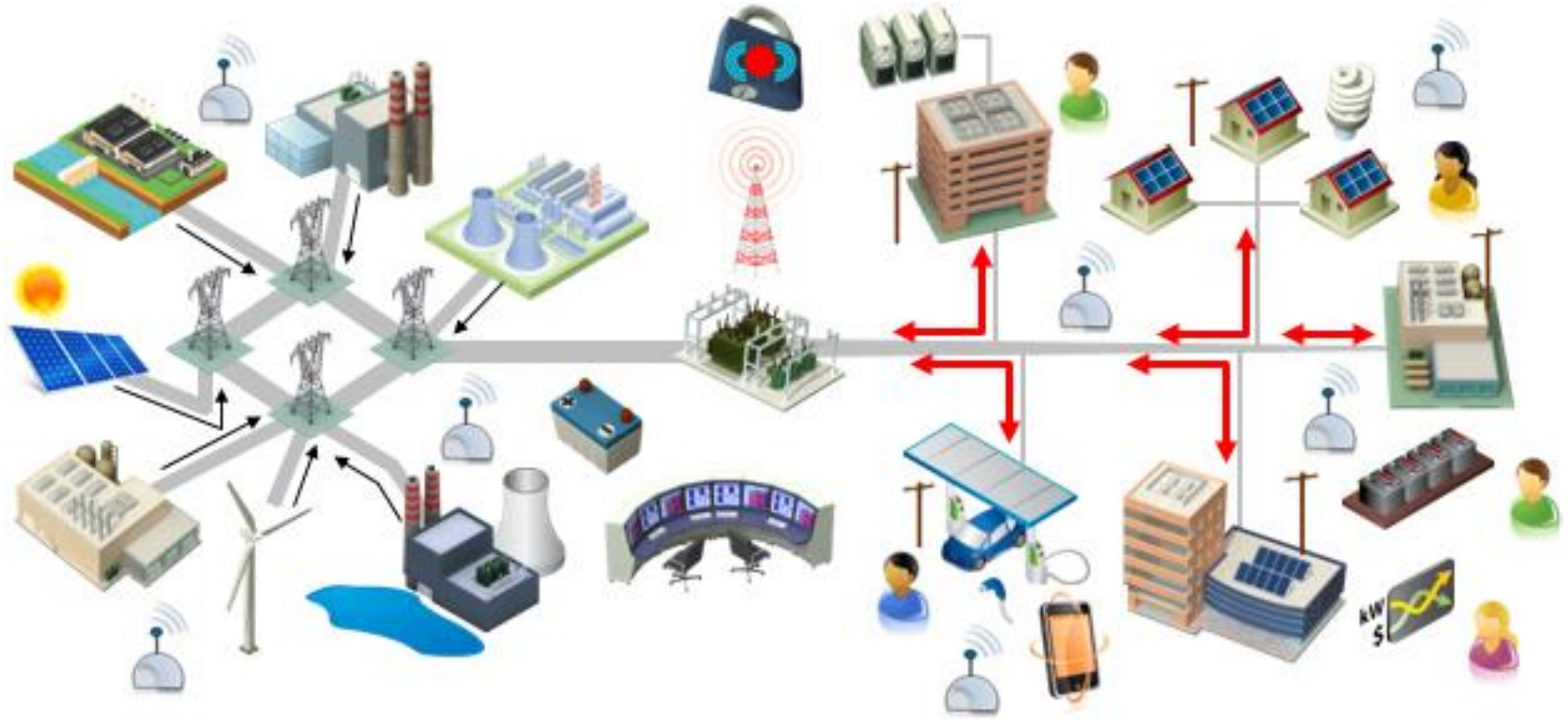
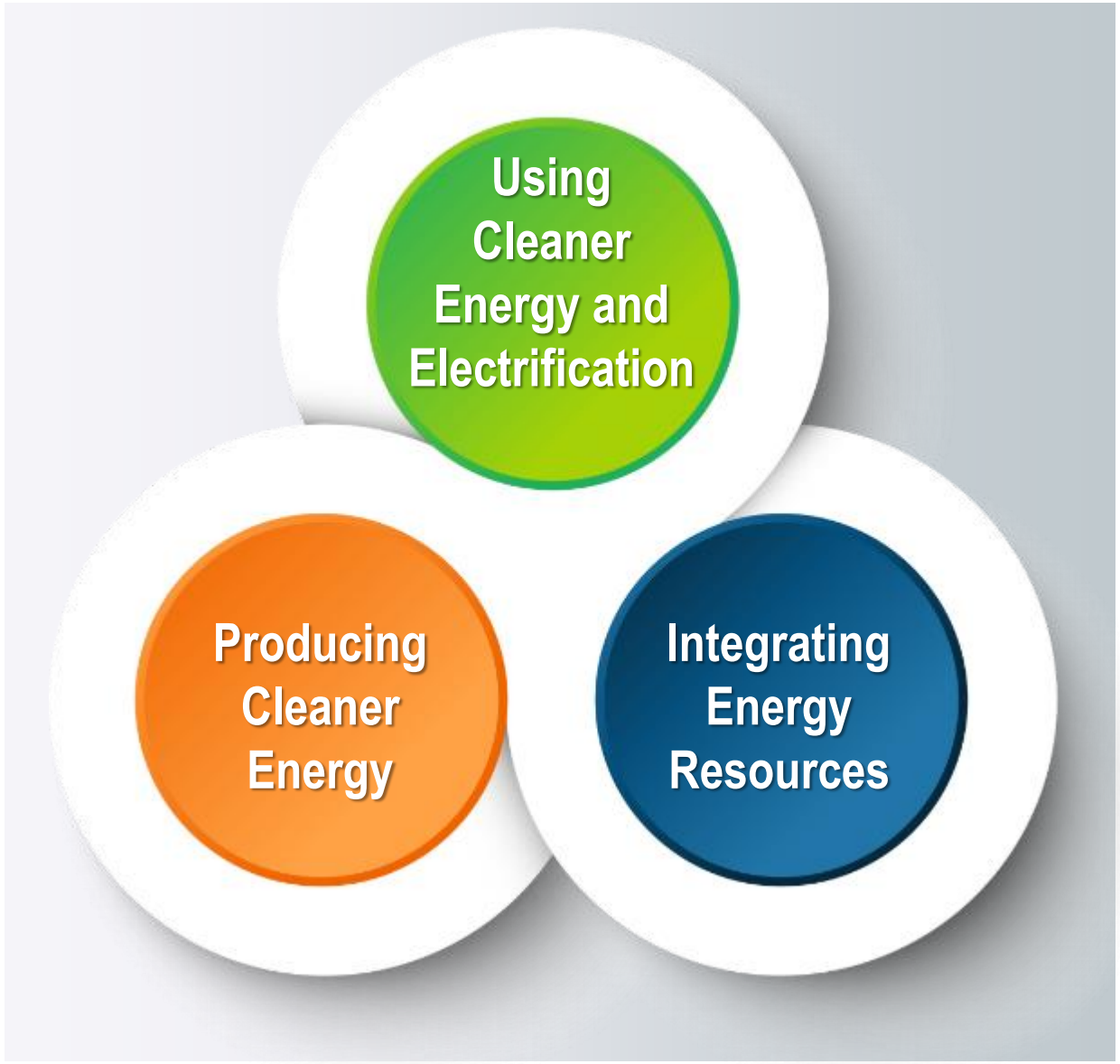
The Vision: An Integrated Grid



Power System that is Highly Flexible, Resilient and Connected and Optimizes Energy Resources

Integrated Energy Network: Three Evolving Infrastructures

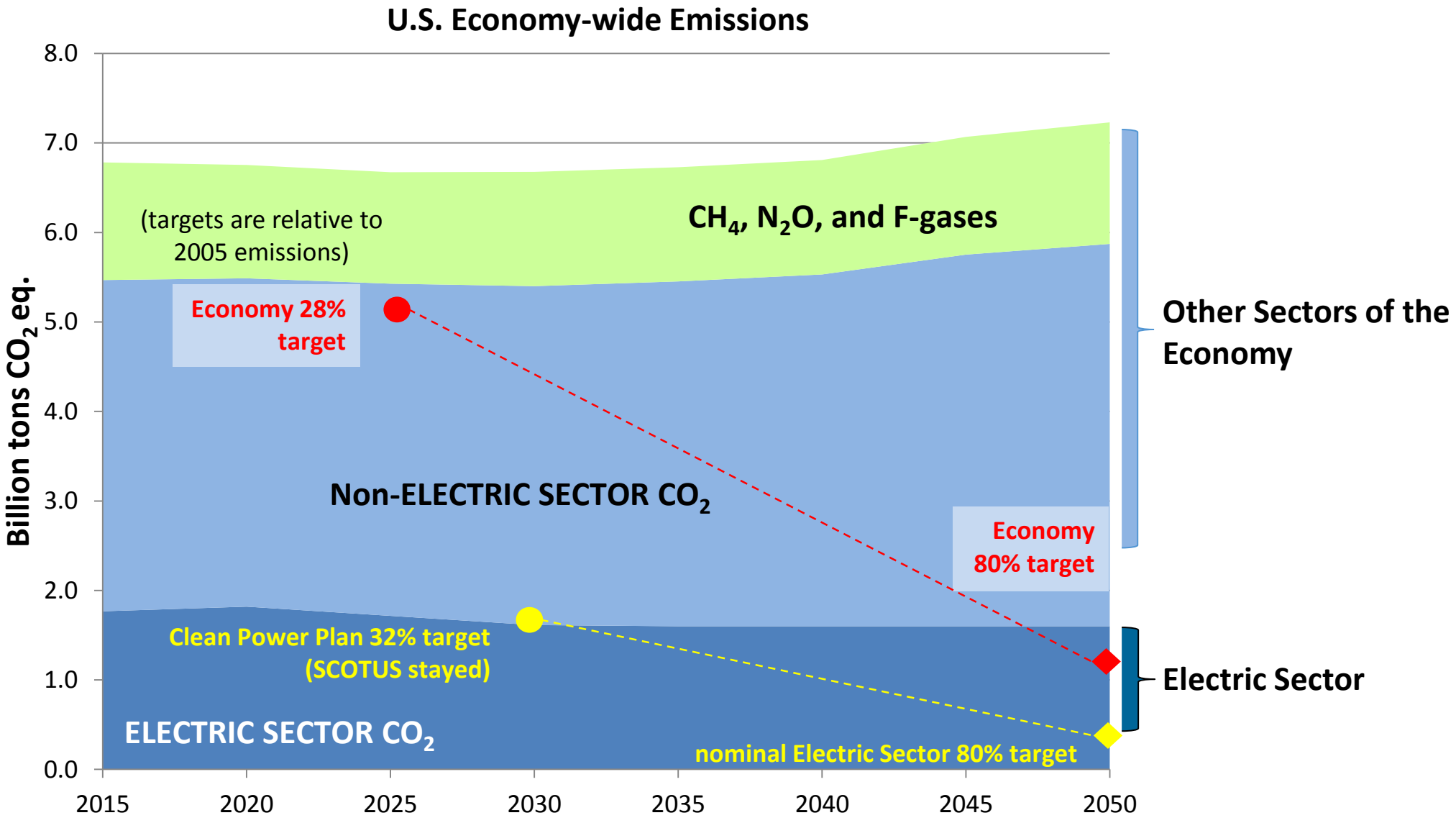


Integrated Energy Network

A Network of Infrastructures that connects customers with clean energy production and use

GHG Targets Require De-Carbonization of End Use

U.S. official goal: "[the 2025] target is consistent with a straight line emission reduction pathway from 2020 to deep, economy-wide emission reductions of 80% or more by 2050."



Source: US-REGEN data; Energy Modeling Forum 24

De-Carbonizing End Use Will Require Multiple Low Carbon Energy Options

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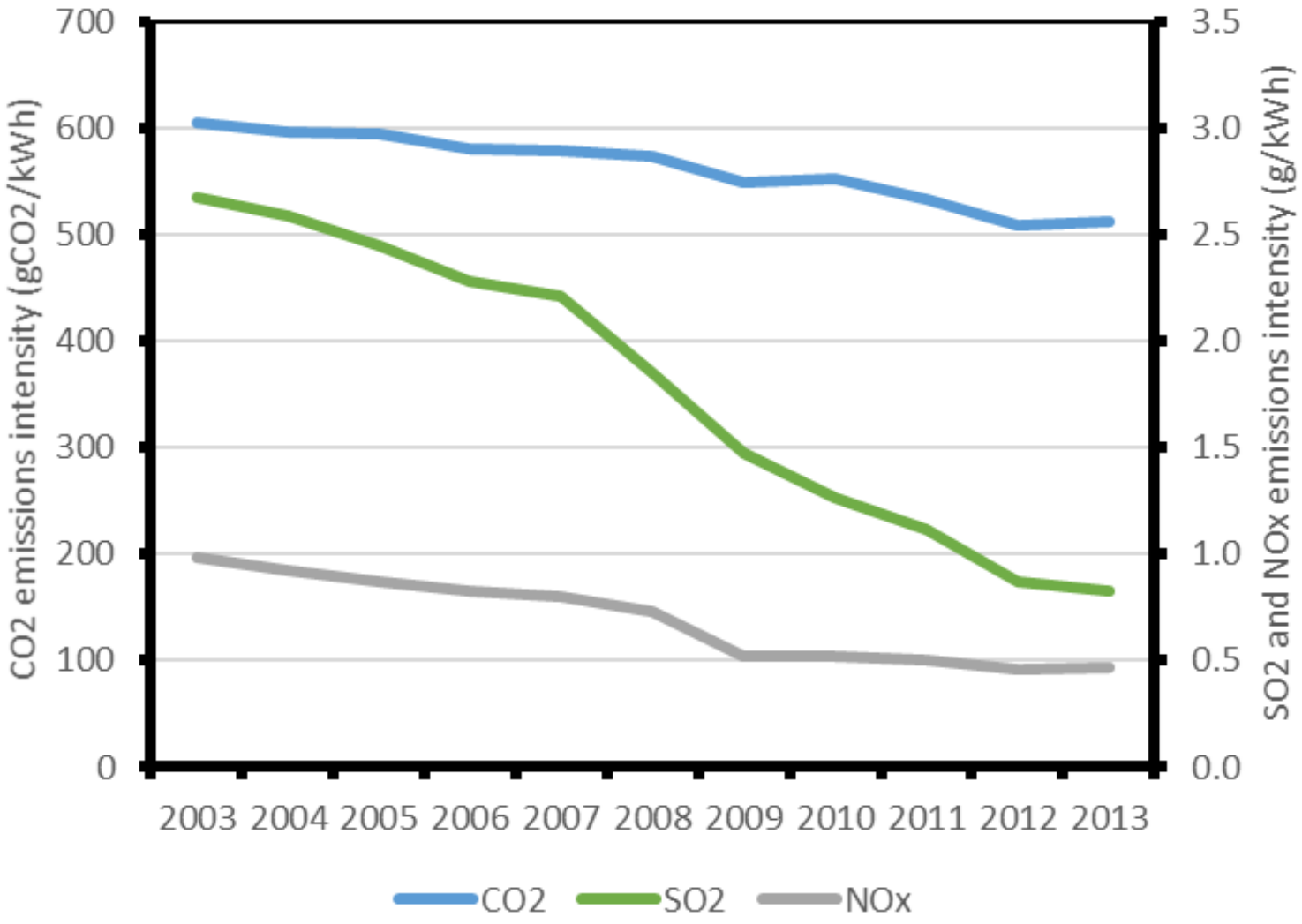
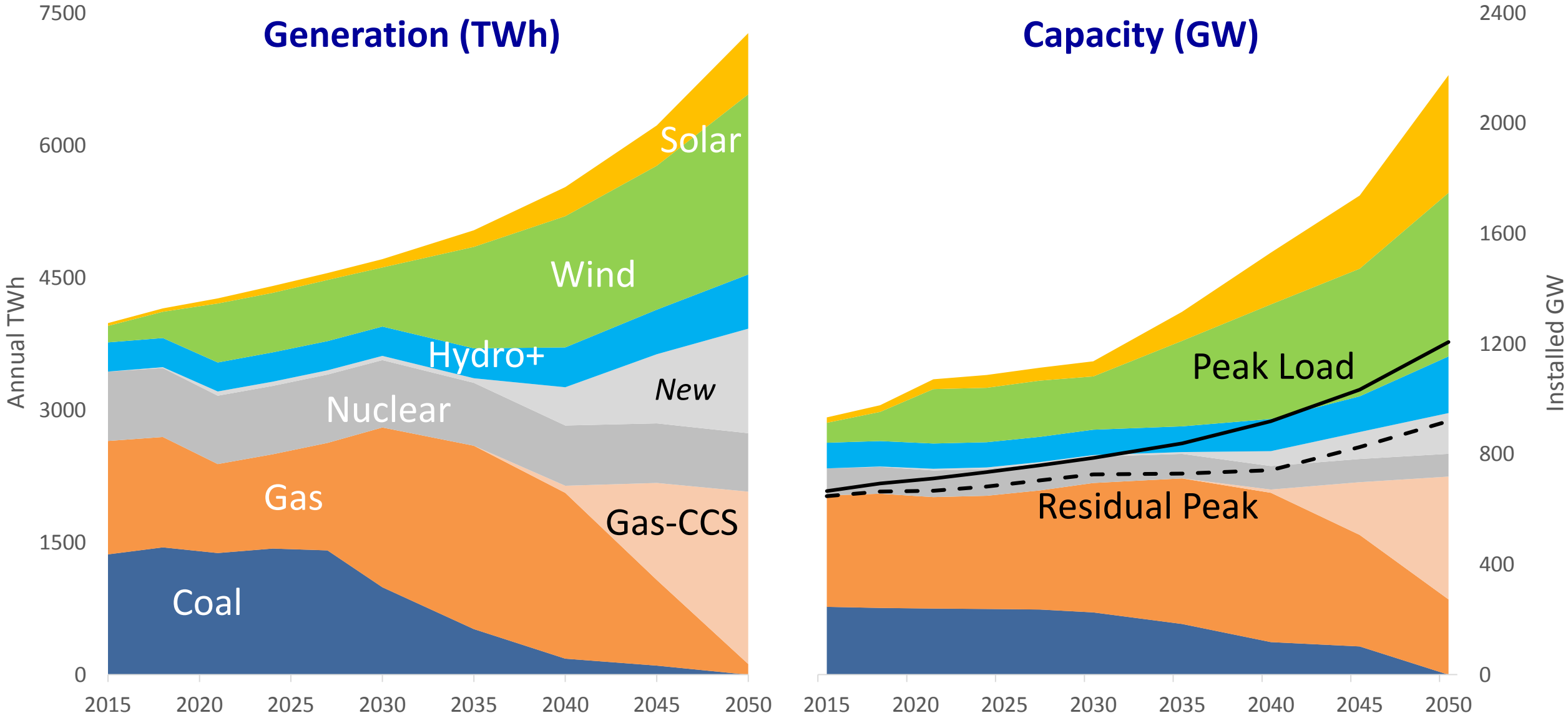
Recent Emissions Trends in the Electric Sector

- From 2003 – 2013, Electric Sector CO_2 emissions decreased by 15%
- SO_2 emissions decreased by 70%, and NO_x emissions decreased by 50%
- These gains were driven almost entirely by mature technologies
- Market readiness and adoption rates of key low-carbon energy production and utilization are crucial to further gains



Low-carbon Generation *Plus* Electrification by 2050



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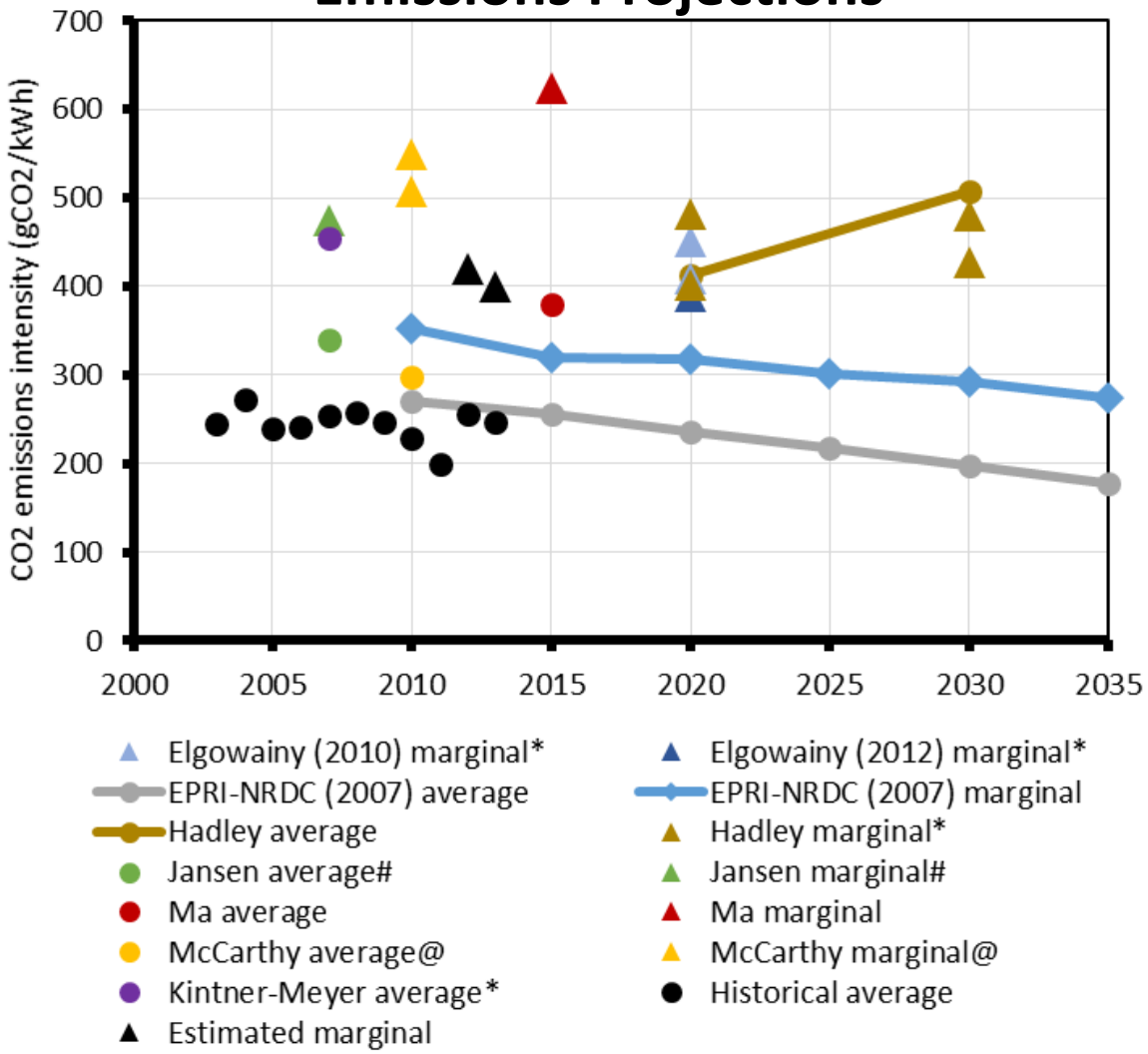
We Need to Get the Analysis Right

- Cross-sector de-carbonization analyses are complex
- Strategic targeting of clean end-use technologies requires better tools integrating generation and consumption
- Understanding technology adoption across all application is critical

Survey of California Electric Sector Emissions Projections



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Together…Shaping the Future of Electricity