

Market Mechanisms for Clean Energy

CLIMATE POLICY AND MARKETS PANEL

PREPARED FOR
Ivey EPMC Workshop

PREPARED BY
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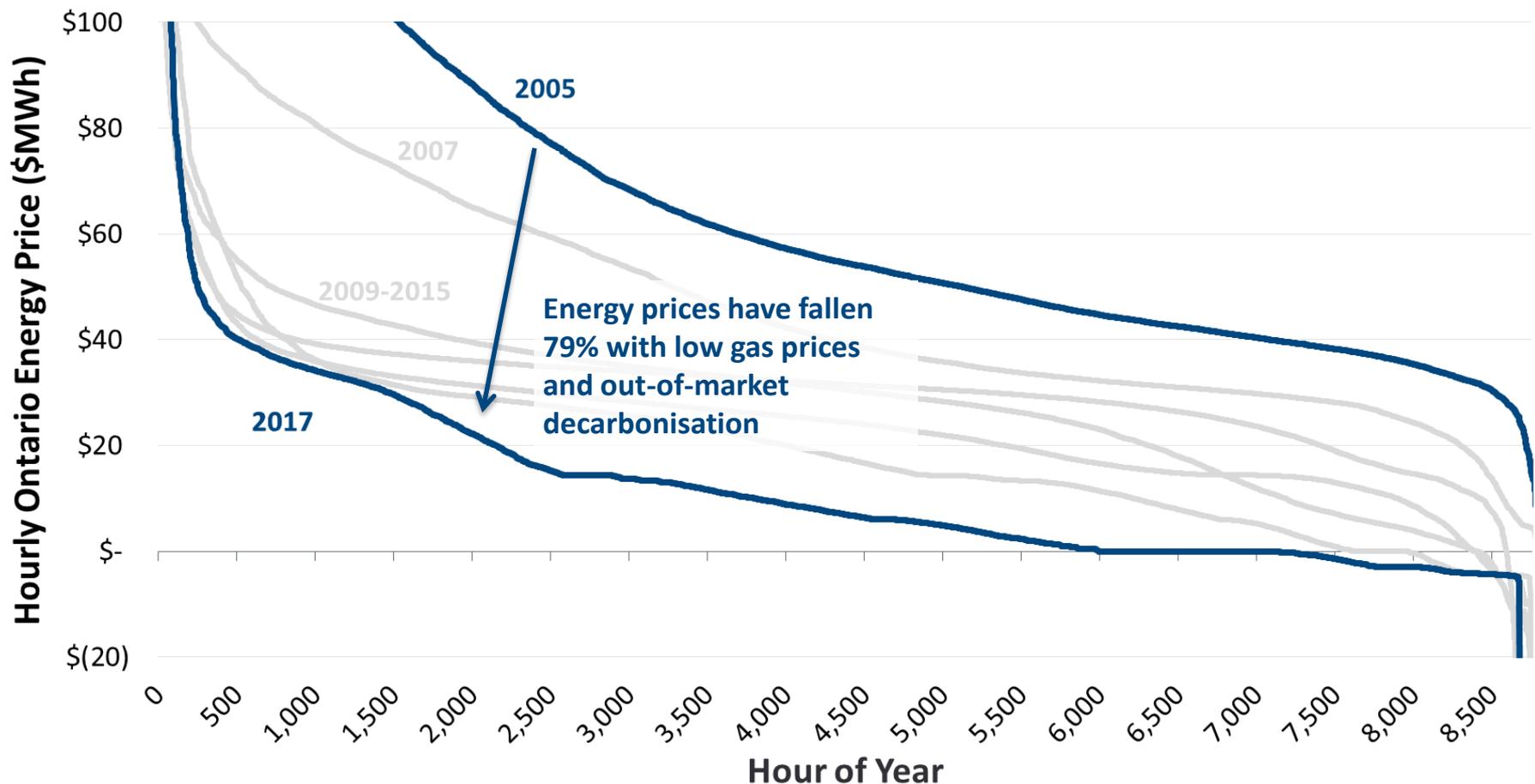
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THE **Brattle** GROUP



Ontario Has De-Carbonized Using Out-of-Market Approaches, Energy Market “Bottoming Out”

Ontario experience shows very low/negative prices with a 90% clean fleet



We Have Two Paths Forward Towards Increased De-Carbonization

Current Path:

Use Contracts and Policies Outside the Markets

- **Bundled Payments:** Resources receive an all-in payment for energy, capacity, and clean attribute, usually long-term
- **Contracts for Difference:** Resources receive a true up from energy revenues to the contract price, representing bundled services
- **U.S. Nuclear ZECs:** Resources receive administrative payment based on carbon price \times marginal emissions rate, generally reduced when energy prices are high

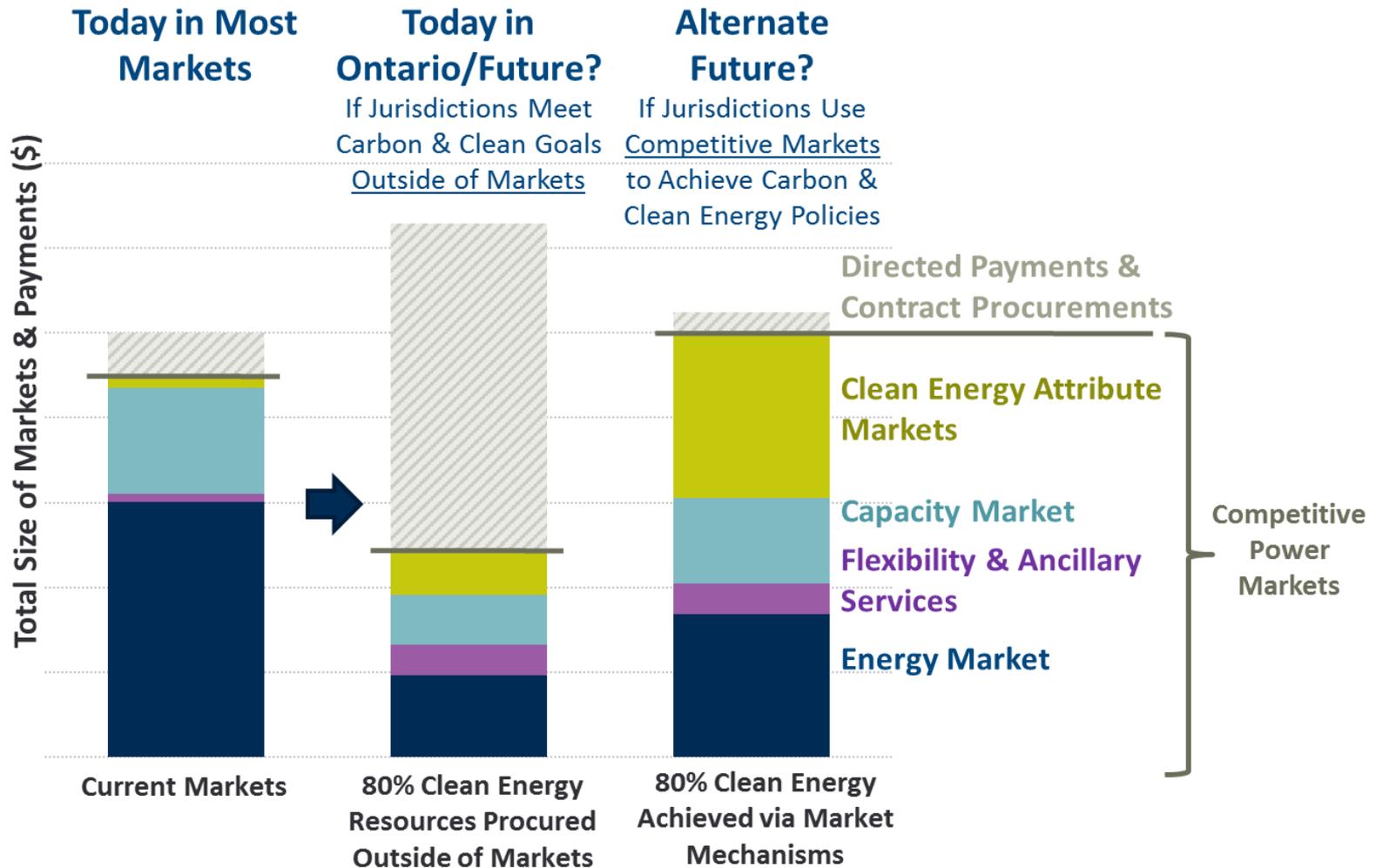
Better Path:

Use the Markets to Achieve Policy & Customer Goals

- **REC Spot Markets:** Short term markets for clean attributes
- **REC Long-Term Procurements:** Procurements for clean attribute with multi-year lock-ins
- **Clean Energy Markets:** Market-determined clean attribute price, usually short term, can incorporate demand from multiple jurisdictions and individuals
- **Carbon Pricing:** “First best” economic solution

Clean Energy Products Link Policy and Customer Preferences with Markets

Potential wholesale market outcomes under non-market approaches vs. in-market approaches



Market mechanisms have several advantages over outside-market approaches

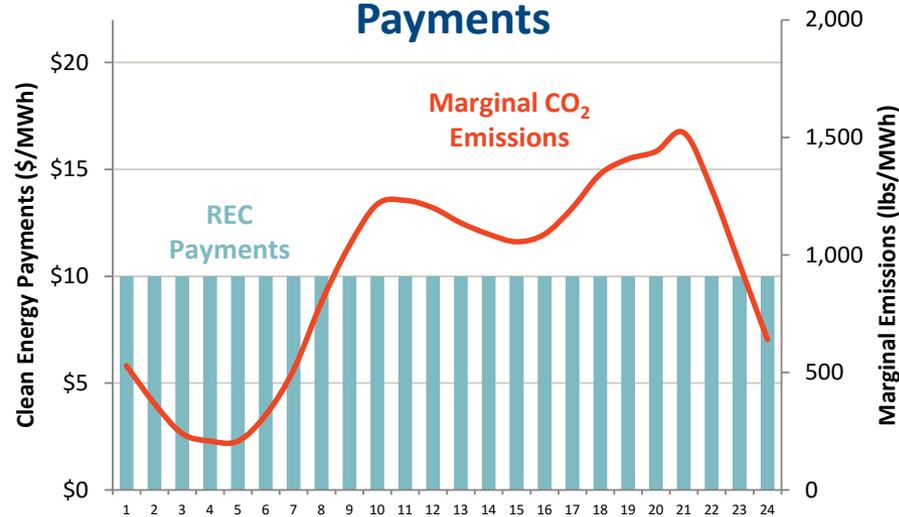
Mechanisms to incentivize clean investment using non-market approaches vs. using the markets

	Outside the Markets			Using the Markets			
	Bundled Payments (e.g., rate-regulated, most U.S. utility PPAs, Alberta REP)	Contracts for Difference (e.g., some Ontario, UK CfD)	U.S. Nuclear ZECs	REC Spot Markets	REC Long-Term Procurements (e.g., NYSERDA REC procurements)	Clean Energy Markets with Dynamic Product	Carbon Price
Incentivize Clean Resource Investment or Re-Investment	✓	✓	✓	✗	✓	✓	✓
Facilitate Competition Across Resource Types	—	—	✗	—	—	✓	✓
Facilitate Competition Between New and Existing Resources	✗	✗	✗	✗	✗	✓	✓
Mitigate Customer Cost Risk	✗	✗	✗	✓	—	✓	✓
Avoid Incentive for Negative Offers	✗	✗	✗	—	—	✓	✓
Align Operational Incentives and De-Carbonization Objective	✗	✗	✗	—	—	✓	✓

Better Product Definition Example: Dynamic Product Decarbonizes at a Lower Cost

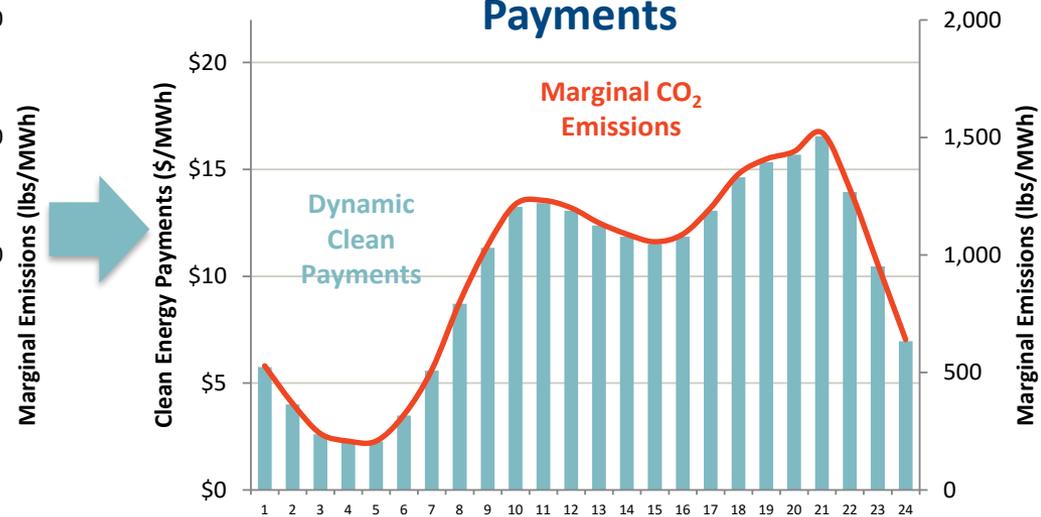
Our proposal for a “Dynamic” Clean Energy Market in New England would align payments with marginal carbon abatement

Illustrative Traditional REC Payments



- Flat payments over every hour
- Incentive to offer at negative energy prices during excess energy hours

Illustrative “Dynamic” Clean Payments



- Payments scale in proportion to marginal CO₂ emissions (by time and location)
- Incentive to produce clean energy when and where it avoids the most CO₂ emissions
- No incentive to offer at negative prices

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Dr. David Luke Oates is an Associate at The Brattle Group with expertise in wholesale electricity market design and modeling.

Dr. David Luke Oates has more than eight years of experience in the electricity industry. He helps clients address complex market design, analysis, and modeling questions in the context of wholesale capacity, energy, and clean energy markets. Dr. Oates has worked across nine electricity markets in Canada, the U.S., and internationally on behalf of a range of clients including market operators, industry stakeholders, utilities, merchant generation and transmission owners, regulators, and law firms. He has extensive experience developing and evaluating capacity market demand curves, qualification, mitigation, and penalty mechanisms, and other detailed capacity market design elements, having worked on these issues on behalf of PJM, MISO, IESO, and AESO. Dr. Oates has also worked on the design and assessment of markets for clean energy and distributed resources in New England, New York, and Ontario.

Dr. Oates earned his PhD in Engineering and Public Policy from Carnegie Mellon University. He earned his B.Sc. in Engineering Physics from Queen's University.

Our Practices and Industries

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Distributed Energy Resources
Electric Transmission
Electricity Market Modeling & Resource Planning
Electrification & Growth Opportunities
Energy Litigation
Energy Storage
Environmental Policy, Planning and Compliance
Finance and Ratemaking
Gas/Electric Coordination
Market Design
Natural Gas & Petroleum
Nuclear
Renewable & Alternative Energy

LITIGATION

Accounting
Analysis of Market Manipulation
Antitrust/Competition
Bankruptcy & Restructuring
Big Data & Document Analytics
Commercial Damages
Environmental Litigation & Regulation
Intellectual Property
International Arbitration
International Trade
Labor & Employment
Mergers & Acquisitions Litigation
Product Liability
Securities & Finance
Tax Controversy & Transfer Pricing
Valuation
White Collar Investigations & Litigation

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