

PJM Carbon Study Objective & Assumptions

Gary Helm
Lead Market Strategist, Applied Innovation
Carbon Pricing Senior Task Force
July 26, 2019

PJM is studying the potential impacts of a significant carbon price in the PJM wholesale energy market in order to inform stakeholders and policy-makers.

- PJM is **not** proposing to establish a carbon price.
- PJM is conducting this study in tandem with the carbon pricing discussion being advanced by Members in our stakeholder process.
- This initial modeling will be further informed by discussions in the stakeholder process.
- Policy-makers in the PJM region are ultimately responsible for environmental policy, and any associated revenue generated through its application.

- Inform state policies
- Preserve orderly and competitive economic dispatch across the entire footprint
- Minimize economic and environmental leakage
- Coexist with the Regional Greenhouse Gas Initiative (RGGI)

- Simulate the impacts of a carbon price on the PJM energy and ancillary service markets, regionally and sub-regionally
 - Current phase will model 2023 (most recent planning case from Regional Transmission Expansion Plan and Market Efficiency process)
 - Future analysis may include longer-term modeling to evaluate potential changes to resource mix from application of a carbon price – *out of scope for current phase.*
- Evaluate the dispatch and commitment of resources and the resulting market and emissions outcomes

- Carbon price
- Application of carbon price
Reference (business as usual), sub-regional, regional
- Definition of “carbon-pricing sub-region”
- Border-adjustment approaches

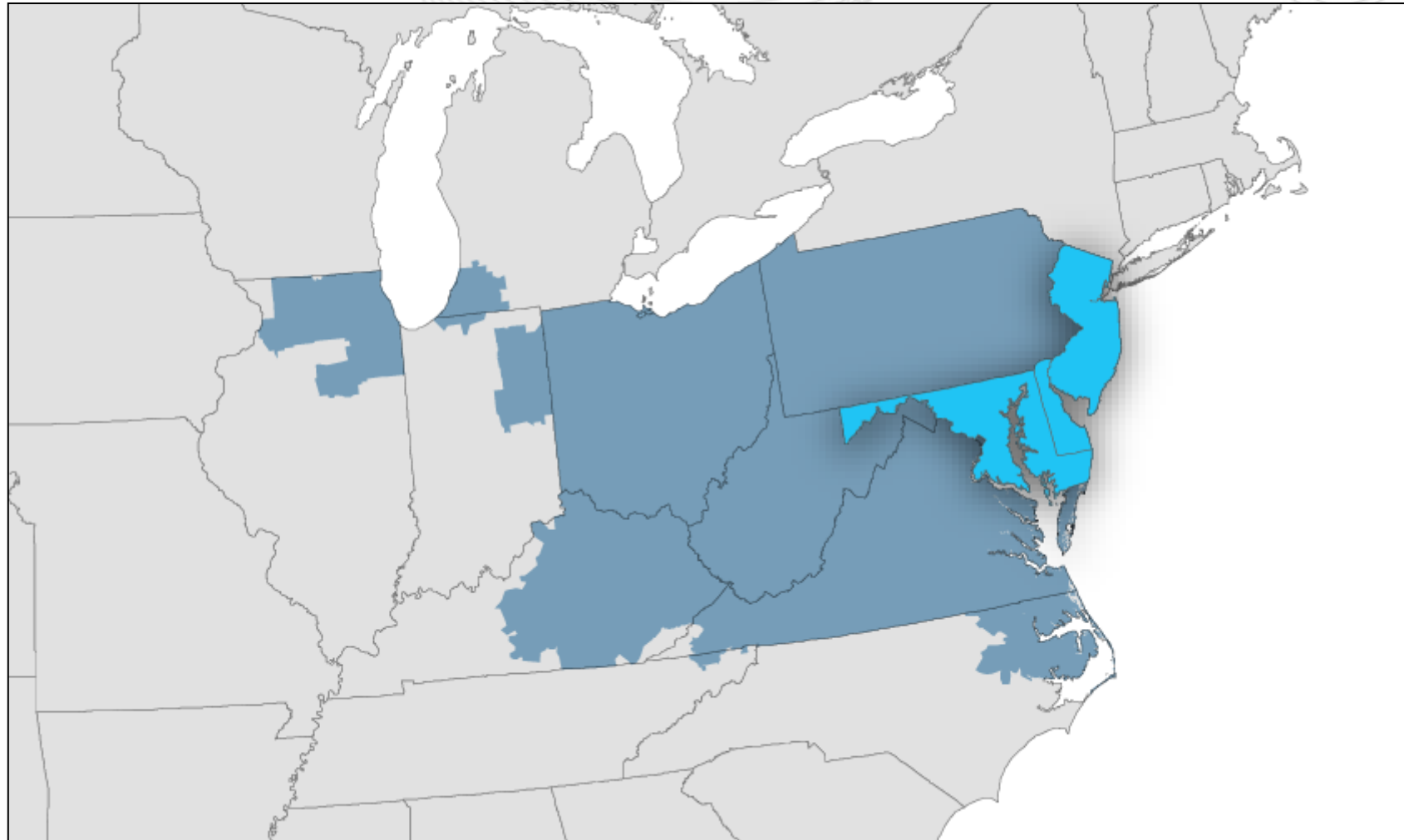
- 2023 Social Cost of Carbon (SCC) determined by the Interagency Working Group on greenhouse gases:

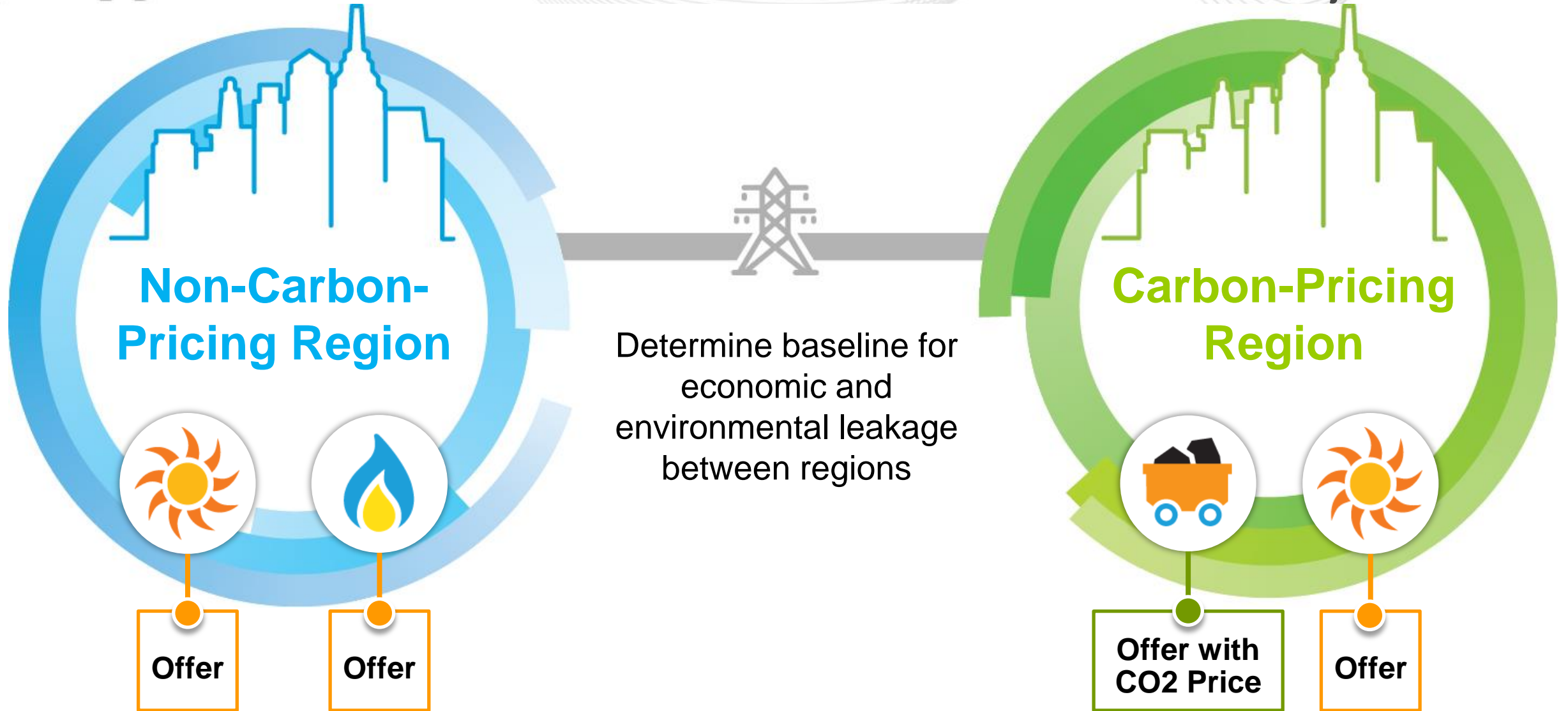
\$52.79/short ton of CO₂ (nominal)

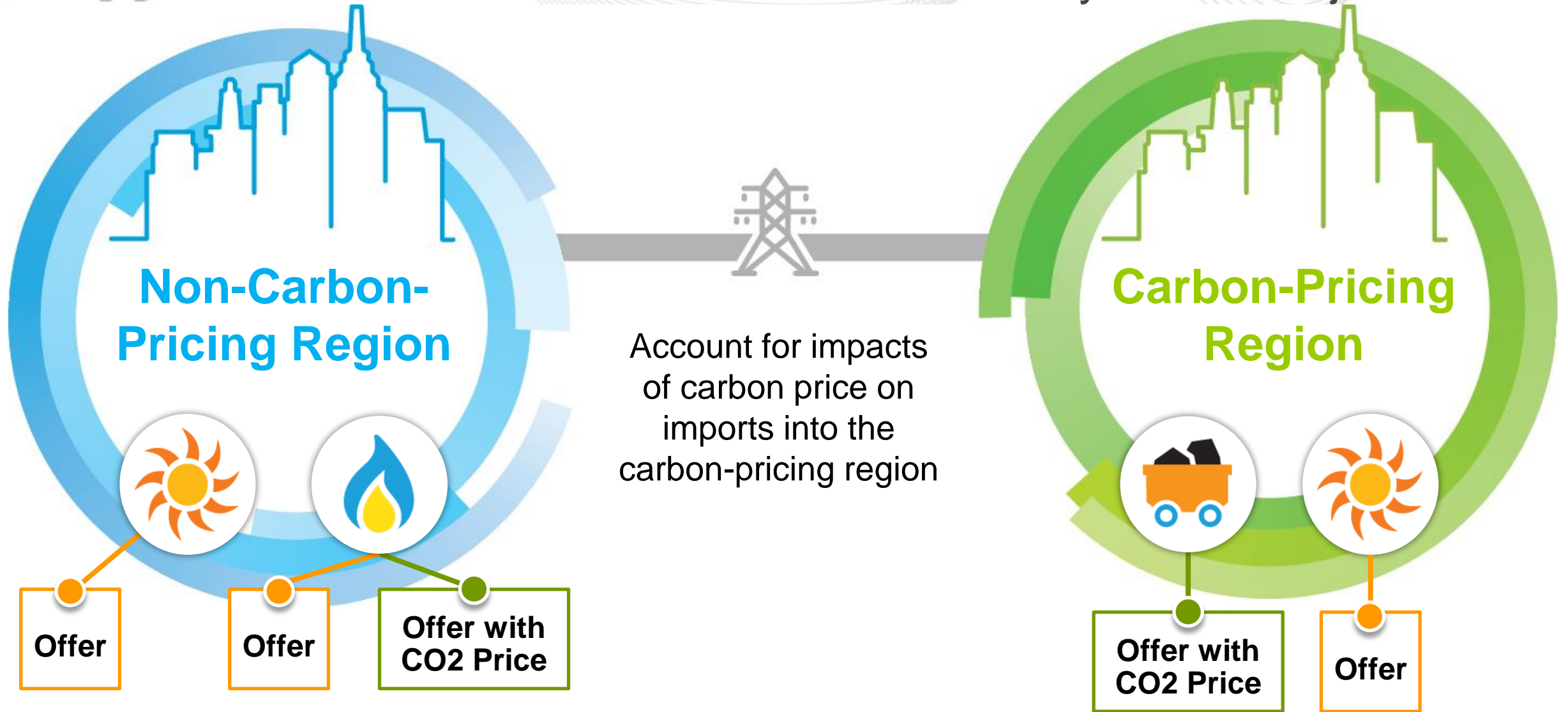
- Sensitivities to determine impact of carbon-price magnitude:
 - 25% higher than SCC: **\$65.99/short ton of CO₂**
 - 25% lower than SCC: **\$39.59/short ton of CO₂**
- Carbon adder to be applied to offers of all emitting resources within the region or sub-region being modeled with a carbon price

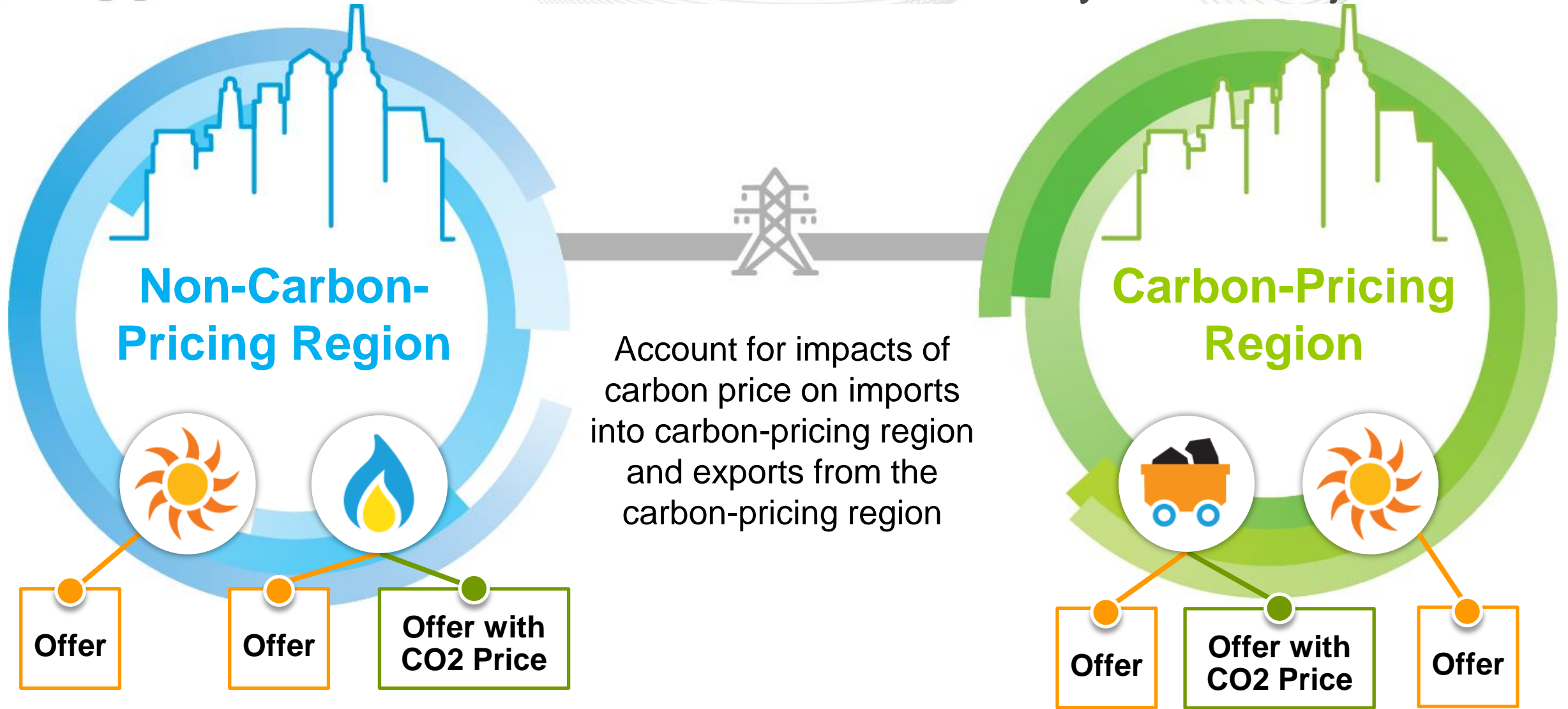
- 'Base' RGGI price will be modeled as \$6.87/short ton of CO₂ based on the Emissions Containment Reserve (ECR) trigger price
- High Sensitivity: \$14.88/ton, Cost Containment Reserve (CCR) trigger price
 - Sensitivity for highlighting leakage impacts: \$0/ton
- **Reference scenario:** The RGGI price will be applied to the offers of resources that are subject to the program
 - **Carbon-pricing scenarios:** When a carbon price is applied to resources in RGGI, the net of the carbon price and the RGGI price will be added to the RGGI price

Study Variables: Carbon-Pricing Sub-Region Definition









- The analysis will include the value of carbon residual funds resulting from border adjustments. States, not PJM, will determine how the funds are allocated.
 - Surplus when there are net imports into the carbon pricing region
 - Deficit when there are net exports from the carbon pricing region

Carbon Price Applicability	Carbon Price	Border Adjustment
No Carbon Price Reference	None	None
RGGI Reference	ECR trigger price	None
RGGI Sensitivity	CCR trigger price	None
Regional	SCC – 25%	External Only
	Social Cost of Carbon (SCC)	
	SCC + 25%	
Sub-Regional	SCC – 25%	External Only
		One-Way
		Two-Way
	Social Cost of Carbon (SCC)	External Only
		One-Way
		Two-Way
	SCC + 25%	External Only
		One-Way
		Two-Way