

# Clean Energy Market (CEM)

CAPSTF

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IMM



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# Clean Energy Market Principles

- **Goal is clean energy**
  - Energy production is the source of emissions
- **Goal is not clean capacity**
  - Capacity is not a source of emissions
- **Buying clean capacity is not an effective way to reduce emissions**
  - Marginal ELCC values will decline
  - Some non-emitting resources are not capacity resources
- **Markets are the most efficient way to provide clean energy**

# Current Approaches: RPS/RECs

- Existing RECs markets/requirements are not consistent across PJM
- Existing RECs prices affected by penalty rates under RPS rules
  - Existing RECs prices incorporate very different implied costs of carbon
- Existing RPS rules limit imports in some cases
- RECs definitions permit banking
  - No defined link to real time
- Not an effective or efficient market design
- Not effectively integrated with other PJM markets

# Clean Energy Market

- **Why a clean energy market?**
  - **Premise is that renewables cannot compete**
  - **Premise is that states' renewable goals cannot be met through existing markets**
  - **Premise is that renewables need more net revenue than provided by existing markets**
- **If there is a competitive clean energy market and these premises are not correct, the price in the CEM will go to zero.**
  - **Should be a test of any clean energy market design**

# Market Approach to Clean Energy

- **Single clean energy market (Clean MWh; CMWh)**
- **Operated by PJM**
- **Single definition of product (CMWh)**
- **Single market clearing price**
- **Trued up to real-time delivery**
- **Single product for all of PJM**
- **Consistent with state RPS definitions**
  - **But not all RPS resources would qualify**
- **Other RPS rules could continue per state decisions**

# Interaction Among PJM Markets

- **Energy market**
  - Offers at marginal cost
  - Net revenue from infra marginal rent
- **Capacity market**
  - Offers at marginal cost
  - Net revenue from infra marginal rent
- **Clean energy market**
  - Premise is that renewables cannot compete
  - Premise is that renewables need additional net revenue
  - Offers at marginal cost
- **Total net revenues from three sources**

# Market Design

- **Sequence/interactions among markets**
- **Energy market is real time spot market**
  - **Recognizing day-ahead market**
- **Capacity market is for one year, three years ahead**
- **Clean energy market is residual market**



# Market Design

- **Clean energy market options:**
  - **Real-time hourly market**
  - **Forward market: one year**
  - **Forward market: other options**
- **Real-time market**
  - **Creates prices that vary with output**
  - **Creates prices that vary by hour**
  - **Creates option for buyers to match actual energy market purchases with actual clean output**
  - **Creates transparent hourly information about total CMWh**



# Market Design

- **Goal is to provide a competitive market for renewable sellers and buyers**
- **Sellers have real-time information about energy markets**
  - Energy market forwards
- **Sellers have three year ahead information about capacity markets**
- **Real-time/shorter duration clean energy markets allow renewables to account for relevant information**

# Market Design

- **Goal is not to guarantee payment of Net CONE**
- **Goal is not to increase/suppress capacity market prices**
- **Goal is not to convert CEM into a capacity market**
- **Goal is not to eliminate uncertainty or guarantee revenues**
- **There will be uncertainty with any design**
  - **Real time CEM means that capacity offers do not account for actual CEM revenues; forward prices for CMWh**
  - **Combining with capacity market means that capacity offers do not account for uncertainty in energy market net revenues (historical or forward looking estimates)**

# Market Design

- **Demand for clean energy is defined by:**
  - **States**
  - **Individual buyers**
- **Single market maximizes competition**
- **Competition benefits sellers and buyers**
  - **Incentives for efficiency**
  - **Transparent market signal for policy makers/buyers**
- **Competition to provide clean energy will result in the lowest possible prices to states and other renewable buyers**
  - **But no lower**

# Market Design

- **States that do not have clean energy goals that cannot be met through existing PJM markets**
  - **Do not demand CMWh**
  - **Do not pay for CMWh**
- **Impact on non participating states should be a test of any clean energy market design**

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