U of I ‘Solar Farm 3.0’ Analysis

Final Report (Public Version)

July 6, 2020

CFR – Who We Are

Renewable Energy Advisory Firm

- Founded in 2010 by two former McKinsey & Company energy practice partners; privately-held
- Focus 100% on bringing tailored RE solutions to large businesses and institutions
- Independent, objective and transparent; technology, developer and project agnostic
- Pioneered RE demand aggregation since 2014
- GSA accredited, small business, 40+ professionals
- Mission and core values underpin everything we do to maximize value for our clients

Team Experience

- 150+ years combined energy experience:
  ~2,900 MW of renewables
  ~6,000 MW traditional generation
- Deep expertise in corporate strategy, innovation, organizational and operational issues
- Advanced capabilities in risk management, financial analysis, and transaction execution

Track Record

> Served +**50 institutions, businesses, and government agencies** coast-to-coast in the U.S., Canada and beyond

> **Optimized client energy portfolios** including operational large-scale RE projects, brown power, and natural gas with more than **+16 GWh/year** under contract

> Enabled client projects across multiple grid regions, regulated and deregulated markets, ranging <1 MW to 240 MW

> **International track record** with 6 businesses with global footprint and/or headquarters outside U.S.

CFR Investigated 2 Questions for U of I

Q1. Are there financially compelling renewable energy (RE) solutions for U of I in today's market?

- **Yes.** There are tradeoffs to consider between project location, economics, and market risks. Wholesale PPAs in IL and MISO cost more but provide local project and potentially stronger hedge benefits. Meanwhile, national projects provide more economic value in project itself.

Q2. How should U of I procure a wholesale PPA?

- **Define** project success criteria. **Run** a comprehensive **competitive process** for RE solutions.

- **Analyze** project economics and risks. **Conduct** project and developer due diligence. **Negotiate** contract terms that optimize risk and reward. **Integrate** the RE solution into U of I's energy portfolio.

CFR Investigated 2 Questions for U of I

Q1. Are there financially compelling renewable energy (RE) solutions for U of I in today's market?

- U of I's current energy situation: **brown power financial projections**, **RE goals**, and **progress to date**
- **Wholesale PPAs**, **current sample project economics**, and **tradeoffs**

Q2. How should U of I procure a wholesale PPA?

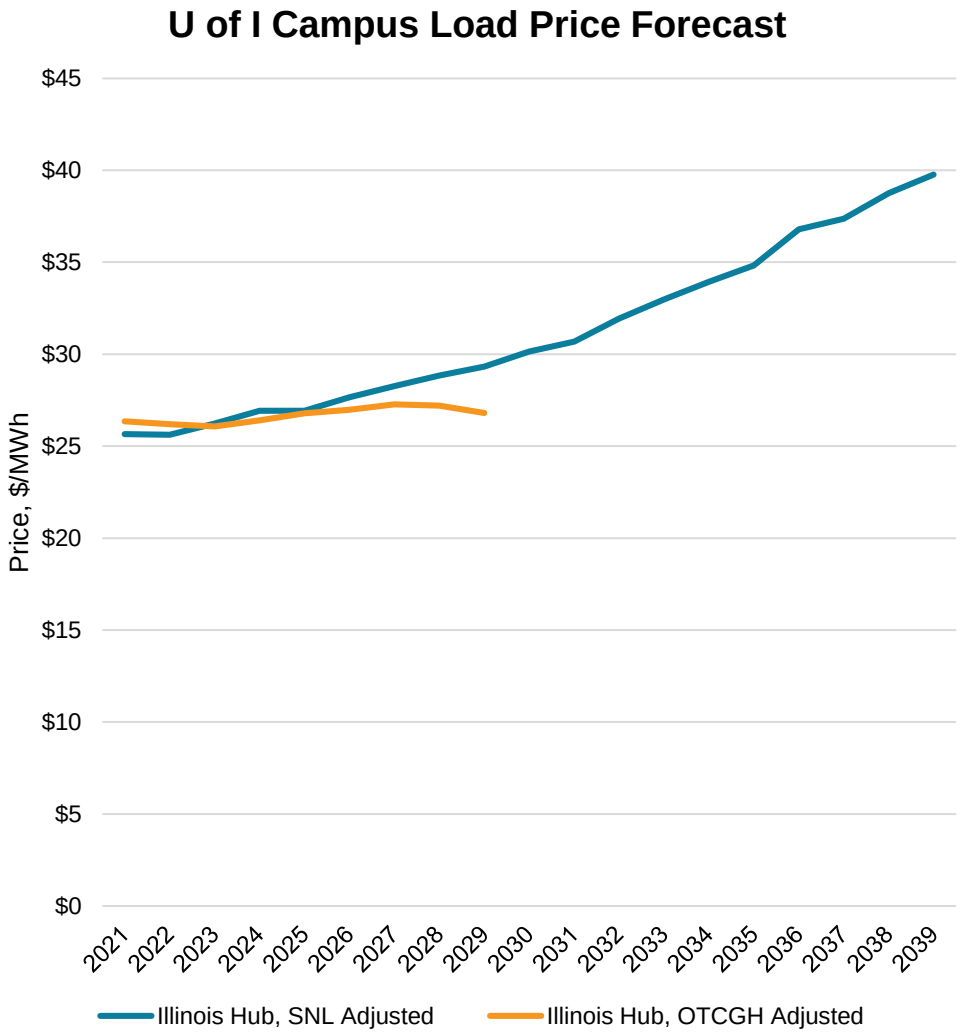
Brown Power Financial Projections for U of I

U of I's future power price path differs **based on forecast source**

How CFR projects costs:

CFR reviewed SNL price forecasts and OTCGH around-the-clock forwards* to project U of I's potential future cost of electricity:

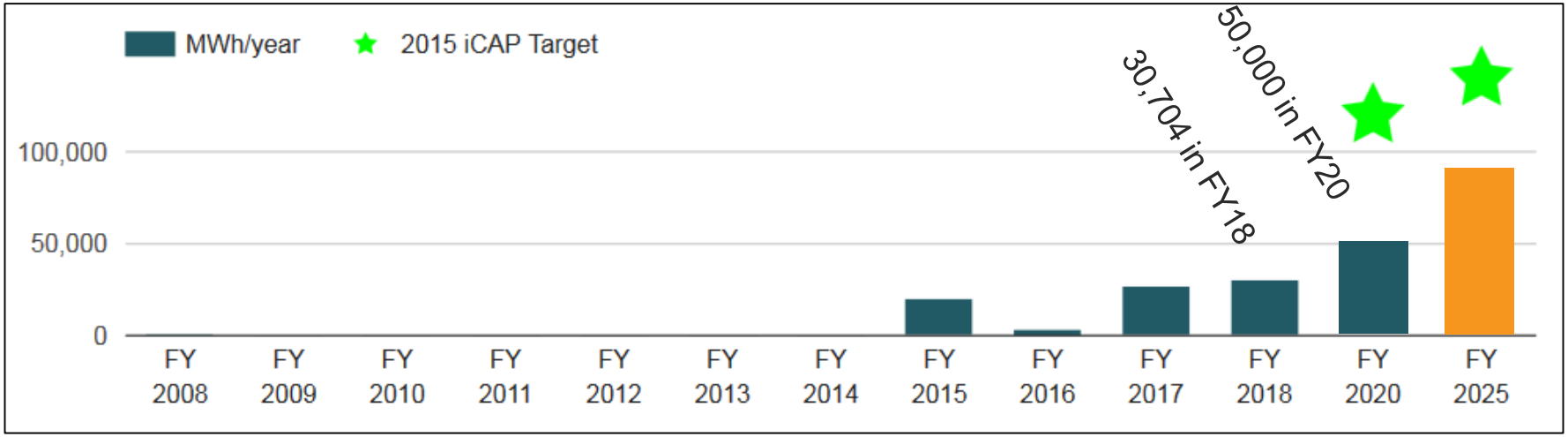
- Based forecasts on **Illinois Hub**
- **Adjusted for basis** between AMIL.PEIC node and Illinois Hub (~$0.16/MWh based on 3 year basis average)
- **SNL forecast** projects **2.5%** annual growth rate through 2039
- **OTCGH forwards** project **0.2%** growth rate through 2029



U of I Climate Action Plan (iCAP) Goals & Progress

U of I RE projects:

Solar Farm 1.0	+ ~5,000 MWh/yr
Solar Farm 2.0	+ ~20,000 MWh/yr
Railsplitter Wind (Lincoln, IL)	+ ~25,000 MWh/yr
Solar Farm 3.0 (proposed)	**+ 90,000 MWh/yr**
iCAP goal	**= 140,000 MWh/yr** by 2025



RE Solution: Wholesale Power Purchase Agreement (PPA)

Definition: Agreement to buy power (and environmental attributes)

- At agreed-upon **fixed price**
- From a **specific, new-build project** (providing power to grid in deregulated marketplace)
- For **set period of time** (typically 12-15 yrs as compared to historical norm of 20-25 yrs)

Availability: Projects are located in deregulated markets but buyers can be located anywhere because the power does not necessarily need to be physically delivered to the buyer

Economics & Risks: PPA economics are driven by the **difference between the fixed PPA price and the floating market price** at the settlement point. Correlation between RE project's market and buyer's retail market impacts PPA's potential hedge value. Many additional factors impact economics and risks.

Key Players in PPA Transactions: Roles & Responsibilities

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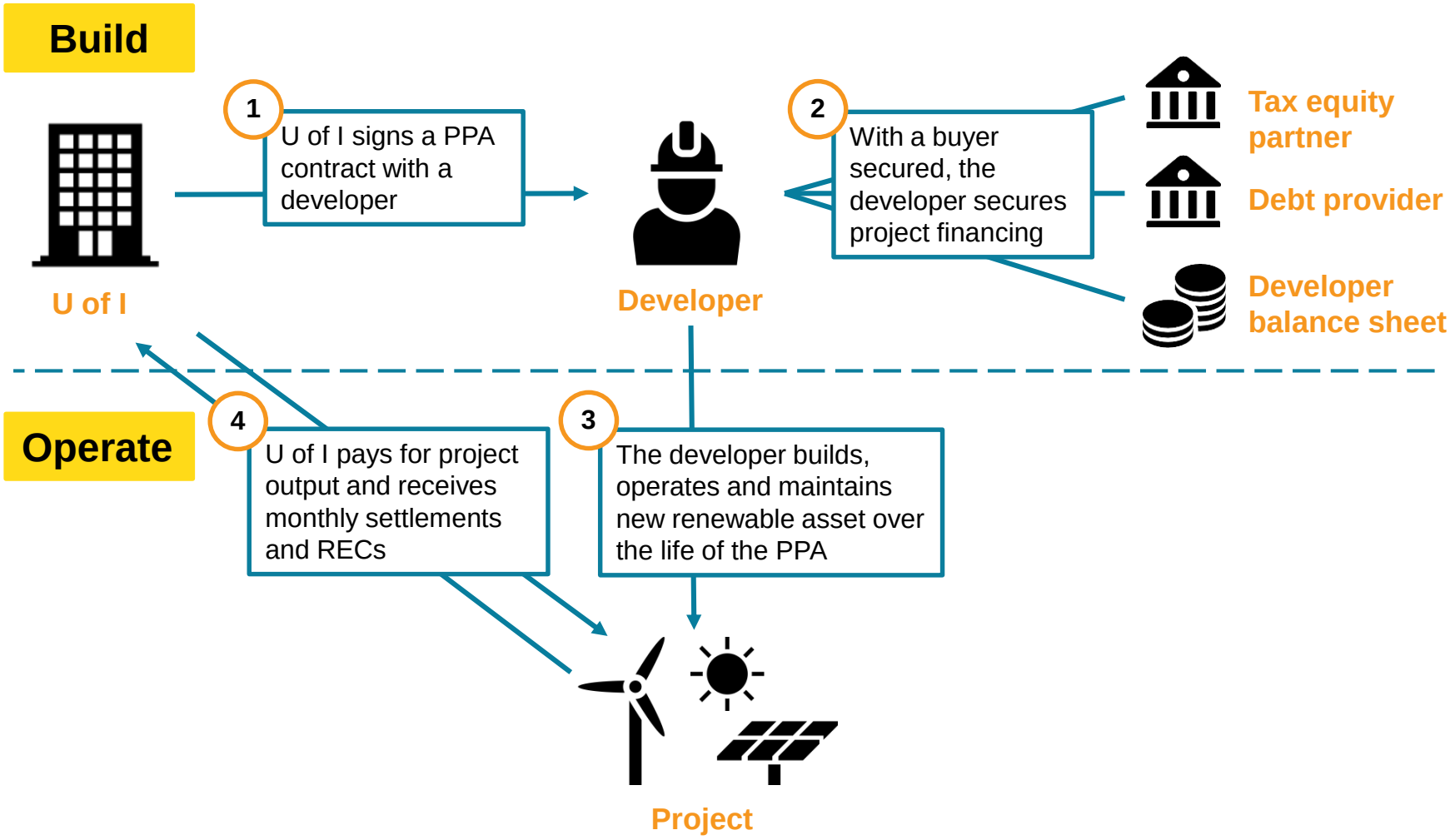
Although buyers contract with developer, numerous parties are involved in RE project



Wholesale PPA Mechanics

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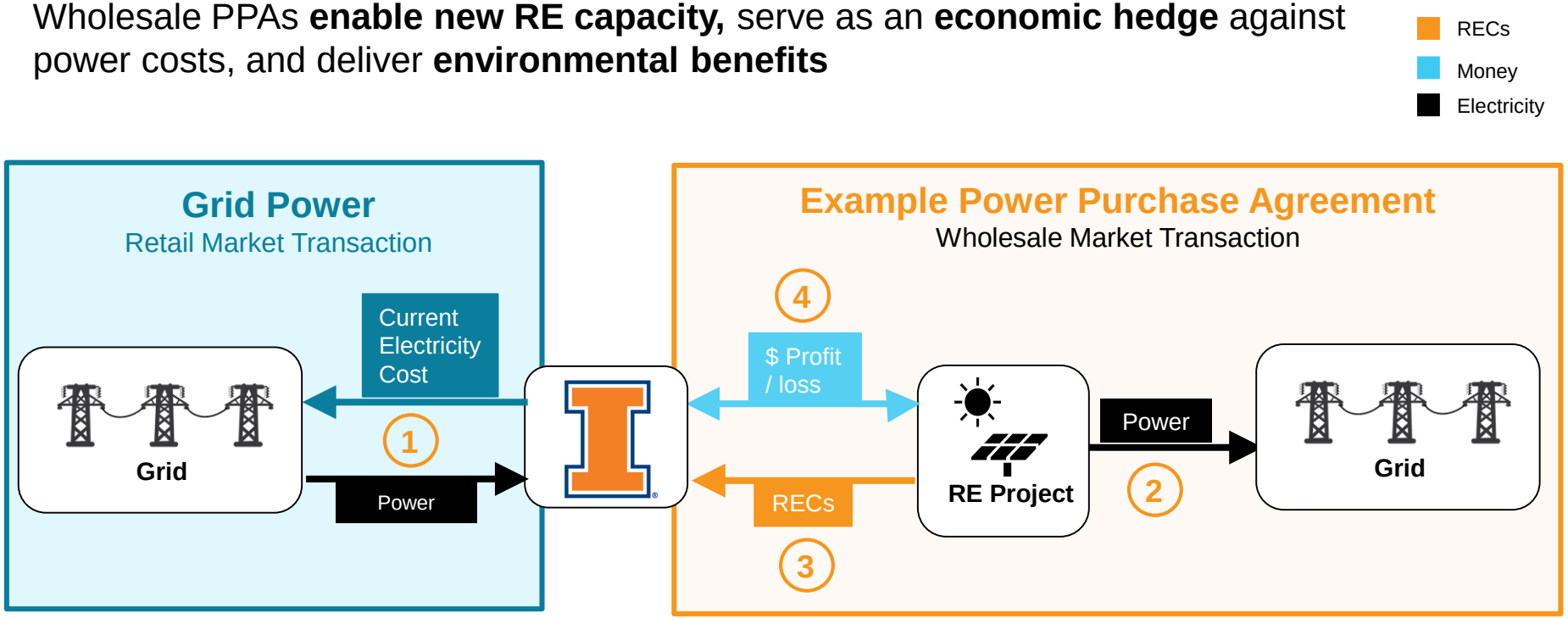
Wholesale PPAs **enable new RE capacity,** serve as an **economic hedge** against power costs, and deliver **environmental benefits**



How it works:

1. No change to retail electricity purchases
2. RE project's electricity is sold into wholesale market / grid by developer
3. Client takes title to renewable energy certificates (RECs)
4. Developer settles profit/loss (local market floating price – fixed PPA price) with client

Economics of Wholesale PPA

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Economics are determined mainly by the **floating market price compared to the PPA price** over the life of the contract.

> The buyer's cost/savings is the **difference between the floating market price** and the **fixed PPA price** (hourly transactions are reconciled monthly with the buyer)

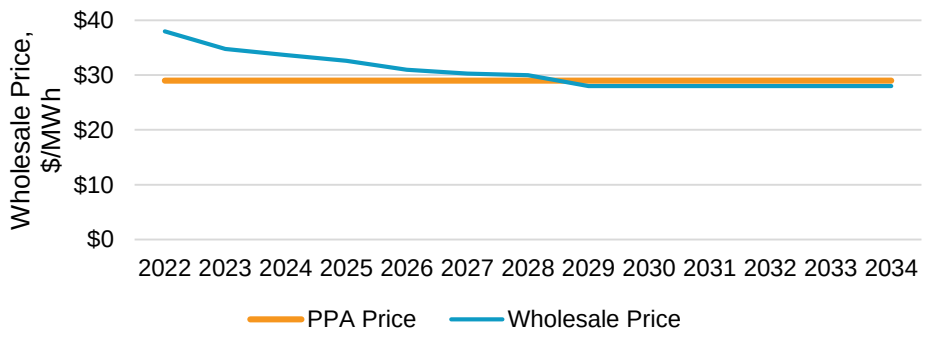
> The fixed PPA price does not change (unless specified), but the **floating market price does**

> **CFR's base model uses projected changes in the forward liquid power trading price** at each settlement point to determine how the floating market price will change

Tech.	State	Commercial Operation Date	Term (Yrs)	Fixed PPA Price ($/MWh)	Year 1 Floating Price ($/MWh)	Assumed Annual Growth Rate for Wholesale Price	Levelized Savings ($/MWh)
Solar	TX	12/2022	12	**29.00**	**37.90**	**-2.5%**	**1.5**

Illustrative Annual PPA Settlement

Note: Actual monthly settlements will vary

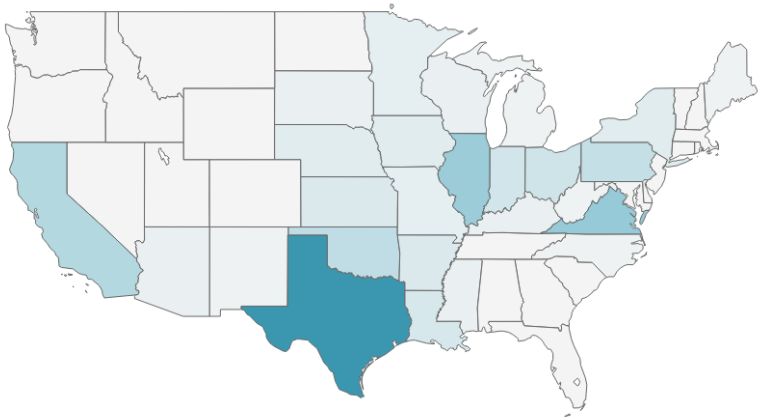


Competitive Marketplace Review

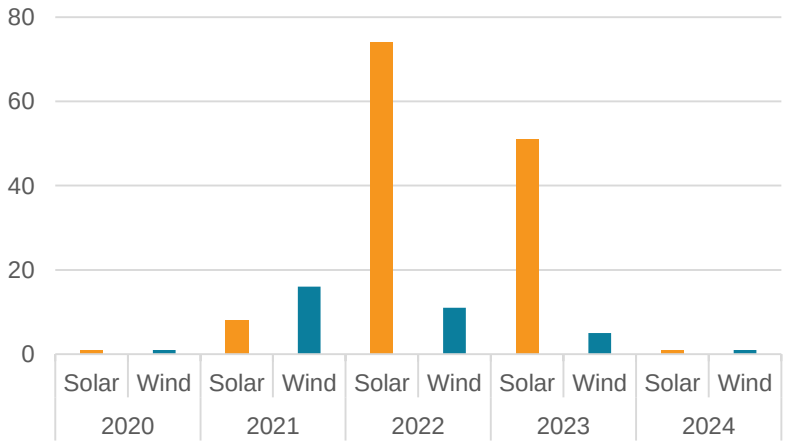
CFR Reviewed the Competitive RE Marketplace, including:

- Over 100 pre-vetted RE providers
- 168 projects in 25 states from 30 developers
- 157 Projects available with at least 90,000 MWh/year (U of I's goal for this procurement)

Number of Projects by State



Number of Wind/Solar Projects by Commercial Operation Date



Summary of 5 Sample Wholesale PPA Bids

Current market shows attractive PPA opportunities available to U of I

IL project
MISO project
Out-of-region project

Project	Comm. Oper. Date*	ISO or Grid	Settlement Point	PPA Structure	Term (Yrs)	PPA Price ($/MWh)	Year 1 Floating Price ($/MWh)	Levelized Savings (LS) ($/MWh)	NPV of Savings ($)**
Confidential		MISO (IL)	Confidential					(2.6)	(1.6M)
		MISO (IN)						(0.8)	(0.5M)
		ERCOT (TX)						1.7	1.0M
		ERCOT (TX)						1.5	1.1M
		ERCOT (TX)						1.2	0.6M

- IL and MISO PPAs provide **slightly-negative** to **near-neutral** project economics
- Current market shows ERCOT (TX) PPAs providing ~$1-2/MWh in levelized savings
  - Wide range of term lengths (7-12 yrs), risk mitigants (upside share, floor)

National projects maximize savings; local projects provide best hedge

* The date at which the project is expected to start producing electricity and therefore the PPA would begin

Questions to Be Addressed Today

Q1. Are there financially compelling renewable energy (RE) solutions for U of I in today's market?

Q2. How should U of I procure a wholesale PPA?

- **Major procurement challenges**, economic and risk **analyses,** project **selection criteria**

Navigating through PPA Procurement Challenges

Successful PPA procurements rely on navigating four key challenges

Opaque pricing of projects and risk mitigants

1. **Align internally early** and **understand key preferences** (contract structure, risk appetite, tenor, etc.)
2. **Run competitive process**, specifying pricing request preferences to potential suppliers
3. **Remember lowest fixed PPA price does not mean better**; must also account for market's floating price, project production profile, tenor

Changing supply mechanics

1. **Consider how market's fuel costs and generation assets may evolve** over contract term and impact project's expected savings
2. **Keep aware of ongoing industry impacts** (e.g. supply chain constraints, tariffs) that may affect PPA pricing even after securing initial bids

Evolving landscape of solutions and contracts

1. **Maintain open mind** to PPA types (virtual, physical) and evolving RE solutions (e.g. retail)
2. **Maintain a Plan B** as preferred projects adjust pricing or are purchased by other active buyers
3. **Look to enter into exclusivity agreement** for preferred project to defend from other buyers

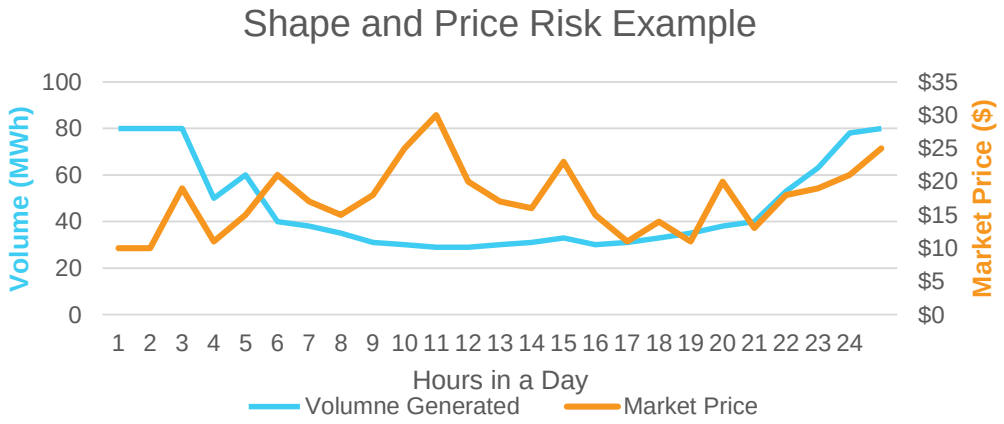
Inconsistent contract terms from suppliers

1. **Adequately evaluate and weigh many tradeoffs**, including between contract tenors, risk mitigant structures, etc.
2. **Assemble strong team** well versed in RE for procurement and contract negotiations
3. **Establish positions on key contractual protections** (e.g. seller performance, production shortfalls, construction delays)

Examples of Wholesale PPA Risks: Price and Shape

Market price and timing of production (shape) are critical to PPA economics. Multiple risk analyses are essential for selecting the best project.

	Definition	Impact to Buyer
PRICE RISK	> When floating market prices fall below fixed PPA price	> Buyer is exposed if the market floating price is less than the fixed PPA price in the short term (hour to hour) or the long term (contract term)
SHAPE RISK	> Project production timing is uncertain due mostly to weather > Similar assets generating at the same time may depress wholesale prices	> Returns are driven by when the project generates output and sometimes price and shape risk are intertwined > Not adequately accounting for shape risk can overinflate projections > Risk of many RE assets producing simultaneously and driving down prices; currently more common and detrimental with wind projects



In this example, the buyer is exposed to price and shape risk:

> **Price:** Fluctuates from a peak of ~$25 to a low of <$10 showing high variability even in one day

> **Shape:** Lowest production in hours when prices are high and highest production when prices are low; this can impact performance and needs to be built into analysis

Specific CFR analyses are designed to address both price and shape risk

Project Selection Process

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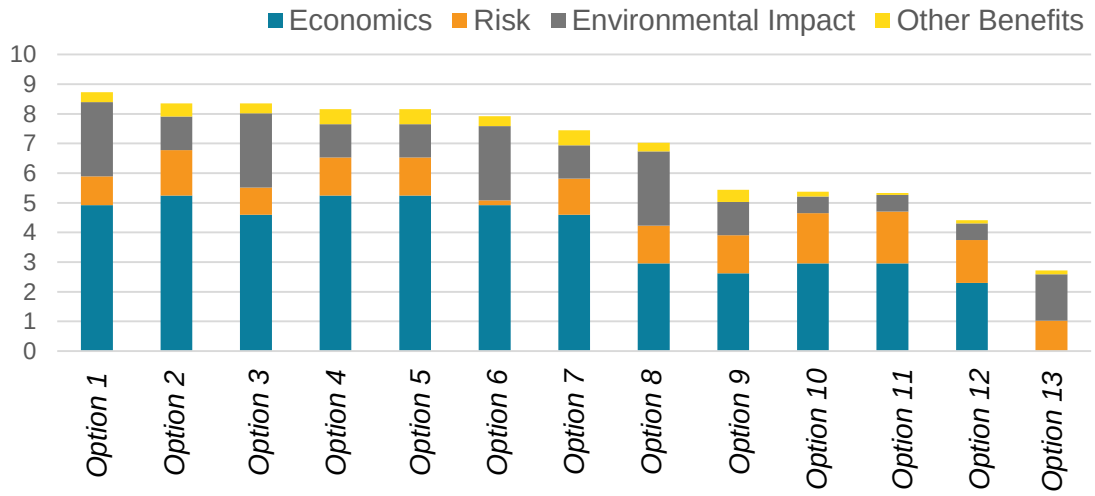
To ensure success with a RE procurement, it is important to understand collective institutional priorities for selecting the right RE solution

Sample project scoring



Project Selection Process & Criteria

- Score all PPAs on apples-to-apples basis
- Tie together economic and non-economic components of options
- Inform trade-offs between options to determine the right solution for the institution

Sample PPA Contractual Risk Mitigants

Besides running analyses to determine lower risk projects, U of I can also layer in contractual risk mitigant structures to reduce exposure to the market floating price

A growing number of buyers look to negotiate market risk-mitigating contract structures to best reflect their optimal balance of economics and risks.

In recent years, increasing numbers of developers or third party-financers are willing to accept additional market risk in PPAs in exchange for a share of cost savings.

PPA Structures

Upside Share
In exchange for a lower fixed PPA price, the buyer shares specific % of the settlement upside with the developer

Price Floor
Developer assumes risk for market floating price below the floor (e.g. $0/MWh)

Price Collar
Developer sets a minimum and maximum for the market floating price, taking losses below the min and savings above the max

Least risk mitigated → **Most risk mitigated**

Benefits	Upside Share	Price Floor	Price Collar
Protects against downside	x	x	x
Limits cash flow volatility	x	x	x
Provides downside certainty		x	x

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Next Step: Identify course of action for implementing RE solution.

Questions?

> Contact Chris O'Brien (Director, Business Development) at cobrien@customerfirstrenewables.com and/or Gavin Ahern (Senior Engagement Manager) at gahern@customerfirstrenewables.com

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Wholesale PPA Settlement

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A PPA would be settled monthly or quarterly, separately from your utility and supply bill

Settlement

Electric Utility

- You pay current monthly transmission and distribution (T&D) costs for electricity delivered

Competitive Electric Supplier

- You pay current monthly electric supply costs for brown power

Project Developer (Project Company)

- On a monthly or quarterly basis, you are compensated or charged based on the difference between the floating price from the sale of electricity into the wholesale market and an agreed upon fixed PPA price

Illustrative Example

Assumptions

- Monthly Load: 1,500 MWh
- RE Produced: 1,000 MWh
- Fixed PPA Price: $22/ MWh
- Avg Market Floating Price: $23/MWh
- Electric Supply Rate: $60/MWh

Utility Bill

- Pay for delivery of 1,500 MWh at current rate

Electric Supply Bill

- Pay for 1,500 MWh of brown power provided based on current retail rate of $60/MWh ($90,000)

Power Purchase Agreement (PPA)

- Receive a check for $1,000 (or $1/MWh)