Solar Farm 3.0: Analysis for Options for UIUC

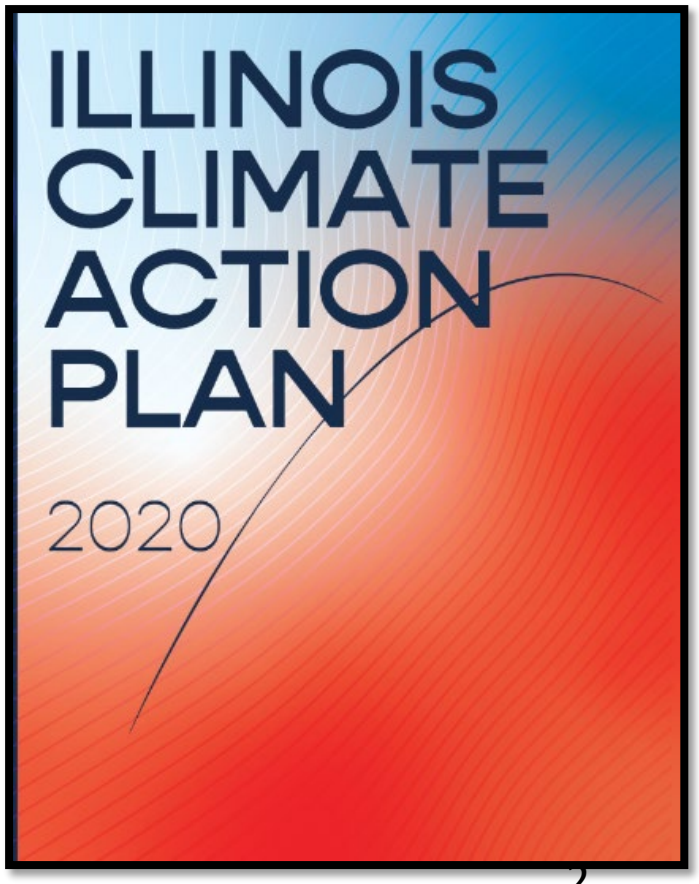
Presented to Chancellor Jones

10/3/2022

Facilities & Services
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

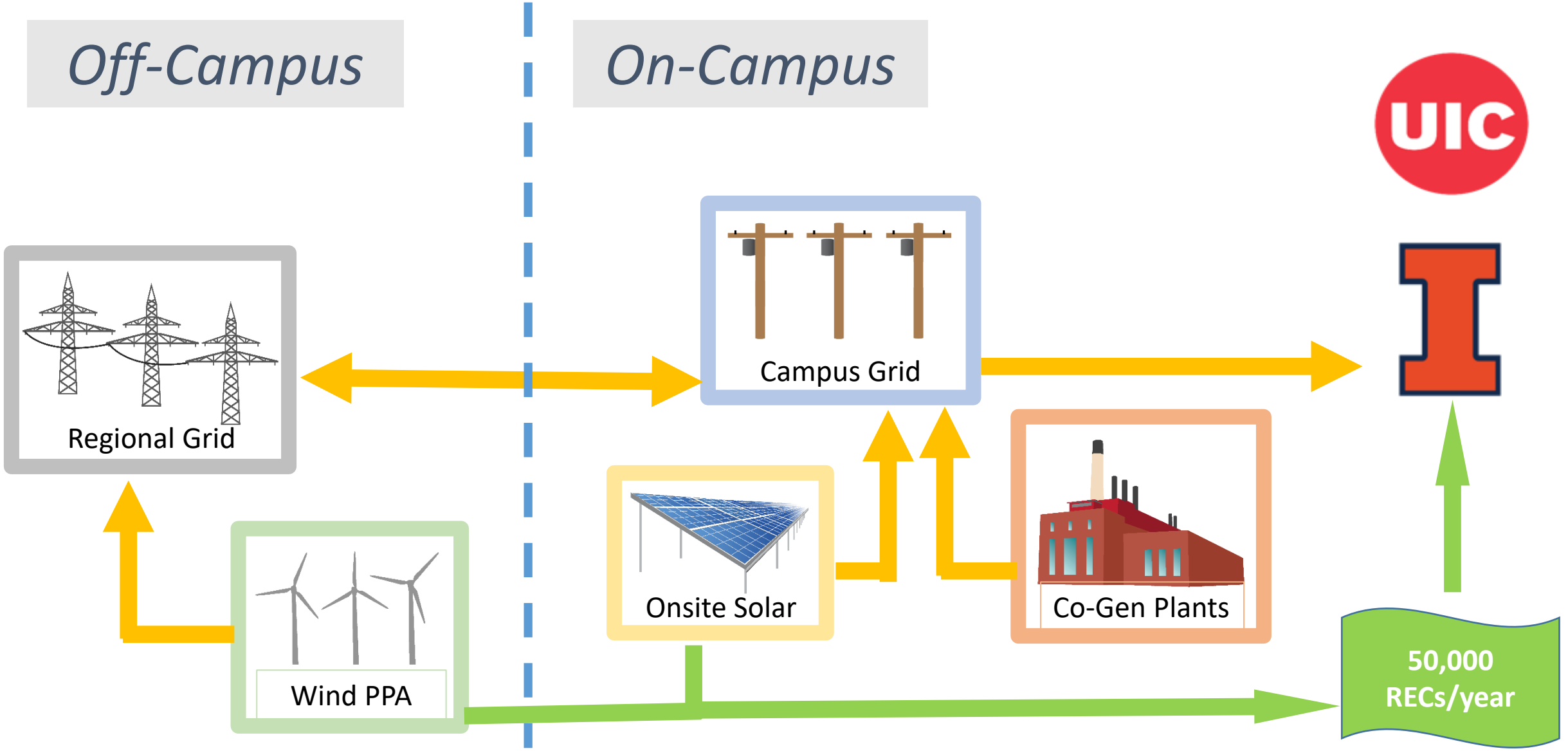
Climate Leadership Commitments

- Signed by 500+ leading American higher education presidents and chancellors, through Second Nature
- 2008: Carbon Commitment, pledging to be carbon neutral as soon as possible and no later than 2050
- 2016: Resilience Commitment, pledging to build resilience to climate change with our local community

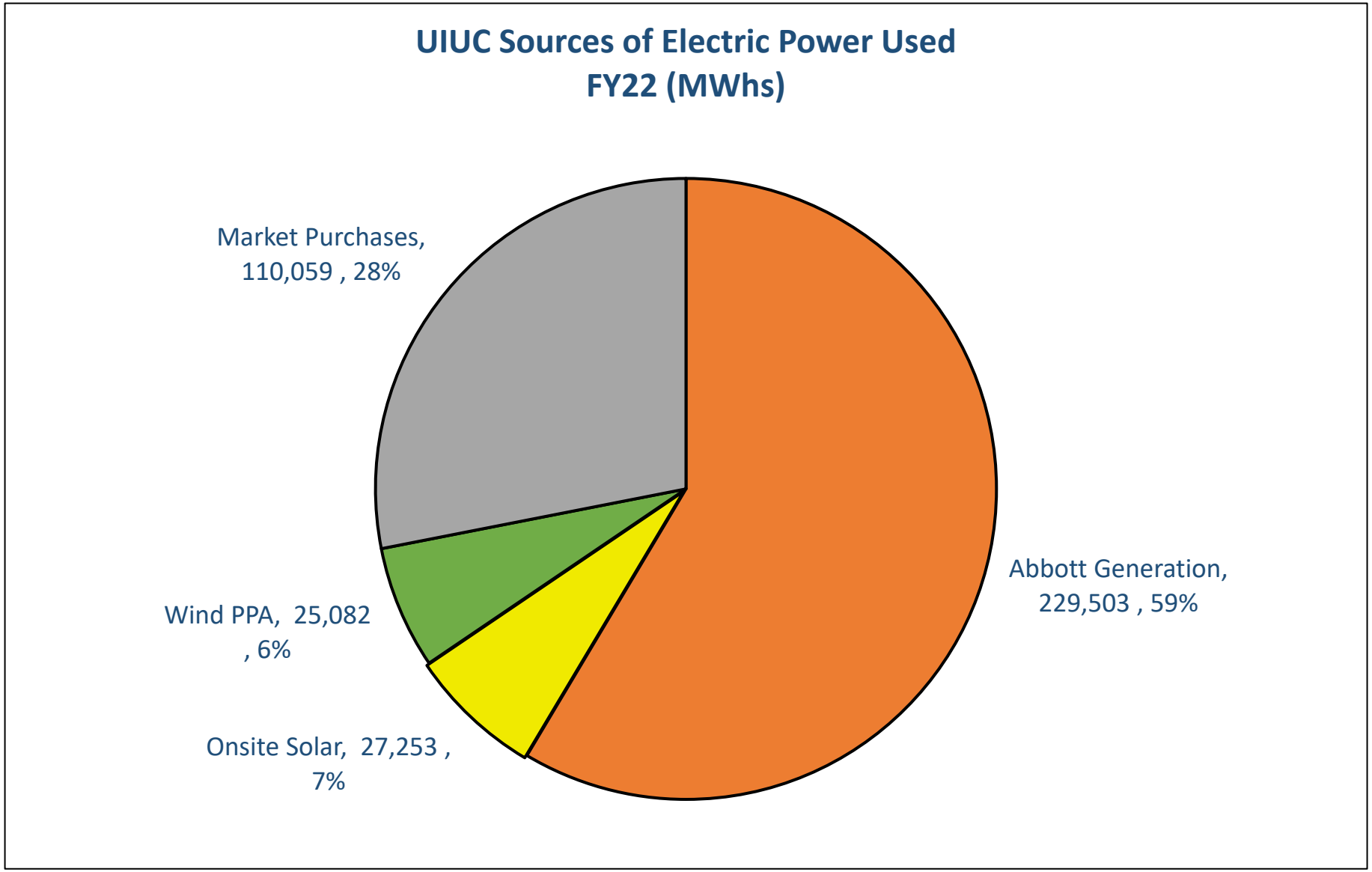


Clean Power Goals

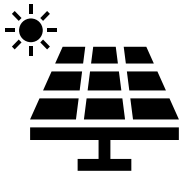
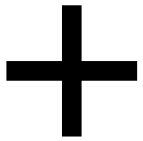
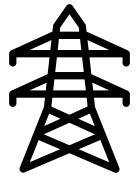
Solar Farm 1.0	+ ~5,000 MWh/yr
Solar Farm 2.0	+ ~20,000 MWh/yr
Wind PPA (Lincoln, IL)	+ ~25,000 MWh/yr
Solar Farm 3.0 (proposed)	**+ 90,000 MWh/yr**
iCAP goal	**= 140,000 MWh/yr**



Business as Usual


UIUC Sources of Electric Power Used
FY22 (MWhs)
Market Purchases, 110,059 , 28%
Abbott Generation, 229,503 , 59%
Wind PPA, 25,082 , 6%
Onsite Solar, 27,253 , 7%

Evaluation of Options

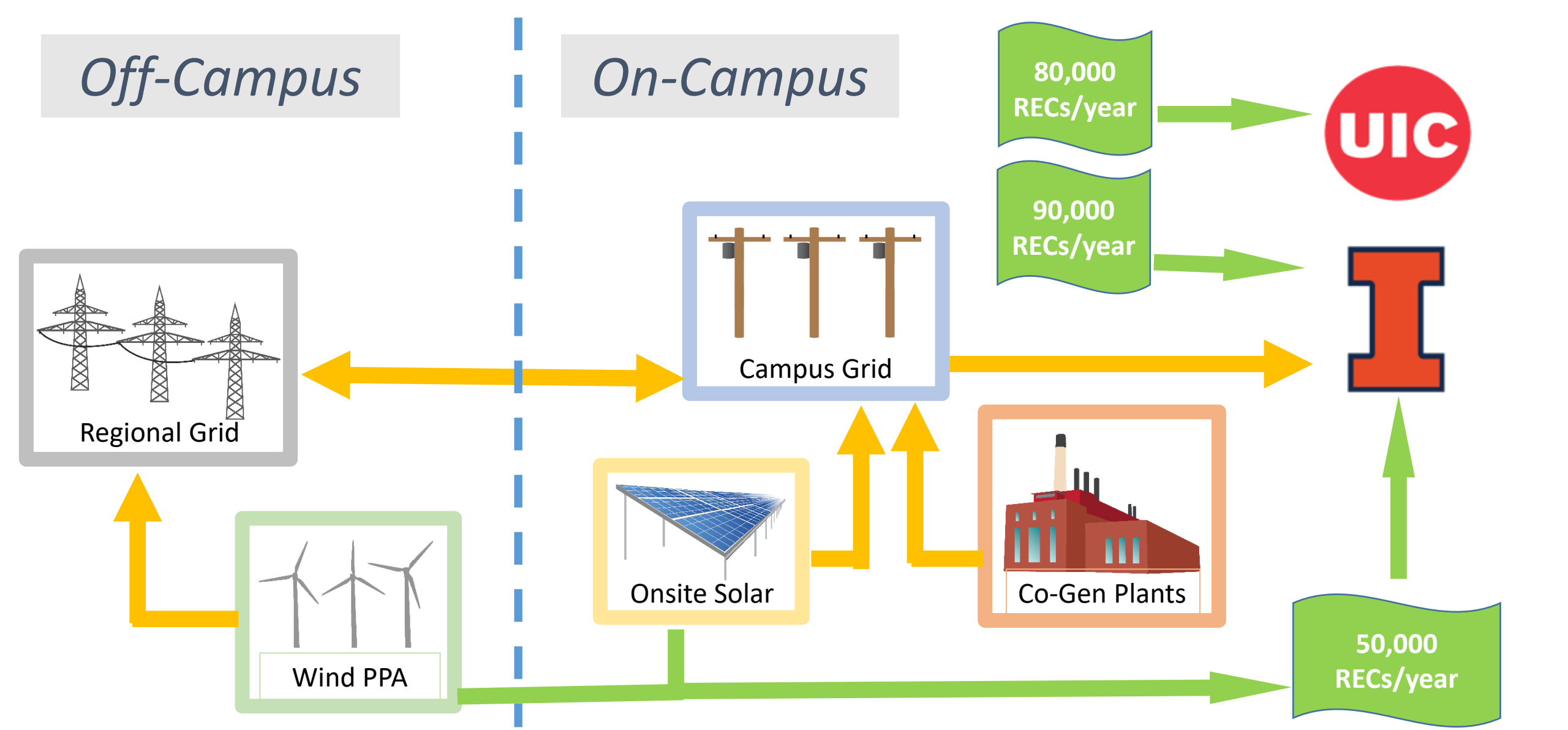
					
Unbundled RECs	Onsite Solar	Indirect PPA (national)	Indirect PPA (MISO)	Indirect PPA (Illinois)	Physical PPA

Key Evaluation Criteria

- Economics
- Environmental Impact
- Risk
- Ease of Implementation
- Location

Definitions

- **Additionality**: The addition of new clean/renewable energy production facilities, and the fact that the new facility occurred due to the actions of a particular agency, such as the U of I.
- **REC**: Renewable Energy Certificates (sometimes called Renewable Energy Credits) representing the production of one megawatt-hour of renewable power added to the electric grid. This is a separate accounting methodology, because it is impossible to track the path of an electron.
- **PPA**: A Power Purchase Agreement is a contract to buy electricity and it may or may not include the RECs. All our existing PPAs include the RECs.
- **BAU**: Business as Usual represents power production using the current co-generation power plants, on-site solar, the wind PPA, and market purchases from the grid.
- **Levelized Cost**: Total average cost per megawatt-hour over 15 year period
- **NPV:** Net Present Value is the total cost for the 15 year period in today's dollars, with a discount rate of 5%.
- **Subsidy/Savings:** The subsidy or savings for each option is compared to the BAU cost.
- **Estimated Contract Cost:** The projected total cost to the University over the 15 year period; this number does not reflect related savings.



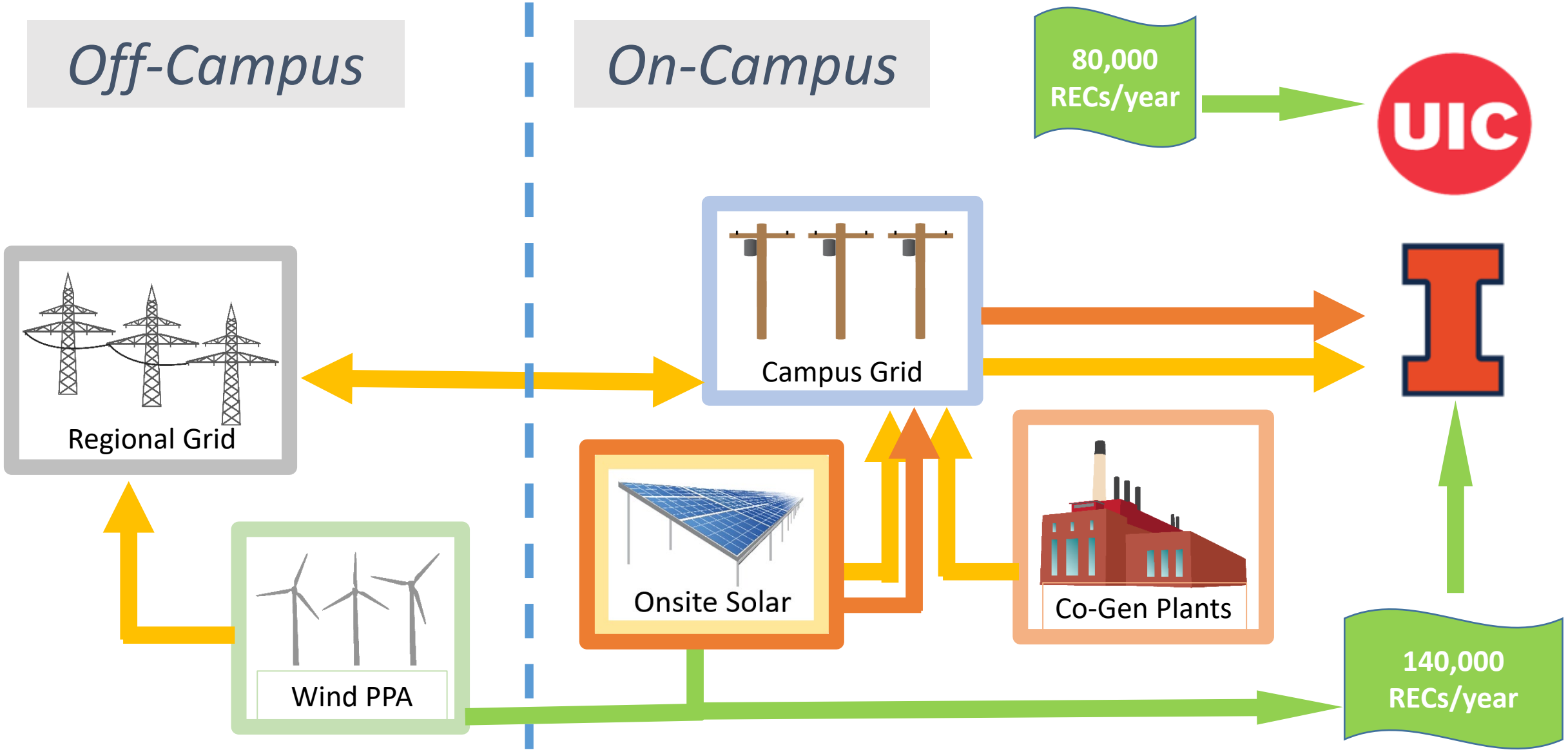
Unbundled RECs

Unbundled RECs: Summary

Process	> U of I pays a $/MWh price for RECs on the national market, to legally claim the use of renewable energy. > No electricity is purchased in this solution. > National RECs (the cheapest of unbundled RECs) can come from any state; typically they come from states that do not have renewable portfolio standards and which have excess RE generation (e.g., Texas).
Additionality	> Unbundled RECs do not enable new renewable energy generation
Economics	> **UIUC Campus:** Subsidy over BAU: ~$1.7/MWh, 15-year NPV: $1.6M > **UIC Campus:** Subsidy over BAU: ~$1.7/MWh, 15-year NPV: $1.4M

$ 2,295,000

Estimated UIUC Contract Cost



Onsite Solar

Onsite Solar: Summary

Process	> UIUC and UIC pay $/MWh fixed price for electricity generated from new-build ground-mount solar project on UIUC campus and receive RECs. > Electricity is sold to grid at floating wholesale market rate given campus would be unable to consume generation during solar production hours. > On UIUC's campus and nearby land
Additionality	> Enables creation of new renewable energy generating facility
Economics	> **UIUC Campus:** Subsidy over BAU: $12.3/MWh, 15-year NPV: $9.9M > **UIC Campus:** Subsidy over BAU: $12.3/MWh, 15-year NPV: $12.5M

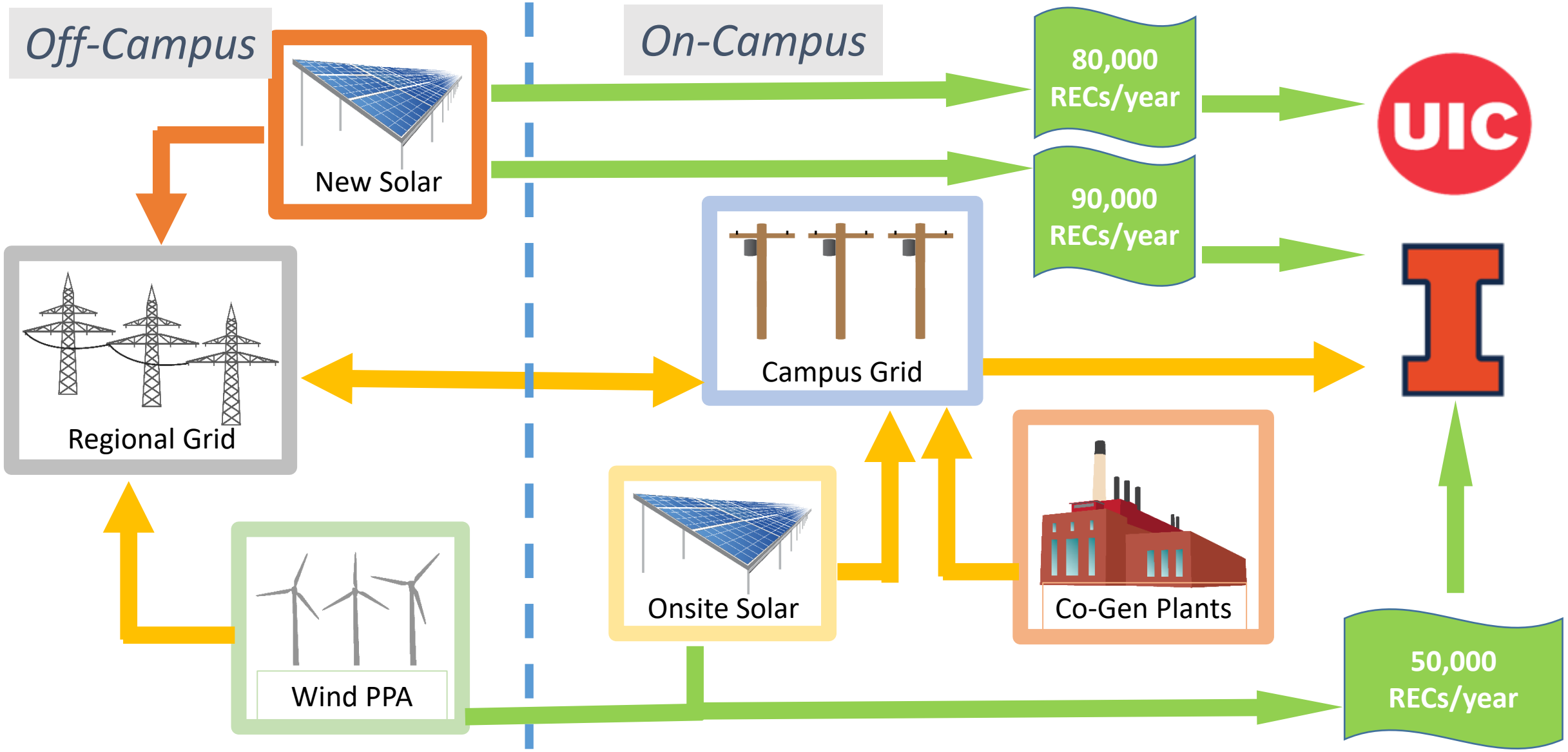
$16,605,000

Estimated UIUC Contract Cost

$10.4M-$14.9M

Estimated UIUC Land Lease Cost

! Onsite project requires 350-500 acres, estimated to cost $560k-800k+ annually for 25-year lease



Indirect PPA

Indirect PPA in Illinois: Summary

Process	> U of I guarantees $/MWh fixed price for electricity generated from new-build RE project and receives RECs and floating wholesale market price for electricity sold directly into local grid. > Potential exists to **pay** or **save**. > Can be located anywhere with competitive wholesale market, in Illinois
Additionality	> Enables creation of new renewable energy generating facility; commitment to purchase electricity and RECs allows solar developer to raise 3rd party financing to build project
Economics	> **UIUC Campus:** Subsidy over BAU: $8.2/MWh, 15-year NPV: $6.2M > **UIC Campus:** Subsidy over BAU: $8.2/MWh, 15-year NPV: $5.9M

$11,070,000

Estimated UIUC Contract Cost

Indirect PPA in MISO: Summary

Process	> U of I guarantees $/MWh fixed price for electricity generated from new-build RE project and receives RECs and floating wholesale market price for electricity sold directly into local grid. > Potential exists to **pay** or **save**. > Can be located anywhere with competitive wholesale market, in MISO region; example is from Indiana
Additionality	> Enables creation of new renewable energy generating facility; commitment to purchase electricity and RECs allows solar developer to raise 3rd party financing to build project
Economics	> **UIUC Campus:** Savings over BAU: **$3.7/MWh**, 15-year NPV: **$2.9M** > **UIC Campus:** Savings over BAU: **$3.7/MWh**, 15-year NPV: **$2.6M**

$(4,995,000)

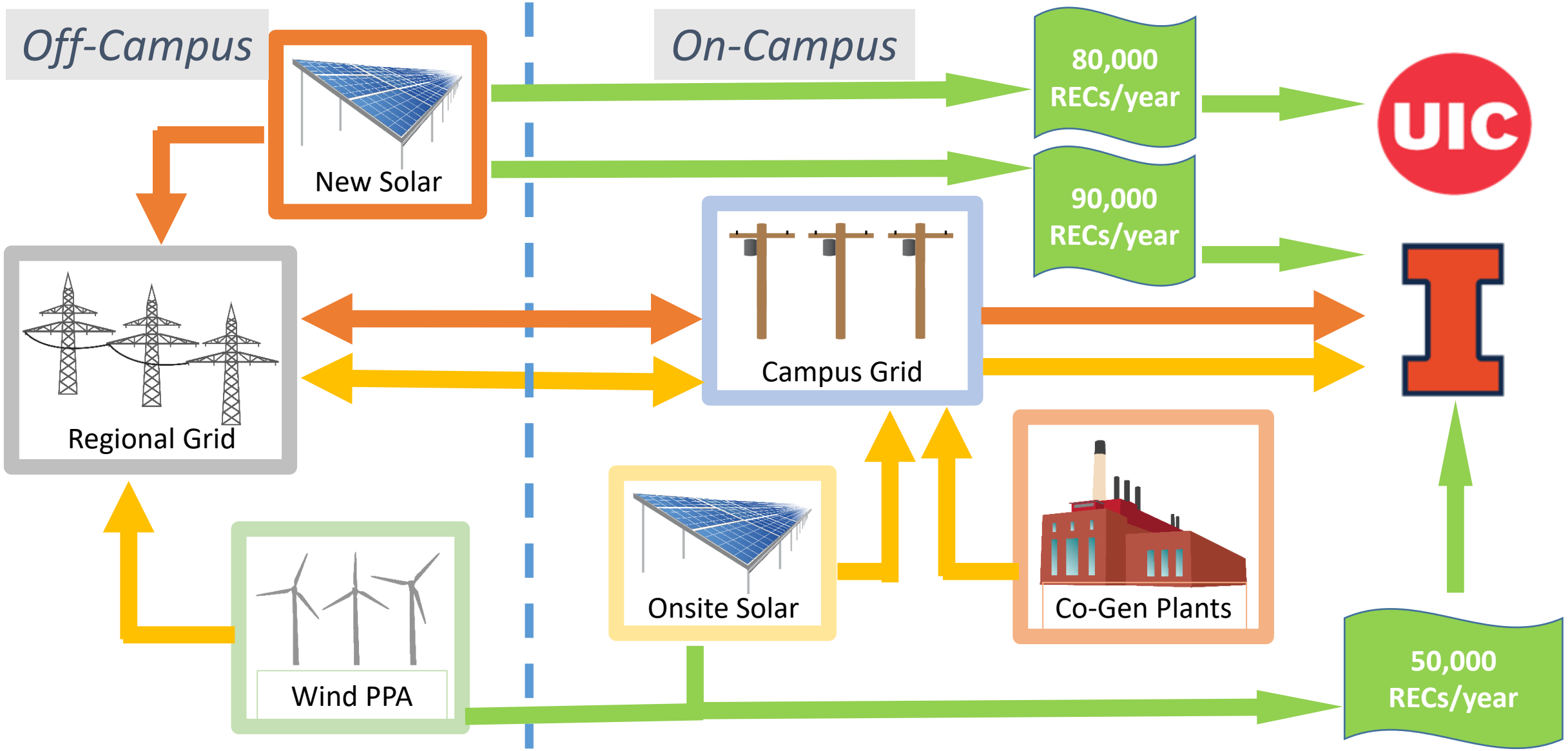
Estimated UIUC Contract Cost

Indirect PPA in USA: Summary

Process	> U of I guarantees $/MWh fixed price for electricity generated from new-build RE project and receives RECs and floating wholesale market price for electricity sold directly into local grid. > Potential exists to **pay** or **save**. > Can be located anywhere with competitive wholesale market, in national grid; typically in Texas
Additionality	> Enables creation of new renewable energy generating facility; commitment to purchase electricity and RECs allows solar developer to raise 3rd party financing to build project
Economics	> **UIUC Campus:** Savings over BAU: **$4.2/MWh**, 15-year NPV: **$3.4M** > **UIC Campus:** Savings over BAU: **$4.2/MWh**, 15-year NPV: **$3.0M**

$(6,048,000)

Estimated UIUC Contract Cost



Physical PPA

Physical PPA: Summary

Process	> U of I guarantees $/MWh fixed price for electricity generated from new-build RE project and receives RECs and electricity at campus. Excess generated electricity is sold back to grid at floating market rate. > Physical PPA would directly reduce U of I's purchased load, if consumed, and provide hedge. If not consumed and resold, it would not impact U of I purchased electric load > Located in Illinois
Additionality	> Enables creation of new renewable energy generating facility; commitment to purchase electricity and RECs allows solar developer to raise 3rd party financing to build project
Economics	> **UIUC Campus:** Subsidy over BAU: $9.7/MWh, 15-year NPV: $7.9M > **UIC Campus:** Subsidy over BAU: $8.4/MWh, 15-year NPV: $6.0M

$13,095,000

Estimated UIUC Contract Cost

RE Solution Comparison Table for UIUC

Most Favorable

Least Favorable

Criteria	Sub Criteria	REC Purchase	Onsite Solar	Indirect PPA (MISO)	Indirect PPA (TX)	Indirect PPA (IL)	Physical PPA (IL)
Economics	> Estimated Contract Cost • Levelized Subsidy / Savings ($/MWh) • NPV ($)	$2.3M $1.7/MWh $1.6M	$16.6M $12.3/MWh $9.9M	**$5.0M** **$3.7/MWh** **$2.9M**	$6.0M $4.2/MWh $3.4M	$11.1M $8.2/MWh $6.6M	$13.1M $9.7/MWh $7.9M
Environmental Impact	> Additionality	> No	> Yes	> Yes	> Yes	> Yes	> Yes
Risk	> Downside risk	> Low	> High	> High	> High	> High	> High
	> Price volatility	> High	> Medium	> Medium	> Medium	> Medium	> Medium
Ease of Implementation	> Ease of pre-contract execution and negotiations	> Easy	> Difficult	> Medium	> Medium	> Medium	> Difficult
	> Ease of post-contract execution management	> Easy	> Difficult	> Medium	> Medium	> Medium	> Difficult
Location	> Financial benefits in Illinois	> No	> Yes	> No	> Yes	> Yes	> Yes

** MISO is the Midcontinent Independent System Operator or local ‘in-region’ grid for UIUC and a nearby and interrelated grid for UIC

Thank you

Presented by Dr. Ehab Kamarah