REC Arbitrage

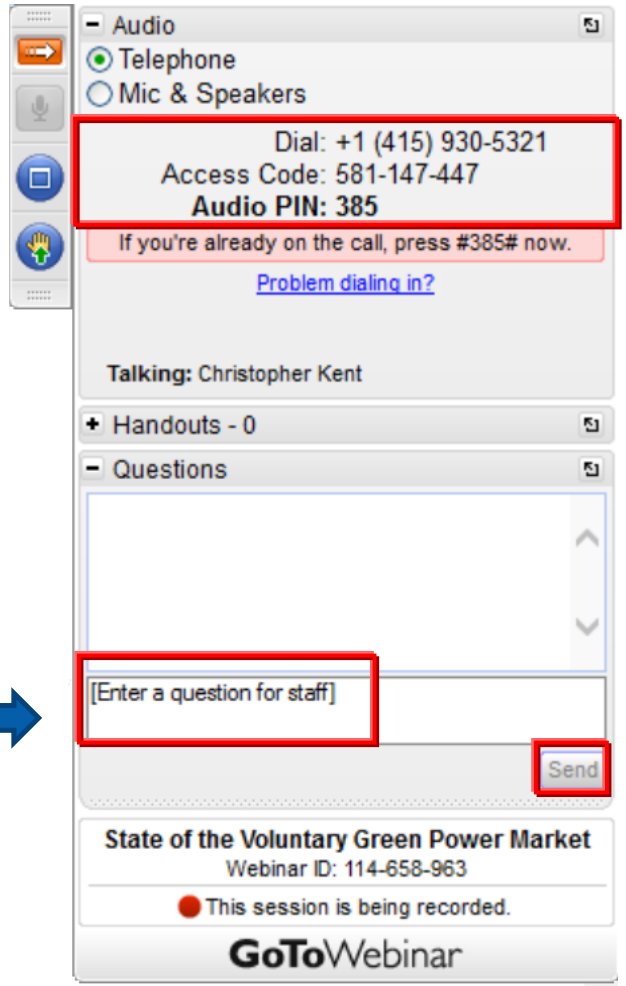
January 17, 2018

Speakers and Agenda

- Speakers
  - Christopher Kent, Program Manager, Green Power Partnership
  - Kevin Hagan, Director of Corporate Responsibility, Iron Mountain
  - Jeremy King, Director of Sustainability & Campus Improvement, Denison University
- Agenda
  - RECs & REC arbitrage overview
  - Case Studies
    - Iron Mountain
    - Denison University
  - Question and Answer Session

Webinar Logistics

Open and close your control panel



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Type in your questions here

Hit "send" to submit your questions

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Green Power Partnership Overview

- Summary
  - The U.S. EPA's Green Power Partnership is a voluntary program that encourages organizations to use green power.
- Objectives
  - Reduce U.S. greenhouse gas emissions
  - Expand the voluntary green power market
  - Standardize green power procurement as part of best practice environmental management
- Program Activities
  - Provide technical assistance and tools on procuring green power
  - Provide recognition platform for organizations using green power in the hope that others follow their lead
- 1,500+ Partners procure over 44 billion kWh annually

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Upcoming Webinar

- State of the Voluntary Green Power Market
  - Wednesday, February 21, 2018 1:00 PM – 2:00 PM EST

Register today!

https://www.epa.gov/greenpower

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What is a Renewable Energy Certificate (REC)?

- A REC is a tradeable, market-based instrument that represents the legal property rights to the "renewable-ness"— or all non-power attributes—of renewable electricity generation.
- A REC is created for every Megawatt-hour of renewable electricity generated and delivered to the utility grid
- A REC includes the following information:
  - Type of renewable resource
  - Location of renewable resource
  - Date stamp or vintage of generation
  - Emissions profile of the generating resource
  - Unique identification number

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Why are RECs important?

- RECs are the currency of renewable energy markets
  - Both compliance & voluntary markets
  - Allow access to, allocate, and claim use of renewable generation on a shared grid
- Influence electricity market dynamics by allowing the expression and aggregation of consumer preferences for specific forms of electricity generated from renewables
  - REC procurement reduces available REC supply sending a demand signal to the market to develop more supply
- Incent new renewable energy project development
  - Voluntary users can qualify their preference for specific renewable technologies
  - States can spur development through mandated programs (SREC programs)
- Legal instrument conveying to owner the exclusive rights to make claims about "using" or "being powered with" the renewable electricity associated with that REC and thus avoid the double counting of the same generation attributes by another party.
- Tool used for meeting corporate goals for GHG reporting as well as for state policy mandates under Renewable Energy Portfolio (RPS) standards

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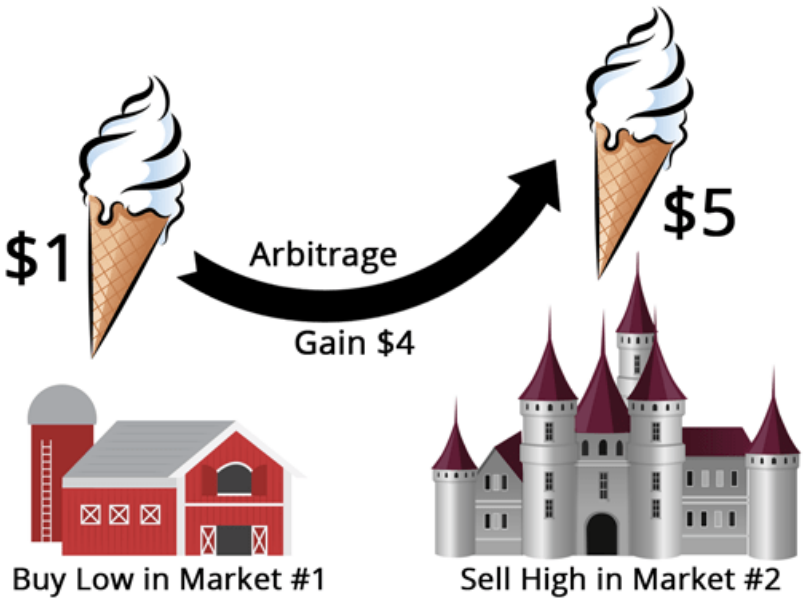
What is an Arbitrage?

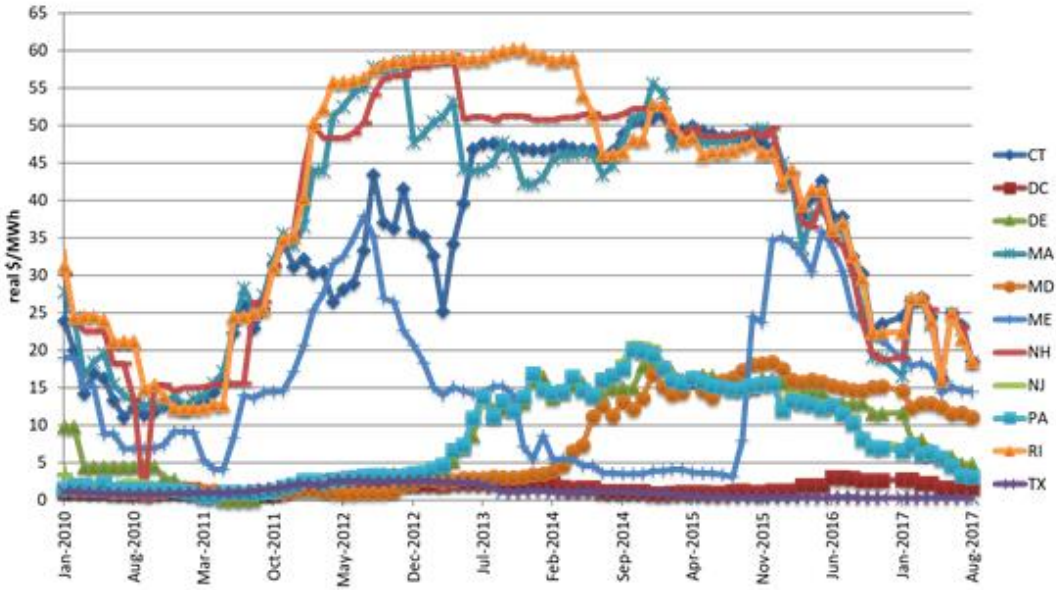
- In economics and finance, **arbitrage** is the practice of taking advantage of price differences between two or more markets
  - Striking a combination of matching deals that capitalize upon the imbalance, the profit being the difference between the market prices.
    - Source: https://en.wikipedia.org/wiki/Arbitrage



What is a REC Arbitrage?

- REC arbitrage occurs when RECs from one renewable electricity project are sold and replaced by less expensive RECs from another renewable electricity project.

REC Prices



Compliance-eligible Wholesale REC Prices (excluding solar RECs)

Voluntary National Wholesale REC Prices (All Resources)

Source: NREL

Why REC Arbitrage

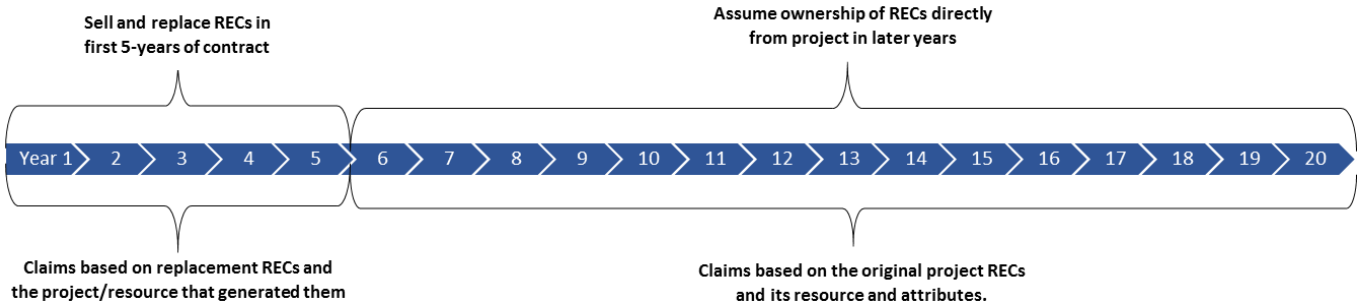
- REC arbitrage offers consumers in markets with high REC prices a means to simultaneously achieve two competing objectives:
  - improve the economics of their renewable electricity procurement, and
  - substantiate renewable electricity use and carbon footprint reduction claims.

How is REC Arbitrage Done?

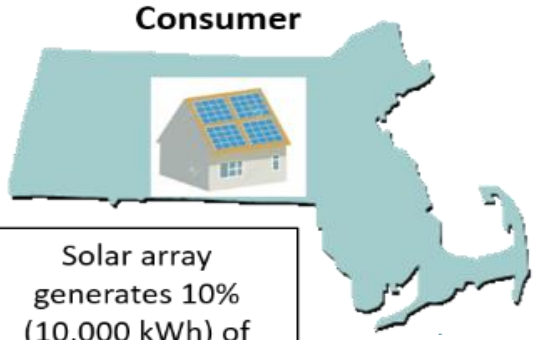
- Contractually Specified
  - Power purchase agreement (PPA) specifies that replacement RECs are provided in place of the project's RECs. Third-party owner of project is contractually conveyed project's RECs.
- Separate Transaction
  - Consumer engages in a separate transaction with a renewable energy provider, such as a REC marketer, to purchase replacement RECs for their self-financed renewable energy project or the RECs associated with their PPA.

Additional Considerations

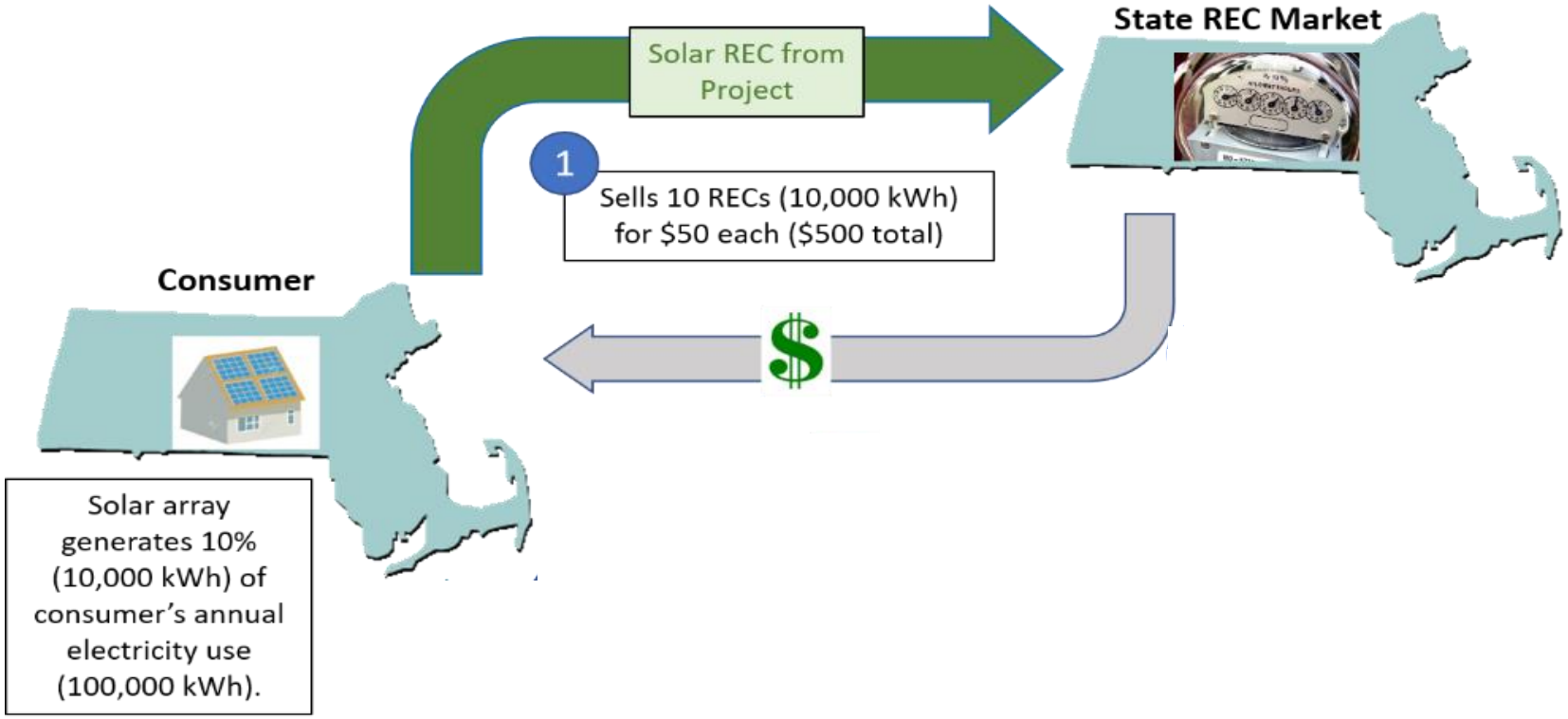
- Exchange ratio of arbitrage
  - Electricity consumers can structure their arbitrage at different exchange ratios to fit their needs and objectives.
  - Project and replacement RECs do not need to be exchanged on a 1:1 ratio.
- Term of REC arbitrage
  - Electricity consumers can shorten the length of the arbitrage arrangement relative to the full term of their purchase contract or ownership of the renewable energy project.
  - Consumer could receive replacement RECs for first portion of their electricity purchase term, then receive the project's RECs for second portion, each of which affords the consumer different financial values and environmental claims.

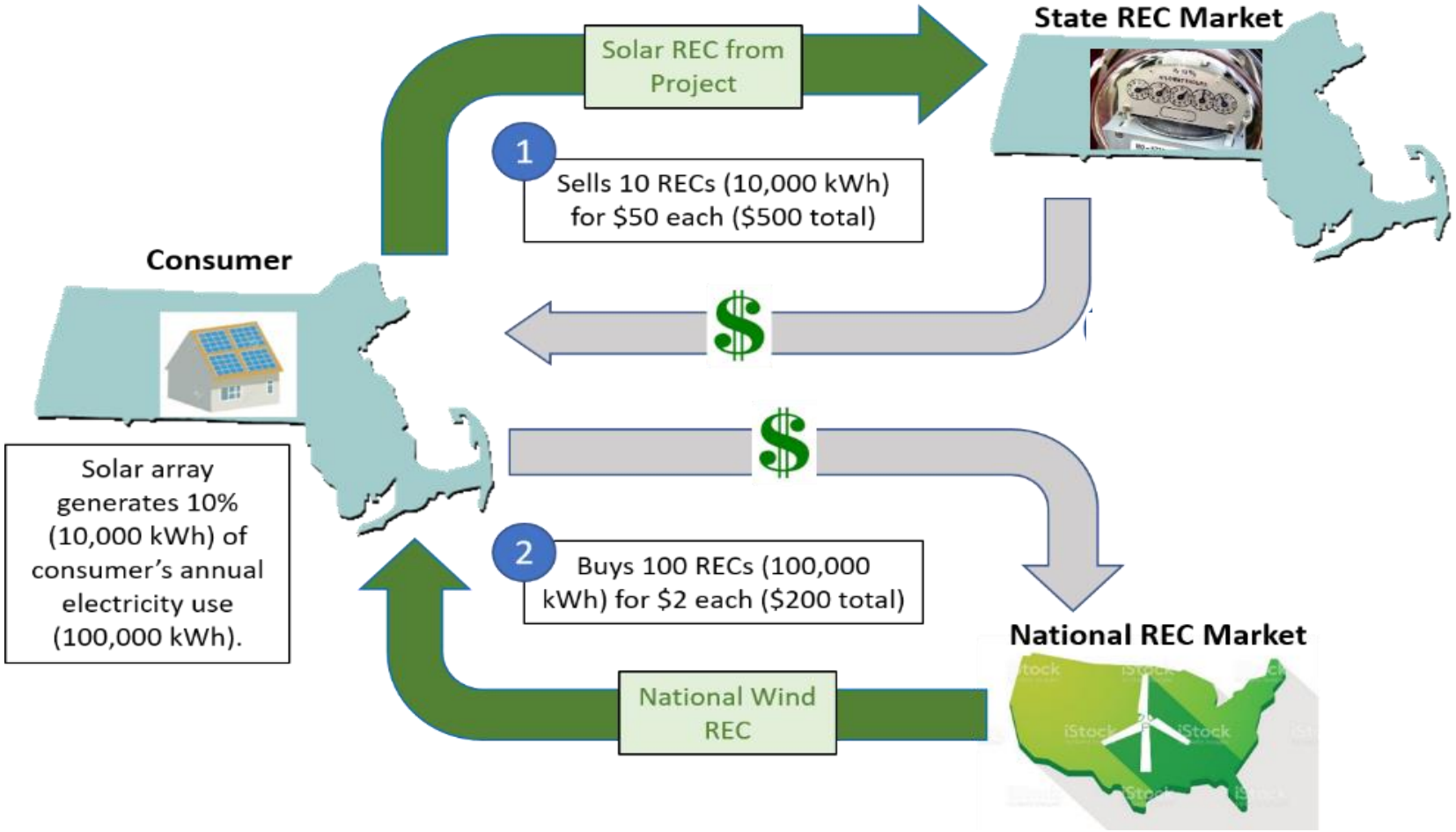


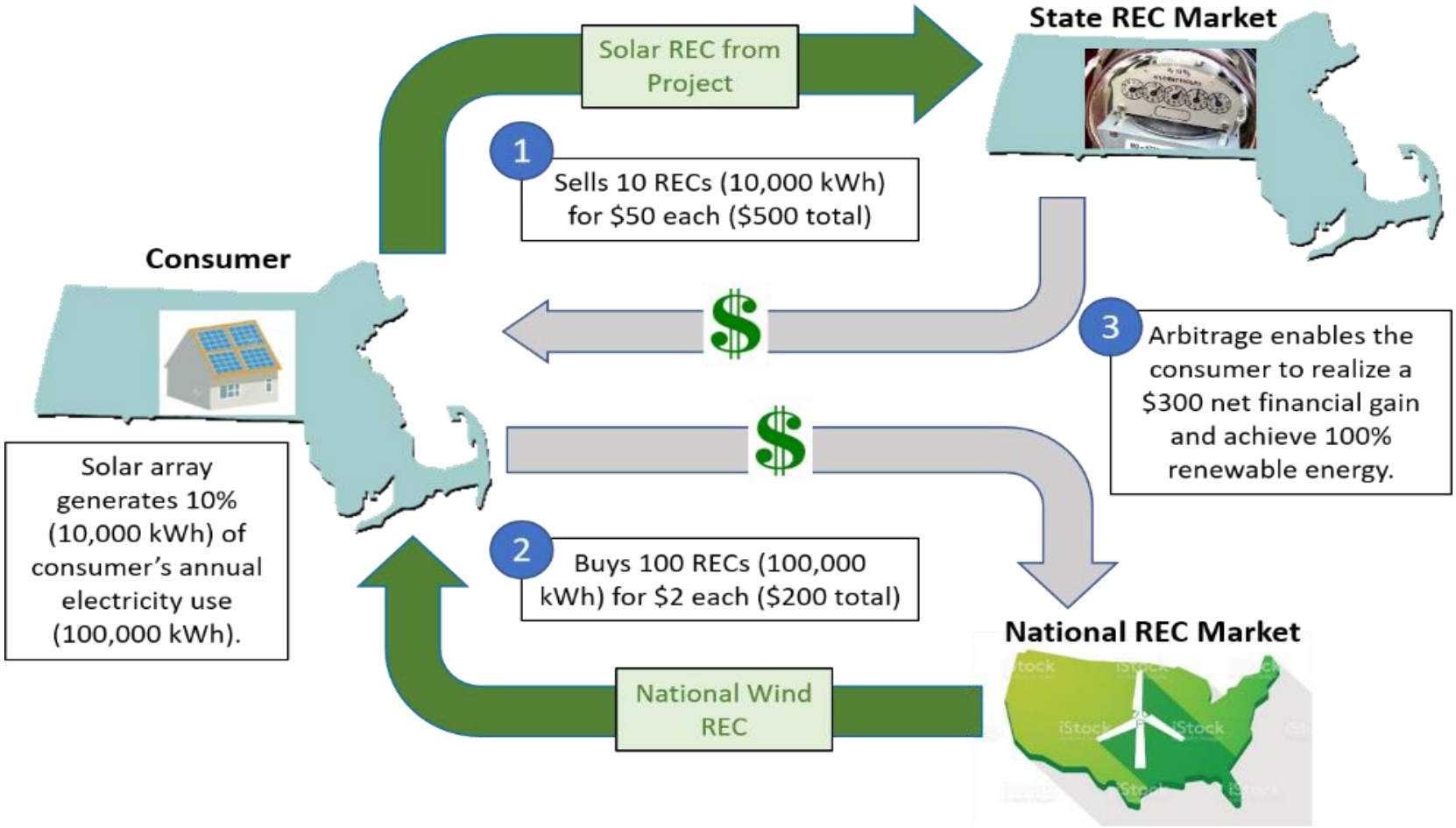
Example



Solar array generates 10% (10,000 kWh) of consumer's annual electricity use (100,000 kWh).


State REC Market
Solar REC from Project
1
Sells 10 RECs (10,000 kWh) for $50 each ($500 total)
Consumer
$
Solar array generates 10% (10,000 kWh) of consumer's annual electricity use (100,000 kWh).


State REC Market
Solar REC from Project
1
Sells 10 RECs (10,000 kWh) for $50 each ($500 total)
Consumer
$
$
Solar array generates 10% (10,000 kWh) of consumer's annual electricity use (100,000 kWh).
2
Buys 100 RECs (100,000 kWh) for $2 each ($200 total)
National REC Market
National Wind REC


State REC Market
Solar REC from Project
1
Sells 10 RECs (10,000 kWh) for $50 each ($500 total)
Consumer
$
3
Arbitrage enables the consumer to realize a $300 net financial gain and achieve 100% renewable energy.
Solar array generates 10% (10,000 kWh) of consumer's annual electricity use (100,000 kWh).
$
2
Buys 100 RECs (100,000 kWh) for $2 each ($200 total)
National REC Market
National Wind REC

Economics and Claims-based trade-offs

	Improves economics of electricity procurement	Enables electricity consumer to substantiate renewable electricity "use" claims
Project REC retained by developer (No arbitrage)	Yes (by the amount of the REC price)	No
Project REC conveyed to electricity consumer (No arbitrage)	No	Yes (using the project RECs)
REC arbitrage	Yes (by the difference between the project REC price and the replacement REC price)	Yes (using the replacement RECs)

Advantages and Challenges

Advantages

- Decreases the relative cost of using renewable electricity.
- Enables consumers a means to legally substantiate renewable electricity use claims.
- Reduces a consumer's carbon footprint and a universally accepted accounting practice in standard GHG accounting protocols.
- Can be easily executed through a PPA or separate contract.
- Provides flexibility and optimization of environmental and economic objectives.
- Allows consumers to support a robust national voluntary REC market.

Challenges

- Increases the complexity of an organizations "story" to stakeholders about its renewable electricity use.
- Since renewable electricity use claims must be associated with the replacement RECs, arbitrage creates a disconnect between the consumer and their renewable electricity project
- For consumers purchasing electricity directly from a renewable energy project, REC arbitrage requires additional contract language and negotiations with the project developer.
- For consumers who own a renewable energy project, REC arbitrage may require additional transactions to sell project RECs and then purchase replacement RECs.

EPA Resources

REC Arbitrage Guidance Document
www.epa.gov/greenpower/procurement-tools-resources

Guide to Making Claims About Your Solar Power Use
www.epa.gov/greenpower/procurement-tools-resources