Retail Market Potential:
Moving from Vertical Integration to Retail Choice

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Exelon: An Industry Leader

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Exelon Utilities Overview

Note: Rate base number is Exelon and PHI combined and denotes year-end; revenue number accounts for PHI revenue as of March 24, 2016 merger date.

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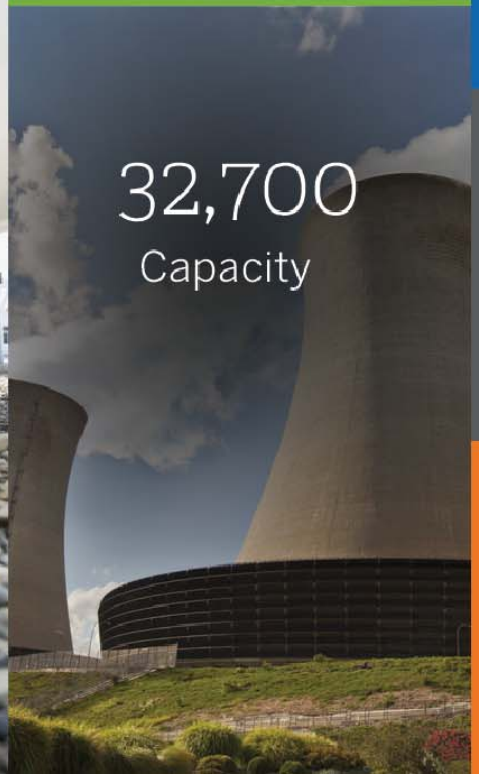
Exelon Generation Overview

#1
Lowest carbon intensity among large power generators



#1
Retail electricity provider in the country

205 TWh
Customer Load Served

94.6%
Nuclear Capacity Factor in 2016

97.2%
Gas and Hydro Dispatch Match in 2016

8th
largest gas provider

203 TWh
Generation Output

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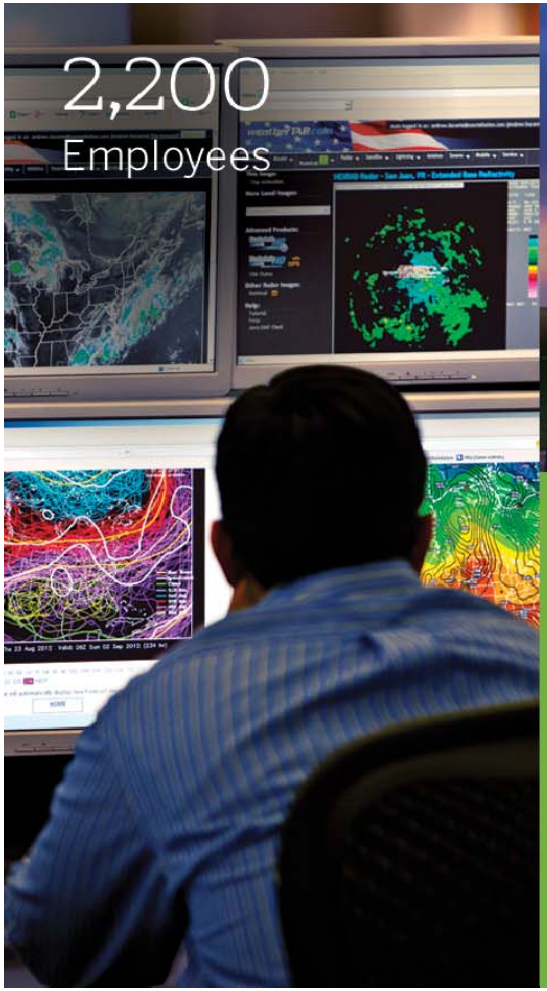
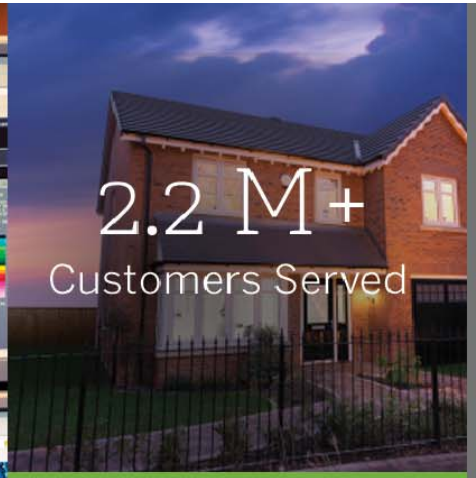
Constellation Overview





In 2016, retired
2.9 million
RECs for customers, enabling them to avoid approximately
1.51[1] million
metric tons of GHG emissions and support the use of renewable power generation

#1 Retail
Retail Electricity Provider in the U.S

8th largest
gas provider in the U.S.

1.6 TCF
Gas Delivered

48
Operate in 48 States

27,000
Volunteer Hours

(1) As calculated based on the national average generation supply mix used in EPA eGRID2014.

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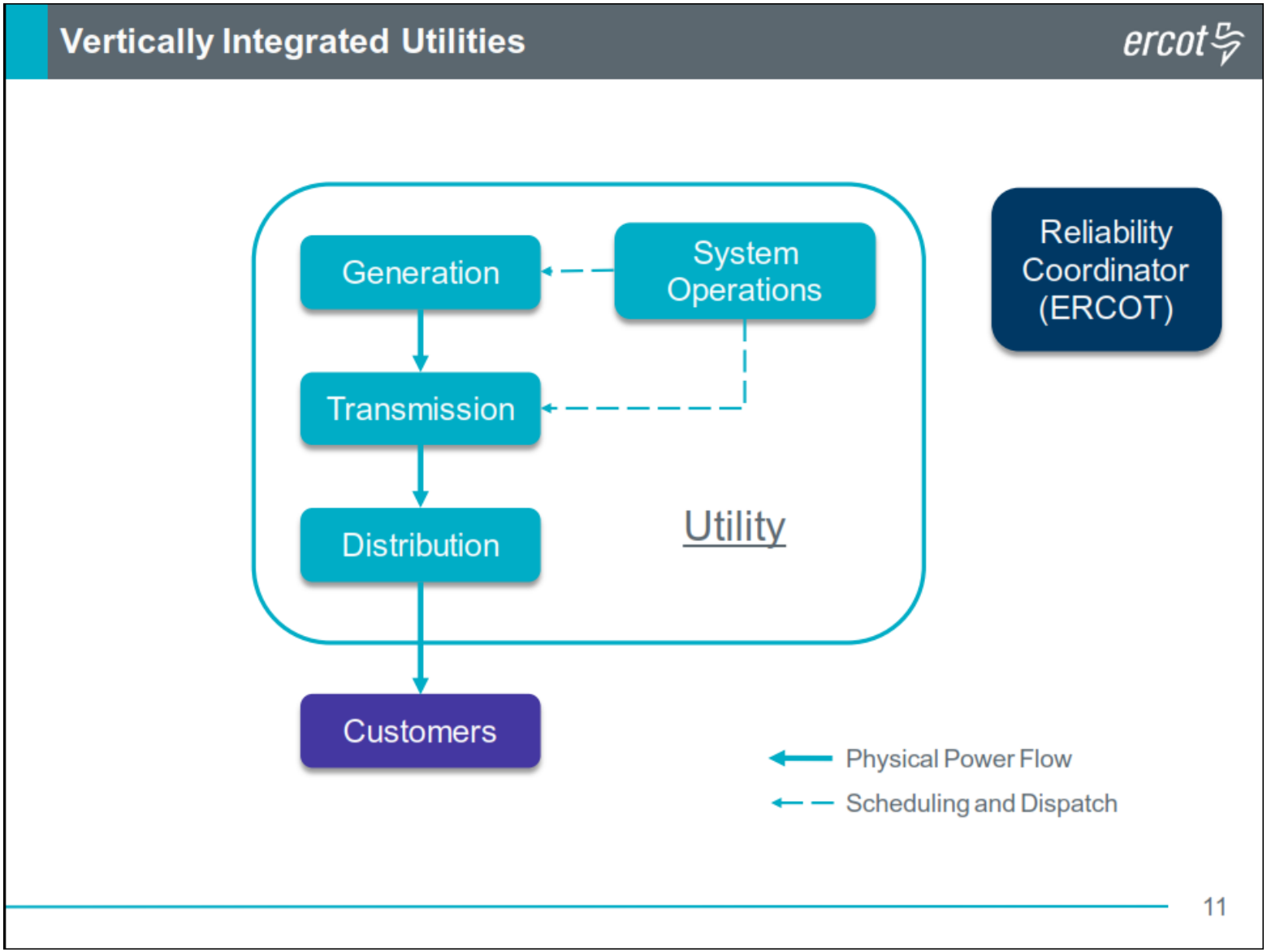
Functions in Vertically Integrated Utilities



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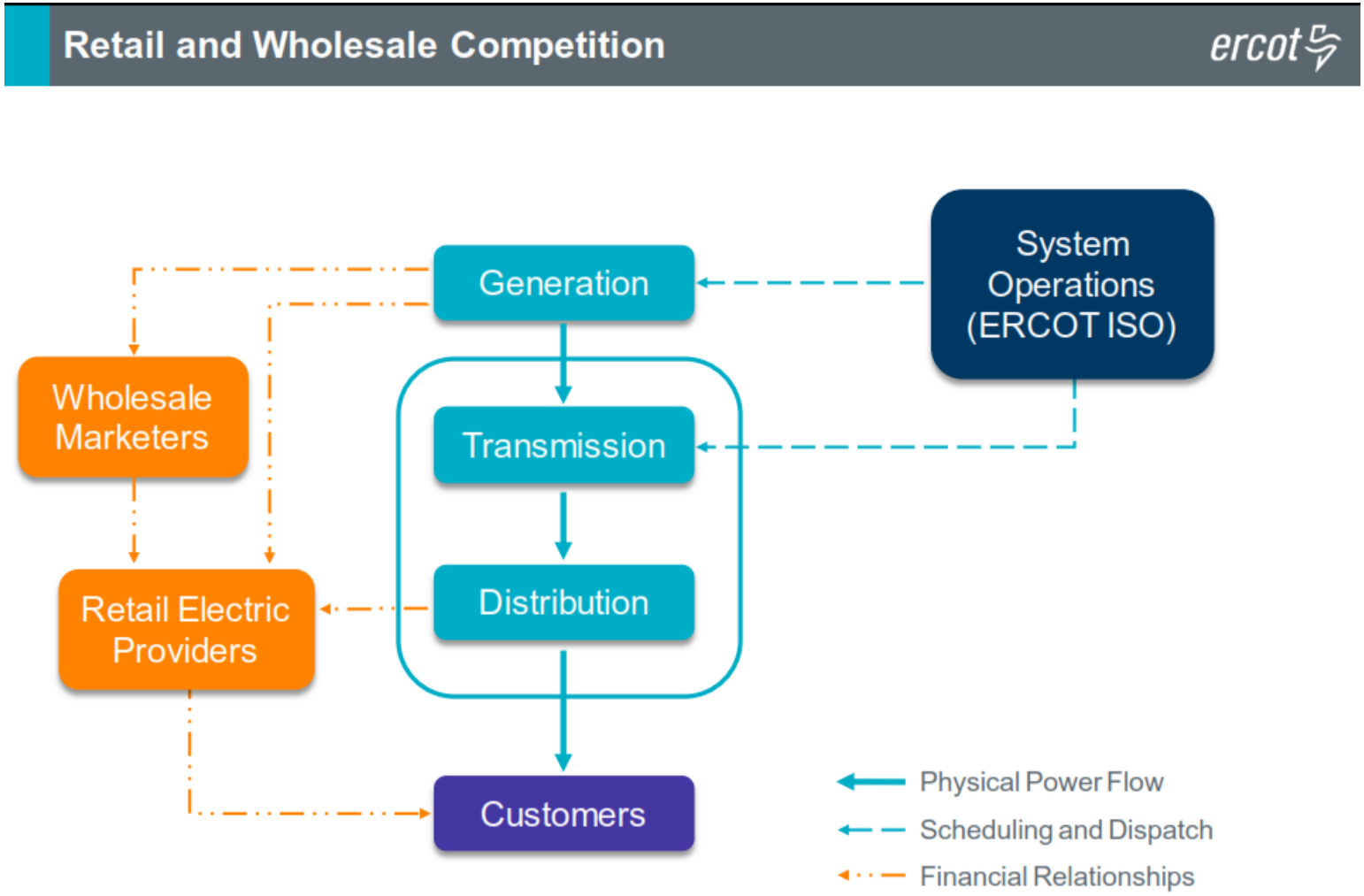
An Organized Market : Functions and Entities within Wholesale and Retail Competition



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Nevada's Current 704B retail choice program

- "704B" refers to the Nevada statute, enacted in 2001, that permits retail choice for customers with a peak load (on contiguous sites) of 1 MW or greater
  - The customer files an application commencing the exit proceeding at the PUCN.
  - The supplier and the customer enter into a supply agreement.
  - The PUCN must approve the customer's application, and the customer must pay an exit fee designed to avoid shifting costs to other customers.

Nevada's Current 704B Retail Choice Program

- What changes for the customer and utility under 704B?
  - The customer signs transmission (NITS) and distribution service agreements with the utility that includes providing or paying for ancillary services necessary to maintain reliability.
  - The customer pays for and NV Energy installs meters that provide usage information to the customer and the utility.
  - The customer's supplier provides usage forecasts to the utility.
  - The customer's supplier schedules and delivers power to the Nevada hub (like Mead) in an amount that matches the forecasted use by the customer.
  - The power is delivered to the customer's delivery point via the NV energy transmission and distribution system under NITS and a distribution agreement.
  - Differences between the forecasted/scheduled quantities and the actual usage are managed through the organized EIM market, and supplier pays NV Energy for those imbalances.

Transitioning from 704B to full retail choice

- Could the mechanics of 704B be used to facilitate retail choice?
  - In concept, the existing 704B framework *could* serve as the launching point for broader retail choice because the EIM interface has already modelled the resources and loads (customer delivery points) that exist on the NV Energy system for dispatch purposes, a key requirement in a retail choice market.
  - However, there would be *challenges* associated with simply expanding 704B practices.
    - The scale and number of transactions would be much larger. The system operator would have to:
      - Manage large quantities of load forecast data and large numbers of power schedules
      - Be able to track how customers are using their NITS to manage congestion
      - Settle EIM balances for many customers instead of just a few.

Transitioning from 704B to full retail choice

- Are the wholesale and retail market transitions more efficiently done through membership in an existing organized market (like the CAISO or SPP) or should other systems be utilized or created for this purpose?
  - Some of the key day- to- day functions include:
    - Maintaining the reliability of the system – *Keeping the lights on!!!*
    - Determine and publish market prices for dispatch and ancillary services
    - Manage large quantities of load forecast data and large numbers of power schedules
    - Track how customers are using transmission
    - Settle EIM/market transactions
  - In addition to day to day system and market operations, the transmission and resource planning process will likely need modification to ensure that long term reliability is preserved.
    - Generation Capacity planning/Resource Adequacy
    - Ancillary Service planning
    - Balancing transmission planning with generation capacity

Organized Market Example using ERCOT

Market Participants

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Who are the ERCOT Players?

Qualified Scheduling Entities

Load Serving Entities

Transmission and/or Distribution Service Providers

Resource Entities

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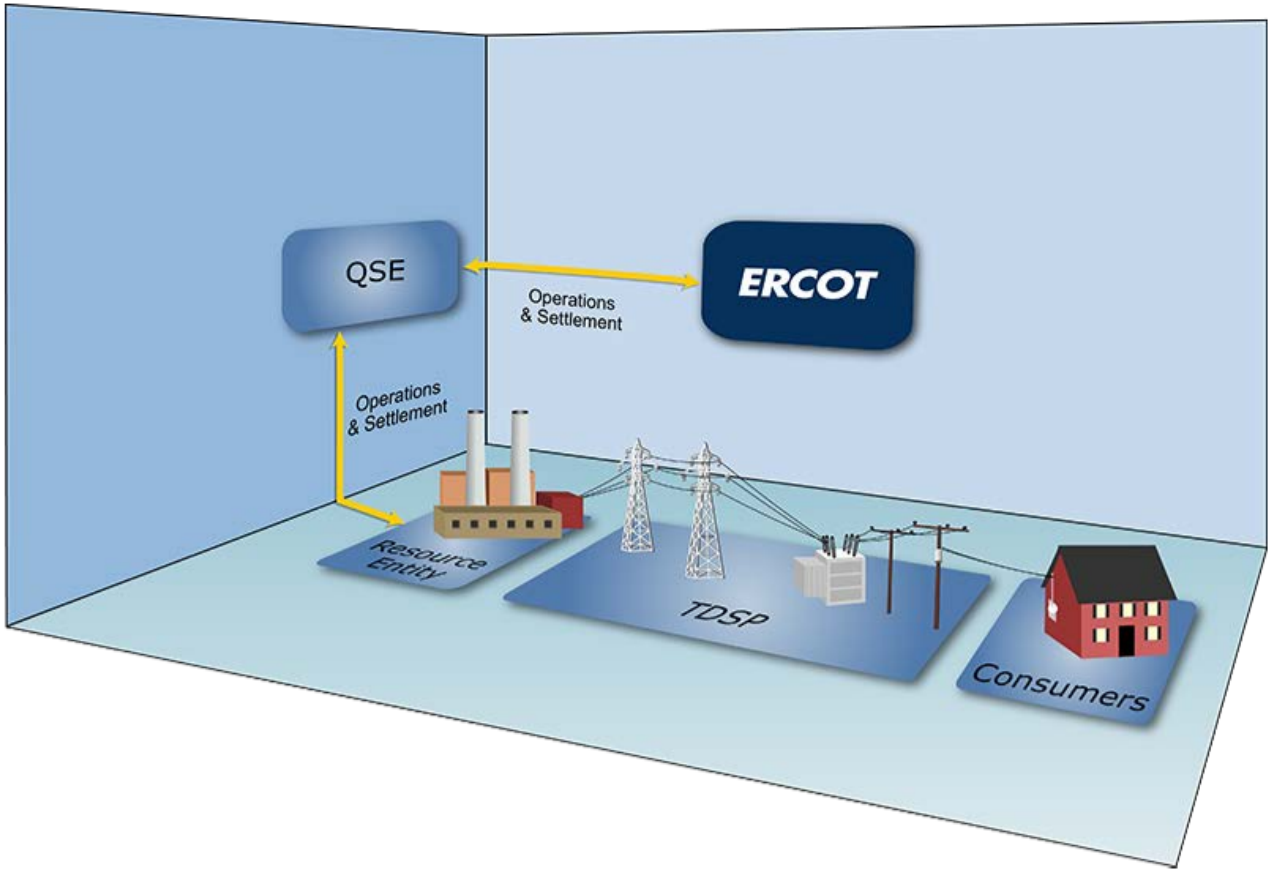
How does generation interact with the market?

Market Relationships

ercot



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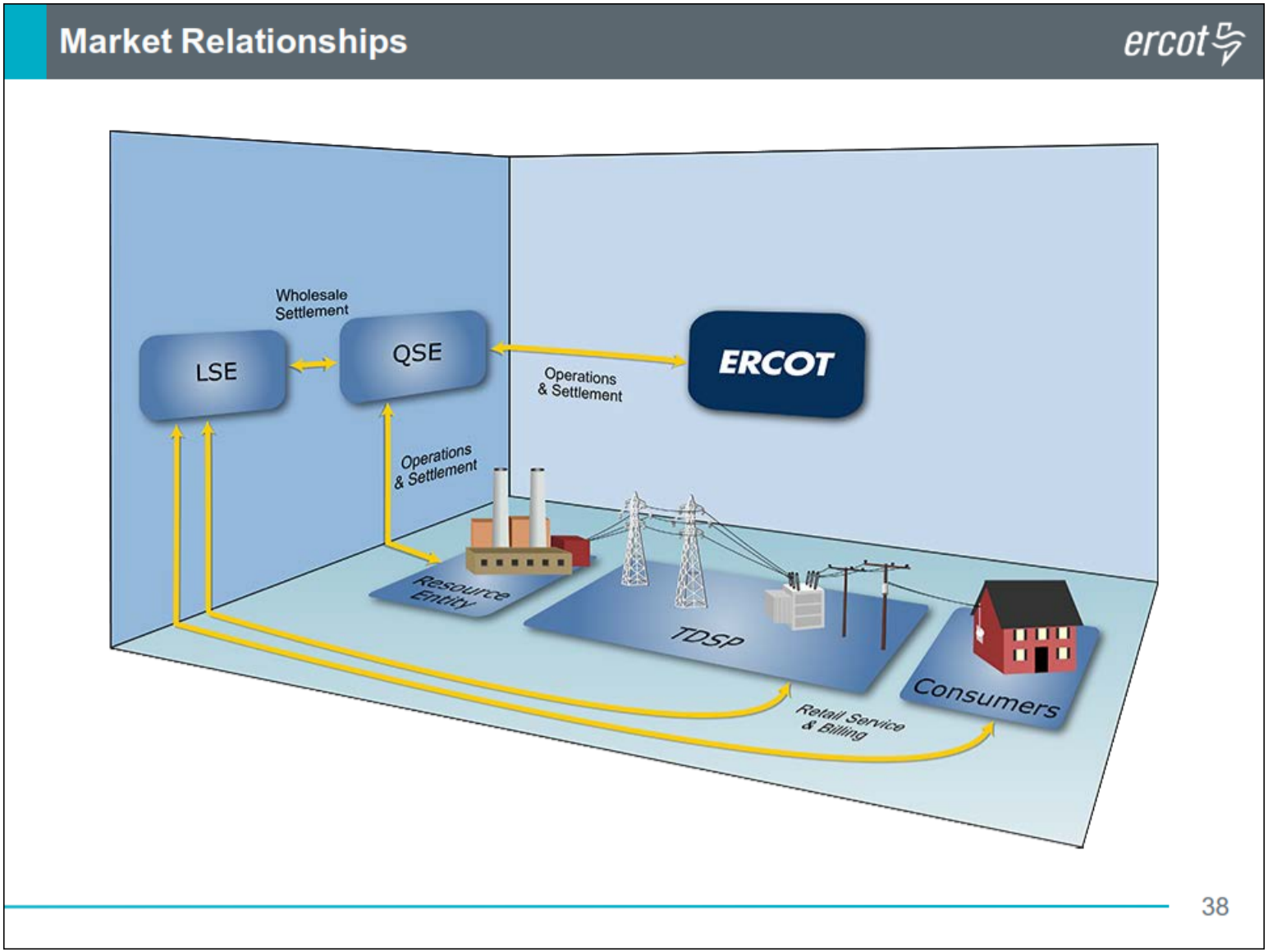
How do customers interact with the market?



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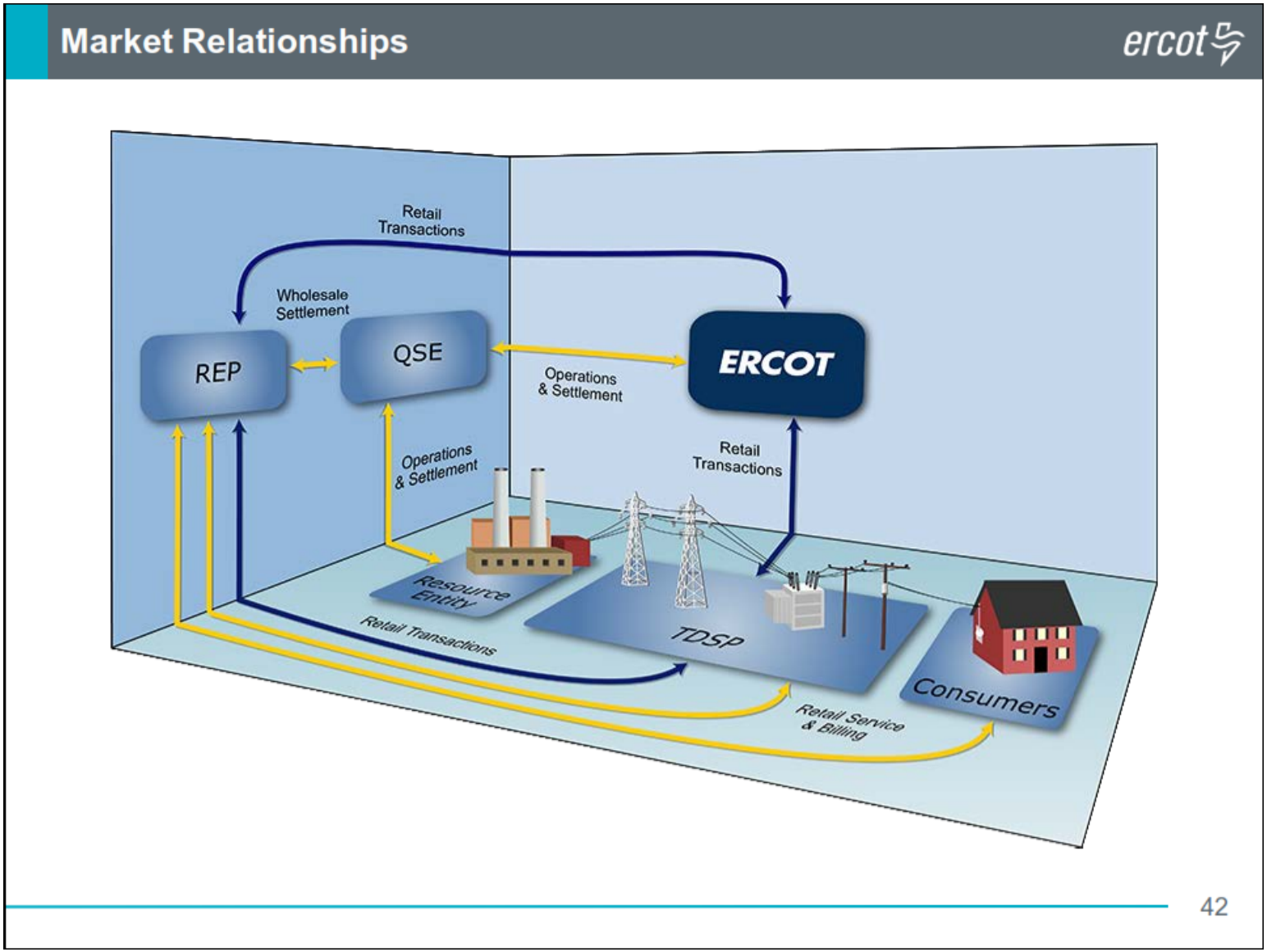
Who tracks which customers are with which suppliers?



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Training Resources

- ERCOT
  - http://www.ercot.com/content/wcm/training_courses/109518/Nodal_101.pdf
  - http://www.ercot.com/content/wcm/training_courses/109630/Retail_101_ILT_05-03-2017.pdf

- PJM
  - http://pjm.com/training/training-material.aspx

- NYISO
  - http://www.nyiso.com/public/webdocs/markets_operations/services/market_training/workshops_courses/Training_Course_Materials/Market_Overview_MT_101/NYISO%20Energy%20Mrkt%20Place.pdf

- MISO
  - https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/Training%20Materials/100%20Level%20Training/Level%20100%20-%20Introduction%20to%20MISO%20and%20Markets.pdf

- ISO-NE
  - https://www.iso-ne.com/about/what-we-do/in-depth

Glossary

- **Ancillary Services**– Physical attributes unique to electricity required to keep the system running. These are generally provided by generation to support the transmission system. They are quantifiable and are priced as part of electric service.
- **Congestion**– When power flows exceed or begin to exceed transmission capability
- **EIM– Energy Imbalance Market** – Dispatches resources across all the participating entities, improving efficiency and providing price transparency.
- **ISO- Independent System Operator**– the entity physically running the system
- **LSE– Load Serving Entity**– the entity that serves customers. In an retail choice environment, it would generally be the retailer supplier.
- **Market Operator**– The entity running the market. May be the same as the system operator.
- **NITS–Network Integration Transmission Service –** allows customers to deliver power to its load
- **QSE– Qualified Scheduling Entity–** An ERCOT term for entities that physically schedule and settle with ERCOT. Each LSE and generator must create or contract with one.
- **REP– Retail Electric Provider – A** type of LSE
- **RTO– Regional Transmission Organization–**– Another description often used synonymously with ISO
- **Resource Entity**– Generally a generating unit, but may be demand response or storage.
- **Resource Adequacy**– A measure of the resources available to meet future demand
- **TDSP—Transmission and Distribution Service Provider**
- **Wholesale Marketers**– Physical and financial entities who buy and sell power but are not necessarily generators or LSEs.

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