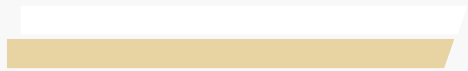
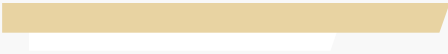


Electricity Markets Track

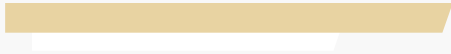


Ground Rules



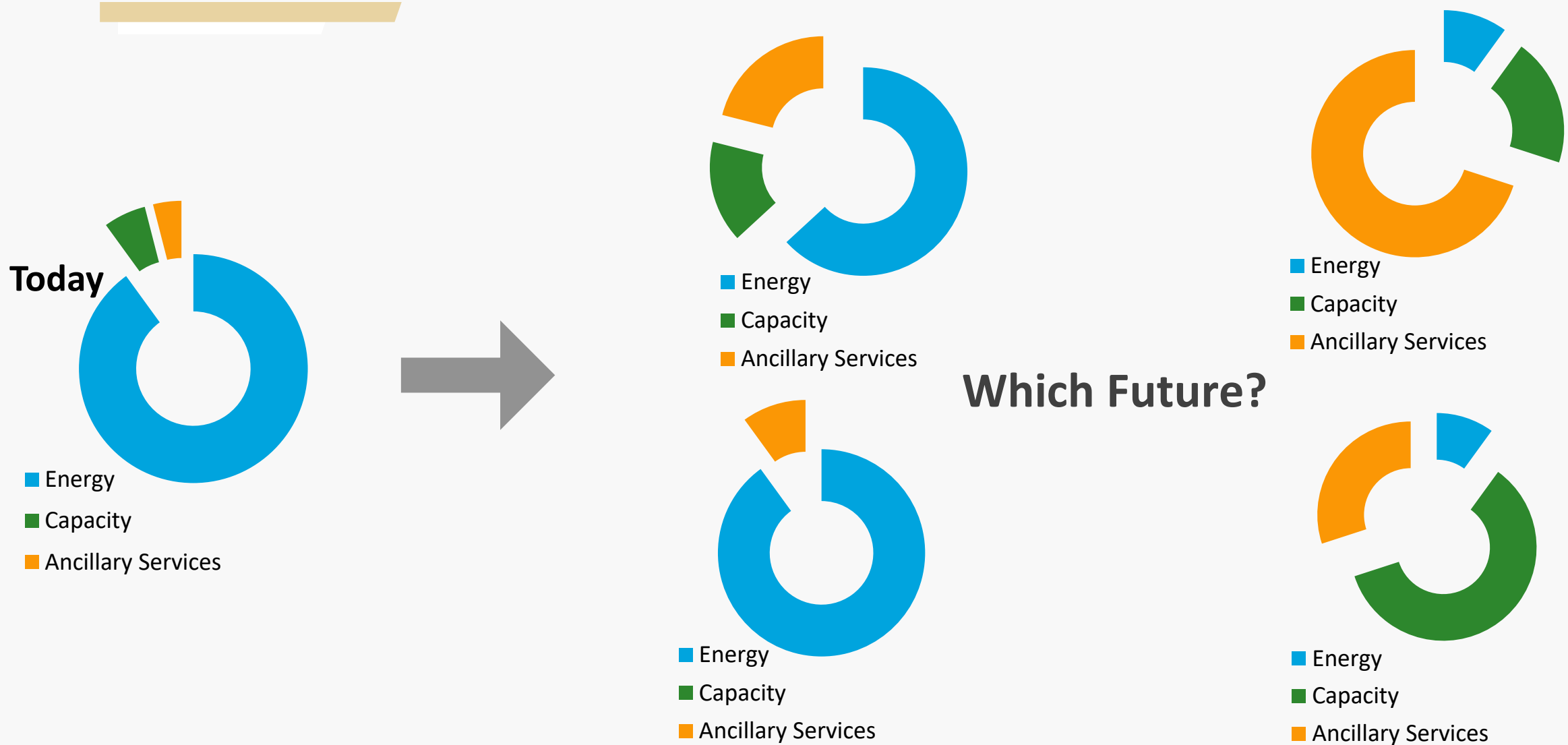
- Chatham House Rules - participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.
- U.S., Europe, Australia, etc., have different market structures – the purpose of this meeting is not to understand and discuss those existing differences, but for common themes on future designs across the globe
- Focus on a challenging but achievable goal. Guidance from conference chairs. 100% instantaneously happening often, but not 100% by energy?

Goal



- Explore how markets can be designed to meet societal, individual and corporate goals in an environment with 100% renewable penetration
 - Reliable, affordable, sustainable, fair

Impact of 100% renewable on current markets



Expectations



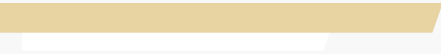
- Societal
- Consumers
- Producers

Societal Expectations



- Optimal allocation of resources
- Social equity
- Sustainability

Consumers' Expectations: Value for Money



- Value:
 - Planned and unplanned total interruptions should be rare
 - Effect of scarcity on daily life or operations should be manageable
- Money:
 - Minimize some function of the operating cost, capital cost and risk
 - Operating cost: purchase electricity from the grid, running own resources
 - Capital cost: behind the meter storage, on-site generation, make demand flexible
 - Risk: probability and magnitude of spikes in the operating cost
 - How consumers balance these two types of costs and risk depends on their access to capital and their risk aversion.

Producers' Expectations



- Return on equity commensurate with risk
- Market
 - Fair
 - Efficient
 - Transparent
 - Stable

Other Expectations?



The Benevolent Monopolist's Perspective



- Reduce capital costs including O&M costs
- Select best locations
 - Geographic diversity
 - Minimize congestion
 - Reduce T&D losses
 - Reduce need for additional T&D infrastructure
- Maximize capacity factor
- Reduce forecasting error
- Meet quality and reliability expectations
- Meet expectations during extreme conditions

Reducing operating costs no longer a primary incentive

Thought Exercises for the Next Day and a Half



Exercise 1 - Clean slate

We have a system with _____, the national government asks this expert group to design from scratch an electricity market structure that will meet the expectations described in the previous slides.

Thought Exercises for the Next Day and a Half

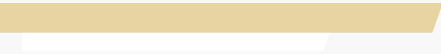


Exercise 2 – How do we get there?

Consider the existing market structures and the potential market structures defined in the previous exercise.

- How do we transition to these new structures?
- How fast can it happen? How fast should it happen?
- What are the obstacles to this transition?

Other Questions



- How do we incentivize the optimal mix of upstream (e.g. extra generation capacity, grid-scale storage) and downstream (e.g. behind the meter resources) investments required to maintain an acceptable level of reliability ?
- Should the generation adequacy goal be revised downward if the current standard becomes very costly?
- If generation scarcity becomes more frequent, how can this be handled in a market context?
- How can consumers who help keep the system in balance be remunerated?
- Global market vs. local (transactive) market

Other Questions?



Approaches that have been proposed



- Energy markets (status quo)
- Capacity markets (e.g. broadband suppliers)
- Unique structures
 - Configuration markets, Delivery markets, platform markets
- Reregulation