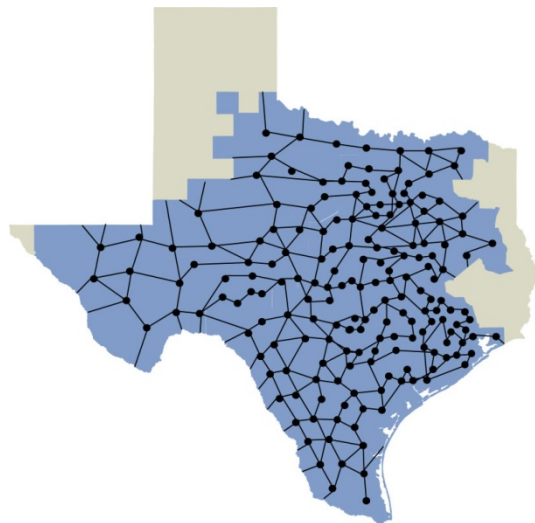


# ***UK ELECTRIC MARKET REFORM APPLICATION TO TEXAS POWER MARKET***

Ingmar Sterzing  
CEIC Seminar  
April 10, 2013

# UK and ERCOT... Strikingly Similar

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- Similar generation infrastructure and generation mix
- Electrically isolated from surrounding regions
- Restructured market with Wholesale and Retail competition
- Almost identical generation reserve margin forecasts
- Implementing reforms to assure generation adequacy

# 2011 Energy Mix

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## Capacity by Fuel Type

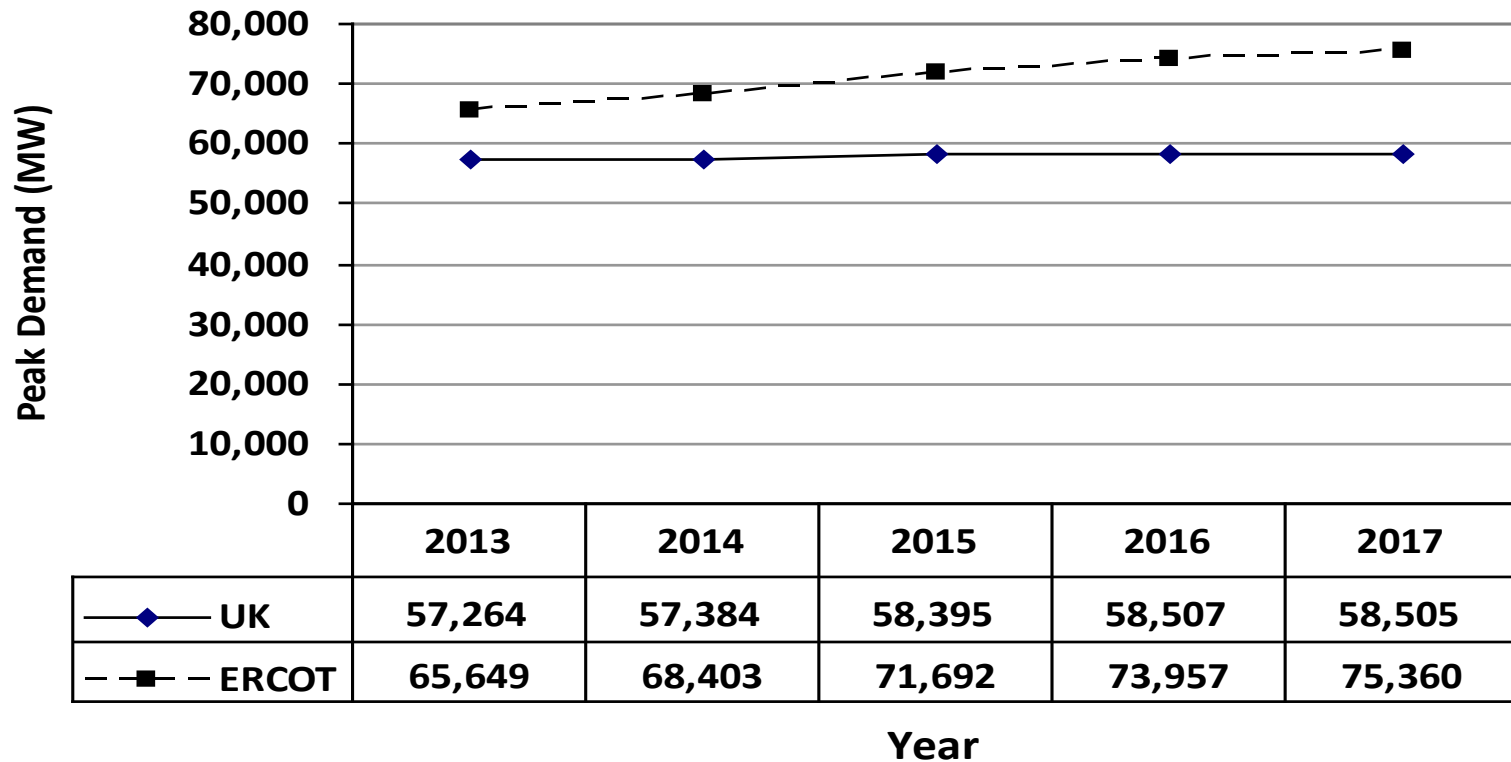
|              | UK        |     | ERCOT     |     |
|--------------|-----------|-----|-----------|-----|
| Fuel Type    | GW        |     | GW        |     |
| Coal         | 23        | 28% | 18        | 22% |
| Gas          | 34        | 42% | 49        | 60% |
| Nuclear      | 10        | 13% | 5         | 6%  |
| Other        | 14        | 17% | 10        | 12% |
| <b>Total</b> | <b>81</b> |     | <b>82</b> |     |

## Generation by Fuel Type

|              | UK         |     | ERCOT      |     |
|--------------|------------|-----|------------|-----|
|              | TWh        |     | TWh        |     |
| Coal         | 109        | 30% | 131        | 39% |
| Gas          | 146        | 40% | 135        | 40% |
| Nuclear      | 69         | 19% | 40         | 12% |
| Other        | 42         | 12% | 29         | 9%  |
| <b>Total</b> | <b>366</b> |     | <b>335</b> |     |

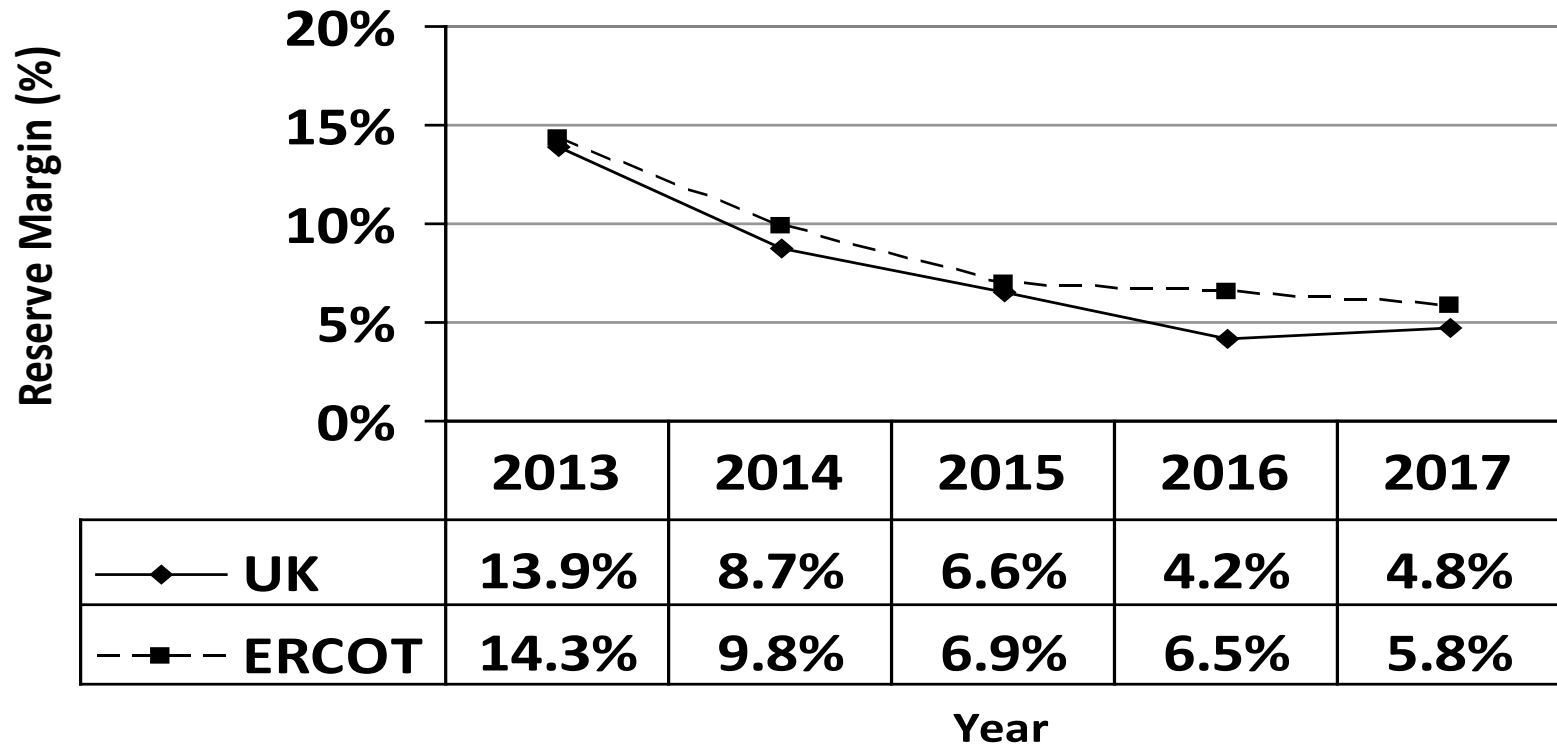
# Peak Demand Forecast

UK and ERCOT Peak Demand (MW)



# Generation Reserve Margin

UK and ERCOT Generation Reserve Margin



# Summary of Comparison

| Characteristic            | UK  | ERCOT  |
|---------------------------|---|--|
| Market Design             | Wholesale and retail competition with centralized Energy-Only market  | Wholesale and retail competition with centralized Energy-Only market   |
| Generation Mix            | Similar generation mix with 82 GW installed capacity, less than 2% import/export capability   | Similar generation mix with 81 GW installed capacity, less than 2% import/export capability  |
| System Load               | Winter peaking system with total load 366 TWh, relatively flat year-to-year load growth but expected to grow with economic recovery   | Summer peaking system with total load 335 TWh, increasing year-to-year load growth   |
| Generation Reserve Margin | Market based optimization. No mandatory standard or capacity market. Declining and forecasted to be below reliability standards by 2015   | Market based optimization. No mandatory standard or capacity market. Declining and forecasted to be below reliability standards by 2015  |
| <b>Natural Gas</b>        | Increasing capacity with higher fuel pricing driven by declining local supply and increasing imports  | Increasing capacity with lower fuel pricing due to increasing availability of local unconventional gas production  |
| <b>Coal</b>               | Declining capacity and declining local fuel supply due to requirement to eliminate fossil plants that do not have carbon sequestration  | Declining capacity and declining local fuel supplies, but ample imports available. Air quality requirements increasing the cost and timing of new coal plant development   |
| <b>Nuclear</b>            | Declining capacity due to retirements   | Stable capacity  |
| <b>Renewable</b>          | Mandatory renewable obligations for energy retailers. Feed in Tariff for distributed renewable systems for homes and businesses. Increasing wind capacity driven by renewable generation mandate. Current capacity does not meet targets. | Mandatory renewable obligations for energy retailers. Increasing wind capacity, driven by federal Production Tax Credit (PTC) and Texas Renewable Portfolio Standard (RPS). Current capacity exceeds 2025 RPS capacity target of 10,000 MWs. |
| Demand Response           | Limited, centralized programs for reliability and market driven programs established at the retail level.   | Limited, centralized programs for reliability and market driven programs established at the retail level.  |
| <b>Emissions</b>          | Increasing regulation of air quality emissions including carbon dioxide reductions. National policy mandate to significantly reduce greenhouse gas emissions by 2050.   | Increasing regulation of traditional air quality emissions. Currently no greenhouse gas regulation or mitigation measures.   |
| Transmission              | Regulated, open access transmission system  | Regulated, open access transmission system with progressive transmission development for Clean Renewable Energy Zones (CREZ)   |

# Market Design Challenges

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|   | UK | ERCOT |
|---|----|-------|
| • Maintaining reliability and supply security                               | +  | +     |
| • Need to meet demand growth  | +  | +     |
| • Operational security, capacity needed to support wind power intermittency | +  | +     |
| • Carbon reduction progress is not sufficient to meet policy objectives     | +  | -     |
| • Lack of sufficient investment in new generation capacity                  | +  | +     |
| • Long-term investment price signals are uncertain and volatile             | +  | -     |

# Proposed UK Reforms

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## Feed-in-Tariff, Contract for Differences (CfD)

- Long term (15+ years) instrument used to provide long term revenue certainty to encourage investment in low carbon generation
- Load pays when market price is below strike price, load receives payment when market price is greater than strike price

## Targeted Capacity Market

- Near term mechanism to assure generation adequacy
- Targeted capacity market will focus only on a limited capacity needed to assure reliability during periods of high demand, or with large wind fluctuations

## Carbon Price Support (CPS) and Emissions Performance Standard (EPS)

- A carbon floor price will be established to provide carbon pricing certainty not present in the EU trading scheme
- EPS to limit the amount of CO<sub>2</sub> emitted by new fossil fuel power stations as a regulatory backstop to CPS



# Proposed ERCOT Reforms

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## Energy Only

- Maintain energy only market and allow price levels to rise as needed to provide sufficient revenue for new entrants
- Modify existing mechanism to minimize price intervention
- Provide expanded security measures for emergency periods

## Capacity Market

- The current proposal includes a three year forward capacity market.
- The market would operate across the entire region.
- The design would seek to maintain Energy Only scarcity price signals.

## Demand Response

- Proposed reforms recognize the importance of an efficient Demand Response mechanism to support an Energy Only market
- Current mechanisms are in place to provide the system operator with demand response capacity during periods of reliability.
- Policy reforms are focused on improving the participation of demand in energy markets

# UK and ERCOT Market Reforms

| Mechanism   | Market | Reform  |
|---|--------|---|
| Energy Only   | UK     | Maintain, but less inclined to support high prices  |
|   | ERCOT  | Maintain and improve price signals by raising price caps  |
| Capacity Market   | UK     | Limited capacity market for reliability purposes only   |
|   | ERCOT  | Possible three year forward market  |
| Feed In Tariffs (FiT), with Contract for Differences (CfD)    | UK     | Long term contract for differences to provide revenue certainty for low carbon generation investment  |
|   | ERCOT  | No such reform is under consideration.  |
| Demand Response   | UK     | Successful energy efficiency programs. Limited mechanisms to procure and call on Demand Response for reliability purposes. Desire to increase DR. |
|   | ERCOT  | Policy reforms are focused on improving the participation of demand in energy and/or capacity market.   |
| Carbon Price Support and Emissions Performance Standard (EPS) | UK     | Reinforcement of renewable and carbon reduction policies  |
|   | ERCOT  | No such reform is under consideration   |

# Conclusions

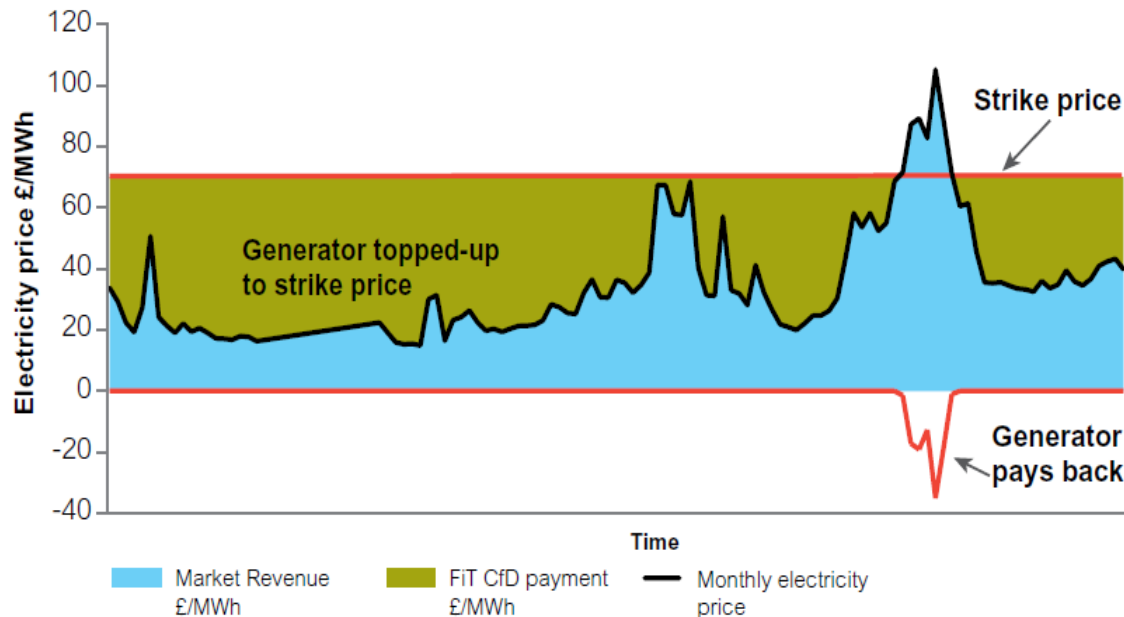
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- **Short term**
  - Both markets desire to retain Energy Only as primary market mechanism
  - UK is primarily focused on a limited capacity market
  - ERCOT is considering a broader, capacity market
- **Long term**
  - UK retirements, low carbon, and renewable factors are driving additional generation investment reforms (CfD, CPS, and EPS)
  - ERCOT reforms are not focused on long term generation mix
  - ERCOT is not likely to implement emission reduction programs
  - **ERCOT may consider a CfD if the current market design results in an overconcentration in one form of generation**

# Texas/ERCOT CfD Approach

Cost effective mechanism to encourage investment in new generation to meet resource requirements.

- A Contract for Difference (FiT CfD) is a long-term contract between an electricity generator and a contract counterparty. The contract enables the generator to stabilize its revenues at a pre-agreed level (the strike price) for the duration of the contract. Under the FiT CfD, payments can flow from the contract counterparty to the generator, and vice versa.
- A 'two-way' FiT CfD provides for payments to be made to a generator when the market price for its electricity (the reference price) is below the strike price set out in the contract. However, when the reference price is above the strike price, the generator pays back the difference. That is, generators return money to consumers if electricity prices are higher than the agreed tariff.



# Current Challenge

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- **Low, marginal prices do not support investment in new generation**
  - Short term marginal prices are on average too low to encourage sufficient investment in new generation.
- **High short-term energy only prices are no guarantee of future prices**
  - High short-term energy only prices are not guaranteed to result in new generation when needed. Investors are still reluctant because of timing issues, by the time the plant is on-line (3+years) the price could drop again. High prices now do not guarantee high prices when the plant is operational. This issue is even more problematic for longer term projects that require a 6-8 year duration for development and construction.
- **Capacity markets have problems**
  - A capacity market tends to fund existing generation and is not directed specifically at new generation investment. Therefore, the majority of the capacity market benefit flows to existing generators not to new generation investment.
- **Year-to-year shortage and emergency conditions are not viable for a robust, growing economy.**
- **New generation investors are seeking revenue certainty in the first few years of operation of a new facility.**
- **No long-term contracting incentive**
  - Retail electric providers do not want to contract long term because they are benefiting from purchasing low average power based on marginal pricing. Power purchase agreements with terms of 5-10 years are too risky for competitive retailers.

# Things to Avoid

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- Cannot return to “regulated” model, but need some form of revenue certainty for investment
- Putting the consumer at risk for development, construction, or operational risk.
- Work within the existing market structure to the extent possible. Avoid/minimize government/regulator intervention.

# Contract for Differences (CfD) Option

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- A CfD would be awarded to a generation supplier that would invest and build a new generation facility. The CfD would set a strike price between the CfD counterparty and the supplier for a term of 5+ years.
- The mechanism would be directed solely at new generation investment not existing generation.
- The CfD would not cover construction risk. If the supplier does not complete the facility or if it costs more than expected to complete the facility, the CfD would not provide relief. Therefore, the consumer does not bear the risk of construction.
- Energy supplied from the new facility would be offered into the market as normal. The CfD administrator would perform a secondary settlement. If the market price is greater than the strike price the excess funds would be return to load on a load ratio share. If the market price is less than the strike price the supplier would receive a make-up payment. Load would pay the makeup payment on a load ratio share basis.
- If the market price is below the strike price for an extended period then the payment can be seen as a hedge payment or insurance payment to have that capacity in the market.
- If the market price is above the strike price for an extended period then load receives the up-side benefit and the supplier does not receive a windfall profit.
- The mechanism would be sufficient for a new generation project to receive financing.
- The process would be transparent to help prevent corrupt practices.

# CfD Administration:

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- The CfD is optional, suppliers can continue to investment and build generation without a CfD.
- A central authority, ERCOT or Private Party, would be established as the administrator.
- PUC or ERCOT establish capacity shortfall target based on forecast. This capacity amount could be conservative and account for uncertainties as it is for generation that will be on-line in 3+ years. The amount would still allow for shorter term fluctuations around near term uncertainties.
- Suppliers with projects would first be qualified and due diligence would be performed to assure that the projects are viable and meet requirements.
- If needed the characteristics of the capacity could be specified such as peaking, base load, non-fossil etc. to meet system operating needs.
- A process such as an auction could be used where the qualified suppliers compete to win a contract for difference. The competitive process assures that the CfD strike price is optimized for a particular resource.



# **Congratulations!**

## **Three Rivers Association for Energy Economics, USAEE Local Chapter**

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### **Inaugural Meeting and May Dinner**

**Speaker:**

**Howard, Gruenspecht, Ph. D.,  
Deputy Administrator, Energy Information**

**Date: Monday, May 20, 2013**

**Time: 6:00 pm – 7:30 pm**

**Venue: Carnegie Mellon University**

**Price: \$25 Members; \$10 Student Members**