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# Transmission pricing and contentious cost (risk) allocation issues

## Requirements, Challenges, Solutions and Strategies

Sean Gammons

Director

Transmission Finance Conference, London

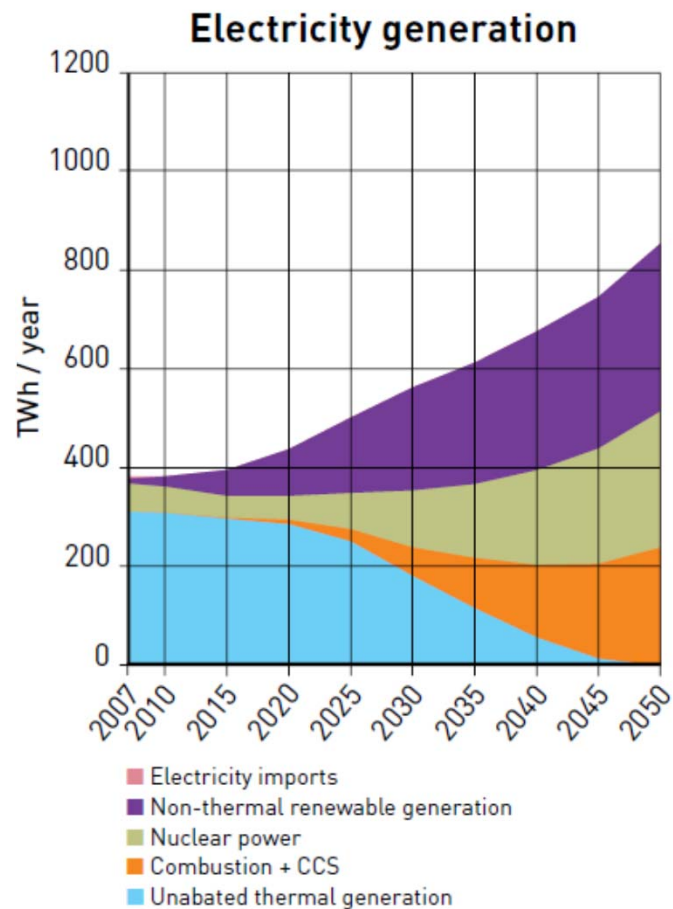
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Insight in Economics™

# Environmental and market efficiency goals both impinge on transmission

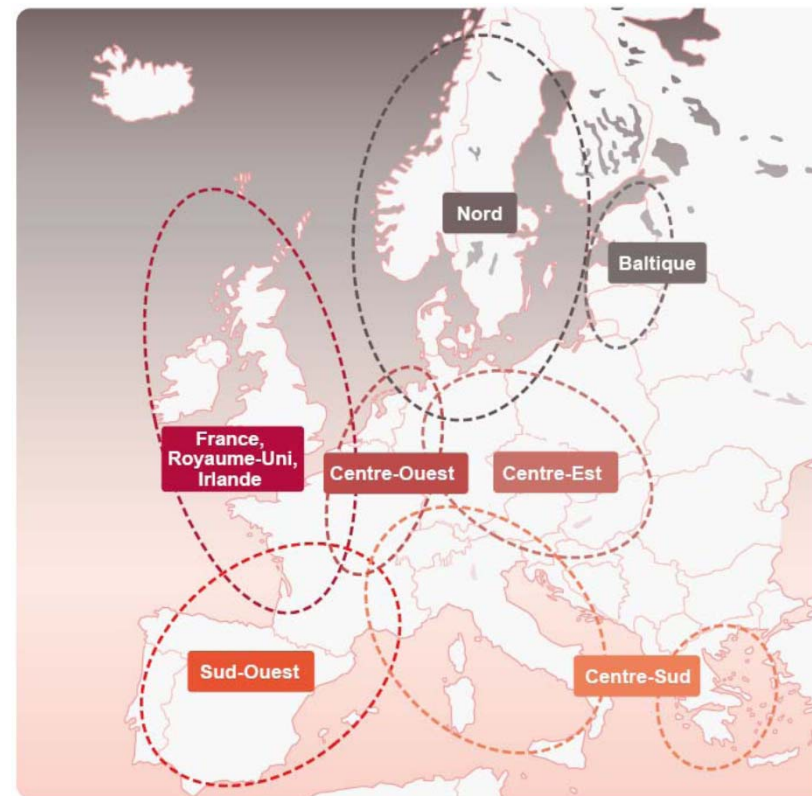
1. Decarbonisation policy is driving need for massive new transmission investment

2. The EU Target Model is seeking to promote efficient pricing of transmission capacity



Source: DECC 2050 Pathways, 2010

**EU Regional Initiatives**

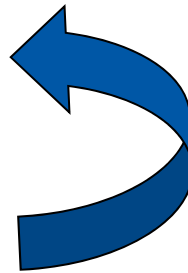


Source: EDF R&D, 2010

# These trends create major challenges for regulatory policy



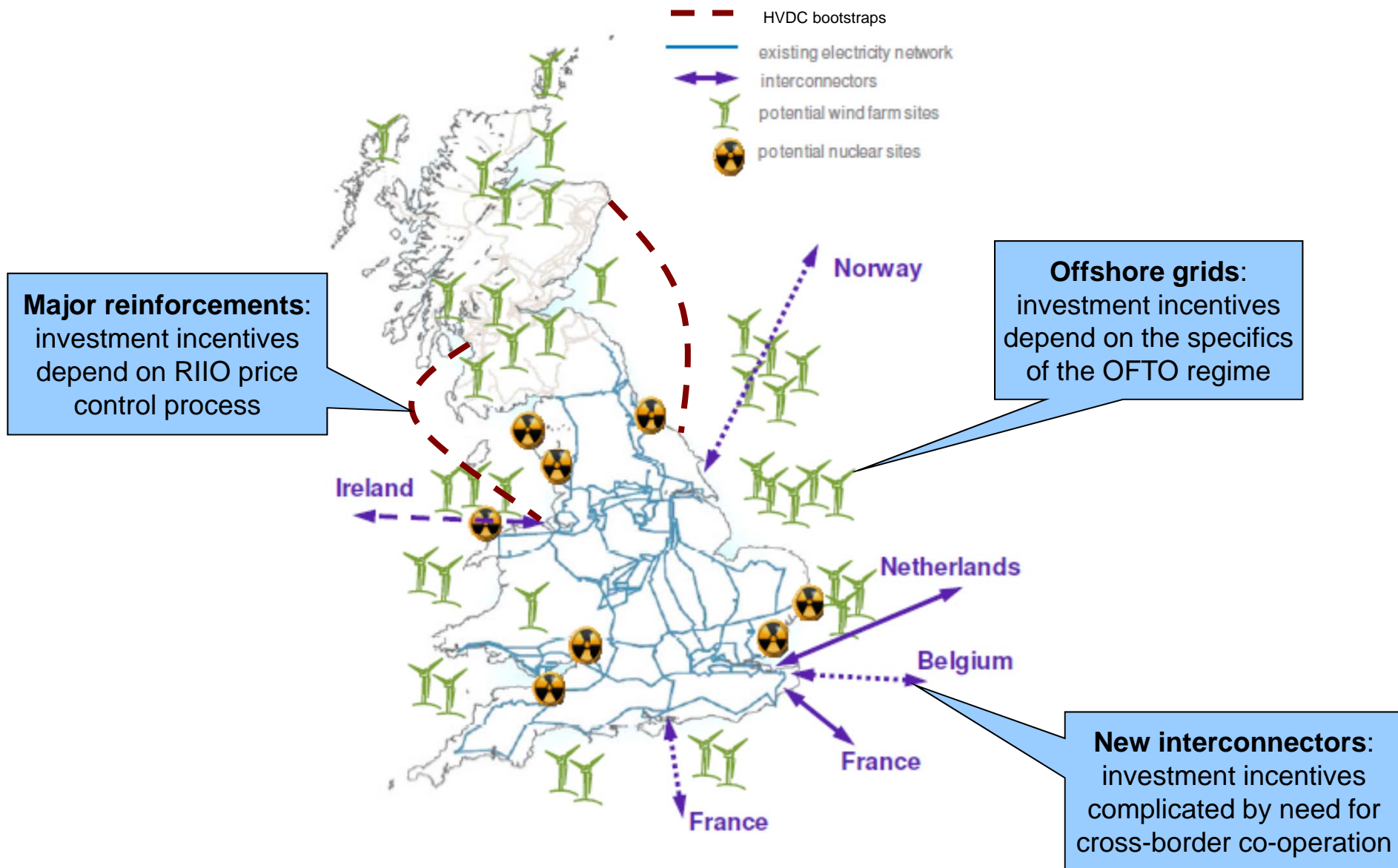
- Regulatory policy on transmission pricing needs to balance two complementary objectives:
  1. Incentivise efficient transmission investment
  2. Signal locational costs to users to incentivise efficient choices
    - Costs of infrastructure provision triggered by locational siting decisions
    - Costs of congestion/losses due to dispatch and consumption decisions
- The policy choices are complicated by disagreement over the definition of “efficiency”
  - Should transmission pricing be used to support government environmental objectives?
  - Does efficient pricing of congestion/losses conflict with efficient energy market outcomes?





# Investment incentives

# Investment requirements span a wide range of projects



# The OFTO regime illustrates the complex choices facing regulators



- “Generator build” vs. “OFTO build”
  - Raises contentious construction cost and risk allocation issues
- Two different regulatory contracts and sets of incentives
  - Generator build
    - relies on **ex post prudency review** of actual costs
    - ...reinforced by generator’s direct exposure to local asset charges and delivery deadlines
  - OFTO build
    - relies on **ex ante 20 year revenue cap** with limited risk sharing
    - a risky structure that may lack credibility and thus undermine efficiency (parallels to NFFO contracts, and future CFD FITs)

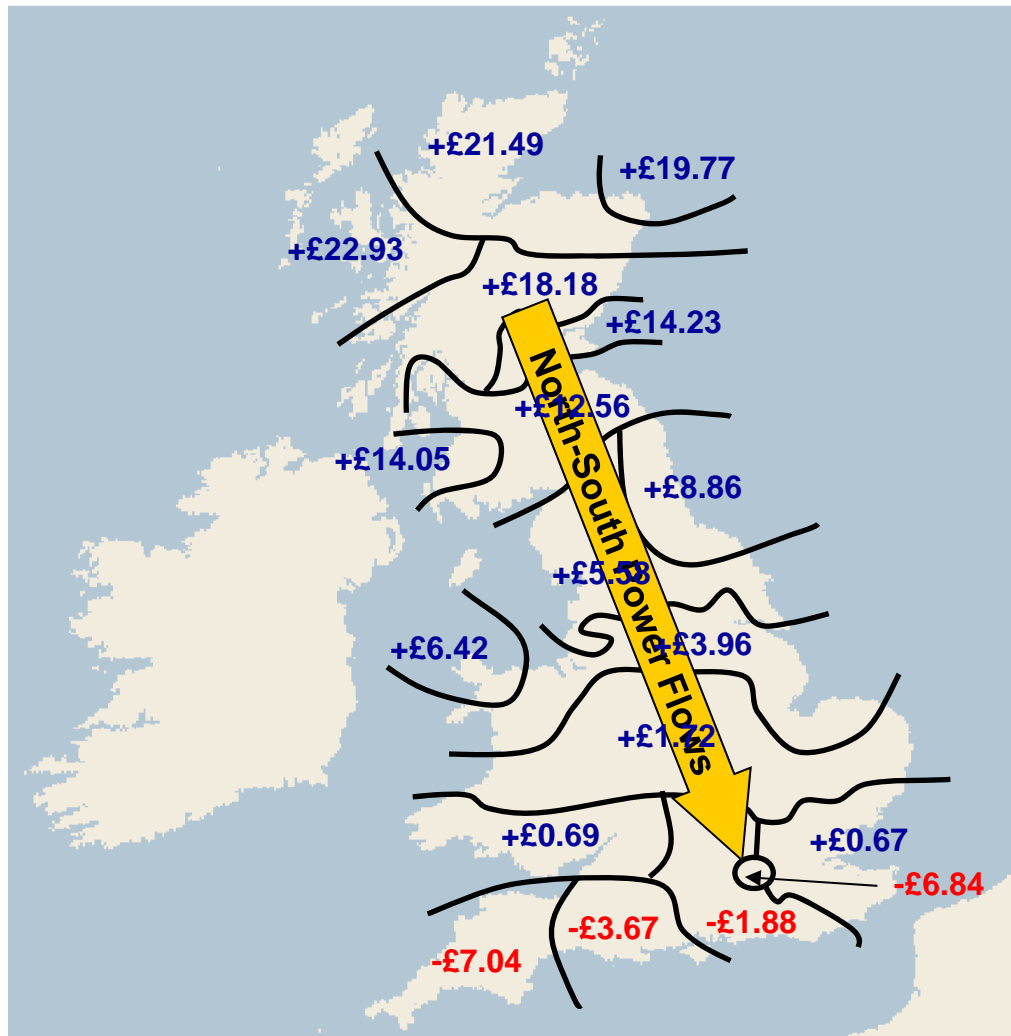
Not clear the OFTO build model has legs



# Locational cost signals

# Current GB TNUOS charges provide locational cost signals

## Current Transmission Network Use of System (TNUoS) Charging Zones

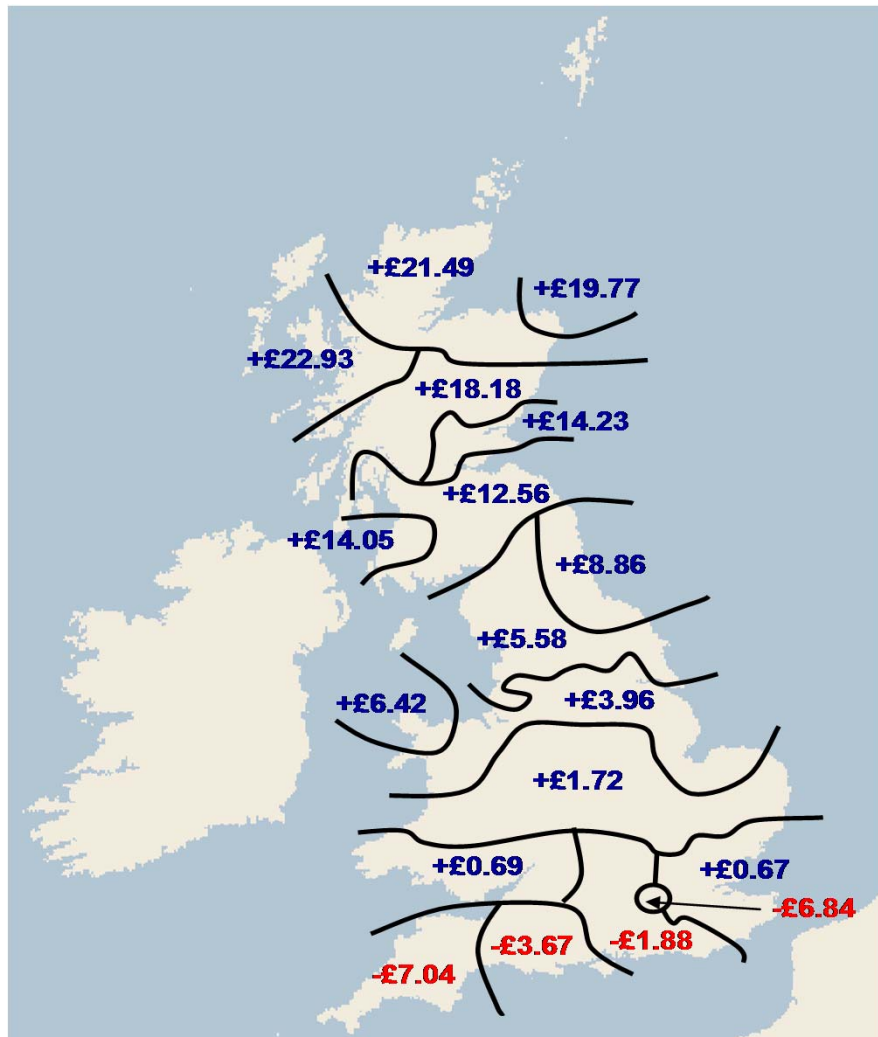


- Charges depend on marginal costs of grid reinforcement
  - Capacity is constrained along north-to-south transmission corridors
- => Northern generators pay positive charges, southern generators pay negative charges

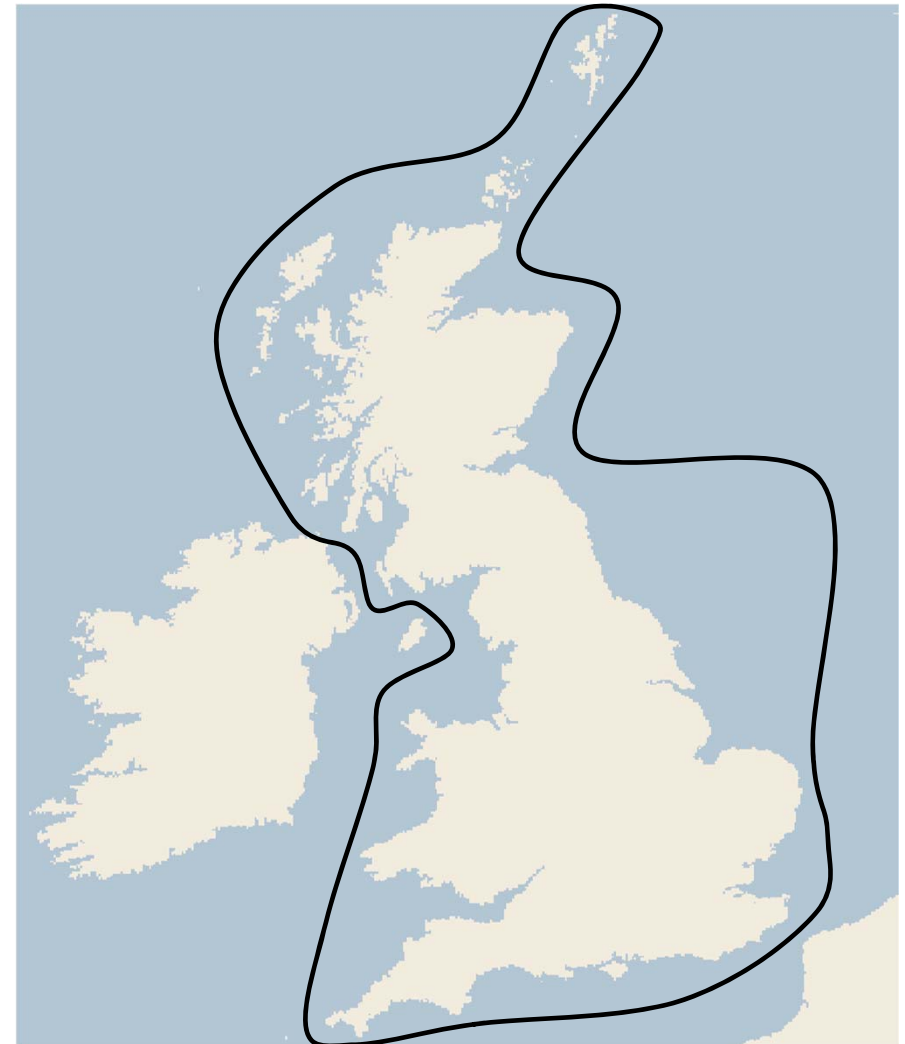


# In the context of Project Transmit, we studied the impact of moving to uniform G-TNUoS charging

## Locational Scenario

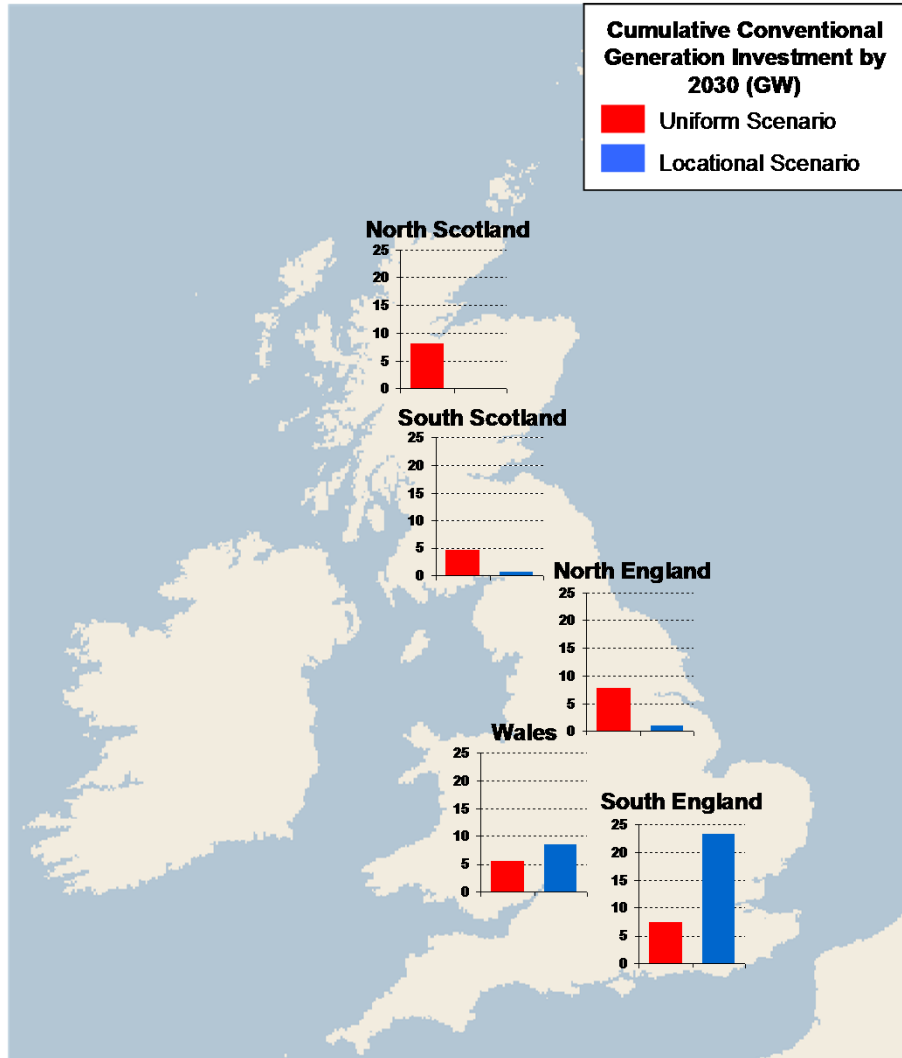


## Uniform Scenario

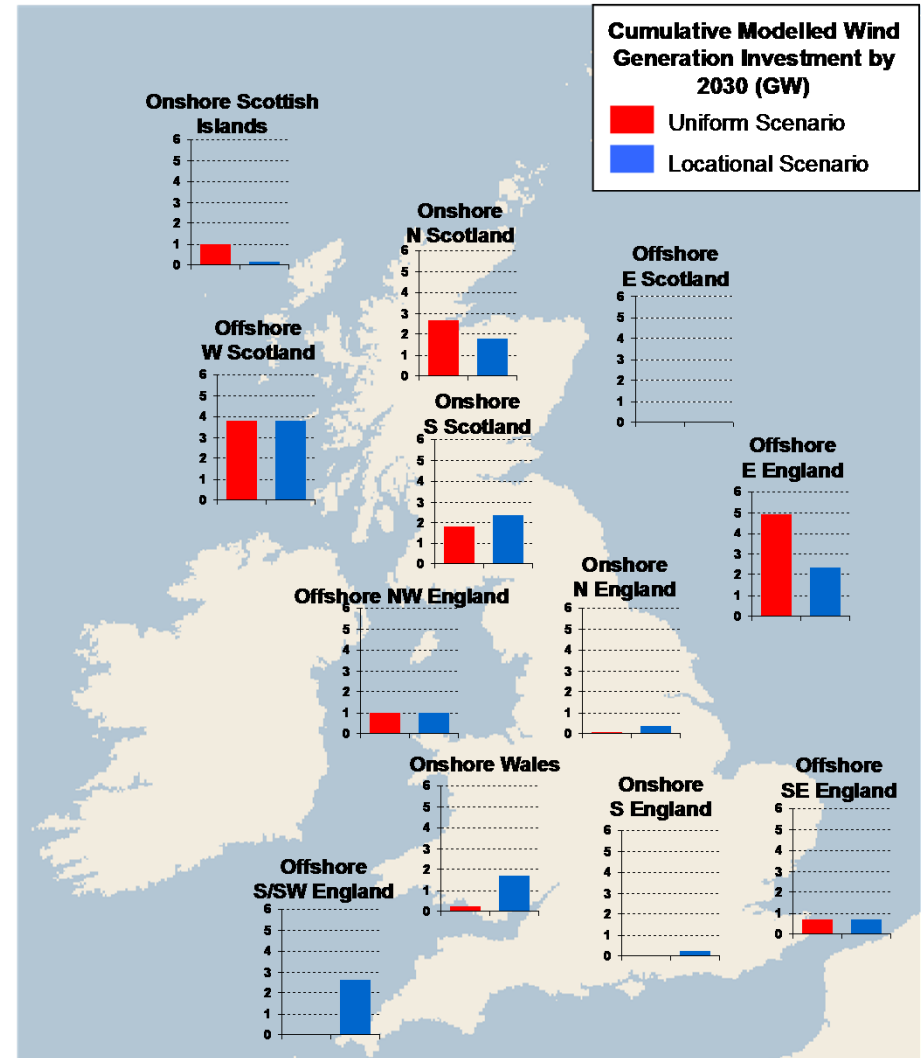


# Uniform charging shifts new generation investment to more remote locations

## Conventional Generation



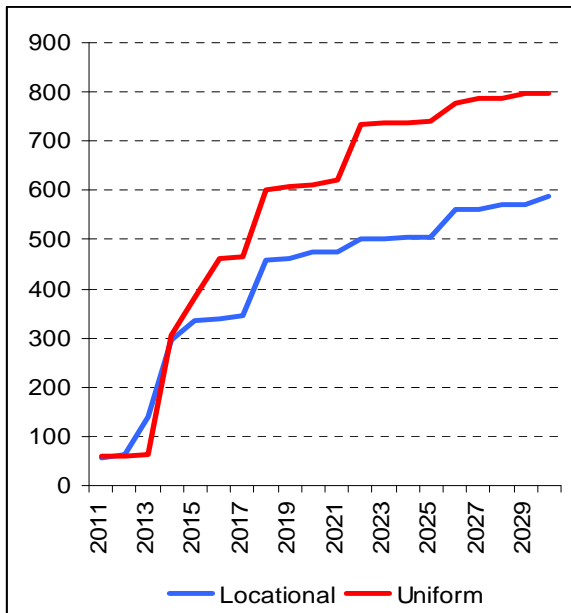
## Wind Generation



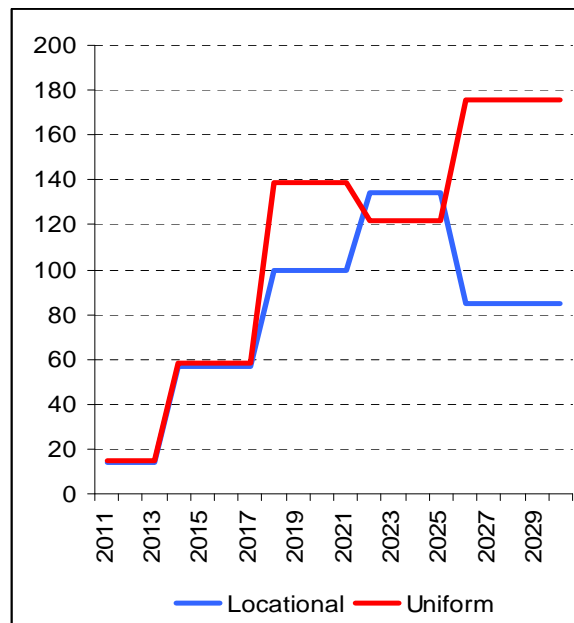
# Transmission costs and losses rise considerably in the uniform case

- Locating more renewable and conventional capacity in Scotland increases reinforcement requirements and losses
- Locating wind further offshore also raises infrastructure costs

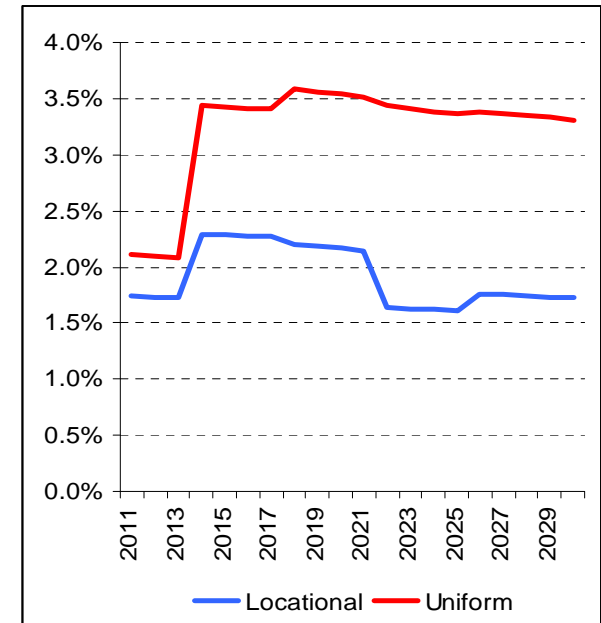
### Transmission Investment Requirements (2010 £Mn)



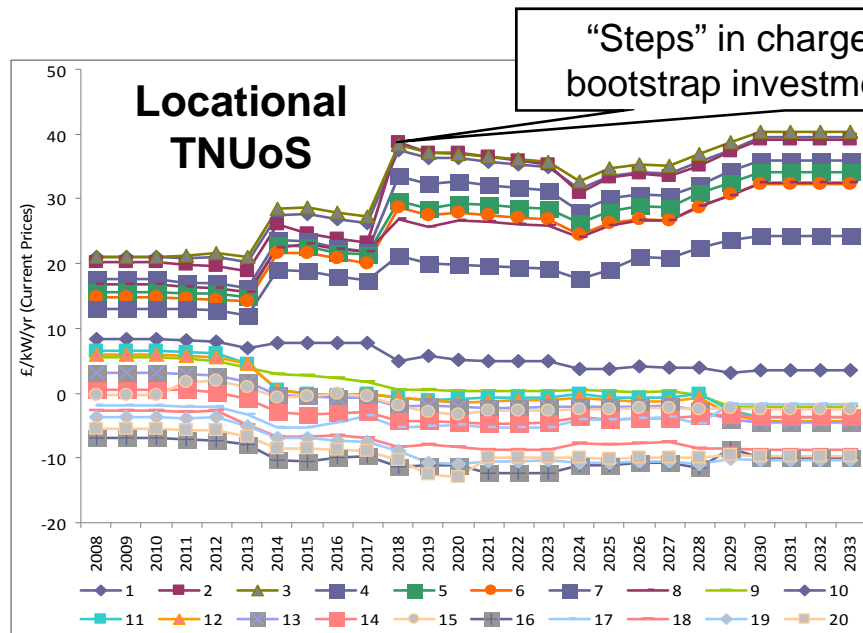
### Constraint Costs (2010 £Mn)



### Transmission Losses (%)



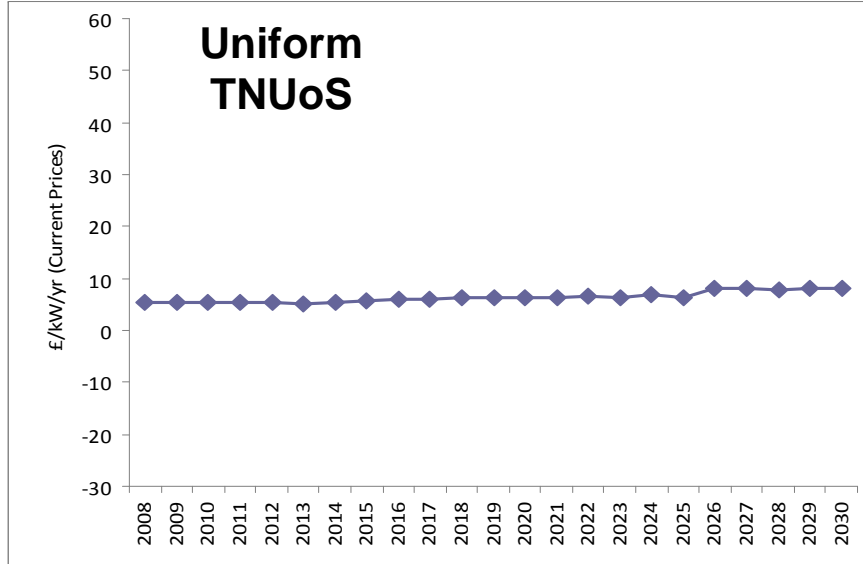
# SP-NGET reinforcement requirements increase TNUoS tariffs in Scotland



“Steps” in charges occur when bootstrap investments take place

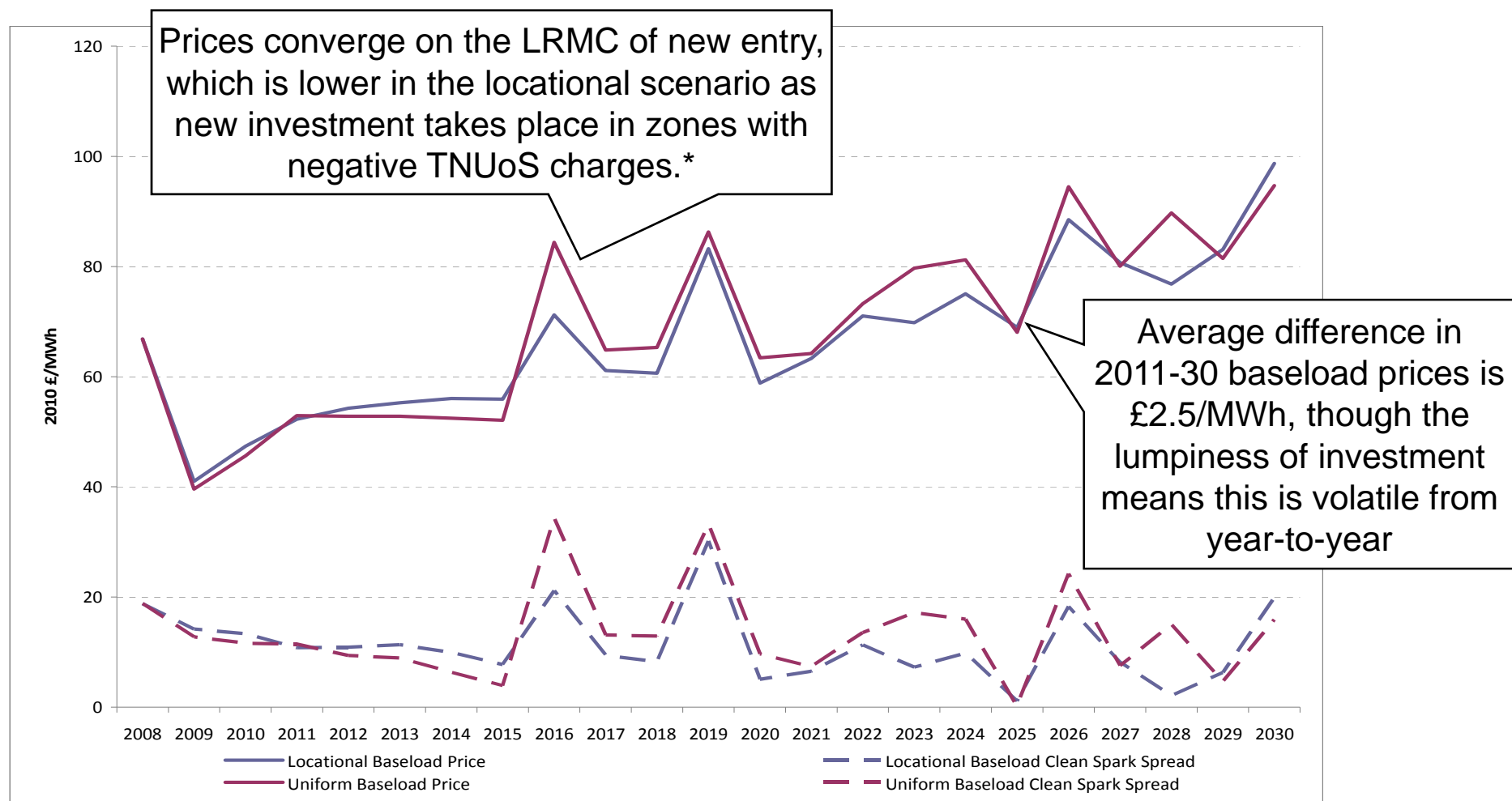
Charges in Scottish zones rise, due to SP-NGET reinforcements

English and Welsh charges fall gradually to 2030



Uniform charges start at c£5/kW/yr, rising to c£8/kW/yr

# In the long-run, wholesale prices are lower in the locational scenario

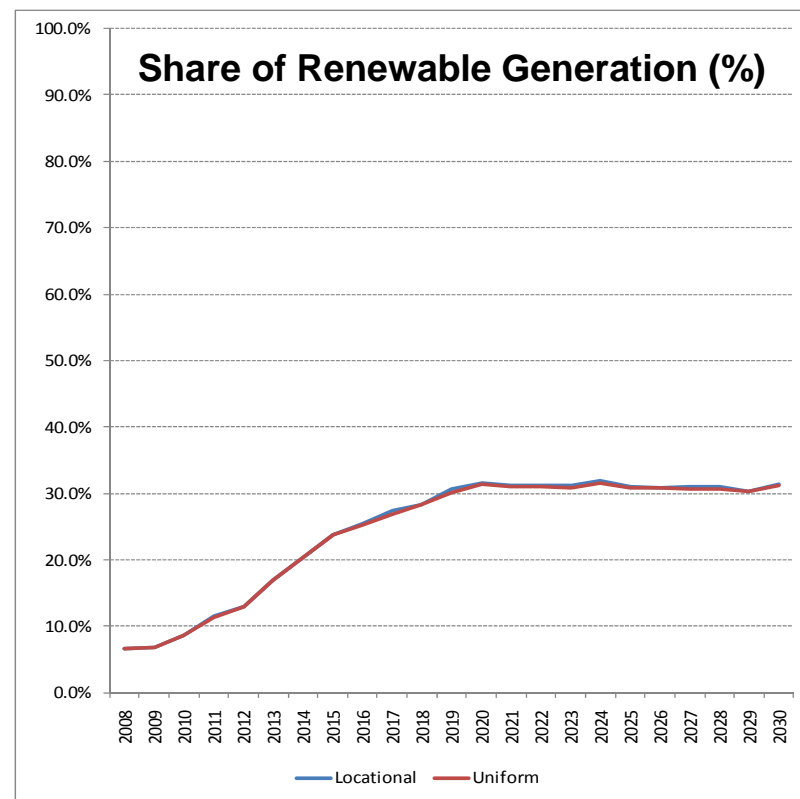
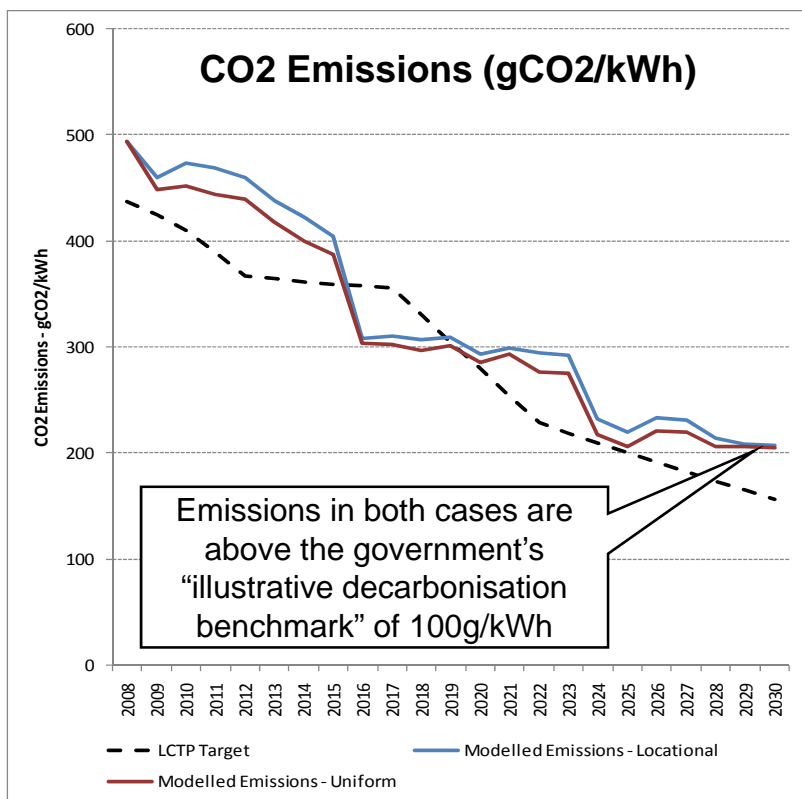


\* For example, electricity and gas transmission charges faced by new CCGTs are £13/kW/yr higher in the uniform case, which raises the cost of new CCGT investment by £2.5/MWh, based on a 60% load factor

# Government environmental targets are met in both cases

- Emissions are similar in both cases, falling at close to the rate required to meet targets

- In both cases, there are sufficient “profitable” renewables projects to provide 30% of generation



**We find no evidence that uniform TNUoS are needed to help meet government environmental targets**

# Uniform TNUoS increases costs without any environmental benefits



## Change in Costs to the Consumer =

- Δ Wholesale Power Price x Demand +
- Δ RO Subsidy Payments +
- Δ Demand TNUoS +
- Δ Constraint Costs & Losses

<i>NPV to 2030 @ 3.5%, 2010 Prices</i>	<b>£Mn</b>	<b>£/MWh</b>
Wholesale Purchases	13,899	2.50
Renewable Subsidies	262	0.05
Losses	5,781	1.04
Constraints	334	0.06
Demand TNUoS Charges	1,294	0.23
<b>Total</b>	<b>21,569</b>	<b>3.89</b>

Locational incentives matter even in the decarbonised power markets of the future

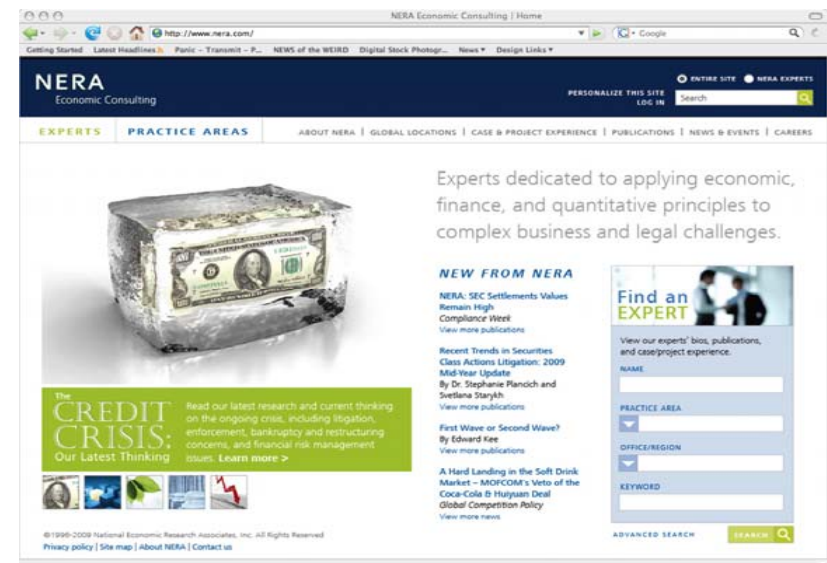
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# Contact Us

Sean Gammons

Director  
NERA—London  
+44 20 7659 8564  
[sean.gammons@nera.com](mailto:sean.gammons@nera.com)