

Wind Charging

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nationalgrid

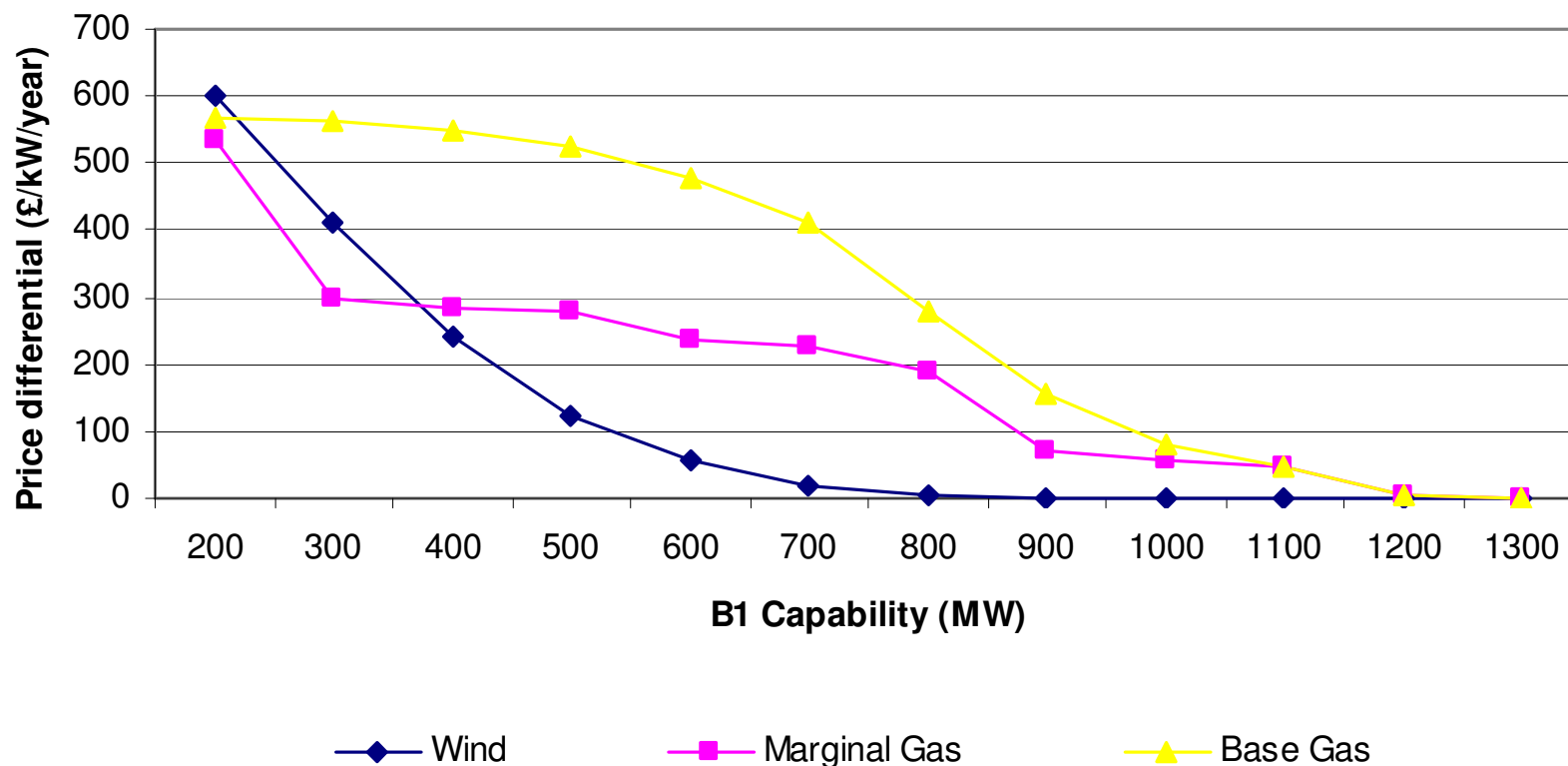
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Efficient Investment for Different Technologies

- ◆ What is the efficient level of transmission if you build 959MW of different types of generation in zone 1?
- ◆ Three different scenarios:

| Scenario | 1. Wind | 2. Base Gas | 3. Marginal Gas |
|----------------|---------|-------------|-----------------|
| Wind | 959 | 0 | 0 |
| Base Gas | 0 | 959 | 0 |
| Marginal Gas | 10 | 10 | 959 |
| Water | 494 | 494 | 494 |
| Pumped Storage | 300 | 300 | 300 |

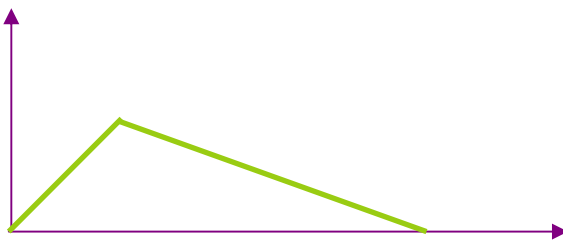
Constraint Costs on B1



- ◆ If the cost of reinforcing B1 is relatively cheap ($\sim\text{£}4/\text{kW}/\text{year}$) you would reinforce B1 to $\sim 800\text{MW}$ for wind and $\sim 1200\text{MW}$ for gas
- ◆ Efficient reinforcement for wind would be in the order of 2/3rds that of gas

Factors Influencing Cost

- ◆ Two key attributes that influence the annual constraint cost are:
 - ◆ Bid Price of generator (influences cost of resolving individual constraints)
 - ◆ Load duration of generator (determines likelihood of constraint)
- ◆ The cost of resolving an individual constraint is higher for wind as they have a larger bid price
- ◆ However, a constraint is less likely with wind because the load duration curve tends towards lower outputs than the gas generator.

| | Wind | Base Gas |
|---------------|--|---|
| Bid Price | -£50 | £10 |
| Load Duration |  |  |

Next Steps

- ◆ Using the current model the efficient level of investment can only be found on one boundary at a time
- ◆ Using a more advanced model the system can be optimised for multiple boundaries
- ◆ This new model will also allow us to optimise transmission reinforcement over multiple years