



## Future Flexibility Markets

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# Why does E.ON Care?

- Flexibility affects the end consumer - they pick up the bill



**e-on** 8 March 2011  
The way we work

Electricity account statement  
March 2011

Customer balance

	Total
Account balance brought forward	£2.00
Standard charges	£208.00
Peak charging (if you have applicable)	£208.00
<b>Total</b>	<b>£418.00</b>

Amount due

	Total
Standard charges	£208.00
Peak charging	£0.00
Standard charges (if you have applicable)	£0.00
Standard charges (if you have applicable)	£0.00
Standard charges (if you have applicable)	£0.00
Peak charging (if you have applicable)	£0.00
Peak charging (if you have applicable)	£0.00
<b>Total amount due</b>	<b>£208.00</b>

**Total amount due**  
The amount you should pay for your account for the month of March 2011. **£208.00**

- Our generating plant can supply flexibility services



Citigen CHP

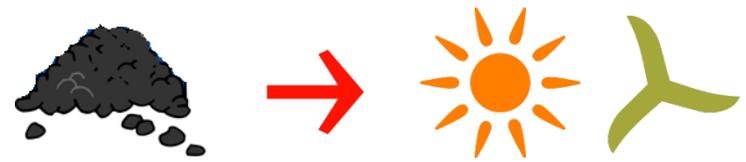
- Our customers can supply flexibility services



# Why is Flexibility so Important?

## Seven System Transitions

1. Running Costs
2. Running Regimes
3. Energy Value
4. Balancing
5. Consumers
6. Economic Valuation
7. Efficiency

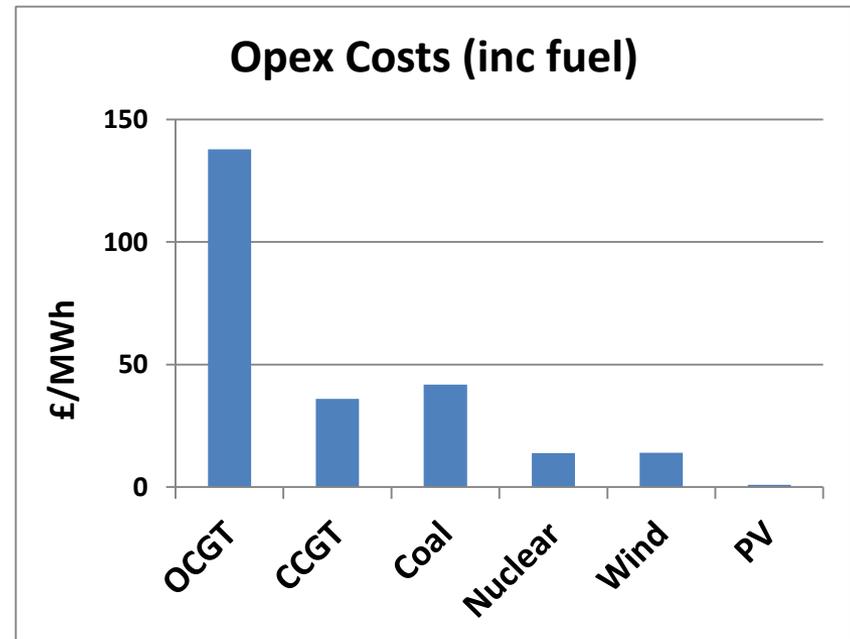


## Running Costs: High Opex → Low Opex

An increasing amount of energy will come from renewable sources.

This has a lower operational cost (than traditional generation)

These lower Opex plant run whenever they can.



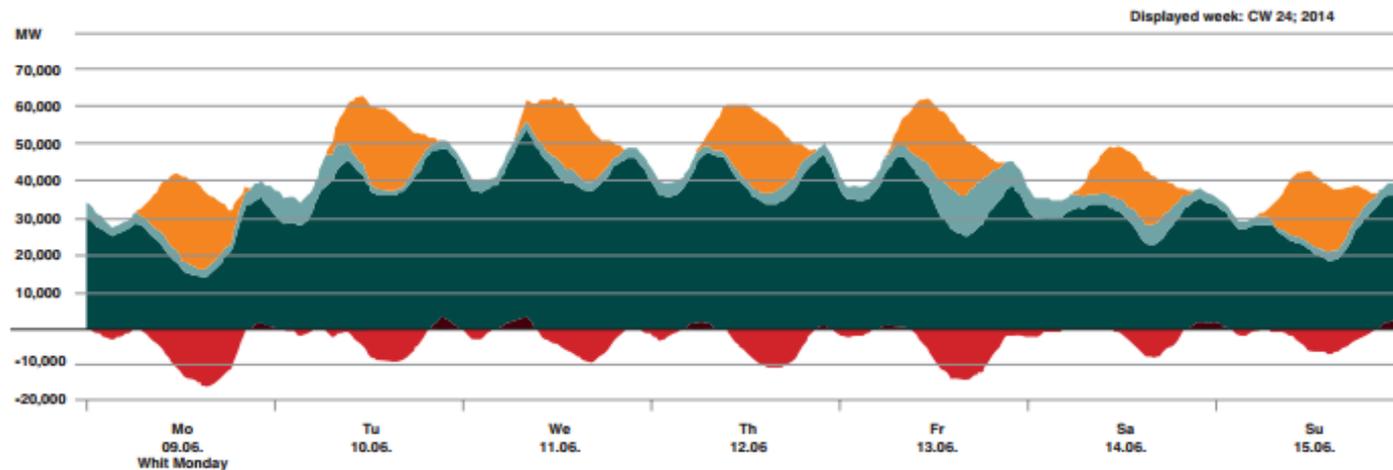


## Running Regimes: Baseload to intermittent

Intermittent renewables squeeze out flexible firm generation.

So flexible firm generation also generates intermittently (challenging business case for traditionally baseload plant).

Flexible firm is not flexible when cold and flexibility from subsidised renewables is expensive.



A sunny week in Germany (from ERP report “Managing Flexibility Whilst Decarbonising the GB Electricity System”)

## Energy Value: From the kWh to the kW

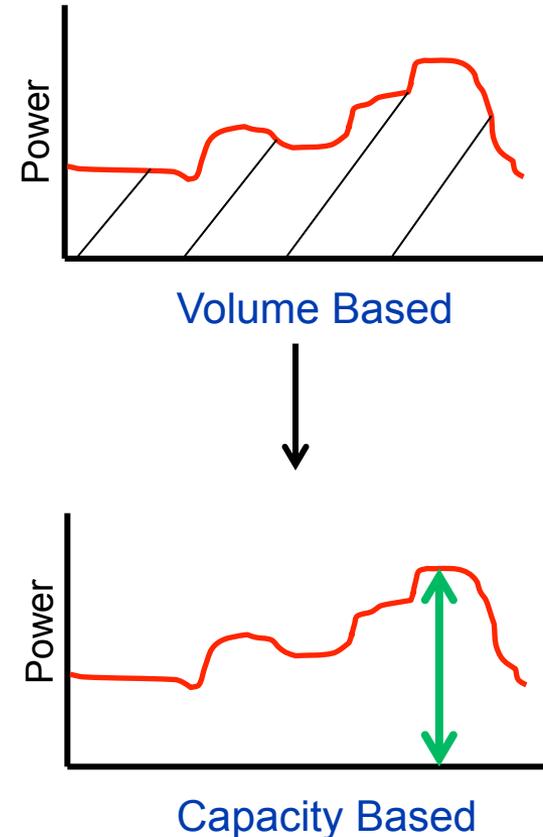


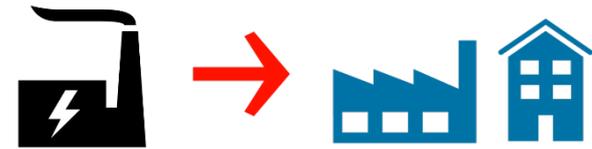
As the value of a kWh decreases, the value of capacity will need to increase.

Capacity and flexibility markets therefore become increasingly important to fund new investment.

Reviewing whether these markets are “fit for purpose” will be an important consideration for policy makers.

Flexibility may no longer be just an “Ancillary Service”.





Balancing:

Generation follows demand to Demand follows generation

As the generation becomes less flexible, demand will have to be more flexible.

We will see an increase in the number of providers of flexibility – from 10s to 100s

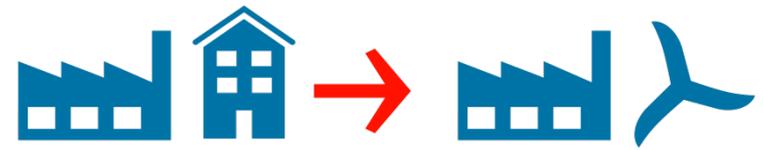
Bilateral contracts and tenders are unlikely to work. A more market based approach is needed which best protects the interests of customers.

**National Grid have stated that they would like to see 30-50% of all balancing actions performed by the demand side. This will be achieved through the power responsive programme**



nationalgrid

e-on



# Consumers: Energy consumers to Flexibility consumers

## Energy Balance

Player	Energy (kWh)
Coal	Provides
CCGT	Provides
Nuclear	Provides
Wind	Provides
PV	Provides
Demand Side	Consumes



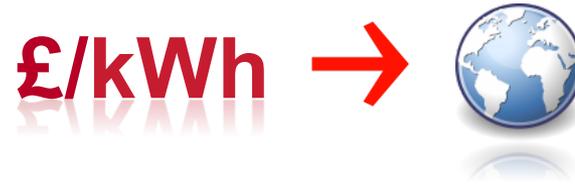
## Flexibility Balance

Player	Response (kW)	Reserve (kW)
Coal	Provides/Consumes	Provides/Consumes
CCGT	Provides/Consumes	Provides/Consumes
Nuclear	Provides/Consumes	Consumes
Wind	Consumes	Consumes
PV	Consumes	Consumes
Demand Side	Provides/Consumes	Provides/Consumes

The future market will be much more complex as roles change – both generators and customers will supply and consume flexibility



## Economic Valuation: LCOE to a holistic view



Many investment decisions are based on LCOE.

This is especially true of the renewables sectors and has historically been how RoCs and CFDs are priced

If flexibility income becomes increasingly significant, the contribution of LCOE will become relatively smaller over time.

Value to the system of a generator, depends on the existing generation mix.

## Efficiency: Energy Efficiency to Capacity Efficiency



In an energy system where capacity and flexibility hold more value than wholesale energy, peak power usage and time of usage will be more important to the total cost of a customer's bill

**End customer capacity efficiency and flexibility may become more important to the system than energy efficiency**

**“Switch it off” → “Switch it on at the right time”**

# Seven System Transitions

## Current System

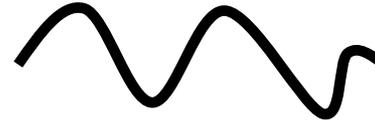
## Future System

High Opex



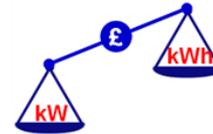
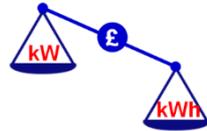
Low Opex

Baseload Firm



Intermittent

kWh



kW

Generation follows demand



Demand follows generation

Energy consumers



Flexibility consumers

LCOE

£/kWh



Holistic view

Energy efficiency



Capacity efficiency

# What will the flexibility market of the future look like?

Bilaterals? Market based? Exchange?

Liquid? Illiquid?

Larger? More complex? Simplified?

Technology agnostic? Technology targeted?

Generation led? Demand led?