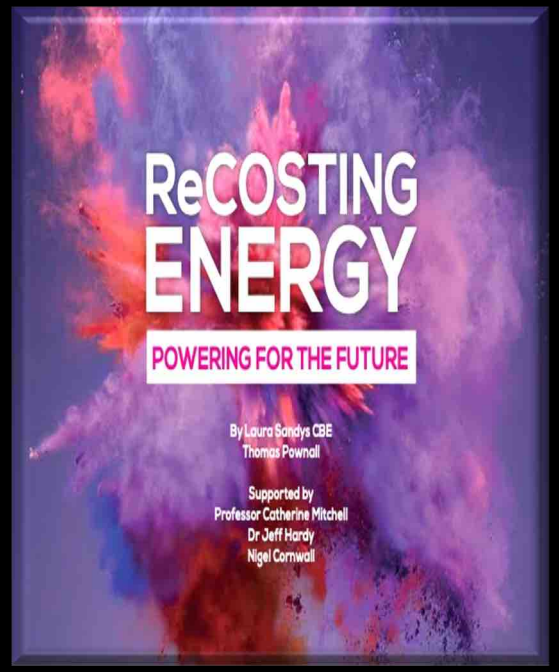
ReCosting Energy Launch



- Welcome
- Jonathan Brearley, CEO of Ofgem
- Laura Sandys Report Overview
- The Rt Hon Anne-Marie Trevelyan MP
- Panel Discussion:
  - Prof Catherine Mitchell
  - Dr Jeff Hardy
  - Nigel Cornwall
  - Thomas Pownall

Reports all available at www.challenging-ideas.com/publications
Comment, challenge, critique: recostingenergy@gmail.com

Tweet throughout #RecostingEnergy & tag @Laura_Sandys

Huge thanks to the support from

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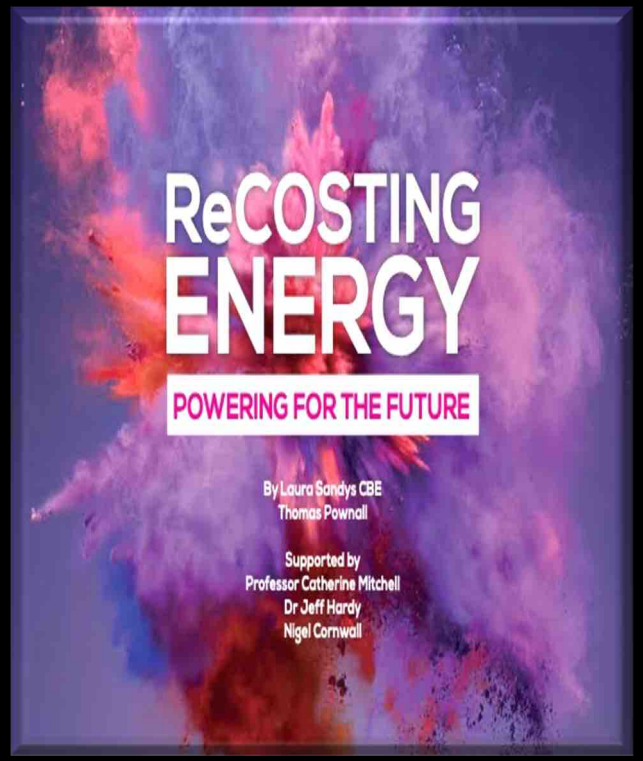
ReCosting Energy Overview



We have been trying to squeeze a decarbonised energy system into a fossil fuel structure.

It doesn't FIT!

There is a big Decarbonisation Dividend to capture if we cost, value and sell energy differently!

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Comments, challenges, critiques and to find out more please email on recostingenergy@gmail.com

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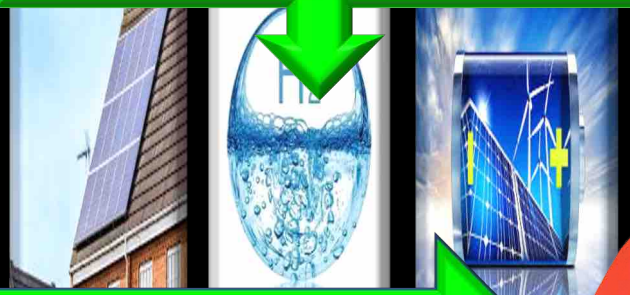
The Challenge: A New Cost, Value & Price

Capital Assets changing the COST base of energy throughout the system



Blended Assets

Free feedstock, high CAPEX, low OPEX

MIND THE VALUE GAP

Blended Assets & Services the new VALUE

Multi-actor Management

Demand and Supply equally valuable

MIND THE VALUE GAP

Consumer Models changing how energy is PRICED

Varied Business Models

Tailored Services & Products replacing commodity pricing

Planning From the Future

Very different economic driver to "consumption"

Requires citizens to invest in decarb transport

V

Min 50 million actions & assets not able to be managed as today

Requires citizens to invest in new heating systems & energy efficiency

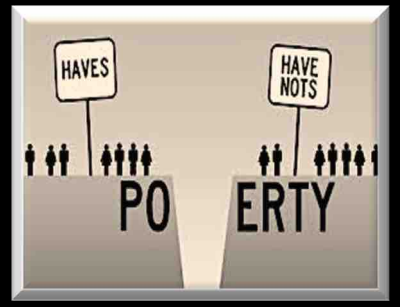
E

£20bn investment p.a. required throughout the system not just generation

New requirements & products due to climate change

T

Reducing value of kW - like data from $1m to $0.001 for MB



Growing inequality with new losers / winners

O

Getting More From Less

Accelerate Decarb

Reveal True Value

Reward Customers

Unlock Investment

Optimisation Not Consumption

Whole System Costing

Demand & Supply Equal

Capital & Services Not Commodities

Different Outcomes & Drivers

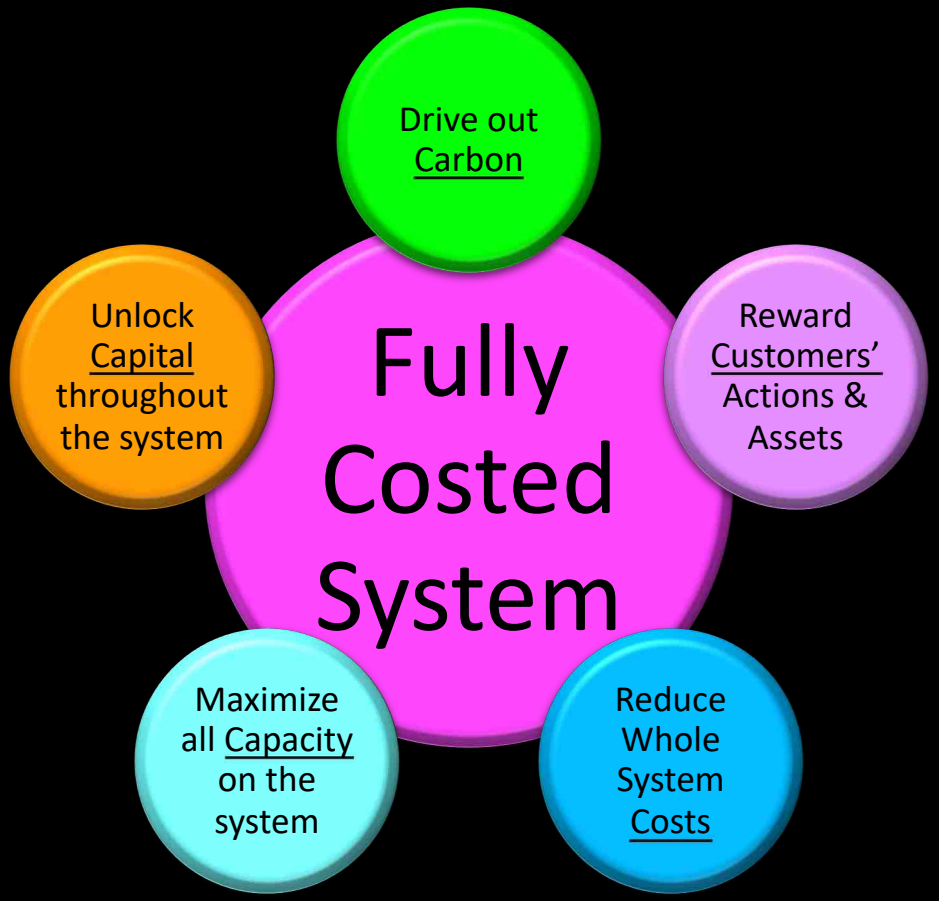
New Processes & Assessments

Changed Competitive Tensions

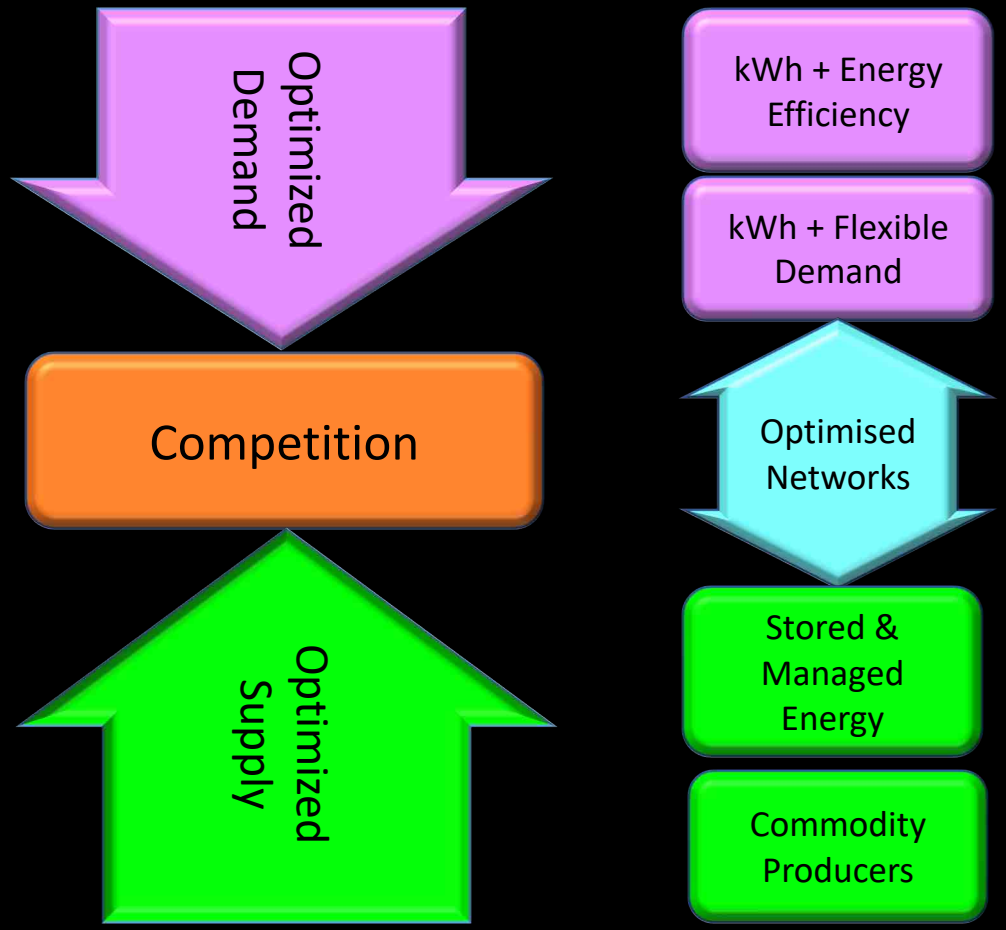
Support where Investment Risk Really Lies

Delivering a Citizens Dividend

Optimisation Not Consumption



New Competitive Pressure



The 5 C's becoming the Policy & Regulatory Drivers

New Market Design

Fully Costed: From Silos to Whole System

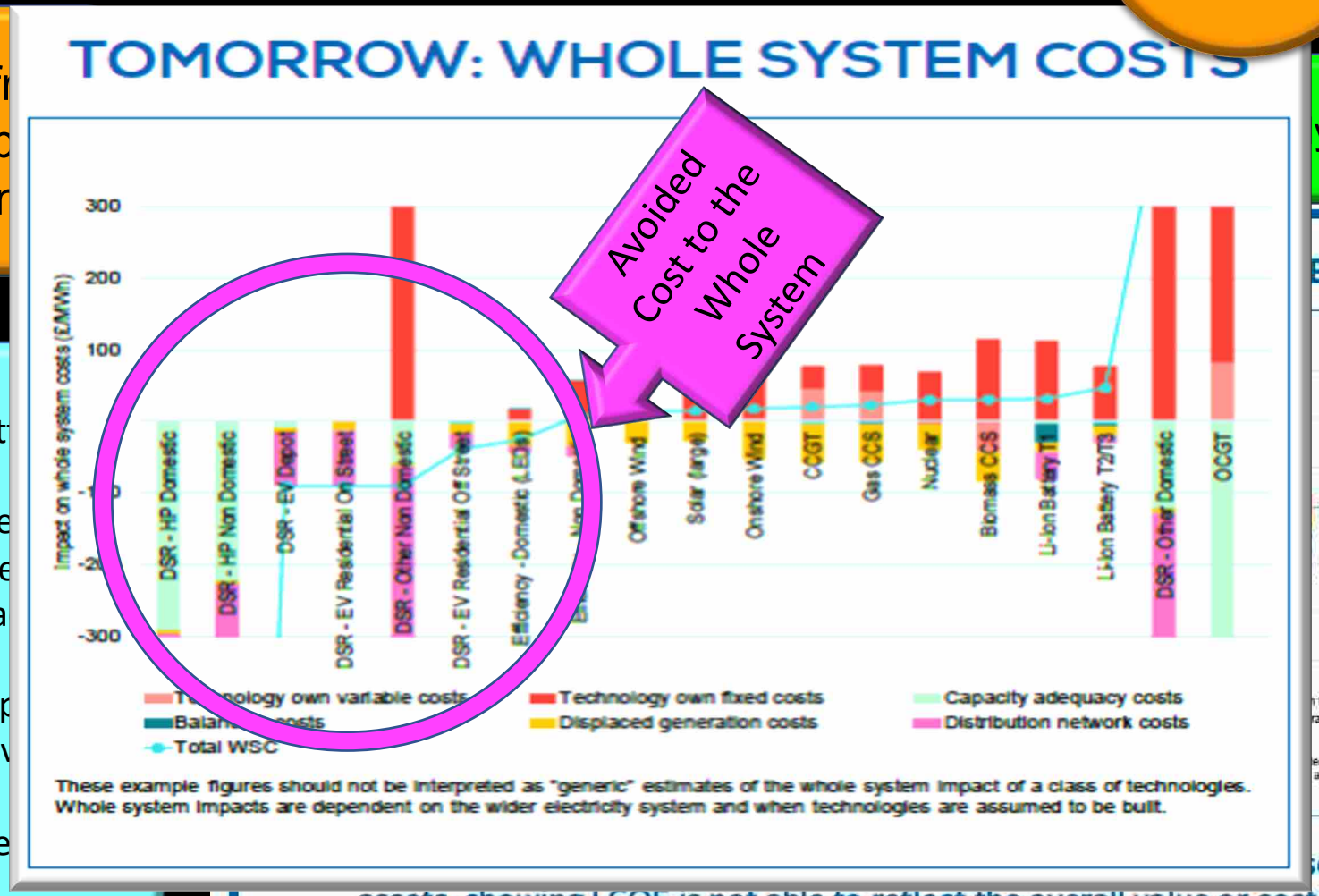
Unlock Capital throughout the system

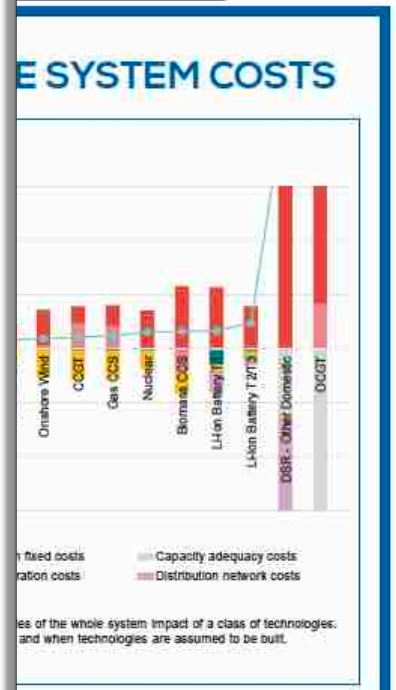
Fully Costed System

Why? Cost is moving fr
commodity to the supp
chain & its interactior

y across

- **Value and Waste Unlocked:** Sit
between the silos
- **Accountable for Total Costs:** Ke
players accountable for all syste
- **Demand Important:** Demand a
assets equally valued
- **No Place to Hide:** No pass the p
- **Total Cost Reduction:** Productiv
efficiency up
- **Avoided Cost of Energy**: These
reveal an avoided cost





Huge thanks to BEIS modelling team, Frontier Economics & LCP

Drive Out Carbon: Carbon Busting

Drive out Carbon

Unlock Capital throughout the system

Why? There is an unconscious fossil bias across regulation, policy & markets

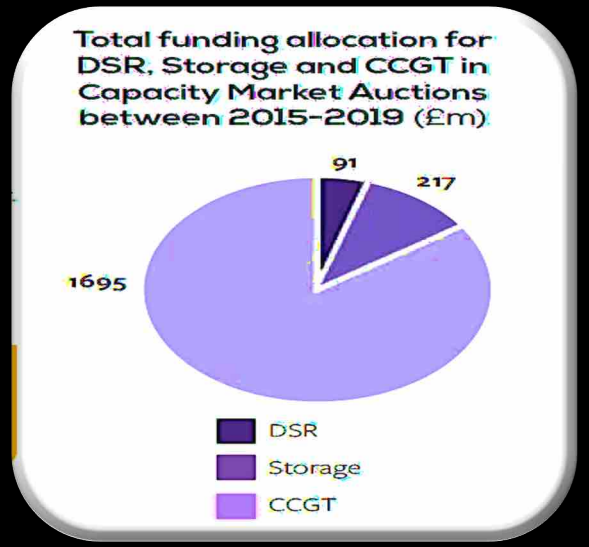
- **Destination Clear Accelerating Investment:** 2030 80% decarbonisation supplier mandate
- **Merit Order Change:** Demand first, low carbon /flexibility second
- **Fossil Fuel Bureaucracy:** Increased burden for fossil fuel choices
- **Restack the Deck:** Reform all policy, markets & regulation to be Net Zero compliant

CALL TO ACTION!
Email us all the carbon bias you can identify

Carbon Intensity across all Flexibility Markets 2019

Market	Value (2019)	Size (2019)	Carbon intensity
Balancing mechanism	£590m	Abs: 20,000 GWh Net: 630 GWh	Fossil fuels >99% of turn up
Short term operating reserve (excl spin gen)	£50m	2000 GWh	>99% fossil fuel contracts
Fast reserve	£90m	220 GWh	85% fossil fuel contracts
Firm Frequency Response	£40m	3250 GWh	20% fossil fuel contracts
Mandatory Frequency Response	£30m	2500 GWh	Large units only. Will be primarily fossil fuel generation
Capacity market (delivery 2021/22)	£500m	55 GW (de-rated)	70% fossil fuel contracts
DNO tenders	£1.5m	c. 850 MW (MWh unknown)	>80% fossil fuel contracts
Wholesale Market	£13,000m	219,000 GWh	~40% fossil fuel generation

ELECTRICITY DISTRIBUTION LICENCE: CONDITION 4
Needs to be changed to prioritise demand, low carbon and flexibility as currently it is not Net Zero compliant and requires technology neutrality.



Demand is Equal to Supply

Why? Demand actions & assets reduces whole system costs - capacity, local constraints, peaks & curtailment

- **Design around optimised Demand:** Change Policy & Regulatory focus
- **Unlock Storage:** through the system
- **Energy Efficiency as a key player**: it has big value to total systems costs

Self Supply

Capital Assets delivering flexibility, capacity or generation

Demand Shifting

Assets or actions contributing value to the system

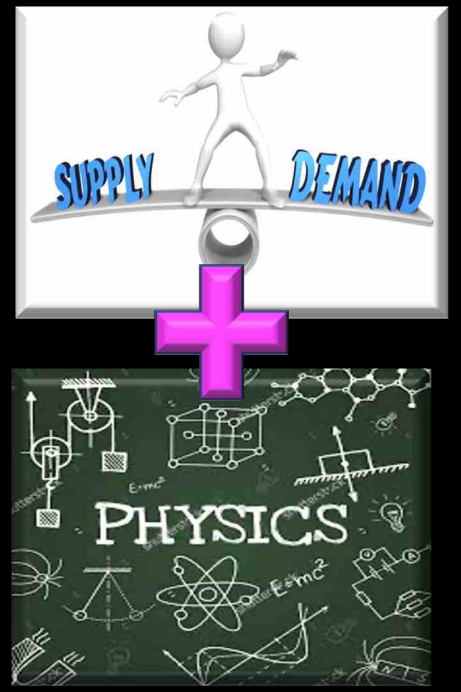
Energy Efficiency

Permanent reduction of total energy needs

Reward Customers' Actions & Assets

Reduce Whole System Costs

Maximize all Capacity on the system

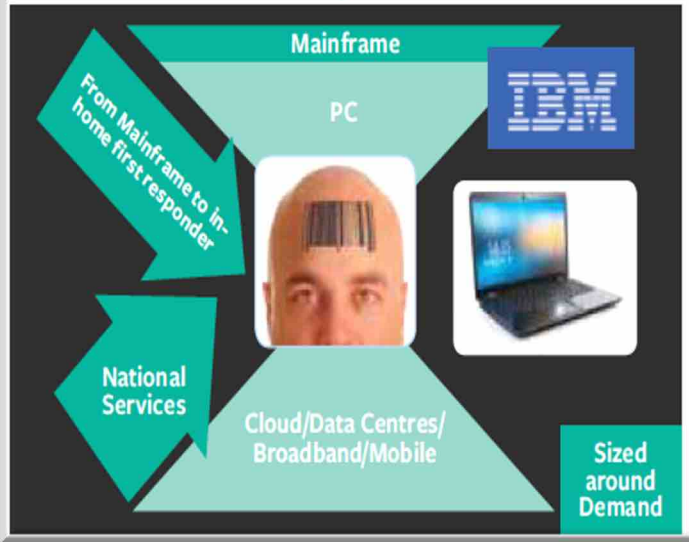


Optimising Demand: Data and Food

What is Optimised Demand?

From Mainframe to PC
Data provision has moved from a central mainframe system to one designed around the storage capacity of the PC and consumer facing Cloud services, drawing on national and local services to meet and provide additional services against "optimised demand"

Customer-centric Food
Customers have wide choice blending supermarkets with specialist providers, local markets and eating out. Crucially fridges are integral to the food system. Without fridges in homes, supermarkets would need to be three times the size – fridges are energy's equivalent of distributed "storage"



Frozen Food is the interseasonal storage we need in energy

Without Fridges (distributed "storage") supermarkets would be 3 times bigger

Powering Up Customers
Equal Access to Markets & Support Mechanisms

Maximize all Capacity on the system

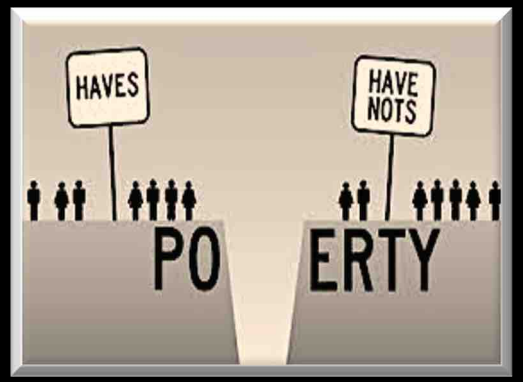
Reward Customers' Actions & Assets

Reduce Whole System Costs

HM Treasury

Net Zero Report

"Liquidity constraints occur where people are willing to make an investment that is cost saving but do not have access to the capital to pay for it"



10s of millions of assets "required" by hard pressed consumers

Capacity Market
Increase access for efficiency, all storage types, self-supply & DSR

All Markets
Equal access for demand & flexibility assets & actions

Mini Contracts for Difference
Contract for Difference miniaturized

Energy Efficiency
Fully loaded value of Avoided Cost of Energy & Carbon

Flexibility Purchase Agreement
Suppliers, DNOs, ESO and generator buying Demand as they do Supply

Services

2019 Allocation of Resources

Supply Assets & Actions 2019

- Capacity Market: £3.85 bn
- Balancing & System Costs: £1.94bn
- CfDs: £600m
- Network Reinforcement : £2bn

Demand Assets & Actions 2019

- Capacity Market: 5.6% storage / 2.35% DSR

- Customer Assets
- Balancing : 0.29% DSR
- Energy Efficiency
- Avoided Cost of Peak Energy

Less than 10% of all support going to demand side assets

From Commodities to Services

Why? Capital decarb assets don't respond to commodity price signals, & complexity & system optimisation sits with companies not consumers

- **Open Up to Consumer Services:** Review retail license to unlock services
- **Consumer Protection:** new and appropriate safeguards required
- **Develop New Service Agreements:** develop a new range of services throughout the supply chain

Incentives in the Right Place to optimize & drive efficiencies

Maximize all Capacity on the system

Reward Customers' Actions & Assets

Reduce Whole System Costs

Fully Costed System

Unlock Capital throughout the system

Unlocks Investment & Innovation

Example for EV's (Mobile phone model)

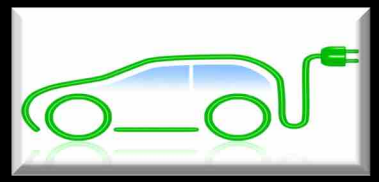
Reduce price for car

Very cheap miles

Leasing Contact

Agrees to optimize charging

Car Plus x Miles per Week



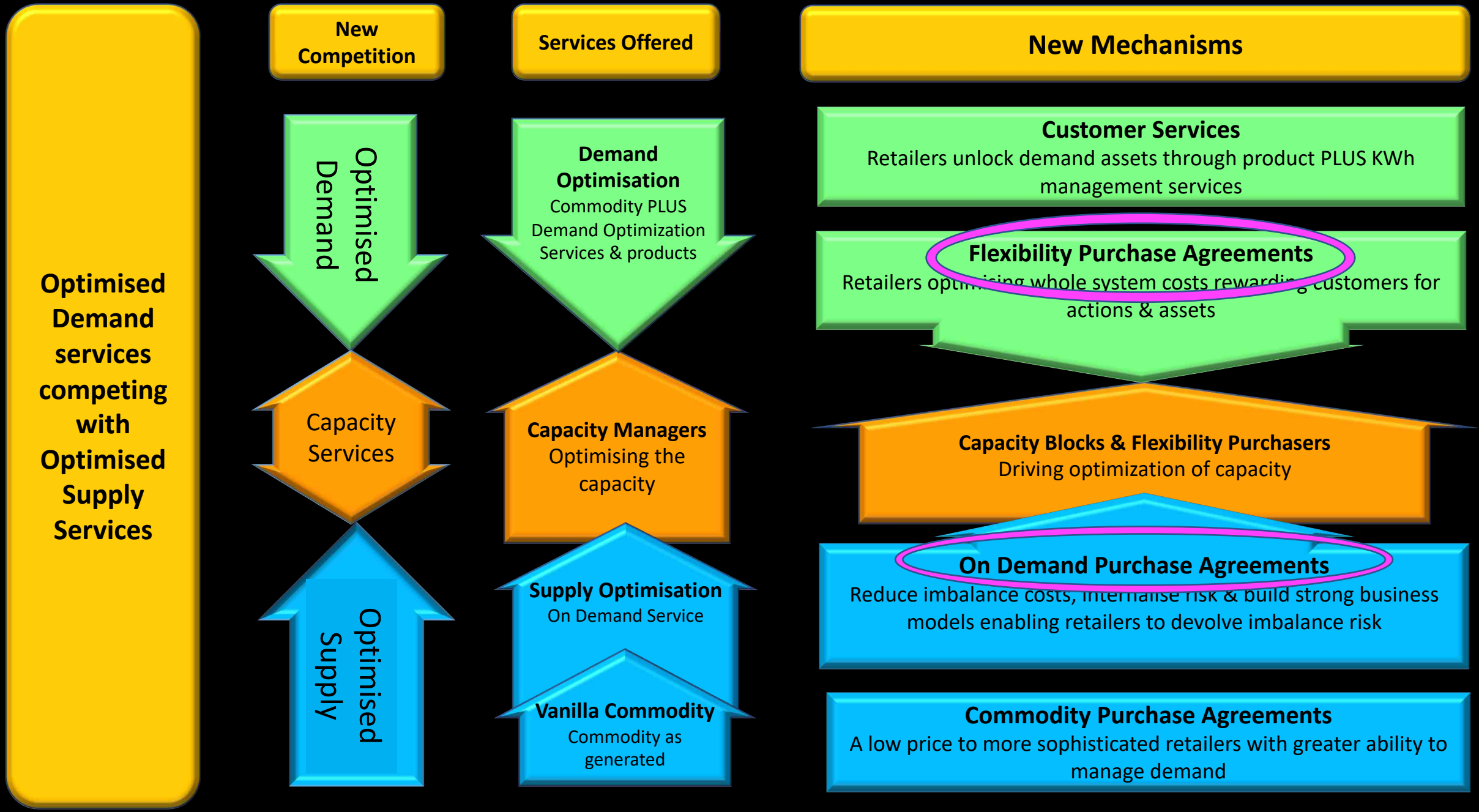
Adding Capacity at Peak
Micro Capacity Market Payment reducing the asset costs

Flexibility Purchase Agreement
Flexibility Purchase Agreement or Traded DSR

Lowest Cost Commodity
Leasing company incentivized to buy energy at very lowest price

Reduces overall system costs
Positive impact on available capacity, local constraints, balancing, peaks and curtailment from an asset already purchased for a non-energy purpose

Recognition of new Business Models by Regulation
Appropriate protections for consumers
Linkage between leasing arrangements, financial services regulation and energy regulation


Optimised Demand services competing with Optimised Supply Services
New Competition
Services Offered
New Mechanisms
Optimised Demand
Capacity Services
Optimised Supply
Demand Optimisation
Commodity PLUS Demand Optimization Services & products
Capacity Managers
Optimising the capacity
Supply Optimisation
On Demand Service
Vanilla Commodity
Commodity as generated
Customer Services
Retailers unlock demand assets through product PLUS KWh management services
Flexibility Purchase Agreements
Retailers optimising whole system costs rewarding customers for actions & assets
Capacity Blocks & Flexibility Purchasers
Driving optimization of capacity
On Demand Purchase Agreements
Reduce imbalance costs, internalise risk & build strong business models enabling retailers to devolve imbalance risk
Commodity Purchase Agreements
A low price to more sophisticated retailers with greater ability to manage demand

From Subsidies to the Market

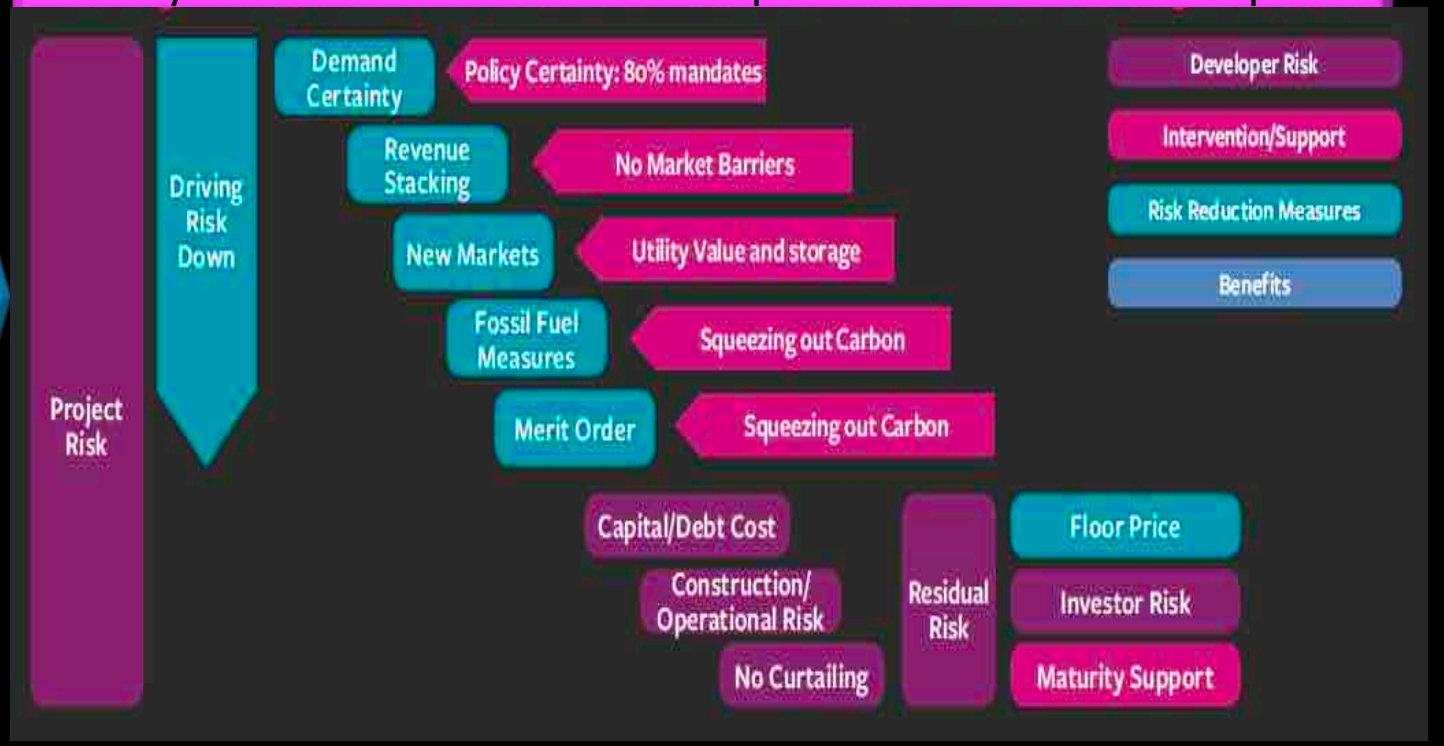
Why? Support the market, focus on capital & unlock investment support for immature technologies

- **Carbon Busting:** Policy on decarbonisation reducing risk and fossil fuel competition
- **Support the Market:** As much policy focus on supporting the unsubsidised market
- **Low Powered Floor Price:** move mature technologies to the market
- **Unlocks Post Subsidy Assets**: a floor price will enable assets coming out of support regimes to continue generating
- **On Demand Services:** will build stronger business models with added value

Unlock Capital throughout the system

Reward Customers' Actions & Assets

Policy Measures PLUS low floor price reduces risk to capital



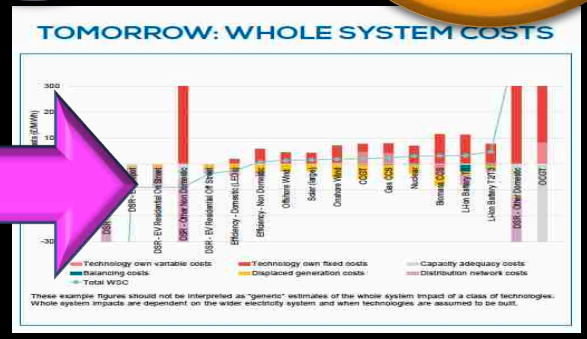
From Mature to Immature Technologies

Reward Customers' Actions & Assets

Fully Costed System

Unlock Capital throughout the system

Why? To start the heavy lifting & drive support to immature technologies including consumer facing assets

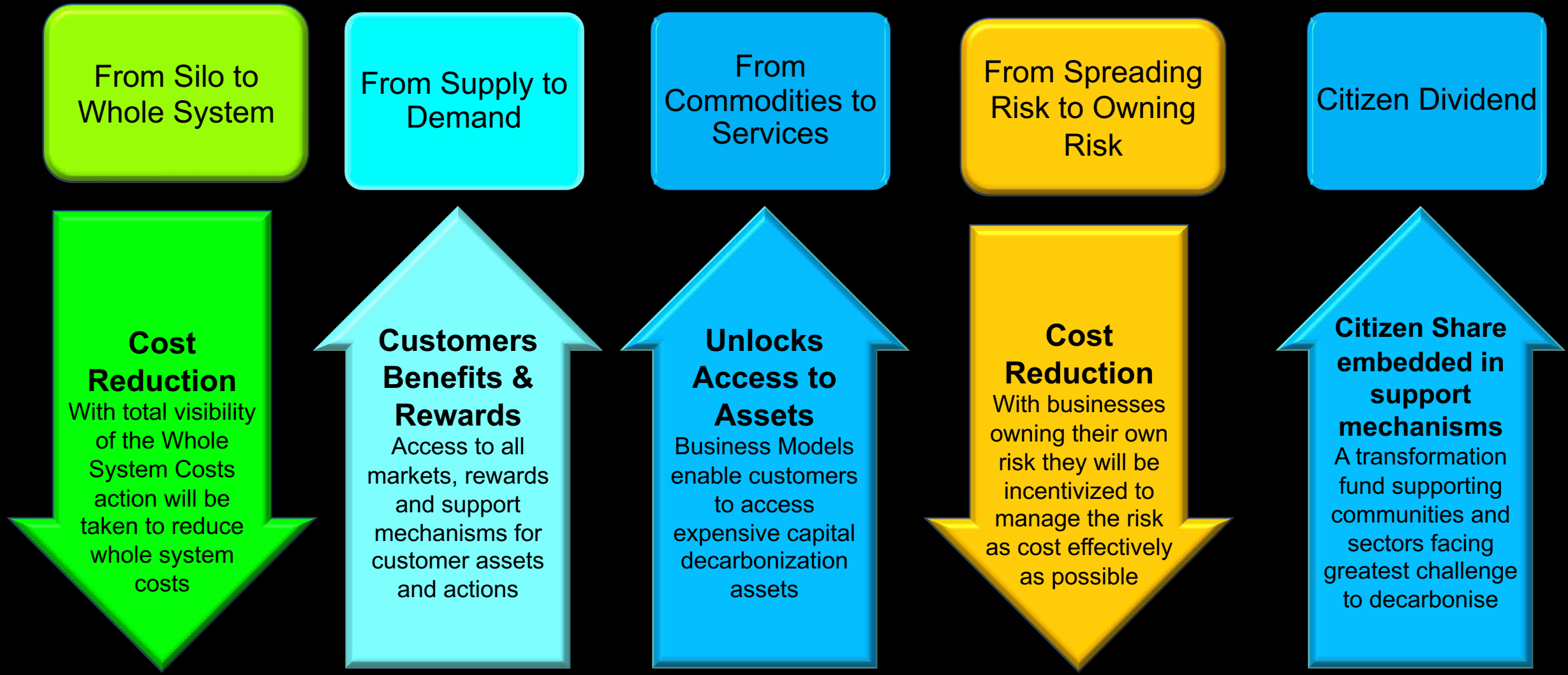


- **Short Term Changes to CfDs:**
  - Revenue stacking promoted
  - Mandate storage for large projects
  - Reduce constraint payments
- **Medium Term Changes to CfDs:**
  - Focus on immature technologies
  - Spread the Joy: miniaturise for demand side assets & EE
  - A Citizen Share – reward for derisking capital
- **Attract New Investors:**
  - An Investment Sandbox unlocking new funding models

INFRASTRUCTURE INVESTMENT IN SMART METERS

Infrastructure investors have financed the deployment of smart meters showing that "distributed assets" with clear revenue projections can be appealing to big capital if an appropriate regime is established

From the Few to the Many: The Citizen Dividend



Outcomes we would love to see!

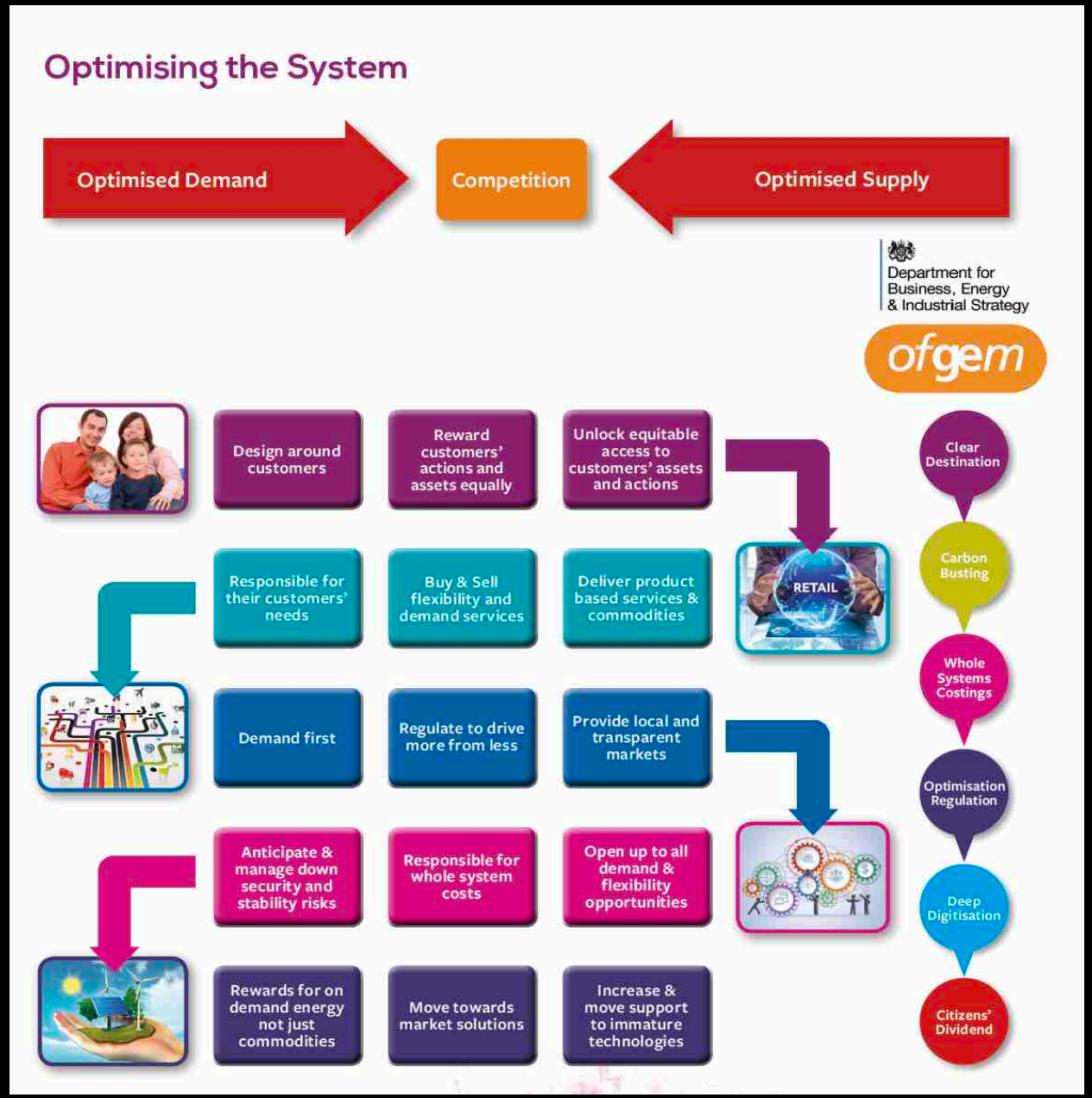
A Carbon Busting Review: Drive out carbon in policy and regulation

Whole System Costings: Acceptance the commodity price can no longer be the proxy for whole system costs

Demand equal to Generation: Equally rewarded, supported & fairly accessible

New Service Agreements: Retail Services, Flexibility Purchase Agreements, Capacity Services, Energy on Demand services and Commodity as Generated

Low Powered Floor Price: To accelerate and derisk capital in the unsubsidized market



Welcome
The Rt Hon Anne-Marie Trevelyan
Minister of State for Energy

Wonderful Advisors: Panel Discussion

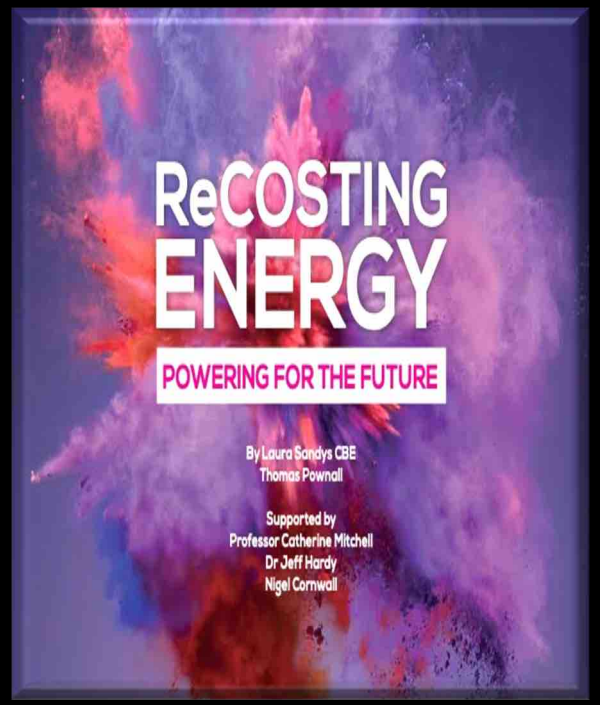
Professor Catherine Mitchell
UK's first female professor of energy policy. A mover and shaker in energy policy, governance guru & regulation reformer!

Dr Jeff Hardy
Leading brain at Grantham Institute, the Energy Rev, & best in business on consumer energy systems A great co-conspirator!

Nigel Cornwall
One of the most respected energy analysts in the UK with a detective mind identifying problems & solutions to Net Zero

Thomas Pownall
A great co-author who has a brilliant overview of system and market needs. A joy to work with & good luck for his PhD

Thank you so much for joining us



This is the start not the finish…

- Mini reports will be developed
- Podcast from experts on the themes
- Responses to consultations
- Significant engagement
- Welcome push back, push forward, rejection even!

Three Box Set Episodes Available at www.challenging-ideas.com/publications

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