Good Homes Alliance

asset utilities
Delivering Solutions

Expert Workshop

Electricity Grid Networks and EV Charging Infrastructure

31st August 2021
2pm - 4pm

Agenda for the workshop

01

How The Electrical Network Works
Q & A at the end

02

The Financial (Asset) Value Owning The Networks
Q & A at the end

10 minute for a cup of rosy lee
Or coffee lol

03

Where Local Authorities/Housing Associations Can Go Wrong
Q & A at the end

04

Strategic Grid Solutions
Q & A at the end

Opening Points

Who Is This Workshop For?

Simplified Non-Technical Approach.

Grid Connections Should Be Treated As A Game.

Introduction to Asset Utilities

Focus is Delivering Solutions

2007	32,344	£ 33m	31
Year Established	Grid Connections	Client's Profit/Savings	Local Authority Clients

Solution #1 : Grid Solutions

Solution #2 : ZERO Carbon Solution for Non-Domestic Buildings
Self-funded solution that costs £660 per building and reduces carbon by 59%

Solution #3 : Renewable Energy Assessment for Non-Domestic Buildings
Financial viability with full 20 year modelling and grid contesting for £640 per building

ZERO Carbon Places.org
A network to help local authorities achieve net zero carbon

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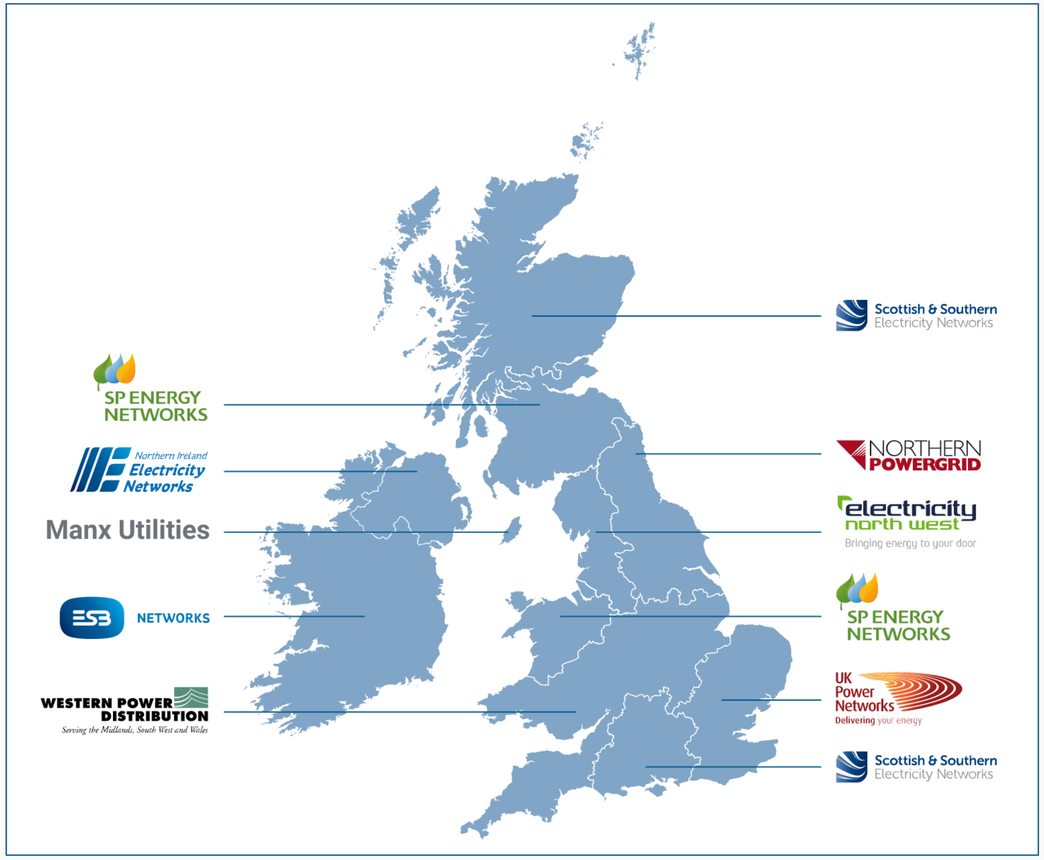
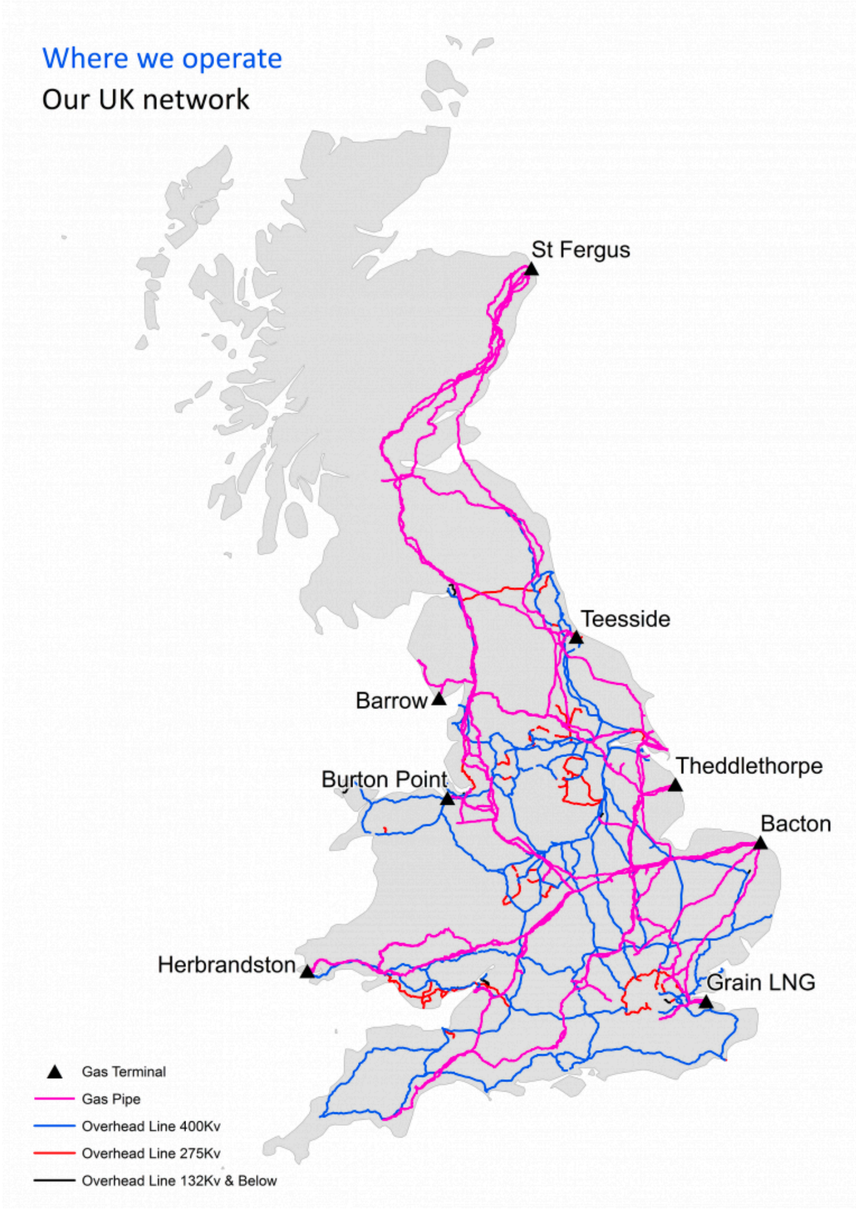
01 How The Electrical Network Works

Distribution Network Operators DNO's



Independent Distribution Network Operators IDNO's

14 companies approved by Ofgem with same distribution licenses as the DNO



Transmission System

High voltage movement of electricity

Distribution System

Enters the DNO area at 220 kV or 132 kV
Bulk Supply Points
BSP

33 kV network

33 kV Substations

11 kV network

11 kV Substations

Or commercial building, renewable energy product or EV charging point

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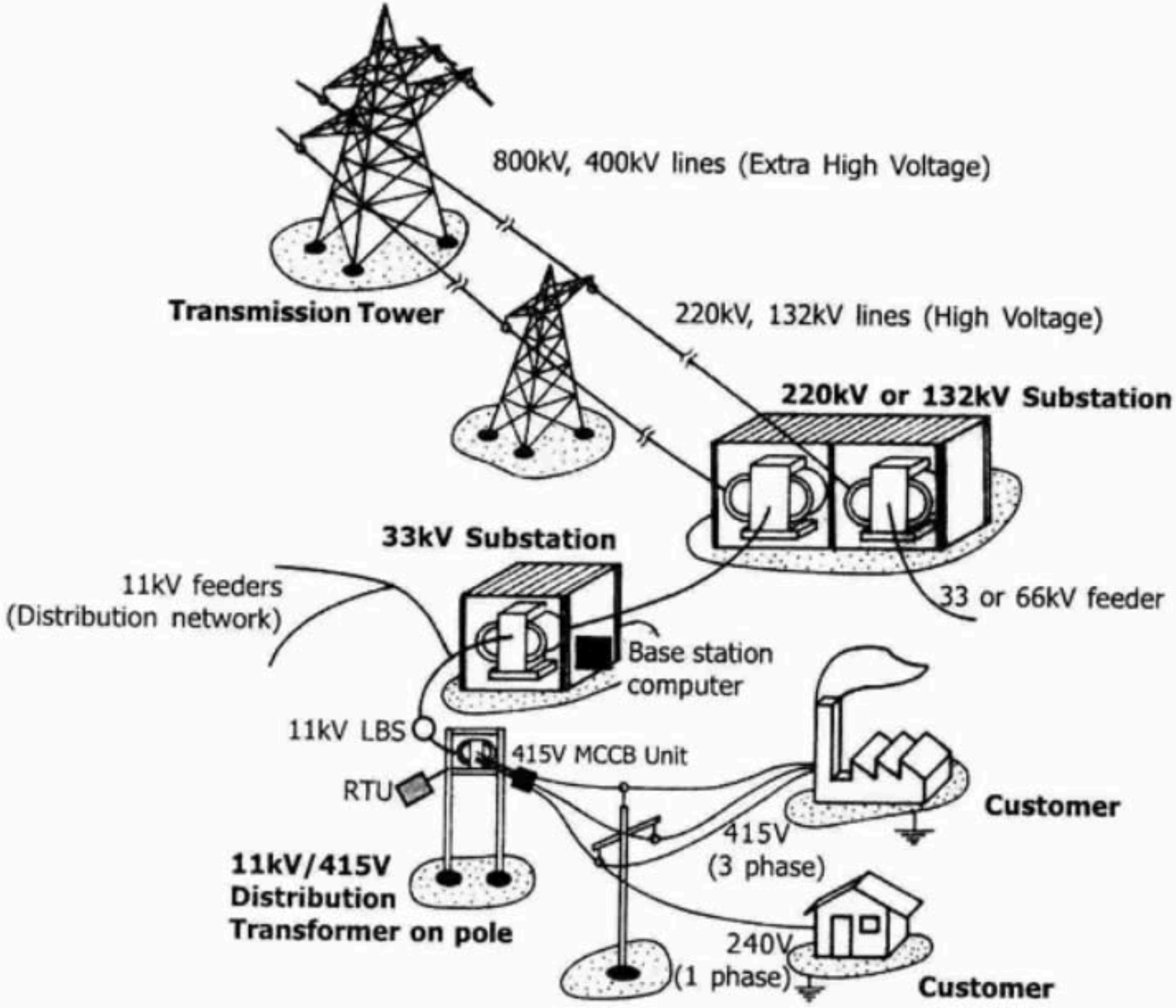
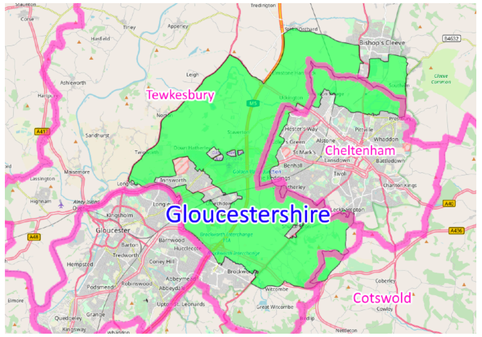
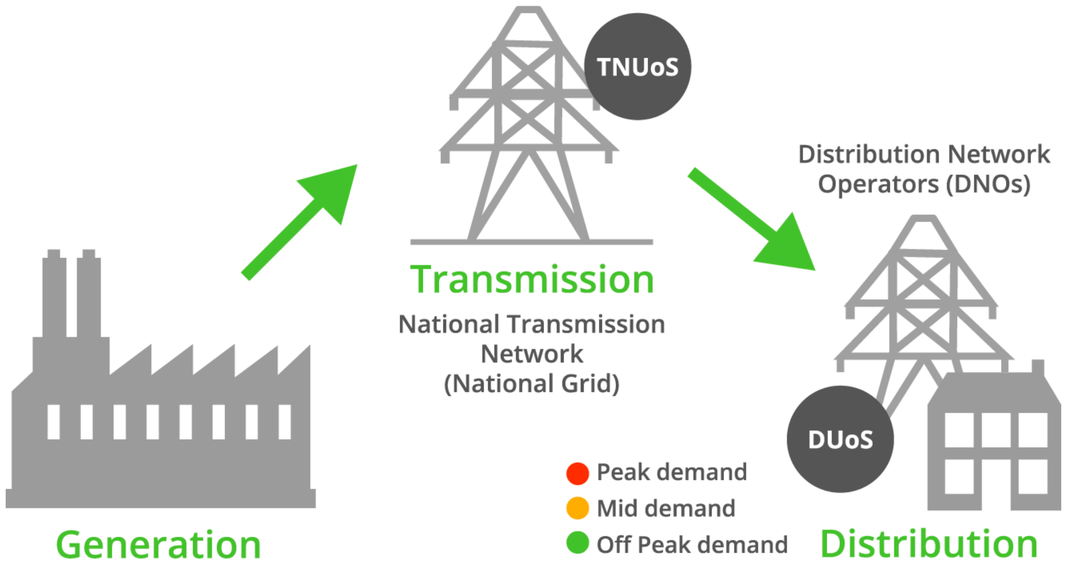

800kV, 400kV lines (Extra High Voltage)
Transmission Tower
220kV, 132kV lines (High Voltage)
220kV or 132kV Substation
33kV Substation
11kV feeders
(Distribution network)
33 or 66kV feeder
Base station
computer
11kV LBS
415V MCCB Unit
RTU
Customer
415V
(3 phase)
11kV/415V
Distribution
Transformer on pole
240V
(1 phase)
Customer

Concept of Headroom

DNO has responsibility for ensuring the balance of import (demand) for electricity with export (generation) of electricity in their region.

Headroom is the maximum available power entering the DNO's grid at the Bulk Supply Point (BSP). If there is no 'headroom', there is no new capacity for grid connections.





User System Charges is where the DNOs generate an income.

Capacity Availability

Substation name	Lockleaze Bsp 132kv
Substation type	BSP
Substation number	113370

Substation Demand Headroom	-37.27 MVA
Substation Reverse Power Headroom	36.34 MVA
Upstream Demand Headroom	-
Upstream Generation Headroom	-
Substation Fault Level Headroom	0 kA
Associated Statement of Works	No

Substation name	Paulton
Substation type	Primary
Substation number	161315

Substation Demand Headroom	4.06 MVA
Substation Reverse Power Headroom	6.80 MVA
Upstream Demand Headroom	-
Upstream Generation Headroom	-
Substation Fault Level Headroom	4.7 kA
Associated Statement of Works	No

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Heathrow chief: We can have a supersize airport AND save planet

Interview Page 91

Financial MAIL ON SUNDAY

Billions drain abroad from UK power grids

SPECIAL INVESTIGATION

Tycoons cash in on energy bills – fuelling fears Corbyn will try to renationalise network

By Neil Craven

GIANT foreign firms which own the cables that supply electricity to British homes are making vast profits and siphoning hundreds of millions of pounds out of the country each year, an investigation by The Mail on Sunday can reveal.

Four firms that connect homes to the National Grid – including two owned by billionaires from the US and China – dished out dividends of more than £1billion in the past two years alone.

They are paying themselves vast sums despite assurances that they are heavily regulated.

The findings of our probe will raise concern that the massive payouts are heaping extra costs on households – which pay for the running of the power network via their electricity bills – and could be seized upon by Jeremy Corbyn as the Labour party seeks to renationalise the power grid.

The 14 regional power networks in the UK are controlled by just six privately run companies. Two of these are part of larger energy groups, SSE and Scottish Power, but four are owned directly by overseas investors.

Northern Powergrid in the North East is owned by Berkshire Hathaway – run by the world's third richest man Warren Buffett.

UK Power Networks, covering the East of England, is owned by Hong Kong-based multi-billionaire Li Ka-shing.

Western Power Distribution, which covers the Midlands and the South West, is owned by the US energy conglomerate PPL Corporation.

Electricity North West, which stretches from Manchester to Cumbria, is owned by Australian firm Colonial First State and US bank JP Morgan.

The latter is up for sale for £2billion and bidders are understood to include Li Ka-shing.

Statutory accounts for the firms reveal that most make vast profit margins. In total, those four firms declared profits of £1.7billion on revenues of £4.5billion last year. The profit margin is more than 37 per cent. However, watchdog Ofgem and the Energy Networks Association, which represents the firms, said the companies are required to reinvest profits into their networks to improve services to customers.

The remaining two network operators are owned by energy providers ScottishPower and SSE, which are both currently subject to stringent caps on the prices they charge consumers.

Figures provided by the ENA suggest the 'cost of investment activities' across all six network operators was more than £2.5billion in 2017. It claimed that these huge outlays left a 'post-investment return' of £319.7million on revenues of £6.3billion – a profit margin of just over 5 per cent.

But our investigation reveals that the four independent companies paid their foreign owners more than twice that in dividends in the corresponding period. The total dividends paid by the four firms to their owners from 2014 to 2018 were close to £2billion.

Some networks also carry significant debts, including loans from their parent company, meaning the owners are able to make more money through interest payments.

Electricity bills for consumers include the cost of maintaining distribution networks. This accounts for about 15 per cent of the overall bill. The ENA said the networks are 'thoroughly scrutinised by the regulator'. It said the dividends paid were higher than its stated profit for the energy network industry because they 'also include money received from unregulated parts of the businesses'.

But UK Power Networks, which has paid its owner more than £800million in dividends since 2014, describes itself as a group that 'owns, operates and manages three of the 14 electricity distribution networks in Great Britain'.

It says in its latest set of statutory accounts, filed at Companies House: 'The group operates within a regulated environment with the major part of its revenue being set as part of a price control review by the industry regulator Ofgem.'

Mark Todd, co-founder of the comparison site Energyhelpline, said: 'Thenetworks are seen as a good asset to own. It's like a savings account that pays a very high rate of interest.

'If the regulator sees that the return on investment is exceptional then they should take action because it's not fair that foreign investment companies can buy up vast tracts of the British energy network where there is zero competition and then charge a price which is too high.'

Ofgem said: 'Ofgem's framework ensures that energy network companies deliver both good levels of performance and value for money for consumers.

'From 2021, Ofgem has proposed a much lower cost of capital for network companies to raise the billions of pounds of investment needed, which will result in lower returns for investors and more savings for consumers.'

THE GREEN CON BY ENERGY FIRMS

Personal Finance Pages 92–93

DEAL: Software firm Accloud is paying Priti Patel £45,000 a year to work for 20 hours per month

PICTURE: LOUISE HAYWOOD-SIM / CAMERA PRESS

MP is sitting Priti as her firm heads for AIM float

By Jamie Nimmo

A COMPANY that counts Tory MP Priti Patel as a director is plotting a float on London's stock exchange.

Accounting software firm Accloud, which targets firms in India, last week received a pledge for $30million (£23million). The finance from Australia-based fund manager Mayfair 101 in exchange for a larger stake paves the way for a listing on AIM, London's junior stock market, which could value Accloud at tens of millions of pounds.

Patel, a pro-Brexit former Minister whose parents are from India, was appointed a director of Accloud this year. She receives £45,000 a year for about 20 hours of work a month.

The MP for Witham in Essex is not listed by Companies House as a shareholder. But she could receive shares before the float, as is often the case. Patel was forced to quit as International Development Secretary in 2017 after revelations of unofficial meetings with Israeli ministers.

Mayfair 101 said Patel's 'deep connections throughout India and other developing nations align with Accloud's go-to-market strategy'.

The firm made an $18.8million loss after tax for the year ending March 2018. However, its auditors BDO quit in December saying it could not conduct a proper audit. It said Accloud PLC, a shell company set up in 2015 to buy an operating company, Accloud Ltd, had not included financial statements for the firm it bought. BDO said in its resignation letter the issue had not been addressed.

Accloud did not respond to a request for a comment. Patel said: 'All declarations are with the Commons register'.

Article 5th May 2019

14 regional power networks controlled by six privately run companies.

Of the six, two are owned by larger energy groups SSE and Scottish Power and four by overseas investors.

In 2017 the 'Cost of investment' activities was £2.5 billion, leaving a 'post investment return of £319.7 million on revenues of £2.3 billion - a profit margin of 5%.

The four overseas companies paid their owners in dividends nearly **£2 billion between 2014 and 2018.**

https://www.ft.com › content

Labour plans to nationalise energy networks at below market ...

14 May 2019 — Jeremy Corbyn, **Labour** leader, will set out on Thursday how a government led by him would **nationalise** Britain's **energy networks** — the cables ...

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Network Reinforcement Costs

Bulk Supply Points 132 kV → 100% DNO

↓

33 kV network and substations → Shared between DNO and Customer (on a percentage of use basis)

↓

11 kV network → 100% Customer - ‘First Comer’

DNO's Grid Connection Obligations

DNO is obliged to provide you with a grid connection and a quotation, but at what cost?

Case Study : New Funeral Building

East Cambridgeshire District Council
www.eastcambs.gov.uk

Standard Grid Response

Import plus Solar PV export at **500 kVa**

- Grid connection cost **£21m plus vat**

If the Grid Was Tested

Import plus Solar PV export at **199 kVa**

- Grid connection cost **£63,000 plus vat**

Loss Through Standard Response

- **Fees of £5,000 - £8,000**
- **Time 4 - 5 months**
- **Possible loss of entire project**

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01 How The Electrical Network Works

Q & A

02 The Financial (Asset) Value of Owning The Networks

It's Everything To Do With Distribution

(who owns the network - electricity, gas, water and fibre)

DNO → **Point of Connection POC** → **IDNO** → **Meter Point**

Usually an 11 kV substation

Could be 5m or 500m cabling

[Principle also applies to gas (IGT) and water networks - an Inset Licence]

Who ever owns the 'network' is entitled to the transportation fee (DUoS), included in the customer's energy bill (except for water) and calculated by Ofgem.

It's the same principle of renting a domestic property and the income will be there for the duration that power is consumed.

Known as an 'ASSET PAYMENT.'

What's The Asset Payment Worth?

Depends on different factors

- Gas is more valuable than electricity
- 1,000 houses are more valuable that 1 commercial building using the same power.
- The calculation is linked to meters rather usage

Value Example

The 'Asset Value' is calculated by the IDNO or IGT (for gas) and then deducted from the contracting cost of connecting each property or project.

Domestic properties could see a 50% reduction in the utility services contracting (connection) fees.

How Popular Is This?

Gas
10.5% of the 21.9m gas connections - 2.3million were via a IGT.
Bear in mind the IGT network has only existed since 2007.

The IDNO's have 782,000 electrical connections.

Developers' Utility Partner Choices (2020)		
	Construction	**Adoption**
Gas	**171** Utility Infrastructure Providers	**18** Independent Gas Transporters (plus the Gas Distribution Network Operator)
Electricity	**299** Independent Connections Providers	**13** Independent Distribution Network Operators (plus the DNO)
Water	**202** Self-Lay Operators/WIRSAE firms	**9** "New Appointees" plus the local monopoly
Multi-Utility*	**38** Multi Utility Recognition Status providers	**6** businesses with IGT & IDNO licences
Sources: OFGEM, OFWAT		

Main Developer Retains The Asset Values

The main developer negotiates a master utility contract with a single IDNO/IGT.

The secondary housing developers pay a utility connections fee and have no contact with the DNO etc.

The main developer may retain the ‘asset payment’ and benefit financially for every house connected.

Housing Developer 1

Housing Developer 2

Housing Developer 3

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There Is A Shortage Of Capacity

Case Study : CambridgeShire

Cambridgeshire County Council

We won a tender to access the future demand for grid capacity to 2030 as there were presently issues in the region making affordable grid connection.

We were able to determine that :

1) much of the region had limited or no spare electrical capacity
2) to meet the future demand, including that of EV, the available capacity would been to **increase by 300%**

The major issue being the First Comer principle .

And The Capacity Issues WILL Get Worse

Using Housing As An Example

1. A house requires a 3kVa connection. So 1,000 homes = 3 MW
2. But if a 7 kW EV charging point is required, an additional amount of demand is required of 3 - 7 MW for the 1,000 homes
3. Total ‘demand’ from the grid has now increased to 6 - 10 MW
4. If there are already grid issues, this extra demand will either use up any available demand, which means **all other connections in the area** will be expensive due to 11kV reinforcement costs
5. Add on additional demand from an Air Source Heat Pump and the problem gets worse.

These issues relate to EV charging connections and have an equal adverse knock on effect on future renewable projects too.

So the planning of future projects is essential.

Owning the distribution is where the **Money** is

DNO and IDNO'S

Own cable network

Money is made because they control the distribution of electricity

nationalgrid

National Grid

Own pipe network

Money is made because they control the distribution of gas

openreach

Openreach

Own fibre network

Money is made because they control the distribution of fibre

bp chargemaster bp

BP Chargermaster

Own EV charging points

Money is made by also owning the database of EV customers too

Examples of the value of a database

MSE

MoneySavingExpert.com

Martin Lewis built a database of people interested in saving money.

Like local authorities, he was trusted by his 5 million subscribers and was able to generate an income and profit from the database.

He sold the business for **£87 million** to Money Supermarket who saw the value in his database.

skyscanner

Skyscanner started by printing A4 flyers of low cost airlines and handing them out on the streets of Edinburgh.

The database was built to 60 million subscribers before it was sold to Chinese travel firm **ctrip.com for £1.4 billion.**

This valued the company at 80 times profit.

Examples of owning
‘Distribution’ and Physical Product

Chargemaster built up a network of 6,500 charging points.

BP purchased this company for **£130 million** because of the potential to own both the physical product (charging posts) and customer data base.

BP Chargemaster then launched its Polar Plus service with a monthly fee of £7.85 per month for reduced charging costs, it attracted tens of thousands of subscribers.

NewMotion built up 30,000 charging points across Europe and even though it made a net loss of £3.5 million in 2016 against a net turnover of £11.57 million.

Shell saw the value distribution network already established and purchased the company for an undisclosed sum.

02 The Financial (Asset) Value of Owning The Networks

Q & A

03 Where Local Authorities/Housing Associations Can Go Wrong

Three Areas That Create Problems

AREA #1 : No Collective Strategy

AREA #2 : No Testing Capacity Issues In The Grid

AREA #3 : No DNO Consultation

AREA #1 : No Collective Strategy

When considering solar PV farms, solar PV roofs and EV charging projects :

- Are sites considered in isolation?
- If a ‘project’ is created, are secondary sites included if there is an issue with a more preferred location?
- Are the different projects (as listed above) considered collectively? ie you know the total demand/generation requirements

- What is the driver for each project?
- Is it carbon reductions, if so what is the impact collectively across the authority/association?
- Is it to produce income?
- Is it to build a valuable distribution business? eg owning the customer’s details

- If EV, is the size of the charger future proofed against faster charging required at a future date? eg mobile phone development

AREA #2 : No Testing Capacity Issues In The Grid

Failure to do this costs time, money and potentially cancelled projects.

The usual process is to identify a site/project and then make a formal grid application.

This involves internal time, external consultants to make the grid applications (technical input into the ENA grid application) and DNO fees.

Case Study : New Funeral Building

East Cambridgeshire District Council
www.eastcambs.gov.uk

Standard Grid Response

Import plus Solar PV export at **500 kVa**

- Grid connection cost **£21m plus vat**

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If the Grid Was Tested

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- **Fees of £7,000 - £8,000**
- **Time 4 - 5 months**
- **Possible loss of entire project**

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AREA #3 : No DNO Consultation

The DNO is there to support authorities and associations.

We in effect create partnerships, where there is a vested interest on both sides of the discussion.

Gloucestershire County Council

Central Bedfordshire Central Bedfordshire Council

Cambridgeshire County Council

Western Power Distribution
Serving the Midlands, South West and Wales

UK Power Networks
Delivering your electricity

UK Power Networks
Delivering your electricity

03 Where Local Authorities/Housing Associations Can Go Wrong

Q & A

04 Strategic Grid Solutions

We would recommend following these 5 stages.

STAGE #1 : Know What You Want - The Big Picture

STAGE #2 : Complete A Grid Assessment

STAGE #3 : Testing The Grid

STAGE #4 : DNO Engagement

STAGE #5 : Solutions To Solve Capacity Issues

STAGE #1 : Know What You Want - The Big Picture

This is the opportunity to look at the entire estate and create a collective aspiration for everything that can be achieved.

Alternatively, if it is a single housing development, it is an opportunity to reduce the utility services costs by unlocking as much of the 'asset values' as possible.

Collective Vision/Desire

- Can the aspirations for solar PV farms, roof mounted solar, EV charging points plus other renewable projects be expressed as a single big picture vision/document?
- As well as preferred sites, can secondary sites be considered should there be grid constraint issues.

EV Strategy

- This would require all locations, size of charging points (future proofing required) to be collated. There will be software available to access traffic flow, ideal locations, financial modelling etc

CATAPULT Energy Systems

Housing Developments

- If a single housing development, how can all the value be extracted from the asset values? Is there an opportunity for a central battery to store excess generation from solar PV panels to be resold to home owners

STAGE #2 : Complete A Grid Assessment

Before even considering making a budget/formal grid application, an assessment of the grid should be completed to understand any/all capacity issues.

This information then guides the decision making on which sites/projects to promote.

1. How much capacity is available in the grid? ie headroom at **132 kV substations**
2. What capacity exists at each of the **33 kV substations**? Both demand and generation if applicable
3. What **11 kV issues** exist? **Who is the FIRST COMER that will fund the problem?**
4. What new developments are in the planning process and yet to secure grid capacity?
5. What implications do these developments have on plans with the authority/association to make their grid applications?
6. What planning issues could be expected by imposing restrictions on housing developments requiring EV and/or air source heat pumps? Re the requirement for increased capacity
7. Has the EV strategy identified what size of charger goes where? And is the connection points future proofed if more powerful chargers are required?

Gloucestershire County Council · Cambridgeshire County Council · Central Bedfordshire Council · Warwickshire County Council · Bristol City Council · Oxfordshire County Council www.oxfordshire.gov.uk · Buckinghamshire County Council · asset utilities Delivering Solutions

STAGE #3 : Testing The Grid

This stage is about making <u>budget applications</u> for all key sites.

As opposed to making a single application per site, the strategy should be to make multiple budget applications for each site in order to understand if there is a constraint, where the constraint commences.

This stage is extremely important for a number of reasons.

These include :

1. It identifies the anticipated grid connection cost for each site, thus identifying where there may be connection issues
2. This allows possible alternative sites to be considered
3. This strategy of multiple applications also identifies the maximum size of demand or generation that can be applied for without any constraint issues. ie you have a viable project
4. This strategy also triggers STAGE #4 and entering into a sensible conversation with the DNO

STAGE #4 : DNO Engagement

Working with the DNO as a ‘partner’ is paramount.

A key component is to have the DNO working with you on your project/sites.

Having their support is crucial as they are able to steer conversations by advising where there are issues and how these challenges can be resolved.

They fully understand the mechanics of their network and having the ‘inside’ track is key.

This approach of involving senior players within the DNO saves time, money and often a serious amount of ‘heart ache.’

STAGE #5 : Solutions To Solve Capacity Issues

If there is NO capacity, there is NO capacity.

A major hurdle when there are grid constraints on the 11 kV network, is who will pay for reinforcement costs. This is the ‘first comer’ rule, where that organisation meets all such costs and further applications are excluded from such costs.

If no one meets these costs, literally no new connections, developments or projects commence in that area.

An alternative solution is for the local authority to step and fund the construction of new substations at 33 kV or even at 132 kV. It is possible that the ‘funding party’ can then receive their investment refunded as new projects connect to that new substation. This has to be within the first 5 years.

EBBSFLEET GARDEN CITY

Ebbsfleet Development Corporation invested in new electricity substations at 132 kV in order to supply up to 15,000 homes.

Cardiff CC funded a new substation to kickstart development in Sea Davids district.

04 Strategic Grid Solutions

Q & A

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Thank You

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