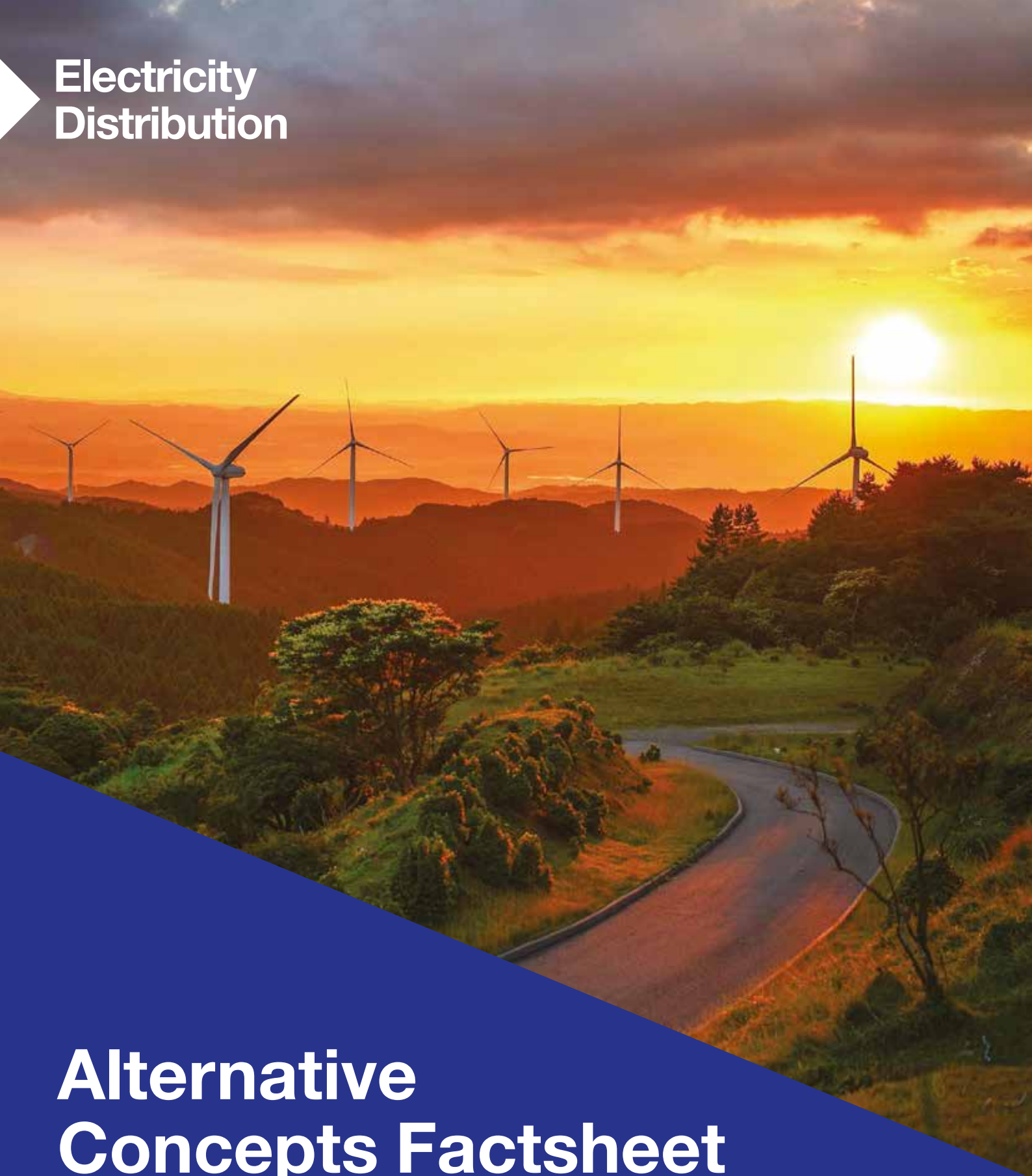
Electricity Distribution



Alternative Concepts Factsheet

Alternative concepts to improve the economics and access to electricity for industrials in South Wales

nationalgrid

Alternative Concepts Factsheet for Industrials in South Wales

As the electricity distribution network operator in South Wales, National Grid Electricity Distribution (NGED) understands that timely and economic access to electricity is critical to industrial competitiveness and to attracting international investment.

We want to collaborate with our industrial customers and be proactive in making better use of existing connections, in supporting behind-the-meter generation and PPAs, and planning for future electricity infrastructure.

In addition to the ongoing network development plans and standard reinforcement of the network, the alternative concepts presented in this factsheet are potential opportunities to get more out of the existing infrastructure and improve the economics of electricity in South Wales.

Use Case 1:
Within the Boundaries of My Site

Get the most out of existing import connections

1. Flexible Interruptible Import Agreements – import limited connection (install more capacity under a limitation scheme and import greater than your contracted firm limits at permitted times), timed connections (capacity is subject to restrictions within specific time periods), phased connections (capacity increases over time). For example, Active Network Management (ANM) is a type of interruptible connection where control systems adjust import and/or export in line with agreed limits
2. Add behind-the-meter (BTM) renewables, storage, and microgrid (private network that can be tethered to or run independently from the grid) for self-consumption only (no export to the grid), increasing share of renewable electricity improving flexibility by switching consumption between grid and onsite renewables.

Expand to export connections

3. Add an export or mixed connection to the BTM renewables and storage (and microgrid) to have the option to sell excess electricity when prices are attractive.
4. Flexible Interruptible Export Agreement - export contract can also be export limited, timed, phased, e.g., ANM.

Use Case 2:
Beyond the boundaries of my site - shared infrastructure in development areas and industrial clusters

1. Shared connection for import – share an import connection with another party with complementary import load profiles and manage risk with add behind-the-meter (BTM), onsite renewables and storage (and possibly a microgrid), and contract terms
2. Shared direct wire Power Purchase Agreements (PPAs)– share import of onsite renewables and access to storage with another party and manage risks through contracts
3. Shared connection for export (or mixed connection) – share onsite renewables and export to the grid, optimise local use within the cluster and sell excess electricity when prices are attractive
4. Synergies with other non-electricity networks or loads - optimise electricity consumption with other networks in the cluster that can act as flexible demand and storage (e.g., heating, cooling, water, EV charging).

Use Case 3:
Anticipatory Investment and Capacity Reservation to future-proof future developments

1. Share plans as soon as possible
2. Phase the import connection requirements to match the grid constraints and Network Development Plan (ten-year plan of how NGED will develop the network)
3. Add BTM battery (and microgrid) to enable time-phasing (within day) of import connection
4. Add BTM on site renewable generation (and microgrid) to reduce import requirement.

Example Customer Journey

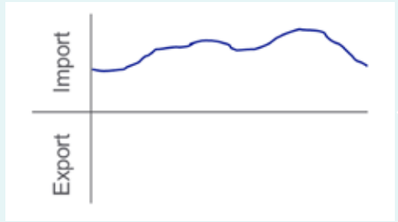
Illustration of how the alternative concepts could be applied and layered to improve the economics and access to electricity

Within the Boundaries of My Site - **Industrial ABC**

Step one

The flatter the line, the more in harmony with the generation profile

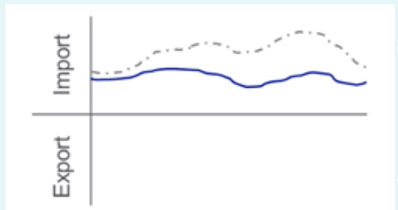
- An industrial facility currently has a 4MW peak electrical demand.
- The facility plans to reduce electricity costs and has available land to offset 50% of its peak electricity demand with solar and wind energy.



Step two

The flatter the line, the more in harmony with the generation profile

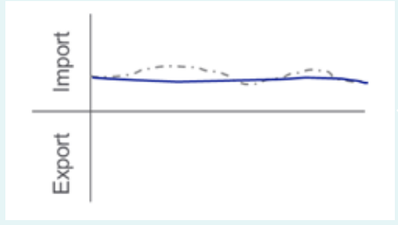
- The facility constructs a 1.5 MW solar park and 0.5MW wind turbine on nearby land connected ‘Behind the Meter’ via a microgrid and Export Limitation System (ELS).
- The energy generated by the BTM installation reduces the facility’s energy consumption throughout the year on an intermittent basis.



Step three

The flatter the line, the more in harmony with the generation profile

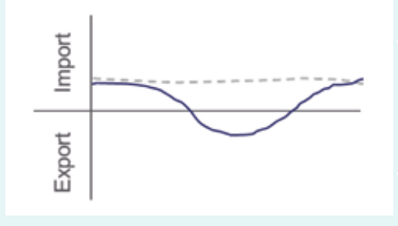
- The facility then decides to supplement the solar and wind generation with a 2MW battery storage system.
- The Battery Installation provides additional flexibility to take advantage of lower electricity prices/avoid peak prices and participate in demand turn up/turn down markets.



Step four

The flatter the line, the more in harmony with the generation profile

- The facility expands the solar installation by a further 3MW to take installed capacity to 7MW (4.5MW Solar, 0.5MW Wind, 2MW BESS).
- A flexible/interruptible export capacity of 3MW is agreed.
- The facility can now also sell into the market and participate in generation turn up/turn down.



The load profile is increasing in harmony with the grid’s generation profile

Industrial Clusters/Shared Infrastructure - **XYZ Enterprise Zone**

Step one

- Two industrial customers looking to locate to a new greenfield Enterprise Zone have a combined electrical demand of 50MW.
- The two industrial customers form a Joint Venture (JV) and secure a Reservation of Capacity and Infrastructure Works Agreement for demand.

Step two

- The new BSP substation is established with the costs shared between the two parties as per the JV Agreement.
- The two industrial customers construct their plants in parallel with the substation build and energise their connections.

Step three

- An Industrial cluster begins to form with new customers looking to locate to the vacant plots.
- Future tenants can either obtain connection from the existing customers or obtain new connections from the BSP which could trigger potential refund payment to the initial contributor.

Step four

- The connected customers wish to offset their demand and so connect Solar and Wind Farms using adjacent land supplemented by Battery Storage.
- The customers can participate in various flexibility markets such as demand turn down.

Step five

- A nearby site is selected as a pilot for a 5MW solar farm
- Rather than establish a new connection, a Power Purchase Agreement (PPA) is agreed with one of the Industrial customers.
- The customer applies to add 5MW of export capacity to their Connection Agreement and a connection is installed between the two sites.

Alternative Concepts for Industrial Customers

Concept	Description	Considerations/Implications for Industrial Customers
Industrial Customer Flexible (Interruptible) Import Agreements • **Timed Connections** • **Phased Connections** • **Active Network Management (ANM)**	Flexible connection agreements can allow customers to install equipment with greater import capability than that which has been secured to our design standards on the condition that their import can be interrupted or reduced. Agreements could include time-of-use constraints, phased ramped up of capacity, visibility and control requirements, and transition/upgrade when available clauses.	• Customer is made aware of the conditions for when import reduced e.g., where a fault, overload or planned outage takes place. • Agreement on the circuit/network conditions for which the customer will not be compensated.
BTM renewables and storage for self-consumption only (no export to the grid)	Configuring consumption assets so they can operate both behind-the-meter, serving on-site industrial loads/consume from on-site generation or be grid facing- importing from the grid. Key features include dual dispatchability (assets can respond to on-site needs and grid signals), providing demand response, and dynamic control systems.	• Batteries and onsite generation are behind-the-meter with no exporting to the network. Customers are technically assessed for long-term parallel running, but zero export limited • Flexibility opportunity is demand-response (demand turn down and demand turn up) that can be achieved through demand response and associated renewables.
BTM renewables and storage for self-consumption and export	Configuring generation/consumption assets so they can operate both behind-the-meter, serving on-site industrial loads/consume from on-site generation or be grid facing- exporting/ importing from the grid. Key features include dual dispatchability (assets can respond to on-site needs and grid signals), revenue stacking from providing flexibility services, and dynamic control systems.	• Batteries and onsite generation can be both behind-the-meter or export to the network depending on design. • Flexibility participation can now be delivered through demand, generation, or battery e.g., demand turn-up/generation turn-down and demand turn-up/ generation turn-down.
Industrial Customer Shared Connections, and BTM Renewables and Storage for self-consumption only (no increase in import capacity)	A grid connection that allows multiple electricity-consuming installations to share a single grid connection. Note: there is no export to the grid. NGED already optimises unused capacity across its customer base, but in this case, customers coordinate and optimise use of connection. Technical and legal features include separate connection agreement (or shared understanding between parties), separate metering, balancing entity to interface with DSO, and redispatch rules agreed to by the parties.	• T&Cs that allows NGED to discuss terms with both parties. • Commercial arrangement/contract with provision for the event that one party or more falls away.

Concept	Description	Considerations/Implications for Industrial Customers
Industrial Customer Shared Connections, and BTM Renewables and Storage for self-consumption and export	A grid connection that allows multiple electricity-generating and electricity-consuming installations to share a single grid connection. Technical and legal features include separate connection agreement (or shared understanding between parties), separate metering, balancing entity to interface with DSO, and redispatch rules agreed to by the parties.	• Customers have a connection agreement with T&Cs that include import contract/ export/battery, depending on assets. • Demand and generation customers operate under different regimes and technical requirements. Site would be a mix of both. • Commercial arrangement/contract with provision for the event that one party or more falls away.
Anticipatory Investment and Capacity Reservation	A connection capacity reservation and infrastructure spending incurred prior to a binding connection agreement based on forecast future needs. (e.g., similar approach to a housing developer, EV charging provider). Although the “legally binding” part of the contract is the agreement, this approach aligns development plans.	• Consider how to phase requirement to match grid constraints and build out. • Share plans with NGED as soon as possible for consideration in DFES, ED3, RESP.
Industrial Participation in Flexibility and Resiliency Markets	Industrial facilities, particularly in energy-intensive sectors, have distinct constraints – such as continuous processes or temperature-sensitive production – but also hold significant potential to contribute to system flexibility. By designing demand-side mechanisms that recognise these operational realities, industry could participate more effectively while maintaining both operational and financial stability.	• Confirm that the site can meet the technical performance requirements. • Register as a flexibility provider or with a flexibility provider (e.g. energy supplier who is already registered). • Revenue stacking by participating in NESO Balancing Market, capacity market, and NGED flexibility market.
Support For Clusters, Shared Power Purchase Agreements, BTM Microgrids/Non-standard Connections	DSOs have become a critical enabler of industrial clusters, collaborating with industrial sites and other utilities to orchestrate flows of electricity, heat, and gas. They coordinate grid access and upgrades, shared sub-stations, shared connections, and coordinate renewable development. In support of renewable Power Purchase Agreements (PPAs), DSOs enable metering and settlement and optimising self- consumption between the parties in the cluster.	• Build for the future. Whilst connection timing may not always match customer expectations, a mixed allows alignment later. • Alight technical standards, so connecting or participating in flexibility or resiliency markets is an option. • Explore opportunities to optimise with the other energy networks in the cluster (e.g. electricity, heat, water, cooling, charging).

Consider Participating in NGED Flexibility and Resiliency Markets (Distribution-level)

DTU (Demand Turn-Up) product being introduced for summer 2026

DTU (demand turn up) product encourages customers to use power from local renewables when they are generating the most.

Part of an effort to develop new markets that encourage shaping demand around the predictable intermittency of renewables, as well as ensuring a safe and secure network by seeking behind the meter self-consumption.

Any consumer who can increase their demand will be paid per $/MWh to respond at times we instruct. NGED will instruct this on a day ahead basis over the Summer of 2026 to match against the volume of renewable generation we forecast.

The window to register in these zones opens in September and will remain open year round.

GTD (Generation Turn Down) can also participate in this market.

In South Wales, three GSP locations: Swansea North Grid, Upper Boat, Uskmouth.

Existing products – GTU (Generation Turn Up)/ Demand Turn Down (DTD)

Schedule Utilisation – scheduled constraint management service with fixed delivery periods. Utilisation payment only.

Scheduled Availability, Operational Utilisation – developed to support network in the event of a specific fault condition (e.g. maintenance). Availability and utiliisation payment.

Operational Utilisation – supports power restoration following a rare fault condition. Premium utilisation payment

In South Wales, HV 46 Primary Substation locations and LV 141 secondary Substation locations.

Consider Participating in NESO Flexibility and Resiliency Markets (UK Energy System level)

Explanation of Terms

Balancing entity in shared connections – the entity responsible for the amount of electricity entering and leaving the shared connection.

Behind-the-meter (BTM) – energy generation and/or storage systems that are located on the customer's side of the utility's electric meter.

Dual Dispatchability – an asset's ability to be controlled or "dispatched" for two purposes- i.e., assets are able to respond to onsite needs and grid signals.

Flexibility service provider (FSP) – entity that offers the ability to adjust electricity consumption or generation in a pre-agreed manner in response to a signal from the DSO (distribution systems operator) or the National Energy System Operator (NESO).

Industrial Cluster – geographic area where industrial sites are co-located and provide the opportunity for scale, sharing of risk and resources, aggregation, and optimisation of demand.

Long-term parallel running – the operation of a customer installation that is continuously or routinely synchronised with and connected to the main utility grid.

Microgrid - private network connecting generation, consumption, and storage in a defined area, that can be tethered to or run independently from the grid.

Mixed connection – both an import and export connection, described in the connection agreement's Terms and Conditions (T&Cs).

Power Purchase Agreement (PPA) – long-term contract between two parties, the seller (the electricity generator) and the buyer or off-taker (can be consumer, retailer, or marketer).

Redispatch in shared connection – balancing entity (managing shared connection) that can change scheduled output or consumption in accordance to rules agreed to by the parties.

Revenue stacking (flexibility markets) – strategy where a single asset or entity managing multiple assets participates in and earns income from multiple distinct markets or services.

Within the boundaries of my site – refers to the legal, operational, and physical perimeter of the site that your organisation owns, leases, or controls.

Zero export limited – restriction placed on a distributed power generation system which prevents it from sending any excess electricity to the grid.

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