Grid Resilience

Resilient

Credit: 20

Points: 3

Outcome

The building contributes to the functioning of the grid as it transitions to a higher level of renewable energy capacity.

Criteria

Credit Achievement	**3 points**	**– Climate Positive Pathway –** • The building provides active generation and storage systems. and/or • The building has the infrastructure to deliver an appropriate demand response strategy. and/or • The building has reduced its electricity consumption through passive design.

Additional information

Stage implementation

Strategy	**Brief**	**Concept**	**Design**	Tender	Construction	**Handover**	**Use**

Synergies with other credits

- Energy Use
- Energy Source
- Climate Change Resilience
- Operations Resilience

Sustainable Development Goals

- Goal 7 (Affordable and Clean Energy)
- Goal 13 (Climate Action)

Relevant reporting initiatives

- GRESB
- TCFD

Climate Positive Pathway – Leadership point

- This credit is part of the Climate Positive Pathway in Green Star Buildings. When the pathway is achieved, a Leadership Challenge point is awarded to the building for a total of 14 points for this path.

Requirements

Credit Achievement

The project must comply with **at least one** of the following criteria:

- Active Generation and Storage Systems
- Demand Response
- Passive Design Solutions

Project teams may provide a solution where a combination of the three pathways is used. In this situation, the overall reduction must be 20% of the building's total electrical load.

To provide benefit to reducing demand on the grid, it must be demonstrated that the reduction occurs during times of Grid Maximum Demand. If the buildings overall peak demand falls outside of the hours of Grid Maximum Demand, that peak cannot be increased due to the impact of load shifting.

The NZGBC is intending to add an alternative compliance pathway based absolute value targets, which will be available in the future.

Active Generation and Storage Systems

The building has the capacity to reduce its electricity peak demand by 20% of the building's annual peak electricity demand for at least a one-hour period.

The peak demand reduction can occur through thermal storage solutions (such as chilled water storage systems), by electricity storage solutions (batteries), or through renewable on-site generation.

Where the electricity demand reduction is achieved by using on-site generation or electricity storage:

- The system (generation or storage) must incorporate switch gear and transfer switches to enable it to operate in the event of grid outage or grid demand response event. This means that the system should be able to work in either:
  - A long-term paralleling with the grid mode, such that the generator can export back to the grid
  - Island mode to power the building, or to power critical building systems
- The building must have approvals in place with the electricity utility company to operate as a peak reduction system and to have the capacity to become part of a network load demand system or to operate in island mode should it be required.

Unless a separate agreement exists with the network operator, the generator must not export more than 30% of electricity generated to the grid during peak solar generation periods. That is, the building should be consuming, storing, or transferring through a micro-grid to other buildings, most of the available excess electricity being generated.

For this pathway, the building management system (BMS) must include a demand management dashboard that shows the peak demand target, current, historical demand, alongside the critical performance characteristics. The BMS must also have the capacity to accept external control signals to enable signing up to current or future demand response programs.

The active demand management strategies must also be tested and commissioned prior to occupancy, assuming a full load profile on a peak day.

Demand Response

The demand response strategy must show how at least 20% of the building's annual peak electricity demand is being shed without affecting occupant amenity (comfort, lighting, movement) as outlined in credits *Light Quality* and *Thermal Comfort and Amenity Spaces* for at least 4 hours.

This pathway relies on the building having the plan and infrastructure to manage demand responses, which includes:

- Ensuring the building's automated management system has forward predictive capabilities (based on potential weather events outside standard design days, or predictions by the network operator) to alert building management to a potential event
- Having a demand management dashboard that shows the peak demand target, current, historical demand, the demand shedding priorities and enabling button alongside the critical performance characteristics (usually comfort temperature)
- Having the building management system provide an automated way to start their load shedding strategy and enable communication to relevant parties
- Having the ability for the building's automated management system to accept external control signals to enable signing up to current or future demand response programs

This pathway also relies on ensuring the demand response strategy is tested, and that occupants and the building management system are aware what the implications are. This means:

- Including load shedding responses in the scope of work for the commissioning activities
- Including the load shedding strategy in the relevant building management manuals and training
- Introducing a communication strategy to outline to occupants how they will be impacted on the day of a potential event
- Where the building is tenanted, introducing language in leasing contracts outlining the load shedding strategies and what impacts these may have on tenants

Occupant amenity is defined as maintaining a similar level of operation as when the building is not load shedding.

Passive Design Solutions

For this criterion to be awarded, the building must achieve the below:

- The building's facade demonstrates a 20% improvement of the peak electricity demand over a reference building modelled to NZBC Clause H1, or the version of the code applicable to the building's construction, whichever is later.

Buildings that are passively designed but don't meet this criterion, should contact the NZGBC for alternative paths.

This path does not apply to industrial buildings or data centres.

Submission content

Submissions for this credit must contain:

- **Submission form**
- **Evidence** to support claims made in the submission

Recommended evidence:

Active Generation and Storage Systems

- Energy model demonstrating the buildings peak energy demand
- Description of active generation or storage systems or technologies
- Overview of the buildings BMS
- Evidence of approval with utility provider or evidence that no more that 30% of generated electricity is exported

Demand Response

- Description of the plan or infrastructure to manage demand response
- Evidence that the system has been implemented into building commissioning processes and tested

Passive Design Solutions

- Energy model showing the building's façade demonstrate a 10% improvement over reference buildings
- As built drawings showing the occupiable spaces

Alternate documentation can also be used by project teams to demonstrate compliance.

The recommended evidence listed above is applicable to the as built submission. See the *Design assessment documentation* section in the Introduction for more information on submitting evidence for the Design assessment.

The key requirement is that evidence is provided to support each claim made within the Submission form.

Guidance

Applicability

Refer to the Energy Use calculation guide for details on how to complete the modelling calculation, including definitions.

Issues related to this credit

This credit aims to address the following issues related to enabling the ongoing transformation of the grid. The credit aims to encourage two approaches to this interaction:

- Managing demand
- Managing a building's capabilities to provide energy to the grid, or to adjust the building's demand in response to the needs of the grid at a point in time

There are five key components to this credit:

- The degree to how much the building is impacting on the grid during peak times or similar shocks
- The capacity for the building to contribute to increasing the amount of renewable energy into the grid
- The opportunity for the building to provide short or on-demand flexibility to manage its energy consumption
- Aligning supply of unscheduled generation (wind, solar) and demand for energy
- The opportunity for the building to increase the grid's resilience during its peak

If alternative solutions exist that address two or more of these components, project teams are encouraged to contact NZGBC to develop an alternative path.

Peak demand reduction

Project teams are encouraged to review demand response, load shifting and onsite energy storage solutions to meet this credit. Energy storage solutions may be electricity storage (for example, batteries) or thermal storage (for example, chilled water tanks).

The term "electricity demand reduction" has been referenced in this credit. Other terms, such as "peak lopping" or "peak shaving" are used interchangeably with "electricity demand reduction" and essentially deliver the same outcome.

Onsite energy generation

This element of the credit aims to optimise energy generation onsite with the demand profile, either through demand response, sizing of renewables or using onsite energy storage solutions such as batteries. The purpose is not to unnecessarily reduce renewable energy generation. The intent is to encourage the availability of renewable energy at times of peak demand.

The 30% energy export has been calculated to allow for weekend energy export assuming there is no energy used onsite during that same period.

Micro-grids

As the aim of this credit is for the building to work with the wider grid, a building connected to a micro-grid can use the flexibility and capacity of the micro-grid to optimise the building's impact on the wider grid.

The inclusion of micro-grids recognises precinct scale energy masterplans where some buildings have significantly higher renewable energy generation potential than it can use, such as industrial buildings. This allows buildings to export locally in a micro-grid that is designed to support the volume of energy trading, without impacting the wider electricity network.

Onsite diesel generation and climate positive

This credit does not recognise the use of diesel generators to encourage managing grid interactions.

While diesel generators may be an effective way to manage grid interactions, this credit is aiming to provide a best practice approach to delivering its outcome. As diesel generators are typically found in buildings, this outcome is not considered beyond standard practice.

However, noting that diesel generators can be used to achieve the goals of this credit, we recommend scheduling the regular generator start up and loading as part of the maintenance schedules to coincide with peak demand reduction events to get maximum use of the burnt fuel. We also recommend that you review the content of this credit and consider how your generator can support grid decarbonisation. However, this will not be rewarded.

Base building vs tenancy

For the *Grid Resilience* credit, the base building should consider the relationship with the tenanted spaces and how tenant operations may have an impact on the base building peak demand, both in terms of magnitude and timing.

However, we note the credit is only going to be scored on managing base building services.

In cases where tenancy or process loads were included in the peak energy calculations, the project team should detail in their submission that this is the case and note that the profile of the building shown for this credit may differ from that shown in the *Energy Use* credit.

Future opportunities

While this credit is concerned at this time with the resilience of the grid during specific events, there is the opportunity to develop solutions that assist the grid on an on-going basis. This could take shape of hosting significant battery or thermal storage to help modulate grid interactions, or other similar solutions, particularly at the precinct level. We expect future updates to this credit to move in this direction.

Definitions

Baseload demand

The building's lowest point of electricity demand during operational hours.

Building peak demand

The building's predicted annual peak electricity demand that is calculated as per the Energy Use calculation guide.

Grid maximum demand

The grid maximum demand is the window of time where the maximum electricity demand occurs, and is expected to occur. This is defined as:

- 7 am – 10 am and 6 pm – 9 pm during winter months

Peak solar generation period

The peak solar generation period is defined as 8 am – 4 pm.

Occupant amenity

Occupant amenity is defined as: temperature ranges are within the typical design days, all lighting is running, and vertical and horizontal transportation is not impaired. All other health and safety systems (hydraulic, fire, etc) are also functioning.

Supporting information

The following resources support this credit:

- Energy Use calculation guide