Introducing, *Integral*

Integral is a proposal for a universal, large load flexibility classification, that can be used by grids and loads to simplify and accelerate load connection. Each tier is defined by the set of flexibility grid services a load could reliably provide. By adopting Integral, loads and grids benefit from transparency in the value of flexibility to accelerating grid connection, and grid support.

What problem is Integral trying to solve?

Loads have limited visibility of the value its load flexibility can bring, making design for flexibility complex or undervalued. While short term decisions on load siting has an influence long term economics – load actors need to balance both time to power and long term efficiency.

At the same time electric utilities and system operators don't have a common or have a limited toolset to recognizing load flexibility's value in decision making around connection and operations– the ecosystem is fragmented, inhibiting the growth and adoption of flexibility as an integration solution.

What is Integral's Value?

For Network Utilities: Adopting standardized class definitions into grid interconnection and planning studies can increase flexibility offers and may identify opportunities to advance connection times for large loads in the locations that maximise long term efficiency.

For Large Loads: Developing site designs and business models that incorporate delivery of flexibility services represented in Integral classes may enable accelerated deployment and reduce the need for short term trade-offs in location strategy.

How does a large load achieve an Integral classification?

Integral proposes a set of capabilities that represent flexibility services that are aligned with a majority of the high value use cases where flexibility unlock issues that constrain grid connection.

Each service is aligned with a common grid need and requires a decrease (or increase) in grid load for a given duration, with a given notice period and availability. Examples of services may include relief during severe grid congestion, mitigating system demand peaks, prolonged periods of low supply, fast intra-day balancing or similar.

Large load designs (including business constraints) are assessed against the ability to meet the service definitions with an accompanying Integral simulation software tool. Based on its performance against the services, the proposed design could achieve a class rating.

What can you use a classification for?
The classification can be used to start the discussion between the load customer and the utility or system operator during the grid application process to transparently articulate the capabilities that may be available or considered as part of the connection study process. Systems and parties may build derivative programs based on the framework (whole or in part) to enable voluntary participation in flexible load programs.

Unlocking Grid Capacity

The ultimate value of load flexibility can be achieved when the capability can be relied upon in grid planning, investment, operations and connection study processes. EPRI is developing tools and approaches to integrate standardized flexibility classes into the analytical approaches needed to realize flexibility's value in grid planning.

Example Class Requirements

The table below shows an example of how classifications could be linked to specific sets of generic, universally relevant services. A working group of DCFlex members are actively developing the proposal through a series of working group meetings with the intent to evaluate feasible options for such meetings. The intent of the process is to devise the minimum set of services that captures the majority of the value that can be accrued by providing load flexibility in a broad set of systems and contexts.

The example relationship between tiers and services, service descriptions and the selection of those services given above are for illustrative purposes only, and subject to research initiated in DCFlex.

Class	In Plain English	What this means	Frequency Control	Transmission Relief	Peak Congestion Relief	Dark Doldrum	Intra Day Balancing	Fully Dispatchable
A	Baseline	Provides some reserve	✔					
B	Emergency Resource	Self serves during grid outage	✔	✔				
C	Planned Peak Reduction	Reduces stress at peak	✔	✔	✔			
D	Advanced Flexibility	Fast or long response	✔	✔	✔	**At least one**		
E	Fully Dispatchable Flexibility	Reacts on command	✔	✔	✔	✔	✔	✔

Example

Collaborating to Unlock Large Load Flexibility

The Integral classification scheme is under active development through EPRI's DCFlex project to further define the approach and build the tools needed to integrate flexibility into decision making. Integral needs industry partners to actively collaborate on the development and implementation of the approach into practice. To find out more about how to get involved, please contact dcflex@epri.com

Working Group — California ISO · COMPASS datacenters. · Dominion Energy · DUKE ENERGY · ercot · Georgia Transmission · ieso Connecting Today. Powering Tomorrow. · ING · NVIDIA. · Schneider Electric

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