



Generation Resource Interconnection & Integration BPA Transmission Services

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Background: Interconnection or Integration?

- BPA is the owner and operator of the Federal Columbia River Transmission System (FCRTS)
- BPA's customer utilities also operate Transmission Systems, as well as lower voltage Distribution Systems
- The connection of a Generating Facility directly to the FCRTS is "Generation Interconnection"
- When a Generating Facility connects to a customer utility system and operates within our Balancing Authority Area (BA, BAA), BPA refers to the customer utility as the "Host Utility" and describes this as "Generation Integration"

Background: Interconnection or Integration?

- Every generating resource (aka ‘Generating Facility’) that operates in the BPA BAA is ‘integrated into the BAA’ whether or not it is directly interconnected to the FCRTS.
- When we get to some of the technical aspects of today, many if not all the requirements apply equally to the interconnected and integrated Generating Facilities.

Background: Regulatory Environment

Transmission Services conducts the sale of transmission services according to the rules of its Open Access Transmission Tariff.

Background: Regulatory Environment

From BPA's Strategic Intent Paper, January 2015:

D. Clarifying BPA's commitment to the FERC open access transmission policies

BPA remains committed to providing non-discriminatory open access transmission through the BPA OATT.....

Background: Regulatory Environment

The Open Access Transmission Tariff – OATT:

The OATT exists to “... ensure that services thereunder are just, reasonable and not unduly discriminatory or preferential.”

Open Access: Transmission Services must grant service to all customers without prejudice

Non-discriminatory: Transmission Services can not show undue preference for, or unduly discriminate against, any customer or class of customers

Generation Interconnection

Governed by formal procedures set forth in BPA's OATT

Large Generator Interconnection Procedures (LGIP) is
Attachment L – *Generating Capacity over 20 MW*

Small Generator Interconnection Procedures (SGIP) is
Attachment N - *Generating Capacity 20 MW or less*

Generation Interconnection

The LGIP and SGIP provide a transparent and non-discriminatory basis for :

Addressing the technical aspects of interconnecting new generation (system impacts, upgrades, etc.)

Establishing costs of system upgrades and interconnection facilities necessary for bringing the generating facility online

Creating a system of queue priority based on the order in which requests are received – the Interconnection Queue

Generation Interconnection - LGIP

Request Submitted (Deposit: \$10,000 or \$20,000);

Technical Studies

Feasibility Study (FES): Deposit \$10,000

- Can it be connected to one of these POIs? (agreed at Scoping)
- Early approximation of what it might take to achieve the interconnection, and ballpark estimates.

Interconnection System Impact Study (ISIS): Deposit \$50,000

- Choosing a single POI, what overloads or other problems would the project cause; and what would it take to mitigate them?

Facilities Study (FAS): Deposit \$100,000

- In detail from the ISIS, what facilities need to be constructed and how much would they cost? Project scoping and 30% design are conducted in parallel under the same work order.

Generation Interconnection - LGIP

Attachment L: LGIP

Closely follows the FERC *pro forma* LGIP from Order 2003

Adds the requirement that BPA comply with NEPA

The National Environmental Policy Act (NEPA) requires federal agencies to consider the potential environmental effects of proposed projects before making a decision to fund, approve, or implement an action

Explanations of the types of NEPA reviews can be found [here](#).

Generation Interconnection - SGIP

Attachment N: SGIP

Closely follows FERC Order 2006 *pro forma*

Omits 'Fast Track' options intended for very small inverter-based generators connecting to low-voltage distribution systems

BPA does not have such facilities, so FERC agreed BPA did not need these options when we filed Attachment N in 2008

Generation Interconnection - **SGIP**

Small Generator Interconnections

- 20 MWs or less generating capacity

20 MW = ~ 6 – 8 wind turbines

- 200 kW threshold for requiring a formal Request
 - Aligns with Power Services Regional Dialogue contracts
 - Identified in BPA Technical Requirements for Interconnection
 - FERC has identified no lower bound for small generator interconnection requests

Generation Interconnection - **SGIP**

Small Generator Interconnection Procedures

Pre-submittal meeting

Request deposit \$2,500

Study deposits ~ \$5,000 each

FES, ISIS, FAS studies: any or all may be skipped

Shorter timelines

Generation Interconnection

NEPA analyses:

CX = Categorical Exclusion

EA = Environmental Assessment

EIS = Environmental Impact Statement

With limited exceptions, no action may be taken on a proposal until it has been the subject of a CX or an EA showing that no EIS is necessary. An EA can result in a finding of no significant impact (FONSI) or a recommendation to prepare an EIS.

After BPA finalizes an EIS, it produces a Record of Decision (ROD) documenting the BPA Administrator's decision on the proposed action.



Generation Interconnection

Current Interconnection Queue:

6/27/16	Total Active	
	Requests	MW
Biofueled	5	44
Energy Storage	5	157
Geothermal	3	223
Hydro	9	972
Natural Gas	5	2,520
Solar	38	2,082
Wave	1	20
Wind	30	6,099
Grand Total	96	12,117

For informational purposes only.

Generation Interconnection

Queue history:

Active GI Requests					
	May 2011	Jan 2013	Nov 2014	Jul 2015	Jun 2016
Biofuel	5	6	5	6	5
Energy Storage	1	2	3	4	5
Geothermal	2	5	4	3	3
Hydro	3	10	8	9	9
Natural Gas	7	5	5	5	5
Solar	11	10	8	11	38
Wave	1	1	1	2	1
Wind	91	53	40	39	30
Total:	121	92	74	79	96

Generation Interconnection

Active GI Requests					
	May 2011	Jan 2013	Nov 2014	Jul 2015	Jun 2016
Biofuel	5	6	5	6	5
Energy Storage	1	2	3	4	5
Geothermal	2	5	4	3	3
Hydro	3	10	8	9	9
Natural Gas	7	5	5	5	5
Solar	11	10	8	11	38
Wave	1	1	1	2	1
Wind	91	53	40	39	30
Total:	121	92	74	79	96

Active GI MWs

	May 2011	Jan 2013	Nov 2014	Jul 2015	Jun 2016
Biofuel	141	58	60	64	44
Energy Storage	1,200	3	4	7	157
Geothermal	178	261	261	223	223
Hydro	99	837	751	1,326	972
Natural Gas	3,484	2,140	3,205	2,556	2,520
Solar	163	159	83	144	2,082
Wave	2	2	2	22	20
Wind	15,393	10,090	7,985	7,686	6,099
Total:	20,660	13,550	12,351	12,028	12,117

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Generation Interconnection

Recent Queue history:

2012				2013				2014				2015				2016 (to 6/27/16)			
Req. No.	Queue Date	Facility Type	MW	Req. No.	Queue Date	Facility Type	MW	Req. No.	Queue Date	Facility Type	MW	Req. No.	Queue Date	Facility Type	MW	Req. No.	Queue Date	Facility Type	MW
G0480	12/10/12	Biofueled	2	G0496	12/12/13	Hydro	70	G0504	12/15/14	Biofueled	5	G0519	12/17/15	Solar	3	G0548	6/20/16	Solar	80
G0479	10/22/12	Solar	100	G0495	12/9/13	Natural Gas	60	G0503	11/24/14	Natural Gas	10	G0518	11/13/15	Solar	5	G0547	6/20/16	Solar	80
G0478	9/6/12	Wind	500	G0494	8/22/13	Hydro	3	G0502	11/22/14	Hydro	600	G0517	11/13/15	Solar	76	G0546	6/20/16	Solar	80
G0477	9/5/12	Geotherma	38	G0493	8/6/13	Geotherma	30	G0501	10/13/14	Natural Gas	1,100	G0516	10/20/15	Solar	20	G0545	6/20/16	Solar	200
G0476	7/18/12	Hydro	7	G0492	8/2/13	Hydro	300	G0500	10/2/14	ergy Stora	1	G0515	10/6/15	Wind	150	G0544	6/9/16	Solar	80
G0475	6/21/12	Hydro	3	G0491	7/29/13	Biofueled	7	G0499	9/26/14	Wind	250	G0514	9/29/15	Solar	10	G0543	6/6/16	Wind	350
G0473	5/12/12	Wind	10	G0490	7/5/13	Hydro	345	G0498	8/12/14	Hydro	2	G0513	9/18/15	Solar	20	G0540	5/24/16	Solar	64
G0474	5/12/12	Wind	10	G0489	6/6/13	Solar	5	G0497	1/12/14	Geotherma	45	G0512	8/31/15	Solar	20	G0541	5/24/16	Solar	64
G0471	4/11/12	Natural Gas	590	G0488	5/30/13	Hydro	13	Reqs	8	MW	2,013	G0511	7/30/15	Hydro	39	G0542	5/24/16	Solar	106
G0470	3/21/12	Biofueled	1	G0484	5/7/13	ergy Stora	1					G0510	6/30/15	Solar	40	G0539	5/16/16	Solar	600
G0469	1/27/12	Hydro	1	G0483	5/1/13	Biofueled	2					G0509	4/28/15	Solar	1	G0538	5/12/16	Solar	20
Reqs	11	MW	1,262	G0482	4/30/13	Hydro	1					G0508	3/16/15	Solar	20	G0537	5/12/16	Solar	20
				G0481	4/25/13	ergy Stora	2					G0507	2/3/15	Hydro	70	G0536	5/12/16	Solar	20
				Reqs	13	MW	839					G0506	1/22/15	ergy Stora	3	G0535	5/5/16	Hydro	210
												G0505	1/12/15	Wave	20	G0534	4/13/16	Solar	120
												Reqs	15	MW	497	G0533	4/13/16	Solar	20
																G0532	3/18/16	Solar	100
																G0530	2/29/16	Natural Gas	600
																G0531	2/29/16	Natural Gas	400
																G0529	2/24/16	Solar	50
																G0528	2/17/16	ergy Stora	150
																G0527	2/4/16	Solar	200
																G0526	1/28/16	Solar	20
																G0525	1/28/16	Solar	20
																G0524	1/7/16	Solar	20
																G0523	1/7/16	Solar	20
																G0522	1/7/16	Solar	20
																G0521	1/7/16	Solar	20
																G0520	1/6/16	Solar	20
																Reqs	29	MW	3,754

Generation

on

2016 (to 6/27/16)			
Req. No.	Queue Date	Facility Type	MW
G0548	6/20/16	Solar	80
G0547	6/20/16	Solar	80
G0546	6/20/16	Solar	80
G0545	6/20/16	Solar	200
G0544	6/9/16	Solar	80
G0543	6/6/16	Wind	350
G0540	5/24/16	Solar	64
G0541	5/24/16	Solar	64
G0542	5/24/16	Solar	106
G0539	5/16/16	Solar	600
G0538	5/12/16	Solar	20
G0537	5/12/16	Solar	20
G0536	5/12/16	Solar	20
G0535	5/5/16	Hydro	210
G0534	4/13/16	Solar	120
G0533	4/13/16	Solar	20
G0532	3/18/16	Solar	100
G0530	2/29/16	Natural Gas	600
G0531	2/29/16	Natural Gas	400
G0529	2/24/16	Solar	50
G0528	2/17/16	Energy Storage	150
G0527	2/4/16	Solar	200
G0526	1/28/16	Solar	20
G0525	1/28/16	Solar	20
G0524	1/7/16	Solar	20
G0523	1/7/16	Solar	20
G0522	1/7/16	Solar	20
G0521	1/7/16	Solar	20
G0520	1/6/16	Solar	20
Reqs	29	MW	3,754

For informational purposes only.

Generation Integration

When a Generating Facility connects to a customer utility system and operates within our BAA, BPA refers to the customer utility as the “Host Utility” and describes this as “Generation Integration”. Applies to generation whether it is going to market or serving customer loads.

Integrated generation only serving Host Utility load is described as ‘behind the meter’.

Generation Integration

BPA's Generation Integration Business Practice requires generation integration developers to submit interconnection requests under the SGIP or LGIP

- Establishes and preserves capacity rights
- Creates visibility within BPA systems
- Off-ramps to Construction Agreement and Balancing Authority Area Services Agreement (BAASA) as appropriate

Generation Integration

[Generation Integration Business Practice](#)

[Open Access Transmission Tariff \(OATT\)](#)

[Small Generation Interconnection Procedure \(SGIP\)](#)

[Small Generation Interconnection Business Practice](#)

[National Environmental Policy Act \(NEPA\)](#)

[Technical Requirements for Interconnection to the Bonneville](#)

[Transmission Grid](#)

[Metering Application Guide](#)

Generation Integration – BAASA

BPA provides Balancing Authority Area Services to generators operating within BPA's BAA.

These services are essential to the safety and reliability of the FCRTS.

Include:

Generation Imbalance

Energy Imbalance

Operating Reserves - Spinning Reserves

Operating Reserves - Supplemental Reserves

(In some cases) Wind & Solar Integration - Within-hour Balancing Service

Required for generators > 200 kW

Generation Integration

Table 1.— Metering, Telemetry and SCADA Data Requirements for Generation

System or Quantity	G < 3 MW	3 ≤ G < 50 MW ²	G ≥ 50 MW
Billing Information (RMS)	Yes, if G > 200 kW	Yes	Yes
Hourly Estimate of Generation ¹ (by web, FAX, or phone)	Conditional ²	Yes	Yes
Hourly kWh (telemetered)	No	Yes	Yes
kW Continuous Data ¹⁰	No	Yes	Yes
Limit Variable Generation (See Section 12.2.6)	No	Yes ⁷	Yes ⁷
Loss Of Meter Potential	No	Yes	Yes
MW & Mvar On Each Unit ³	No	No	Yes If integrated at 230 kV or above
Bi-directional kW & Bi- directional Kvar meter ⁶	Yes	Yes	Yes
Redundant Meters (A & B)	No	Yes If G > 20 MW	Yes
Gen-ICCP (Redundant Links)	No	No	Yes or via SCADA ⁸
kV, Kvar, Circuit Breaker Status	No	Yes ⁹	Yes ⁹

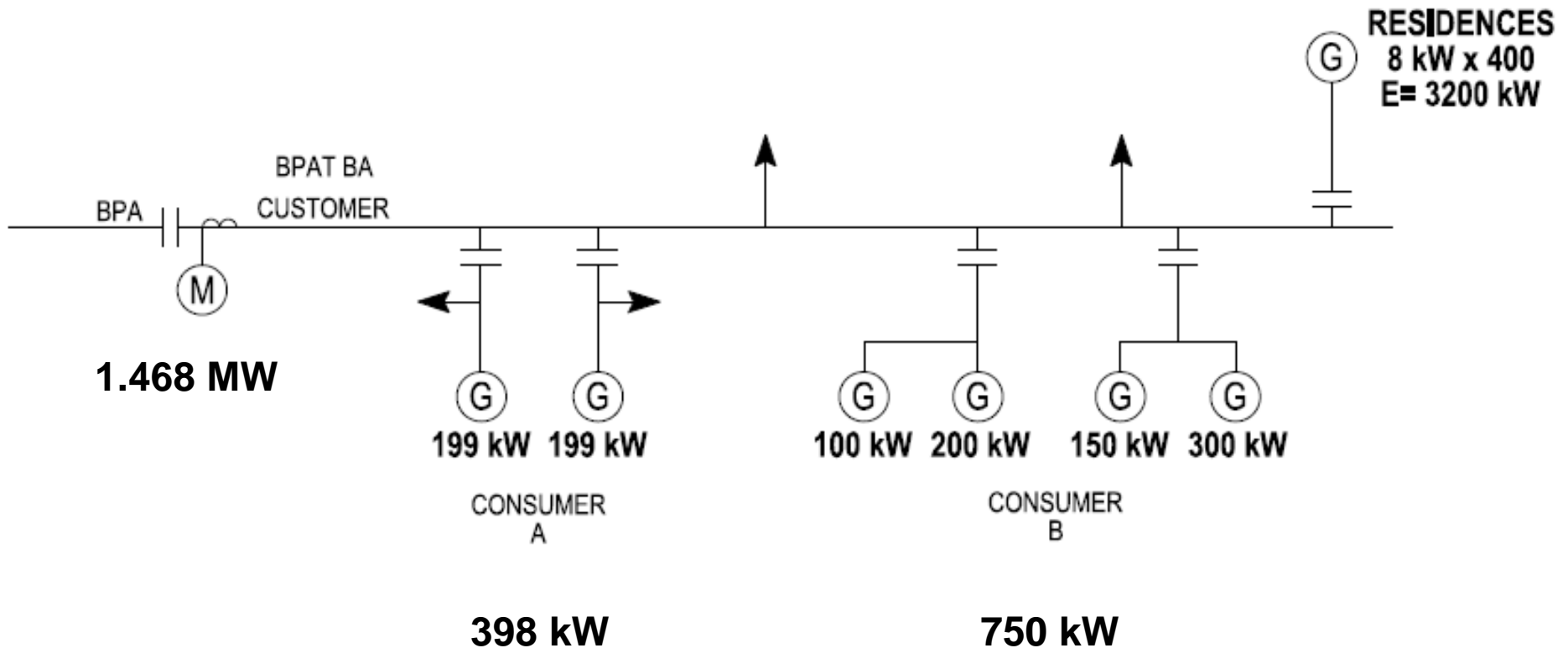
Generation Integration (For reference)

Notes to Table 7 (previous slide):

1. Hourly estimate of generation must equal the sum of transmission schedules for marketed power. It is required from the scheduling agent to BPA
2. Hourly estimate is not required if generation is serving local load only. It is required if generation is being used as a marketing resource. Local load is defined as load that is on the generator side of the meter.
3. Separate meters for each unit are required when generators per line are not identical.
4. Required if BPA is the designated scheduling agent.
5. Station service metering is required for all generation, and station service telemetering may be required. See Sections 12.2.3 and 12.2.4.
6. For generating resources with nameplate rating greater than 200 kW and located in the BPA Balancing Authority Area, BPA revenue metering is required. Refer to the BPA Metering Application Guide requirements for Generation Integration Metering. For generating resources 200 kW and less connected to a Host Utility (i.e. not directly connected to the BPA transmission grid), the Host Utility is responsible for the metering requirements.
7. Wind generating plants with aggregate nameplate rating between 3 and 50 MW may use BPA's alternative Wind Limit communications (email and website) until the total wind generation connected to a single BPA POI equals or exceeds 70 MW. See Section 12.2.6.
8. Wind / variable generation may be allowed to use SCADA as determined by BPA. Redundant links required as determined by Technical Operations.
9. If there is an electrical connection to BPA.
10. Continuous kW may be required if the capacity of a BPA-managed WECC path is impacted, even if outside BPA's BA and not connected to BPA's system.

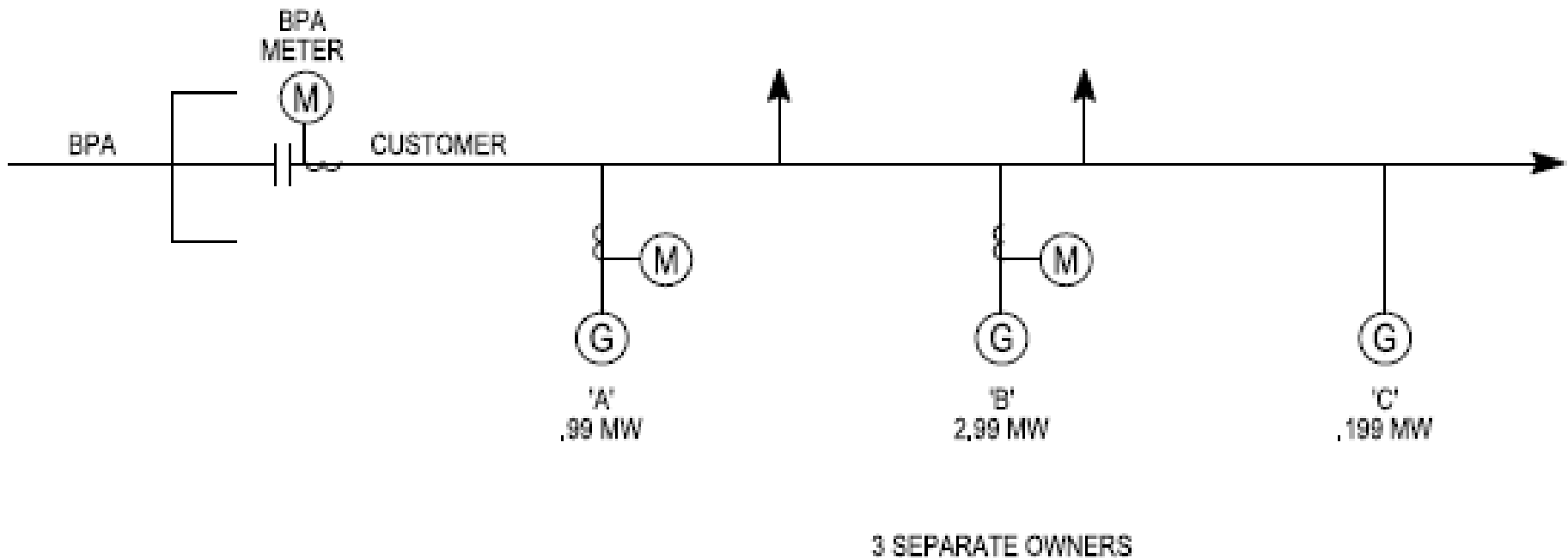
Generation Integration

Situations.....



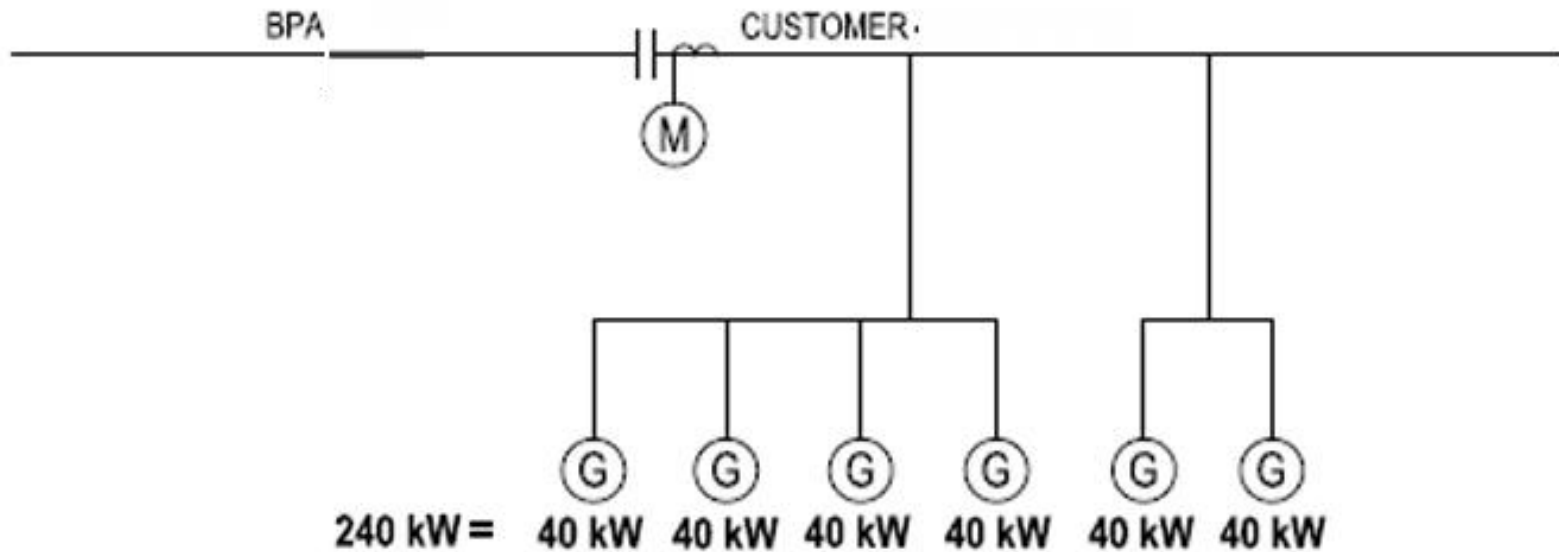
Generation Integration

Situations....



Generation Integration

Situations....



Generation Integration

From the SGIP Business Practice:

...subject to further review ...to determine whether the request is subject to the SGIP. The review will consider relevant factors, including, but not limited to, ownership or Affiliation, proximity of facilities, and whether facilities share a point of interconnection. Other such factors, without limitation, may include:

- a. The Generating Facility has been or will be constructed so that it can and will be metered separately and discretely from any other project.
- b. The Generating Facility has been or will be constructed so that the Transmission Operator views its operation as independent of any other Generating Facility.
- c. The Generating Facility has been or will be constructed so that if a special protection system (e.g., remedial action scheme) is a requirement for interconnection of the project, any such special protection system action could and may be initiated for, and effective on, the subject Generating Facility independently of any other Generating Facility.
- d. Any site permit related to the Generating Facility addresses only the Generating Facility in the Interconnection Request and no other Generating Facility, whether larger in scope or not.
- e. The Generating Facility occupies a discrete and distinguishable topographical footprint, not commingled in any way with any other Generating Facility.
- f. Whether the Plan of Service and Interconnection Facilities provide Interconnection Service to the Generating Facility alone, or to other facilities.
- g. The ownership structure and any Affiliate relationships of the owner of the Generating Facility or the entity submitting the Interconnection Request.

For informational purposes only.

Generation Integration

What constitutes a single project?

When do two 199 kW projects become a 398 kW project needing a Request?

How should we view a 198 kW project next to a 2.99 MW project?

Generation Development

As a courtesy, please notify your Account Executive or Customer Service Engineer of any new solar or energy storage project.

The Solar Taskforce at BPA is gathering data about solar projects in our BAA. You can help us shape future policy by letting us know what is going on in your service territory.

Into the Future...

Questions.....?