

PCM to PF Data Quality Issues

Item	Issue	Discussion	Data Issue; Software Solution
1	GCPD loads - The loads in the NorthernGrid PCM cases appear to have been derived using the WECC L&R forecast, rather than the NorthernGrid forecast	<p>JA - loads in the NorthernGrid PCM cases appear to have been derived using the WECC L&R forecast, rather than the NorthernGrid forecast</p> <p>March 2020 WECC L&R "Monthly" forecast should equal NorthernGrid forecast.</p> <p>Should be BA level load forecast, and not planning area forecast.</p>	<p>* NorthernGrid Data issue</p> <p>* BPA have loads for planning area and also for BA; working with BPA to confirm which forecast was submitted to the L&R</p> <p>* This is Tacoma, DPUD, BPA, IPC, PACE had BA mapping issues; populating BAs is required in the DPM but not all entities are populating them in WECC base cases.</p> <p>* Add to resource data repository</p> <p>* Requirements already listed in DPM</p>
2	Bus mismatches' tab contains a sample of the extremely large bus mismatches present in the PCM case immediately in the EPC export (no Ron S. magic yet) – this is part of the solution difficulty, overcoming such large mismatches in the exported powerflow	<p>The export from PCM to a powerflow case snapshot has some significant bus mismatches (worst in the example case was 4,762,977 MVA; 28 buses > 40,000 MVA mismatch); finding a way in PCM to reduce these on export would greatly help the solvability of the Powerflow cases – right now it takes a 'wizard' level engineer an hour and a half to make one case solve-able out of PCM. Ideally, we'd like to skip the wizard step and have the cases solvable upon export.</p>	<p>* Issue has to do with not having the right voltage angle when adding a new bus. we've been using 1. Pu.</p> <p>* Power Flow uses "Angle Smoothing"; use voltage and angle averages on adjacent busses. If new bus is on a radial branch, use the voltage and angle on the connecting bus. WECC staff will do this edit (add instruction in DDVM)</p> <p>* ABB will look into a potential software solution</p> <p>* Run data sanity check in GridView to determine the extent of the issue; use up to 30 degrees check. Apply check to branches.</p> <p>* All generators should be exported.</p> <p>* Generators on parked busses; appear to be dispatching in PCM but not in power flow</p> <p>* ABB – Jin will validate</p>
3	Do NOT modify topology in any way	<p>GridView can do what it needs to do behind the scenes but literally the imported power flow and exported power flow topology need to match exactly</p>	<p>Agree. The issue has to do with tracking topology changes and reflect that in the reference case. Develop a process to apply edits in the power flow reverence case:</p>
4	Addition of speculative generation might be allowable but there is no reason why that can't be manually added in the process of reading in the import power flow case	<p>Agree – initial changes to generators should be applied in power flow</p>	<p>* Topology – read in from epc file</p> <p>* DC lines- sending end power, rectifier, inverter (alpha, gama)</p> <p>* Phase shifters</p> <p>* Negative load</p> <p>* Generators – voltage control, Pmax, Pmin, Qmax, Qmin, technology</p>
5	Well bounded load profiles and generation dispatch are the only allowable parameters that the PCM should modify	<p>ZZ - think Tracy would support PCM modifying DC line flow/direction and phase shifter adjustments in support of matching the PCM internal model with the exported PowerFlow case, based on other correspondence.</p>	
6	What generator representations are in which of the three models	<p>This check spoke to the generator mapping challenges – I see this as a WECC data management piece, not a software piece provided review tables for the generators e.g., 1) heat rate for generator limit 2) PF limits want to see PF limits honored.</p>	<p>* Data issue; conversation ongoing at WECC.</p> <p>* Need more than one season PF gen rating in the PCM; perhaps also model winter PF case in addition to summer PF</p>

7	Issue: small irrigation loads not reaching its potential (summer pumping is scaled up, winter	Need consistent seasonal bus representation from SRS Use multiple WECC power flow cases to represent different seasons loads – capability is already available in GridView Use multiple WECC power flow cases to represent different switching configuration	Potential solutions – work with ABB and SRS on implement the following: * Use different season load distribution for the same set of load busses. * Can use branch outage table to emulate different seasons’ switching sequences.
8	Checks for motor or battery representation (negative load check).	We had some concerns about must-run motors not being ‘on’; while I believe the source of the current issue is the input data quality for the motors in the WECC PCM data set (motors not dispatched correctly in PCM input data) WECC group chairs may have additional thoughts here. Motors are modeled as generators in GV; need to keep as negative load instead. Most folks are not submitting needed data to support PCM modeling, why not use what is coming from PF? Load distribution\ generation MW that has inconsistent naming. The Composite load model attempts to deal with that. Tracy - The issue is the fact that some negative gen goes away in GV. Kevin - If we know Pmax, we can sum it and model it as gen on GV side and export accordingly to PF Zach - We want to retain visibility; if topology, we do not want to change it. Tracy will take to SRS to address	If motor loads, data needs to be identified in the L&R data collection. Checks: * Netted from load? Remove from load and model as a negative generation * Conforming or non-conforming? If conforming need hourly shapes (model as negative generation) * Should be addressed in the DPM * PG&E negative load can be larger than native load on bus! * Need to jointly decide on managing differences * What should GV do addressing these issues? * A potential software solution will require allowing to export negative load (modeled as load weighted distribute generator in PCM) * Generator ID in PCM needs to be specified, different than that used to represent load * Prefix X and Z are not currently used in the WECC power flow case; in NW Z is used to denote wind generating projects. Use X.
9	Do not remove or net negative load	ZZ - Important one – some of the SRS member modeling practices include modeling negative load for behind-the-meter things (EE, Battery, PV,etc) – we use this on the SRS Powerflow side of things to assess how much of the station load is the gross load, and how much is being affected by behind-the-meter resources. If Gridview could export separate load objects for gross load and the negative load components (rather than exporting a net load), we’d get visibility back in the PCM export powerflow cases. Right now, all we see is net load, which has lead to some confusion in review of these cases and loss of usefulness of the	
10	Do not remove or set Pgen=zero for negative generation	ZZ - Again, I don’t have access to GridView; it appears to be able to export negative generation in some of the PCM cases I’ve looked at, so the issue may be on WECC’s side, assigning the proper profile to these units (and getting that in front of members to provide quality reviews)	Data issue – need member to validate generator data, especially Must Run units.
11	Do not remove distribution generation (i.e. DER)	Similar to above	

12	Checks across all three representations for limit consistency	Demonstrating the inconsistency of applied generator limits; in speaking to Kevin Harris, my understanding is the GridView generator table has a limit, but it may not be the limit that is used if the sub-tables for unit type have a different limit. I don't have and have never used GridView, so I don't know definitively. On principle, of the three potential limits (gen table, sub-table, and PowerFlow), the most limiting of the three should be used to limit the generator in PCM. There are challenges with station service accounting and aggregation for implementation and seasonal thermal generator limits, but the principle of most	Power Flow limit is de-rated for summer; a solution should account for seasonal ratings * check to see if heat rate (HR) is calculated based on Pmax Gross or net? * Kevin: HR uses Published data from EIA 860; cap at PF Pmax * GridView reads in PF Pmin and Pmax initially; however, HR curves override Pmin and Pmax. * Mange differences by holding PF Pmin, Pmax as the guiding * Data issue – need to coordinate to have consistent Pmin and Pmax * Software solution – check for consistency; use GridView Data sanity check.
13	Checks for the BC1 loading against the MW limit in the WECC 30HS1 case and as found in the gen limits for BC1	The PCM export case had exceeded some of the PowerFlow target case generator limits. This should not be so and is a real headache to un-do. Again, limits should be respected in the PowerFlow export case. Adding SS to Pmax leads to exceeding the limit. PCM modeled capacity max was greater than Pmax (e.g., Columbia generation). Pmax in PF should not be exceeded in PCM; Pmin should not exceed Pmax. Tracy – Pmax in PF comes from test data; EIA data likely not so accurate. Need to work with all L&R, PCM and PF to fix	* PCM capacity and PF capacity are related; need to consider Pmax in PF and PCM jointly with consideration of SS.
14	Do not exceed Pmin or Pmax limits of generators	ZZ - as discussed above, there appear to be multiple instances of potential limits between PCM internal and the target powerflow. The most limiting limit should be respected	Data issue – need to coordinate to have consistent Pmin and Pmax * Software solution – check for consistency; use GridView Data sanity check.
15	Do not net out station service load for generation Doing this is causing Pgen to exceed Pmax it seems. There is really no reason to modify the station service load. The number of instances of this are modest but important	ZZ - as the WECC PCM team has implemented, uses net generation (sans station service); the SRS modeling practice is to include station service explicitly. See the attached 2021 DPM document for details. My understanding is there is a translation between PCM and Powerflow to account for the station service, but like all things there may be bugs in the data and assumptions (or universality of assumptions); I think the bulk of the conversation will be on the WECC practices side, but I could see the addition of a software spot in GridView for station service load to be included on the 'internal' PCM side of things, if that doesn't exist already.	Data Issue Modify HR, using Pnet not Pgross

16	Imports \ exports issue	<p>We had certain path levels in the PCM, but upon export to PowerFlow, the case was nowhere near those path levels (even after we fixed the DC line issues and after playing with phase shifter settings). Something isn't lining up between PCM internal and PCM export models. ZZ doesn't have access to the PCM case 'innards' to do a full comparison but aligning the flows between PCM and Powerflow cases takes a fair amount of work.</p> <p>Tyler – may have differences in paths definitions.</p> <p>Zach suspects an issue in the export process.</p> <p>Tracy: Once Gen, Loads, PDCI, Phase Shifters, paths definitions, etc. all validated, we should have consistent flows in both PCM and PF.</p>	<p>Changes made in power flows after exporting the hourly data from PCM will definitely impact path flows.</p> <p>* Changes to the DC model can contribute</p> <p>* Check interface definitions; power flow vs PCM</p> <p>* ABB will validate, by exporting an hour and check import\export.</p> <p>* Check path 3</p> <p>* PDCI</p> <p>* IPPDC</p> <p>* Path 19</p> <p>* Path 20</p> <p>*</p>
17	Do not remove or adjust generation that has a Unit Type of <DC (Represents DC Ties)>	Tracy didn't finish this – Tracy, could you advise?	<p>Represent as DC line (not as generator pair) in the reference power flow case.</p> <p>* Transbay Cable is not in PF generator pair. Jin is looking into a solution; how to address 2-generators.</p> <p>* Tracy - SRS is also looking into a potential solution.</p>
18	Dummy bus numbers (multi-section lines and transformer midpoint)	In the submittal/build process (for base cases) these are auto-generated, so that numbering gets to be inconsistent case-to-case, which notably impacts bus and branch alignment.	<i>Can be solved if (WECC, SRS) could figure out a means to get the dummy bus numbers consistent (rewrite a consistent set of bus numbers over the auto-generated ones), that would go a-ways toward overall case topological consistency.</i>
19	Generator capacities greater than transformer or branch rating	<p>Add L&R resources to PF, making sure that the transformer limits are not exceeded for the location.</p> <p>Rules of thumb (all need to be checked with basic power flow)</p> <ul style="list-style-type: none"> • Do not exceed capacity of POI • 0 to 34.5 kV: 5 MW • 4.5 to 69 kV: 25 MW • 15 kV: 25 to 50 MW • 30 kV: 50 to 125 MW 	Data issue in placing L&R generators that were not able to be aligned with the PF.
20	Stantiago Synchronous Condenser is being dispatched	There is a solar plant in the 2030 ADS PCM that has the ID of DG that is distributed to two of the buses with the same ID as the synchronous condensers.	Data Issue
21	Data Input Issue _ Mid C Area –Summer seasonal hydro projects showing online dispatch during Winter.	confirmed that if one did add up all the monthly distributed values in the EIA 923 report, it does work back to the total number submitted by CBH staff.	
22	adding resources that have greater capacity than the transmission transfer capacity of lines connected to the bus.	Resource Placement issue	Data Issue
23	incompatibility between PowerWorld and PSLF here – in PowerWorld, the name is the invariant key; in PSLF, it is the path number. NorthernGrid had re-named some paths with the same number (for example, PDCI to have separate S-N and N-S meter definitions);	PSLF EPC file type only accepts the number (path 65) so the different monitoring directions were lost in the EPC export. NorthernGrid Paths with bugs (either definition or rating) were 5,8,17,19,20,32,65,71,73,75,and 78. I can provide more information if needed as to the nature of the errors.	

24	Portland General (PGE) had sent a file to delete the Trojan-Harborton #3 line from the case;	The file was much more involved than just removing the line.	
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