How do I model Var Dispatch on a Solar PV Generator?

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Question

Can I use the *Generator* model to generate only vars? I have a PV site that they want to see if they can do var support also but the vars will vary like a pv site and I will need to model the daily load shape. If I can not do this with a generator model, what is your suggestion?

Answer

This is a common question and I can tell you various organizations are developing controllers to model that sort of thing. However, it is not clear that any of these will be made open source at this point. The controllers typically dispatch the vars based on a voltage objective that is defined by a curve. You can already do constant voltage objectives with the existing *Generator* model as discussed below.

I have done some simple stuff like you are wanting to do and I am pretty sure I did it with a *Generator*. Don't forget that you can define a **Qmult=** property on a *Loadshape* that corresponds to the var output of the generator or load.

What I did was copy the kW multiplier from the *Loadshape* object into a column on a spreadsheet. Then in the next column, I computed the kvar (Q) multiplier required for constant kVA output. Then I saved the new column to a text file and used the syntax **Qmult=(file=myfile.txt)** to define the Q multiplier portion of the *Loadshape*. Of course, constant kVA may not be the objective you had in mind. But you can represent any other objective you have in mind with this approach. The problem is that you may need intelligence from elsewhere to determine what you want to do with the var dispatch. This is where the various controllers come in.

Another approach is to define the PV generator as **Model=3** (analagous to a P-V bus, not to be confused with a photovoltaic (PV) generator) and give the model a voltage objective (**Vpu=1.0** for example). It will compute the vars required to keep the voltage constant -- if it stays stable. It should if there is only one, but this model can be cantankerous. Don't put more than one Model 3 Generator on the same bus. That probably won't work because each will be trying to control the voltage.

Alternatively, leave your PV generator models as they are (I assume Model=1) and hang a separate *Generator* element on the same, or nearby, bus with a small, nominal kW value, Model=3, and set large kvar limits (**minkvar=**, **maxkvar=** properties). This is like a synchronous condenser. Set Vpu= some realistic per unit voltage. It should give the vars required to maintain a constant voltage at the bus you attached it to.

--Rdugan 12:54, 14 September 2010 (UTC)

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