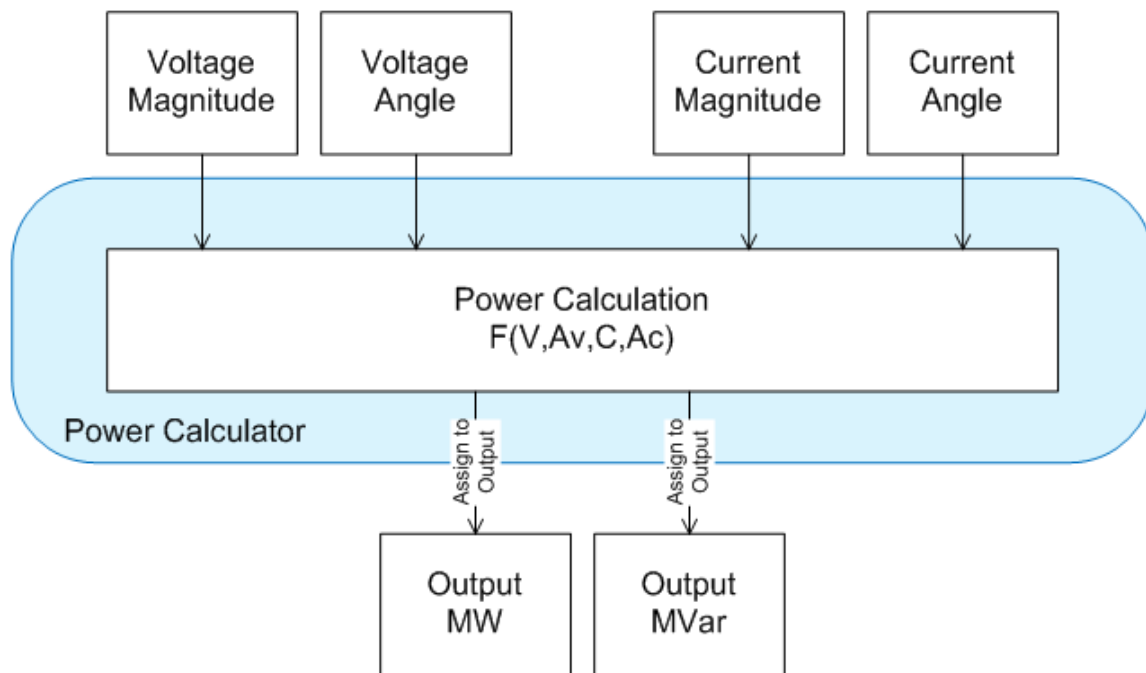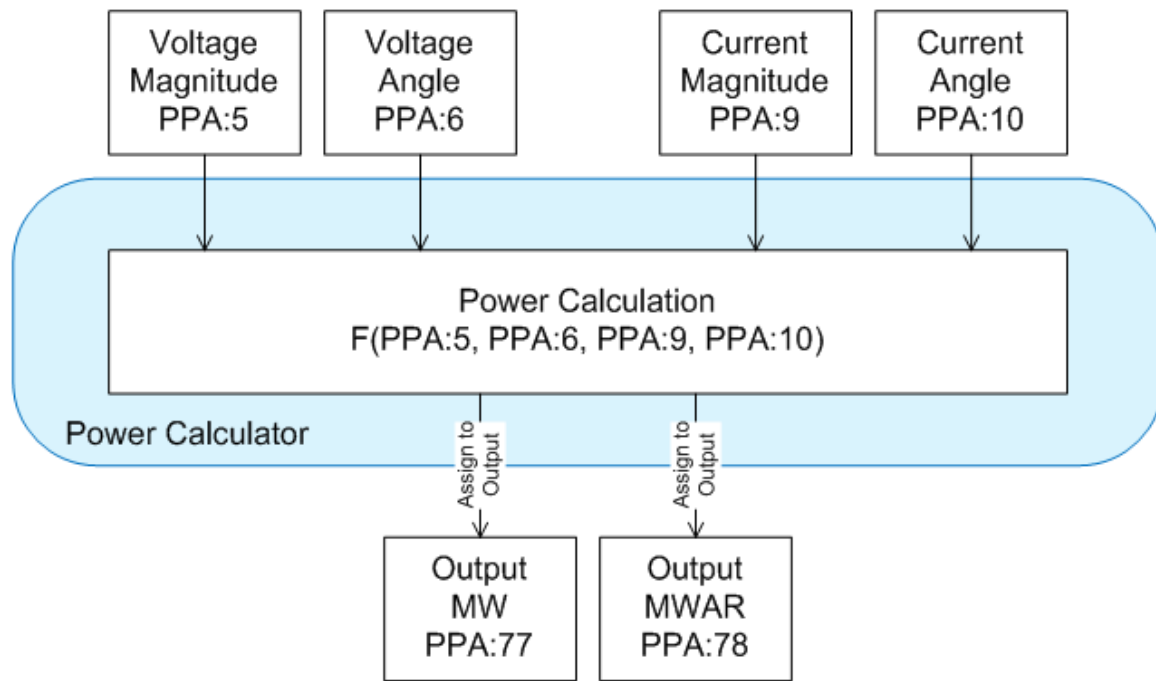# Power Calculations in the openPDC and openPG

The Power Calculator is an action adapter that is used to compute real and reactive power from a Voltage phasor and a Current phasor. Inputs are the positive sequence values from the PMU.

Below is a graphical representation of how the Power Calculator is constructed.

Example

The example below shows how to set up the Power Calculator adapter. Here is the data flow diagram below. In this example, "Measurement Keys" are used to refer to specific input signals rather than Point Tags.   However, Point Tags can be used as the reference to input voltage and current phasors.

In general, the steps for configuration of the Dynamic Calculator are:

1. Create the output signal that will receive the results of this calculation (e.g., PPA:77; PPA:78)

2. Find the designed input signals (e.g., PPA:5; PPA:6; PPA:9; PPA:10)

3. Create the Action Adapter of type "Power Calculator"

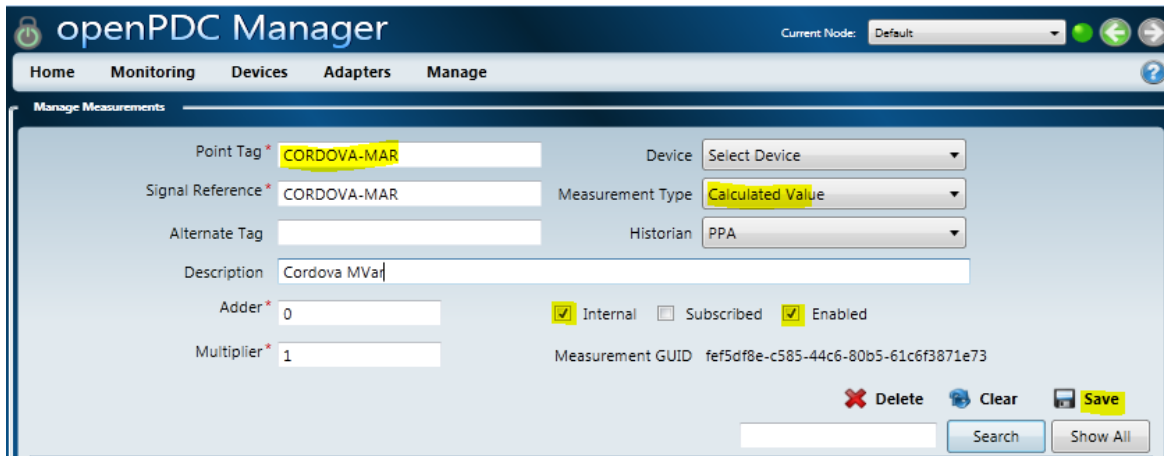**Step 1** – Create a Real Power (MW) output for the Power Calculator results in menu Manage - Measurements:

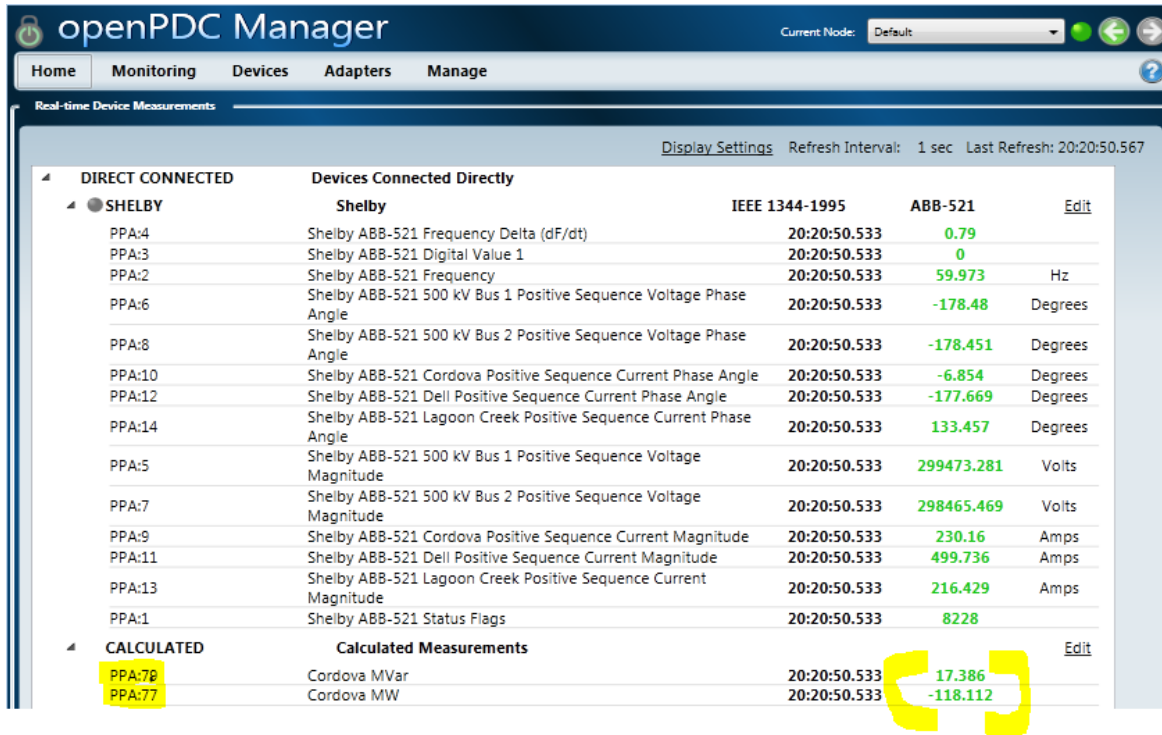**Step 2** – Create a Reactive Power (MVAR) output for the Power Calculator results in menu Manage - Measurements:

At this point you do not know the reference ID for this output. Go to menu Monitoring – Device Measurement to find the ID:

PPA:77 – MW Calculation; Point Tag = "CORDOVA_MW"

PPA:78 – MVAR Calculation; Point Tag = "CORDOVA_MVAR"

Step 3 – Determine the input. For this example, it will be:

	DIRECT CONNECTED	Devices Connected Directly			
	SHELBY	Shelby	IEEE 1344-1995	ABB-521	Edit
	PPA:4	Shelby ABB-521 Frequency Delta (dF/dt)	13:19:47.433	-0.54	
	PPA:3	Shelby ABB-521 Digital Value 1	13:19:47.433	0	
	PPA:2	Shelby ABB-521 Frequency	13:19:47.433	59.959	Hz
	PPA:6	Shelby ABB-521 500 kV Bus 1 Positive Sequence Voltage Phase Angle	13:19:47.433	61.313	Degrees
	PPA:8	Shelby ABB-521 500 kV Bus 2 Positive Sequence Voltage Phase Angle	13:19:47.433	61.338	Degrees
	PPA:10	Shelby ABB-521 Cordova Positive Sequence Current Phase Angle	13:19:47.433	-128.009	Degrees
	PPA:12	Shelby ABB-521 Dell Positive Sequence Current Phase Angle	13:19:47.433	61.413	Degrees
	PPA:14	Shelby ABB-521 Lagoon Creek Positive Sequence Current Phase Angle	13:19:47.433	10.812	Degrees
	PPA:5	Shelby ABB-521 500 kV Bus 1 Positive Sequence Voltage Magnitude	13:19:47.433	299775.5	Volts
	PPA:7	Shelby ABB-521 500 kV Bus 2 Positive Sequence Voltage Magnitude	13:19:47.433	298777.125	Volts
	PPA:9	Shelby ABB-521 Cordova Positive Sequence Current Magnitude	13:19:47.433	246.801	Amps
	PPA:11	Shelby ABB-521 Dell Positive Sequence Current Magnitude	13:19:47.433	529.233	Amps
	PPA:13	Shelby ABB-521 Lagoon Creek Positive Sequence Current Magnitude	13:19:47.433	210.833	Amps
	PPA:1	Shelby ABB-521 Status Flags	13:19:47.433	8228	
	CALCULATED	Calculated Measurements			Edit

PPA:5 – Voltage Magnitude

PPA:6 – Voltage Angle

PPA:9 – Current Magnitude

PPA:10 – Current Angle

Step 4 – Create Power Calculator in menu Adapters - Action Adapters:

Start by giving it a name and defining the type as 'Power Calculator'. Here is the full connection string for this example:

inputMeasurementKeys={PPA:5; PPA:6; PPA:9;PA:10};
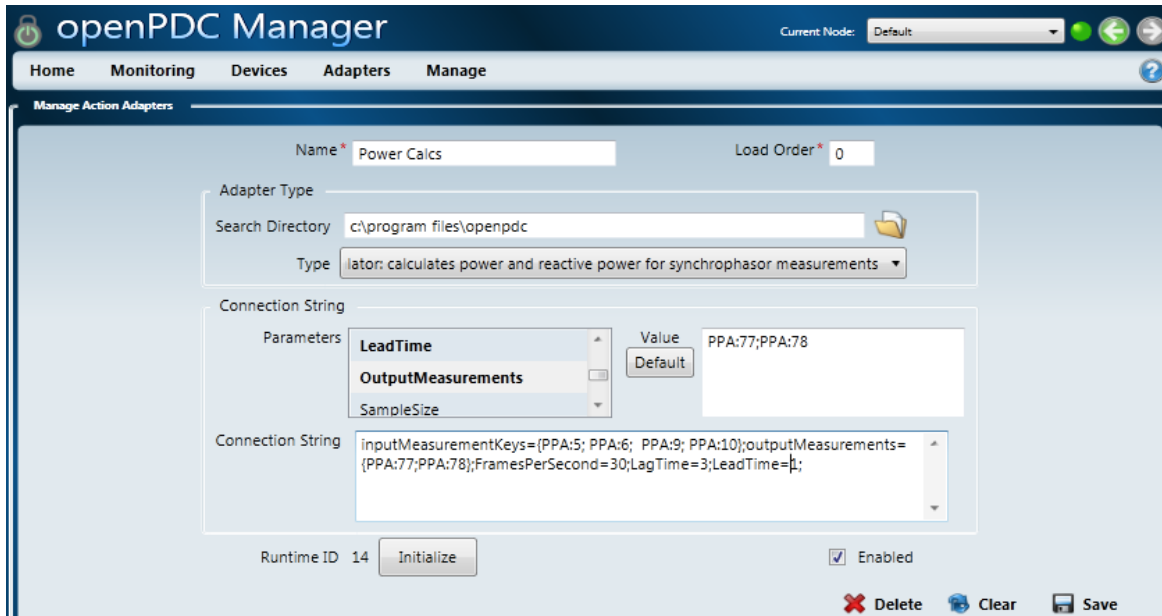
outputMeasurements={PPA:77;PPA:78};

FramesPerSecond=30;

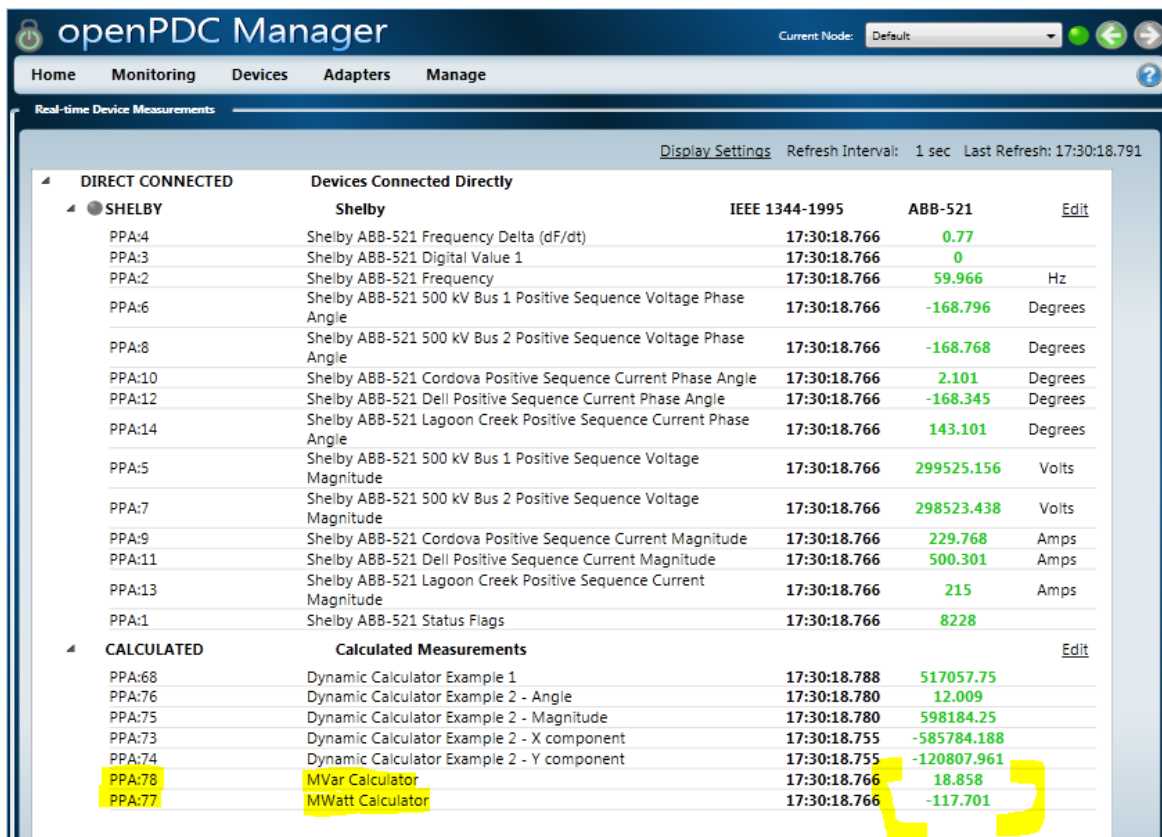LagTime=3.0 Seconds;

LeadTime=1.0 Seconds;

Note: None of these connection parameters are initially available in the list box. You must type them in the connection parameter box before they will be available in the list box. At that point you may modify them using the list box and the value box.

Here is a screen shot of the completed Power Calculator Example:

Click the Initialize button to start the Calculations.

Confirm operation at menu Monitoring – Device Measurement:

Power Calculator Example is complete.

ABOUT THE AUTHOR

Shawn Williams is a project manager at GPA with

extensive experience within the process control industry.