



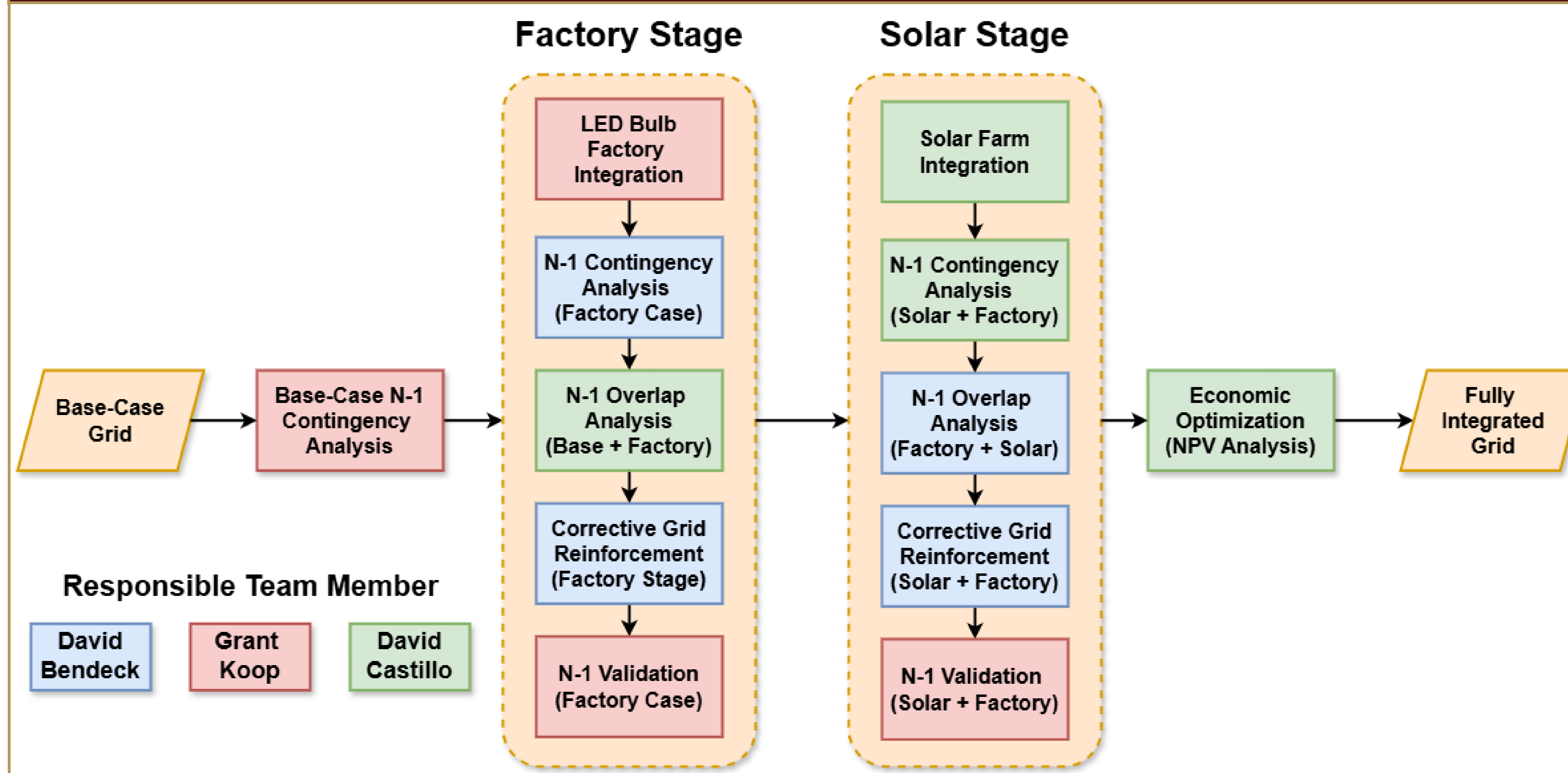
**WATTS UP**

## Overview



- PowerWorld simulation of local grid integration of an LED bulb factory (load) and utility-scale solar farm (generation)
- Focus on transmission-level planning with evaluation under base-case and N-1 contingency conditions

## Overall Block Diagram

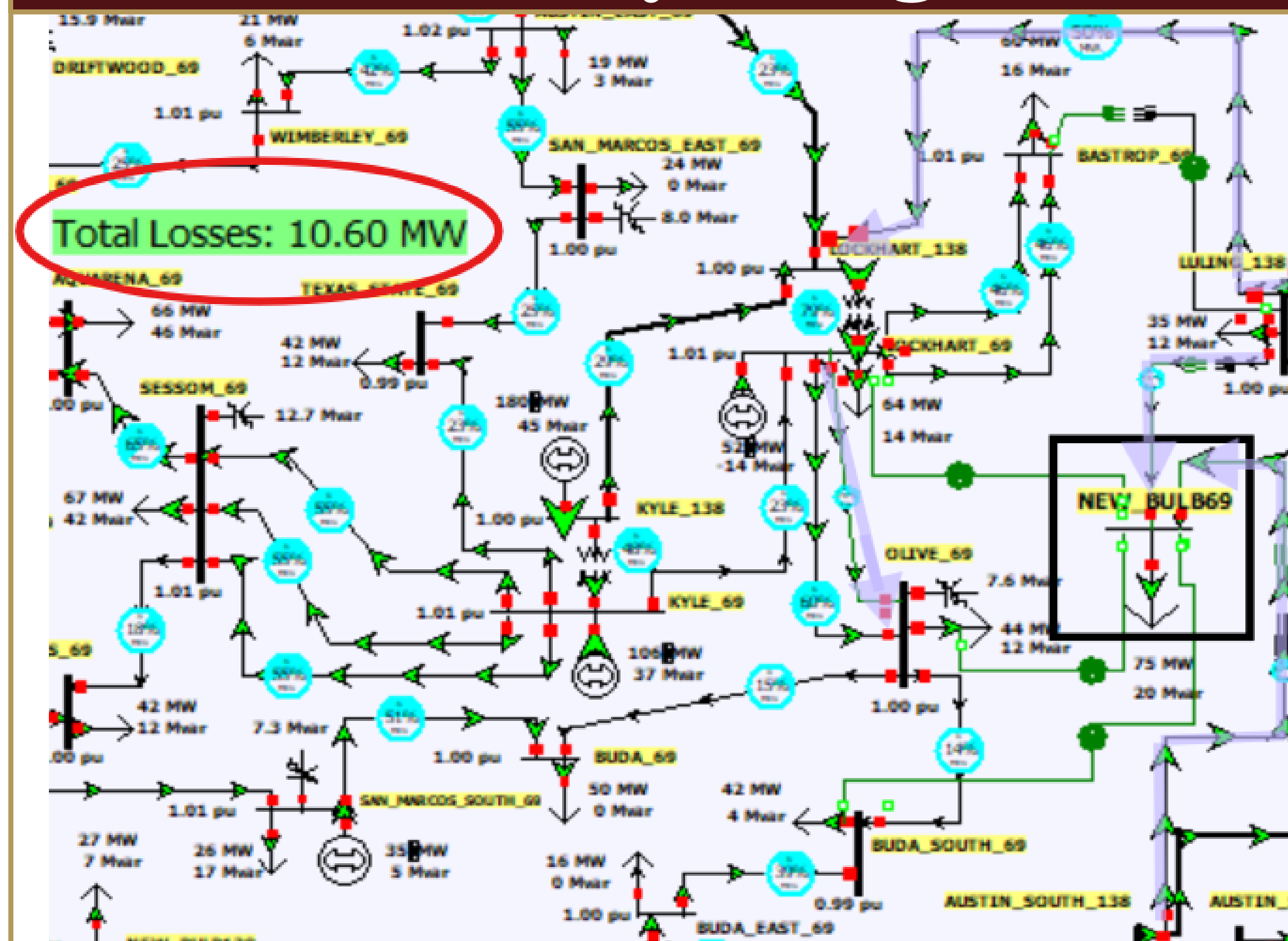


## N-1 Contingency Analysis

Name	Skip	Category	Process	Solved	Post-CTG	Islanded	Islanded	Global	Transient	Remedial	QV	Custom	Violat	Max	Min
					AUX	Load	Gen	Actions	Actions	Autoplot	Monitor	Violation	Branch	%	Volt
1_000032LEMON069-000032LEMON138C1	NO	YES	YES	none				0	0	0	NO	0	3	155.0	0.938
2_000020CLIVE069-000040PEACH069C1	NO	YES	YES	none				0	0	0	NO	0	3	148.6	0.933
3_000014REDBUD069-000040PEACH069C1	NO	YES	YES	none				0	0	0	NO	0	2	148.6	0.942
4_000032LEMON138-000029ELAM138C1	NO	YES	YES	none				0	0	0	NO	0	1	115.9	
5_000014REDBUD069-000034CHERRY069C1	NO	YES	YES	none				0	0	0	NO	0	1	127.6	
6_000032LEMON069-000030BIRCH069C1	NO	YES	YES	none				0	0	0	NO	0	1	135.8	
7_000010PINE069-000013PALM069C1	NO	YES	YES	none				0	0	0	NO	0	0		

- Evaluates system response to loss of a single component (line, transformer, generator)
- Power flow evaluation of voltage, thermal, and capacity violations to ensure post-outage stability

## Bulb Factory Integration



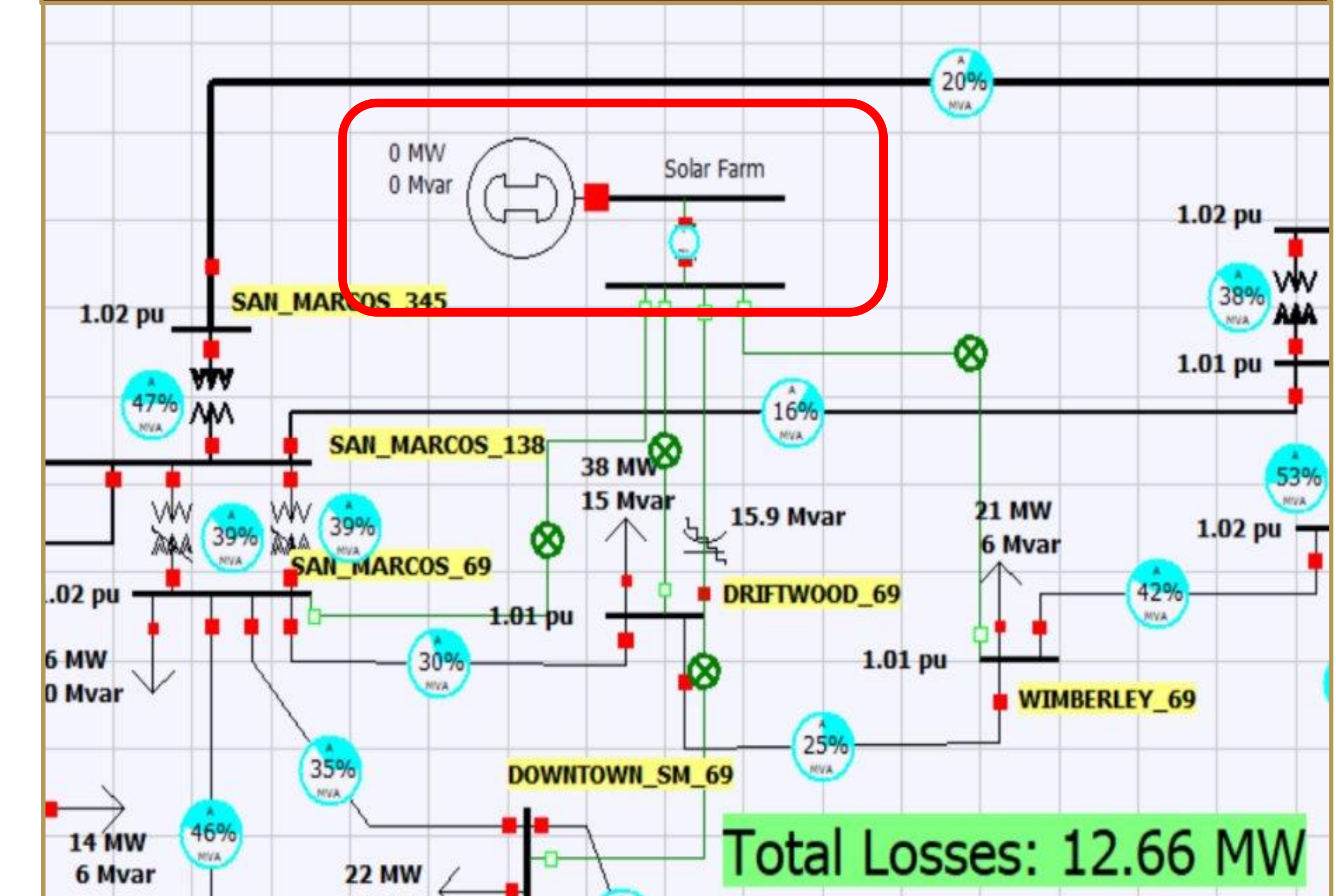
## Conductor Types

Conductor Type	Current Rating (A)	161-kV Lines (\$/km)	138-kV Lines (\$/km)	69-kV Lines (\$/km)
Rook	770	—	—	\$274,000 /km
Crow	830	\$534,000 /km	\$452,000 /km	\$301,000 /km
Condor	900	\$562,000 /km	\$480,000 /km	\$329,000 /km
Cardinal	1110	\$589,000 /km	\$507,000 /km	—

## Economic Analysis

Factory Integration Selected Rights of Way		
<b>CROW</b>		
\$8,455,500.00	Bulb To Luling	<b>Option 1</b>
\$9,585,000.00	Bulb to South Austin	
\$5,200,000.00	Olive to Lockhart	
\$23,240,500.00	Total Cost	
<b>CROW</b>		
\$5,200,000.00	Bulb to Lockhart	<b>Option 2</b>
\$8,455,500.00	Bulb to Luling	
\$5,200,000.00	Lockhart to Olive	
\$18,855,500.00	Total Cost	
<b>CROW</b>		
\$8,455,500.00	Bulb To Luling	<b>Option 3</b>
\$9,585,000.00	Bulb to South Austin	
\$9,301,000.00	Lockhart to Luling	
\$27,341,500.00	Total Cost	

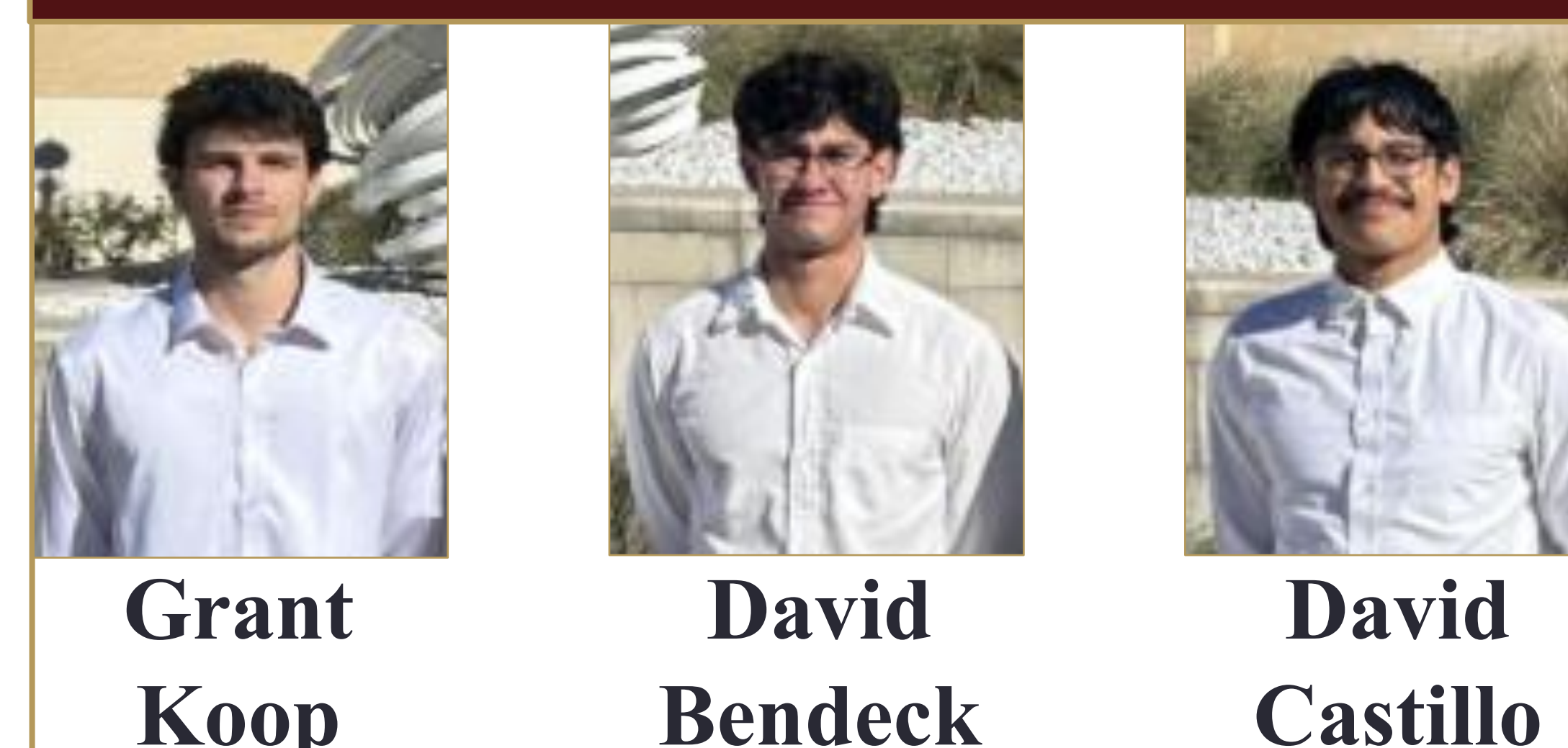
## Solar Farm Integration



## D1 Deliverables

- Integrated LED Bulb Factory
- Integrated Solar Farm
- Complete Base-Case and Factory-Case N-1 Contingency Analysis
- Two Complete Grid Reinforcement Plans
- Preliminary cost estimates for each grid reinforcement plan

## Team Watts Up!



## D2 Deliverables

- Working simulations at various times of day under various conditions
- All contingency errors corrected
- Complete Net Present Value Analysis
- VAR compensation scheme(s)
- Complete list of equipment selection