

# Financial and Risk Analysis on Three Solar Tracker Designs

## Summary Report

Report Published by:

GameChange Solar Corp.  
230 East Ave, Suite 100  
Norwalk, CT, USA

Release Date: February  
14th, 2018



## Report: Financial and Risk Analysis on Three Solar Tracker Designs

### 1.0 Summary

GameChange Solar LP (“GameChange”) wrote this report as a financial and risk analysis of three tracker systems.

System 1 is the type where each tracker table operates as an independently driven unit (i.e a decentralized system). with a PV solar module charging a battery, which runs a linear actuator driven by a DC motor. This system is the current model of the GameChange Genius Tracker™.

System 2 is the type where each tracker table operates as an independently driven unit (i.e. a decentralized system) with a PV solar module charging a battery, which runs a slew drive driven by a DC motor.

System 3 is a central drive (i.e. a ganged system) design where multiple tracker tables are driven by a single large motor linked by a rotating driveline.

The analysis was conducted by delving into the technical characteristics of each system, followed by a failure modes analysis to determine associated risks for component failures. The final output of this process was to provide relative financial analysis of the three system types through both the Levelized Cost of Energy (“LCOE”) and Net Present Value (“NPV”) methods for financiers, developers, owners, and other stakeholders of utility scale solar PV power plants.

System 1 had the highest power output of all the systems. This was because System 1 has the highest module density which resulted in the rows being furthest apart and therefore more time facing the sun at optimal angles than the other systems.

Annual Output	System 1	System 2	System 3
Row Spacing	15 ft.	14 ft. 5 in.	12 ft. 7 3/16 in.
Power Output Year 1 (Mwh)	124,227	123,520	121,155

**Row Spacing and Power Output from PV Syst from Layouts with Identical Land Usage and Module Count**

System 1 had the lowest overall operations and maintenance (O&M) cost:

System 1 had the lowest grass cutting cost because of the combination of highest ground clearance (less frequent cuts) and easy access for grass cutting machines (no central drive which forces machines to turn around at middle of trackers)

Tracker Specific Maintenance Costs	System 1	System 2	System 3
Tracker Specific Maintenance incl. grass cutting & batteries replacements	\$ 3,732,778	\$ 8,754,970	\$ 5,344,560
Decrease in Tracker Maintenance - System 1 over System 2 (\$)		\$ (5,022,192)	
Decrease in Tracker Maintenance - System 1 over System 2 (%)		-57.36%	
Decrease in Tracker Maintenance - System 1 over System 3 (\$)			\$ (1,611,783)
Decrease in Tracker Maintenance - System 1 over System 3 (%)			-30.16%

**Row Spacing and Power Output from PV Syst from Layouts with Identical Land Usage and Module Count**

System 1 had low equipment related O&M cost, the lowest in class for the independent row driven systems due to a maintenance free drive system and very long life batteries requiring infrequent changes.

## Report: Financial and Risk Analysis on Three Solar Tracker Designs

Therefore, System 1 exhibited the best (highest) return on investment and the best (lowest) LCOE of the three systems:

Pre-Tax Cash Flows	System 1	System 2	System 3
Undiscounted System Cash Flow with ITC (\$)	\$ 17,971,994	\$ 12,446,697	\$ 13,336,807
Increase in Undiscounted Cash flow - System 1 over System 2 (\$)		\$ 5,525,297	
Increase in Undiscounted Cash flow - System 1 over System 2 (%)		44.39%	
Increase in Undiscounted Cash flow - System 1 over System 3 (\$)			\$ 4,635,187
Increase in Undiscounted Cash flow - System 1 over System 3 (%)			34.75%
	System 1	System 2	System 3
Undiscounted System O&M costs incl all replacements	\$ 30,404,253	\$ 35,437,612	\$ 32,027,077
Decrease in Undiscounted System O&M - System 1 over System 2 (\$)		\$ (5,033,359)	
Decrease in Undiscounted System O&M - System 1 over System 2 (%)		-14.20%	
Decrease in Undiscounted System O&M - System 1 over System 3 (\$)			\$ (1,622,824)
Decrease in Undiscounted System O&M - System 1 over System 3 (%)			-5.07%

### Undiscounted Cash Flows

Levelized Cost of Energy	System 1	System 2	System 3
LCOE over 30 Year Life (\$/MWh)	\$ 43.28	\$ 44.79	\$ 44.81
Decrease in LCOE - System 1 over System 2 (\$)		\$ (1.51)	
Decrease in LCOE - System 1 over System 2 (%)		-3.37%	
Decrease in LCOE - System 1 over System 3 (\$)			\$ (1.53)
Decrease in LCOE - System 1 over System 3 (%)			-3.41%

### LCOE net of ITC

CONFIDENTIAL AND PROPRIETARY