Balance of System and Energy Production Comparison: DC-Optimized Solution Vs. Traditional String Solution

Technical Paper

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Introduction

This technical paper estimates the electrical BoS cost and energy production differences between design variations for a sample light commercial project for a 480Vac grid. This analysis used Helioscope and PVsyst modelling tools to compare a DC-optimized solution against a traditional string inverter solution of equivalent capacity.

A Comprehensive Look at BoS Costs and Energy Production in a Typical Commercial 480V Grade Application

In the competitive solar landscape, optimizing the Balance of System (BoS) costs is crucial. BoS includes all solar system components—mounting systems, cabling, electrical elements, conduit, and installation labor. This case study showcases the cost efficiency achieved using SolarEdge technology, leading to streamlined installations and overall cost reductions.

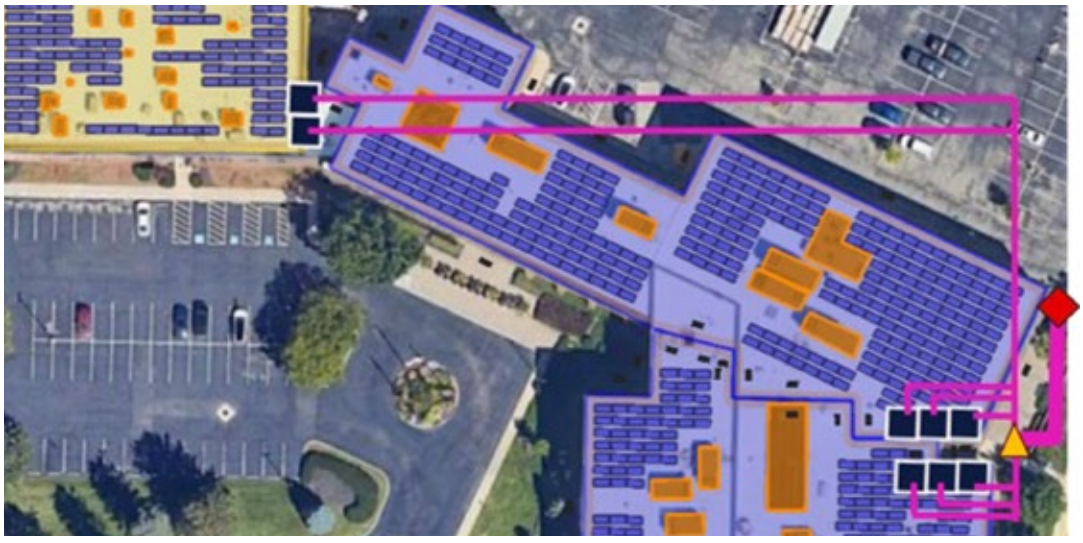
- System Size: 439kW DC
- SolarEdge Inverters: 3*120kW
- Traditional String Inverters: 6*50kW & 2*33kW
- Location: Columbus, Ohio

Higher BoS Savings Over Traditional String Inverters

Example 439kW Project

SolarEdge Inverter

Traditional String Inverter



Inverters AC-CB AC Cable Grid Connection

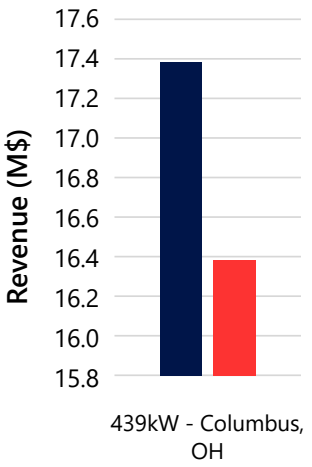
BoS Breakdown	SolarEdge System	Traditional String Inverter System
DC Power (kWp)	439	439
AC Power (kVA)	360	366
545Wp Modules	806	806
Inverters	3	8
No. of Strings	26	50
Modules per String (typ.)	30-32	16-18
#10 Cu PV Wire (ft)	8,240	16,426
DC Combiner Box	-	-
AC Cable (ft)	2,016 (#4/0 Al)	4,573 (#3 Al)
Conduit (ft)	504 (2.5”)	1,143 (2.5”)
AC Combiner Box	1	1
Datalogger	1	-
AC Labor & Material ($) -1	**$16,914**	**$26,693**
DC Labor & Material ($) -2	**$7,982**	**$18,041**
Overall BoS Savings	**$19,838**	**-**

1. DC BoS includes MLPEs (labor only), cabling, conduit, combiner boxes, fuses, etc.
2. AC BoS includes inverter (labor only), cabling, conduit, AC combiners, circuit breakers, etc.

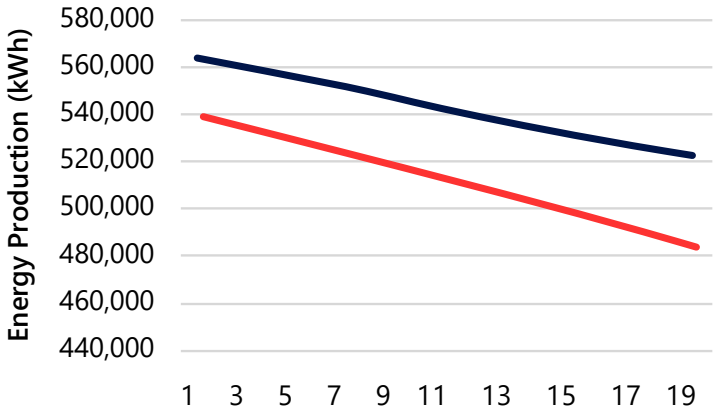
Increased Energy Yield & Revenue

SolarEdge Inverter
Traditional String Inverter

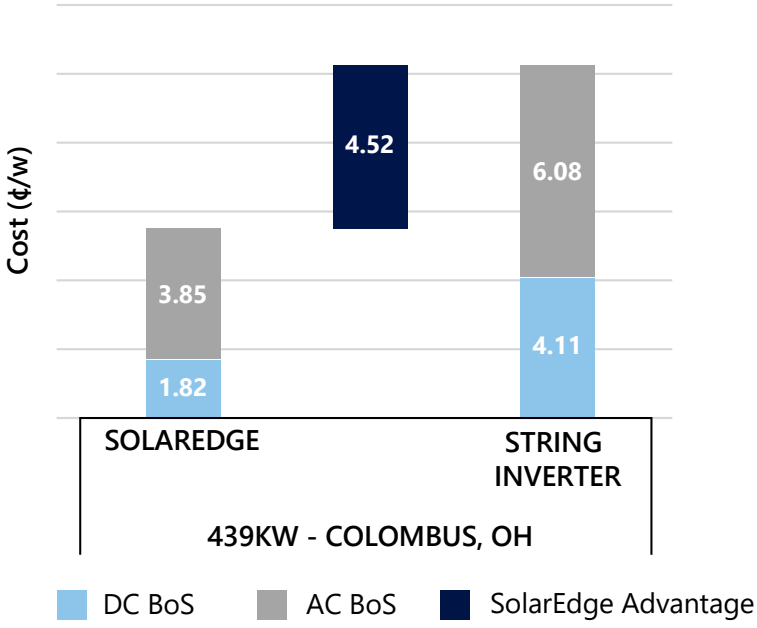
Added Revenue over 20 years



Year 1 - 20



Electrical Balance of Systems



DC BoS AC BoS SolarEdge Advantage

In Summary: The SolarEdge Advantage

SolarEdge DC-optimized inverters generate ~5% more energy over system lifetime when compared to traditional string inverters. In addition to BoS cost savings of up to 50%, other system benefits include:

- Fewer components
- Reduced labor, installation time, and material cost
- Minimized electrical losses due to optimized cabling design