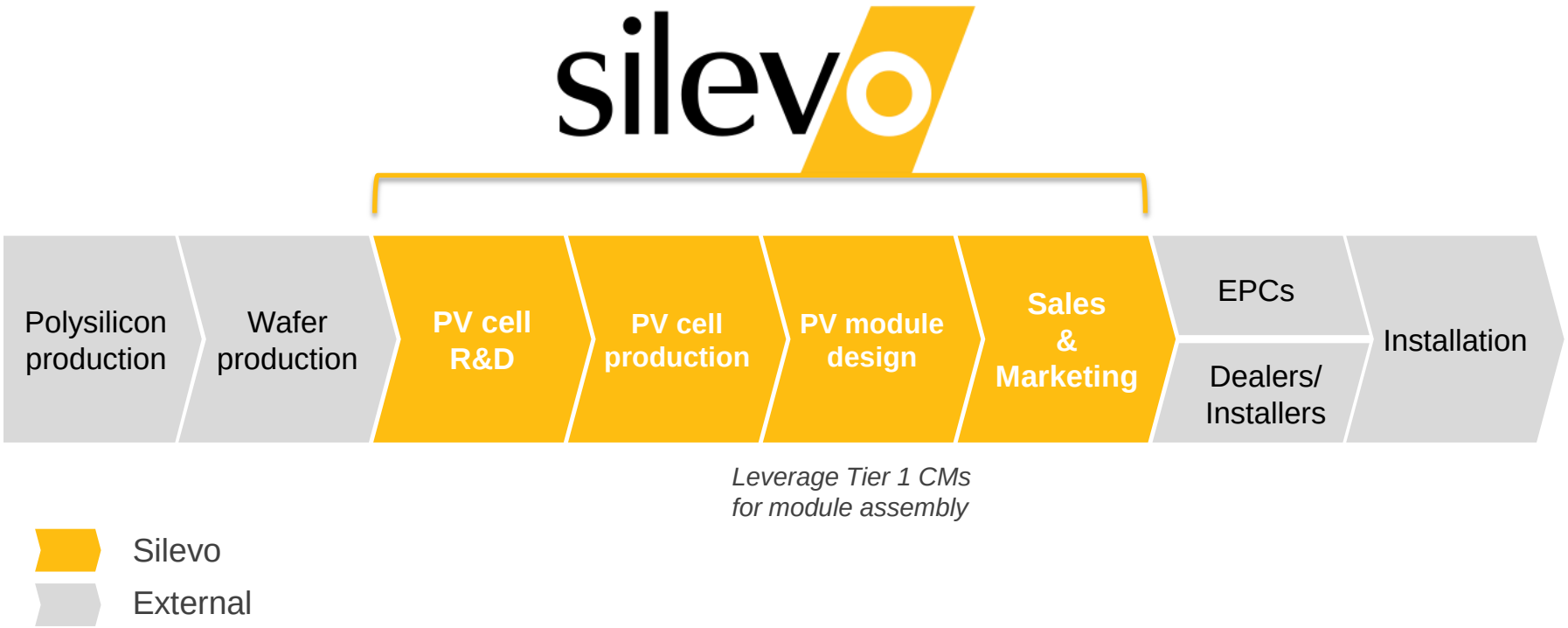
Silevo Overview

June 2013

Corporate Overview

Established	2007. U.S. Corporation
Locations	HQ & R&D in Fremont, CA Manufacturing in Hangzhou, China
Founders	Former Applied Materials executives with device physics & factory automation expertise
Technology	Triex® cells & modules >22% cells >18% modules Hybrid tunneling-junction cell architecture
Manufacturing	2013: 30 MW cell production 2014: 230 MW cell produciton Tier 1 contract manufacturers for module assembly 

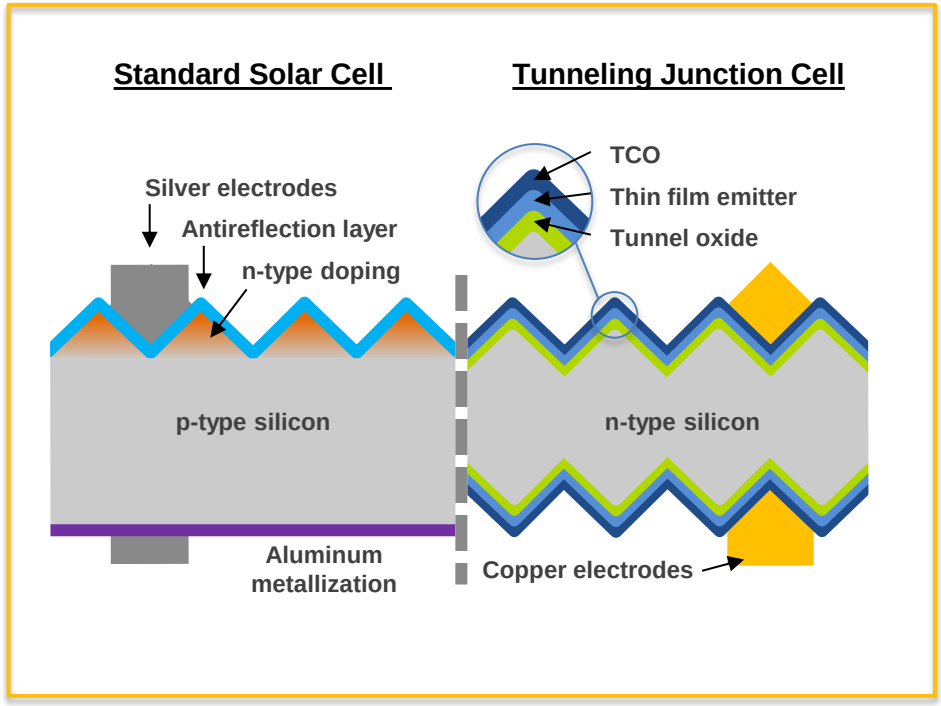
Silevo Value Chain



Tunneling Junction Cell

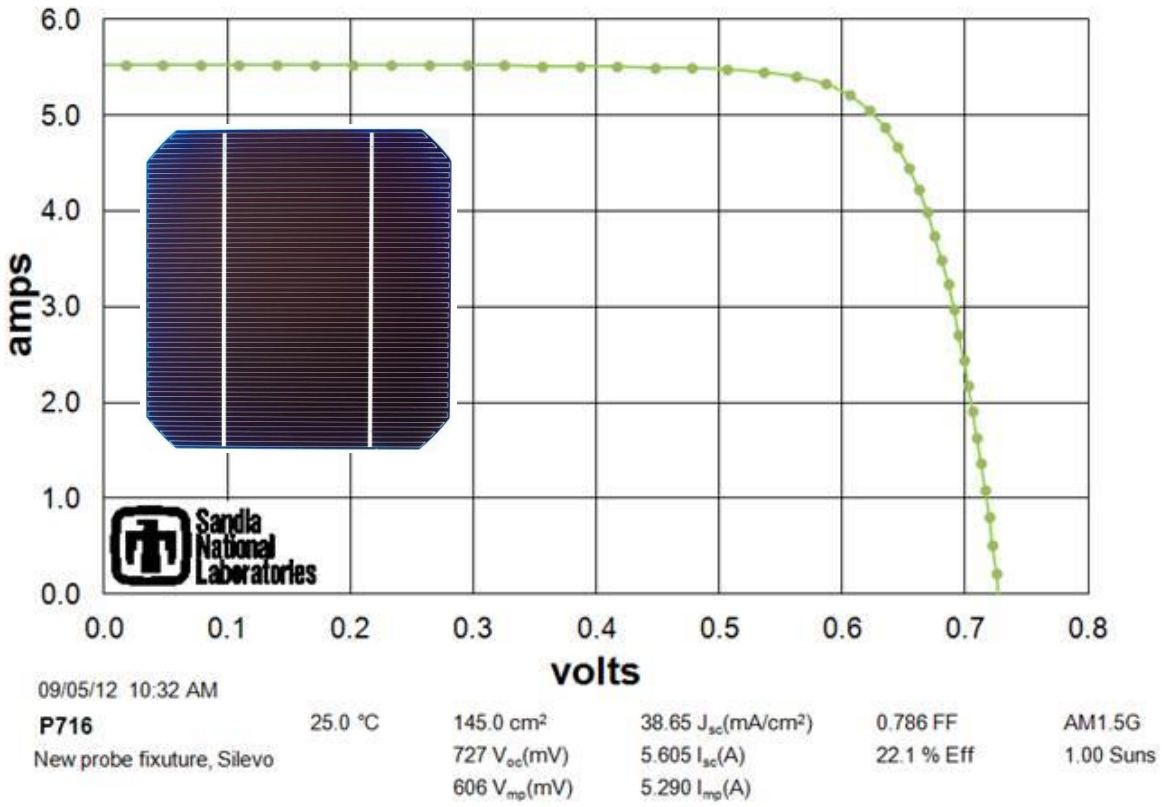
Silevo's innovative Tunneling Junction cell architecture is the engine that powers its signature Triex solar modules.

- Amorphous Si | Oxide | n type cSi
  - High efficiency
  - Low temperature coefficient
- Cu Metallization
  - Eliminates expensive silver paste
  - Low resistivity Reduces shading effect
  - Enables larger size solar cells
- 6 core process steps
  - High volume manufacturing



Champion Cell

22.1% Efficiency achieved on 125 x 125mm cells. Validated by Sandia National Laboratories. Production within .5% of champion.

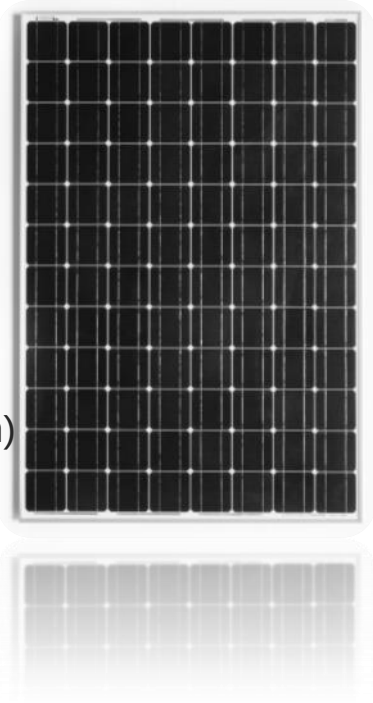


One of Top Three efficiency published laboratory certified cells

Triex Modules

T96-Series

96 5” cells
290 – 305Wp
17.2 – 18.1%
-0.27%/C temp. co.
PTC Ratio: 93.5%
1600mm x 1056mm
Silver frame (blk optn)
UL 600v | IEC 1000v
MC4 connectors

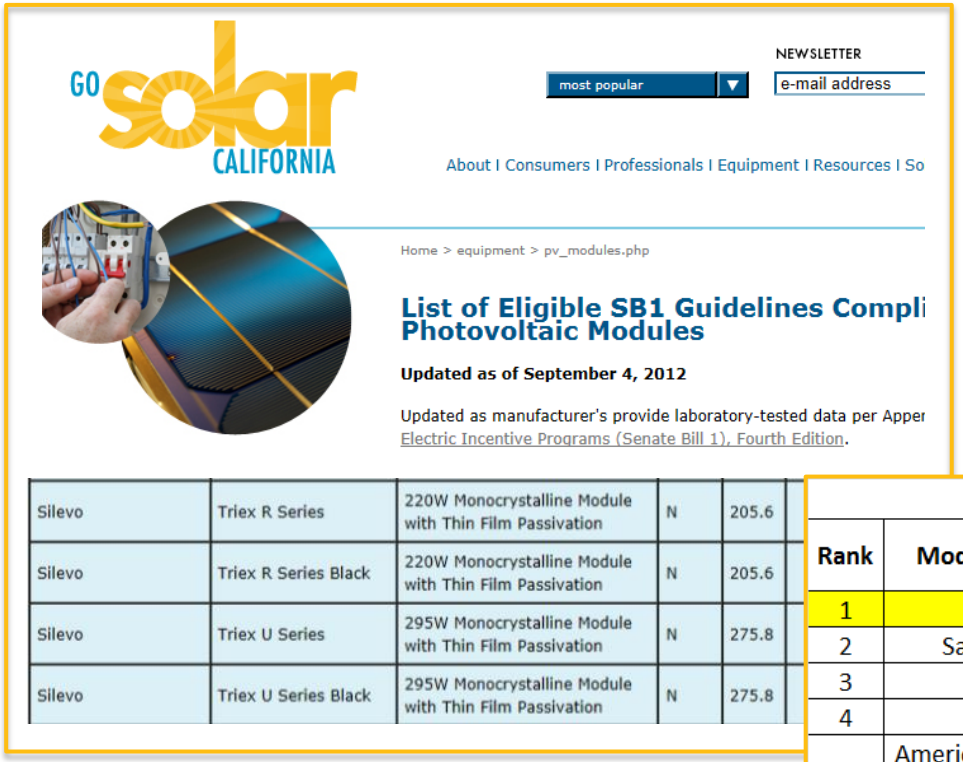


T72-Series

72 5” cells
220 – 235 Wp
17.2 – 18.4%
-0.27%/C temp. co.
PTC Ratio: 93.5%
1586mm x 806mm
Black frame
UL 600v | IEC 1000v
MC4 connectors

10 year product warranty & 25 year linear warranty

No. 1 PTC Rating for c-Si based Modules



Silevo	Triex R Series	220W Monocrystalline Module with Thin Film Passivation	N	205.6
Silevo	Triex R Series Black	220W Monocrystalline Module with Thin Film Passivation	N	205.6
Silevo	Triex U Series	295W Monocrystalline Module with Thin Film Passivation	N	275.8
Silevo	Triex U Series Black	295W Monocrystalline Module with Thin Film Passivation	N	275.8

PTC: PV-USA Test Conditions 20C Ambient 10m above ground level, 1000W/m^2, 1.5 Air Mass, 1m/s Wind Speed

Top c-Si Based PTC Performers

Rank	Module Manufacturer	Module	PTC/STC Ratio
1	Silevo	Triex R & U Series	93.49%
2	Sanyo (Panasonic)	VBHN245SA06	93.18%
3	Suntech	PLUTO310-Vdx	92.94%
4	Sunpower	SPR-415E-WHT-D	92.82%
5	American Solar Wholesaler	ASW-235M	92.62%
	Shangpin Solar	SPSM-235D	92.62%
7	Yingli	YL270C-30b	92.26%
8	Trina	TSM-315PA14A	91.90%
9	Mitsubishi	PV-UJ224G6	91.83%
10	Canadian Solar	CS6P-235PX	91.79%

Silevo PTC ranking validates Real World Performance Advantages

Case Study. Netherlands

Silevo High efficiency modules vs Standard Crystalline modules

Module Technical data

Standard Crystalline

Power: 245Wp

 # Cell: 60 x 6 inch cell

Efficiency: 15,1%

Size: 1,640m × 0,992m

Area: 1,63m²

Temp coefficient: -0,45%/°C

NOCT: 45±2°C

Technology type:

Standard PN junction, crystalline

SilevoT Series

Power: 295Wp

 # Cell: 96 x 5 inch cell

Efficiency: 17,6%

Size: 1,586m x 1,056m

Area: 1,67m²

Temp coefficient: -0,27%/°C

NOCT: 46±2

Technology type:

Hybrid Tunelling junction design.

Site location

Location:	De Bilt, The Netherlands
Latitude:	52.1°N
Longitude:	5.1°E
Roof inclination:	30°
Azimuth:	0°
Roof dimension:	14.5m x 4.2m
Roof area:	60.9m²

The simulations were performed using the same geographic parameters as mentioned above. No changes were made on either competitor or Silevo PAN files.

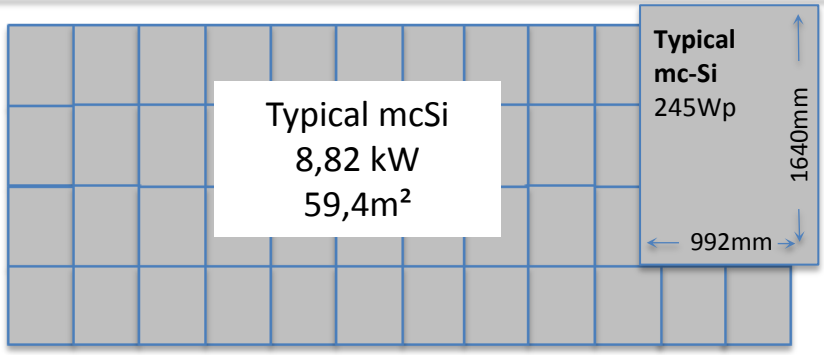
Simulation Results

PVSyst Simulation Summary

	Silevo 295Wp	Standard Module 245Wp	Silevo advantage
Yearly production in MWh	9,92	8,03	+23,54%
KWp installed	10,32	8,82	+17,01%
System efficiency	15,76%	12,93%	+21,89%
KWh/KWp/Year	960	911	+5,4%
Losses from Array to Grid	-9,4%	-14,2%	>51% less

On each parameter the advantage is clear

Silevo Advantage



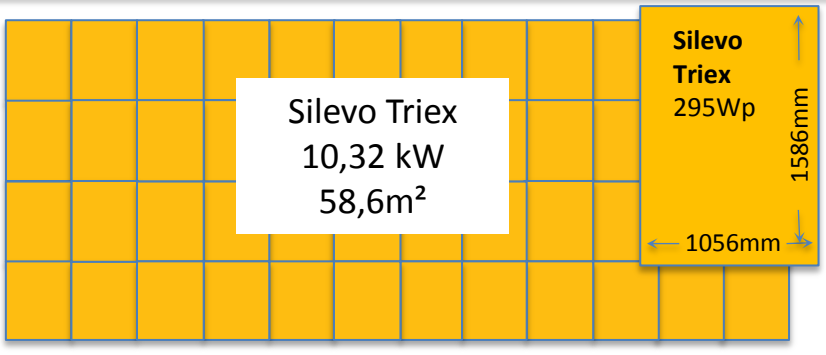
15,1% 245Wp Module

SOLAR CAPACITY: 8,82kW

ANNUAL GENERATION:

Munich, DE:	9,65MWh
DeBilt, NL:	8,03MWh
Uccle, BE:	7,64MWh

BOS & LABOR COST: 1,35€/Wp



17,6% 295Wp Module

SOLAR CAPACITY: 10,32kW **+17%**

ANNUAL GENERATION:

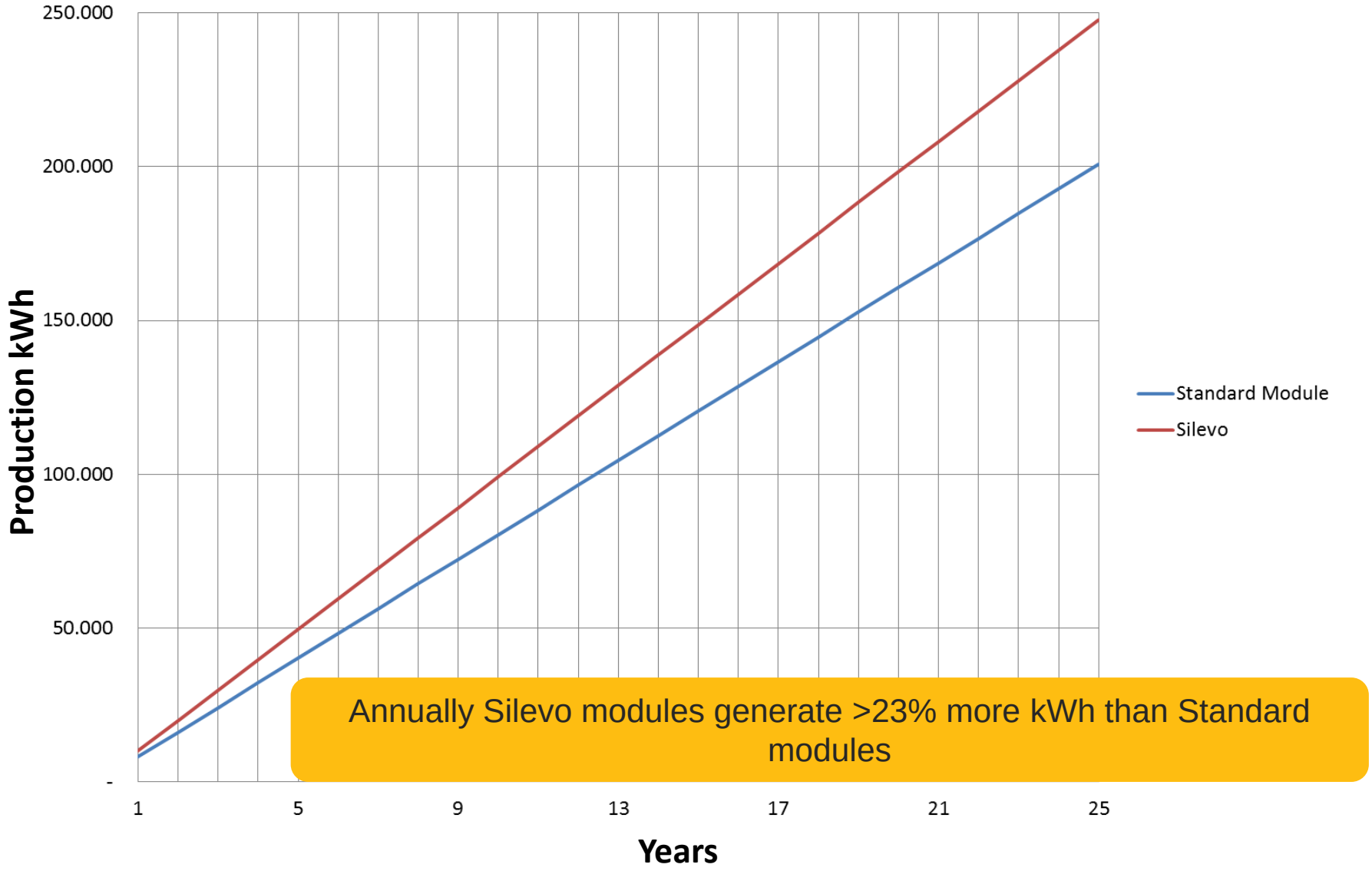
Munich, DE:	11,96MWh	**+23,9%**
DeBilt, NL:	9,92MWh	**+23,5%**
Uccle, BE:	9,45MWh	**+23,7%**

BOS & LABOR COST: 1,08€/Wp* **+20%**

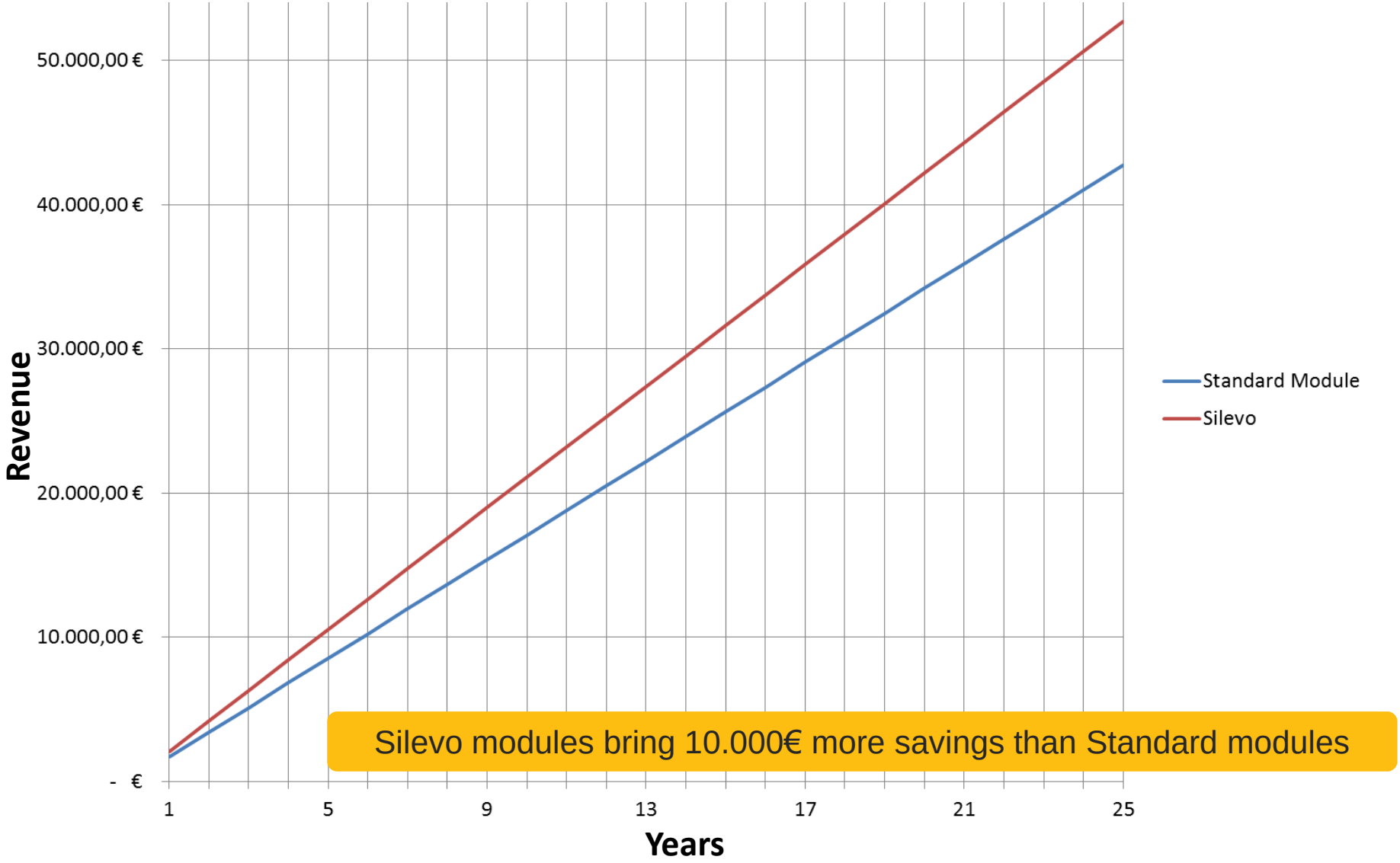
*GTM research. Excludes inverter.

Silevo modules provide >23% more energy in the same area, thereby decreasing €/Wp BOS & labor costs

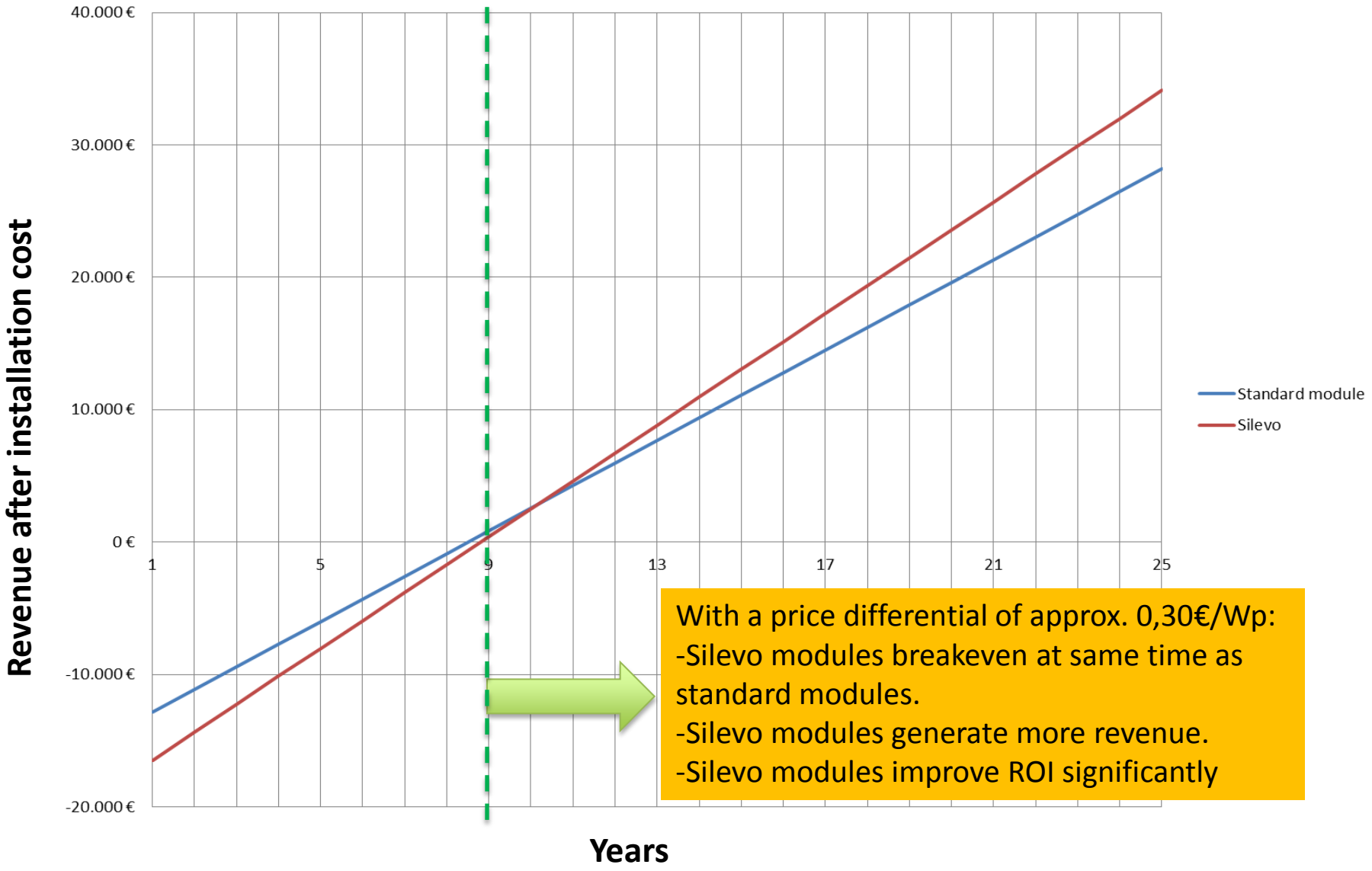
Energy Energy harvest comparison



Revenue comparison



Revenue vs Turnkey installation costs



Module Value

	Standard Module	Silevo
Wp Module	245 Wp	295 Wp
Number of modules	36 modules	35 modules
kWp installed	8,820 kWp	10,325kWp
Cost of electricity	0,21272€/kWh	0,21272€/kWh
kWh/kWp/year (PVSYST)	911	960
Value of module	0,60 €/Wp	1,48 €/Wp
Revenue	37.438 €	37.438 €

Silevo Modules generate more revenue/margin for the end customers.
At a price of 0,60€/Wp for standard modules, to generate the same income a Silevo module would be priced at 1,48€/Wp.
Any price below 1,48€/Wp is increased revenue for the customer.

Conclusion

- Silevo modules produce >23% more kWh vs Standard modules.
- ROI is significantly higher using Silevo modules.
- Although initial investment is higher, the end customer recovers their investment in Silevo modules at exactly the same time as with standard modules with a lower initial price. (9-10 years)
- After breakeven point Silevo generates far more revenue vs standard modules.
- Silevo‘s module value is 1,48€/Wp to generate the same saving as 0,60 €/Wp Standard modules.