

Zevelution Pro 33K

for decentralised PV Plants

**250 kWp Commercial Rooftop
Analysis**



Agenda

1. **Decentralised Concept**
2. **Pro 33K Design Concepts**
3. **Pro 33K Features**
4. **PVSyst Analysis**
5. **Reference Projects**

01

Decentralised Concept

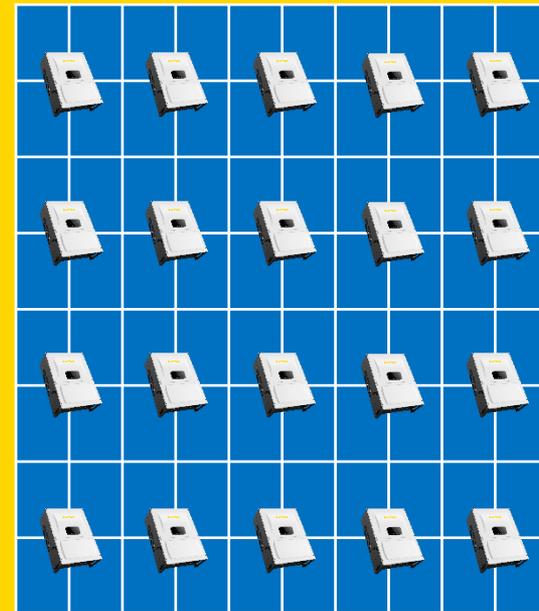
Zevelution Pro 33K – Decentralised Concept

- Decentralised plants have more inverters per PV array than traditional centralised plants
- Improvements in technology and increased capacity has now made string inverters a viable option for commercial and industrial PV plants

Centralised PV Plant



Decentralised PV Plant



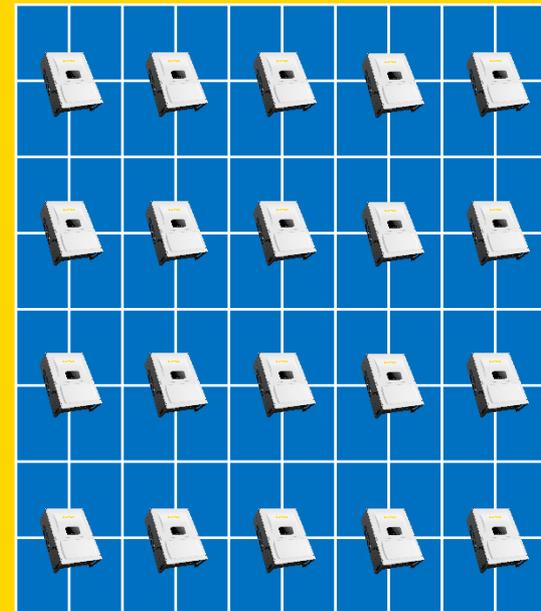
Zevelution Pro 33K – Decentralised Benefits

- Higher system availability due to increased PV plant redundancy

Centralised PV Plant



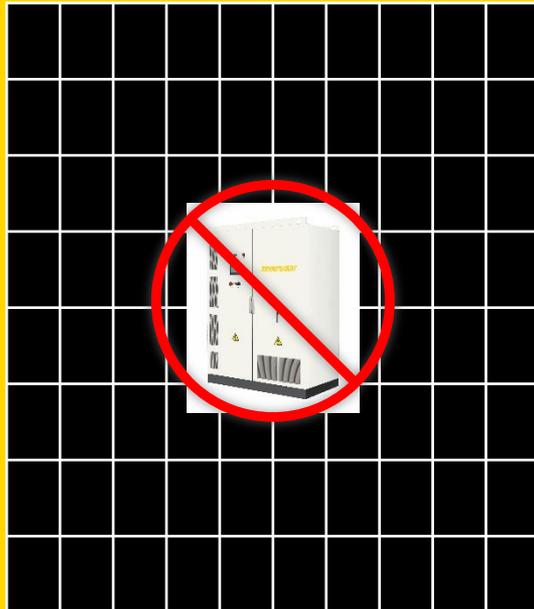
Decentralised PV Plant



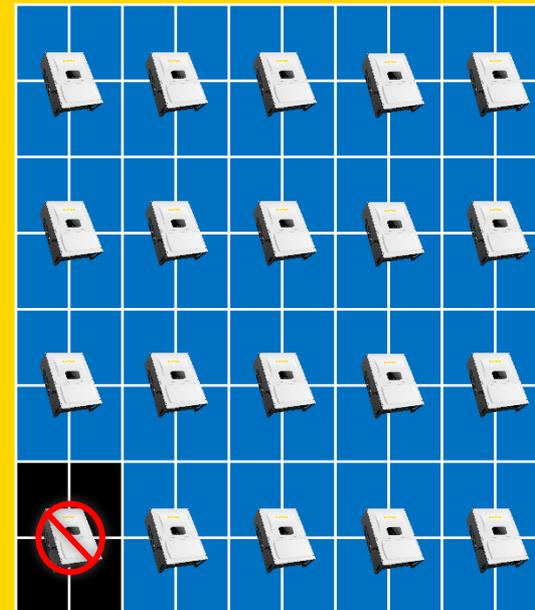
Zeverlution Pro 33K – Decentralised Benefits

- Higher system availability due to increased PV plant redundancy
- Reduces loss of generation from unexpected downtime

Centralised PV Plant



Decentralised PV Plant



Zevelution Pro 33K – Decentralised Benefits

- Greater energy generation due to MPPT tracking across more strings
 - Insert image of Iverter MPPT Tracking

Zevelution Pro 33K – Decentralised Benefits

- String inverter design reduces complexity in regards to O&M
- No heavy lifting required
- Plug & Play replacement



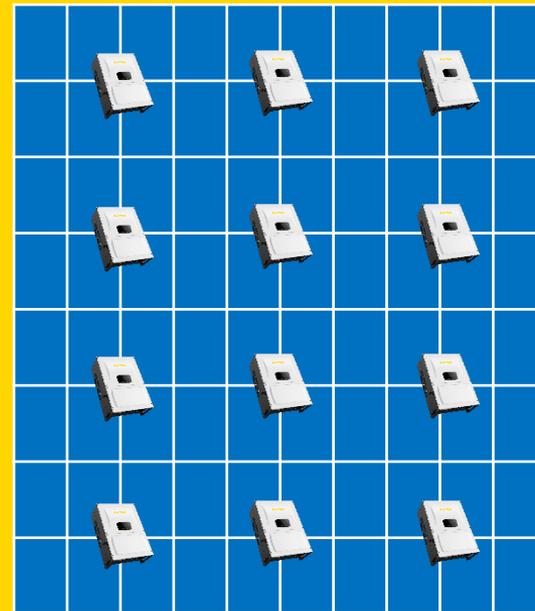
02 Pro 33K Design Concepts

Zeverlution Pro 33K – Decentralised Concept

- The Zeverlution Pro 33K is ideal for decentralised PV plants e.g. commercial rooftops
- It is suitable for both Low Voltage (LV) and Medium Voltage (MV) network connections

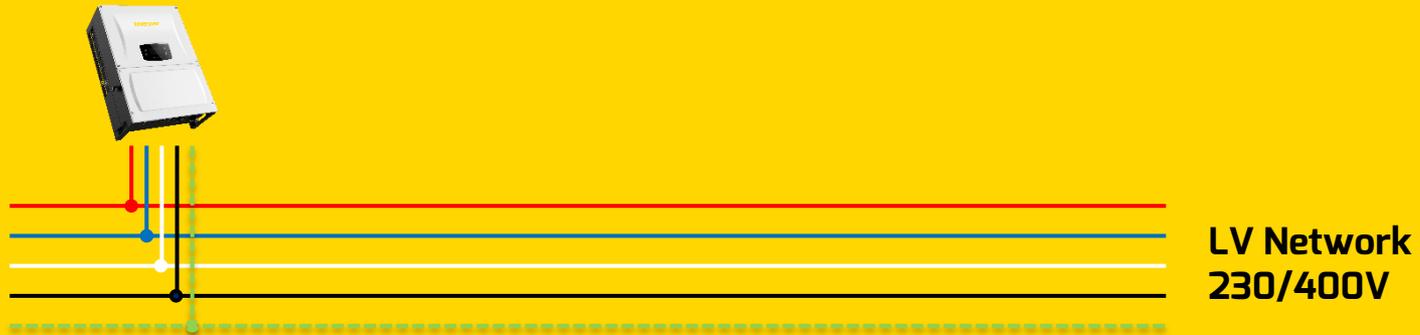


Decentralised PV Plant



LV Connection – Concept 1.

- Direct connection into customer LV switchboard



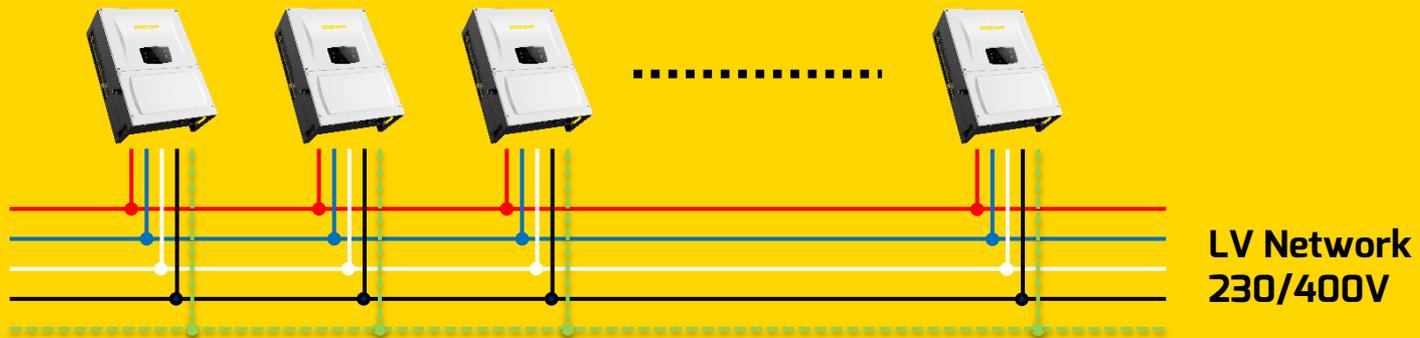
LV Connection – Concept 1.

- Direct connection into customer LV switchboard
- Increase AC capacity via multiple inverters



LV Connection – Concept 1.

- Direct connection into customer LV switchboard
- Increase AC capacity via multiple inverters
- Each Pro 33K may have different PV array configurations



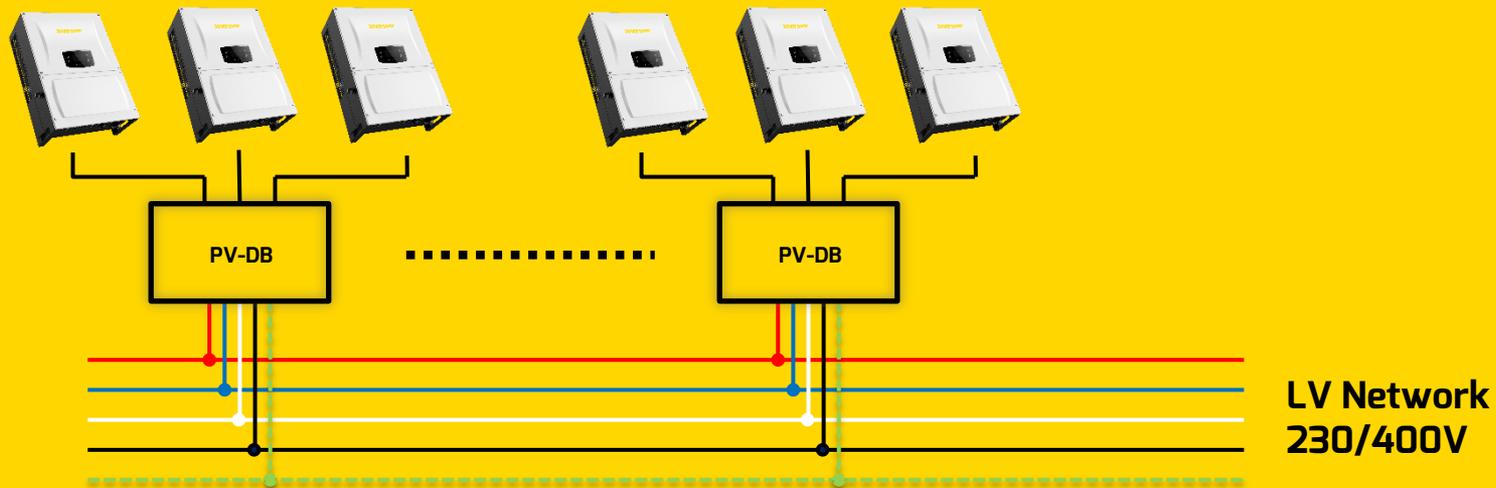
LV Connection – Concept 2.

- Connection into customer LV switchboard via PV distribution boards (PV-DB)



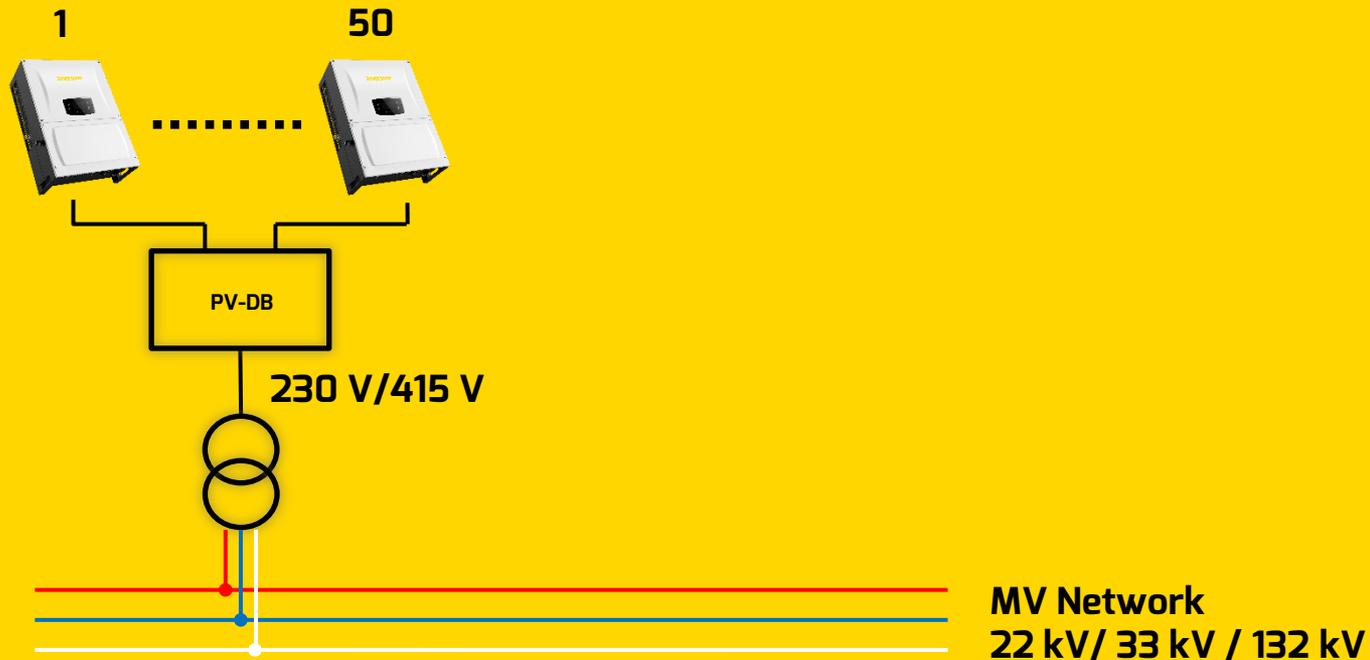
LV Connection – Concept 2.

- Connection into customer LV switchboard via PV distribution boards (PV-DB)
- Increase AC capacity via multiple PV-DB's
- Each Pro 33K may have different PV array configurations



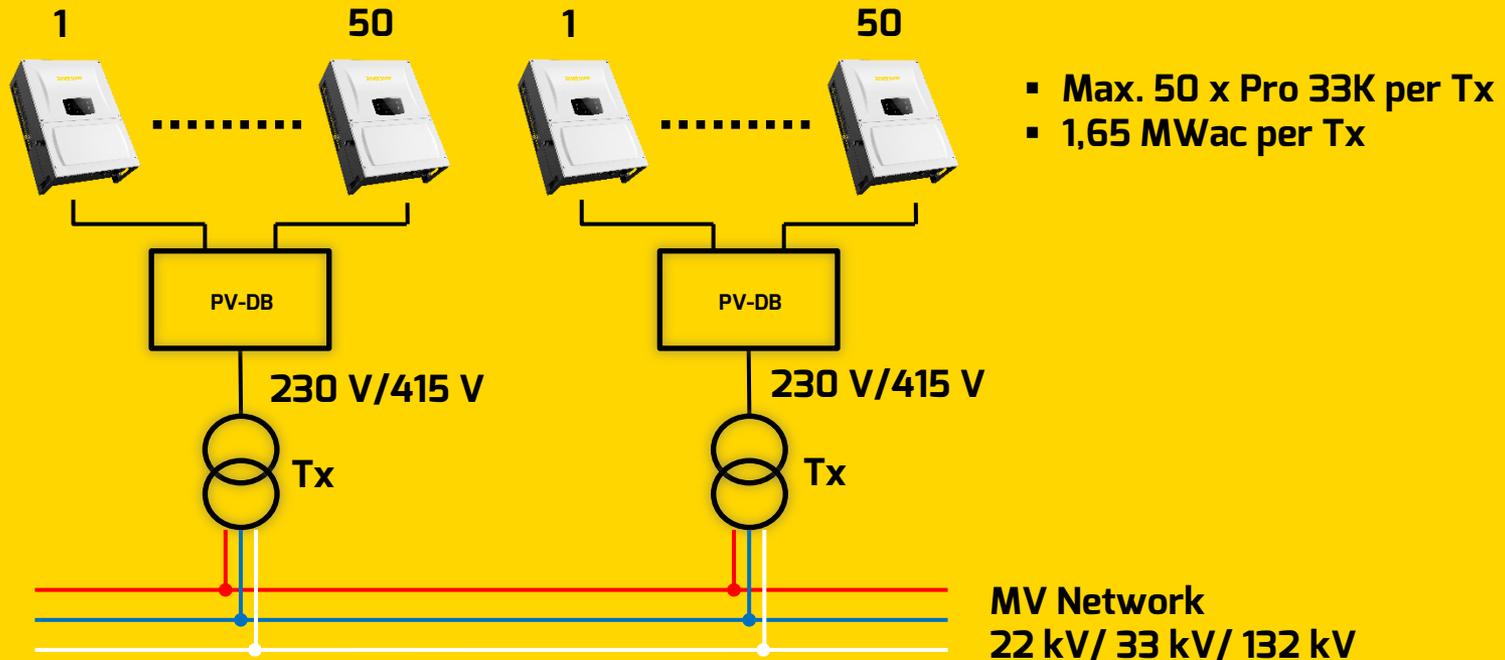
MV Connection – Concept

- Direct connection into MV network via step-up transformer



MV Connection – Concept

- Direct connection into MV network via step-up transformers
- Increase AC capacity via multiple inverters & transformers
- Each Pro 33K may have different PV array configurations



03 Pro 33K Features

Pro 33K – High Power Generation

- 1000V max DC input voltage
- Wide MPPT range :270V-950V
- Low start up voltage: 250V
- Dual MPPT
- High efficiency
 - EU efficiency: 98.2%, Max efficiency; 98.5%



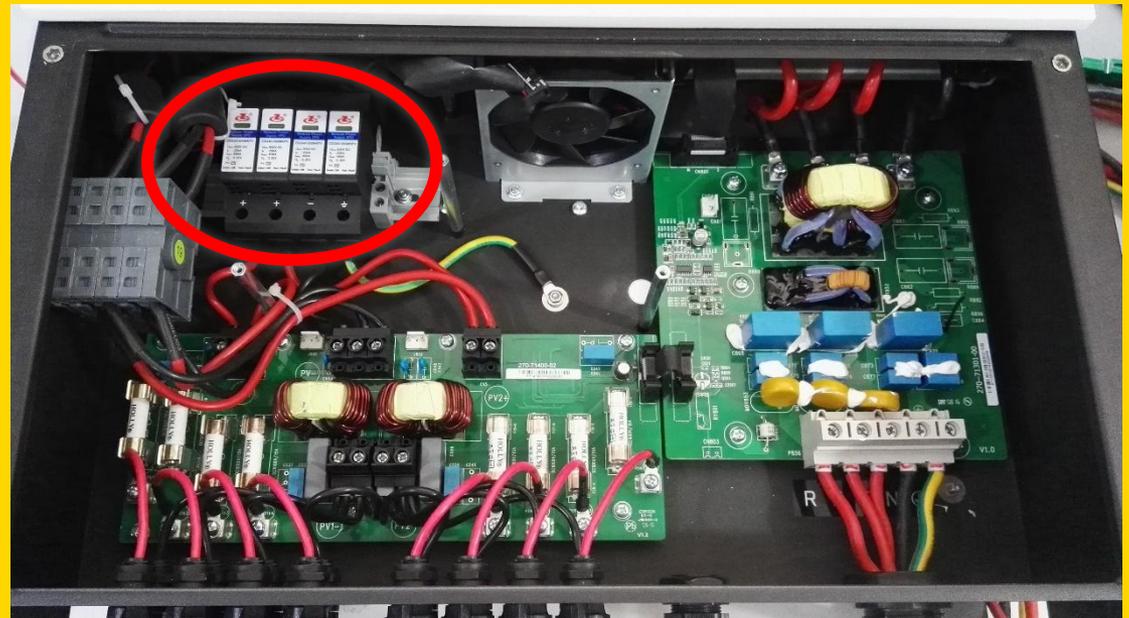
Pro 33K – High Reliability

- **Wide temperature range: -25 °C .. 60 °C**
- **IP65 protection**
- **Patented insulation resistance circuit for ISO test**
- **Sharing of SMA supply chain**
 - **Quality components**
- **Tested by SMA lab before mass production**
- **Comprehensive testing:**
 - **High – Low voltage**
 - **Thermal shock & cycle**
 - **Humidity, drop, Noise**



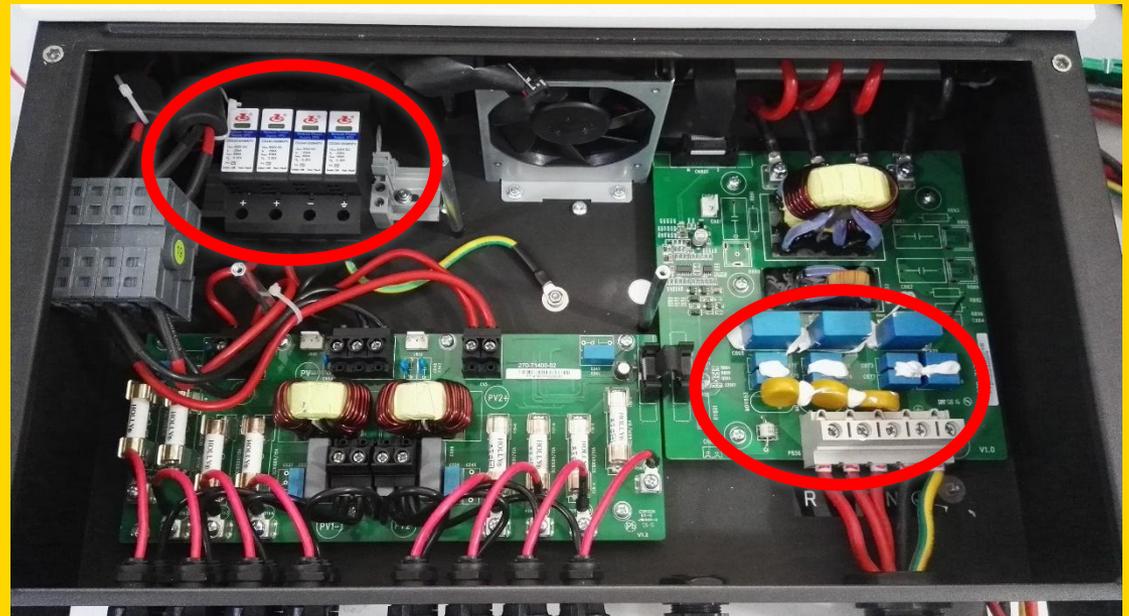
Pro 33K – High Reliability

- Integrated type II DC surge protection device



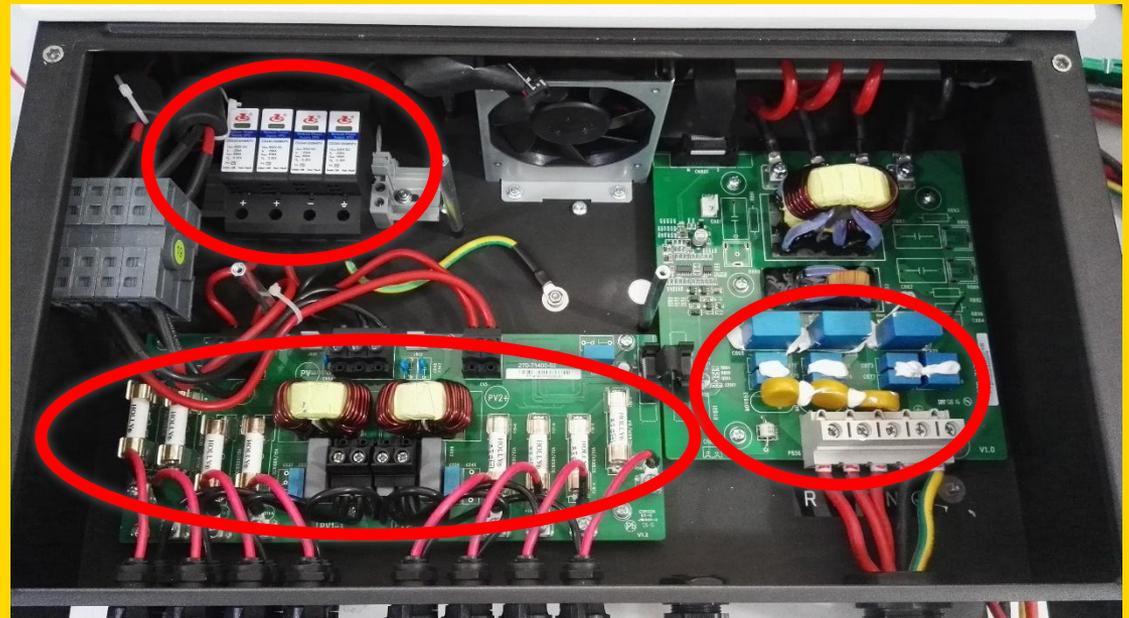
Pro 33K – High Reliability

- Integrated type II DC surge protection device
- Integrated type II AC MOV
 - Protection against indirect lightning strikes
 - Surge voltage



Pro 33K – High Reliability

- Integrated type II DC surge protection device
- Integrated type II AC MOV
 - Protection against indirect lightning strikes
 - Surge voltage
- Internal string fuse
- Over current protection



Pro 33K – Easy Installation & Maintenance

- **Easy handling - 58kg**
- **Sunclix DC connector – Toolless installation**
- **LCD panel – LED status indicators**
- **Voltage & frequency parameters adjusted via LCD**
- **Distribution box with integrated fuses and Type II surge protection device (AC/DC)**
- **Support both modbus and zeversolar's communication protocol**



04 PVSystem Analysis

Case Study – 250 kWp

- Case study based on PVsyst analysis on two possible inverter configurations
- The aim is to determine which PV configuration provides the better ROI and lowest LCOE



Option A

- 255,78 kWp DC capacity
- 198 kWac AC capacity
- 6 x Pro 33K
- 882 x 290 W panels
- DC:AC Ratio – 1,3



Option B

- 255,78 kWp DC capacity
- 231 kWac AC capacity
- 7 x Pro 33K
- 882 x 290 W panels
- DC:AC Ratio – 1,1

System Parameters

- 882 x 290 W Trina Honey Panel
- Location – London
- PVArray
 - South Facing
 - 30 Degree Tilt
 - Row spacing – ca. 4,5 m (conservative)

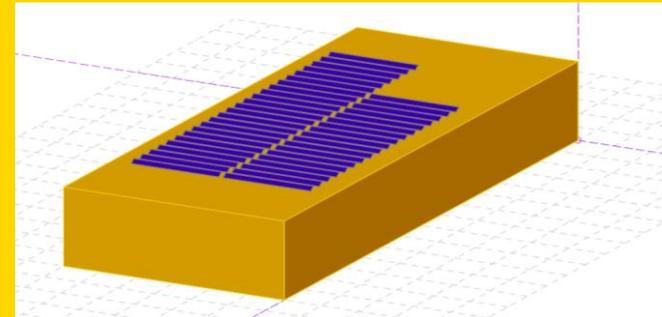
Analysis

- PVsyst 6.4.9
- Assumptions
 - No shading apart from row to row shading

Analysis

Summary

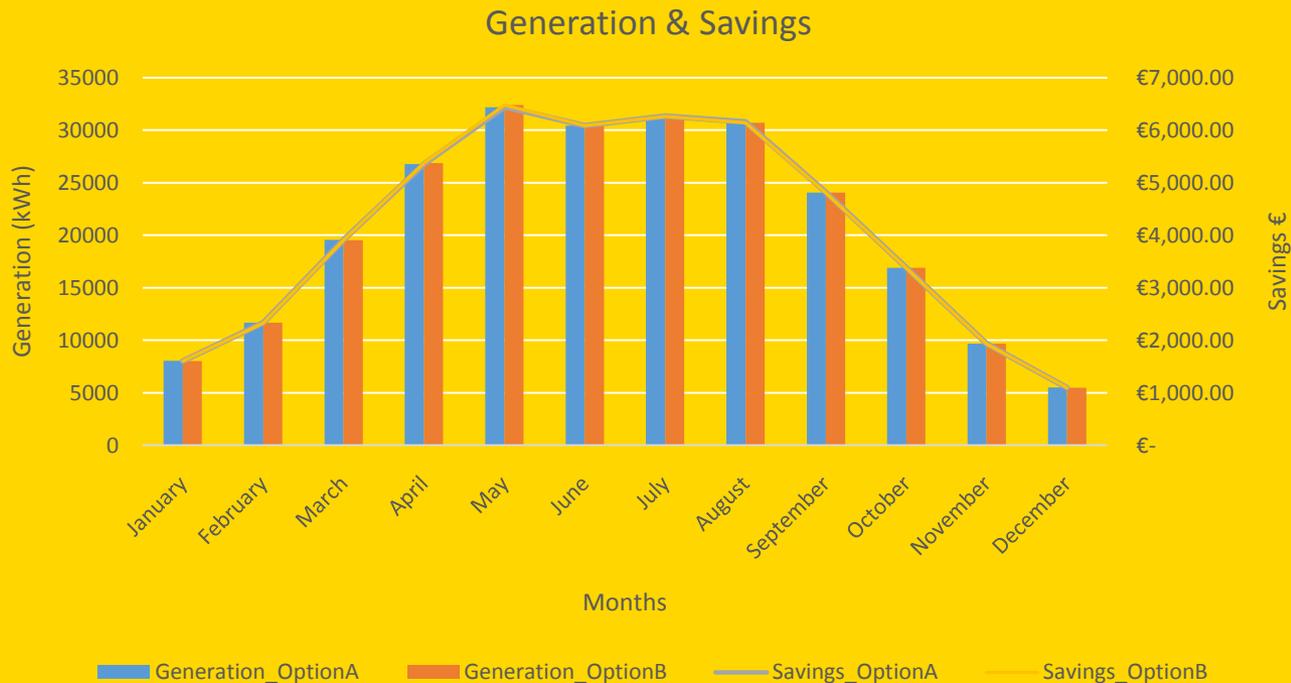
	Option A	Option B
DC:AC Ratio	1,29	1,11
No. Inverters	6	7
No. Panels	882	882
1st Yr Generation (MWh)	246,871	247,027
Savings 1st Yr @ 20 c/kWh	49.374,2	49.405,4



Observations & Conclusion

- Option B generates 156 kWh more per year which translates to 31,6 € per year
- Option A has a lower capex due to:
 - One less inverter
 - Reduced AC cabling
 - Reduced installation time
- Option A - low capex results in a lower LCOE therefore a higher ROI when compared to Option B

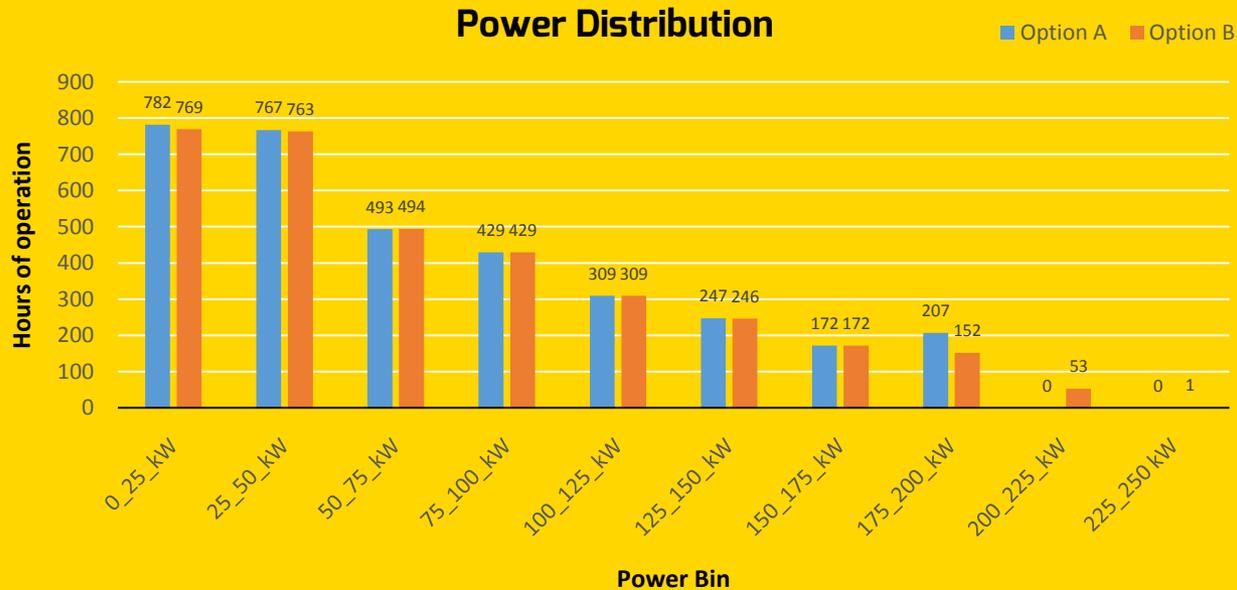
Analysis – Monthly Generation & Savings



Observations

- **Option A generates approximately the same amount of energy compared to Option B**
- **Savings based on 20 c/kWh**

Analysis – Power Distribution



Observations

- Option A operates more hours in lower light conditions due to higher AC:DC ratio
- Option A clips instantaneous power to 198 kWp however does not affect yearly generation

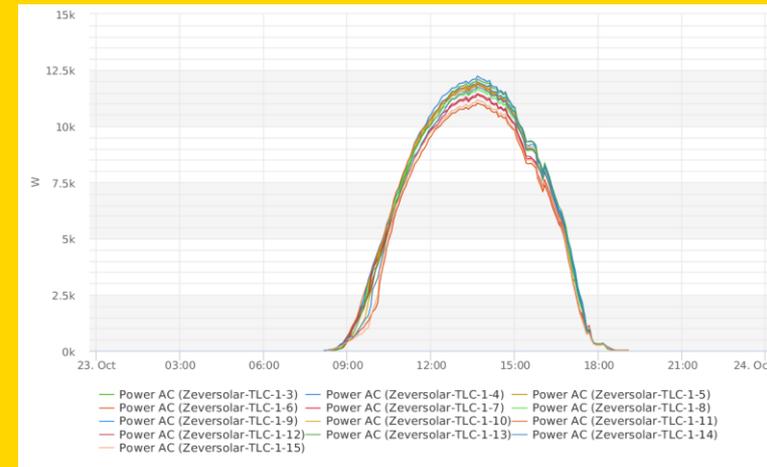
05 Reference Projects

Three phase inverters

EUROPE



- **Project name:** Houdijk
- **Project location:** The Netherlands
- **Project size:** 304,2 kWp
- **No. and type of panels:** 1170 x CSUN 260 W
- **No. and type of inverters:** 13 pcs Eversol TCL 20K
- **Commissioning date:** 08.09.2015



EUROPE



- **Project name:** Polden Business Centre
- **Project location:** Somerset, United Kingdom
- **Project size:** 160 kWp
- **No. and type of panels:** 1170 x CSUN 260 W
- **No. and type of inverters:** 1 x Zevelution Pro 33K, 1 x TLC 20K, 3 x TCL 17K, 2 x TLC 15K
- **Commissioning date:** 08.09.2015

EUROPE



- **Project name:** Sparsholt & Andover College
- **Project location:** Winchester, United Kingdom
- **Project size:** 633 kWp
- **No. and type of panels:** 2500 x BenQ 250/260 W
- **No. and type of inverters:** 29 x ZEVERSOLAR (Various incl. 5 x Pro 33K)
- **Commissioning date:** 01.02.2016

ASIA



- **Project name:** Yangzhou Yanyangtan
- **Project size:** **20 MWp**
- **Project location:** Yangzhou City, China
- **Customer name:** Yangzhou Yanyangtan New Energy Co. Ltd
- **No. of inverters:** 503 pcs Zevelution Pro 40K-MV
- **No. And type of panels:** 275W, Polysilicon

ASIA



- **Project name:** Nike Factory Rooftop
- **Project size:** **2.5 MWp**
- **Project location:** Taicang City, China
- **Customer name:** Simax (Suzhou) Green New Energy Co. Ltd
- **No. of inverters:** 76 pcs Zeverlution Pro 33K
- **No. And type of panels:** Simax PV modules

ASIA



- **Project name:** Zeversolar Factory Rooftop
- **Project size:** **450 kWp**
- **Project location:** Yangzhong, China
- **Customer name:** Zeversolar
- **No. of inverters:** NSG-500K, Zeperlution Pro 33K, Zeperlution 5000
- **No. And type of panels:** LDK 230PDFW

ASIA



- **Project name:** Solar PV Rooftop
- **Project size:** **100 kWp**
- **Project location:** Car park, TGCI, Saraburi, Thailand
- **Customer name:** Thai-German Ceramic Co. Ltd (SCG Group)
- **No. of inverters:** 5 pcs Eversol TLC 20K
- **No. And type of panels:** Canadian Solar 250W Poly