

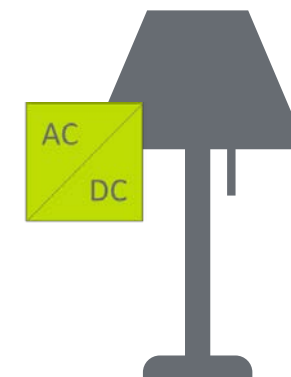
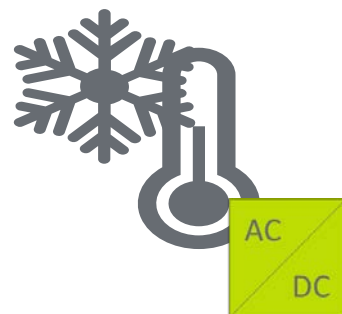
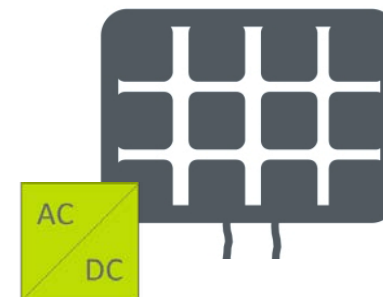
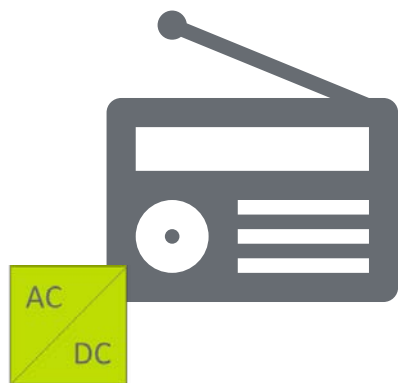
A hand-drawn diagram in a spiral notebook on a wooden surface. The diagram shows a sun labeled 'Solar' with arrows pointing to a battery labeled 'Battery'. Below the battery, a grid of houses is shown with arrows labeled 'energy' pointing towards them. The notebook has a green cover and a green pencil is visible on the right. The background is a wooden desk with some sticky notes and another notebook.

Gleichstromnetze

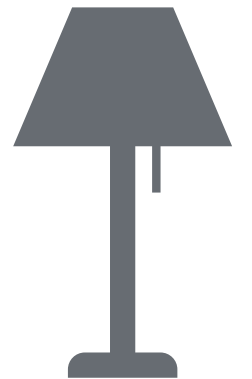
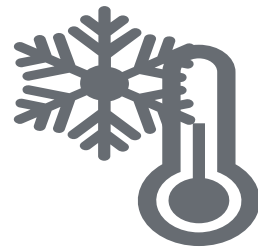
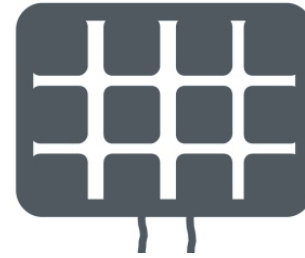
effizient vernetzte Energiesysteme mit der ambiBOX

PIUS Länderkonferenz 2018

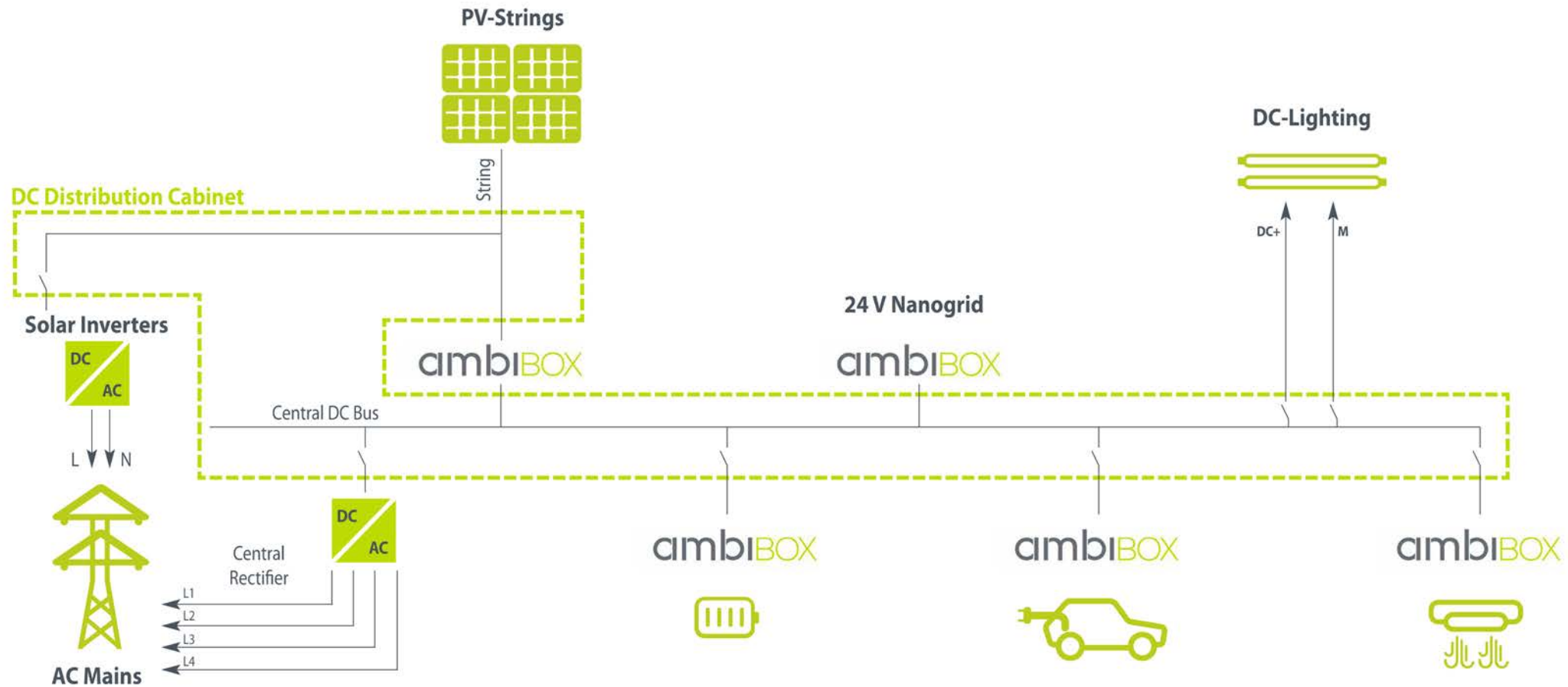
AC ? DC?



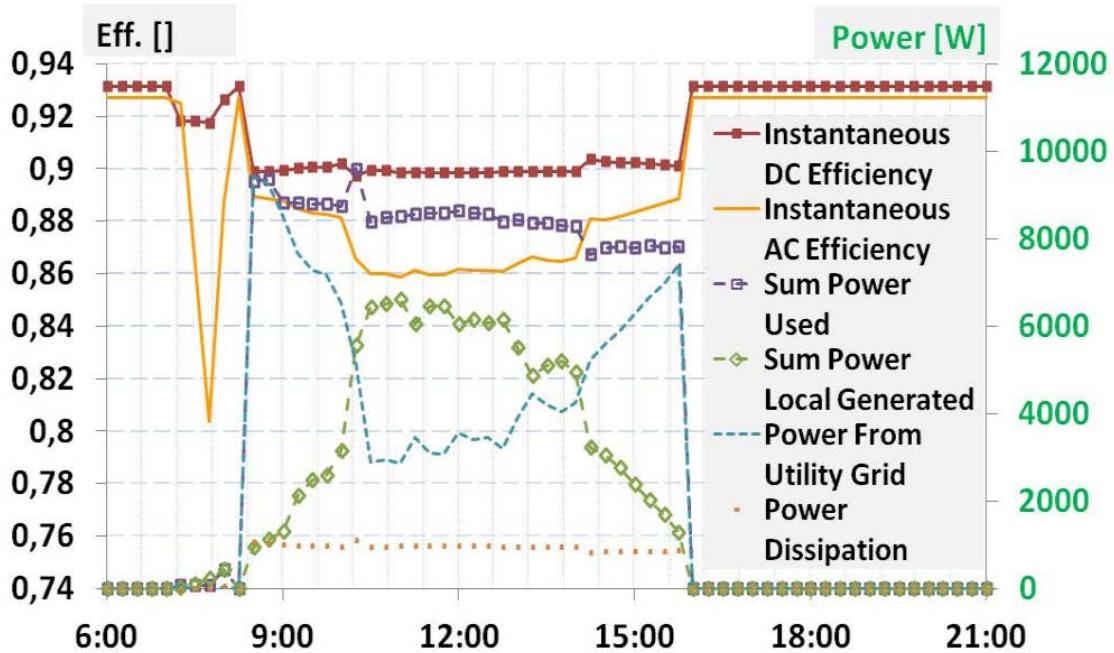
AC ? DC?



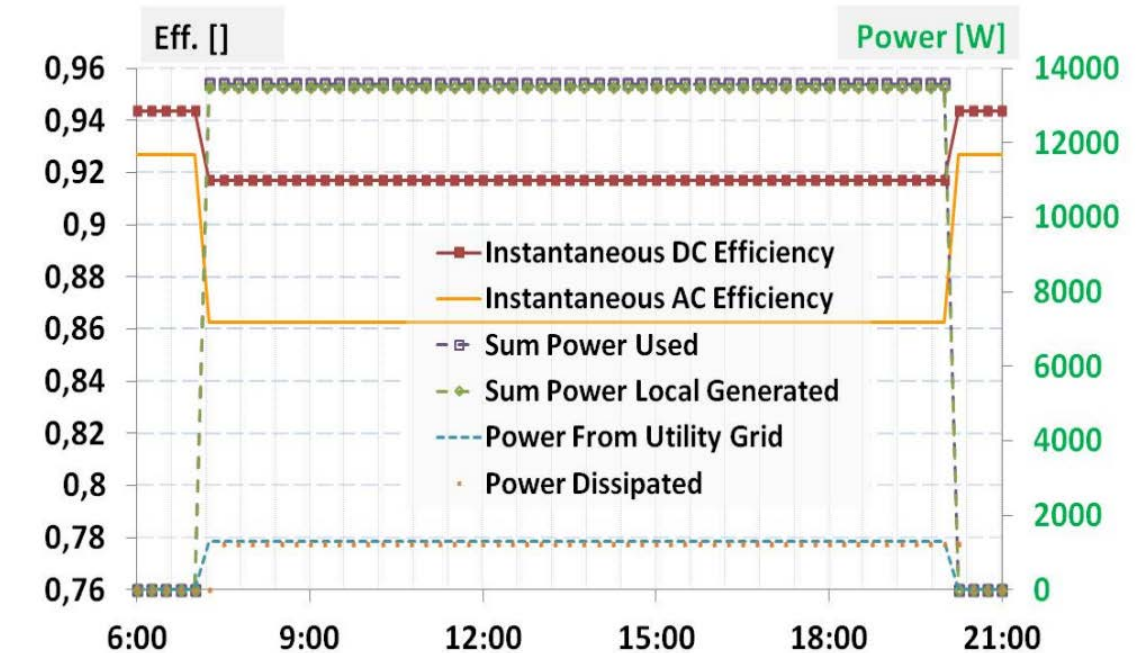
DC-Netz



Vergleich AC- und DC-Netz



2,7%

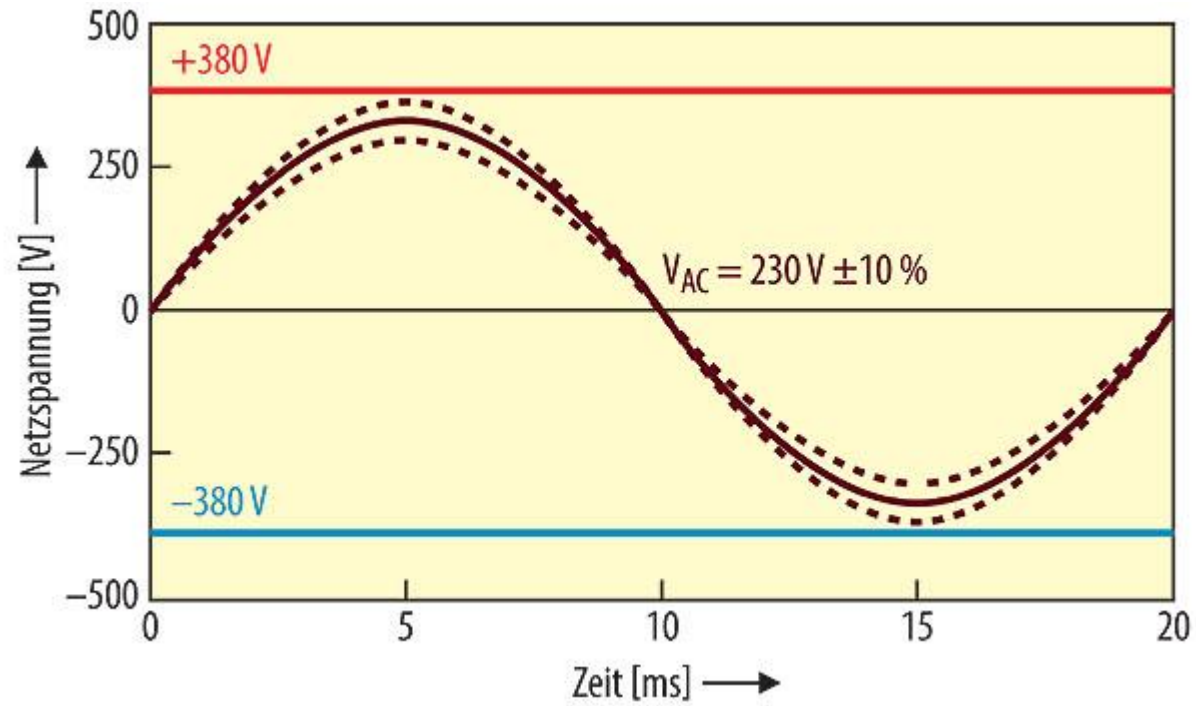


5,5%

Fig. 11. Comparison of the calculated instantaneous efficiency for 400/230VAC and a 380VDC distribution system (left axis). The different generated und used power values are shown on the left axis.

Fig. 12. Comparison of the calculated instantaneous efficiency for 400/230VAC and a 380VDC distribution system (left axis). The different generated und used power values are shown on the left axis.

DC-Netz



2-Phase, 4 conductor DC Grid Power Cable Options

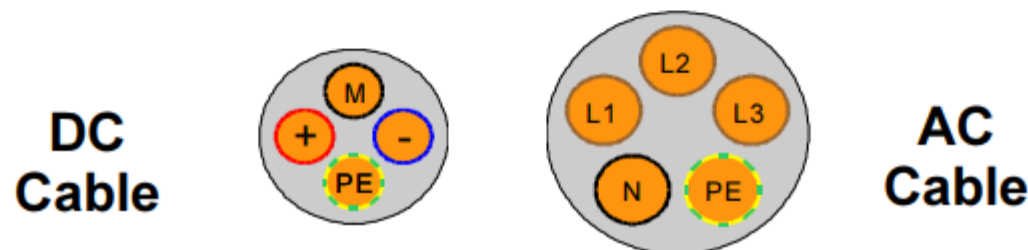
1. In comparison with 5 conductor, 3-phase AC cables

1. 37 % more power at equal cable loss and equal copper cross section

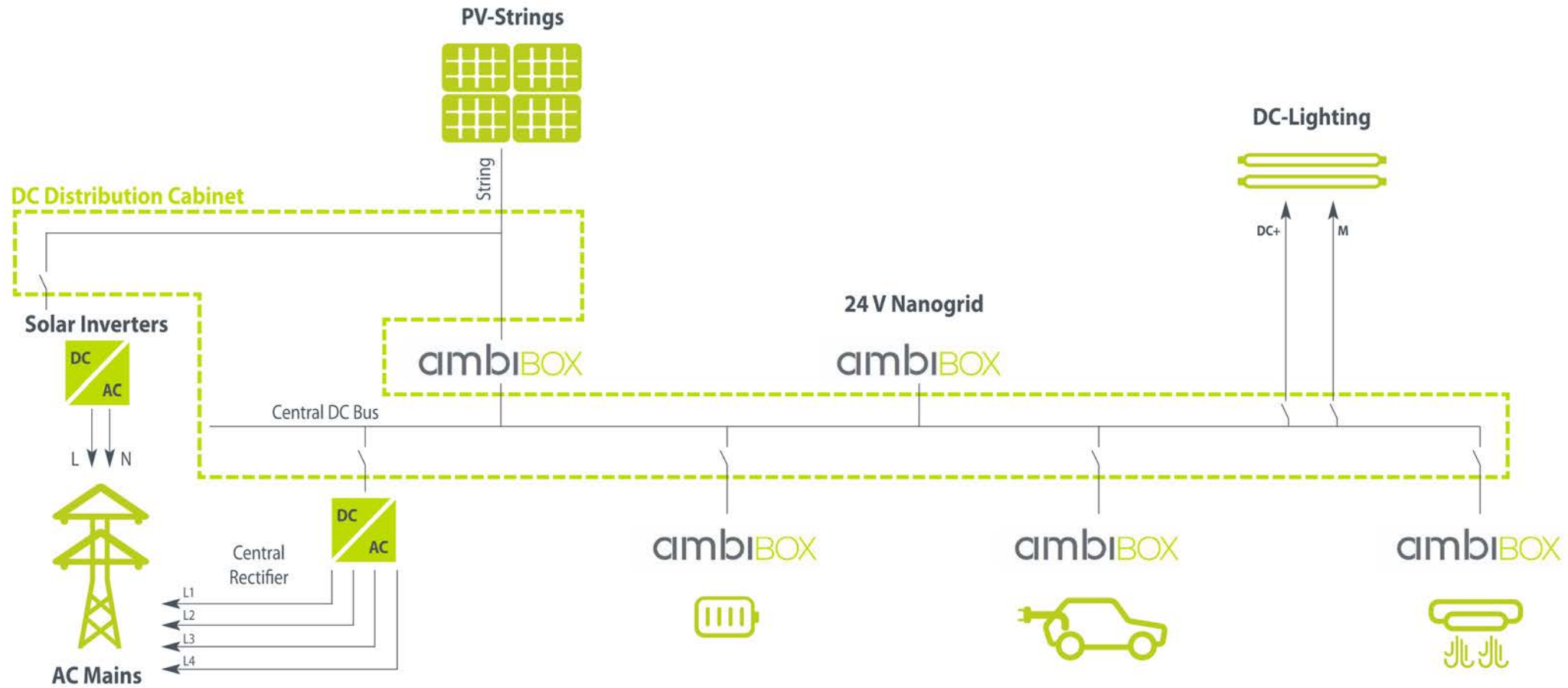
2. 56 % lower cable loss at equal power

$$\frac{P_{\text{Cable.loss.DC}}}{P_{\text{Cable.loss.AC}}} = \frac{2}{3} \cdot \frac{0.8 \cdot R_{\text{AC.conductor}}}{R_{\text{AC.conductor}}} \cdot \left(\frac{3 \cdot V_{\text{AC.Phase}}}{2 \cdot V_{\text{DC.Phase}}} \right)^2 = \frac{3}{2} \cdot 0.8 \cdot \left(\frac{230 \text{ V}}{380 \text{ V}} \right)^2 = 0.44$$

3. 56 % less copper at equal power and cable loss as *cost reduction feature*



DC-Netz



Beispiel



Beispiel



Applications	Energy budget with AC Grid	Estimated energy budget with DC Grid
Heating & warm water	7.0 kWh/(m ² year)	6.7 kWh/(m ² year)
Lighting	15.0 kWh/(m ² year)	9.0 kWh/(m ² year)
Ventilation, IT , Others	15.9 kWh/(m ² year)	15.1 kWh/(m ² year)
Electricity Grid	0.7 kWh/(m ² year)	0.3 kWh/(m ² year)
Central Rectifier	<i>not used with an AC grid</i>	1.0 kWh/(m ² year)
SUM Consumption	38.6 kWh/(m ² year)	32.0 kWh/(m ² year)

Table 2: Specific energy budget of the 1267 m² Marché Restaurants Schweiz AG office building

using AC and DC grids

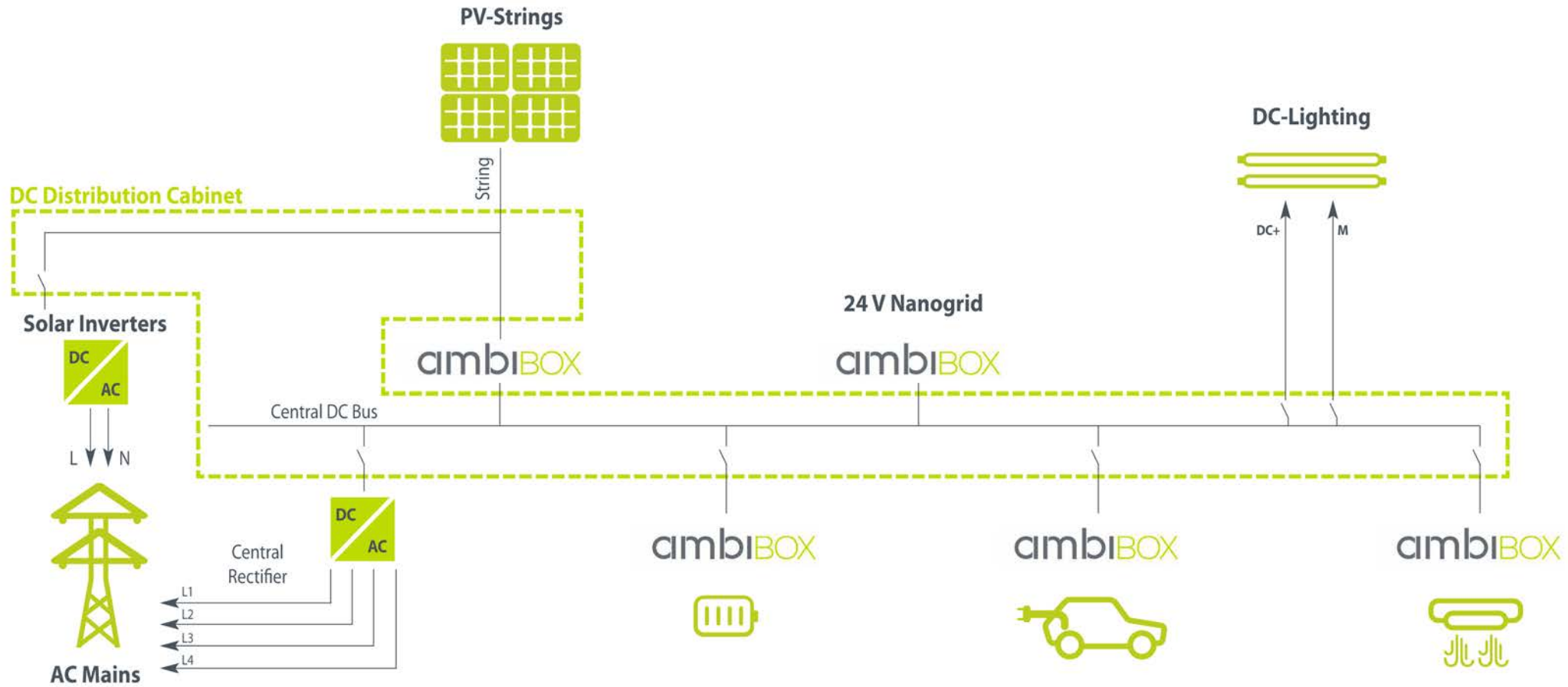
TL Lighting (AC case): $\sim 10 \text{ W/m}^2 * 1267 \text{ m}^2 * 1500 \text{ h/year}$

LED Lighting (DC case): $\sim 6 \text{ W/m}^2 * 1267 \text{ m}^2 * 1500 \text{ h/year}$

IT: PC's, UPS, copier, printer

Others: Coffee machines, Dish washer, etc

DC-Netz





ambiBOX

- DC/DC mit MPP für PV
- DC/DC für Batteriespeicher
- DC EV Charger
 - wallBOX home
semi fast Charger
10 / 20 kW
 - Charge cluster
10 ...200 kW

sidOS

The energy development framework



Kai Fieber

fieber@ambibox.de | +49 6131- 633902- 12

Ambibox GmbH | An der Ochsenwiese 3 | 55124 Mainz | Germany

Geschäftsführer: Manfred Przybilla | Rechtsform: GmbH | Sitz: Mainz | Amtsgericht Mainz | HRB 46348

www.ambibox.de