Supporting material:

Table S1: Defect definition class allocation to the sources, class 1 sources were omitted for improved overview

Source	motivation	Defect class	reason
[36]	unknown	2	"A failure is an effect that (1) degrades the module power and which is not reversed by normal operation or (2) creates a safety issue"
[37]	scientists	2	power loss defects, also 1. given.
[25]	scientists	2	power loss defects, also 1. given.
[5]	unknown	3	DR>2% is "likely warranty"
[38]	scientists	3	"a PV module is generally considered nonfunctional when its maximum power output drops by more than 20% of the initial power while still under warranty". Occurrence data is 1. though.
[42]	scientists	3	ASU-PRL definition
[155]	O&M	3	warranty
[41]	scientists	3	ASU-PRL definition
[44]	scientists	3	ASU-PRL definition
[47]	scientists	3	"defect with RPN above 200 may be considered risky, and a warranty claim may be made for this specific defect"
[42]	unknown	3	ASU-PRL definition
[39]	scientists	3	"all the modules have already degraded beyond the typical end- of-life limit of 70-80% of the original power"
[112]	O&M	4	educated guess from the defect types that was concentrated on
[113]	scientists	4	modules are mentioned to have "failed" without specifying the definition, assume it is a relevant failure.
[49]	other industry	4	catastrophic failures
[50]	manufacturer	4	returns
[131]	unknown	4	classical failure definition (inverters)
[132]	O&M	4	reports
[54]	manufacturer	4	returns
[135]	other industry	4	service cases
[136]	owners	4	educated guess from "each recipient agreed to provide annual reports for each of the first five years of system operation"
[53]	owners	4	educated guess from "each recipient agreed to provide annual reports for each of the first five years of system

			operation"
[137]	owners	4	educated guess from "each recipient agreed to provide annual reports for each of the first five years of system operation"
[138]	unknown	4	required action
[141]	unknown	4	classical failure definition (inverters)
[33]	O&M	4	educated guess from "reported failures per systems"
[143]	O&M	4	by definition: "failures necessarily require corrective maintenance"
[48]	O&M	4	unscheduled maintenance events
[176]	O&M	4	events requiring maintenance
[51]	scientists	4	"A PV module is defined as having failed when two criteria are met: 1) its power output has fallen to less than half of its original rating; and 2) it cannot be repaired in the field"
[162]	manufacturer	4	returns

Table S2: Listing of key figure usage in the sources

source	key figure
[103]	o
[64]	PLR; RPN; P; o; O
[112]	O; P
[104]	YOYPIX
[35]	o; O
[55]	DR
[113]	O
[115]	P; o
[116]	o; O
[49]	PLR; O
[118]	P; o
[119]	o; o (system)
[71]	MTBF; ΔP; o
[121]	PLR; O
[31]	ΔP; o
[122]	o
[105]	YOY
[5]	y
[124]	P; o
[46]	DR; o
[126], [187]	o
[125]	o
[127]	PLR; o
[128]	FR
[50]	cumulative breakage rate (FR, FR(t)); o

[74]	P; ΔP; o; O
[130]	Y; O
[131]	DY, PR, Y; y; ΔY
[132]	f (service requests)
[133]	f (service requests)
[134]	o; O; rP
[54]	YOYPIX
[135]	f; o; O
[169]	rP
[136]	Y; CDF; o per year
[53]	Y; CDF; o per year
[24]	FR; FIT; f
[4]	DR
[137]	Y; CDF; o per year; O (system)
[138]	f; DR
[32]	P
[140]	PR; o; O
[141]	F; F(t)
[18]	o; O
[37]	F; f; o (System); O
[25]	F
[142]	P; O
[38]	RPN; DR; CNF/1000; o
[33]	FR; Y; P; o
[188]	F; FR; MTR
[170]	P
[21]	P; f
[22]	o; P
[90]	P
[23]	o
[43]	DR; ΔP; P (String); o; O
[48]	Y; f; F; MTBF
[145]	P; o; DR
[176]	F; FR; MTBF; O
[171]	Y; DR
[52]	O; P; DR
[149]	P; DR; o; O
[175]	RPN
[34]	o; PR
[51]	o; O
[95]	P; DR; O
[26]	P; ΔP; DR; o
[27]	DR; RPN
[96]	P; ΔP; O
[28]	DR

[29]	Y; ΔP; PR; o
[154]	P; ΔP; PLR; o; O
[155]	o
[99]	DR; ΔP; P (String); o; O
[100]	DR; O; Y
[44]	O; o
[189]	RPN
[173]	P
[156]	o
[101]	PR
[30]	DR; O
[158]	o
[190]	f
[159]	O
[185]	f; P; ΔP
[162]	P; o
[161]	P; rP; DR
[42]	PLR; o; O
[39]	P; o; DR

Distribution of countries and regions

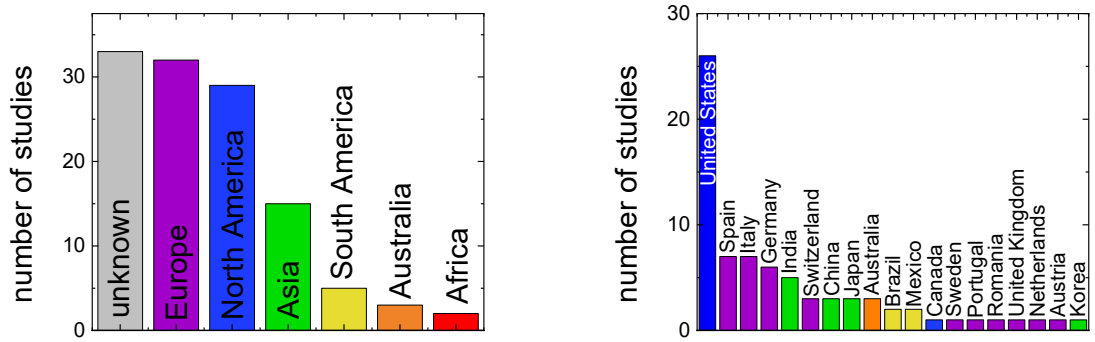

Figure S1: *Distribution of studies per continents (left) and per country (right). Note that only studies were counted that specifically mentioned where the PV installations were located. If studies did not mention locations, they were counted as unknown. Note also that some studies mentioned continent but not country.*

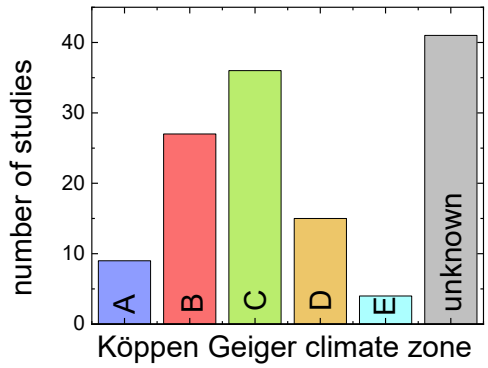

Figure S2: *Distribution of studies per Köppen Geiger climate zone. Note that only studies were counted that specifically mentioned where the PV installations were located. If studies did not mention locations, they were counted as unknown.*

References

Please note that Ref. 1-186 are listed in the main article.

[187] "Photovoltaic Solutions DuPont global PV reliability: 2020 Field analysis," 2020.

[188] I. Lillo-Bravo, P. González-Martínez, M. Larrañeta, and J. Guasumba-Codena, "Impact of energy losses due to failures on photovoltaic plant energy balance," *Energies*, vol. 11, no. 2, 2018, doi: 10.3390/en11020363.

[189] S. Tatapudi, P. Sundarajan, C. Libby, J. Kuitche, and G. TamizhMani, "Risk priority number for PV module defects: influence of climatic condition," vol. 1075907, no. September 2018, p. 2, 2018, doi: 10.1117/12.2321597.

[190] J. H. Wohlgemuth;, D. W. Cunningham;, A. M. Nguyen;, and J. Miller, "Long term reliability of PV modules," *Proc. 20th Eur. PV Sol. Energy Conf.*, pp. 1942–1948, 2005, [Online]. Available: http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=F0050C879CAA1F0BD54880F4EE1AEC40?doi=10.1.1.496.984&rep=rep1&type=pdf.