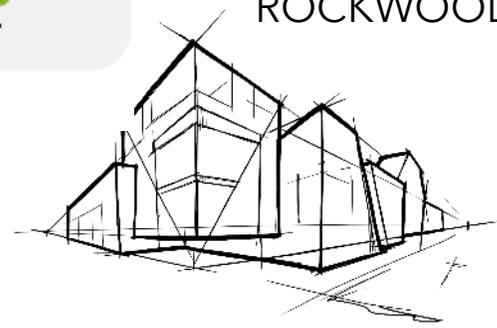


Transformacija zgrada u male elektrane

Anđelka Toto Ormuž, Voditeljica korporativnih poslova, ROCKWOOL Adriatic

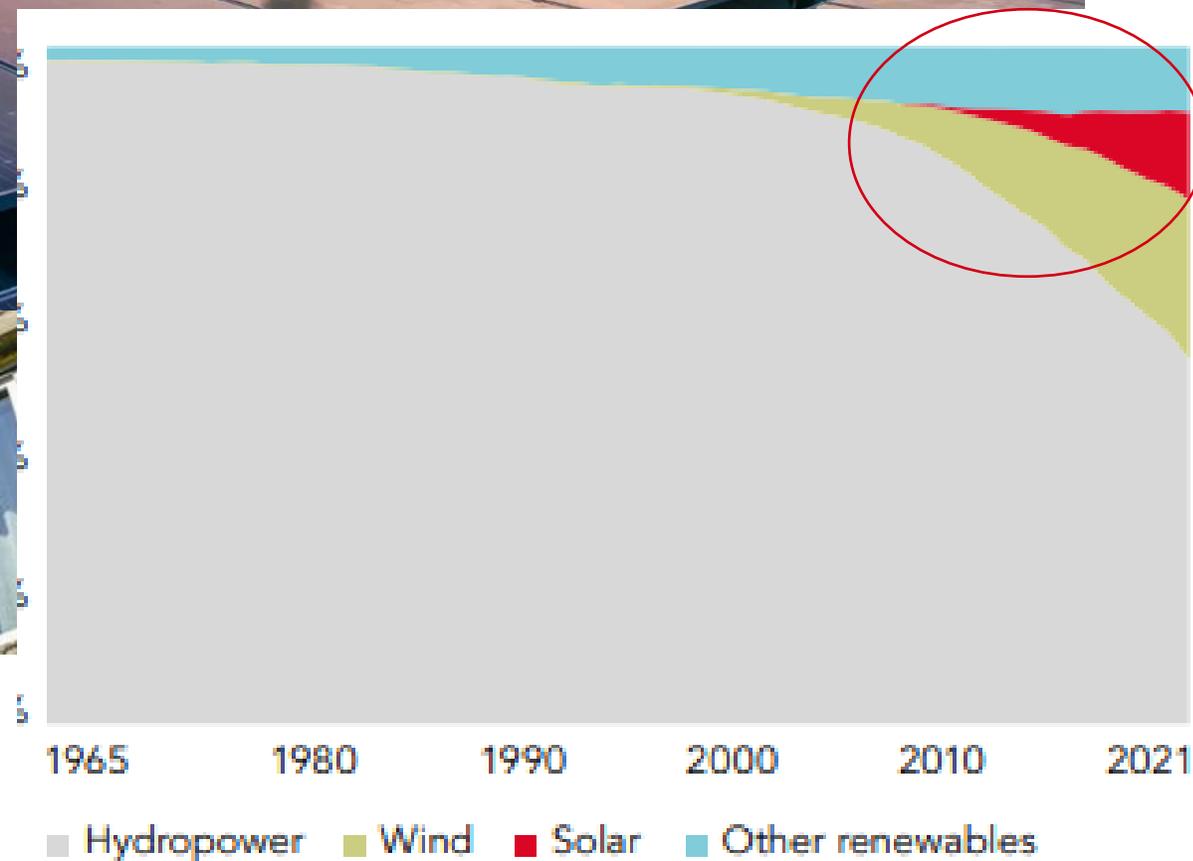


Najbolja tvornica kamene grupe na svijetu u Grupi



ROCKWOOL®

Energetska sigurnost jedan od najvećih izazova današnjice



Politička podrška - masovna upotreba PV panela na krovovima

Kao dio plana REPowerEU, Europska unija odredila je provedbu **solarne strategije** koja je sastavni dio **EPBD*** (Direktiva o energetske svojstvima zgrada) koja solarne panele na krovovima čini obveznim.

EPBD se mora prebaciti u zakone najkasnije do 05/2026.

To će rezultirati **neviđenom transformacijom europskog fonda zgrada** i **masovnom upotrebom tehnologije PV panela na krovovima**.

* EPBD - Energy Performance of Buildings Directive



Solarni paneli bit će obavezni na zgradama

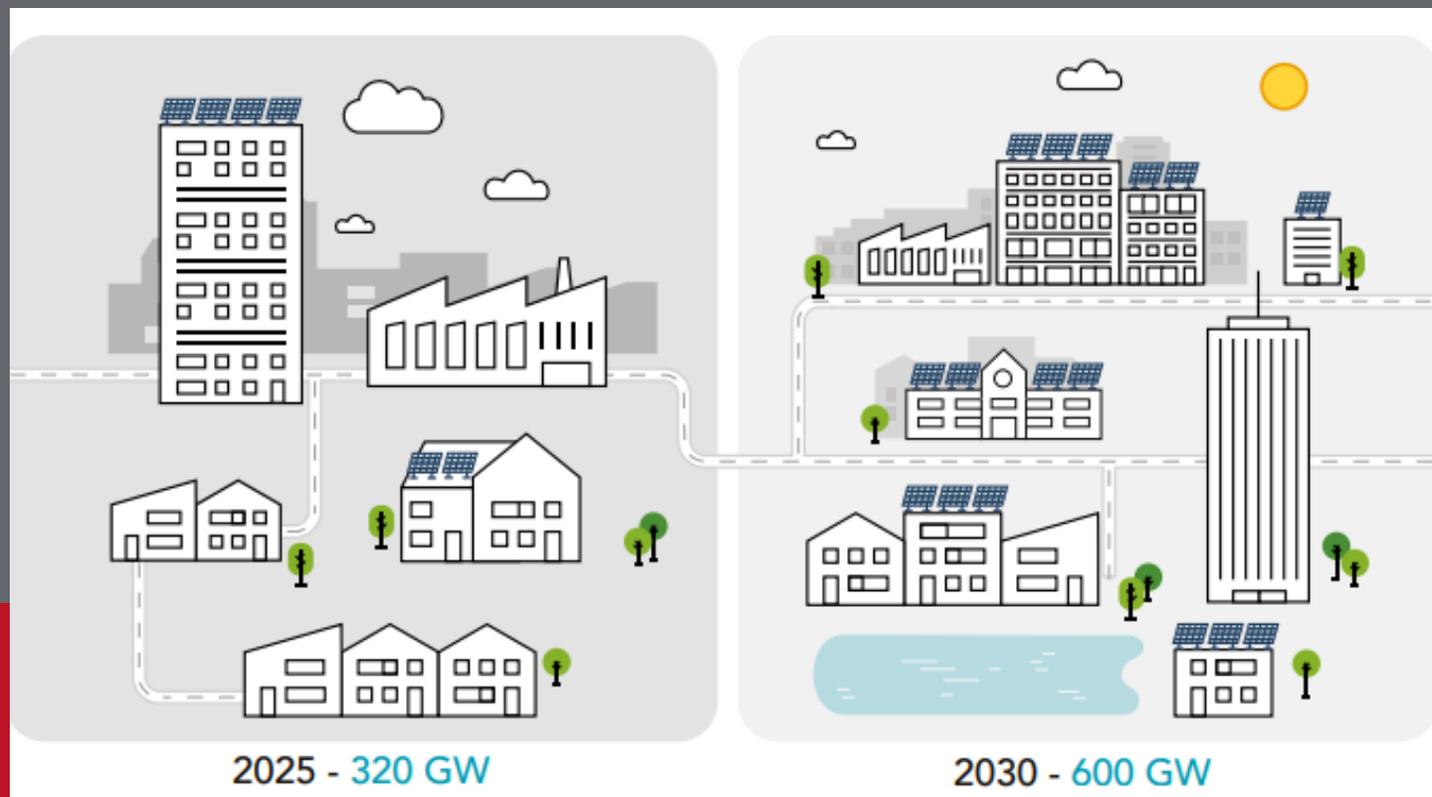
... ako je to tehnički prikladno te gospodarski i funkcionalno izvedivo:

- Na svim **novim javnim i nestambenim zgradama od 31.12.2026.** (korisnom podnom površinom >250m²)
- Na svim **postojećim javnim zgradama:**
 - >2000m² od 31.12.2027.
 - >750m² od 31.12.2028.
 - >250m² od 31.12.2030.
- Na svim **postojećim nestambenim zgradama (>500m²)** kod kojih se na zgradi vrši **velika obnova ili zahvat od 31.12.2027.**
- Na svim **novim stambenim zgradama i novim natkrivenim parkirališta** koja su fizički uz zgrade od **2030.**



Porast instalirane snage

- u Europi instalirani kapacitet iznosio je 136 GW 2020.
- 2025. iznosi 320 GW
- 2030. 600 GW



Jedan moderni nuklearni reaktor proizvodi 1,5 GW godišnje

Radi usporedbe, jedan moderni nuklearni reaktor proizvodi 1,5 GW godišnje.

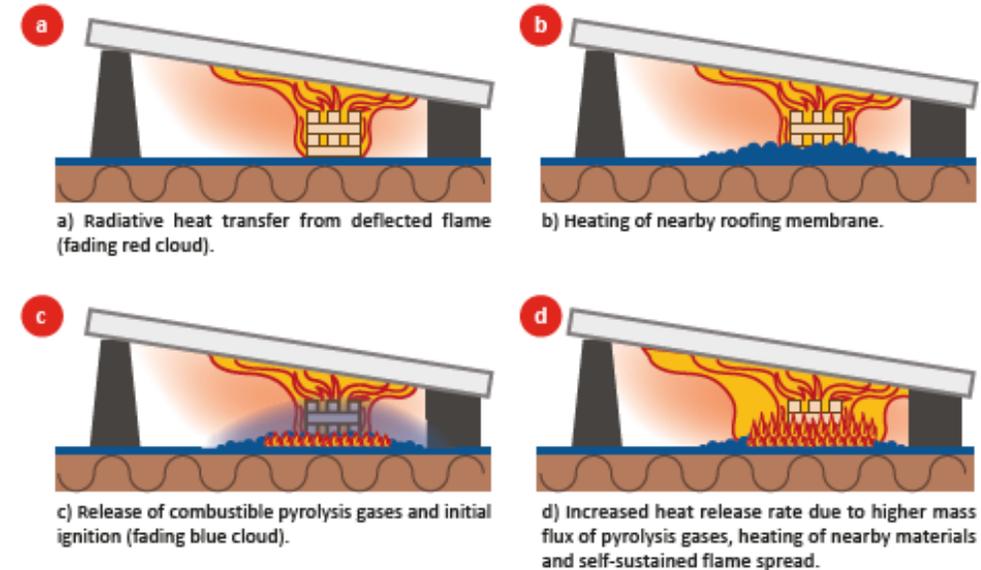
Koji su rizici povezani s krovnim solarnim panelima?

Nedavno je istraživanje Sveučilišta u Edinburghu ukazalo na:

- Solarni paneli mogu biti **izvor iskrenja** odnosno požara; pod naponom su, dio su sustava električne opreme.
- Kada je izvor požara ispod panela, oni mogu spriječiti širenje topline u atmosferu i **usmjeravati požar natrag na krovnu konstrukciju**.
- Požar se zbog toga može **brže širiti i biti intenzivniji**.
- Teško je ugasiti požar na solarnim panelima.
- Vatrogasci mogu imati problema s dolaskom do stvarnog požara budući da djelomično je prekriven panelima. Njihova vlastita sigurnost također može biti ugrožena kada nije moguće isključiti struju koju proizvode solarni paneli, povećavajući **opasnost od strujnog udara**.

Budući da se solarni paneli u mnogim zemljama ne smatraju dijelom građevinske konstrukcije, nisu uključeni u protupožarne propise za zgrade.

To također znači da ne postoje standardizirani testovi požara za solarne panele.



Jomaas Grunde, FISBSBE ERA direktor

Učestalost požara: 29 požara/GW/godišnje

2025.  9.280

2030.  17.400

REPowerEU presents big challenges with respect to PV fire safety



Grunde Jomaas

FISBSBE ERA Chair Holder
ZAG, Slovenia

REPowerEU is a European Commission proposal launched in May 2022 that "plan to make Europe independent from Russian fossil fuels well before 2030, in light of Russia's invasion of Ukraine." A recently completed PhD thesis at the University of Edinburgh by Jens Steemann Kristensen (now at DBI in Denmark) investigated fire safety aspects related to PV modules. The following reflects Jens' very relevant, high-quality research.

The global capacity of solar photovoltaic (PV) systems has increased exponentially over the last decade. In the built environment, PV systems are either building integrated PV (BIPV) or building applied PV (BAPV) systems. These range from domestic household installations of a few kilowatts (kW) to commercial installations with a production capacity measured in megawatts (MW).

The BAPVs are well suited for utilization on elevated roof constructions, especially on commercial flat roofs on warehouses and production facilities. However, PV systems in the built environment have been linked to fires, which is partly because the technology increases the probability of ignition and partly because BAPV systems can facilitate flame spread along the roof. A fault tree analysis based on all publicly available data established an annual frequency of 29 fires per gigawatt capacity, which, considering the Solar Initiative in the REPowerEU plan, predicts that there will be many fires related to PV systems in the coming years.

With the exponential growth of electricity produced by PV systems, fires caused by, or related to, BIPV or BAPV systems have gained some attention, mainly from the local or national media. However, the magnitude of the issue is currently in a state where only a few national fire and rescue services have some sort of databases of fires related to or caused by the system. In addition, some data sets based on media reports have been generated. The mentioned fault tree analysis found that 51% of the fires were caused by an electric failure of a component related to the PV system. Among these, the inverters, connectors, and isolators represented the most likely sources of ignition being responsible for respectively 11%, 12%, and 14% of all incidents. All three component types were prone to human errors as incorrect installation practice or assembly could lead to component failure and thus fire, which correspond well with a recent quantification of risks in PV systems published by the International Energy Agency. The remaining 49% of the fires were caused by an unknown component or an ignition source not related to the PV system. Thus, a significant reduction of the fire-related risk associated with PV-systems in the built environment cannot be achieved by a one-eyed focus on the PV-system's possible role as an ignition source. The reason is that the involvement of a PV system in a fire can modify the fire dynamics and facilitate flame spread. Consequently, a PV system should not be exonerated from the responsibility of fire propagation despite not being the initial cause of the fire. There is therefore a need for research on how to reduce both the number of fires as well as the consequences of eventual fires.

As an example of research work related to fire consequences associated with PV installations, experiments carried out with BAPV systems have established that roofing membranes that prevent spread without the presence of PV modules burn readily with PV modules present. The spread is typically limited to the area below the PV modules, which further supports that the PV modules in fact are facilitating fire spread. Laboratory experiments also found that there is a critical gap height between PV modules and the combustible top layer of the roof. That is, if the PV modules were placed sufficiently far from the roof, the PV modules did not

facilitate fire spread. Note that sufficiently far here could be as little as a few cm higher than a gap height that resulted in fast fire growth. It was also shown that inclined PV modules result in faster spread. Overall, it has been deemed essential to test PV systems with the materials of the roof or wall present, as testing the PV modules (BAPV or BIPV) in isolation is a non-conservative approach.

Given that there are significant challenges related to fire safety of PV systems in the built environment, there are some concerns related to the REPowerEU plan. The Solar Initiative part of the program aims to enable rapid acceleration of PV systems in the built environment by doubling the current capacity to 320 GW before 2025 and to about 600 GW by 2030. The European Commission plans to accelerate the implementation by limiting the length of the permission process for PV installation to three months, by adopting provisions to ensure that all new buildings are "solar ready", and by making rooftop solar energy compulsory for all new public and commercial buildings by 2025, and all existing public and commercial buildings by 2027 if the roof have a useful floor area above 250 m². In addition, solar PV should be installed on all new residential buildings by 2029.

When putting that in context of the study on frequency of fires (29 fires/GW/year installed), which was supported in large part by data from Italy in the period from 2009 to 2015, many fires are to be expected with the implementation of the Solar Initiative. In fact, by simple multiplication, a rough estimate of the number of PV related fires in the EU are 9,280 fires in 2025 and 17,400 fires in 2030. Given the speed that REPowerEU will lead to for the installation, this frequency number might even be conservative. A further concern is that this requirement will apply to all buildings, and there is very limited data and experimental knowledge for PV systems installed on, for example, timber buildings.

In summary, there is a need for fire research and the new standards related to fire safety of PV installations, and this should be funded immediately, as the problem is already significant and is expected to increase. Fire safety of PV modules on buildings needs further studies to ensure that the Solar Initiative of the REPowerEU plan becomes sustainable.

We The Curious - Museum Building, Bristol England, 2022



Summary of reports:

- A major fire broke out at a on 9th of April 2022 at the Bristol museum.
- Fire fighters arriving on site had reported that they found the flames coming from the solar panels on the roof.
- All occupants were safely evacuated by the police and firefighters reported that nobody was in any danger inside the building.
- Fire spread on the roof until it was successfully extinguished by the fire service. The limited damage to the building is due to early intervention.
- Investigators say that the fire started in the building's solar panel system which was installed in 2011. It was reported that a group of birds damaged one of the cells and the panel started the fire.

Articles:

<https://www.itv.com/news/westcountry/2022-04-11/drone-shows-moment-solar-panel-fire-takes-hold-at-we-the-curious-in-bristol>

<https://www.bbc.com/news/uk-england-bristol-61057777>

<https://www.bristolpost.co.uk/news/bristol-news/bristol-fire-solar-panels-caused-6930484>

<https://www.somersetlive.co.uk/news/local-news/curious-fire-solar-panels-were-6930339>

Link to video:

<https://www.itv.com/news/westcountry/2022-04-11/drone-shows-moment-solar-panel-fire-takes-hold-at-we-the-curious-in-bristol>

<https://www.youtube.com/watch?v=2VrNPRW800>



Amazon - Warehouse, Fresno USA, 2020



Summary of reports:

- 220 solar panels and other equipment were damaged in a fire at an Amazon warehouse in Fresno, California.
- It was reported that the fire was caused by “an undetermined electrical event within the solar system mounted on top of the roof”.
- Dozens of firefighters were required to extinguish the fire.
- Reports indicate that between April 2020 and June 2021 Amazon experienced at least six of its 47 North American sites with solar installations, affecting 12.7% of such facilities.
- Reports indicate that Amazon decided to power off all onsite solar installations in North America and initiate inspections of all installations.

Articles:

<https://www.cnbc.com/2022/09/01/amazon-took-solar-rooftops-offline-last-year-after-fires-explosions.html>

<https://www.foxbusiness.com/technology/amazon-temporarily-shuts-down-solar-rooftops-facilities-fires>

<https://www.bdcnetwork.com/fires-amazon-warehouse-roofs-seemingly-caused-faulty-pv-installations>

<https://www.pv-magazine.com/2021/06/11/amazon-warehouse-fire-linked-to-solar-installation/>

<https://www.insiderintelligence.com/content/amazon-warehouses-rooftop-solar-fires-signal-threat-renewable-energy>

<https://eandt.theiet.org/content/articles/2022/09/amazon-switched-off-its-solar-rooftops-after-fires-report-says/>

Link to video:

<https://www.youtube.com/watch?v=1tay5dhaLgU>



**Mi imamo
rješenje kako bi
zelena tranzicija
uspjela i kako bi
bila provedena na
siguran način.**



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- Tlačna čvrstoća pri 10% deformaciji
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- Reakcija na požar

ROCKWOOL
negoriva izolacija
od kamene vune
prirodan je izbor
za ravne krovove
sa solarnim
panelima



Zgrade trebaju
biti ne samo
energetski
učinkovite,
ugodne za
stanovanje već i
sigurne za ljude.





VIDEO



Hvala na pažnji!