



ZAG

ZAVOD ZA
GRADBENIŠTVO
SLOVENIJE

SLOVENIAN
NATIONAL BUILDING
AND CIVIL ENGINEERING
INSTITUTE

Research and Policies – How Slovenia Contributes to Safety and Sustainability

Dr Aleš Žnidarič, Director

Brussels, 23. 5. 2023

Slovenia

- centrally located, bordered by Italy, Austria, Hungary, and Croatia
- area of 20,273 km²
- population 2.1 million
- small size deficiency and advantage



What is ZAG?

- leading Slovenian institute in the field of construction
- impartial, independent & non-profit organisation
- public research institute
- 74-year tradition
- 245 employees, $\frac{3}{4}$ with university degree, 70 doctors
- research : market activities 47 : 53 %



AUSTRIA



LEGEND	
	Highways (vignettes required)
	Local roads
	Highways in construction

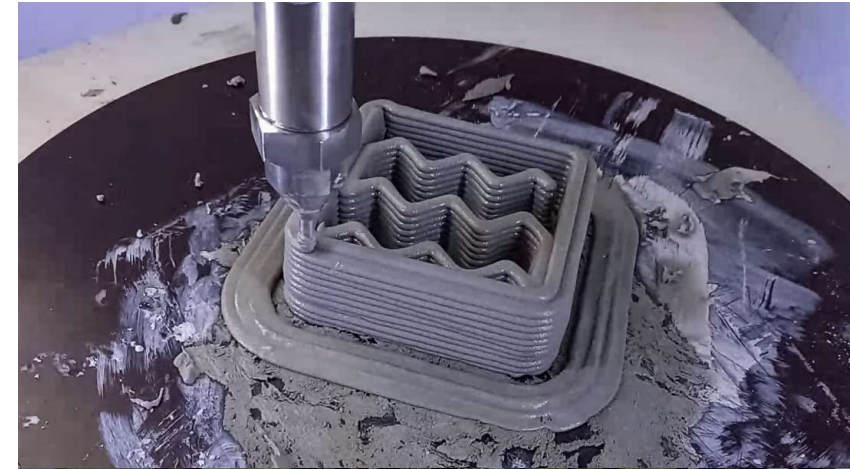
ITA





Research cooperation

- member of 50+ international associations, currently presiding FEHRL
- in over 250 EU funded R&D projects
- in >80 R&D projects, $\frac{2}{3}$ international
- 6th SI institution after drawing funds from Horizon 2020
- well-maintained research infrastructure



Completed and ongoing fire safety projects in the EU

- FIEP – Fire Information Exchange Platform (hosted by Efectis)
- FRISSBE – Fire-safe Sustainable Built Environment (hosted by ZAG)
- EU FireStat (PI: Efectis (big consortium, Jomaas participated))
- JRC report on Performance-based design in Fire Safety Engineering
- Facades – new test standard development with round robin experiments (PI: RISE)

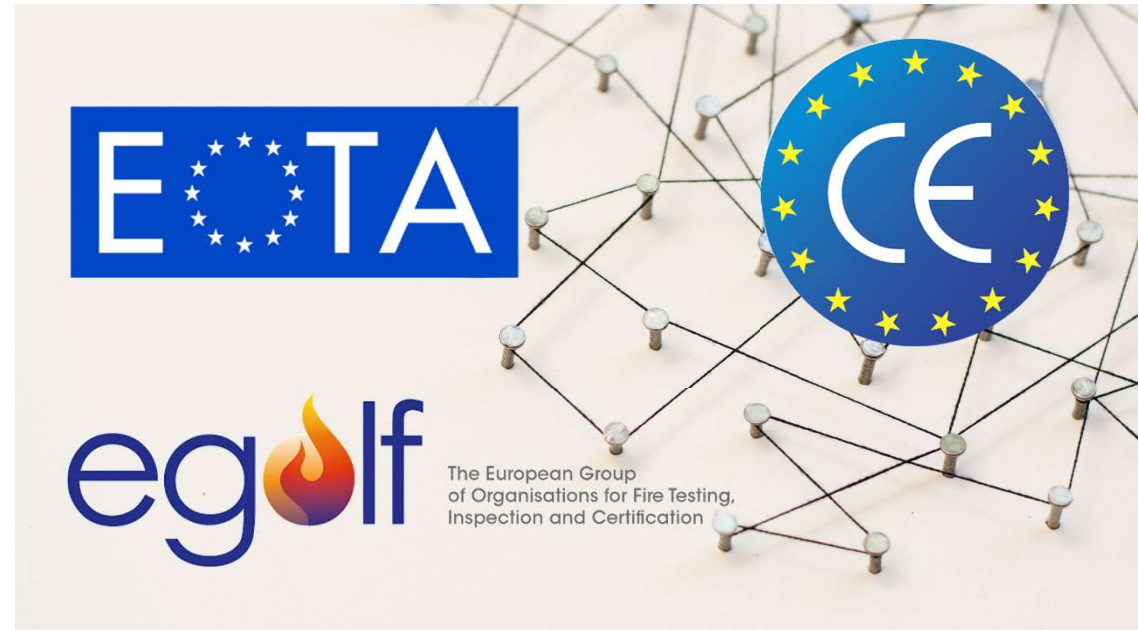
FRISSBE EraChair

- EraChair focus on increase of RTD capacity and institutional changes
- 2021-2026, 2.5 M€
- focus on fire-safe sustainable built environment
- leader prof. Jomaas, 2 senior researchers, 3 PhDs, 6 post-docs
- internationalization of ZAG



Policies

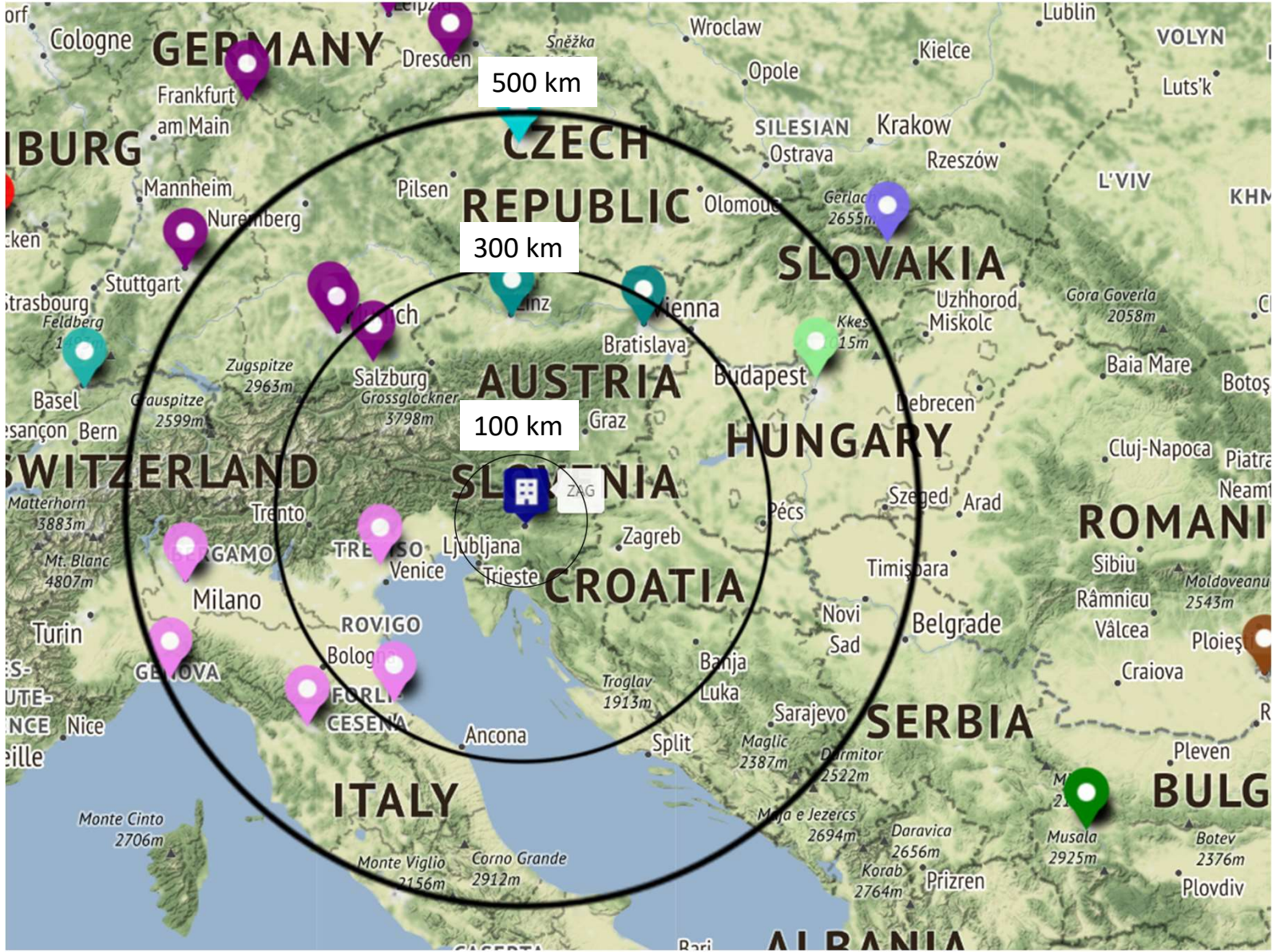
- Slovenia is small, but active
- professional groups, influencing fire safety:
 - EGOLF (European Group of Organisations for Fire Testing, Inspection & Certification)
 - GNB SH02 (Group of notified bodies, fire sector group for construction products)
 - EOTA (European organization for technical assessments):
 - PT4 Fire related project team
 - PT12 Sustainability



EGOLF members



EGOLF Laboratories around ZAG



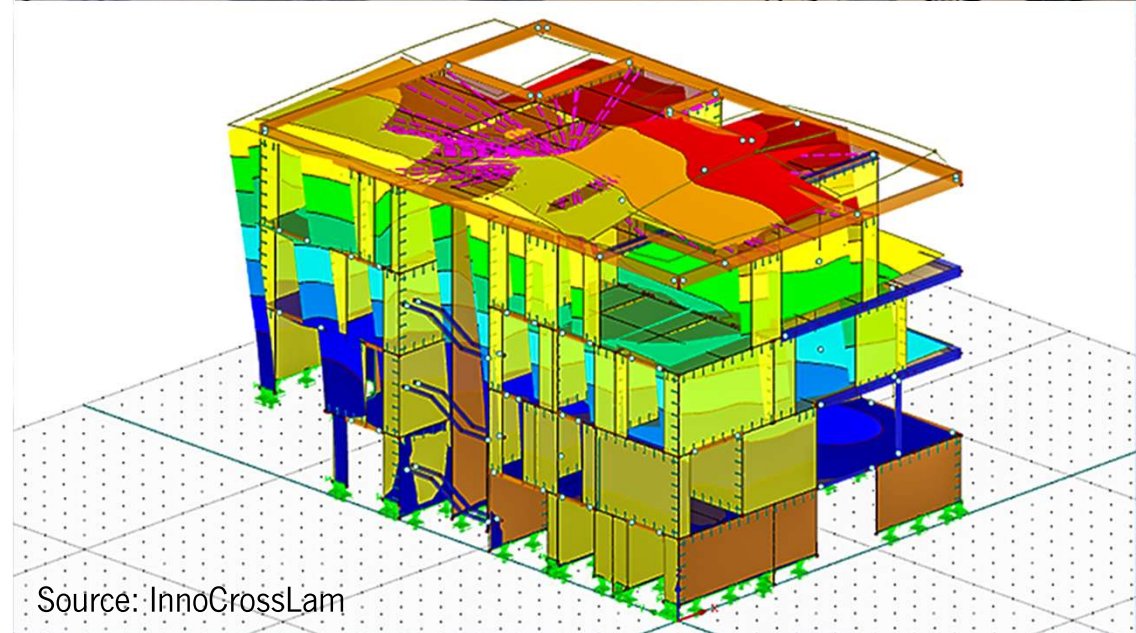
Sustainability

- substantial natural resources:
 - 3rd most forested country in Europe
 - 38% of Natura 2000 area, highest in Europe
 - care for biodiversity
- large support for biobased construction
- industry active in prefabricated houses
- desire and support:
 - to expand buildings in all dimensions
 - for smart sustainable construction
- project Home24 – negative carbon zero energy (off the grid) building



Renewable sources

- promoted and employed:
 - batteries
 - EVs
 - PV
 - advanced super insulating glazing
 - new materials (densified & mineralised wood)
- but,
 - much less done in safety area, except on earthquake resistance
 - fire safety needs additional efforts



Source: InnoCrossLam

Efforts

- academic:
 - EU financed research
 - integration of fire topics in national projects
- promoting wood and CE
- development of materials with enhanced fire properties:
 - densified wood
 - mineralized wood



Efforts

- understanding importance of safety:
 - Innorenew Twinning
 - FRISSBE ERA Chair
- knowledge transfer to firefighters' communities and to policy makers
- increase of research activities and strengthening interinstitutional work



New fire laboratory





Ambition

Place fire research
at ZAG and in SI
on the world map
and improve fire
safety in Slovenia
and beyond



- one of the few
- furnaces for up to 4x8 m test samples
- 1-cm to natural scale
- 11 M€ investment
- EraChair FRISSBE

Fire laboratory overview



Modular furnaces



Hoods with high fidelity exhaust measurements

Some of the challenges

1. Decarbonisation through renewable energy in the built environment

- PV Solar
- Batteries
- ESS

2. Renovation and repurposing

- Facades and insulation
- Modular construction (MMC)
- Timber

3. Health and toxicity

- Firefighter toxicity and cancer
- Fires are more lethal than before (NFPA)
- Flame retardants cannot meet circular economy requirements

4. Transport and infrastructure

- Hydrogen
- Batteries



**RepowerEU – PV on all new office buildings from 2025 and
all new houses from 2029**



PV on All Buildings: Applauded by authorities and PV system providers

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Research

by Birgitte Messerschmidt



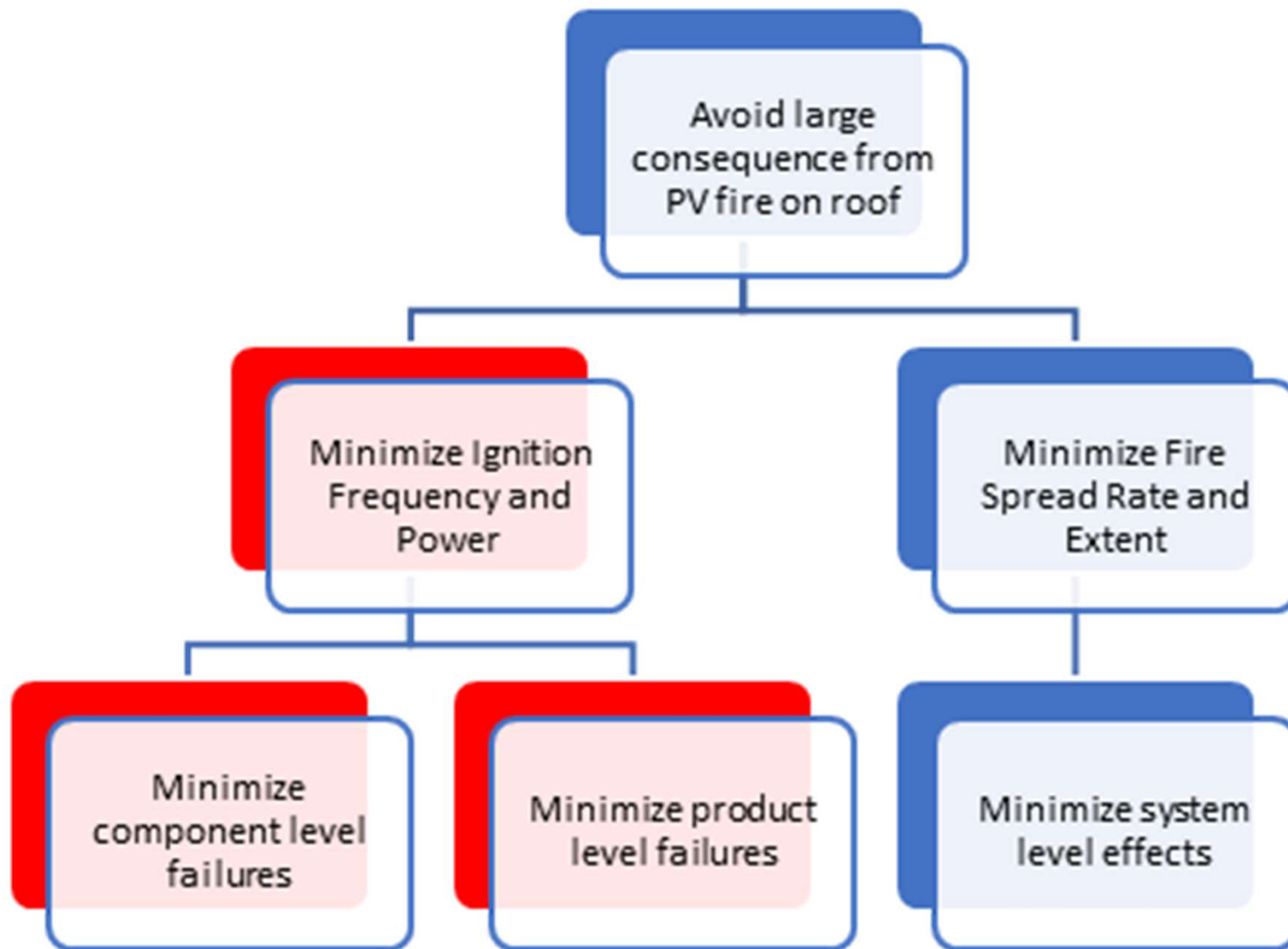
THE GLOBAL VIEW ON FIRE RESEARCH

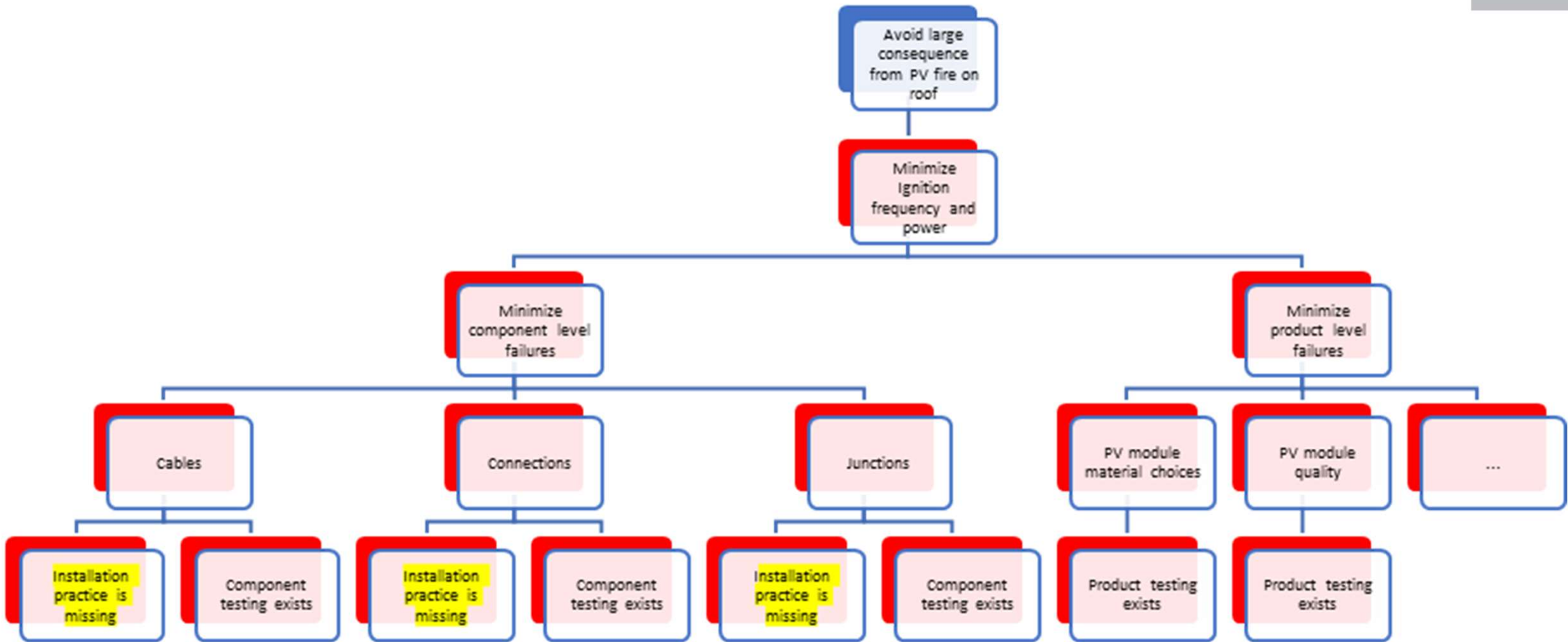


Author(s): Birgitte Messerschmidt. Published on May 2, 2023.

More Power, More Problems?

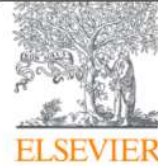
A new European Union rule requiring solar panels on rooftops will transform buildings across Europe—and present a host of new safety challenges





Expected fires (29 fires/GW)

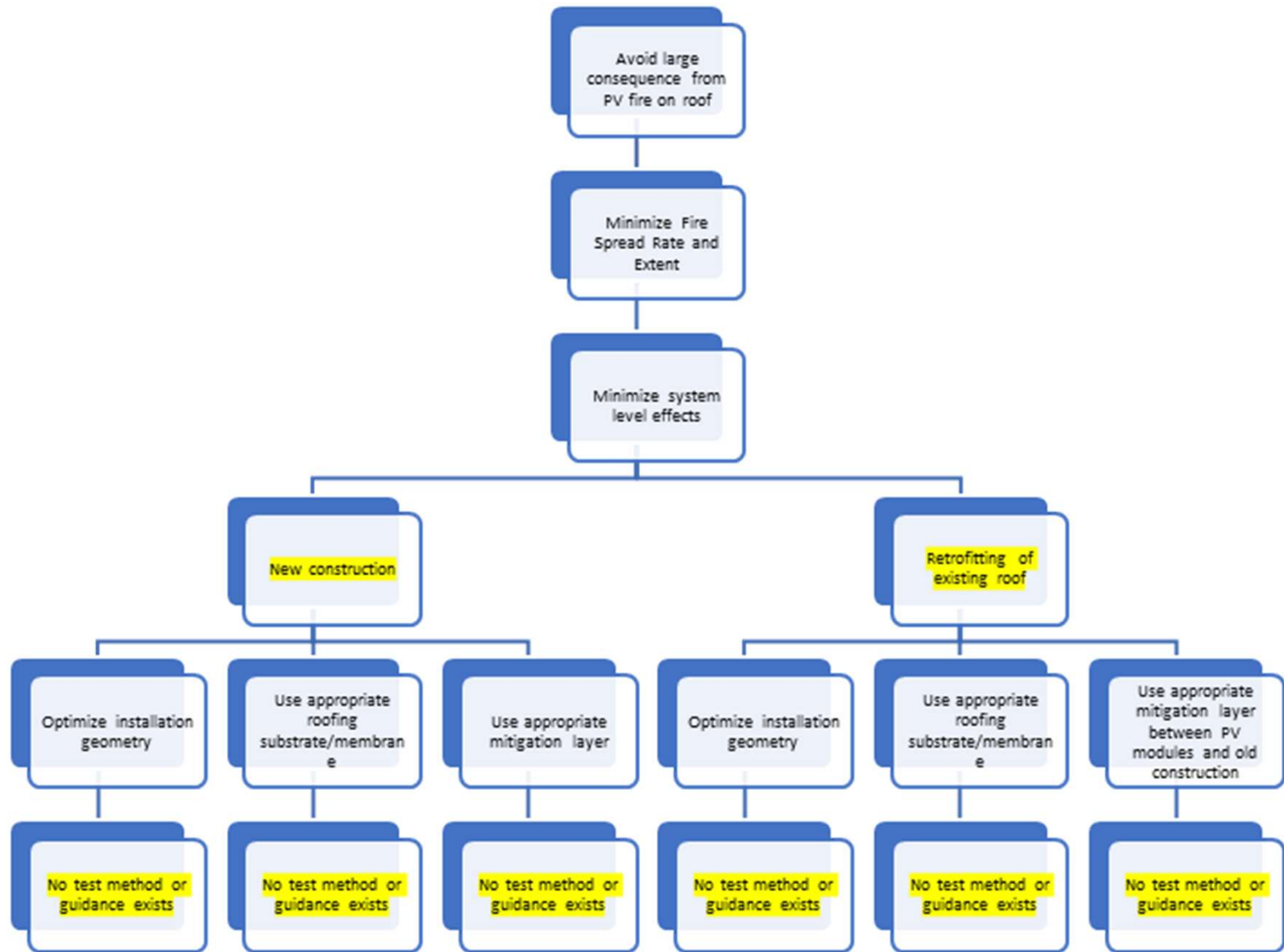
- 9,280 fires in 2025 (EU)
- 17,400 fires in 2030 (EU)
- 900,000 – 2,000,000 fires worldwide in 2050



Fault tree analysis of fires on rooftops with photovoltaic systems

Nur Aliah Fatin Mohd Nizam Ong ^a, Muhammad Adnan Sadiq ^a, Mohamad Syazarudin Md Said ^a, Grunde Jomaas ^b, Mohd Zahirasri Mohd Tohir ^a ✉, Jens Steemann Kristensen ^{b, c}

^a Safety Engineering Interest Group (SEIG), Department of Chemical and Environmental Engineering, Faculty of Engineering, Universiti Putra Malaysia, 43400, Serdang, Selangor, Malaysia



ASKO building, Norway



2588 PV modules on 13 000 m² – 20 Million Euros loss



ASKO building, Norway

ZAG

10 000 m² damage



ASKO building, Norway

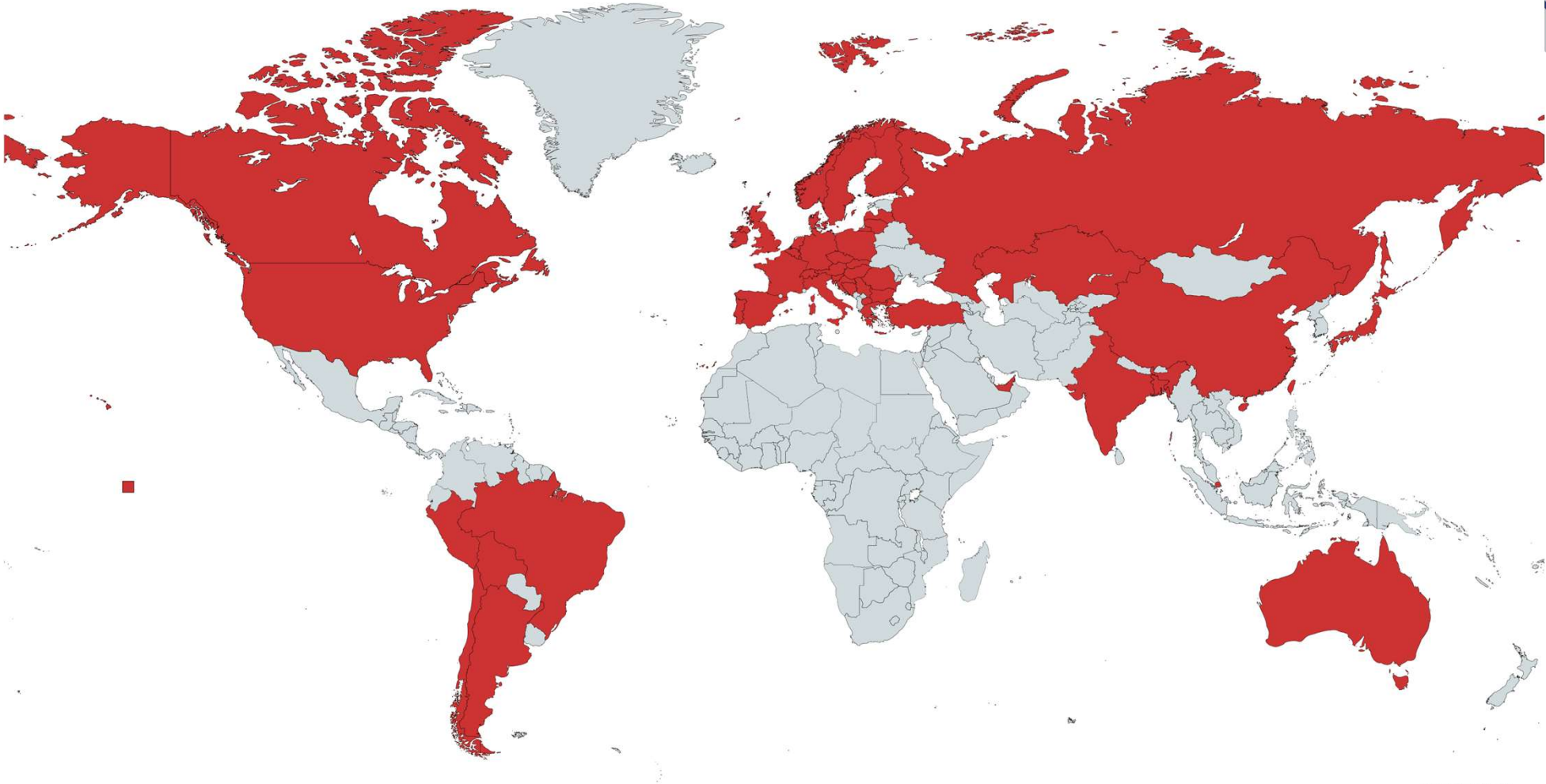
- Additional 20 million Euros related to due to business interruption, partially due to the massive use of water and the materials involved





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Created with mapchart.net



SAVE-THE-DATE

SYMPOSIUM

on Fire Safety & Sustainability

29 & 30 Nov 2023

Ljubljana, SLOVENIA



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