

Comparison of United States Fire Events

A high-level perspective of US fire events in the NEA/OECD
FIRE Database and EPRI's Fire Events Database



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Nuclear-Specific Fire Experience Databases

- **OECD/NEA FIRE Database**

- US NRC reports fire events occurring within the United States that result in either a Licensee Event Report, Event Notification, or loss control

- **EPRI Fire Events Database (FEDB)**

- Contains fire events occurring within the United States of varying severity

Data Streams

- US entries into OECD/NEA FIRE Database

| 1981-1989 | 1990-1999 | 2000-2009 | 2010-2019 | 2020-2023 |
|--|-----------|-----------|-----------|-----------|
| NRC collected fire-related Event Notifications, Licensee Event Reports, and loss control | | | | |

- EPRI FEDB

| 1980-1989 | 1990-1999 | 2000-2009 | 2010-2019 |
|-------------------------------|--|--|---|
| Periodic voluntary collection | Periodic voluntary collection (and supplemented by NRC additions to database as preparing for NUREG/CR-6850) | Industry/EPRI/ NRC effort to review plant reports (condition /CAP/fire) and add into EPRI database Note: Not all US plants completed this process | Fire reports submitted to Institute for Nuclear Power Operations (INPO) IRIS database |

NRC Reporting to OECD/NEA FIRE Database

- LER

- Any event that posed an actual threat to the safety of the nuclear power plant or significantly hampered site personnel in the performance of duties necessary for the safe operation of the NPP including fires, toxic gas release, rad release...

- EN

- Event or situation related to the health and safety of the public or onsite personnel, or protection of the environment

- NEIL – Loss Control

- Fire involving activation or malfunction of fixed fire extinguishing or detection systems
- Physical damage loss greater than \$100,000

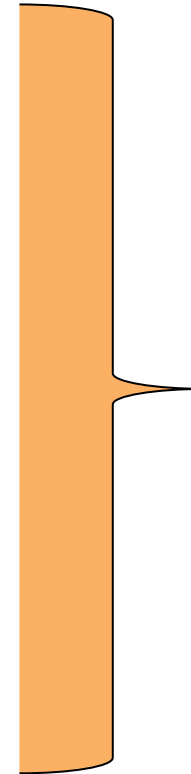
EPRI FEDB Data Sources

- NEIL Fire Incidents*
- LERs or Event Notifications*
- Plant Fire Incident Reports (most prevalent for 2000-2009, but also prior experience)
 - Data source considered the most complete and principal data source for updated FEDB
 - Multi-step process to obtain “real” fires
 - Keyword search and high-level details provided to EPRI
 - EPRI/NRC screening
 - Full reports for likely fires
 - Then screening for fire PRA applicability

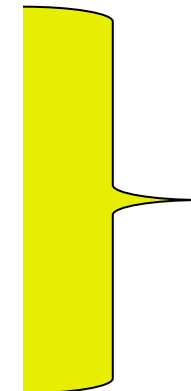
*same as US reporting to OECD Fire Database

Data Sources – Impacts

- Licensee Event Reports
 - Fire that causes an automatic or manual protective system activation (reactor trip, SCRAM/ ECCS)
- Event Notifications
 - Fire lasting greater than 15 minutes
 - Fire damage
 - Safety system actuation
 - Reactor trip
 - Equipment failure
- Plant fire reports
 - Visible flaming, evidence of prior flaming/charring
 - Use of manual fire suppression activities
 - Arcing or arc flash



Likely to capture the more severe fire events



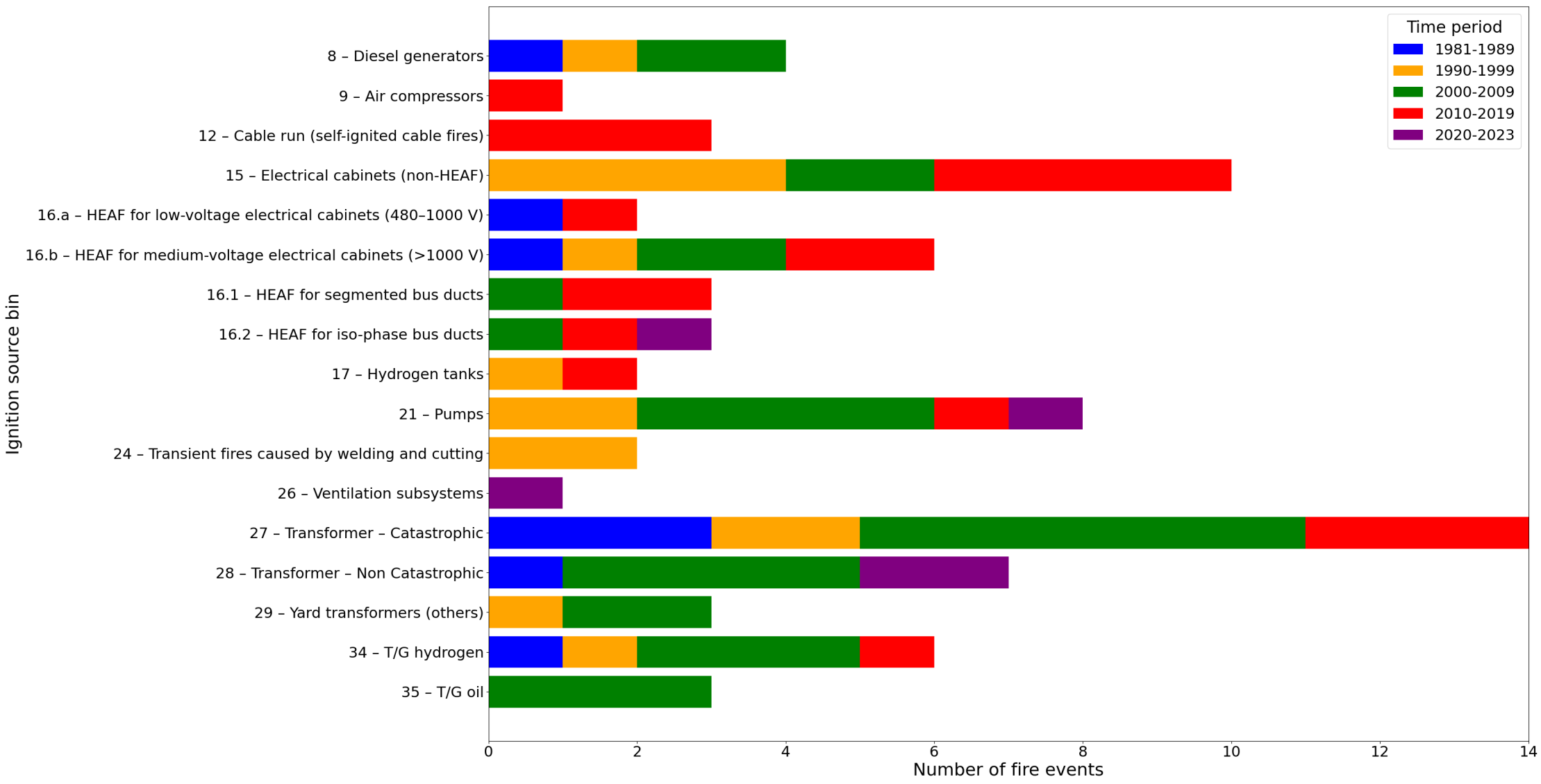
Likely to capture a range of fire effects and the more common / smaller fires

US Fire Events Reported to OECD/NEA FIRE Database

- 81 fire events
 - 1981-2023

| | 1981-1989 | 1990-1999 | 2000-2009 | 2010-2019 | 2020-2023 |
|------------------|-----------|-----------|-----------|-----------|-----------|
| # of fire events | 7 | 15 | 33 | 21 | 5 |

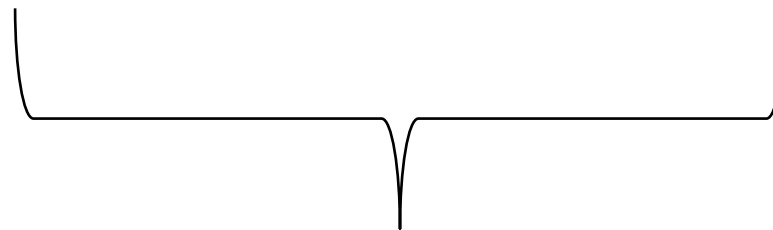
NRC Reported US Fire Data from OECD/NEA FIRE Visualized



EPRI FEDB (US fire events)

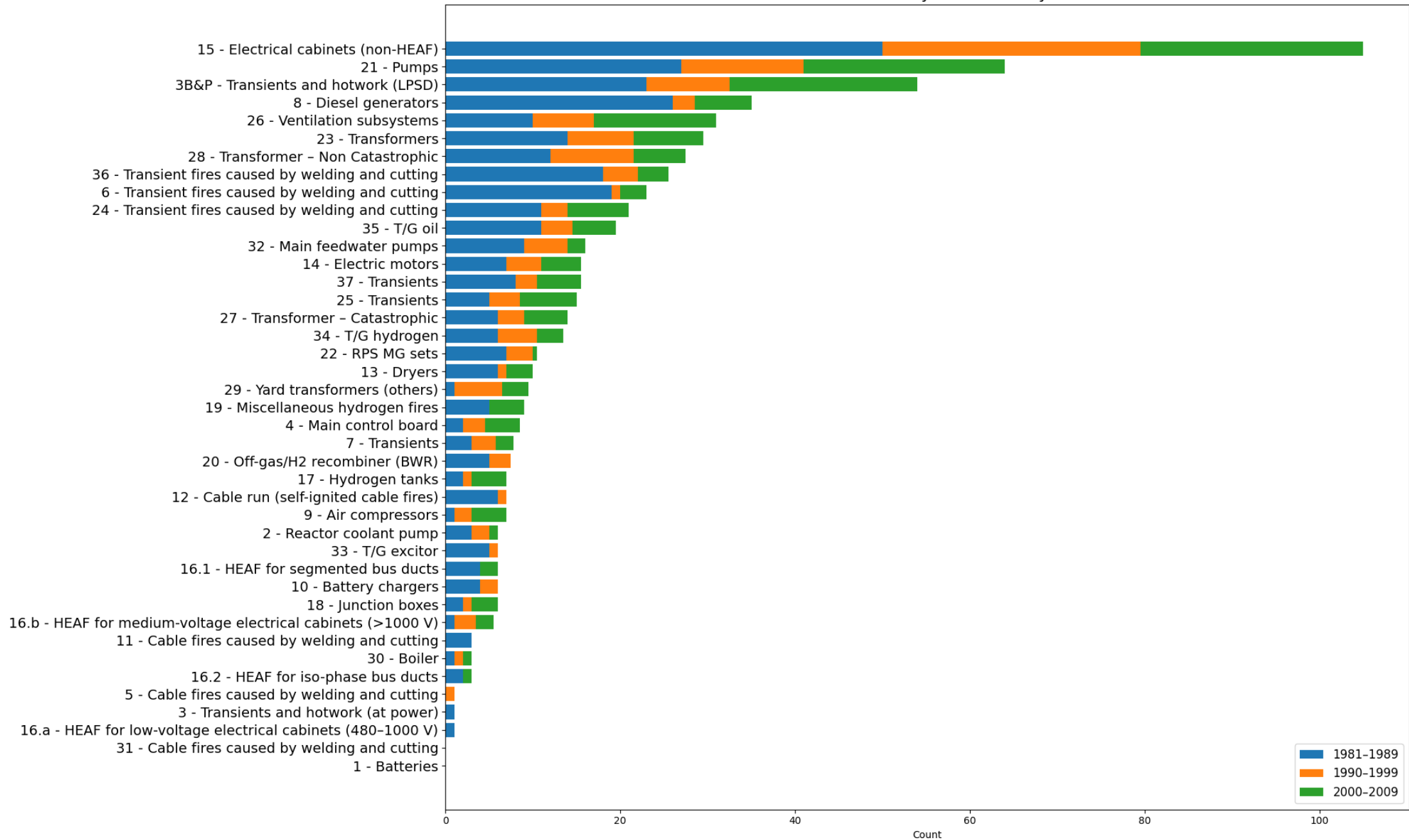
- Around 800 events from 1981-2009
- 219 events from 2010-2019
- Fire events from 2020-current are set to be classified in a near term EPRI/NRC future activity

| | 1981-1989 | 1990-1999 | 2000-2009 | 2010-2019 | 2020-2023 |
|-------------|-----------|-----------|-----------|-----------|-----------|
| # of events | 7 | 15 | 33 | 21 | 5 |
| EPRI FEDB | 327 | 206 | 247 | 219 | N/A |



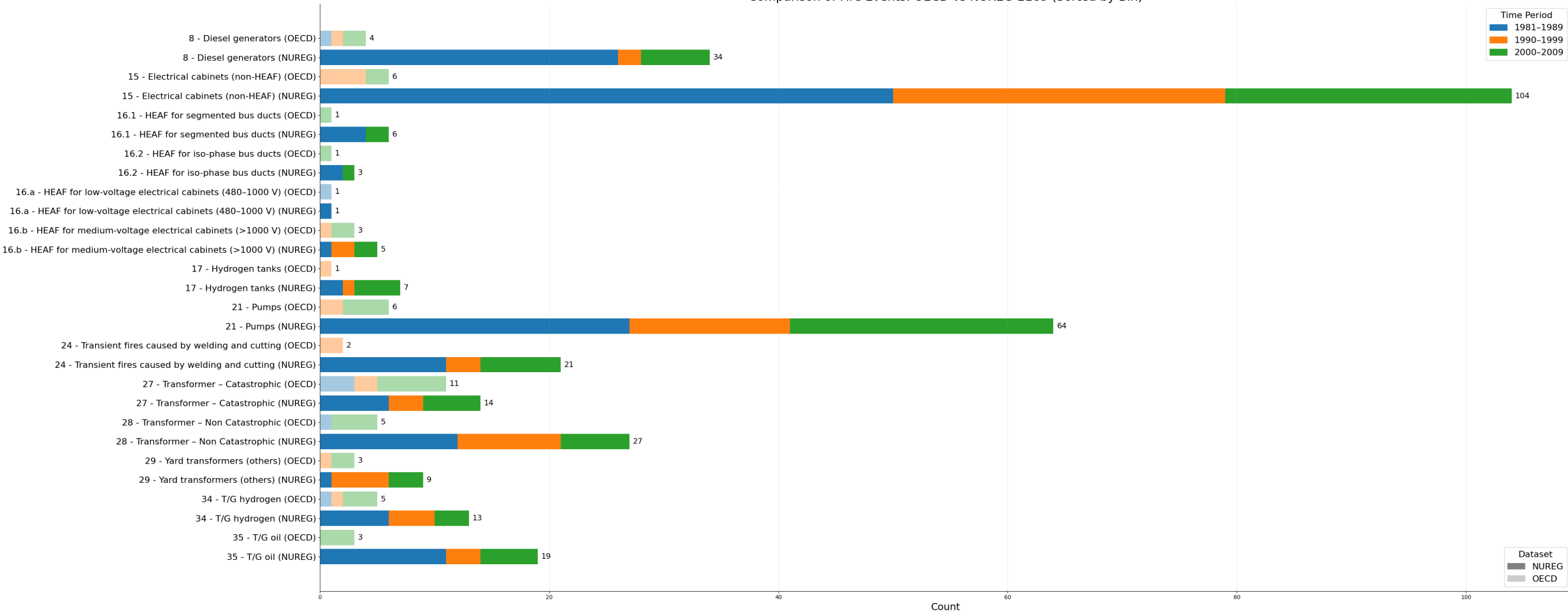
Focus of comparison

NUREG-2169 Fire Events by Bin: Sorted by Total Count



Comparison of US Fire Events from 1981-2009 (NRC reported versus NUREG)

Comparison of Fire Events: OECD vs NUREG-2169 (Sorted by Bin)



Summary

- Fire events added to OECD/NEA FIRE typically include:
 - High-hazard sources (e.g., oil)
 - Explosion (hydrogen, HEAF, catastrophic yard transformer)
 - Equipment likely to lead to a reactor trip (T/G related fires, electrical distribution equipment, yard transformers)
- Due to reporting differences, only 10% of the countable fires in the US are included (reported by NRC) in the OECD/NEA FIRE Database
 - These fires typically represent the larger fires that are valuable for sharing risk / experience insights and information sharing

Summary (continued)

- The NRC has recently initiated a change to the reporting criteria for the OECD database to better reflect the need to capture events specifically important / shareable insights rather than simply “large events”
- Added reporting criteria
 - “Any event that was deemed to be Challenging per the definitions of NUREG-2169 or if the National Coordinator identifies a fire event that illustrates notable PRA risk insights, they may use their discretion to enter the event into the database”
- The intention of broadening the reporting criteria is to capture fire events that were challenging in nature and have PRA insights that can benefit the international community through discussions and lessons learned.



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