



Fire risk under ropeways – a new approach to fly over difficulties

Thibault Chatelus
STRMTG
Sec. Committee VI

2010s : emergence of urban ropeway projects in France



- Update of FR regulations in 2016 : need for a specific safety analysis on fire risk, not many precisions on how to consider risk generated under the line
- European standard EN 17064:2019, same level of precision

2019 → 2022 : more complex ropeway projects in France

- Urban projects :
 - various situations
 - various ways to handle them
- Emergence of « intermediate » projects like « valley lifts »
- More complex discussions on some mountain projects



Example of tricky subject : going over roads

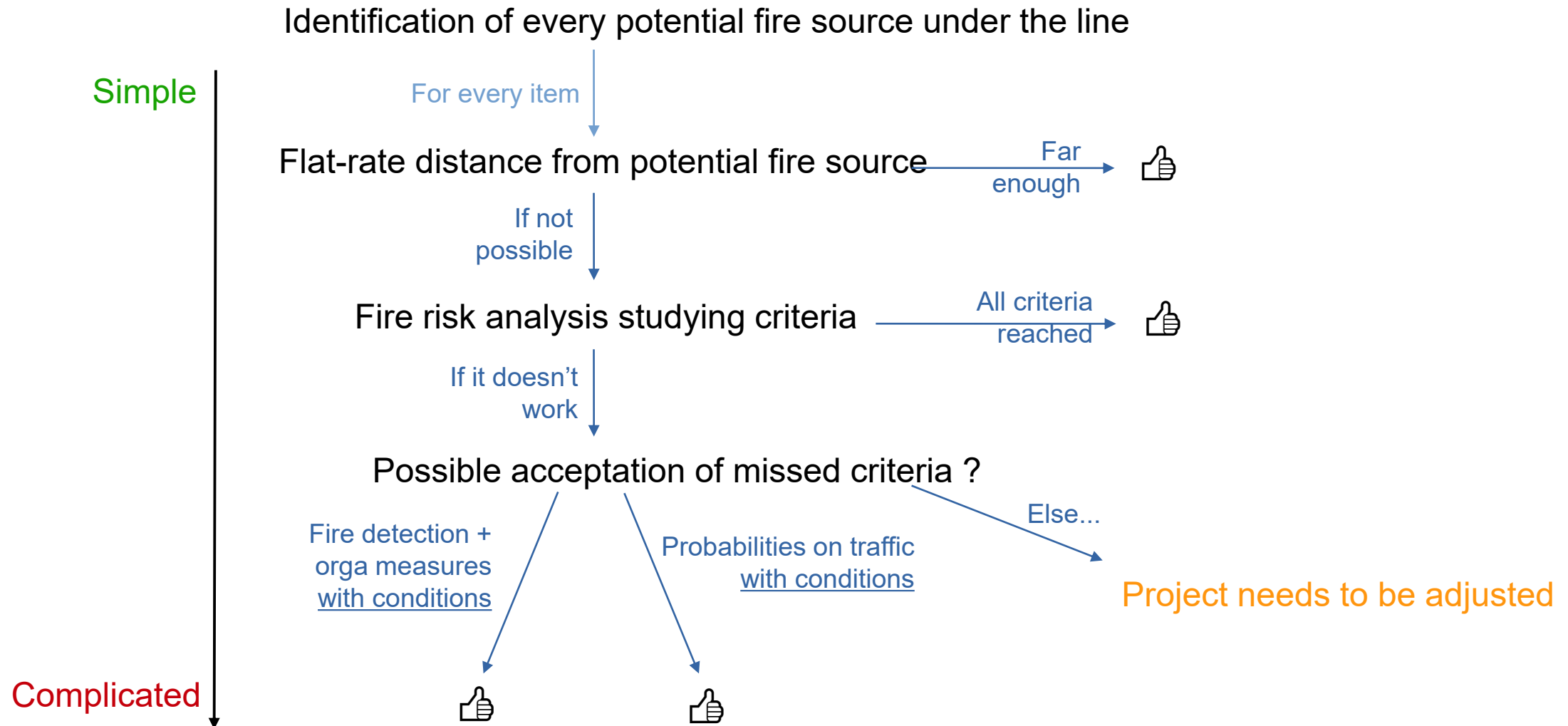
- How high should ropeways go over roads ?
- What are the criteria to be met ?
- What if they are not reached ?
- Should there always be fire detection ?
- Can we accept that low traffic = acceptable risk ? How low ?
- Can we reason differently / types of vehicles ? How far can we « trust » respect of traffic bans ?



Defining a shared and guided approach

- Working group associating french professionals in 2022
 - Update of french regulations, in application since late 2023
- Convergence with many dispositions of european standard EN 17064:2019
- Precisions on acceptable methods to cover the risk :
 - Same discussions we had already had on some projects separately...
 - ...but definition of clearer rules for all projects
- Convergence of approaches urban / mountain

Defining a shared and guided approach



Flat rate distances – vegetation

1) Simple case / existing rule :

path clear of vegetation on envelope space + 1,5m



Flat rate distances – vegetation

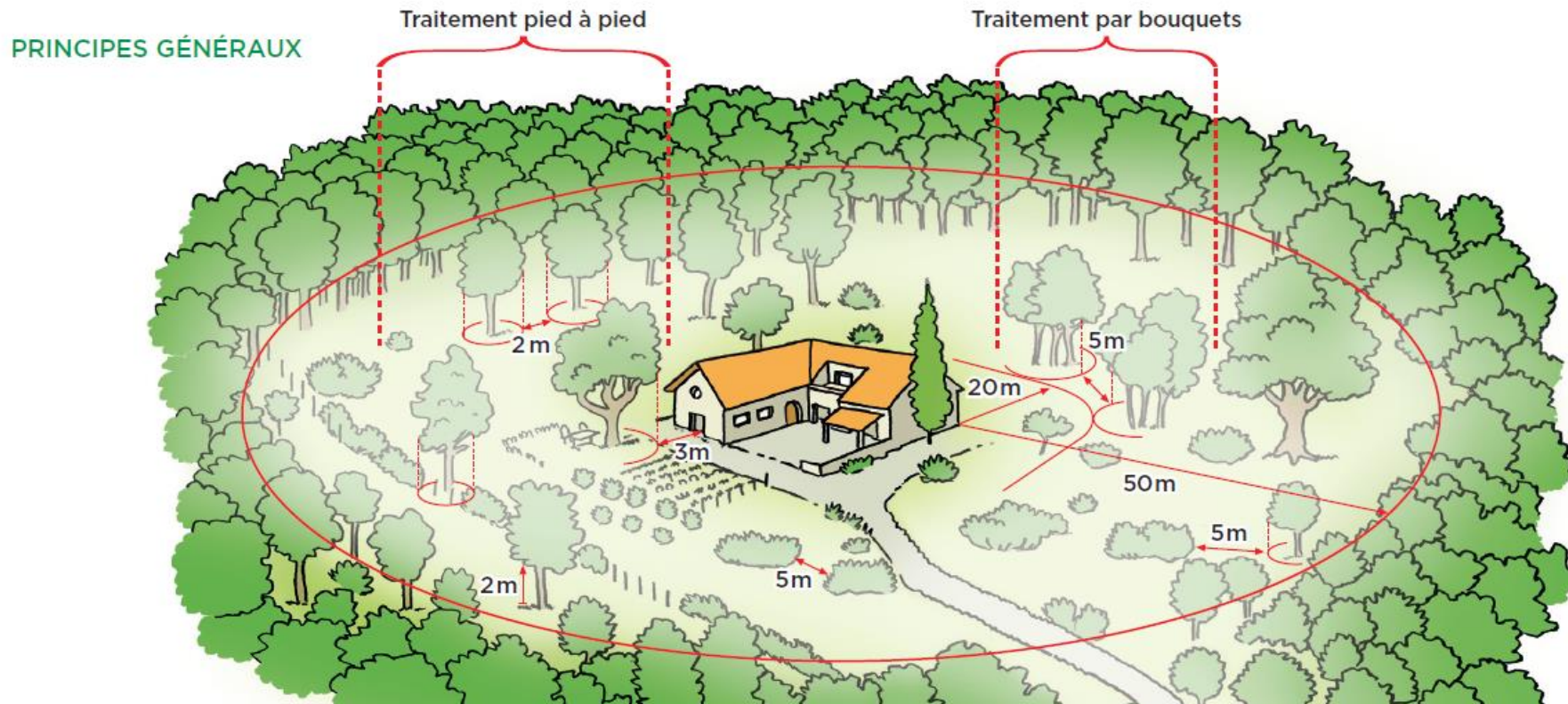
2) Other simple case /
existing rule :
>30m above vegetation



Flat rate distances – vegetation

3) New complicated cases after discussions / specific project realities !

>2,5m above aligned trees or groups of trees, with respect of dispositions for brush clearance



Credit : DDTM 13

Flat rate distances – buildings

>16m
vehicle



>20m
rope

Flat rate distances – other transports

Flat rate values based on static thermal flow calculations with margin

<i>Vehicle categories</i>	 <i>Ropeway with cabins</i>	 <i>Ropeway with chairs</i>
	<i>Height road / cabin</i>	<i>Height road / chair</i>
Cars	13 meters	14 meters
Buses Trains with passengers	19 meters	20 meters
Trucks <26T	25 meters	Too high for a chairlift !
Trucks 35T Fret trains solid goods	33 meters	
Trucks or trains carrying hazardous materials	40 meters	

Specific fire risk analysis

Principle :

- Typical fire sources for objects
- Calculations depending on height :
 - temperature
 - thermal flow static and dynamic
- Acceptable criterias :
 - rope : temperature $<350^{\circ}\text{C}$
 - static thermal flow on vehicle
 - $<3\text{kW}/\text{m}^2$ cabins,
 - $<2\text{kW}/\text{m}^2$ chairs
 - dynamic thermal flow (when fire detection)
 - verifications on towers

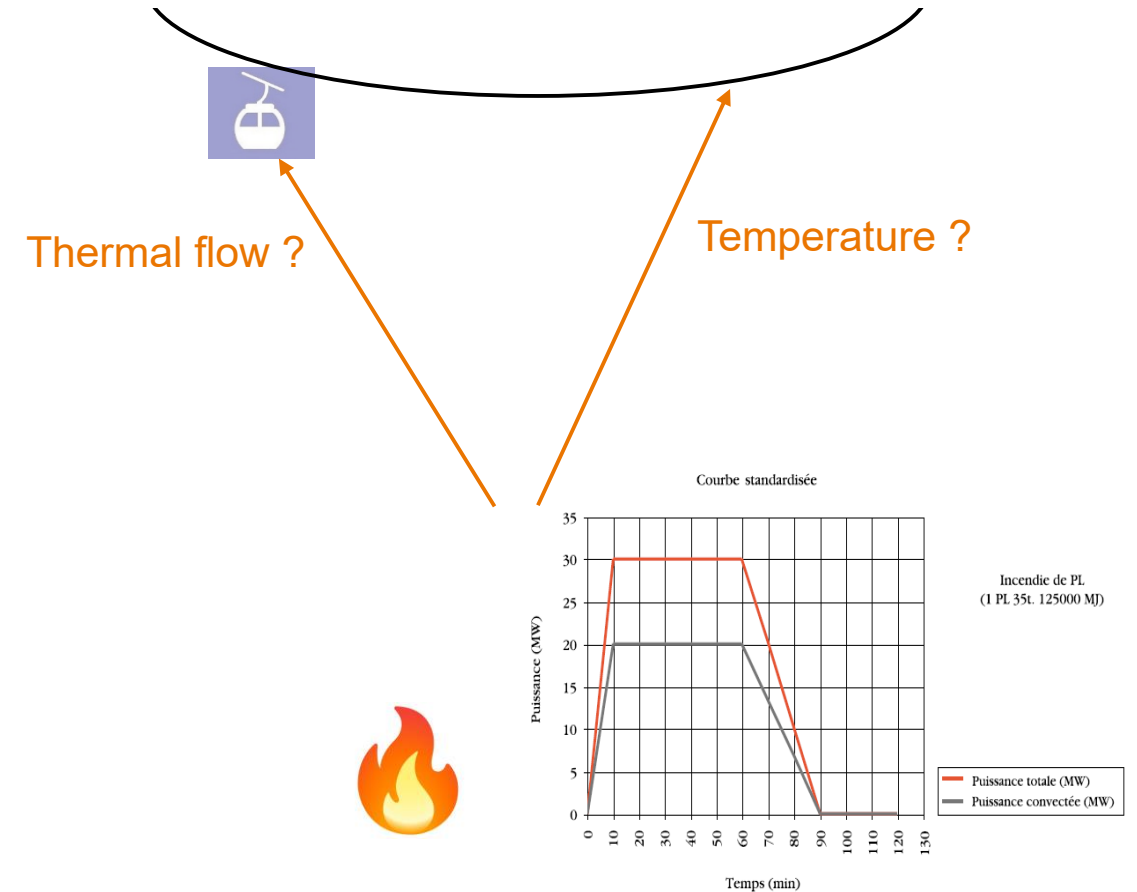


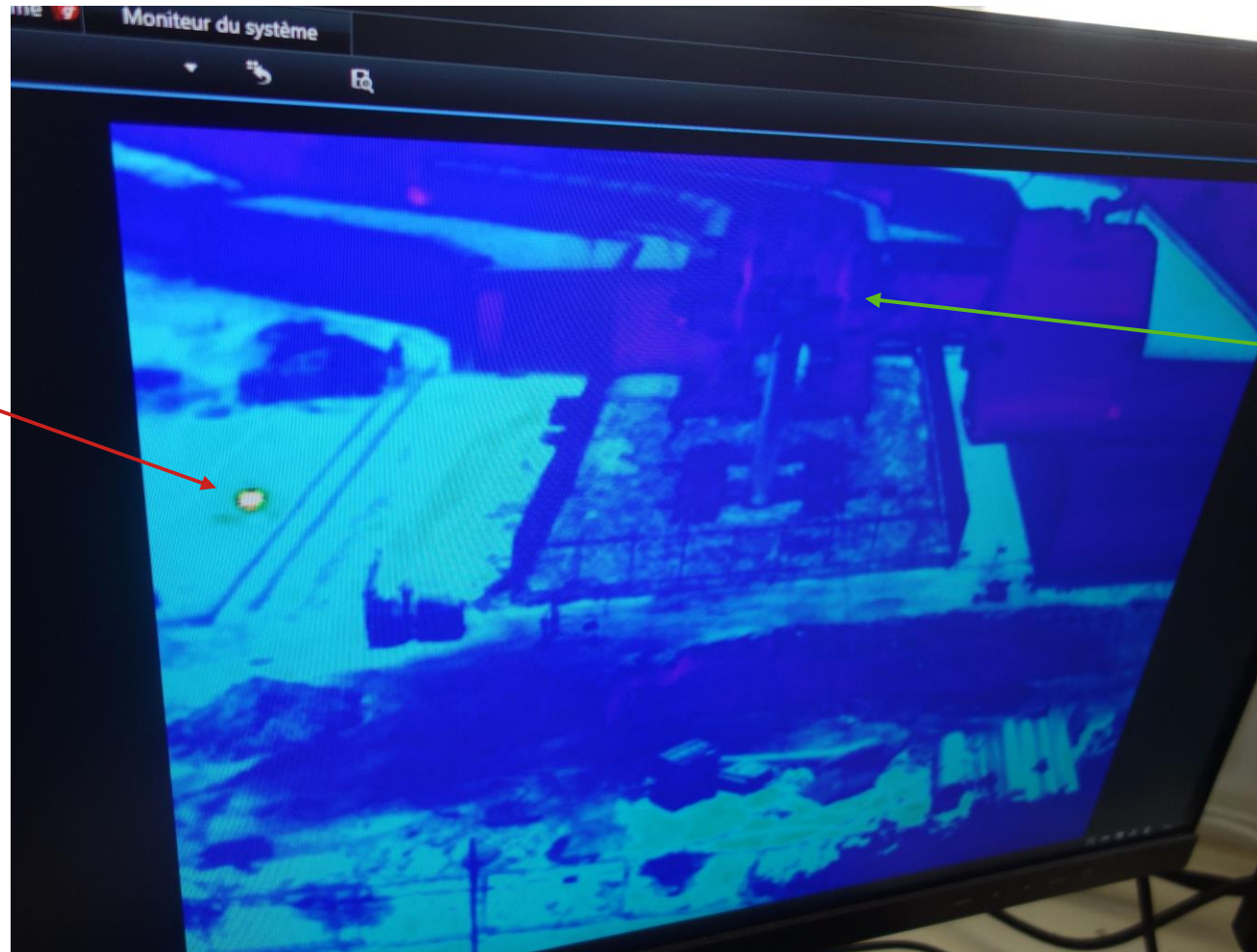
Figure 10

Specific fire risk analysis

If criteria not reached :

1) Possibility of fire detection (g. thermal cameras) + operational procedures

Barbecue :
example of
real test for
fire
detection



Ropeway
station

Specific fire risk analysis

- 2) Possibility to reason on probabilities for road vehicles :
- Calculations must be based on typical fire rates in french road tunnels
 - $< 10^{-8} /h = \text{SIL4}$ for cable criteria
 - $< 10^{-7}/h = \text{SIL3}$ for cabin criteria
 - Possibility to use simpler values in traffic based on calculations with margin :



Vehicle category	Max mean traffic for monocable ropeways	Max mean traffic for bicable ropeways
Cars, buses considered separately	200 vehicles / day	20 vehicles / day
Trucks considered separately	100 vehicles / day	10 vehicles / day
Consideration of total traffic	250 vehicles / day	25 vehicles / day

A few different rules between urban and mountain areas

Simple

- Mountain chairlift projects :
 - If going over a road >10m,
 - Fire detection considered directly acceptable without complicated calculations

- Urban projects : mandatory fire detection for potential sources considered evolutive :
 - Public buildings under flat-rate distance
 - Roads with buses, to cover new power types
 - Roads with trucks and need to have reasoned with probabilities / trafic

Complicated

New approach : application on current projects

- Complex « valley lift » in Saint Gervais : many new rules simplify discussions, almost all « tools from the toolbox » used
- Urban gondola in Créteil : new principles used, may have allowed to save some groups of trees
- Chairlift in Vars : new « simple rule » for chairlifts over road with detection were applied
- On a few installations : it provided answers to previous questions
- On usual new mountain installations : it doesn't change anything



New approach : prospection / topics to be explored

- Rules are more complex than before, but we tried to clarify many points to save some time for every actor around projects
- Vehicles with « other propulsions » gas, H2 and electric :
 - More widespread in total traffic
 - Specific fire sources
 - Less feedback / statistics so far
- A general feedback on the new approach will be organized with french professionnels



**Thank you for
your Attention!**