



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Office fédéral de la communication OFCOM  
**Relations internationales IR**

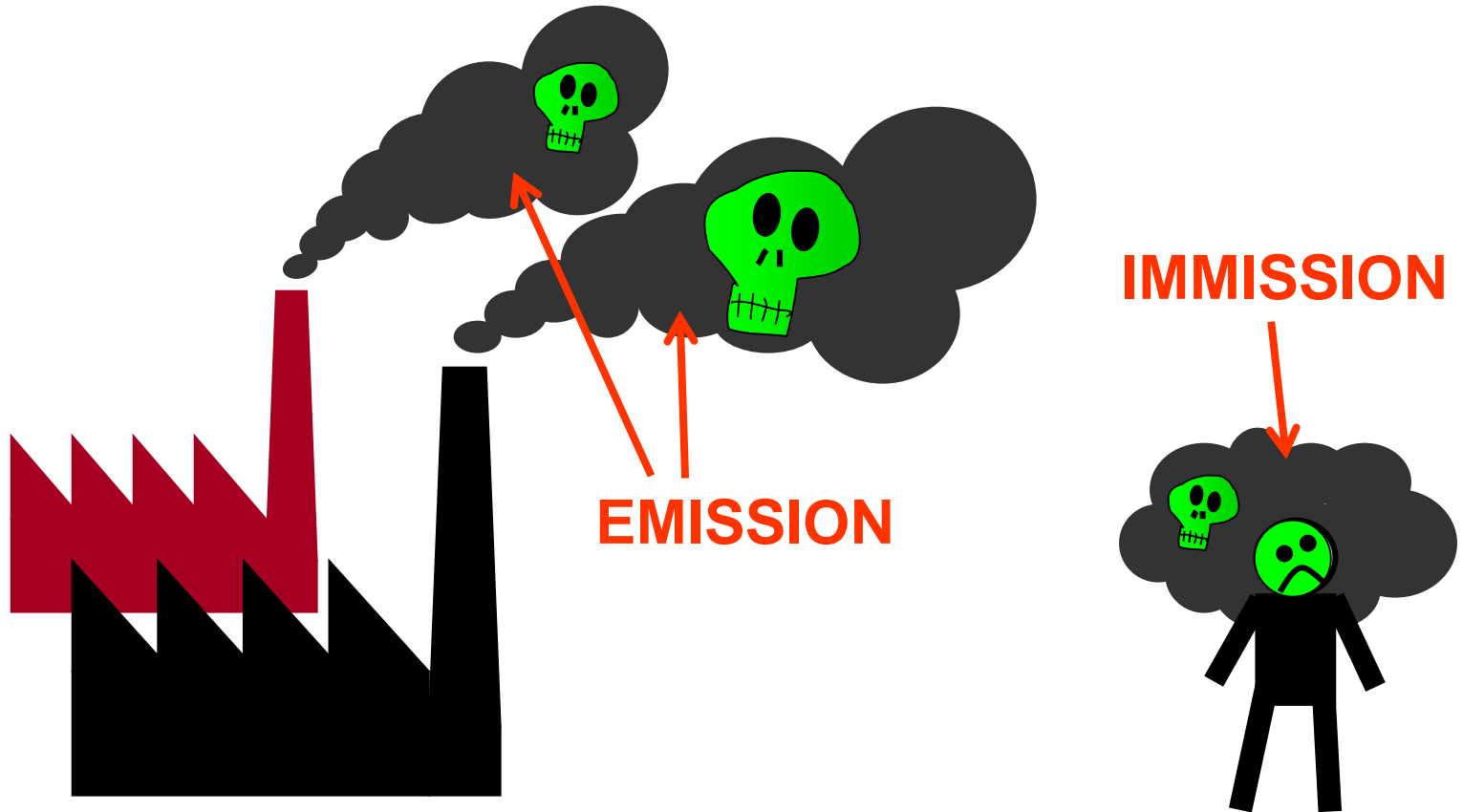
# Country Case Study

# Switzerland

2 November 2017

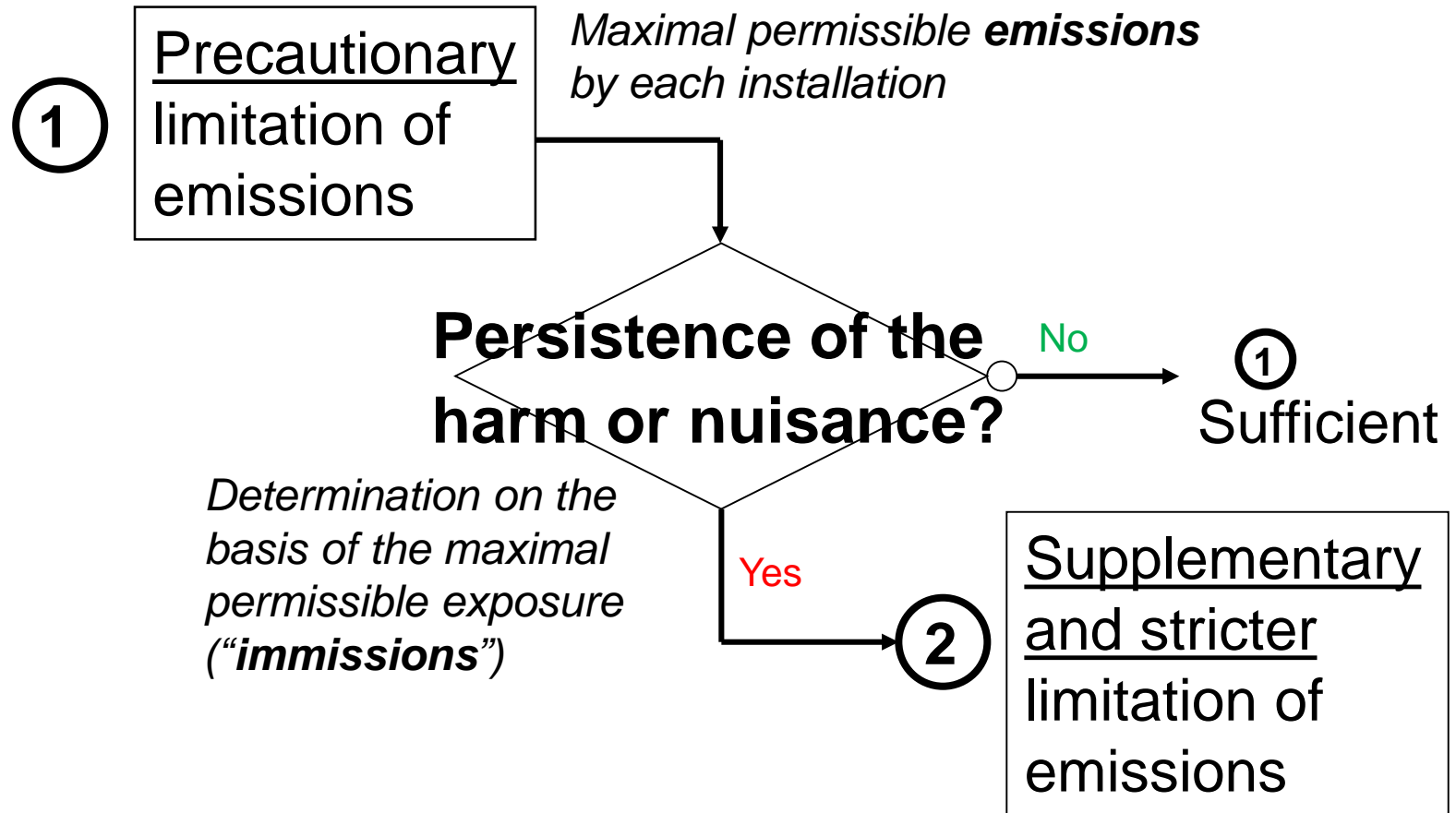


# Definitions





# Limitation of Emissions of Fixed Installations in Two Stages

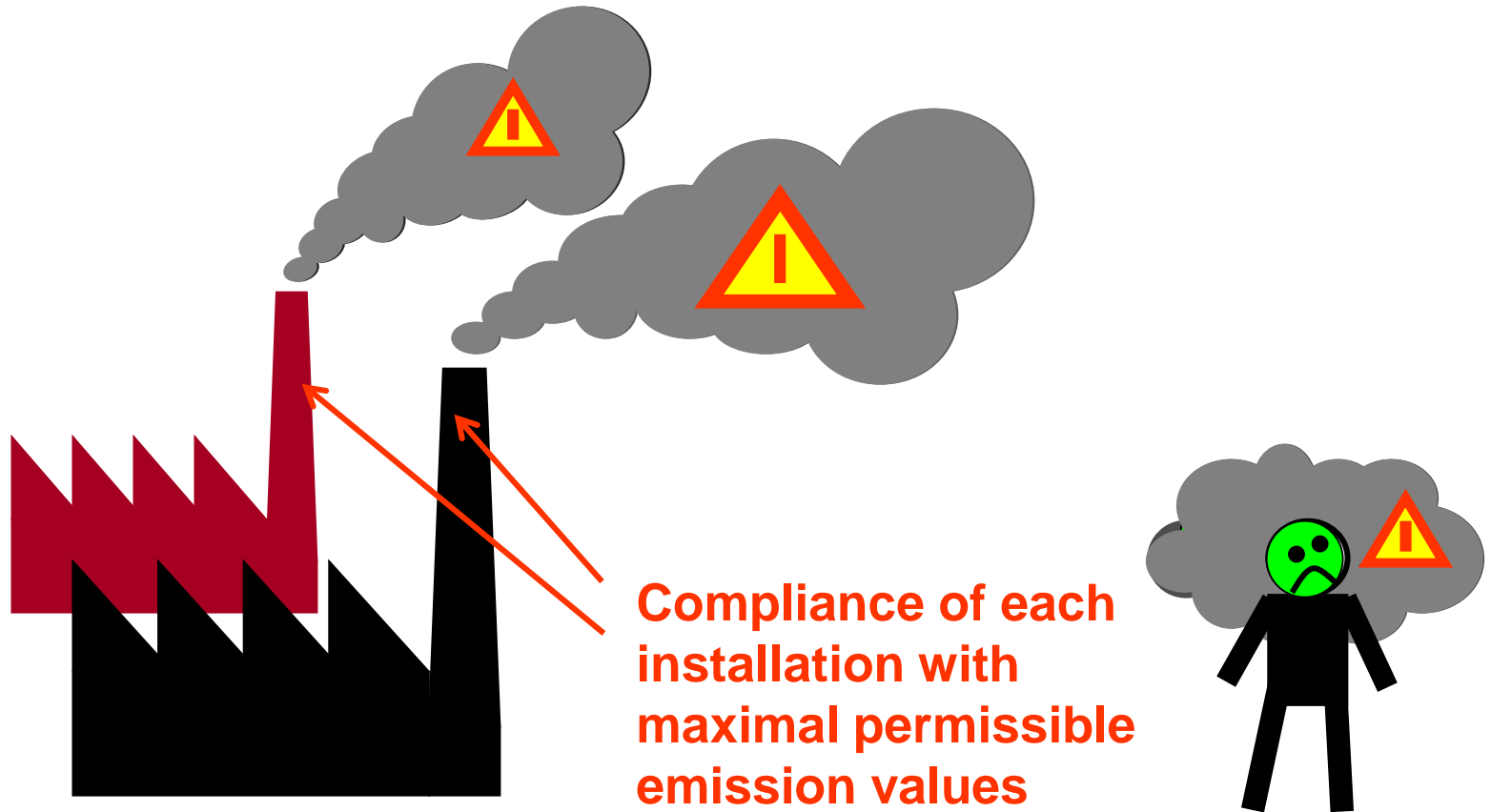




# Precautionary Limitation of Emissions

①

- Principle of the usage of **optimal technologies**

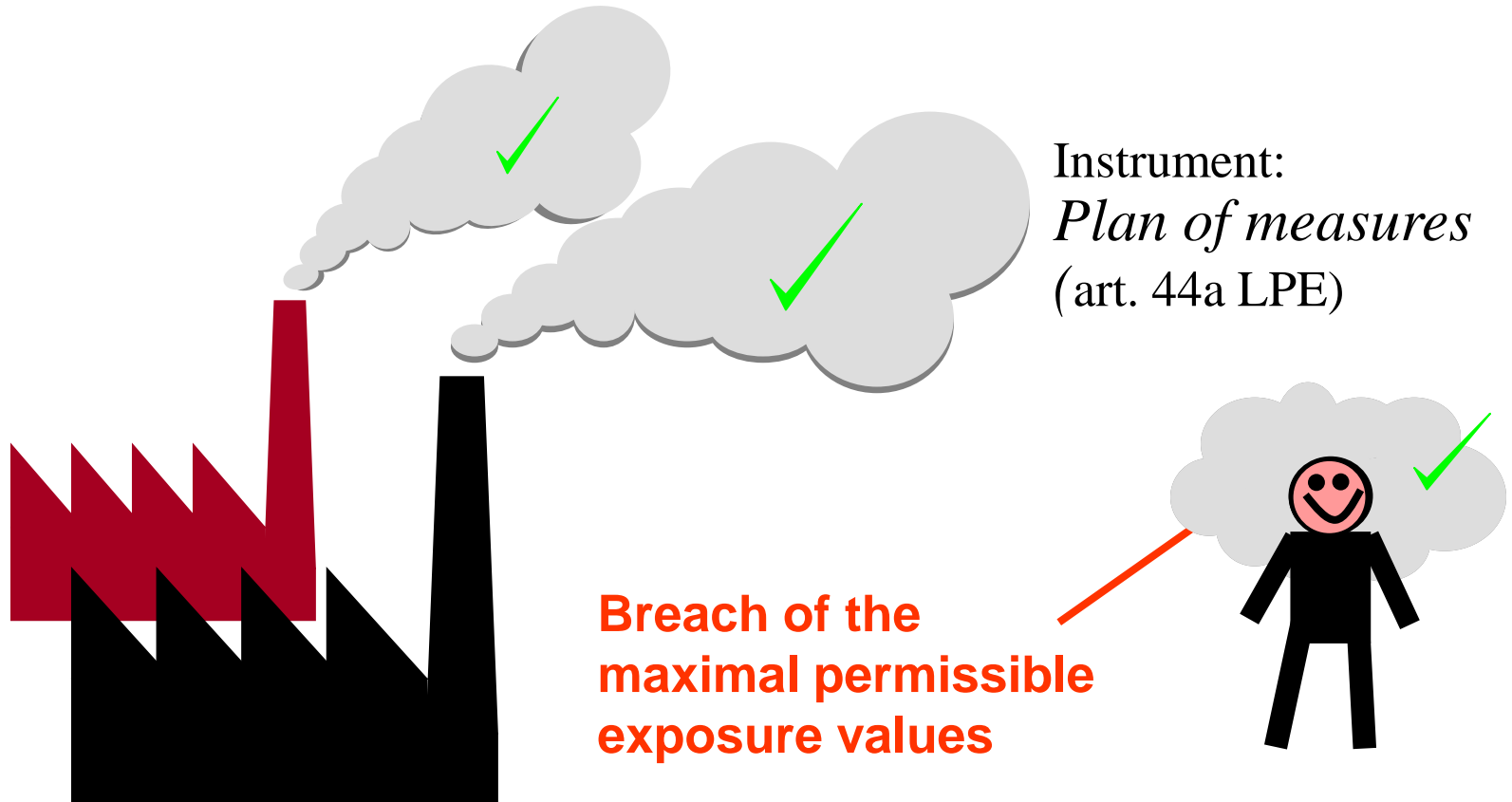




# Supplementary Limitation of Emissions

②

- Principle of **equality** in partaking in burden





# Fixed Installations

## Central Regulatory Source: ONIR

- Federal Law on the Protection of the Environment (LPE ; RS 814.01), whose goals are:

- **Protection**

- Protect against harm or nuisance

- **Precaution**

- Limit effects that could become harmful

- Implementation of the legal mandate relating to NIR:
  - **Ordinance relating to Protection from Non-Ionising Radiation (ONIR; [RS 814.710](#))**
    - [Implementation guidelines](#) of the ONIR of the Federal Office of protection of the environnement (OFEV)



# Approach Chosen in ONIR

- **Protection** (Protect humans from scientifically proven harmful or annoying effects)
  - ONIR sets **exposure limit values (ELV)**
    - Must be respected at **all places accessible to the general public**
    - Can apply to several installations taken together
- **Precaution** (“Limit exposure due to incomplete knowledge about long term health effects”)
  - ONIR sets **installation limit values (ILV)**
    - Must be respected at **places of sensitive use**
      - **Place where humans sojourn for a prolonged time** (bedrooms, living rooms, etc.), playgrounds, ...
    - Applies to the radiation emitted by “a single installation”



# Exposure Limit Values (ELV) and Installation Limit Values (ILV)

## Valeurs limites d'immission dans le domaine de fréquences de différentes installations:

Installation		Valeur limite d'immission
Chemins de fer	16 <sup>2</sup> / <sub>3</sub> Hz	300 µT; 10 000 V/m
Lignes à haute tension		300 µT; 5 000 V/m
Émetteurs radio	10–400 MHz	28 V/m
Émetteurs de téléphonie mobile	300 MHz	41 V/m
	1800 MHz	58 V/m
Émetteurs UMTS	2100 MHz	61 V/m

**ICNIRP Values**

## Valeurs limites de l'installation pour différentes installations:

Installation		Valeur limite de l'installation
Chemins de fer		1 µT (moyenne sur 24 heures)
Lignes à haute tension		1 µT
Émetteurs radio		3 V/m
Émetteurs de téléphonie mobile	300 MHz	4 V/m
	1800 MHz	6 V/m
Émetteurs UMTS	2100 MHz	6 V/m

**Swiss “Uniqueness”**

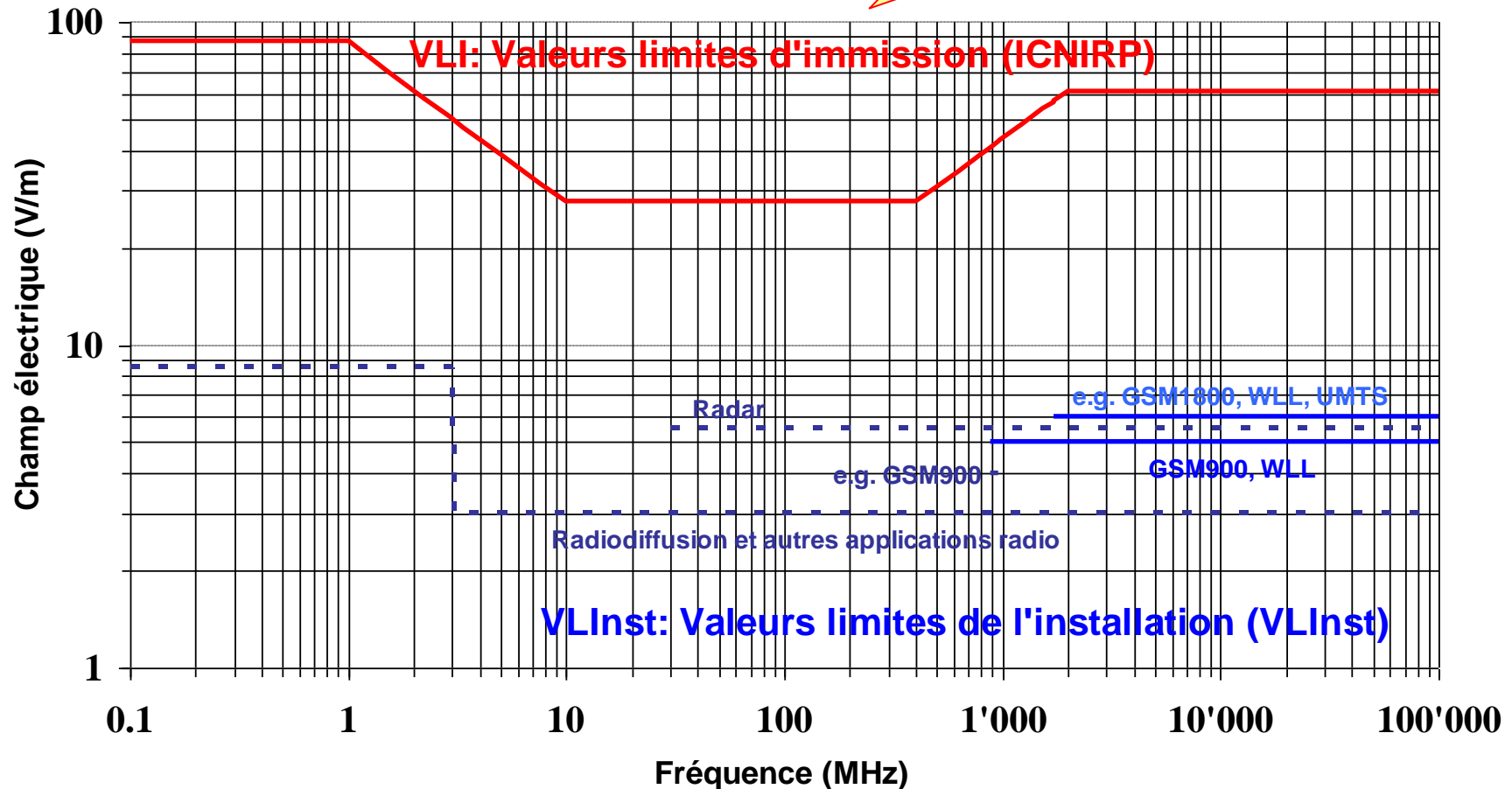
Source: OFEV, Environnement suisse, Electrosmog, 2002

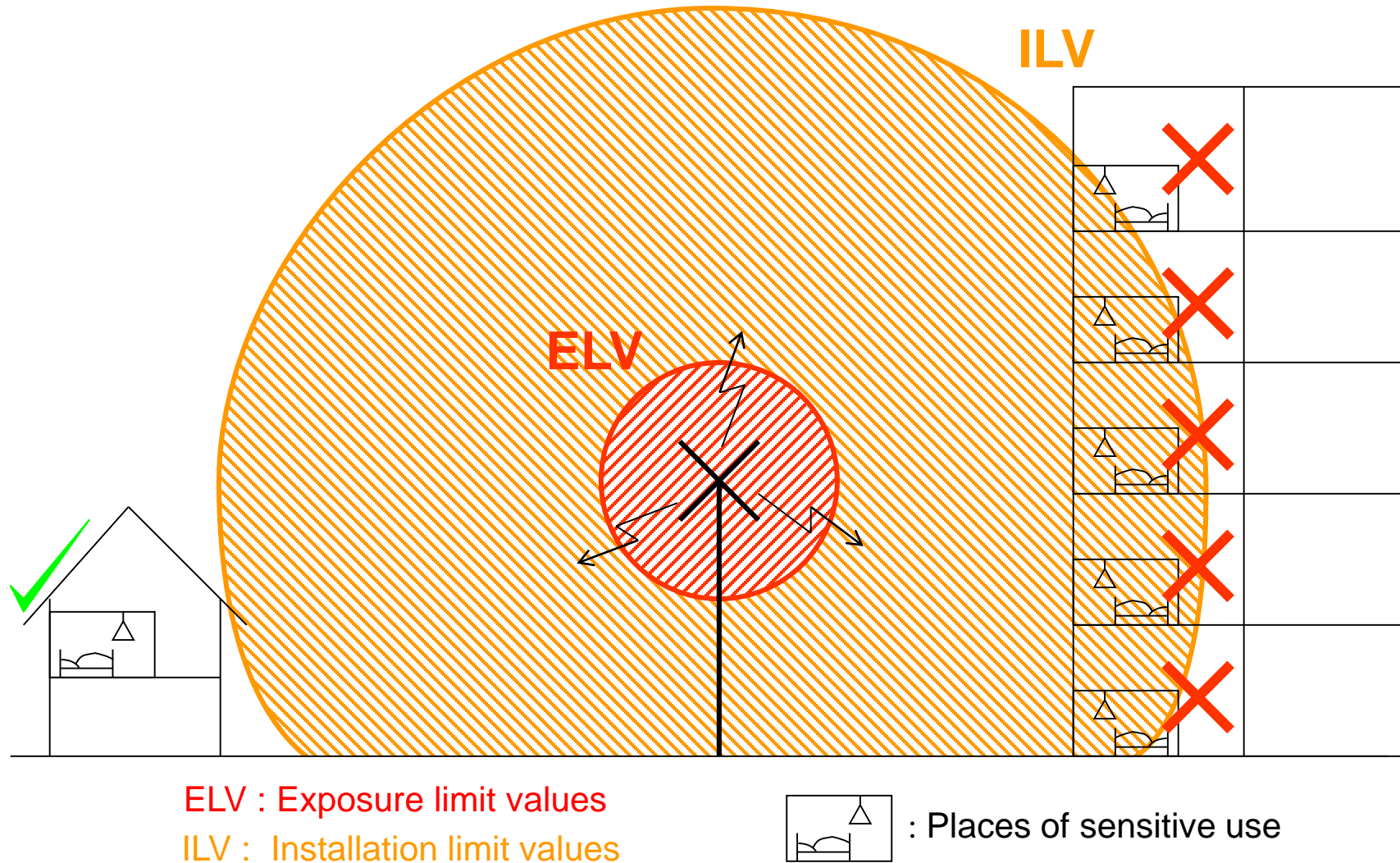




# ELV and ILV

**! Logarithmic Scales !**







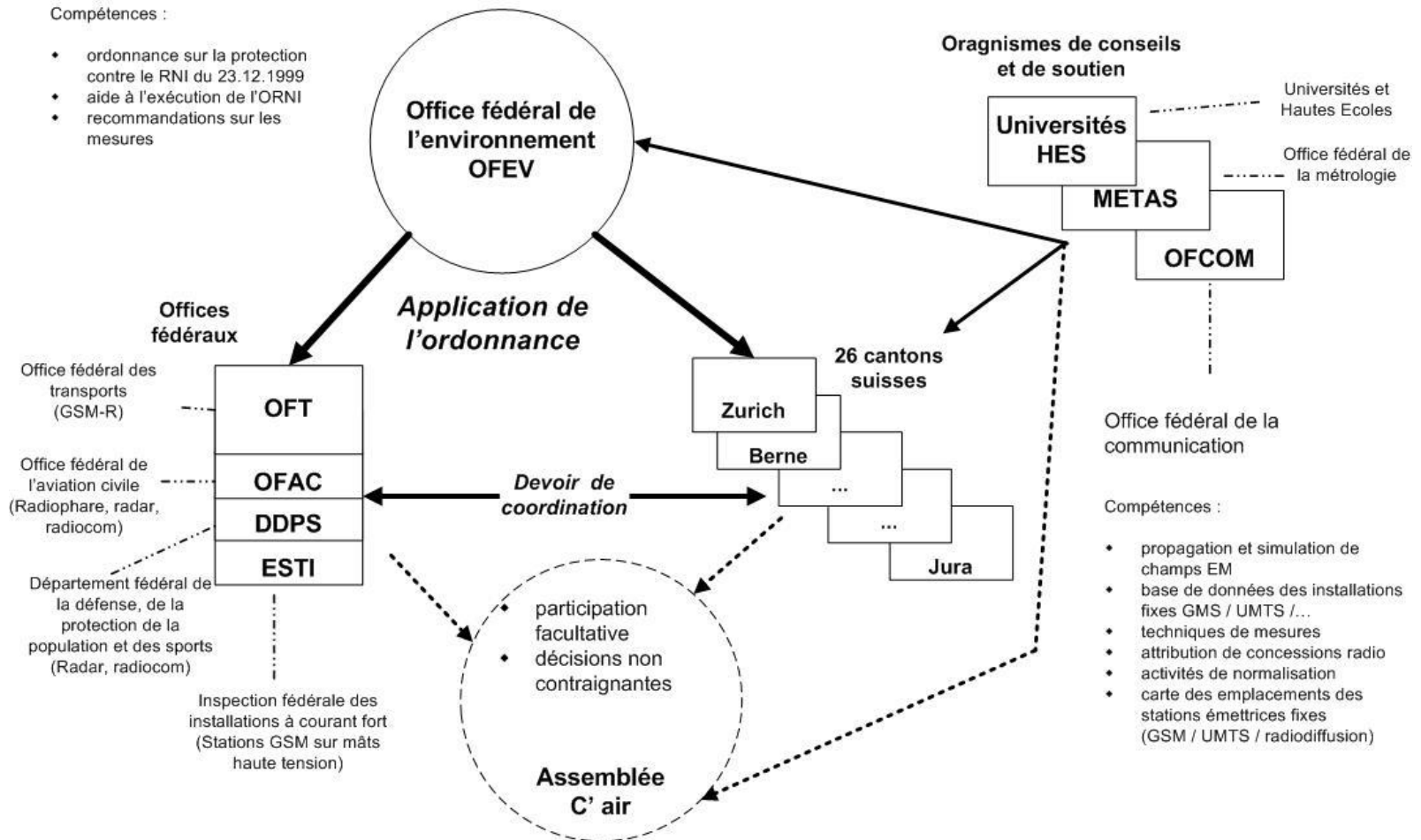
# Enforcement of ONIR

- Cantonal and municipal authorities are competent for the application of ONIR
  - Exceptions: installations under federal competence
    - E.g. railways, high-voltage network
- ONIR applies to new (planning permission) and to existing (obligation to retrofit) installations
  - Modalities vary from canton to canton (26 variants)
  - Cantons try to coordinate their procedures for the application of the ONIR
    - Federal Office for the Environment (OFEV) promulgates directives on measuring and calculation methods
    - Federal Office of Communications (OFCOM) offers assistance to cantons on questions of technical nature



# Institutions Involved

## Rayonnements non-ionisants des installations de télécommunications fixes les différents partenaires

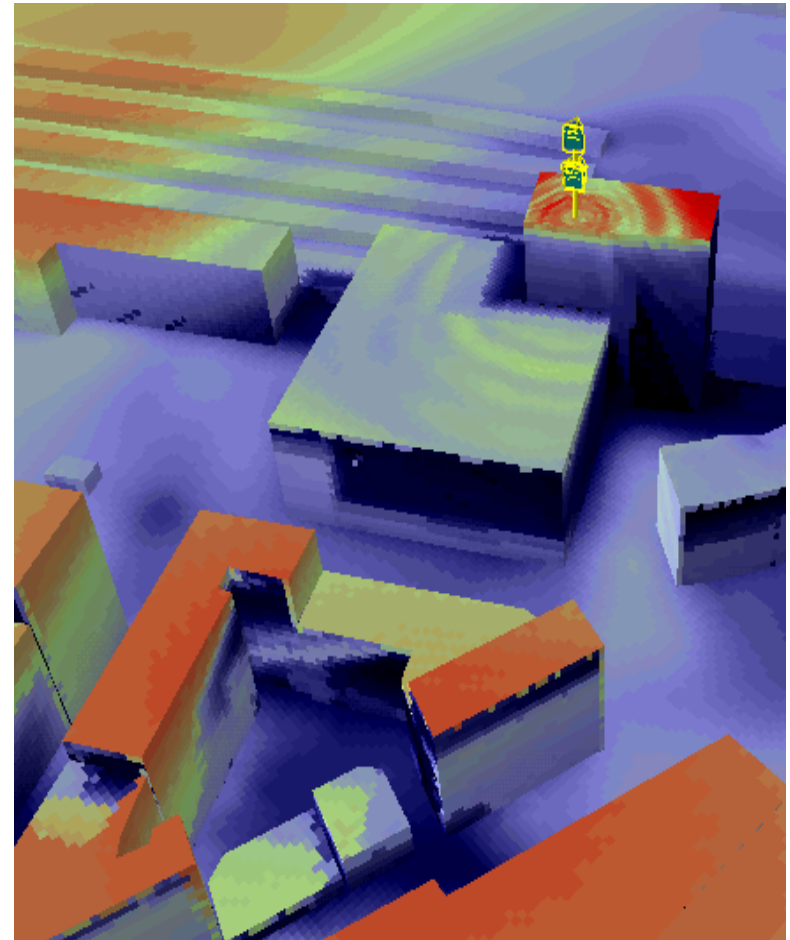




# Modelling of the Exposition

## Calculation Principles

- On the basis of the technical characteristics of the base stations
  - E.g. equivalent radiated power (ERP), antenna diagram H/V
- Maximal power with maximal traffic load (*worst case*)
- Far field conditions and free space propagation
  - Reflexions and diffractions are ignored





# Compliance Verification Measurement

- “Sweeping” method
  - Manual sweeping of the whole volume to be measured whilst varying the preferential direction and the direction of polarisation of the antenna
- Selective measurements
  - E.g. through selection of frequencies (GSM), of code (UMTS; LTE)
- Extrapolation of the maximum authorized power with maximum traffic
- 3.2 dB measurement uncertainty





# Conclusion

- Severity of Swiss ONIR in international comparison
  - The **Installation Limit Value (ILV)** is **unique** in its kind
- Complexity of the application of ONIR
  - Burdensome procedures prior to the delivery of the planning permission (delayed roll-out)
    - Modelling of the exposure (planning)
  - Exposure measurement (compliance verification)
- Proportionate concretisation of the precautionary principle?
  - If 15 years ago one could argue that the approach is economically tolerable for the operators, nowadays the costs of the detriments for the economy of the country are getting critically high (especially as no serious hint of non-thermal effects was revealed by science in the meantime)



# Thank you for your attention