

Les grands problèmes environnementaux liés à la construction et à l'opération des réseaux électriques

Intervenant: R. Fonteneau
December 11th, 2019

Part I : Transmission lines & Environment

Part II : SF6

Part I: Transmission lines & Environment

Aesthetic



Source: Vincent van Zeijst via Wikipedia

Agriculture



Source: Environmental Impacts of Transmission Lines - Public Service Commission of Wisconsin

Planes & Airports

Source: DC2bis via Wikipedia

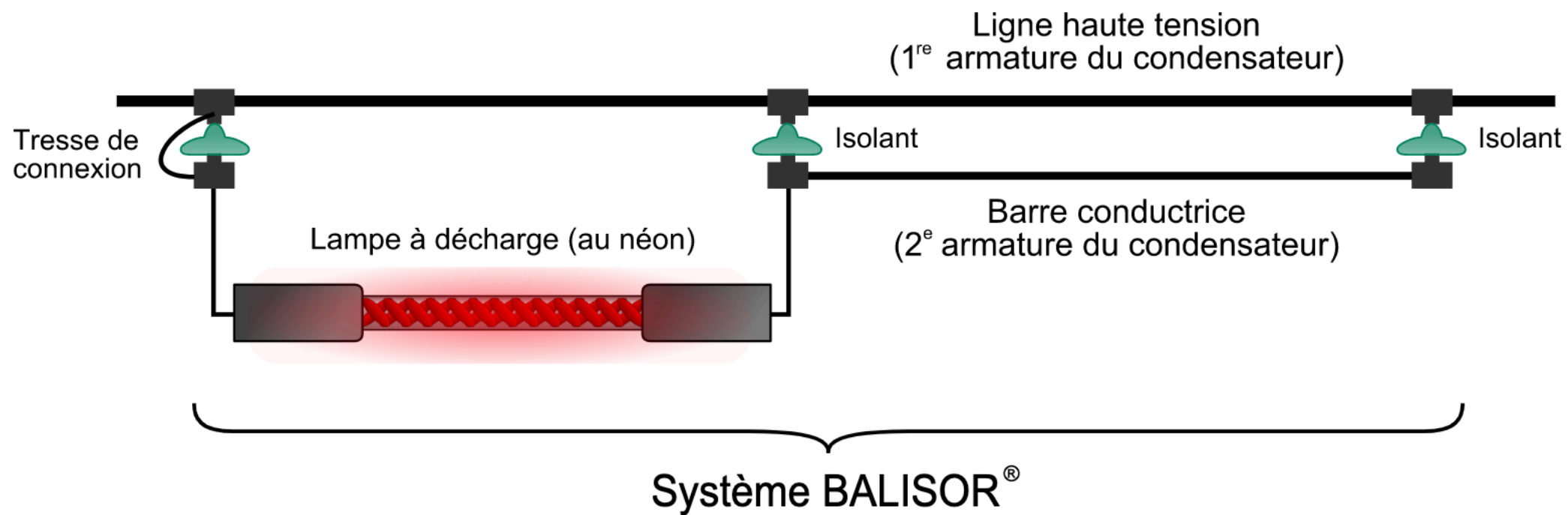
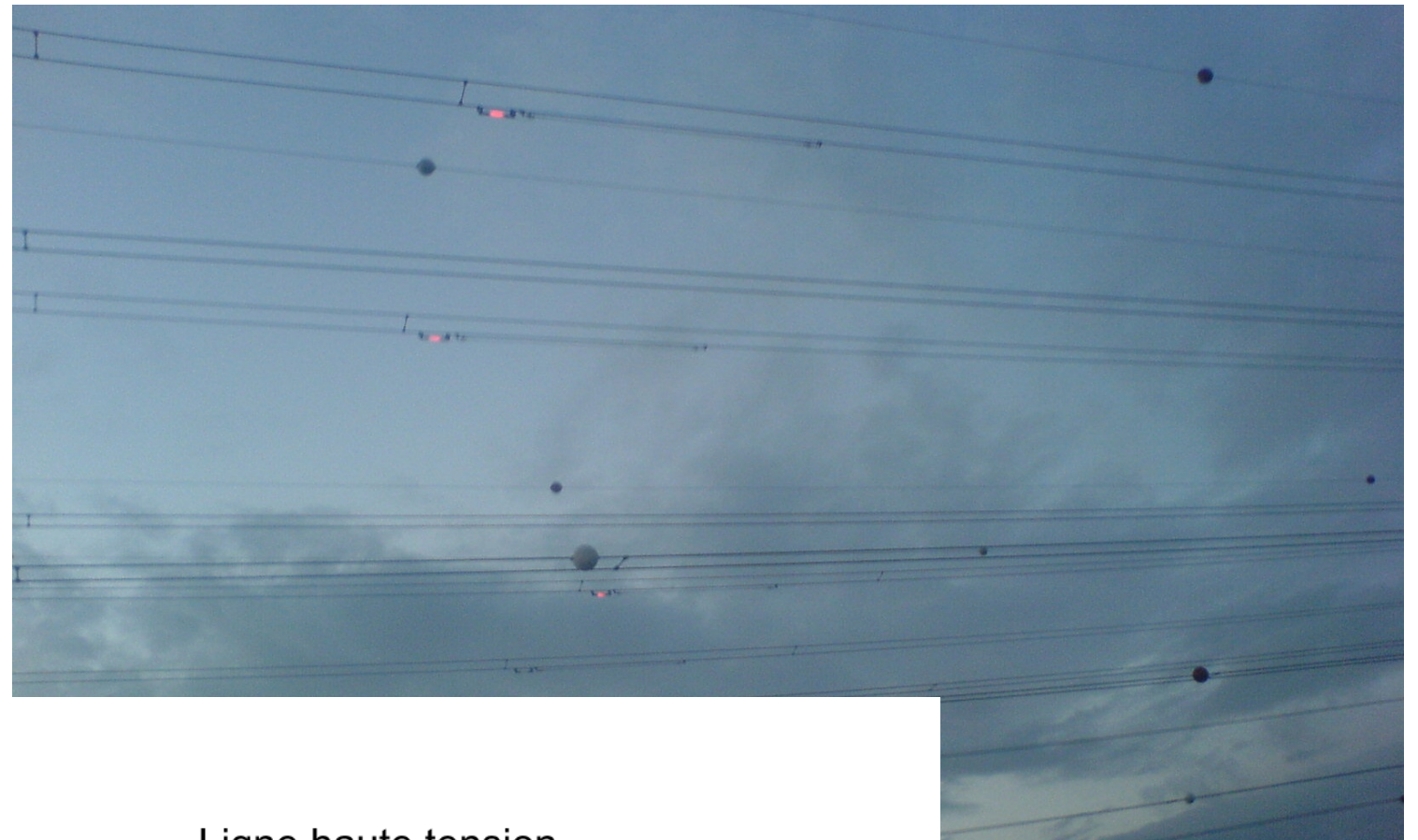


Schéma électrique

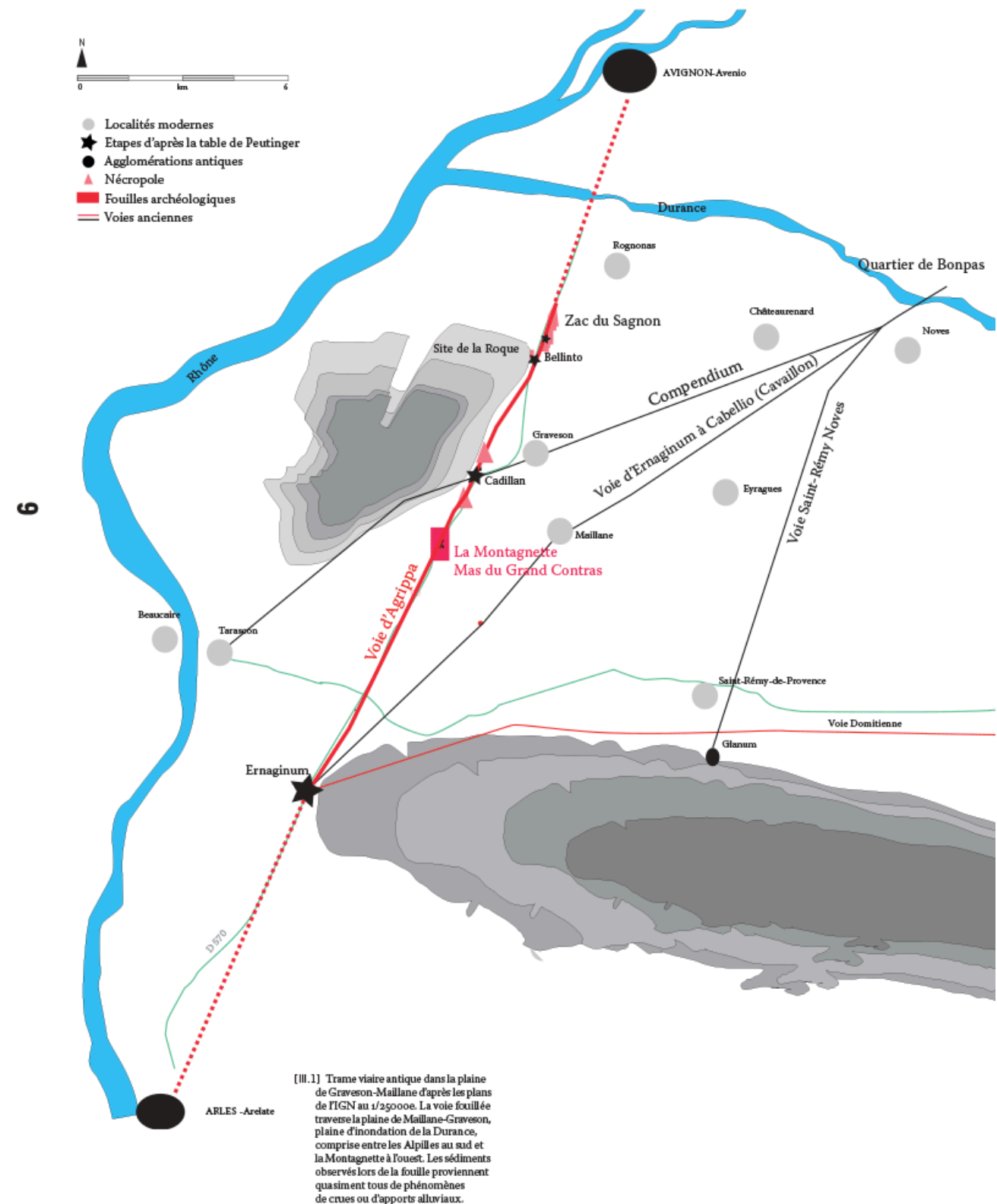


Source: Wagner51 via Wikipedia

Archeological, historical as well as cultural concerns

Archeological and historical sites are tools for learning about the past which are becoming rare. Other cultural concerns may happen, for instance in the case of communities that do not use electricity (e.g., the Amish Community)

Illustration: installation project of the Montagnette substation in France (13); this site led to an archaeological excavation (conducted by Inrap) on a section of via Agrippa, a Roman road linking Lyon to Arles. RTE modified the project to conserve and develop a section of this Roman road.



Exposure to Electric and Magnetic Fields: Impacts on Health

Several epidemiological studies have shown a weak statistical association with the risk of childhood leukemia.

However

Cellular and animals studies have shown no link between EMF and disease.

More generally, no cause-and-effect relationship established between exposure to EMF and human disease, neither plausible biological mechanism.

There is a growing consensus within the scientific community that exposure to magnetic fields is not responsible for human disease.

Implantable Medical Devices and Pacemakers

Potential Electromagnetic Interference or EMI. But exposures come from many origins.

Endangered, Threatened, Protected or invasive Species

Construction and maintenance of transmission lines might destroy individual plants and animals, or their habitat (trees that are cut, soil erosion, wetlands, etc).

Birds may also face collisions or electrocutions.

Human actions are the primary means of invasive species introductions.

Transmission line construction (and also maintenance)
=> Disturbance of ROW soils and vegetation
=> Eventually, contribution to the spread of invasive species

Une petite anecdote...

Source: <http://rapaces.lpo.fr/cna-oiseaux-et-lignes-electriques/reseau-de-transport-deelectricite>





The LIFE ELIA project

The « Life-Elia » project: valorizing electric corridors in order to increase biodiversity.

<https://youtu.be/jwk5tawfPeg>

Develop and restore more than 300 ha under the routes

- > Installation and restoration of forest edges
- > Creation of conservatory orchards
- > Creation and restoration of peat bogs, heaths and meadows
- > Creation of ponds
- > Management of invasive plant species
- > Installation of a grazing and mowing infrastructure
- > Creation of light flowering meadows.

Valorisation des emprises du réseau de transport d'électricité comme vecteurs actifs favorables à la Biodiversité

Nom court
LIFE ELIA

Référence CE
LIFE10 NAT/BE/709

Durée du projet
Septembre 2011 à Août 2016



50 m



20 m

50 m



creating green corridors
under overhead lines



Noise and light impact

Noise generated by equipments

- during the construction phase,
- during the operation.

Other types of sounds: sizzles, crackles, or hissing noises that occur during periods of high humidity, caused by the ionization of electricity in the moist air near the wires

Picture: long exposure photograph of corona discharge on an insulator string of a 500 kV [overhead power line](#) (note that corona discharges represent a significant power loss for [electric utilities](#))

Source: Nitromethane via Wikipedia



Property Owner & Nimby Issues

{Electricity users} and {those that bear the impacts of the facilities}: the second may have an unfairness feeling.

=> Money paid to the landowners for having a transmission line cross their property, but some may not consider it as enough to compensate for aesthetic (or other) impacts as well as loss of 'full rights' on their property (compensation for the « *highest and best use* » of the affected parcel may not always be applied ?)

From Wikipedia :

The Appraisal Institute defines highest and best use as follows: The reasonably probable and legal use of vacant land or an improved property that is physically possible, appropriately supported, financially feasible, and that results in the highest value. The four criteria the highest and best use must meet are legal permissibility, physical possibility, financial feasibility, and maximum productivity. Alternatively, the probable use of land or improved property – specific with respect to the user and timing of the use – that is adequately supported and results in the highest present value.

Also,

- Favoring the placement of new transmission lines within/next to existing equipments
- Property owners, who live near the line, but not on the ROW: affected but not compensated
- Subsequent owners not compensated if the easement payment was a one-time payment
- Potential change in property values.

Cf. NIMBY (Not In My BackYard issues)

Grids alliance aims to counter renewables 'NIMBY syndrome'

Arthur Neslen

📅 7 déc. 2012 (updated: 📅 12 déc. 2012)



2nd_European_Grid_Conference_0.jpg

Languages: Français



EU energy ministers have teamed up with electricity grid operators and environmental groups to counter the NIMBY syndrome on new renewable energy infrastructure builds.

CARDINAL-HICKORY CREEK LINE

In Wisconsin, many oppose transmission line to bring western wind power

WRITTEN BY



Kari Lydersen
January 22, 2019

PHOTO BY

Eric and Kiley Cates /
Submitted

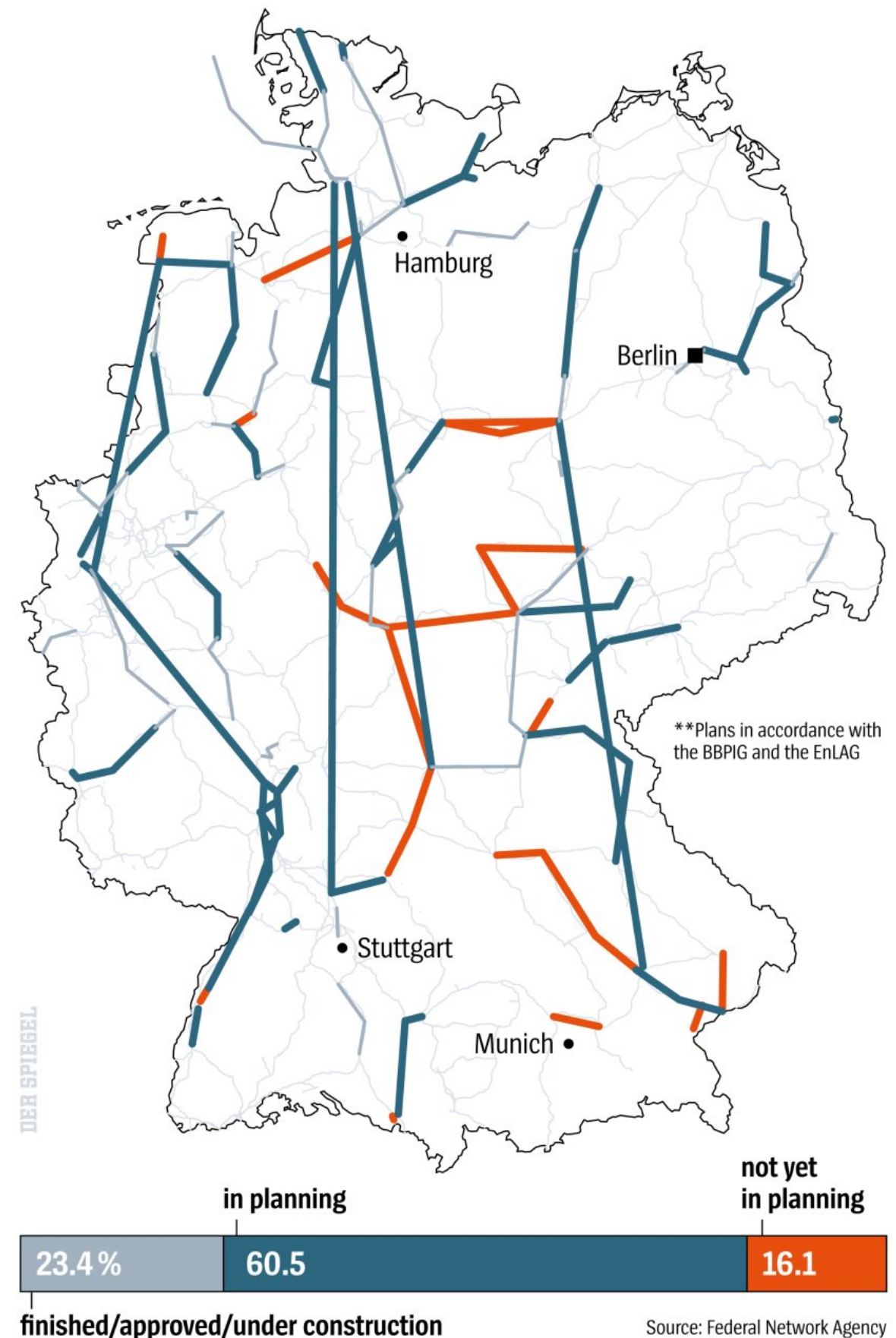


The proposed Cardinal-Hickory Creek line would run through central Wisconsin about a mile from the Cates family's grass-fed cattle operation. Dick Cates is among dozens of residents of the area who oppose the transmission line.

Proponents say the Cardinal-Hickory Creek line is needed to increase grid stability. Critics call it unnecessary.

A Long Way to Go

Important high-voltage transmission line projects* at the end of 2018



Source: <https://www.spiegel.de/international/germany/bild-1266586-1426952.html>

Combining effects: the case of recreation areas

Recreation areas are areas where recreational activities occur (parks, trails, lakes,...). Such area can be simultaneously affected by transmission lines by several factors:

- Decrease the attractiveness of such areas because of aesthetic evolution
- Altering the types of wildlife found in an area by creating more edge habitat or additional mortality risks to birds;
- Providing paths or better access to previously inaccessible areas for those who snowmobile, ski, bike, hike, or hunt (note that, in such cases, it can also pose additional safety risks by adding new poles and wires)



COMMUNIQUÉ DE PRESSE

Pau, le 14 octobre 2015

**Installation de balises dernière génération
sur une ligne électrique pour protéger les grands rapaces
du Parc National des Pyrénées**

ACCUEIL > SUD-OUEST - ARTICLE >
LE PARC NATUREL RÉGIONAL ET RTE TRAVAILLENT DE CONCERT SUR L'AMÉNAGEMENT DES ZONES SITUÉES SOUS LES LIGNES ÉLECTRIQUES

06 MAI 2019

**LE PARC NATUREL RÉGIONAL ET RTE TRAVAILLENT DE CONCERT
SUR L'AMÉNAGEMENT DES ZONES SITUÉES SOUS LES LIGNES
ÉLECTRIQUES**



Plus d'informations sur
www.life-elia.eu

Safety

Contact with transmission lines, fallen lines, lightning.

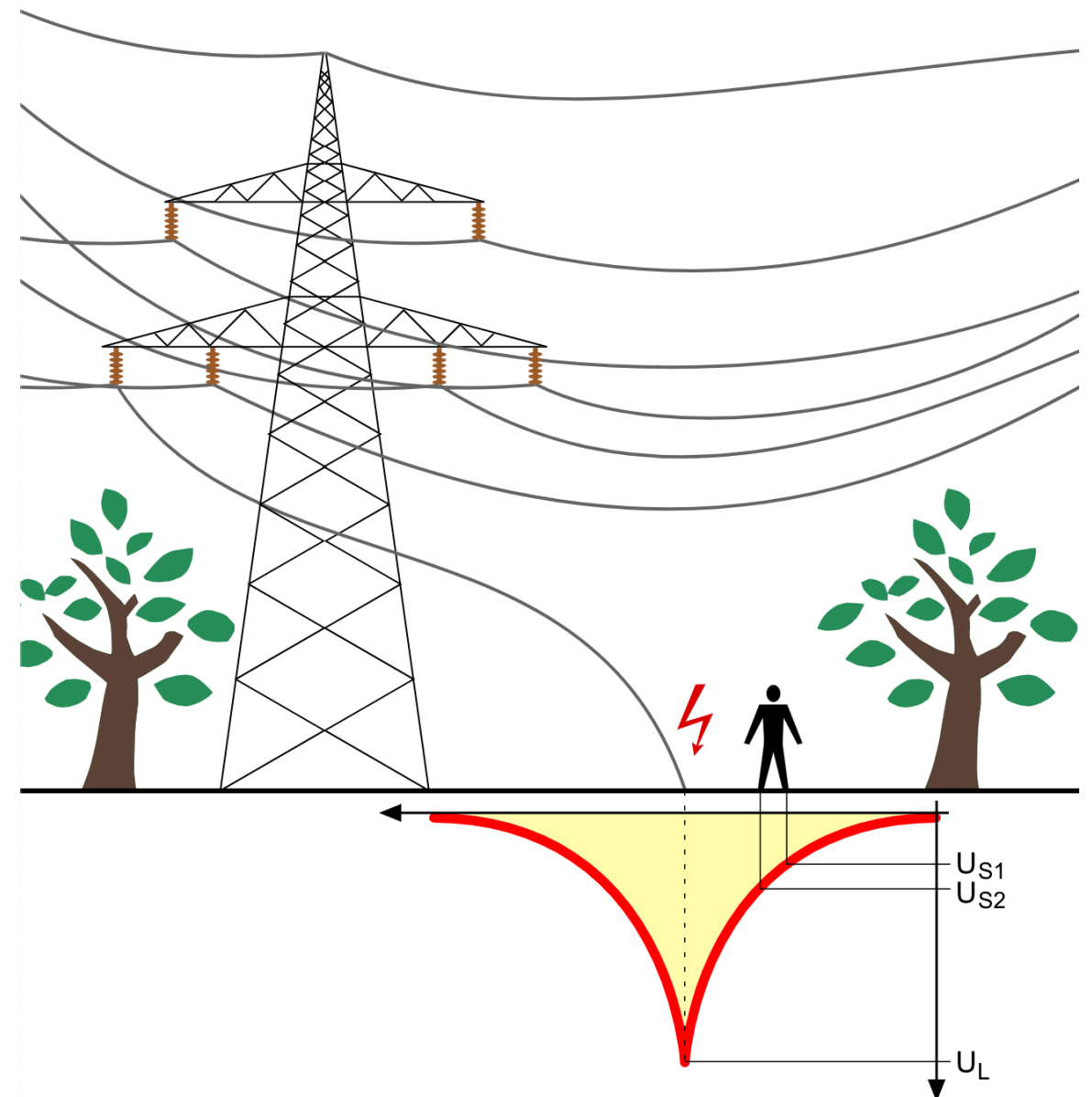
Induced voltage: people or animals can receive an electrical shock by touching a metal object located near a transmission line, depending on the mass and the orientation (wrt the line) of the object.

=> Refueling cars close to high-voltage transmission lines may not be a good idea

Stray Voltage

An interesting case regarding Farm animals:

The Court of Appeal of Caen acknowledges on 24 November 2015 that very high voltage lines have affected the quality of milk produced by the cows of a breeder in the Channel, the judges relying on the report of veterinarians having found that cows were less prone to mastitis follows a three-week cut of the HV line in August 2012



Source: wdwd via Wikipedia

Water Resources, Wetlands, Woodlands



Source: Environmental Impacts of Transmission Lines - Public Service Commission of Wisconsin

Part II: SF6

Un gaz à effet de serre dans les éoliennes

MIS EN LIGNE LE 30/10/2019 À 00:00

CLIMAT



Menu

La Libre.be

International



Europe Amérique Asie Afrique Océanie

International

Le SF6, l'isolant qu'il faut isoler

Publié le samedi 01 décembre 2007 à 00h00 - Mis à jour le samedi 01 décembre 2007 à 00h00

“Grid losses and SF6 represent the biggest share of Elia’s carbon emissions.”

Grid losses are the difference between the amount of electricity entering the Elia grid and the amount of electricity supplied. Grid losses are directly related to the amount of electricity transmitted over long distances. Opportunities to reduce grid losses are very limited.

Elia’s website

Science & Environment

Climate change: Electrical industry's 'dirty secret' boosts warming

By Matt McGrath
Environment correspondent

🕒 13 September 2019



🔗 Share

Climate change



GETTY IMAGES

The expansion of electrical grid connections has increased use of SF6

BBC News

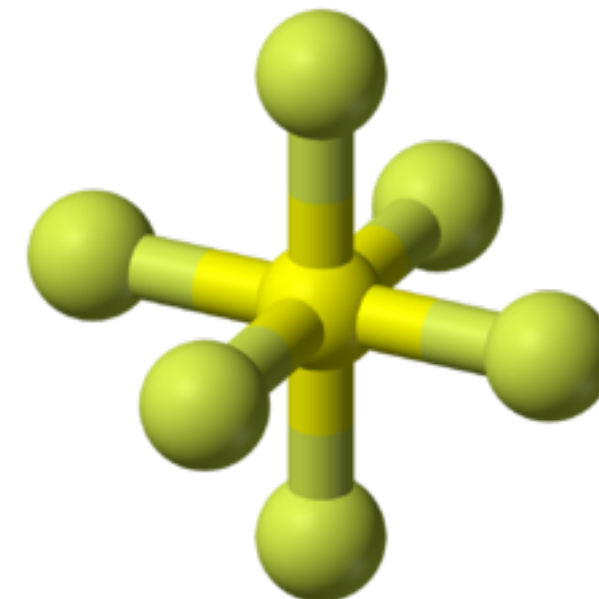
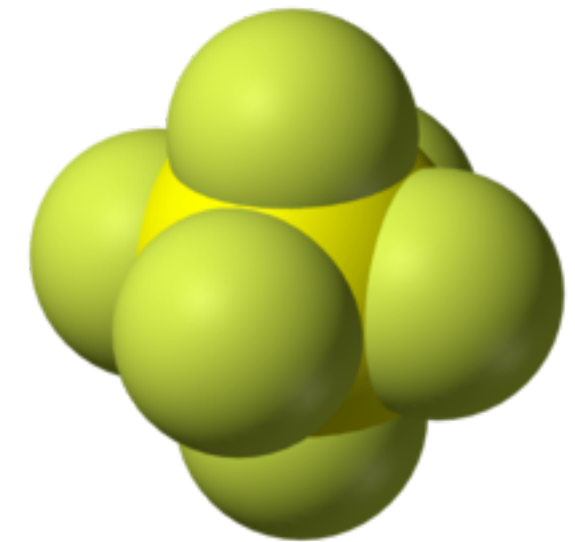
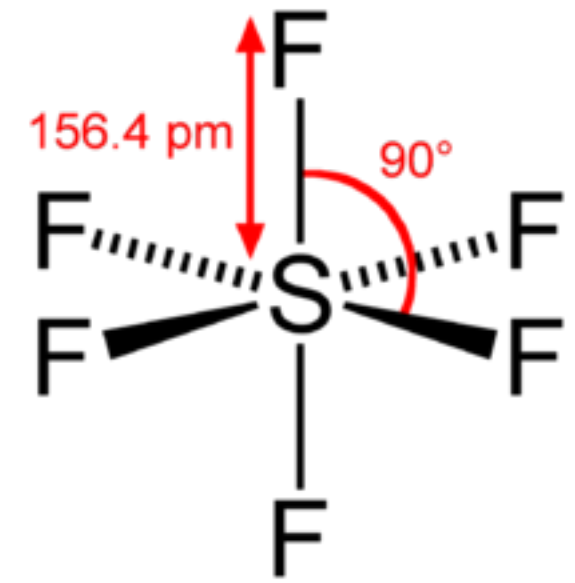
SF₆

Wikipedia says :

Sulfur hexafluoride (SF₆) is an *inorganic*, colorless, odorless, non-*flammable*, non-toxic but extremely potent *greenhouse gas*, and an excellent *electrical insulator*.

More than 10,000 tons of SF₆ are produced per year, most of which (over 8,000 tons) is used as a *gaseous dielectric medium* in the *electrical industry*.

Global warming potential: about 23k times that of CO₂.

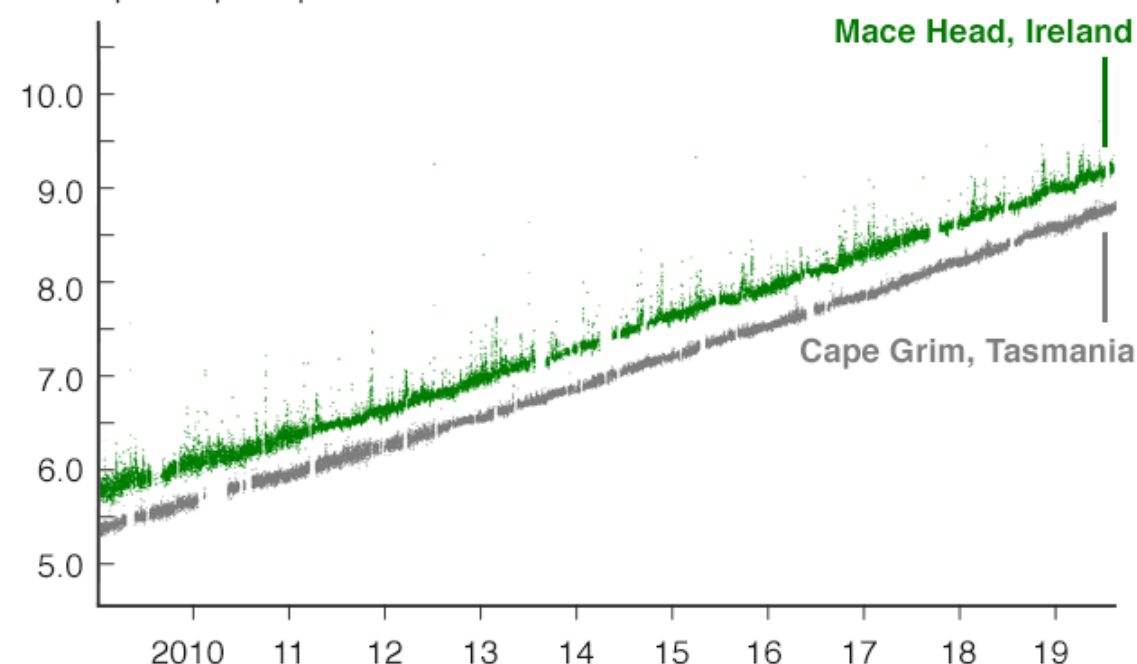


Should we worry?

Concentrations in the atmosphere are very small right now, **but** the global installed base of SF6 is expected to grow by 75% by 2030 **and** the most important means by which SF6 gets into the atmosphere is from leaks in the electricity industry. **Also**, SF6 is a synthetic gas -> not absorbed or destroyed naturally. It will then have to be replaced and destroyed.

How SF6 concentration has increased in the atmosphere

Atmospheric parts per trillion



Source: University of Bristol

BBC

1kg of SF6

Is equivalent to 23,500kg of CO2



SF6 emissions in Europe were the equivalent of

6.73

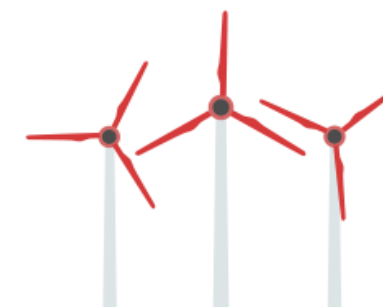
megatonnes of CO2 in 2017



This represents the volume of greenhouse gas emissions from

1.3m

cars for a year



There was an

8.1%

increase in SF6 emissions across Europe in 2017

Based on five-year percentage change

Source: European Environment Agency

BBC

SF₆: alternatives?



21, rue d'Artois, F-75008 PARIS
[http : //www.cigre.org](http://www.cigre.org)

D1-305

CIGRE 2014

SF₆ ALTERNATIVE DEVELOPMENT FOR HIGH VOLTAGE SWITCHGEARS

**Y. KIEFFEL, A. GIRODET,
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ALSTOM GRID, FRANCE

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M. BULINSKI, R. VAN SAN*,
K. WERNER
3M COMPANY, USA, (*) BELGIUM**

SF₆ is one of the six gases included in the Kyoto Protocol, with a global warming potential that is 22800 times greater than CO₂. Therefore, 1kg of SF₆ released into the atmosphere has the equivalent global warming impact as 22.8 tons of CO₂.

Alternative solutions to SF₆ have been researched for a long time. Up to now, no significant success has been achieved in solutions for the transmission network.

« Thanks »