



# Ammonia Safety

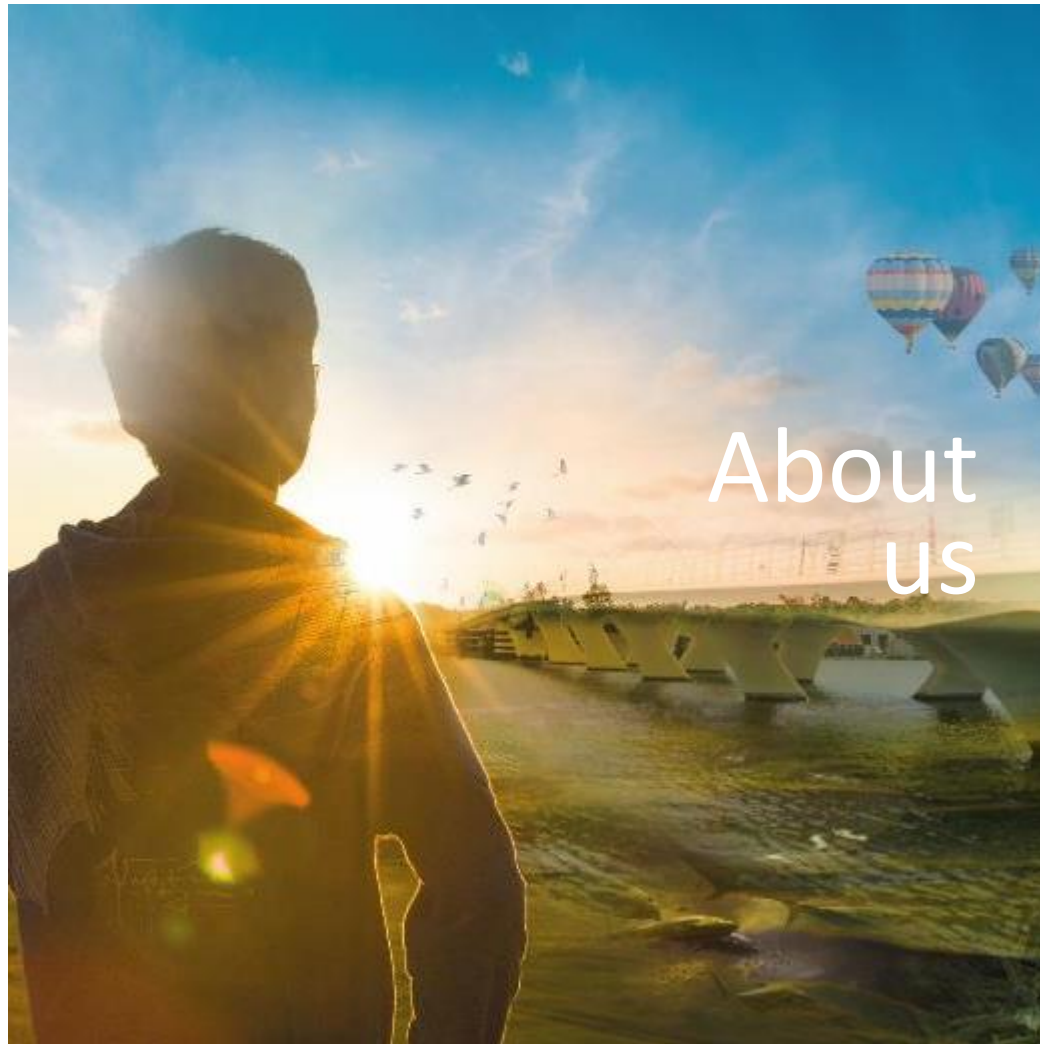
Safety and public perception

Antea Group

Understanding today.  
Improving tomorrow.

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15-11-2022

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# About us

Antea Group is an international engineering and consultancy firm. We combine valuable knowledge with a pragmatic approach, to come up with workable solutions. This makes us a multifaceted, independent partner for companies and government bodies

Just as we have been for over 65 years now

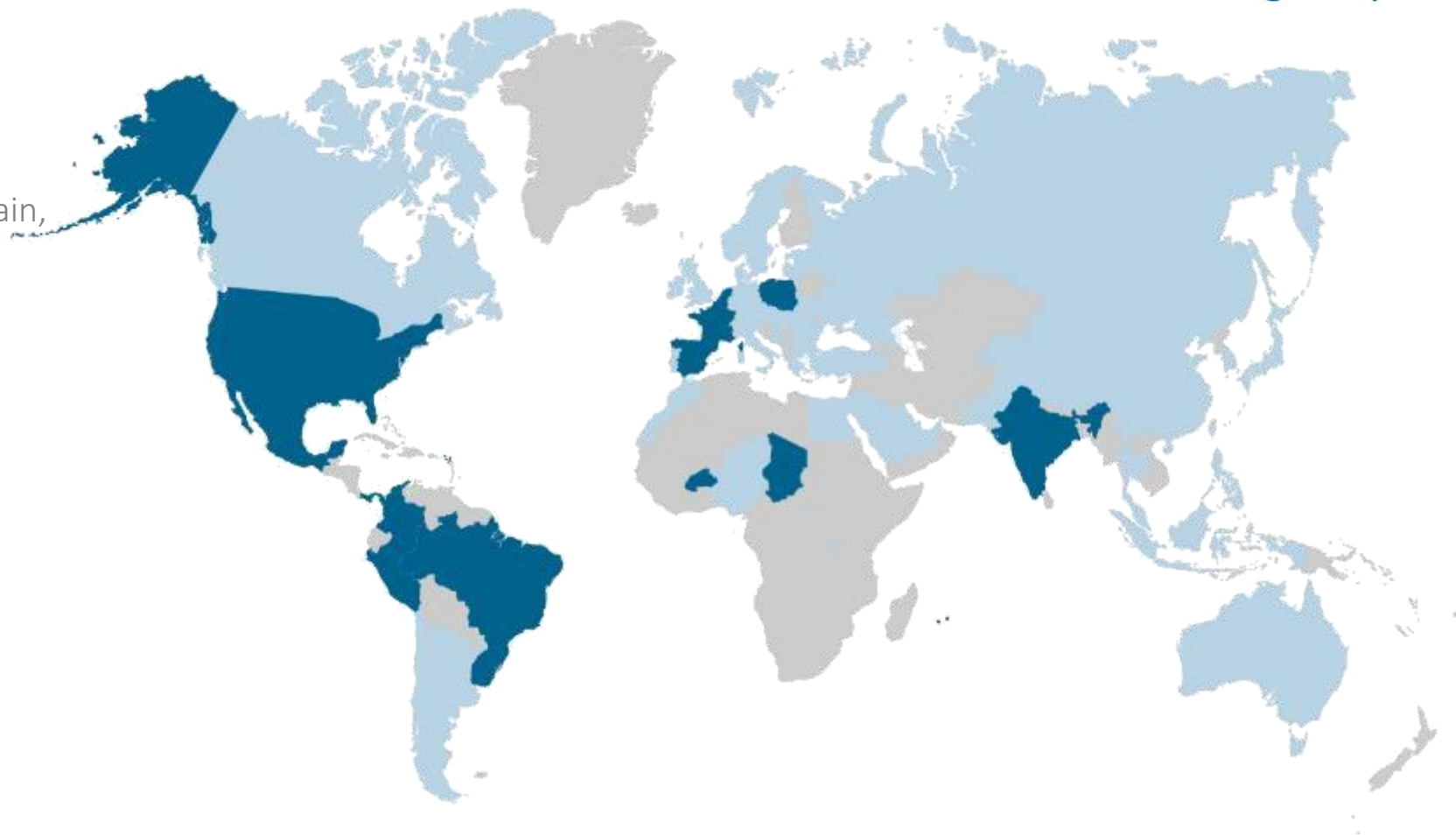


## WORLDWIDE

### Offices in:

The Netherlands, France, USA, Belgium, Spain,  
Poland, India and Brazil

More than 90 offices



# Presentation: Safety and ammonia

- Use of ammonia and energy transition
- Ammonia Risks
- Safety during design
- Quantitative Risk Analyses (QRA): effect of measures
- In case of a LoC: what to do
- Ammonia: public perception
- Summary

# Use of ammonia in industries

- Storage
- Usage as raw material to produce fertiliser e.g.
- Use in renewable energy (storage hydrogen, marine fuel)
- Transportation: via pipeline, ship, truck or rail

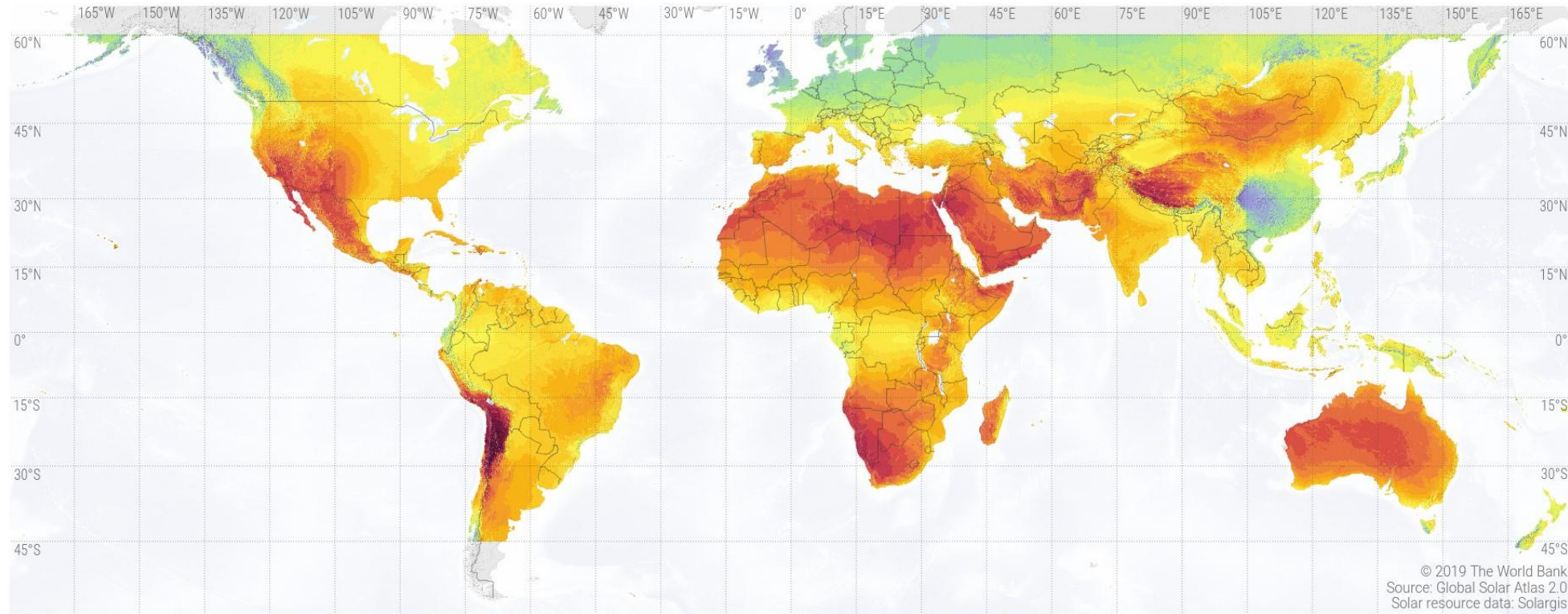
# Port areas in the picture for ammonia

SOLAR RESOURCE MAP

## PHOTOVOLTAIC POWER POTENTIAL

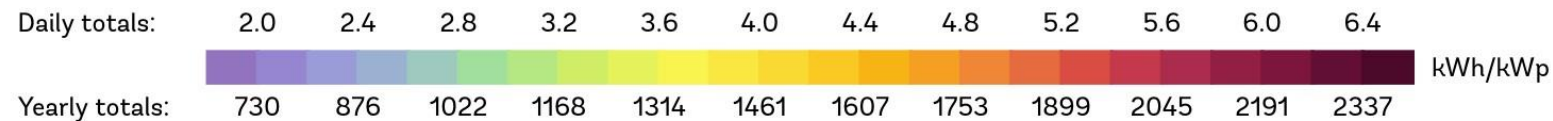


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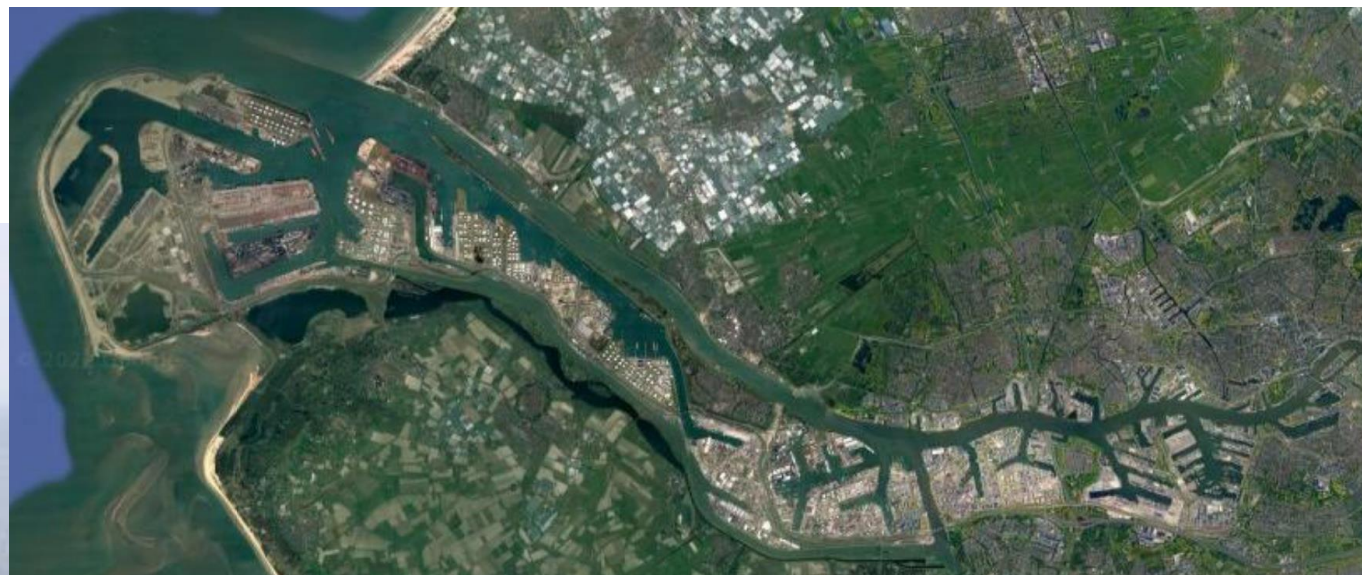
© 2019 The World Bank  
Source: Global Solar Atlas 2.0  
Solar resource data: Solargis

Long-term average of photovoltaic power potential (PVOUT)





# Port areas in the picture for ammonia



# Health risks by contact ammonia

- Inhalation: **Ammonia** is irritating and corrosive. Exposure to high concentrations of **ammonia** in air causes immediate burning of the nose, throat and respiratory tract.
- This can cause bronchiolar and alveolar edema, and airway destruction resulting in respiratory distress or failure.
- When exposed to a liquid pool fire: risk of boiling Liquid expanding vaporous explosion



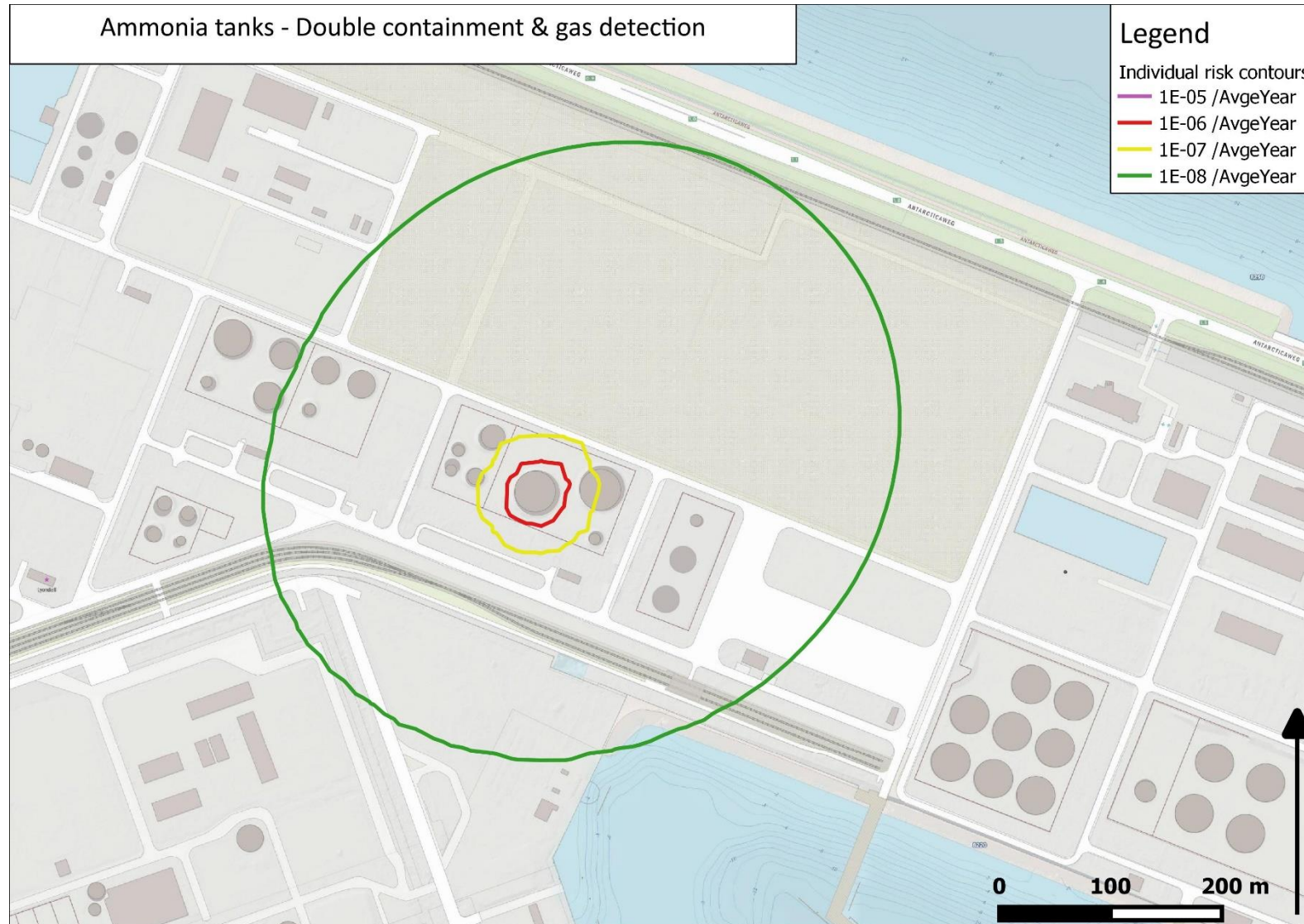
# How to deal with public safety risks

# How to deal with (negative) public perception

# Dealing with public safety risks of $\text{NH}_3$

1. Quantitative risk analyses:
  - a) industrial site
  - b) transportation
  - c) reduce or mitigate the probability of an incident
2. To reduce the effects of an incident:
  - a) look at the environment
  - b) reduce the ammonia pool
  - c) reduce the dispersion of the ammonia cloud
3. Safety management:
  - a) best available techniques
  - b) control and manage safety measures

# Quantitative risk analyses





# How to deal with the (negative) image



## Kans op overlijden per jaar



Vereniging van rijders	1 op de 10 miljoen
Vereniging van bestuurders	1 op de 10 miljoen
Sterven door een bijensteek	1 op de 5,5 miljoen
Door de bliksem getroffen worden	1 op de 2 miljoen
Externe veiligheid	1 op de 1 miljoen (10 <sup>-6</sup> )
Vliegen	1 op de 814.000
Werk in een gemiddeld bedrijf	1 op de 77.000
Lopen in het verkeer	1 op de 54.000
Fietsen	1 op de 26.000
Werk in landbouw en visserij	1 op de 14.000
Autorijden	1 op de 5.700
Brommer rijden	1 op de 5.000
Sigaret roken (pakje per dag)	1 op de 200

Maximum allowed in digital risk for public



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# ROOD SEIN VOOR DE AMMONIAK-TREIN

## AMMONIAK-TREIN VAN HET SPOOR NU OOK IN LIMBURG!

De provincie van Limburg heeft in deze tijd van coronacrisis een extra veiligheidsmaatregel genomen. Vanaf nu wordt de veiligheid van ammoniak-treinen in Limburg nog beter toezicht gehouden. Dit betekent dat er meer controle komt op de veiligheid van deze treinen. De provincie wil ervoor zorgen dat er geen ongelukken gebeuren met deze treinen. Dit betekent dat er meer controle komt op de veiligheid van deze treinen. Dit betekent dat er meer controle komt op de veiligheid van deze treinen.

**TREINRAMP MET KETTERLINGE**

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Take action  
against  
riding bombs

Explosive growth:  
toxic trains

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# How to improve your image

- Show why ammonia is beneficial for society
  - Energy transition, climate and planet proof
- Be safe in what you do
  - Safe by design: Minimize the risks in an early stage
  - Control and manage safety measures
  - Testing and inspecting, and keep up a good administration
  - Safety management and Safety culture: starts with good and responsible leadership
- Explain what you do
  - Good relationship with authorities: follow up safety legislation and permit rules
  - Good relationship with your neighbours: be transparent in what you do

*License to operate!*



# Summary

## Managing Risks and image of ammonia:

- ✓ Don't be afraid, but be aware of the risks
- ✓ Implement, manage and control safety measures applicable for your specific situation
- ✓ Safety culture = good leadership = be an example for your employees
- ✓ Manage public perception: don't ignore feelings of unsafety or other complaints in the surroundings of your business, but: inform, discuss, open up!



Thank you for your  
attention!

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