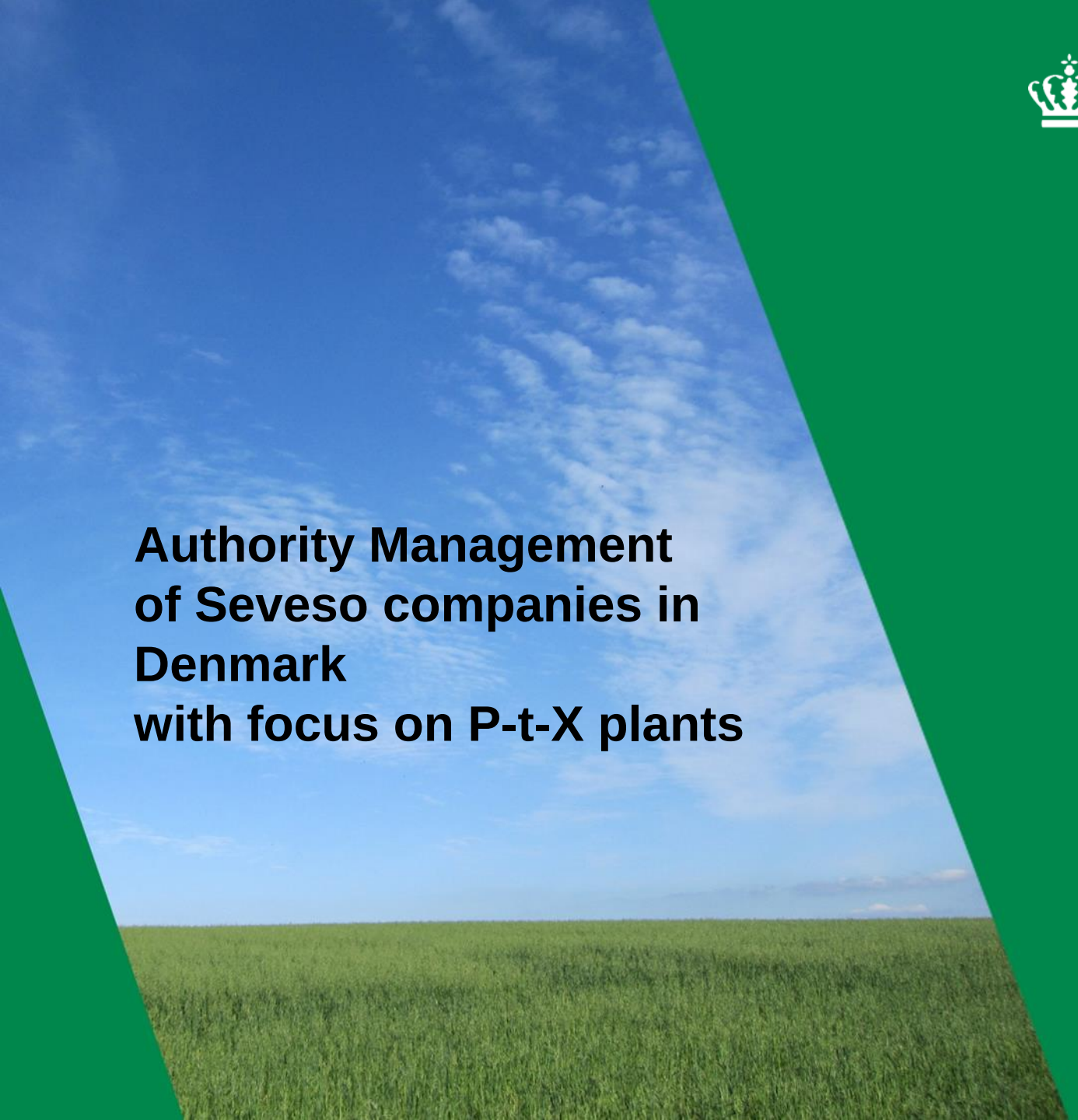


Ministry of Environment of Denmark
Environmental Protection Agency

Authority Management of Seveso companies in Denmark with focus on P-t-X plants

TWG 2 Meeting 2023

DEPA – Industrial Section
Henrik Bechmann Nielsen

The settings

- +400 plants under the Industrial Emission Directive (IED)
  - DEPA is the authority
- 160 plants under the Seveso Directive
- Lower tier plants – the authority is either
  - DEPA or
  - The Municipalities
- Upper tier 3-plants
  - Only DEPA is the authority

The Settings

DEPA is the Co-ordinating
Seveso Authority working along with:

- The Working Authority of Denmark
- The Danish Emergency Management Agency
- Local fire brigades
- Police
- Danish Safety Technology Authority

Power-to-X /PtX

Power to X is a part of the green adjustment of the society to meet the Paris Agreement for Carbon dioxide reduction.

Power-to-X, where X is:

- Hydrogen
- Methanol
- Ammonia
- Jet fuel

PtX processes

Hydrogen

Made by electrolysis of water – energy comes from
- land based winds farms
- offshore wind farms, or
- solar cells

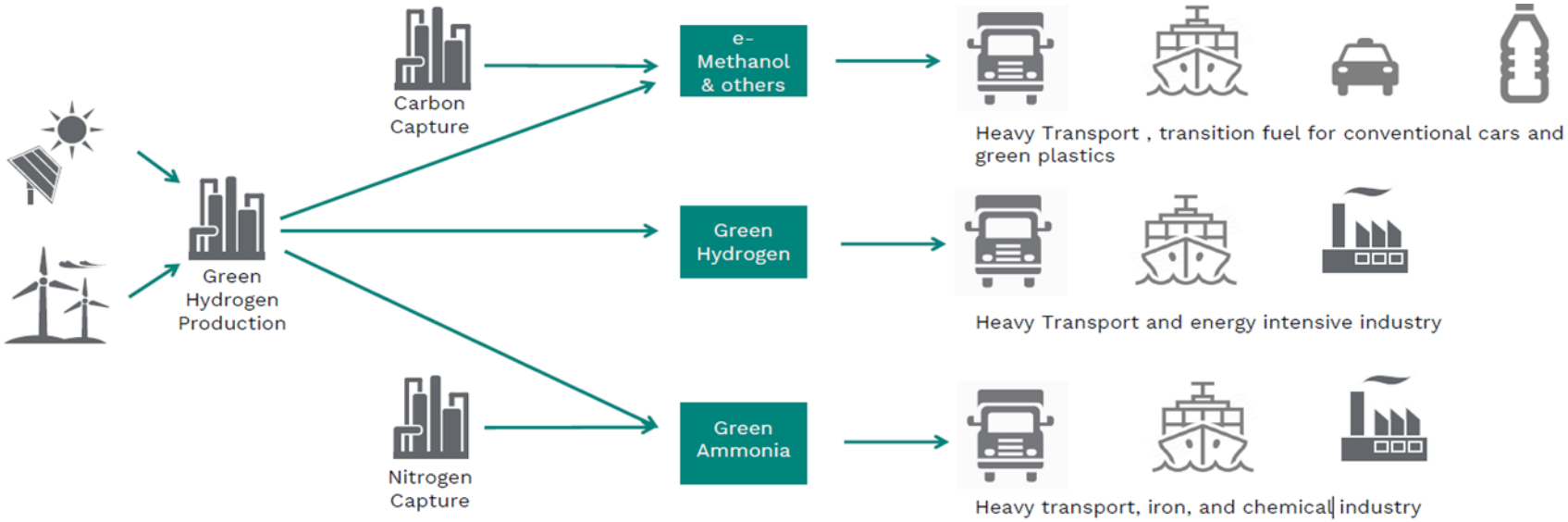
Ammonia

Produced in a Haber-Bosch facility from a chemical process between hydrogen and nitrogen. Nitrogen is extracted from air separation units

Methanol

Produced by synthesis of hydrogen and CO_2 (from different sources)

Power-to-X – Process and application

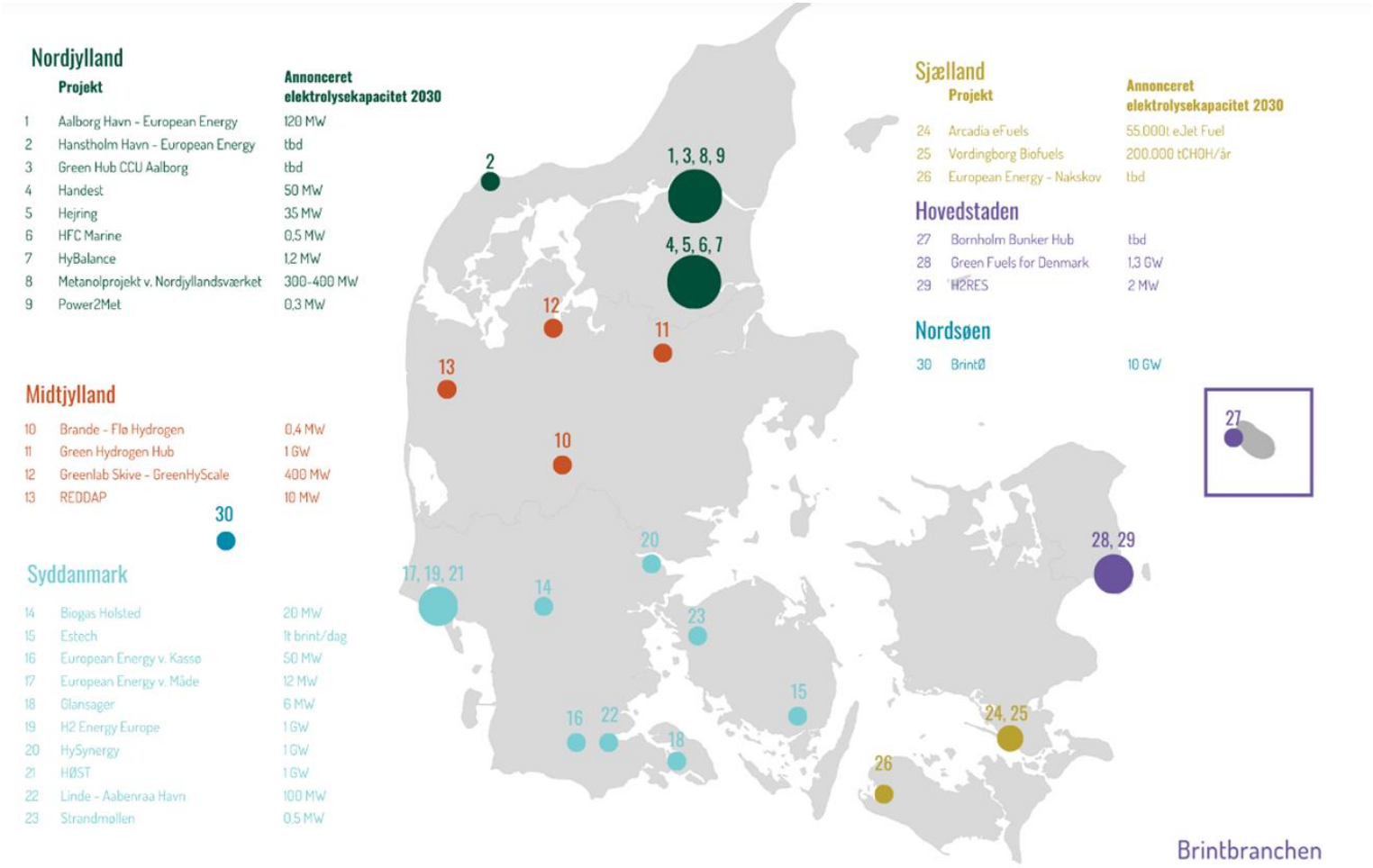


When does a PtX plant becomes a Seveso plant?

The stock /magnitude of dangerous substances:

	Tier 2 (tons) (Lower-tier)	Tier 3 (tons) (Upper-tier)
Hydrogen	5	50
Ammonia	50	200
Methanol	500	5.000
Jet fuel	2.500	25.000

Present and future PtX Projects in Denmark



Status at present

- 4 projects has been cleared and permitted to operate
- 12 projects have applied for permission to operate
- 9 projects are at the planning stage for application

Safety considerations

Safety documentation

What can go wrong?

How wrong can it go?

How to prevent accidents?

What to do, if it goes wrong?

→ Risk assessment

→ Impact calculations

→ Preventive barriers

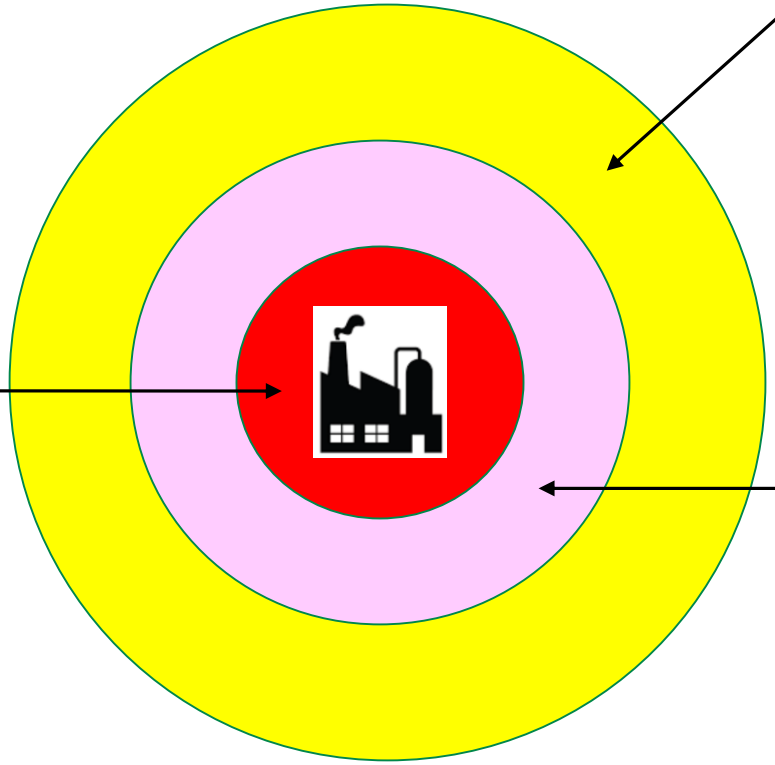
→ Emergency response plan and remedial barriers

Upper tier establishment: Safety report cf. Seveso Directive

Lower tier establishment: Safety document (DK)

What is the risk acceptance criteria for a PtX plant?

Within the area of the maximum risk consequence there must be no institutions with public emergency response, fire brigades or hospitals

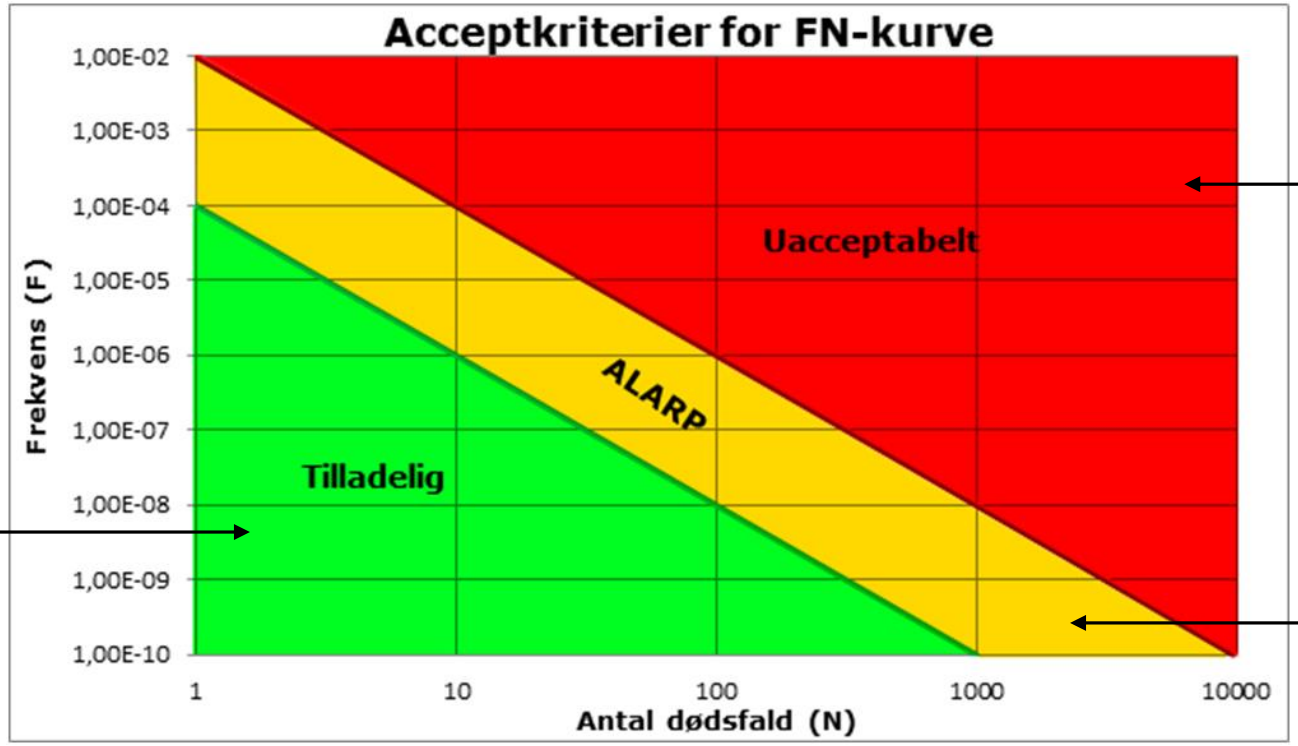


Individual risk 1 x 10^{-5}/year – the plant has full right of access

Within the area of individual risk 1 x 10^{-6}/year, there must be no planned or existing sensitive area-application like housing, offices, shops, institutions, hotels etc.

Example on visualization of the iso-risk curve's

Risk accept criteria for FN curve



Unacceptable

Acceptable

As low a reasonably possible

Number of casualties (dead) N

Example on a time frame for a new PtX project

Project description

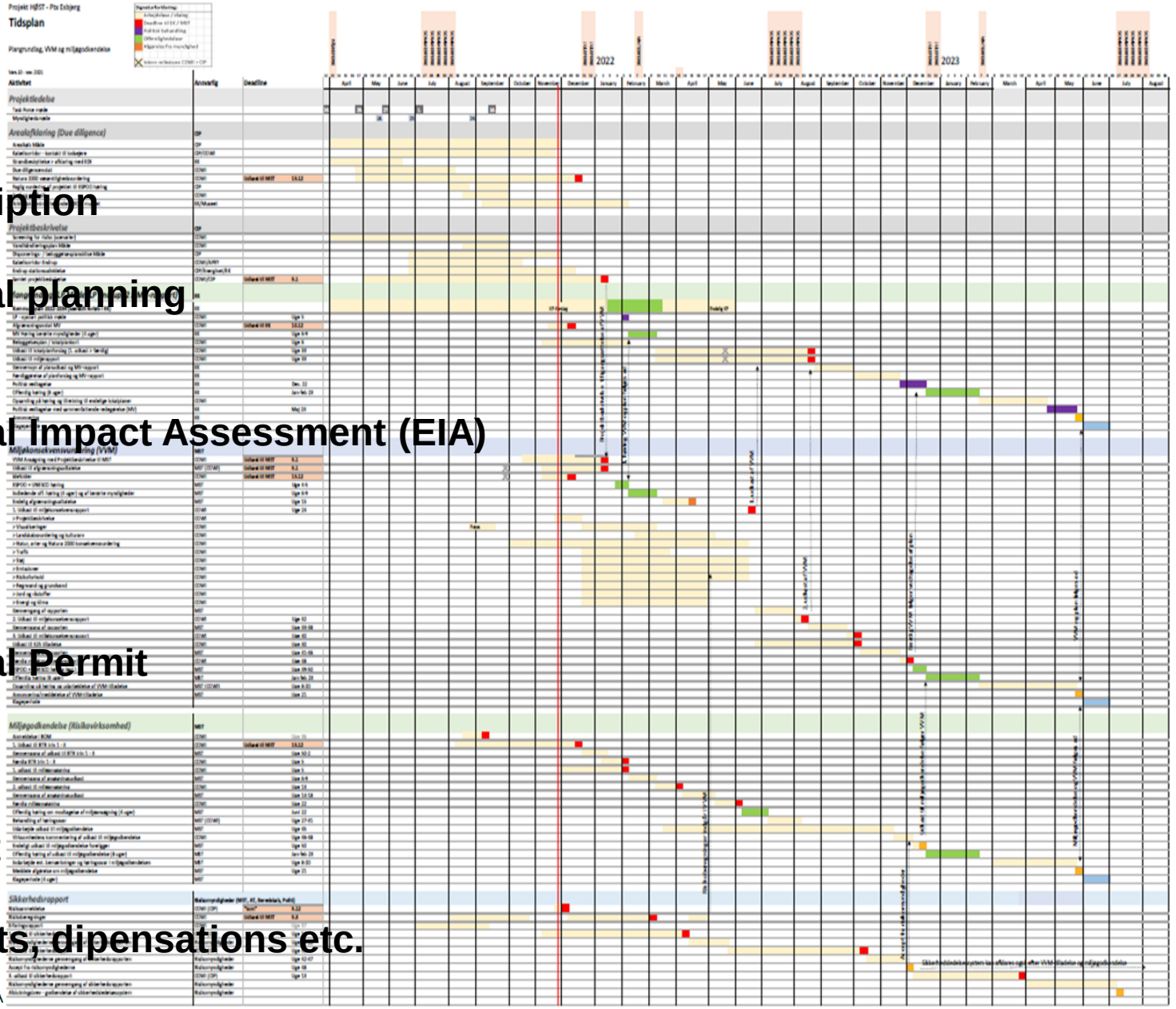
Basis for areal planning

Environmental Impact Assessment (EIA)

Environmental Permit

Safety Report

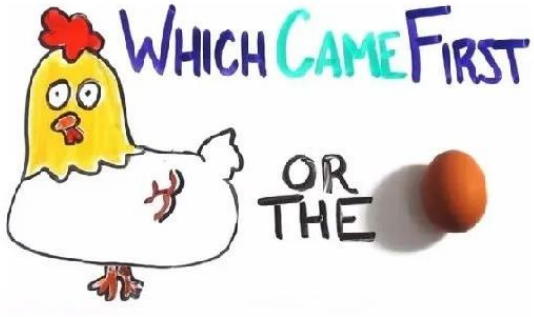
+ other permits, dipensations etc.



Challenges met in the permit process of a PtX establishment

- Dealing with an industry not used to respond to Seveso requirements
- Time pressure – all wants to be “first-movers” in DK and globally – add a pressure to the consultants
- Facility design may change throughout the permit process, add to the time frame
- The regulatory framework face challenges in the interface between legislation and the various involved authorities

Challenges met in the permit process of a PtX establishment



The chicken or egg problematic

- Industry decision on investment can only be achieved, when Seveso authority permit is in place
- The Seveso authorities can only issue a permit, when the decision on design of the establishment is final and risk assessment and PID’s are complete and made available to the Seveso authorities respectively.

Thank you for your attention

Appendixes – The PtX Process – converting green electricity to products from refinery of hydrogen, ex. Ammonia, methanol or jet-fuel.