

# Sicurezza dell'idrogeno dalla produzione all'erogazione

Quadro normativo e approccio alla progettazione



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- Short introduction to Kiwa: global, hydrogen and industry
- Application of the legislative/normative framework
  - an electrolyser
  - a hydrogen refuelling station
- Quality by design through compliance and conformity
- Contact information

# This is **what we do** at Kiwa

Creating trust, driving progress. That's what we do for our customers.  
We support our core activities with three additional activities.



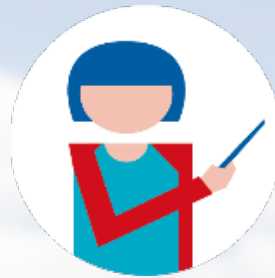
Testing



Inspection



Certification



Training



Consultancy



Data Services

We operate fully independently and impartially. Therefore, we strictly separate our certification, testing and inspection services from adjacent activities like offering training courses, consultancy and data-related or data-driven services.



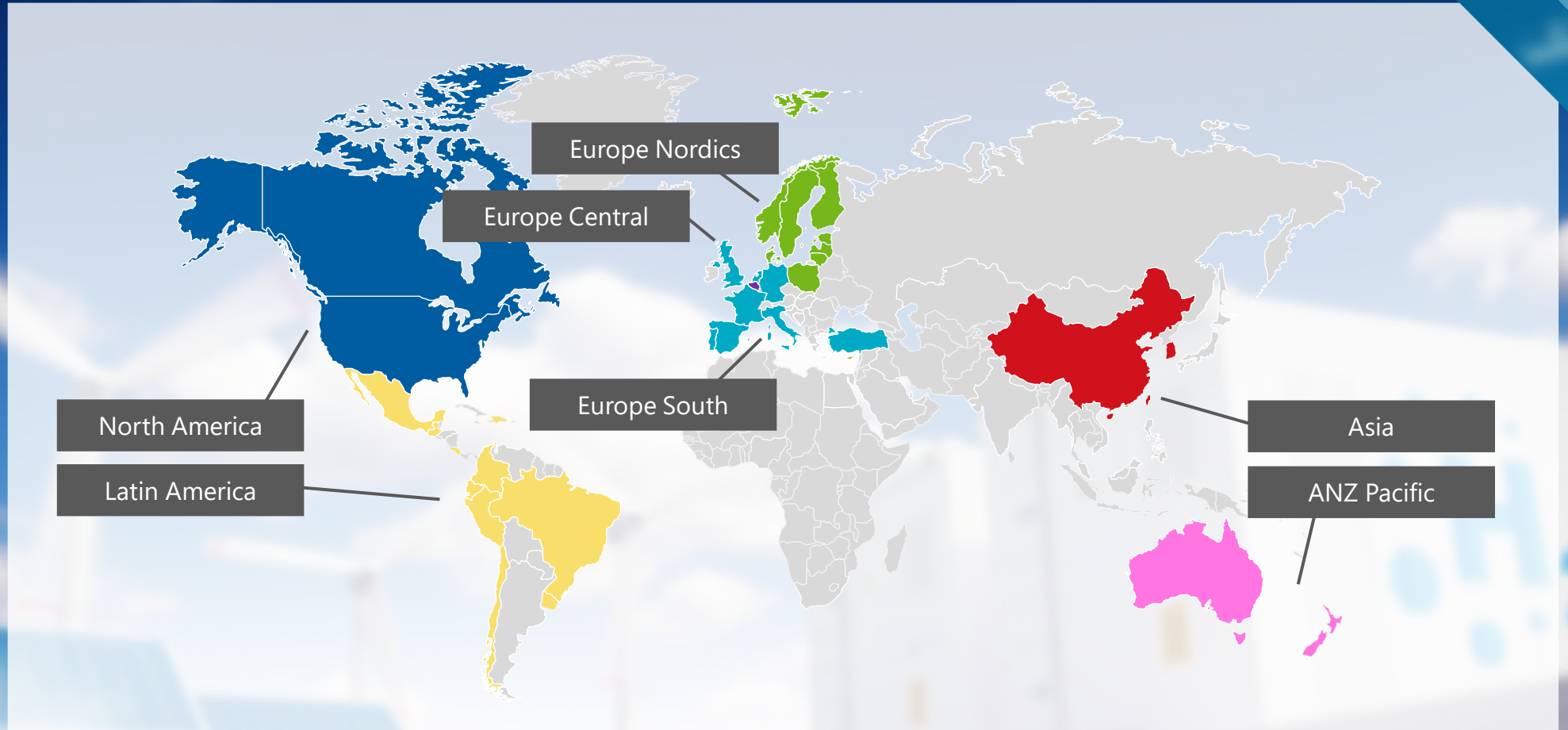
# This is who and where we are today



Globally active,  
locally available



> 10k experts



# Your partner in the **hydrogen** sector

- State of the art hydrogen laboratories
- One-stop-shop for testing, inspection, certification and consultancy
- For all parts of the hydrogen supply chain
- In all phases of industrial project development
- Global player



# Safety from **product** to **workplace**

## *Economic directives*

### PRODUCT

COMPONENT

EQUIPMENT

ASSEMBLY



## *Social & Local directives*

### WORKPLACE

INSTALLATION



**local legislation**

RISK ANALYSIS

E

P

C

		Potential Consequences				
		L1	L2	L3	L4	L5
		Minor injuries or discomfort, no medical treatment or reasonable physical effects.	Minor injuries or discomfort, medical treatment, temporary impairment.	Minor injuries or discomfort, medical treatment, temporary impairment.	Minor injuries or discomfort, medical treatment, temporary impairment.	Minor injuries or discomfort, medical treatment, temporary impairment.
Likelihood	Expected to occur regularly under normal circumstances	Almost Certain	Medium	High	Very High	Very High
	Expected to occur at some time	Likely	Medium	High	Very High	Very High
	May occur at some time	Possible	Low	Medium	High	Very High
	Not likely to occur in normal circumstances	Unlikely	Low	Low	Medium	High
	Could happen, but probably never will	Rare	Low	Low	Low	Medium

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# ...from product

## Pre-Assessment (Design Phase)

- Identification of all applicable directives and relevant standards
- Review of the risk assessment
- Design Review

Pre-assessment  
report

## Costructional Review (Prototype phase)

- Component conformity
- Assessment of the functional safety
- Compliance with requirements

Test programme

## Type Testing (Prototype phase)

- Tests at accredited facilities or at client's site in witness
- ISO 17025 accredited tests

Test report

## Certificate(s) (Production phase)

- Certificate of "presumption of conformity"
- Certificate of compliance with NoBo-required directives

Certificate



### Pre-Assessment (Design Phase)

- Identification of all applicable directives and **relevant standards**
- Review of the risk assessment
- Design Review

Pre-assessment  
report

### Which standards are relevant for electrolyzers?

- **ISO 22734** ("Hydrogen generators using water electrolysis") and all normative references therein (e.g. on pressure vessels, hydrogen piping, safety of machinery, explosion safety etc.)
- **IEC 62282-8 series** ("Energy storage systems using fuel cells in reverse mode") insofar as they relate to electrolysis operation (not fuel cell operation)
- **European Commission JRC Protocol Harmonization:**
  - Low-temperature water electrolysis (LTWE)
  - Accelerated Stress Tests for LTWE
  - High-temperature steam electrolysis (HTE)
- **ISO 14687** ("Hydrogen fuel quality — Product specification")
- Any local/national standards/guidelines available



# ... to workplace

## H<sub>2</sub> refuelling station

### Quadro legislativo

- **Decr. Leg. 26/6/2015** (Attuazione direttiva 2012/18/UE) «*Controllo del pericolo di incidenti rilevanti connessi con sostanze pericolose*»
- **Decr. 23/10/2018** «*Regola tecnica di prevenzione incendi per la progettazione, costruzione ed esercizio degli impianti di distribuzione di idrogeno per autotrazione*»
- **Decr. Min. 7/7/2023** «*Regola tecnica di prevenzione incendi per l'individuazione delle metodologie per l'analisi del rischio e delle misure di sicurezza antincendio da adottare per la progettazione, la realizzazione e l'esercizio di impianti di produzione di idrogeno mediante elettrolisi e relativi sistemi di stoccaggio*»



C&C Domain	Subject
#01	PED Compliancy
#02	Steam legislation
#03	NDT
#04	Camera
#05	Elevators, lifting & hoisting
#06	Electrical Equipment & installation
#07	Risk assessments
#08	Fire Safety
#09	Temporary or mobile construction sites
#10	Environmental legislation
#11	Seveso III / Safety report
#12	Construction works
#13	ATEX 114 "Equipment for potentially explosive atmospheres" (for manufacturers)
#14	Machinery (Assembly according to Unit Approval with IIA) Assembly according to Unit Approval with IIB) Work equipment (including machinery)
#15	Process safety vs Technical safety (Process Safety & Technical safety implemented by Functional safety assessment)
#16	ATEX 153 "Workplace"
#17	Soil displacement during excavation works
#18	KLIM (work permit underground lines)
#19	CLP (Classification, Labelling and Packaging of substances and mixtures)
#20	EPB (Energy Performance of Buildings) (buildings with conditioned atmosphere)
#21	Ionising / radio-active / nuclear radiation
#22	Environmental Impact Assessment EIA (MER)
#23	Industrial Emissions Directive (IED)
#24	Construction Products Regulation (CPR)
#25	Measure Instruments Directive (MID)
#26	Emission limits combustion engines
#27	Temporary Housing and utilities
#28	Special road transport
#29	Restriction of hazardous substances in electrical and electronic equipment (RoHS)
#30	COGEN Certification
#31	Gas Law
#32	LEGIONELLA
#33	APAC (Association assurance Peinture AntiCorrosion ) verzekeringsvereniging – <a href="http://www.apac-corrosion.be">www.apac-corrosion.be</a>
#34	Centrifuges
#35	Renewable Energy Directive
#36	Sustainable Aviation Fuels
#37	ETS (Emission Trading Directive) (if applicable)
#38	Battery Directive
#39	Drinking Water
#40	Havenverordening Rotterdam 2020
#41	Jetty security
#42	Europese F-gasverordening (EU) nr. 517/2014





# ... to workplace

## H<sub>2</sub> refuelling station

### *Quadro normativo*

#### Safety of machinery

- Notified Body for assemblies, PED/MD/etc
- Fitness for service, testing & commissioning
- Risk analyses operators

#### Process safety – risk analyses

- HAZOP, LOPA, SIL Determination
- Certified functional Safety Analysts
- SIF Design & Proof Testing

#### Explosion safety

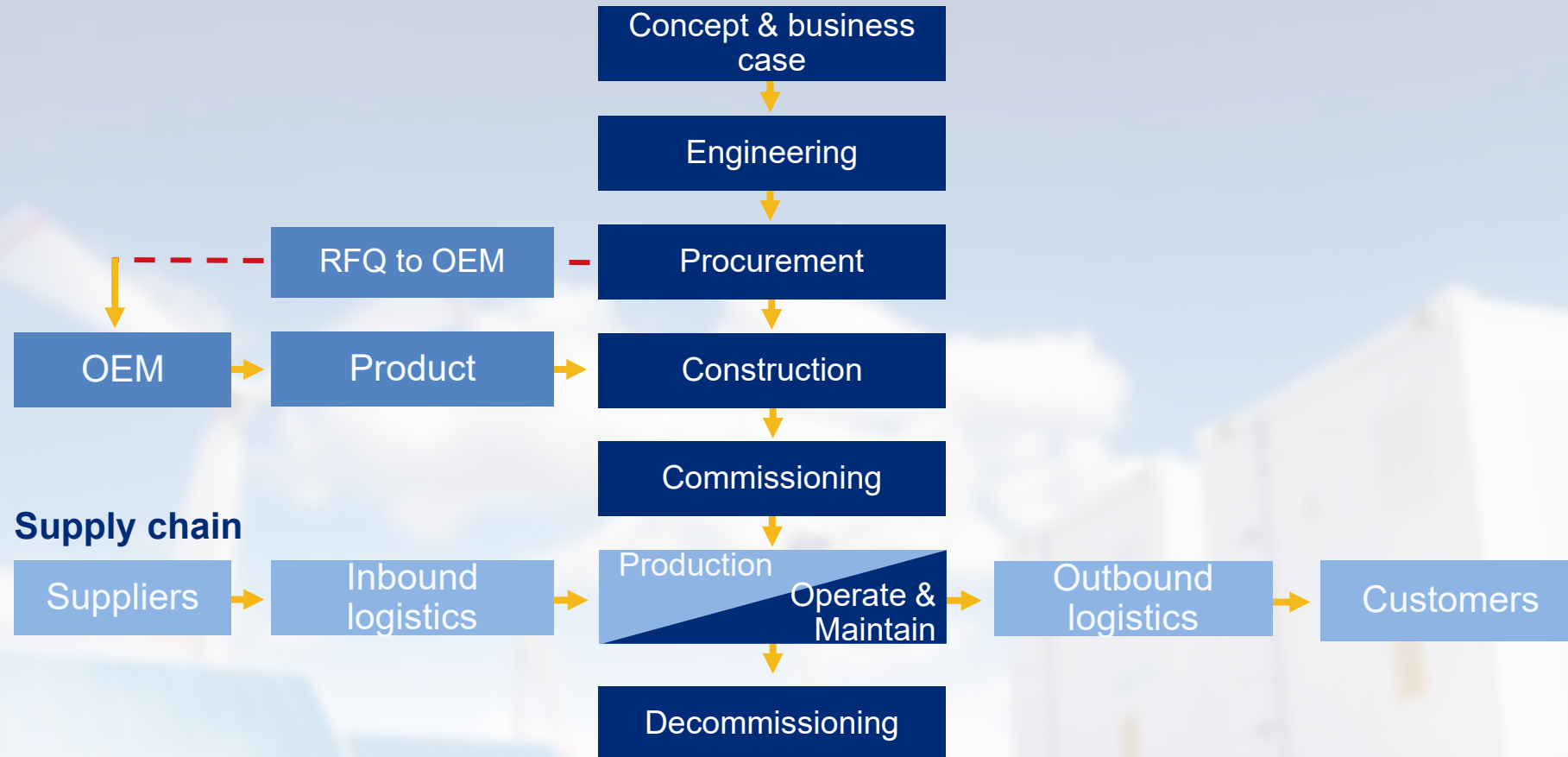
- Expertise and risk analyses regarding ATEX 153 and ATEX 114
- ATEX Zoning & Technical Dossier, identification of ignition sources
- Explosion Safety Document
- Field inspections for ATEX equipment on site

#### QRA and effect modelling

- Seveso safety – major accidents
- Building Risk Assessment
- Facility siting studies
- Ignition sources, Gas detection, Emergency response, Escalation

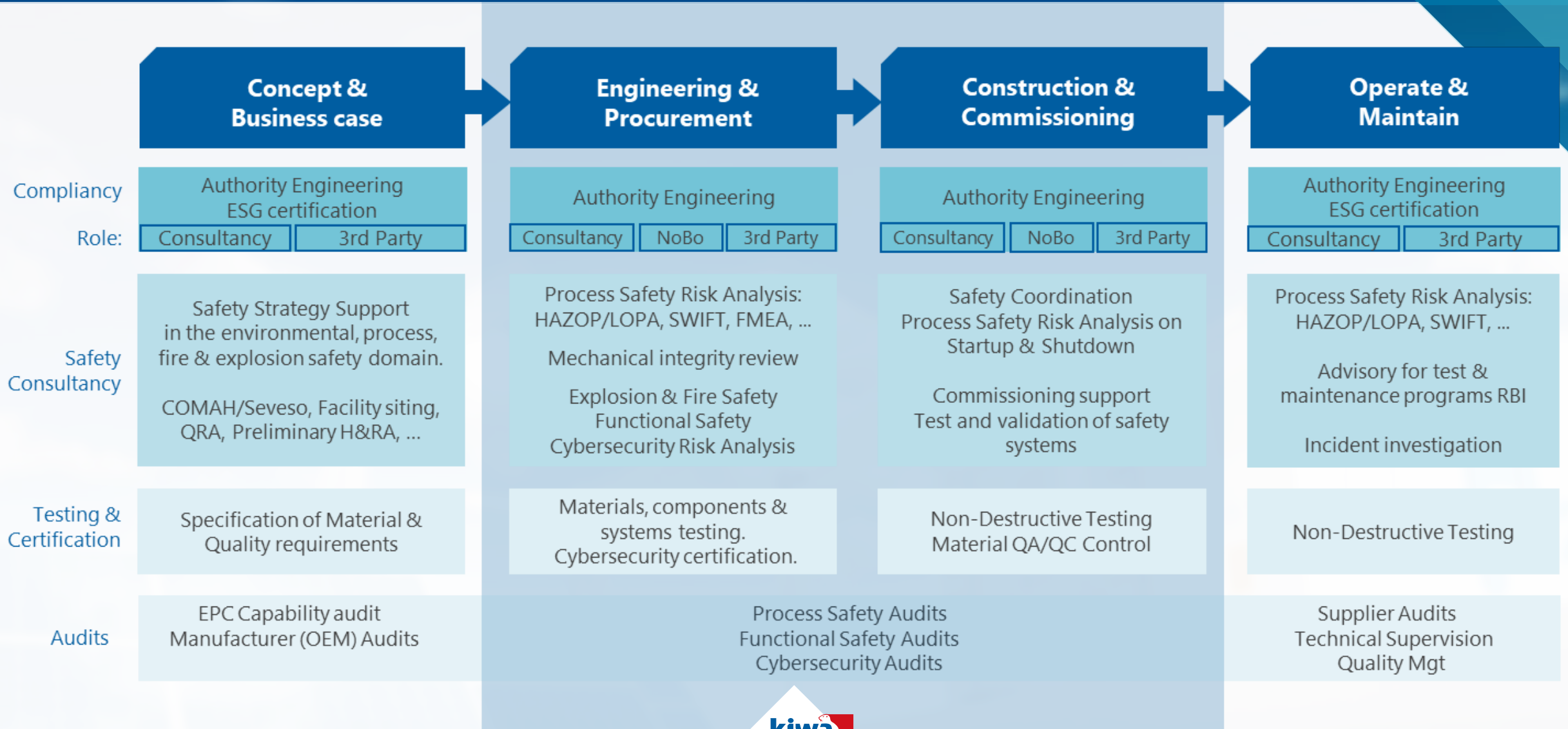


# Quality by design approach – internal processes...





# Quality by design approach – ...in 4 dimensions



# Quality by design approach – beyond silos

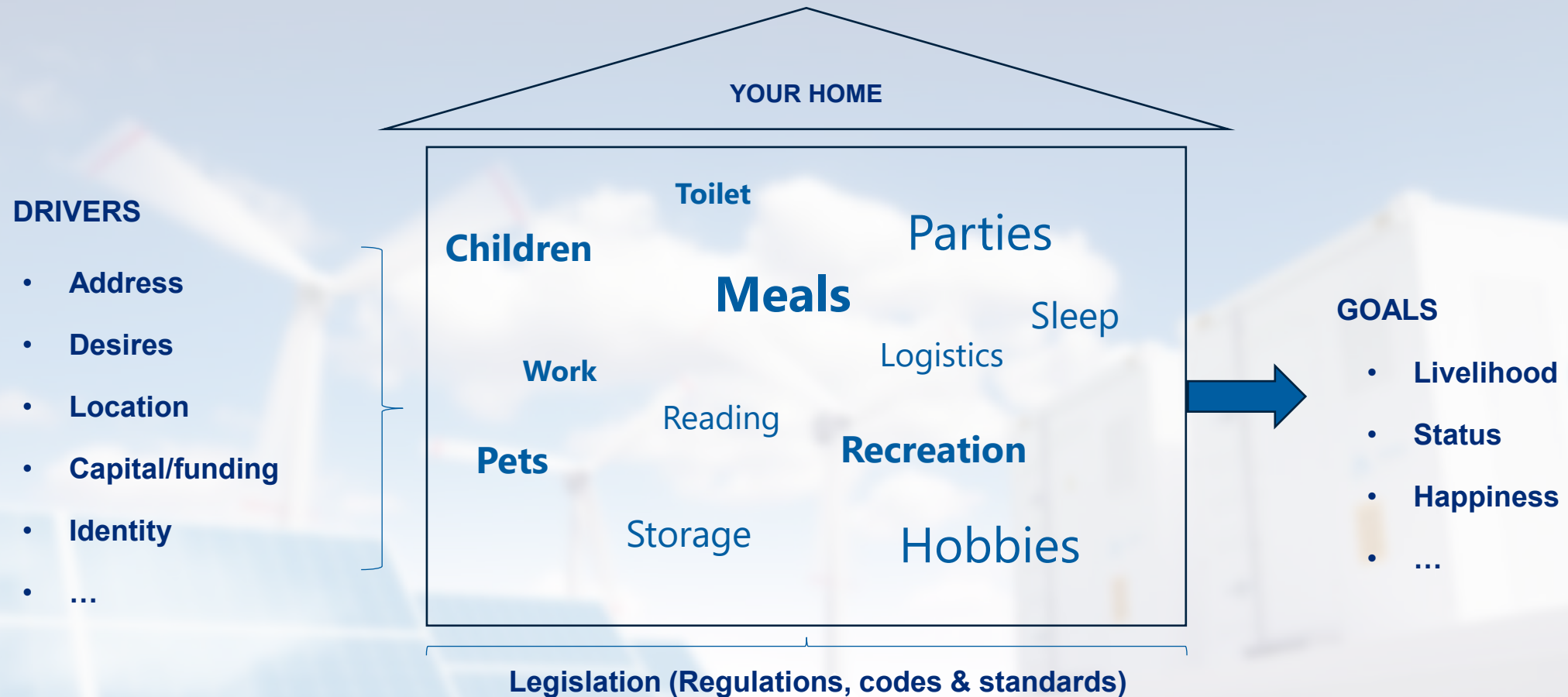
Individual component optimization

does not lead to

system optimization

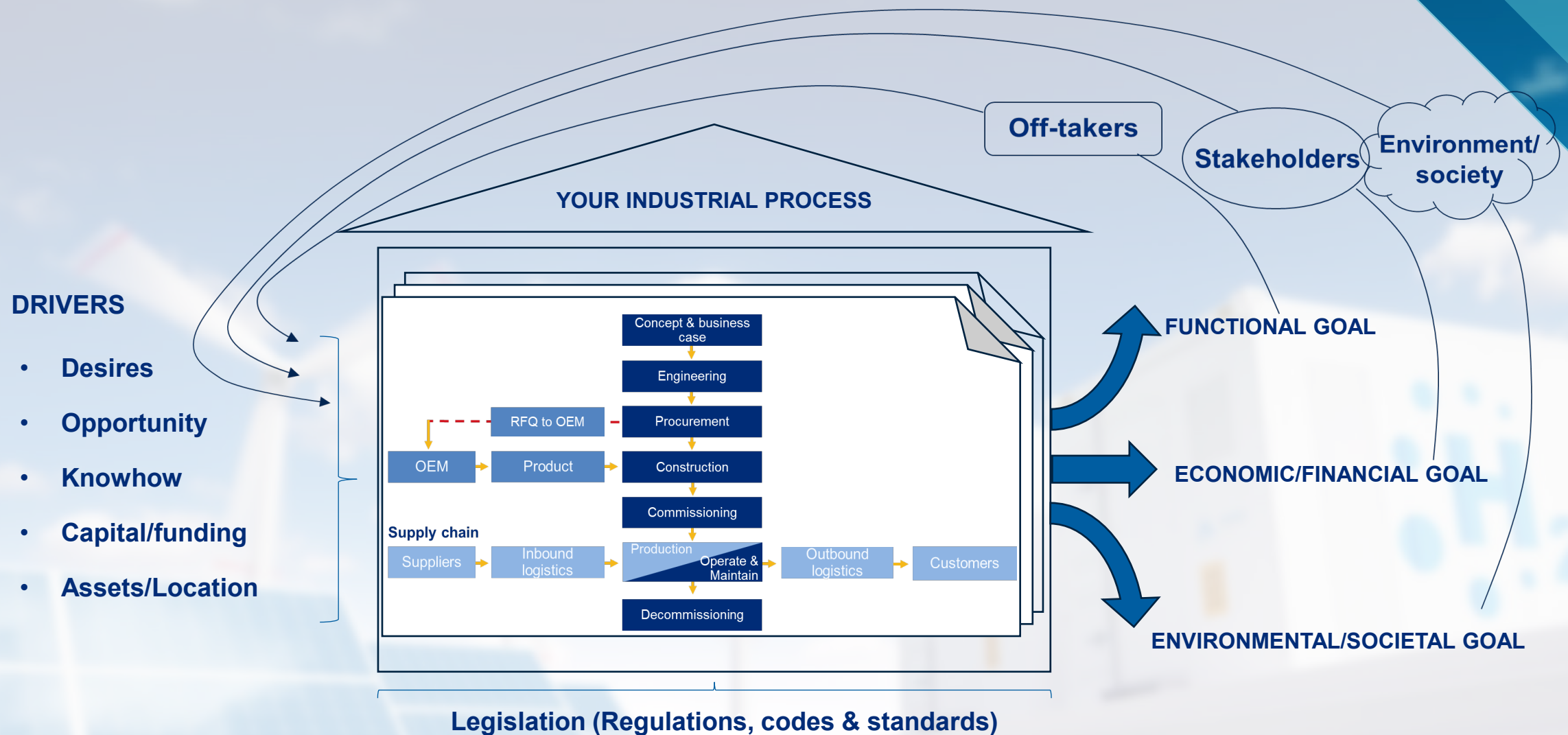


# Quality by design approach – beyond silos

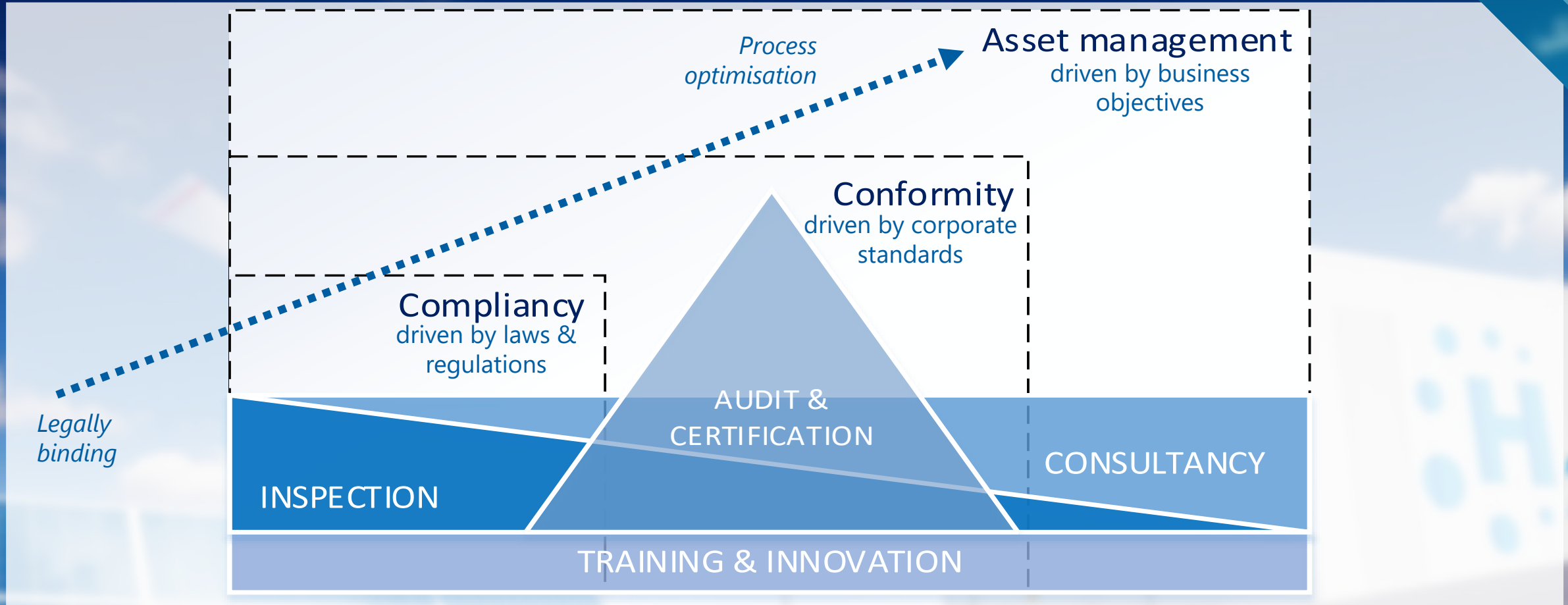




# Quality by design approach – beyond silos



# Kiwa – from NoBo to knowledge partner



# Summary and contact information



**Tailored service packages**  
to enhance safety and quality



**Professionalism guaranteed**  
combining expertise and vision

## Primary contacts



**Stephen McPhail**  
[stephen.mcphail@kiwa.com](mailto:stephen.mcphail@kiwa.com)  
**Giulia Botta**  
[giulia.botta@kiwa.com](mailto:giulia.botta@kiwa.com)



Discover more services →



# We create trust



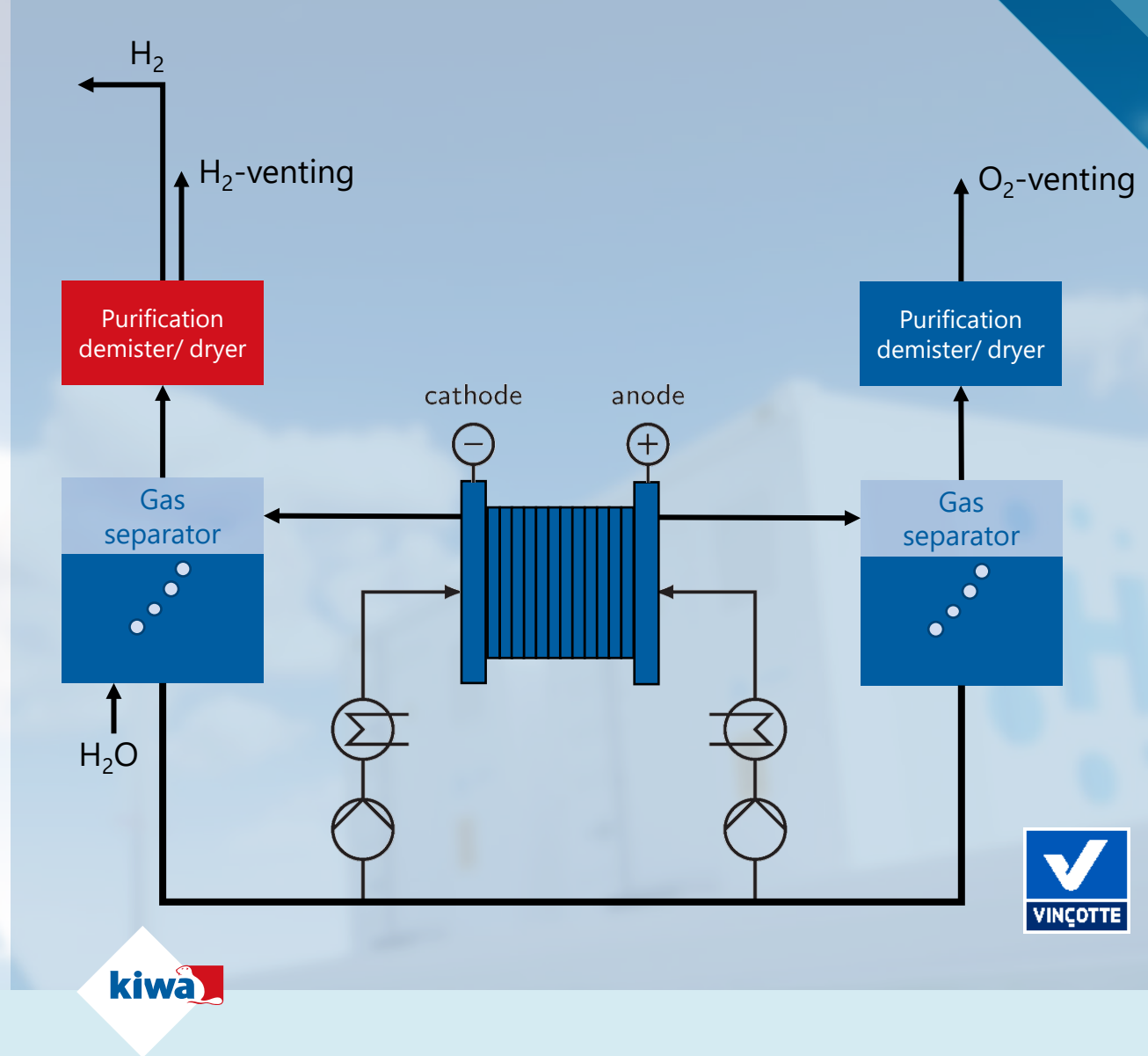
**Stephen McPhail**  
[stephen.mcphail@kiwa.com](mailto:stephen.mcphail@kiwa.com)



Partner  
for  
Progress

### Kiwa supports you in your:

- Alignment between stack suppliers
- Assessment of risk assessments for electrolyzer design & integration
- Audits of suppliers & subcontractors according to relevant standards or Cepsa standard operating procedure (SOP)
- Electrolyzer testing in accredited labs (ISO 22734, IEC 62282)
- Notified-Body services: certification of assemblies and components, inspections during installation and final documentation
- Installation approvals and inspections



# Workplace safety

## Electrolyser plant

Storage &  
Filling station

Compression

### Kiwa supports you in your:

- Bankability assessment
- High level risk assessments
- Support in plant integration philosophies, facility citing studies, ...
- Support/Assessment of risk assessments for plant integration
- Installation approvals and inspections
- O&M Readiness Plan for electrolyser plants

Interconnectivity creates new risks!

