



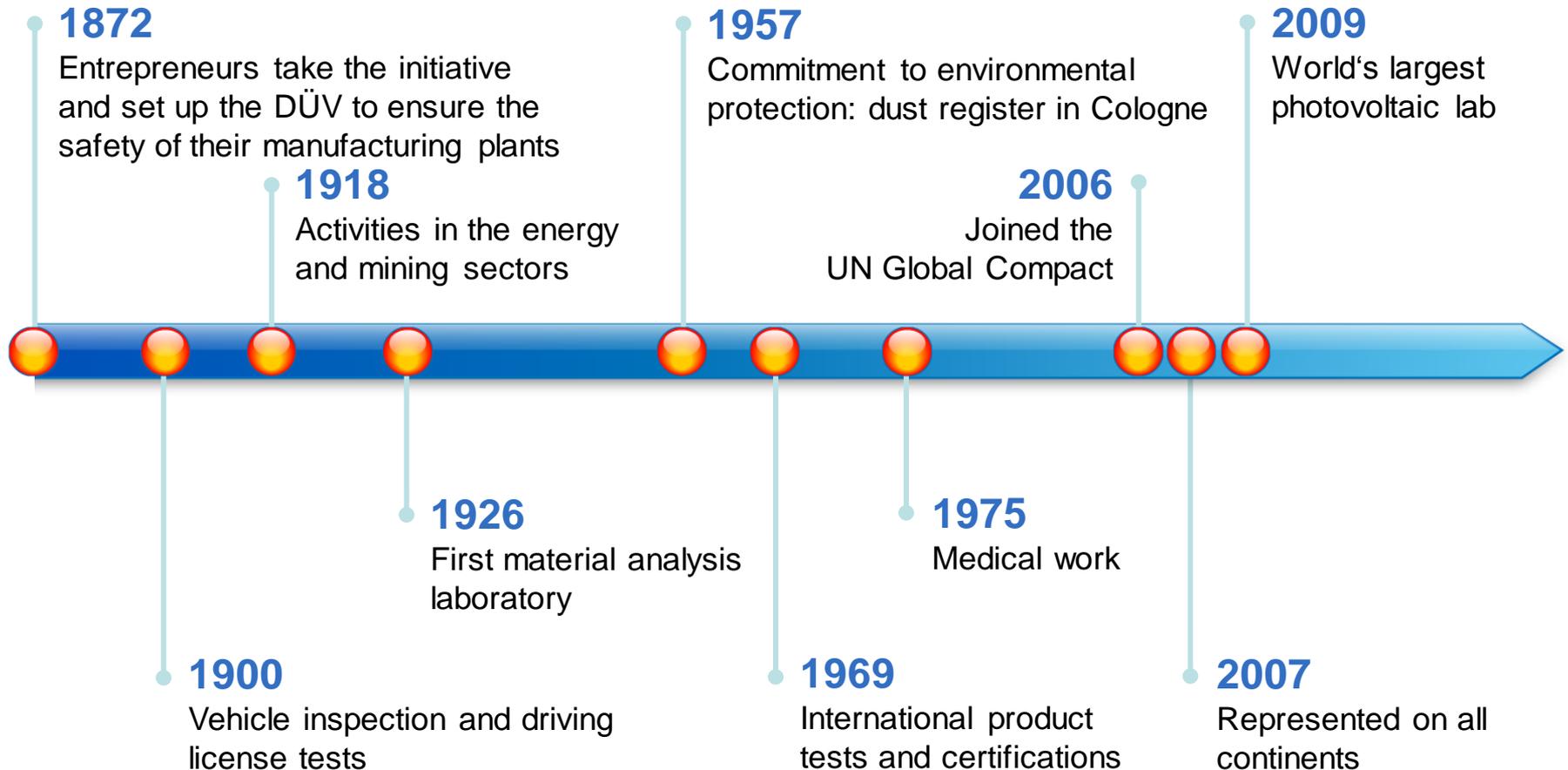
**Safety Aspects  
of Introducing a Viable and Sustainable  
Natural Gas Vehicle Infrastructure  
in Kazakhstan**





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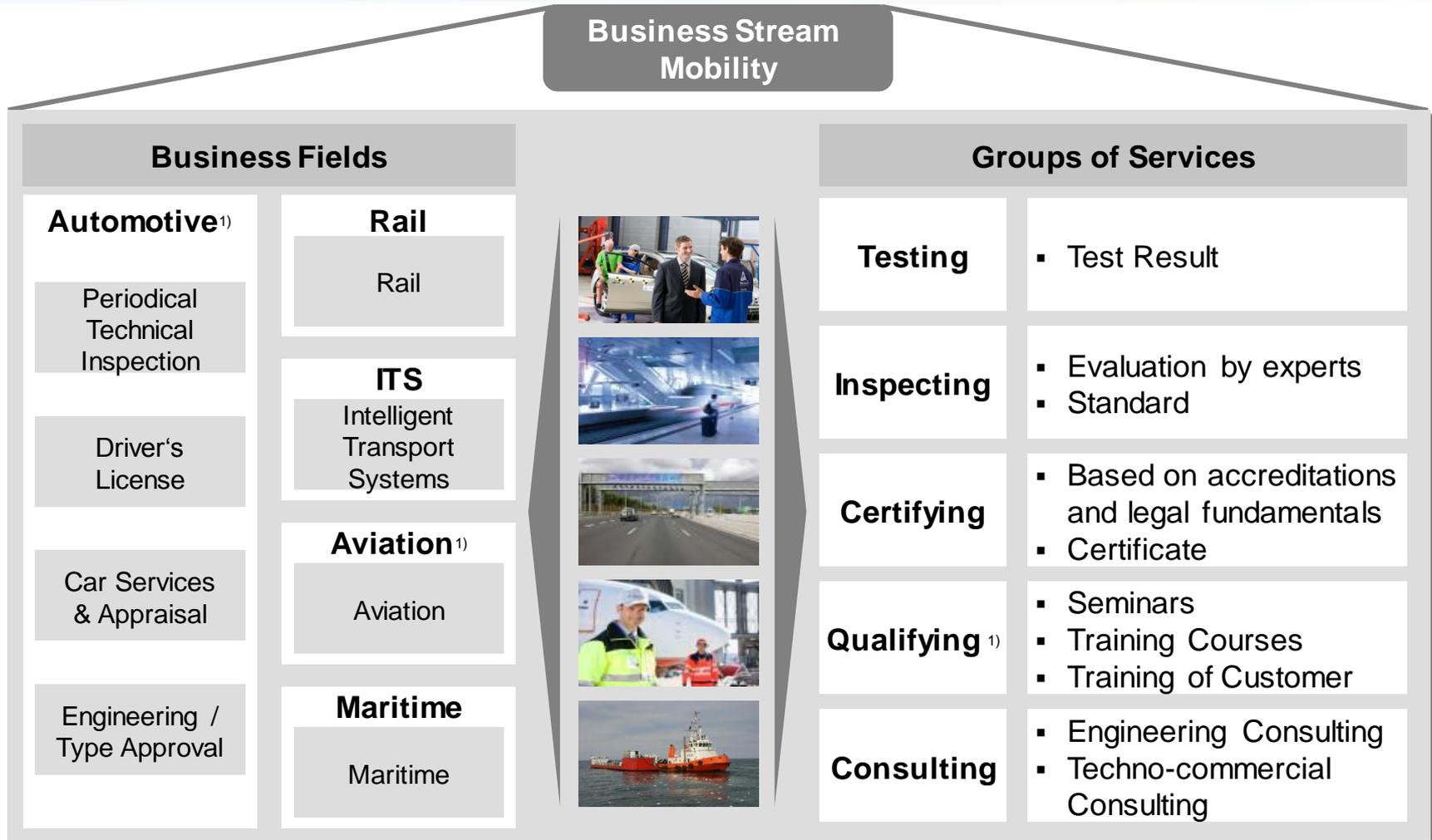
Systems

Processes

People

# Mobility

## Focus on Groups of Service within the Business Fields



<sup>1)</sup> partly overlapping with other Business Streams/Fields possible (e.g. Airports, Driver's Training)

# Contents

**1. Present Situation**

**2. Motivation**

**3. Regulatory Aspects**

**4. Legal Framework Automotive and Industrial**

**5. Specific Contents Automotive**

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# 1. Present Situation

- **Steady economic growth since KAZ independence in 1991**
- **Corresponding success of Almaty results in increase of citizens**
- **Expansion of public transport sector, increase of private cars**
- **Smog / air pollution => health risks**

## 2. Motivation

- Increase of air quality
- Responsible and liable use of crude oil  
(Essential resource w/o alternatives in chemical and pharmaceutical industry, should not be “wasted” as a fuel for vehicles)



### **Introduction of Natural Gas as a viable and sustainable fuel**

**NATURAL GAS**

**Naturally mobile**



### 3. Regulatory Aspects

- Adoption and implementation of a reasonable and consistent legal and regulatory framework all over KAZ is essential
- This challenging work is currently being done, as required by President Nasarbajew and the Senate
- What is available at present? How should new regulations be structured?

## 4. Legal Framework automotive and industrial

KAZ Laws and  
Statutory Regulations

Technical Engineering Standards  
Regulations, Norms, Codes, etc.

ECE  
VdTÜV

Company Policies

Management Procedures

Auditing Process Manual, Audit List

Material Specifications and Minimum  
Functional Specifications

Manufacturer's Recommendations

It is likely KAZ to  
introduce European  
regulations

## 5. Specific Contents Automotive

**Not included/considered yet, but ESSENTIAL!!!!**

### KAZ Regulation Natural Gas Vehicles Scope (excerpt, based on EU legal framework):

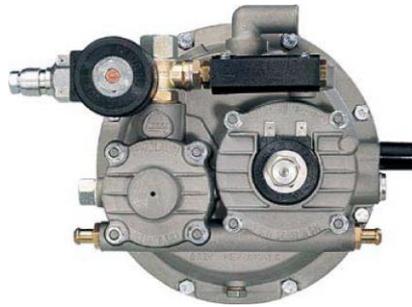
- Legal criteria for the use of components & their installation (UNECE R110, R115)
- Stakeholders and their roles
- Certification of Road Vehicle Workshops to convert vehicles
- Training
- Approval of (converted) vehicles using CNG



## 5. Specific Contents Automotive

# Implementing regulations / measures for NGVs:

## UNECE R 110: Specific Components and Vehicles



## UNECE R 115: Retrofit systems

including emission testing and approval



## 5. Specific Contents Automotive

# Certification of Conversion Workshops/ NGV Repair Workshops

- Dedicated training of personnel with final exam and personal certification (Principal, Sales Clerks, Workers, etc.)
- Assessment of workshop's quality assurance procedures, equipment, insurances
- Final audit / certification
- Re-certification every 24 months

## 5. Specific Contents Automotive

### Training of personnel (I)

Theoretical Training by TÜV:

- Legal Basics
- Fundamentals of Gaseous Fuels: CNG vs. LPG vs. H2
- Specific technical requirements of NGV conversions based on UNECE R110, R115, and state of the art
- Final internal inspection after conversion (GSIT: **G**as **S**ystem **I**nstallation **T**est)
- Periodical re-inspection of NGVs and CNG-cylinders (GST: **G**as **S**ystem **T**est)

### Training of personnel (II)

#### Practical Trainings:

- Dedicated tube fitting training by fittings manufacturer
- Dedicated installation training of kit-manufacturer(s)
- Fault finding training by TÜV
- GSIT/GST training (proper installation, functional test, leakage test)

## 5. Specific Contents Automotive

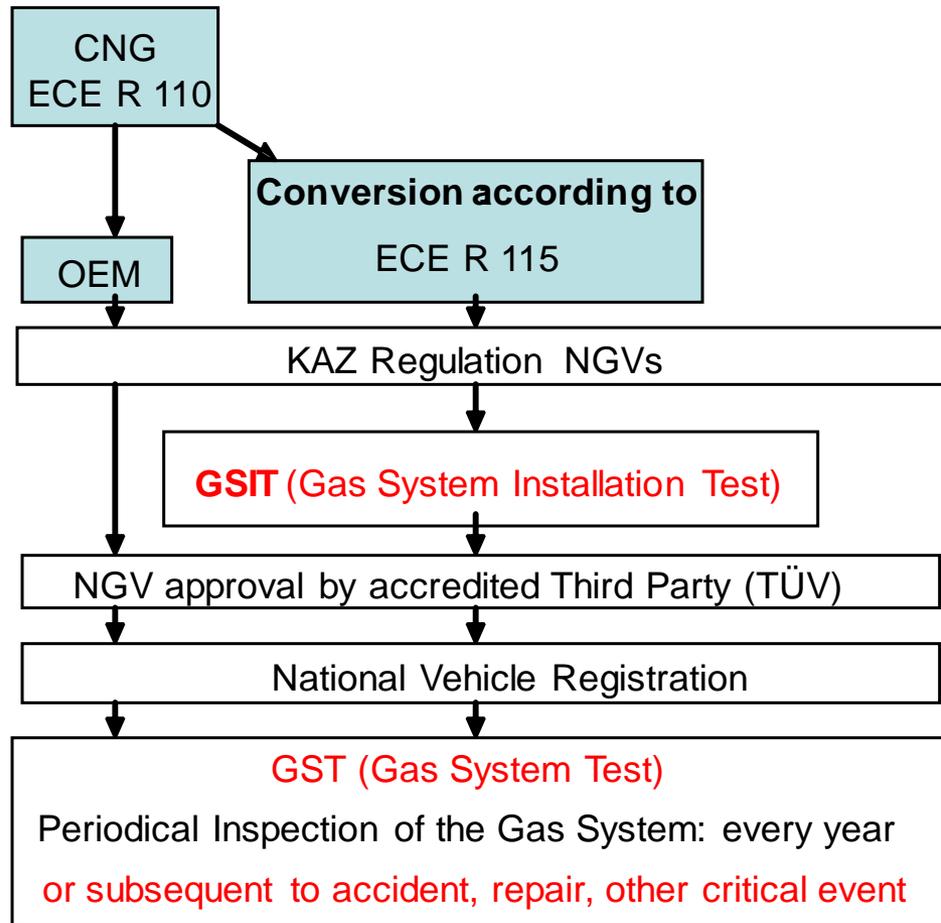
### Training of future trainers

- Comprises of theoretical and practical training as well
- Both parts are more in-depth, and much more detailed
- Future trainers shall have a minimum experience and qualification:

Master craftsman's diploma in Motor mechanic or vehicle electrician or vehicle mechanic or vehicle mechatronic or mechanic for car body repair or car body mechanic or Diploma in Engineering (Dipl.-Ing) or Bachelor or Master Degree in mechanical engineering or automotive engineering or electrical engineering or Aerospace engineering with min. 3 years experience

## 5. Specific Contents Automotive

### The NGV conversion flow chart (how the process should function):



## 6. Specific Contents Industrial

### Suggested Applicable Regulations

#### stationary:

German VdTÜV 510 in conjunction with:

Draft of EN 13638

Draft of EN 13945



#### mobile:

ADR (Transportation of Dangerous Goods on the Road)



## 6. Specific Contents Industrial

### Proposal of implementing regulations / measures (taken from European Legislation):

2003-105-EC: Sevesoll (about Imissions)

Dir 01/95: GPSD (General Product Safety)

Dir 73/23: low voltage

Dir 87/404: simple pressure vessels

Dir 89/336: EMC (Electromagnetic Compatibility)

Dir 94/9: ATEX95 (Explosion Protection of Products)

Dir 97/23: PED (Pressure Equipment)

Dir 98/37: machinery

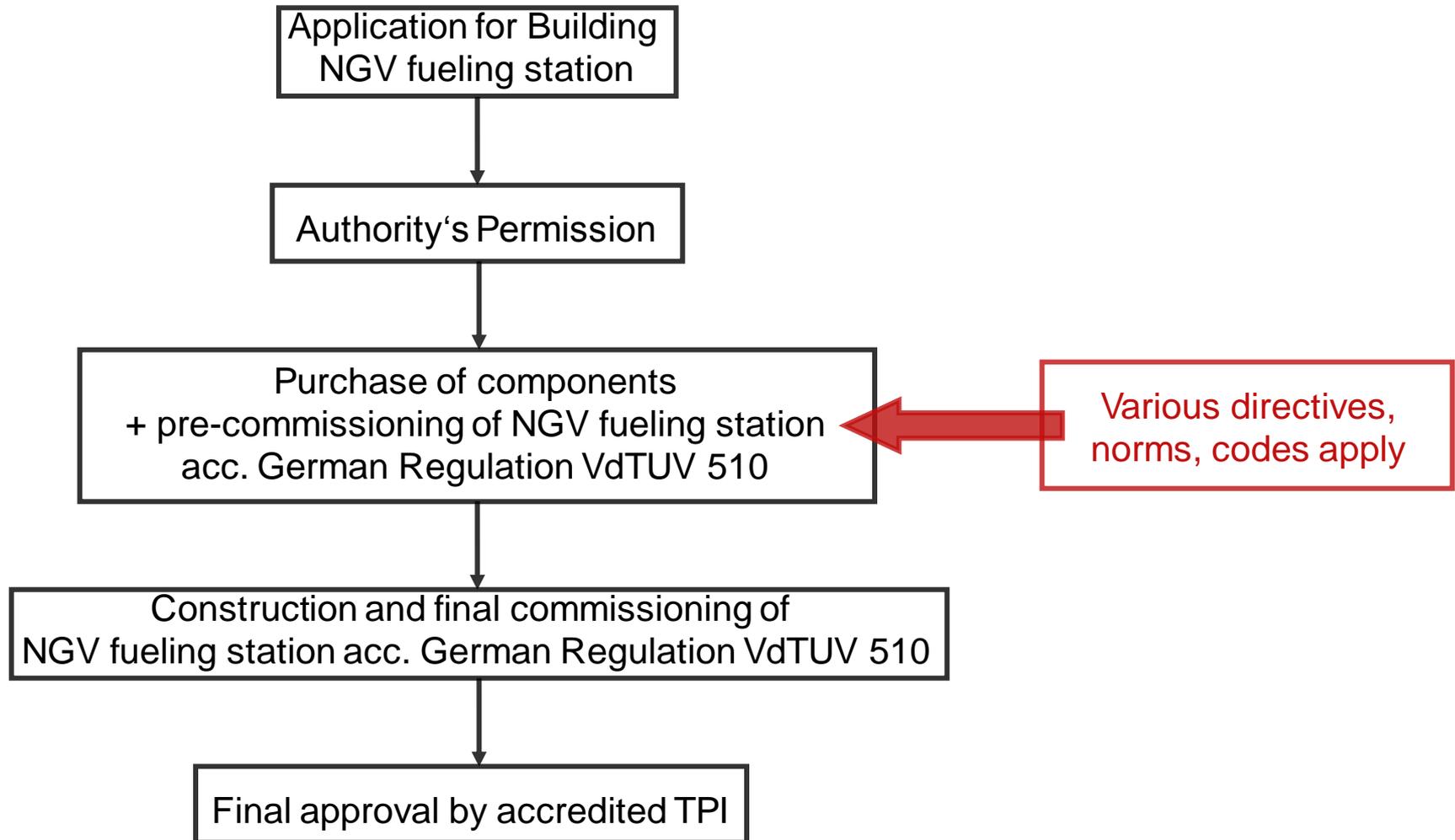
Dir 99/36: TPED (Transportable Pressure Equipment)

Dir 99/92: ATEX137 (Explosion Protection under Operation)

ADR (Agreement Transportation of Dangerous Goods on the Road)



## 6. Specific Contents Industrial



## 7. Summary

**Consistent safety chain addressing automotive and industrial requirements is essential!**

**No mixing of regulations, standards, and codes allowed: dangerous gaps and contradictions would occur!**

**Components** of the gas system to be tested and approved

**Conversion** only by certified workshops with trained employees

**Inspection and certification** of conversion by TUV

**Components** of the NGV fueling station to be tested and approved

**Construction and commissioning** only by reputed and certified companies

**Inspection and certification** of NGV fueling station by TUV