

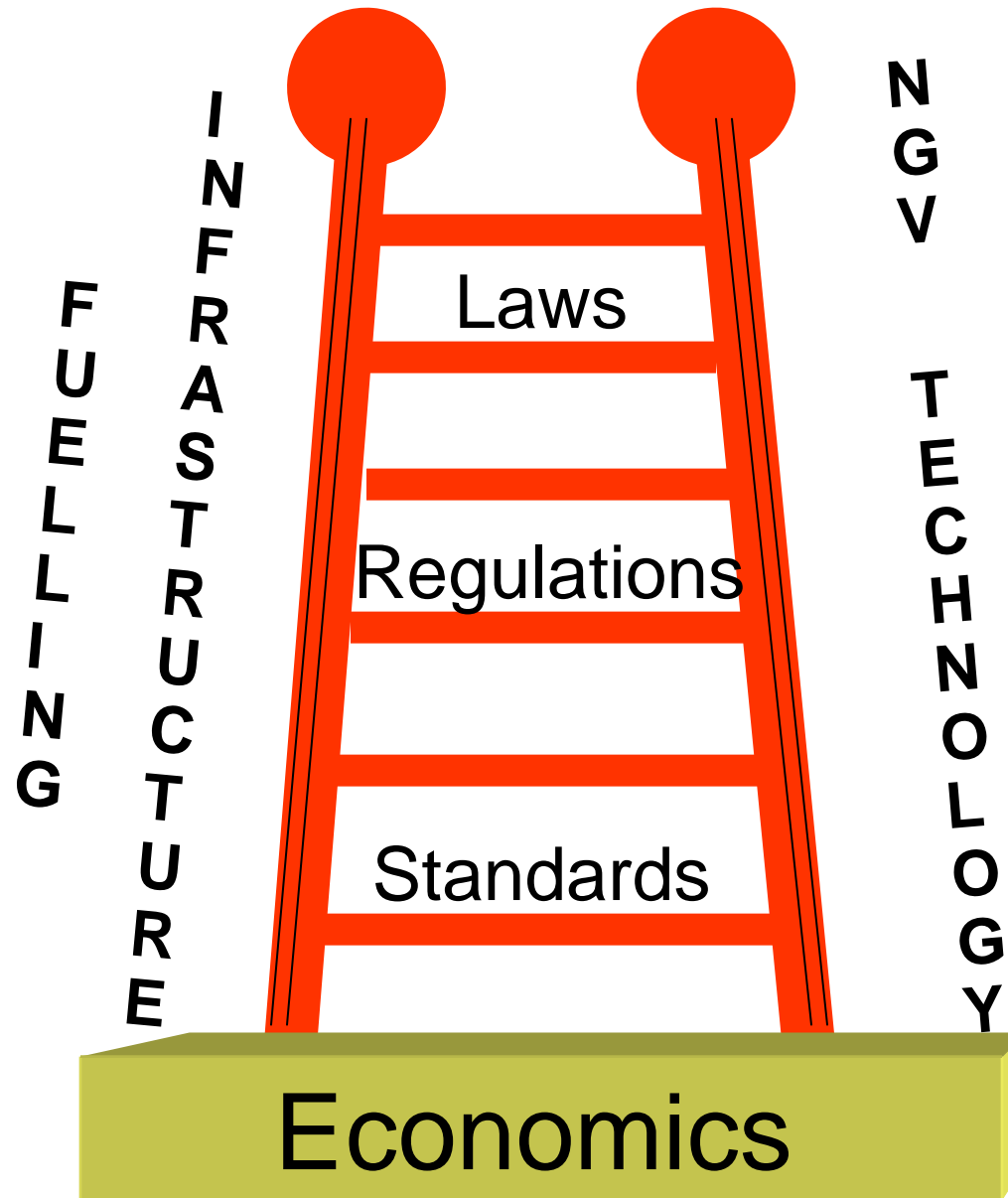
# NATURAL GAS VEHICLE GAP ANALYSIS

## ISO ROUND TABLE HARMONISATION OF GASEOUS FUEL STANDARDS & REGULATIONS

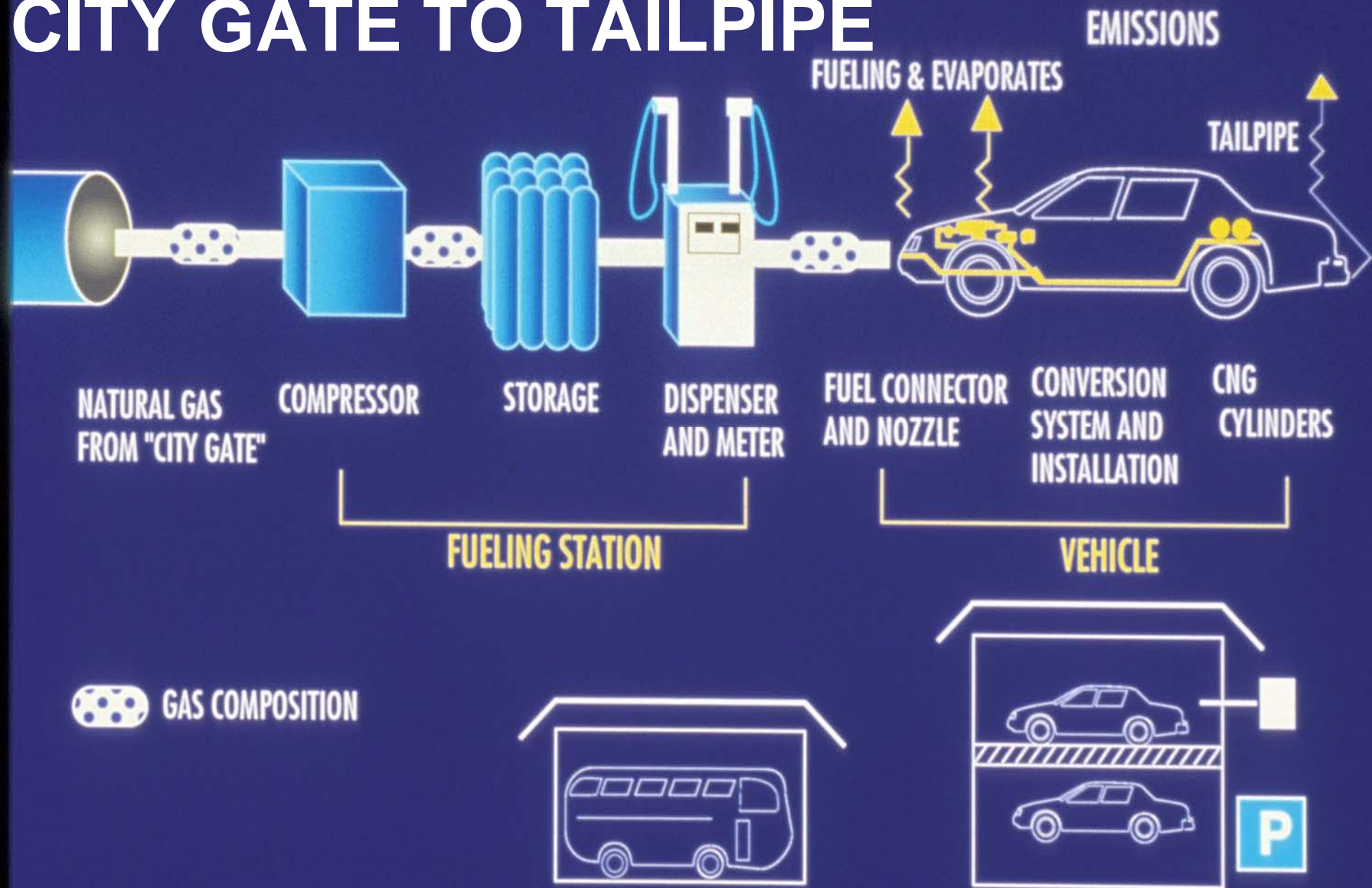
**Dr. Jeffrey Seisler**  
**Executive Director, ENGVA**  
**10 January 2007**  
**Geneva**



# BUILDING A LADDER TO CLEANER AIR



# NGV STANDARD UNIVERSE FROM CITY GATE TO TAILPIPE

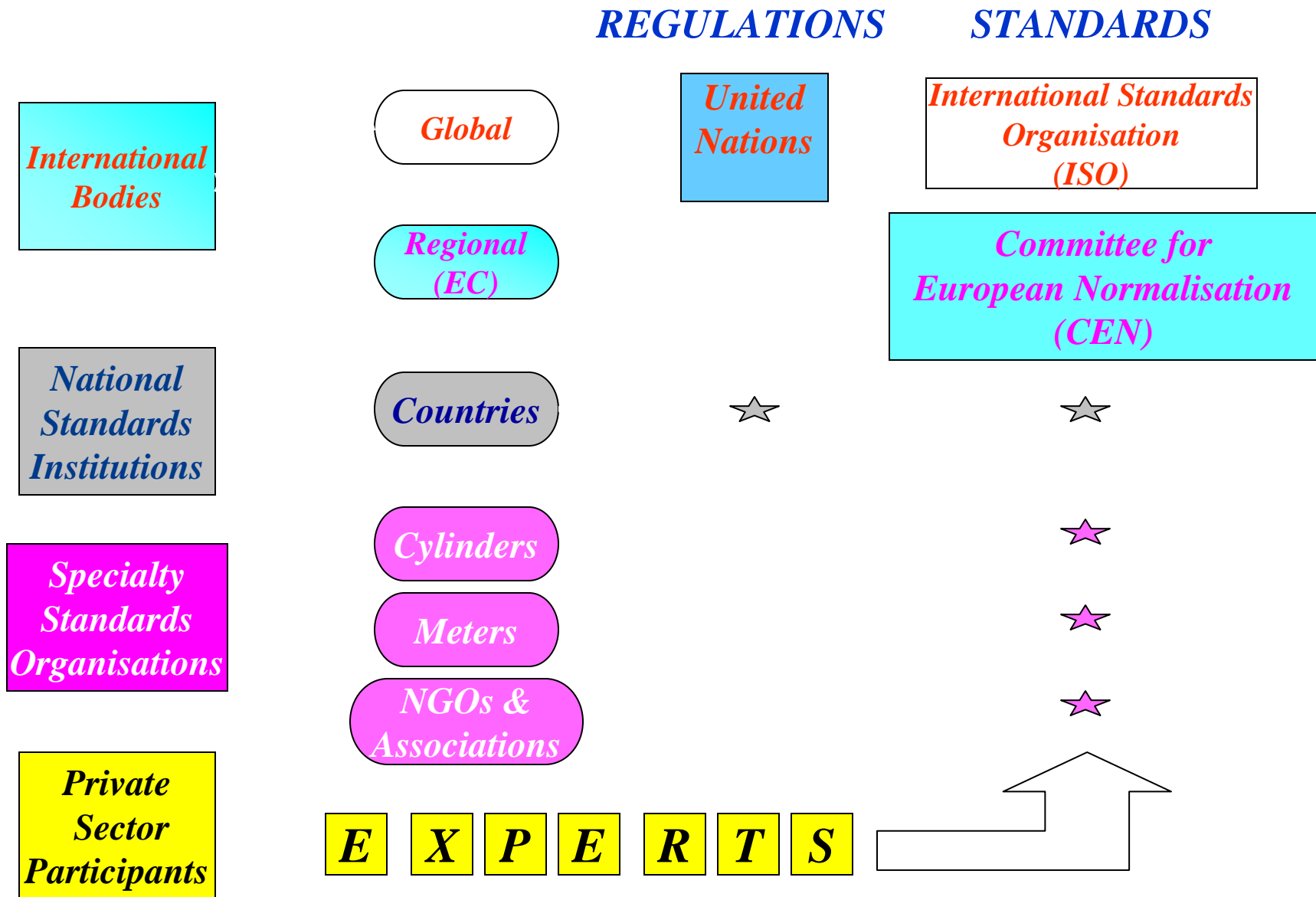




# **THE STANDARDS FRAMEWORK**

## **Poli-Techs**

# LEVELS OF STANDARDS & REGULATIONS (The Patchwork Quilt)



THE....

....ANALYSIS

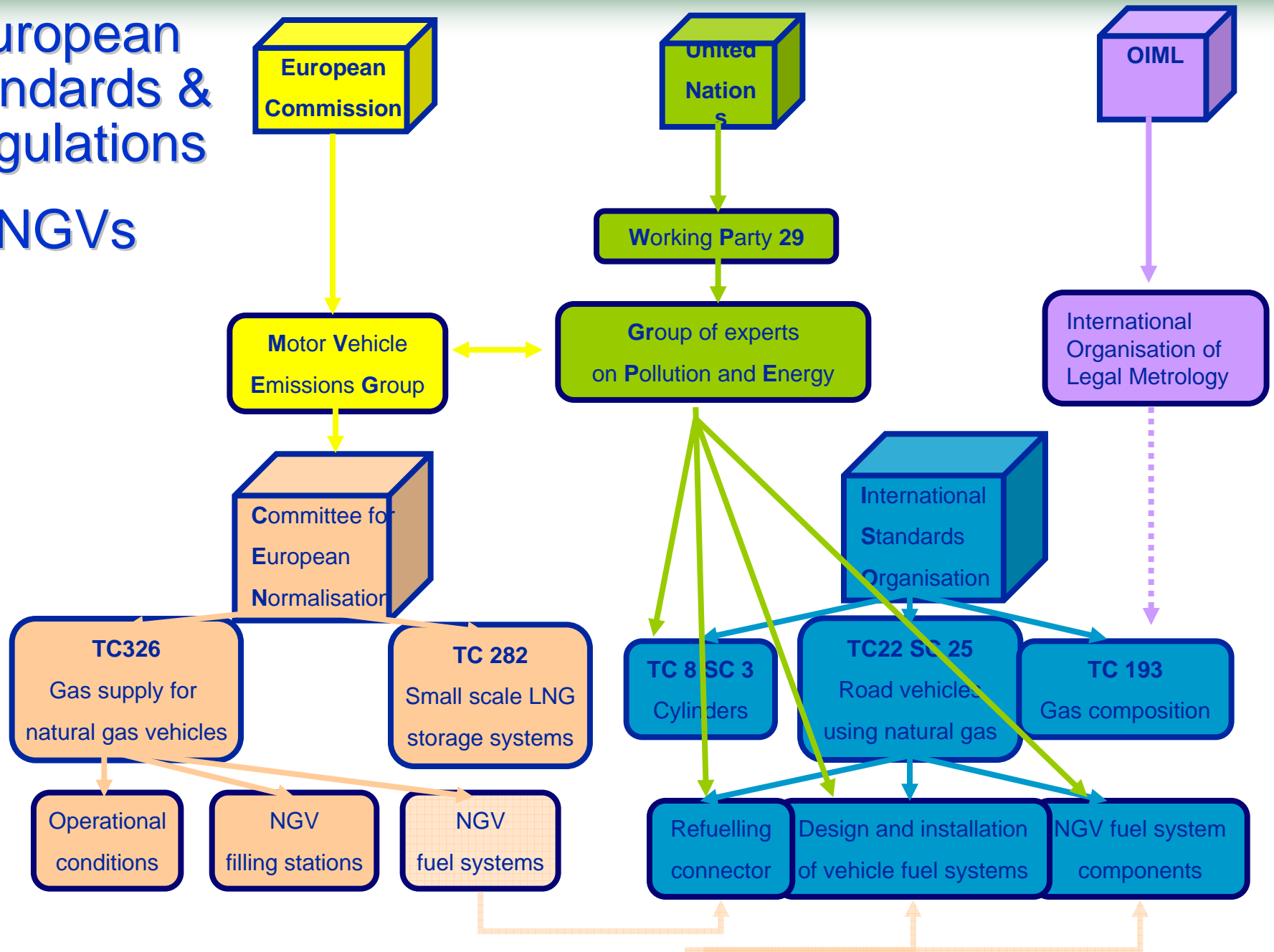
**GAP**

# THE GAP ANALYSIS OBJECTIVE

- **The objective of the study is to identify the relevant international standards and regulations pertaining to NGVs, to compare them and identify key differences and to identify areas where there are currently no published international standards or regulations.**
- **Recommendations for further action suggested**
- **Recognize that the appropriate institutional 'home' for standards remains to be determined in a number of cases (specifically LNG standards for vehicles & fuelling stations)**

# European Standards & Regulations

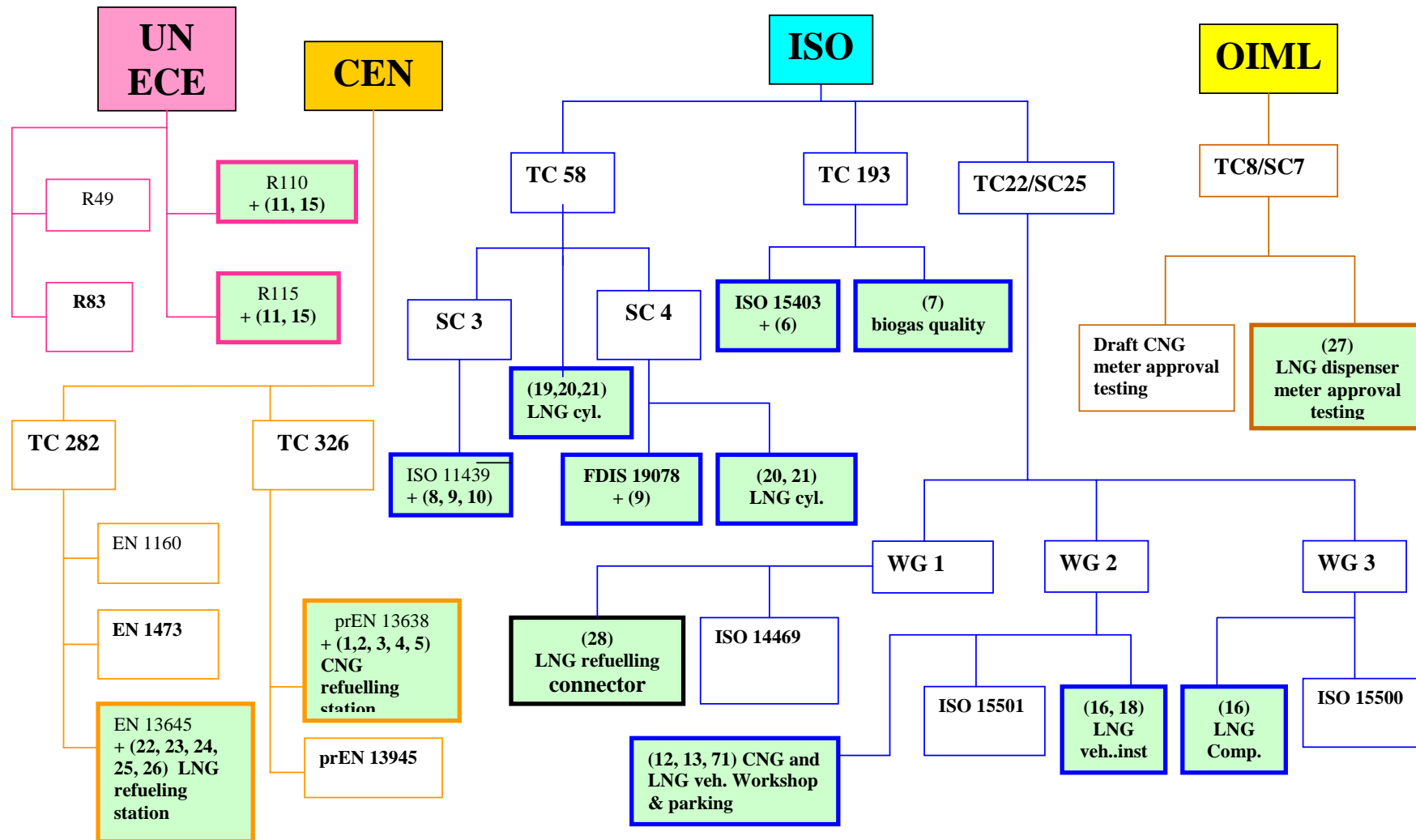
## NGVs



# OVERVIEW OF GAPS

## INTERNATIONAL NGV STANDARDS

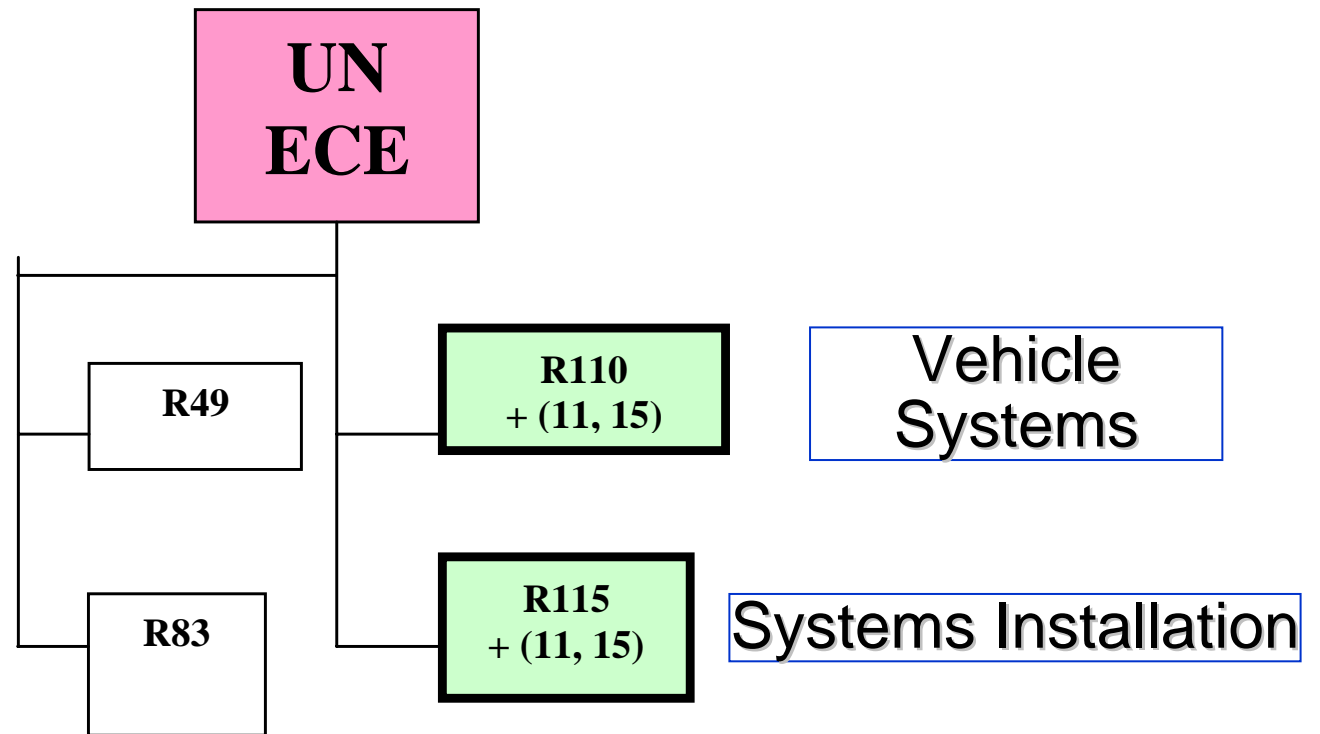
(GREEN BOXES SHOW GAPS)



# OTHER INTERNATIONAL STANDARDS EXAMINED

- NFPA 30A, 52, 57, 88 A and NFPA 59 A.
- SAE recommended practices J2406, J2343 and J2645
- Joint Australian/New Zealand standards AS/NZS 2739, 2746 and AS 4983.
- Swedish standard SS 155438.
- Singapore Technical Reference TR 10.
- US ANSI NGV 2, NGV 4.1, 4.4 and 4.8
- Canadian standards CSA B51 Part 2, CSA 12.6-04
- Italian regulation DM 01/02/1986
- Argentinean standard NAG 419

# GAPS OR ISSUES IN THE ECONOMIC COMMISSION FOR EUROPE REGULATIONS



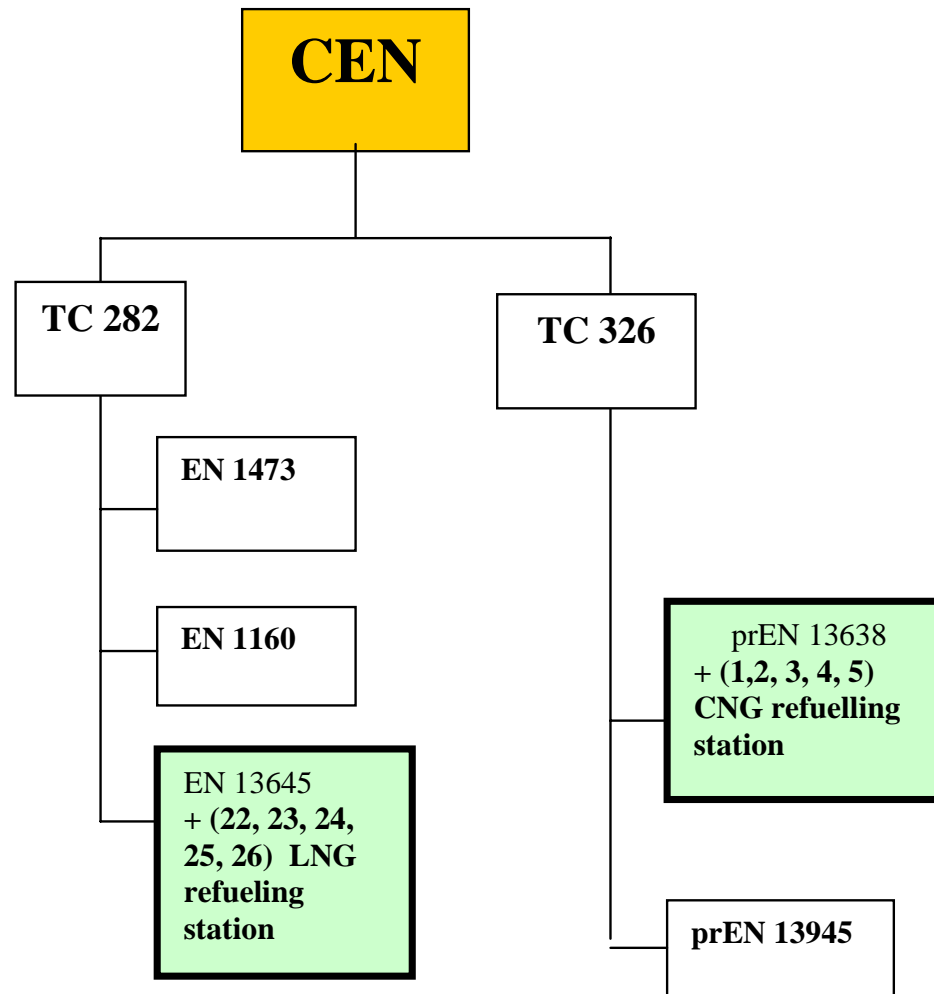
# **UNITED NATIONS REGULATIONS**

## **Economic Commission for Europe**

- **CNG vehicle certification protocol**
- **Vehicle exhaust emission requirements, in terms of test protocol and limit values (as distinct from petrol & diesel) (Also can apply to Liquefied Natural Gas –LNG, which could be the same as CNG)**
- **(issues 11 & 15)**
- **Other Question: Should ECE 110 become a Global Technical Regulation?**

# Committee of European Normalization

## GAPS OR ISSUES IN THE EUROPEAN NGV STANDARDS



Committee of European Normalization

# **COMPRESSION, STORAGE & DISPENSING OF CNG**

- **Dispenser and metering accuracy and fuel accounting practice.**

## ***Other Codes of Practice***

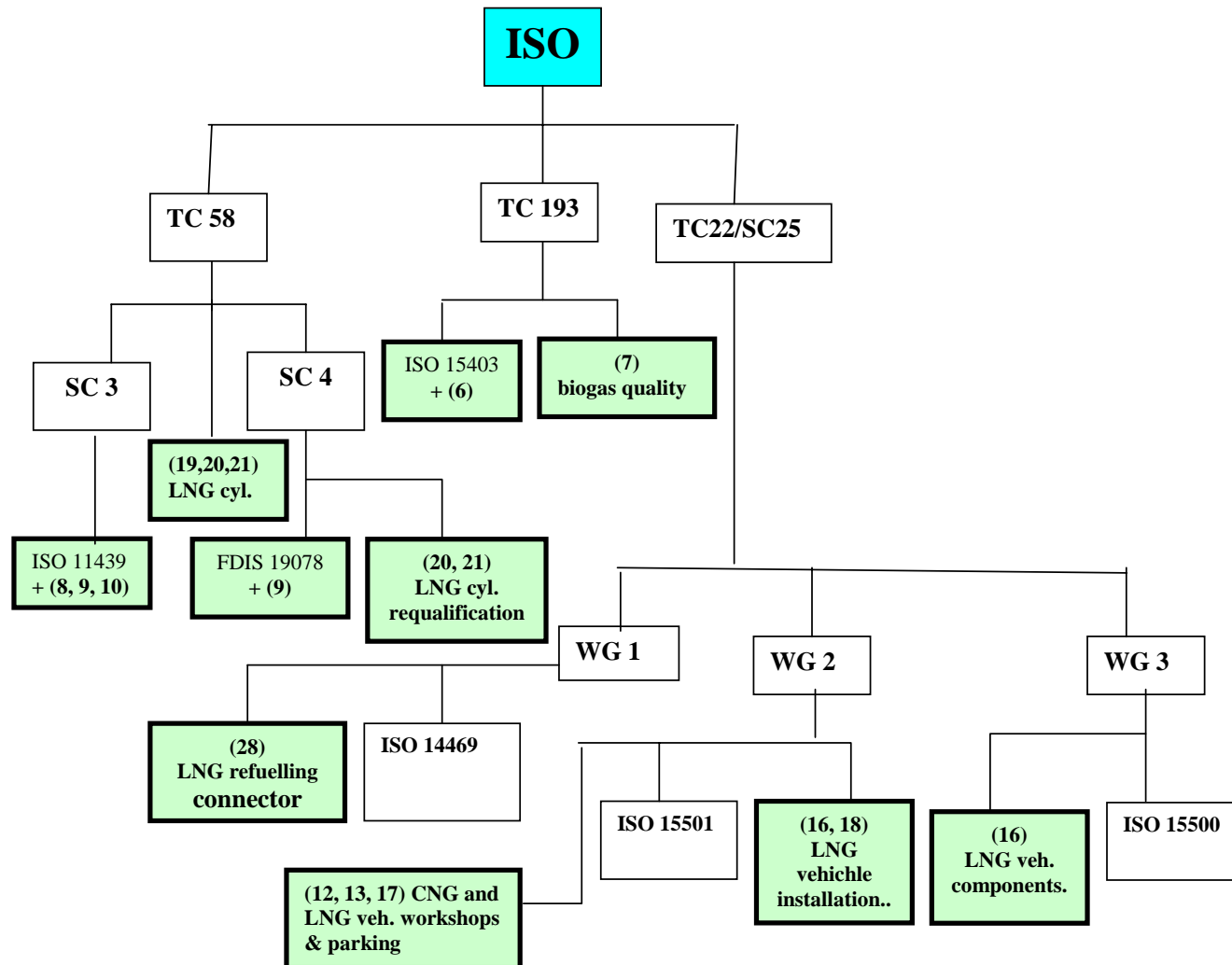
- **Qualitative and quantitative risk assessments including vehicle garages, test stations and gas storage facilities/refuelling stations.**
- **Guide to safety management systems for CNG refuelling stations/gas storage facilities/vehicle workshops/ test facilities/parking areas.**
- **CNG compressor oil carryover reduction, system design and operational practice.**
- **CNG compressor guidelines for the selection of type, compression capacity, compression efficiency, installation space requirements, and economics of purchase and operation..**
- **(issues 1,2,3,4,5)**

## Committee of European Normalization

# LNG STANDARDS

- **Gas composition control at storage facilities and refuelling stations.**
- **Refuelling stations, fuel dispensers and dispenser metering.**
- **LNG metering/fuel accounting practice.**
- **Guide to safety management systems for LNG refuelling stations/gas storage facilities/vehicle workshops/ test facilities/parking areas.**
- **Qualitative and quantitative risk assessment for LNG vehicle installations including vehicle garages, test stations and gas storage facilities/refuelling stations.**
- **Issues 22,23,24,25,26**

# GAPS IN ISO STANDARDS FOR NGVS



# GAPS IN ISO STANDARDS FOR NGVs

- **GAS QUALITY/FUEL SPECIFICATION**
  - Natural Gas
  - Biogas-to-*biomethane*
  - (*issues 6,7*)

# **GAPS IN ISO STANDARDS FOR NGVs**

## **On-board CNG fuel storage systems/cylinders**

- **Service life of on-board CNG fuel cylinders, to be increased.**
- **Re-qualification interval of on-board CNG fuel cylinders has to be increased. (ECE 110 amended to 4 years)**
- **Design qualification verification protocol (for cylinder approval applications).**

**(issues 8,9,10)**

# **GAPS IN ISO STANDARDS FOR NGVs**

## ***CNG Vehicle Systems***

- **CNG vehicle workshops and personnel requirements.**
- **CNG vehicle parking in garages**
- **Issues 12,13**

# **GAPS IN ISO STANDARDS FOR NGVs**

## ***LNG vehicle systems***

- **Installation and components (including issue of gas leak detection/odorant).**
- **Workshops and personnel requirements.**
- **Certification protocol**
  - *Issues 16,17,18*
- **Also, fuelling receptacle**

# **GAPS IN ISO STANDARDS FOR NGVs**

## ***On-board LNG fuel cylinders***

- **On-board LNG fuel storage cylinders, including service life.**
- **Re-qualification requirements and interval of on-board LNG fuel cylinders.**
- **Design qualification verification protocol (for cylinder approval applications).**
- **(Issues 19,20,21)**

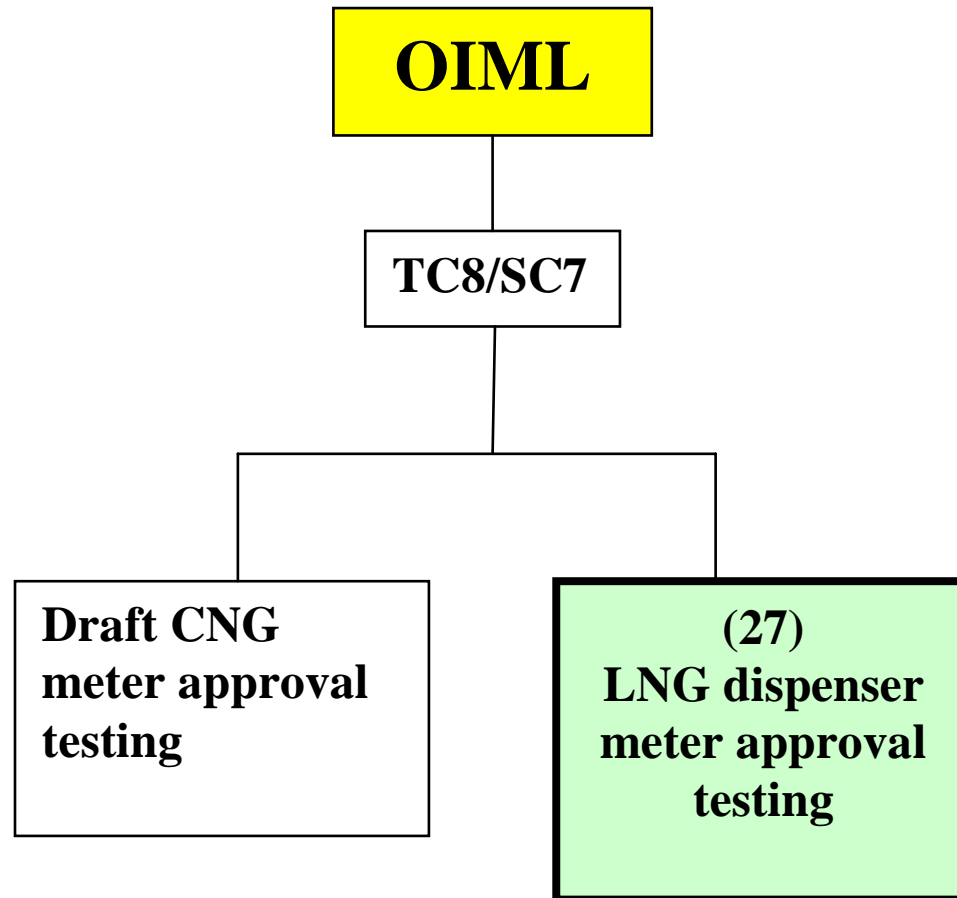
# **GAPS IN ISO STANDARDS FOR NGVs**

## ***LNG refuelling stations***

- **LNG dispenser meter approval requirements and test procedure.**
- **Vehicle refuelling connectors (the fuel dispensing side)**
- **Issues of leak detection (and/or odorization) and lack of oil carryover.**
- **Liquefied-to-compressed (L-CNG) refuelling station design (including issues of leak detection and lack of oil carryover).**
- ***27,28,29,30***

# GAPS IN OIML STANDARDS

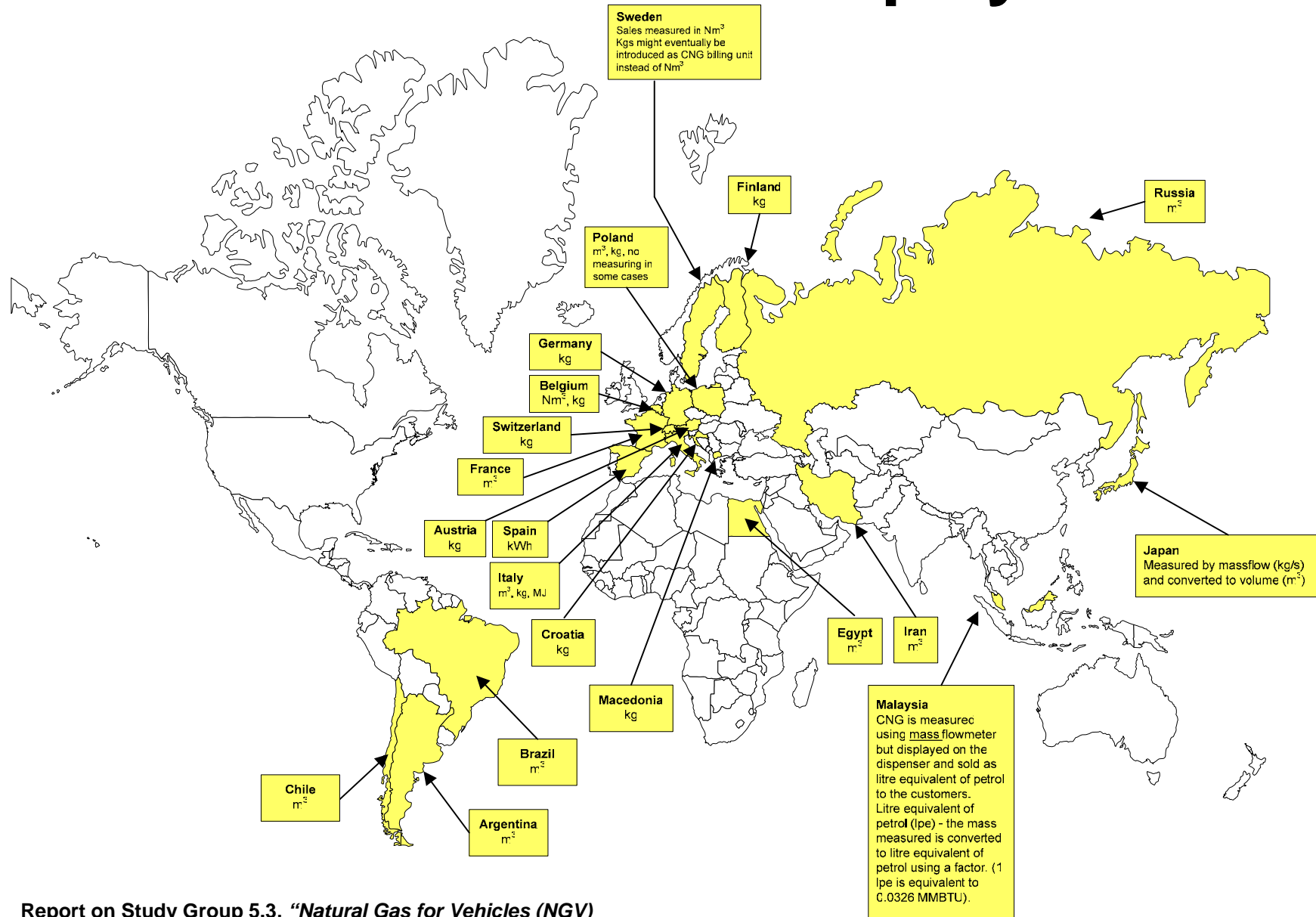
## INTERNATIONAL ORGANISATION OF LEGAL METROLOGY



# METERING ACCURACY & MEASUREMENT UNITS

- **Meter accuracy and testing required to move into public fuelling station where gas is sold and metering accuracy must be regulated**
- **What units of measurement are used (methane) ?**
  - **Kilograms for the meter/dispenser?**
  - **What about point of sale measurement & display units? (kgs/M3/Scf/etc.)**
  - **Etc. = gasoline litres/gallons equivalent (gle/gge?)**

# Fuel Measurement & Display



Report on Study Group 5.3, "Natural Gas for Vehicles (NGV)  
Global Opportunities for Natural Gas as a Transportation Fuel  
for Today and Tomorrow," Final Report, 2006

# **EVOLUTIONARY TECHNOLOGY & APPLICATIONS REQUIRE NEW STANDARDS & REGULATIONS (hitting the moving target)**

- **Use of heavy duty dual fuel vehicles (two fuels simultaneously) now allowed but use is subject to national homologation; future market demand could require additional certification protocol**
- **Fork lifts, 3 wheel Tuk Tuks, etc. to be considered (may require new descriptions of 'vehicles' [?] ?**

# PRICE SENSITIVE MARKETS WILL CONTINUE TO POSE CHALLENGES

- Low price
- Low quality
- Low (no?) safety
- A continuing problem: patent violation and *copies of copies of copies* can compromise safety and the relationship with legitimate equipment suppliers.
- ***ENFORCEMENT*** of regulations is required



# THREE PRINCIPLE CONCERNS FOR THE GASEOUS FUELS INDUSTRIES JUSTIFY THE NEEDS FOR STANDARDS AND REGULATIONS

- SAFETY
- SAFETY
- SAFETY



# **WORLD-WIDE STANDARDS HARMONIZATION: *THE OBJECTIVES***

- **Produce new and additional standards (NGV & H2) as required (but avoid international overlap/duplication)**
- **Harmonize existing standards**
- **Expedite H2 & H2V standard development**
- **Facilitate codification of standards (regulations/codes & codes of practices)**

**THANKS TO HIEN LY  
TECHNICAL CONSULTANT  
AUSTRALIA  
FOR HIS FINE CONTRIBUTION TO THE  
INDUSTRY EFFORTS**

**([hly0104@bigpond.net.au](mailto:hly0104@bigpond.net.au))**

# NATURAL GAS VEHICLE GAP ANALYSIS

## ISO ROUND TABLE HARMONISATION OF GASEOUS FUEL STANDARDS & REGULATIONS

**Dr. Jeffrey Seisler**  
**Executive Director, ENGVA**  
**10 January 2007**  
**Geneva**

