



NATURALHY

# Work Package 3

## DURABILITY

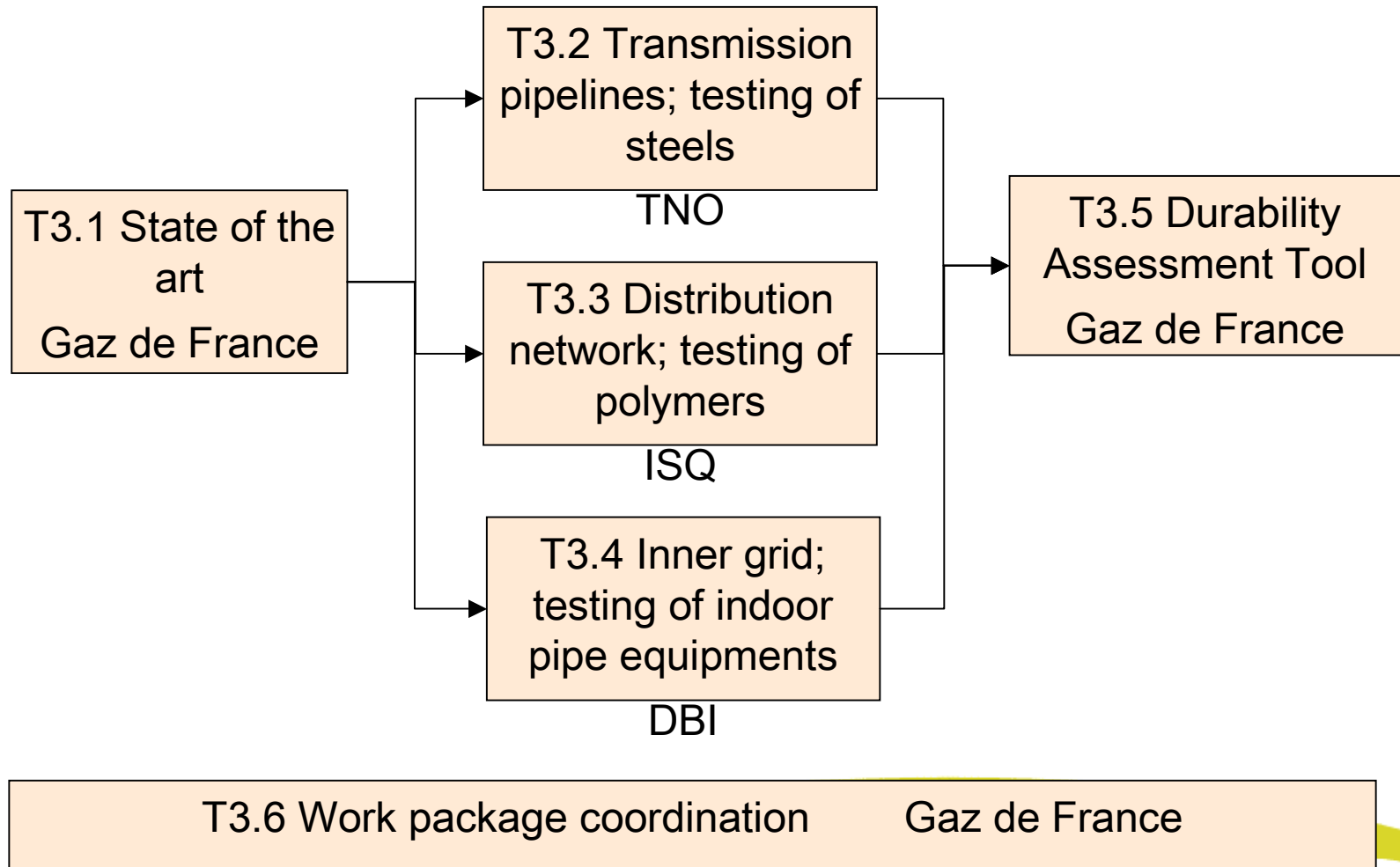
Research & Development Centre  
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## WP3 Durability : objectives

- **Effects of hydrogen** on the durability of materials and components used in the natural gas transmission and distribution networks and end user infrastructure will be determined experimentally
- **Existing defect assessment criteria** will be adapted to take into account an increasing percentage of hydrogen in natural gas
- **A durability assessment tool** will be developed to examine the ageing of materials and components and to provide a practical way of evaluate the system lifetime given its characteristics and the percentage of hydrogen.
- *Results should originally be used for **demonstrations at full scale**.*

## WP3 Durability : tasks & leaders



# T3.1 State of the art

## Objectives

1. Identify the most sensitive-to-hydrogen points along the NG grids
  2. Determine preliminary sets of acceptable limits (H2%, humidity, pressure, ...)
  3. Identify gaps to be filled by the experimental programme
- SOA covers Durability and Integrity subjects.
  - SOA covers transmission & distribution & inner grids.  
*Other parts of the NG infrastructures are not covered.*
  - Data from gas companies; materials, specifications, best practices, service history (maintenance & repair), integrity management

## T3.2 Transmission pipelines

### Objectives

Testing of steels and high pressure grid components

1. Test current materials and equipments (NG/H2 mixtures)
  2. Collect data on components of existing grids
  3. Identify the acceptable range of operation according to H2%
  4. Simulate lifetime of existing grids with different H2%
- Scope = steels for pipes & welds.
  - Samples from excavated or stored pieces of pipes.
  - Work programme = mechanical tests (corrosion, fatigue, burst tests) in air / NG-H2 / H2 media
  - Un-covered devices = valves, flanges, compressors, meters, underground storages, etc.



## T3.3 Distribution network

### Objectives

Testing of polymers and low pressure grid components

1. Test current materials and equipments (NG/H2 mixtures)
  2. Collect data on components of existing grids
  3. Identify the acceptable range of operation according to H2%
  4. Simulate lifetime of existing grids with different H2%
- Scope = pipes & welds and domestic gas meters.
  - Samples of PE and PA from new processed pipes or granulates.
  - Work programme = permeation tests on samples and pipes in air / CH<sub>4</sub>-H<sub>2</sub> / H<sub>2</sub> media at different T + ageing tests + mechanical & microstructural assessment.
  - Gas meter = reliability assessment (*+ ageing tests*)



## T3.4 Inner grid

### Objectives

#### Testing of indoors pipe and equipments

1. Test current materials and indoors equipments (NG/H2 mixtures)
  2. Collect data on components of existing indoors equipments
  3. Identify the acceptable range of operation according to H2%
  4. Simulate lifetime of existing indoors equipments with different H2%
- Scope = gas-valve combination, connection between end-using devices and house installation, and whole end-using device (like boiler)
  - Work programme = permeation tests on metallic materials + impermeability assessment of devices

# T3.5 Durability Assessment Tool

## Objectives

Durability guidelines on existing NG networks for NG/H2 mixtures

1. Identify potential solutions to remove bottlenecks in the transmission, distribution, and indoors networks
  2. Publish a practical guideline for operation of transport, distribution and indoors networks with NG/H2 mixtures
- The results from the WP3 “Durability” will be used in the WP4 “Integrity” for updating the inspection, repair and integrity management tools, and in the WP6 “Decision Support Tool”.
  - *They also intended to be used for demonstration at full scale (task removed).*