



International Partnership *for the* Hydrogen Economy



IPHE



Strategic Priority 4
**“Monitor hydrogen, fuel cell and complementary
technology developments”**

Joint ILC/SC meeting
Dec 1-3, 2009 Washington



Why monitoring?

- There is a need for monitoring the state-of-the-art and the development of hydrogen technologies, to identify critical issues and gaps that should be filled before a *real* diffusion of hydrogen energy vector
- The goal is to list those areas which are on the critical pathway to the hydrogen economy so to be more effective and efficient towards the targets



Why monitoring?

Hydrogen technologies are in different stages of development by many points of view:

- **Scientific**
- **Technical**
- **Economic**

What technologies do we need to build the H2 economy and ***when***?



What technologies ?

Three main thematics:

- **Production**

IMO the most critical aspect to assure a CO₂-free supply of hydrogen

It involves use of RES but also fossil fuels with CCS

- **Distribution and storage**

Storage is an issue mainly for transportation sector

Bulk storage can become important if Hydrogen is used to store Renewable Energy

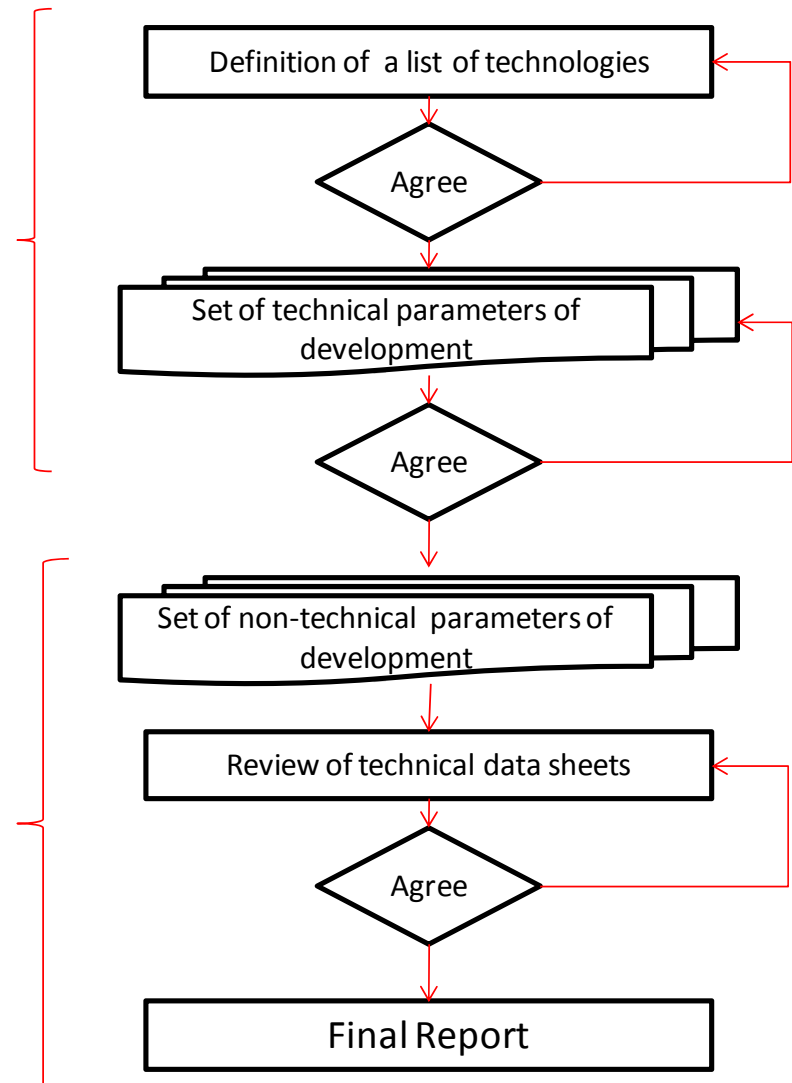
- **Utilization**

Fuel cells are important for transportation and DG, but don't forget Power Generation (turbines and combined cycles)



A possible workflow

2-step
activity





A possible workflow

First phase

- Identification of the formats to use for documents
- Definition of a list of “relevant” technologies (proposed)
- Definition of the “technical” state-of-the-art and gaps for each technology
- Preparation of the “data sheets”
- Review of the documents before issuing



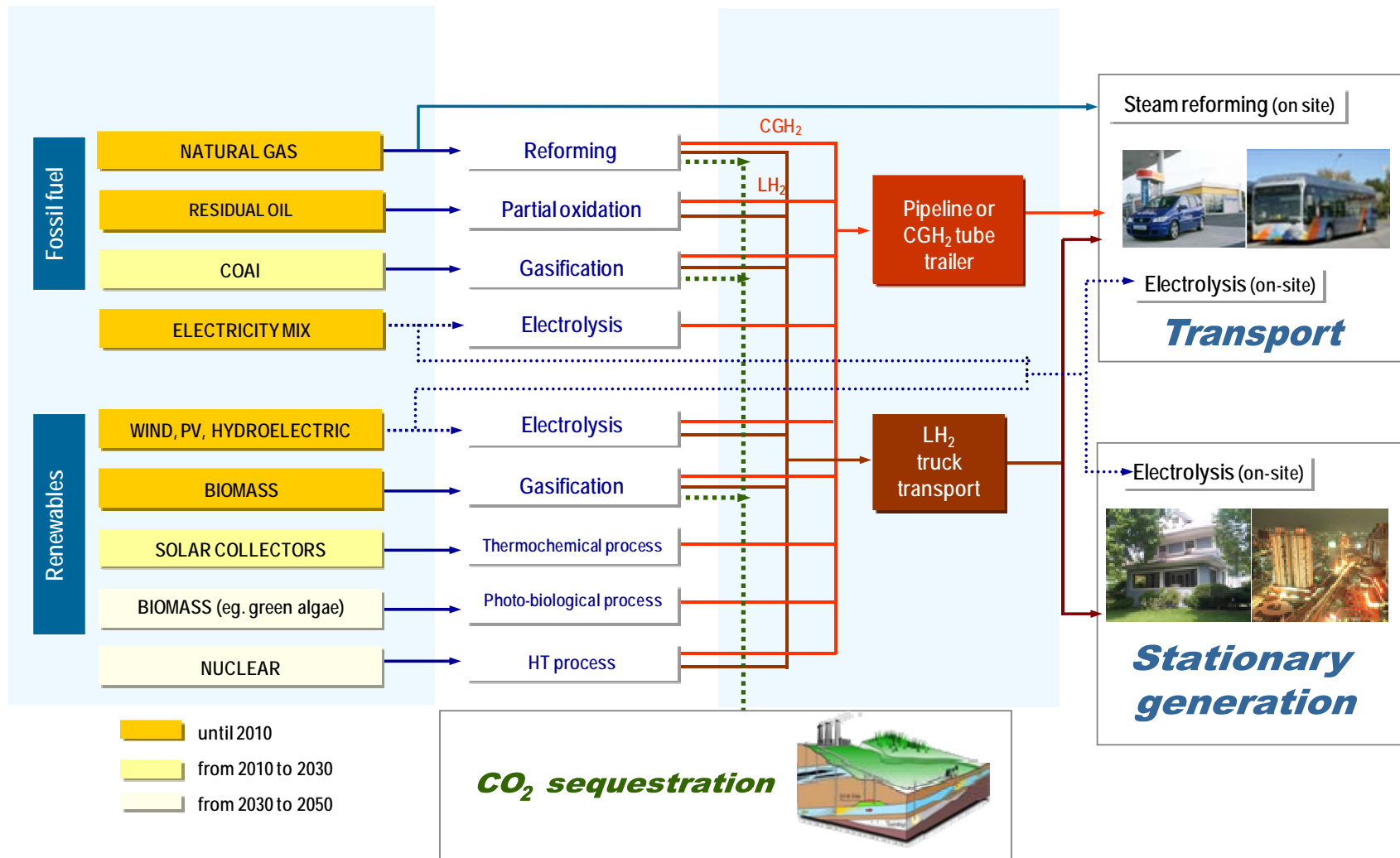
A possible workflow

Second phase

- Definition of the **“non-technical”** state-of-the art for each technology (namely economics)
- Definition of “sensitive” non-technical parameters for each technology
- Review and update of the “technical” data sheets
- Update of data sheets with economic parameters
- Review and final issue



List of technologies





List of technologies

Hydrogen production (7)

Fossil fuels (3)

- Production from Hydrocarbons (centralized and distributed)
- Production from Coal
- Carbon Capture and Storage

Real world data are required, not only “nominal” values!!



List of technologies

Hydrogen production

Renewables (4)

- Electrolysis
- High Temperature processes
- Biomass processes
- Biological processes

*Real world data are
required, not only
“nominal” values!!*



List of technologies

Distribution and storage (5)

- Compressed
- Liquid
- Hydrides
- Hydrogen transportation by road, rail, ships,
Pipelines
- Filling stations



List of technologies

Utilization (4)

- Fuel Cells
- Internal combustion engines
- Gas turbines & Combined Cycles
- Heat production



Some issues

- What is the relationship among H₂-RES-Fossil fuels ?
(what is the “real “role” of hydrogen, decarbonization, energy storage, security of supply, else??)
- Where will the inputs for SP4 activities come from?
From WGs or by ILC members? IEA? other?
- The IPHE projects cover just some aspects, in
Production area just “solar” projects



Cooperation with IEA

- Actual MoUs with task 19 and 22 of HIA just cover hydrogen safety and storage issues
- If it is recognized that for technologies monitoring the IEA input is “important”, a wider cooperation agreement between IEA itself and IPHE should be studied. The IEA knowledge about H₂ technologies is spread in several implementing agreements (HIA, but not only- Advanced fuel cells, GreenHouse Gas, Electric and Hybrid vehicles, etc) and related annexes