



**DF 57 — Life cycle assessment in the building sector:
analytical tools, environmental information and labels**

Environmental assessment of buildings in France

Dr. Sébastien Lasvaux

Research engineer
Expert in LCA of buildings

Agenda

1. General context
2. Recent activities: the HQE Performance pilot project
3. Towards new LCA-based labels for the environmental assessment of buildings

Green building labeling system: a process in evolution in France



14 targets on environmental but also comfort and health (qualitative)

Call for interest
Assess the environmental performance of your new buildings in 2011
Call **larger than just the environment** (incl. also life cycle cost and indoor air quality)

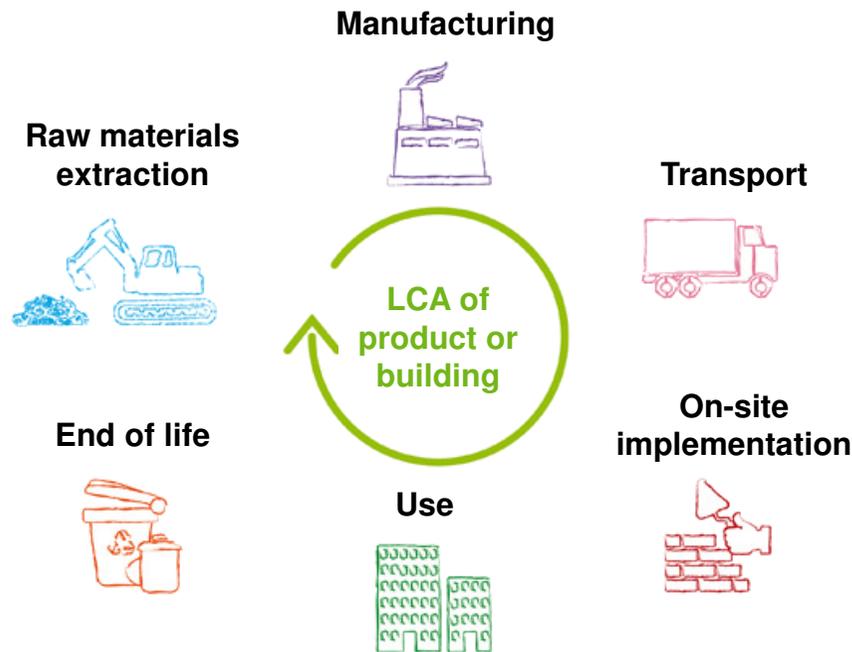
Evolution of the legal framework on building environmental aspects

- A thermal regulation (RT 2012) but no public labels or regulations yet on the total environmental impacts of buildings
- « Grenelle II » Law n° 2010-788 of 12/07/2010 for national involvement for the environment set up ambitious legal framework
- Requirements from the above law
 - Approach based on relevant, objective and quantified indicators, to assess the **total environmental impacts of a building**
 - Natural resources consumption (primary energy, water), GHG emissions, waste
 - These environmental indicators must be
 - Calculated over the total life cycle of the building
 - Opposed to « **reference values** » which define performance levels for buildings
- Needs to launch **LCA case studies of buildings** (cf. section 2)



The LCA approach is a basis for env. information since 2004

- Important standardisation activities in France
 - General LCA: ISO 14040 series
 - Construction products EPD: NF P01-010 (2004)
 - => EN 15804 + national appendix (2013) + Building: NF EN 15978
- The product-specific database (EPD) INIES with +1000 cradle-to-grave EPDs



Source: www.declaration-environnementale.gouv.fr

1558 EPDs
covering 27542
references
(as of 26.11.2014)

Database website
www.inies.fr/

EPD program rules
www.afnor.org/content/download/62497/691387

The LCA approach is now a basis for EPD regulation from 2014

- Main objective: fight against green washing
- Main principle
 - « *if a manufacturer (or anyone who introduces a product on the market) wants to make a product's environmental claim or communicate on product's environmental aspects, he shall register an Environmental Product Declaration (EPD) in the database of the regulated project.* »
- Decree for EPDs based on EN 15804 standard (from 2014) + national rules (cradle-to-grave data only)
- Field of application
 - Construction products and decoration (decree application July 2014)
 - Electrical, electronic and HVAC equipment (decree application July 2017)

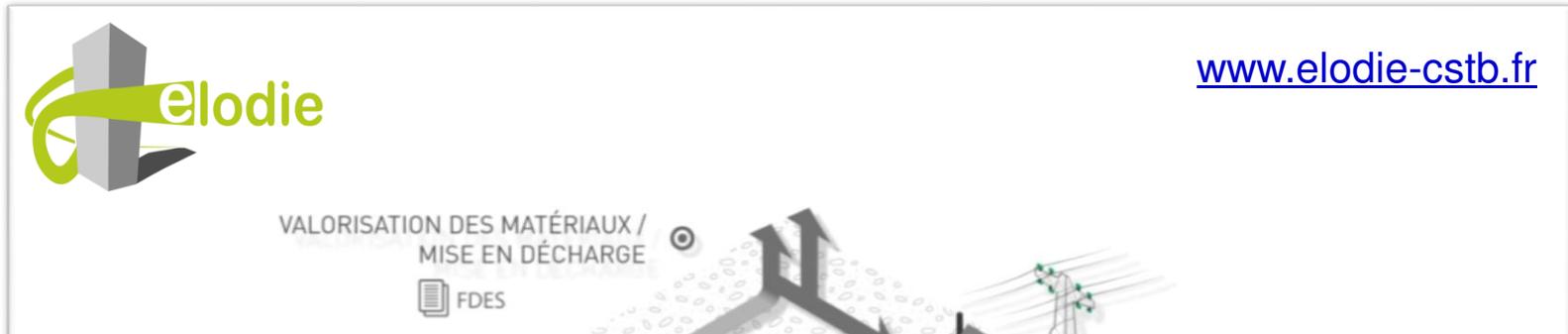


Regulation for EPDs



www.declaration-environnementale.gouv.fr/

Analytical tools developed to use EPDs for building assessment



and other analytical tools are also being developed but are sometimes using different databases (not EPDs) and calculation rules



Starting point: two complementary approaches



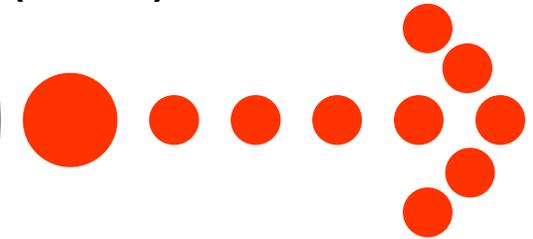
Initiative supported and funded by public authorities



Initiative supported by the HQE association



Converging approach supported and funded by French Environment and Energy Management Agency (ADEME) and Ministry for Housing (DHUP)



From 2011 to 2014:
scope on new buildings

From 2014: scope on
existing buildings

Goals of the pilot project



ADEME



Agence de l'Environnement
et de la Maîtrise de l'Energie

- **Define common rules**
 - Ensure applicability in practice
 - Common indicators
- **Use of product-specific EPDs**
 - INIES database as a basis
- **Involve building stakeholders**
 - LCA training of users
 - LCA method implemented in analytical tools (e.g., ELODIE)
- **Deep analysis of LCA results**
 - Identify guidance values
 - Identify hotspots, levels of actions
 - Provide enough information to define later on reference values



SYNTEC-INGÉNERIE



ARCAD / PQE
Agence Régionale
de la Construction
et de l'Aménagement
Durables
CHAMPAGNE-ARDENNE



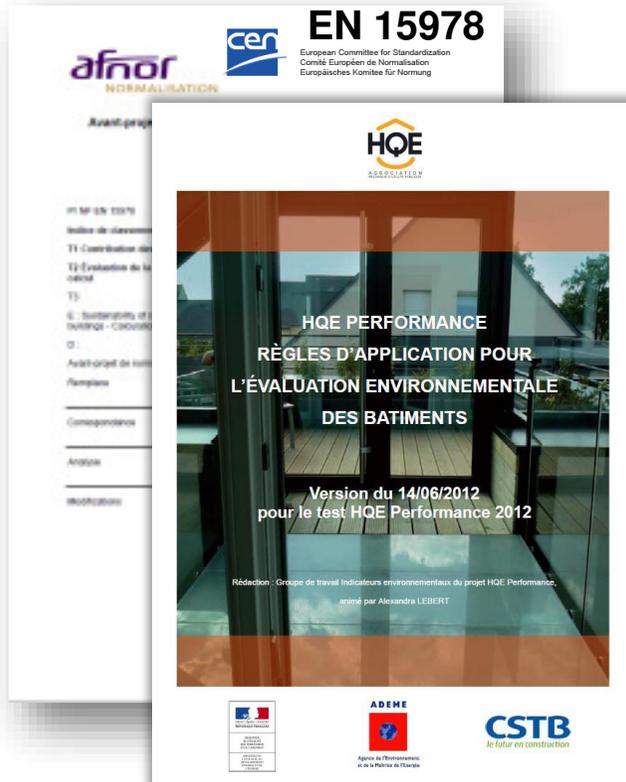
cluster
ESKAL EUREKA
futur



L'UNION DES ARCHITECTES

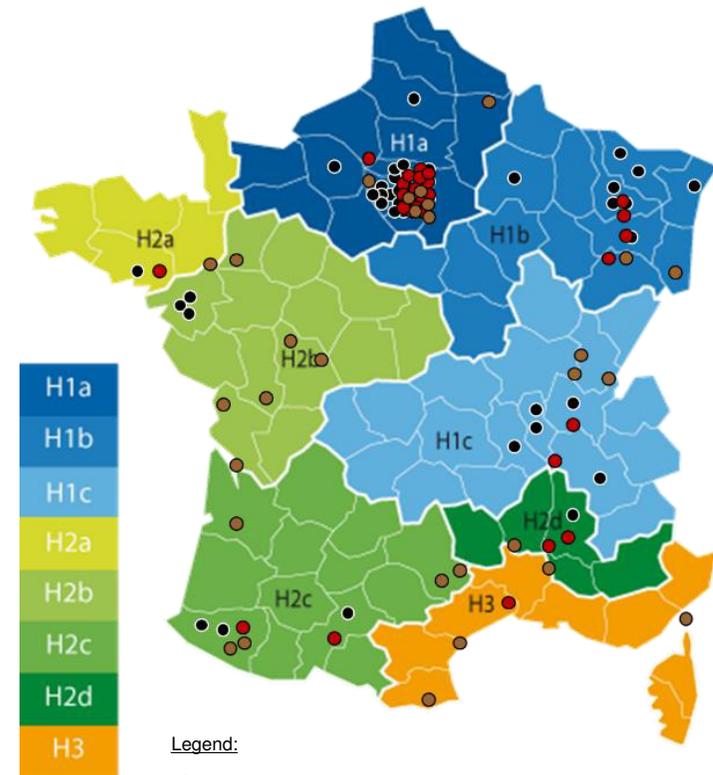
Some methodological aspects

Common rules



Reference study period:
50 years and
100 years

Sample (120 new buildings)



Legend:

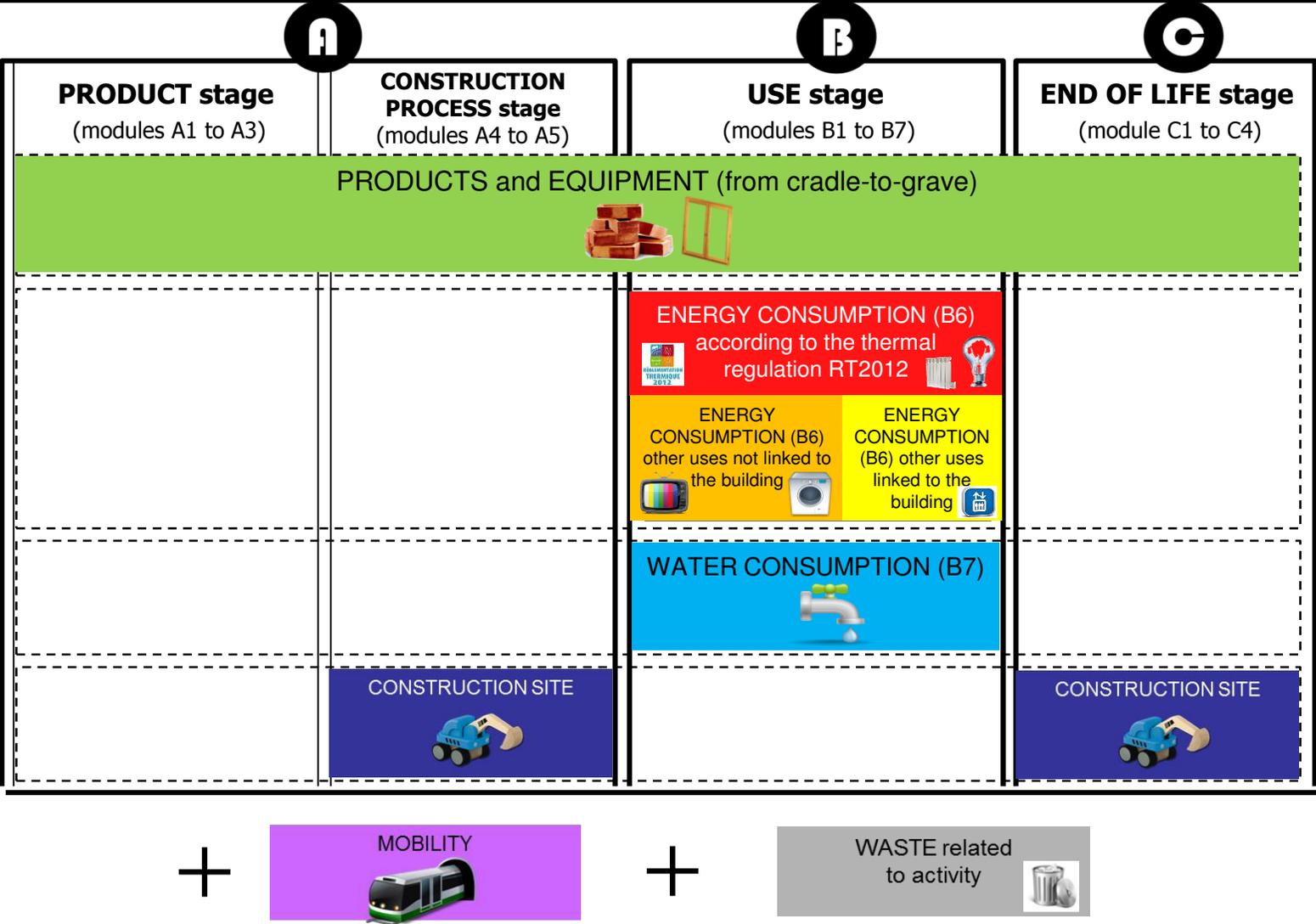
- 45 new office buildings
- 35 new multi-residential buildings
- 40 new individual houses

Climate zone according to the French thermal regulation

Further information available in:

http://assohqe.org/hqe/IMG/pdf/GUIDE_D_APPLICATION_HQE_PERFORMANCE_14-06-2012-2_1_.pdf

Focus on system boundaries with EN 15978 modules



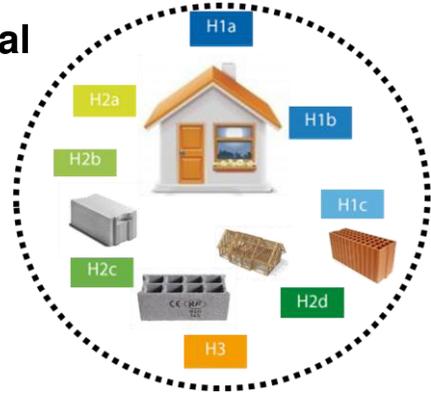
Environmental indicators

All the indicators are based on the EPD programme (from the INIES database)

- ■ Abiotic Depletion Potential (ADP)
 - ■ Global Warming Potential (GWP), 100 years
 - Acidification Potential (AP)
 - ...
 - Primary energy
 - ■ Primary energy, non renewable
 - ■ Water consumption
 - ...
 - Radioactive waste
 - ■ Inert and non hazardous waste
 - Dangerous waste
 - ...
- Parameters describing environmental impacts according to EN 15978*
- Parameters describing resource use according to EN 15978*
- Parameters describing waste flows according to EN 15978*

Results par building types, constructive systems etc.

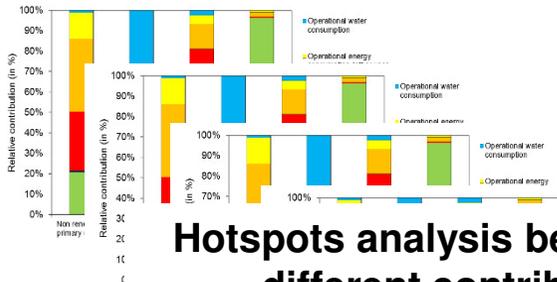
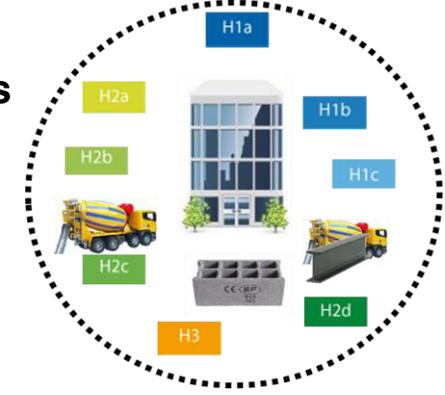
Individual houses



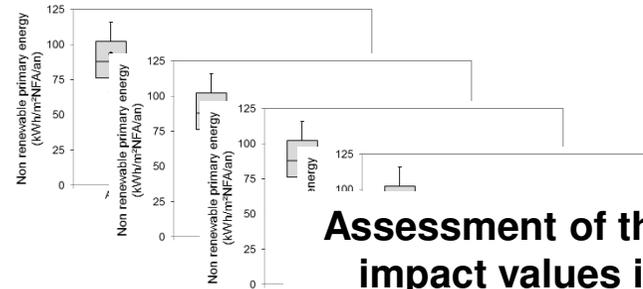
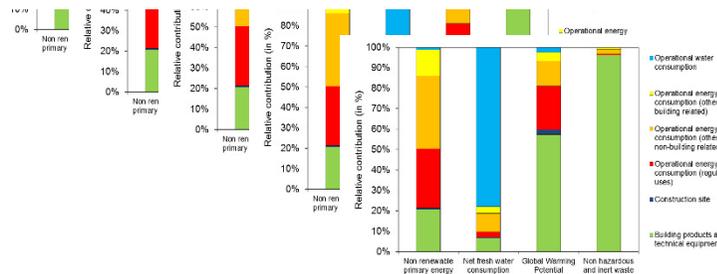
Multi-residential buildings



Office buildings

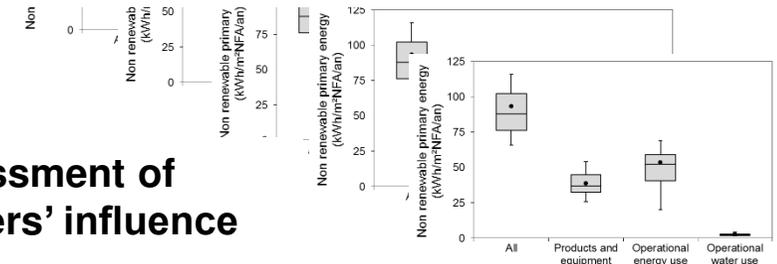


Hotspots analysis between the different contributors

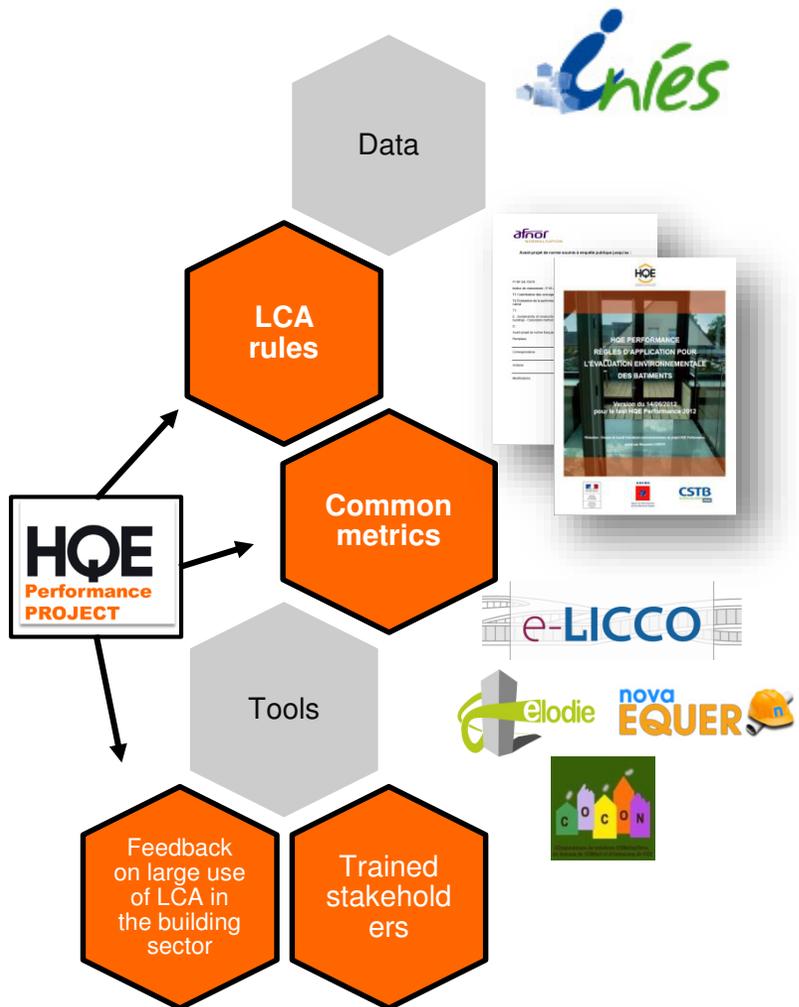


Assessment of the variability of impact values in the sample

Assessment of parameters' influence



Main outcomes of the pilot project



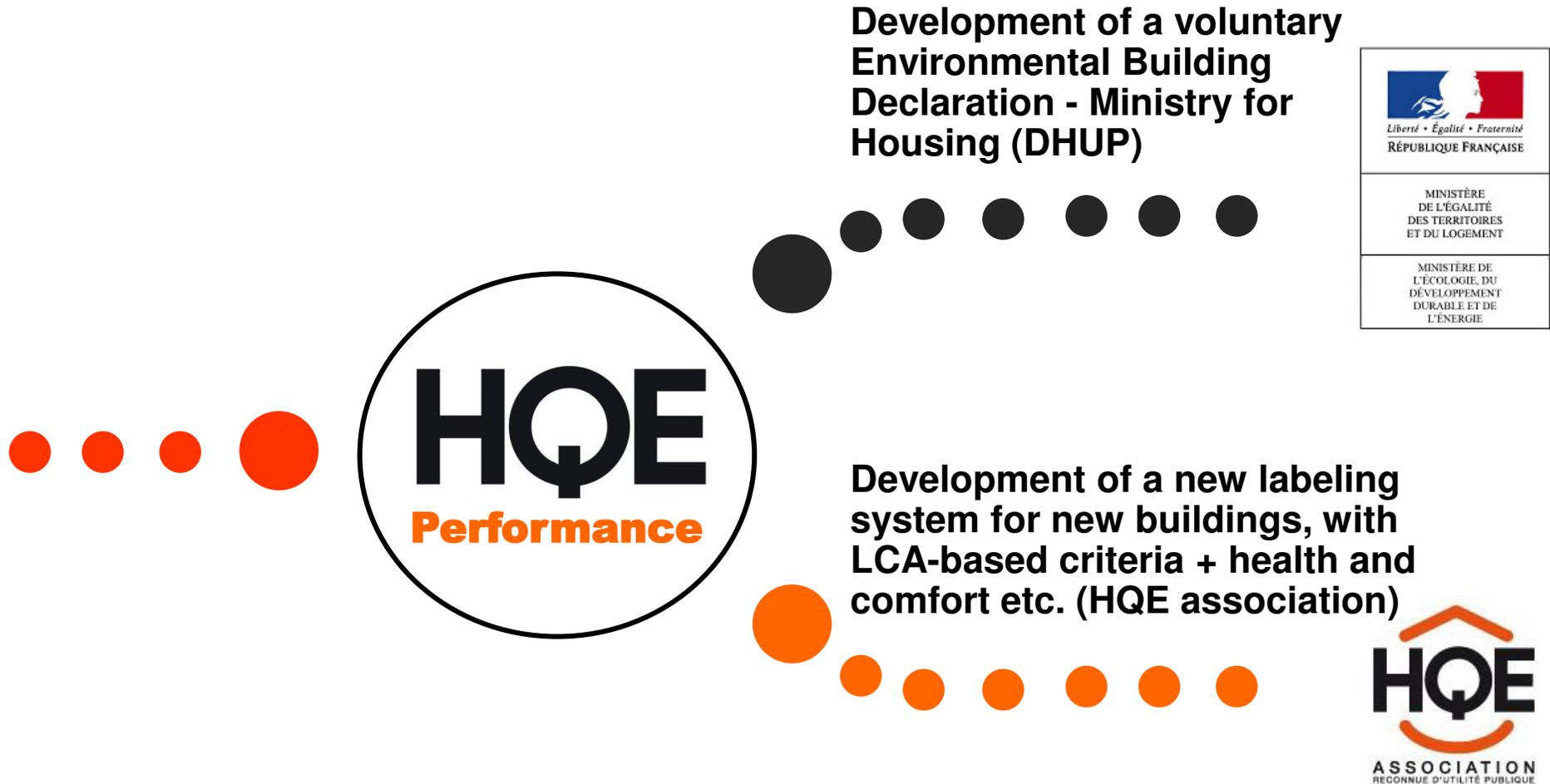
- Large use of product-specific EPDs from INIES
- A common scientifically sound, yet practical assessment framework tested in real case studies
- Trained building stakeholders and feedback
- Statistical results that provide
 - better understanding of the impacts per indicator
 - to be now used for setting target or guidance values in new LCA-based labels

Further information on the HQE Performance pilot project

- Reports available online on the HQE association website (only in french)
<http://assohqe.org/hqe/spip.php?article338>
- Communication document HQE Performance «First trends for new buildings» (english/french)
[http://assohqe.org/hqe/IMG/pdf/HQE_Perf - BD PPP.pdf](http://assohqe.org/hqe/IMG/pdf/HQE_Perf_-_BD_PPP.pdf)
- Scientific article to appear in 2015 in the International Journal of Life Cycle Assessment (presentation of the methodology + selected results for new individual houses)
Lasvaux S., Lebert A., Achim F., Grannec F., Hoxha E., Nibel S., Schiopu N., Chevalier J.
 «Towards reference values for the whole environmental performances of buildings: application to individual houses in the French context» accepted in *Int J Life Cycle Assess.*



From the pilot project towards new LCA-based labels (new buildings)



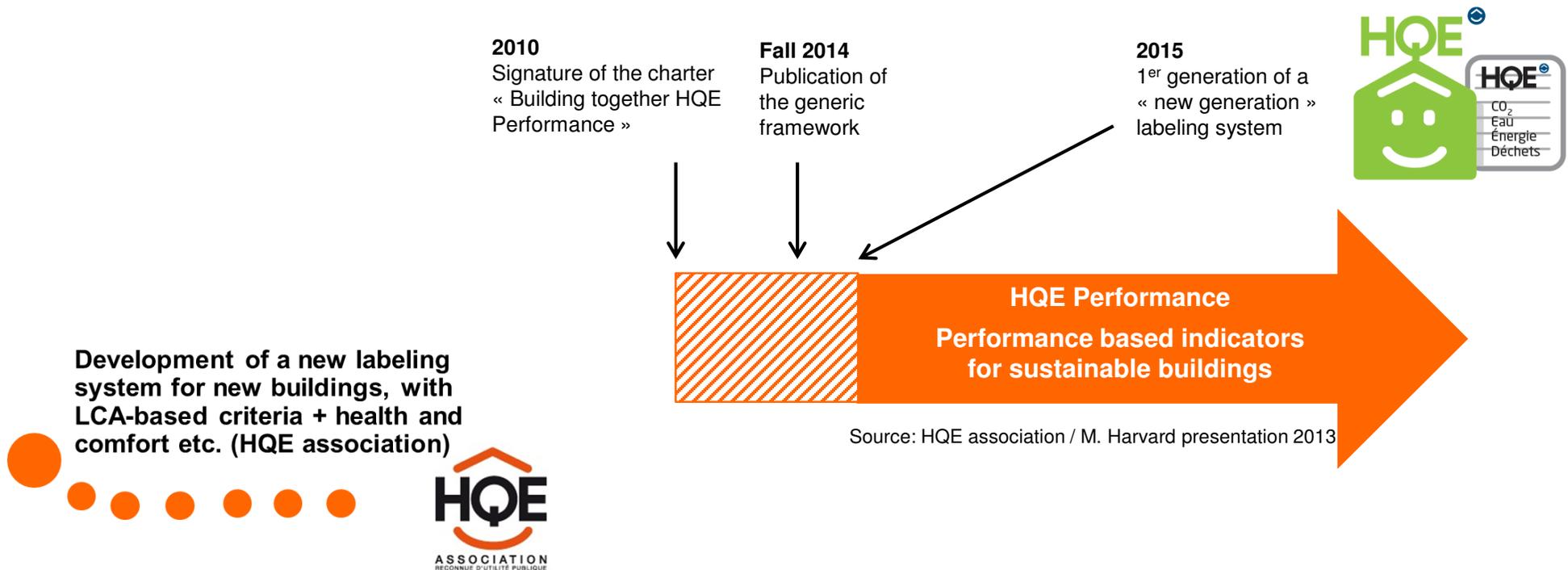
Next steps for the public authorities

- **Official launch** of the works of a future «environmental building declaration» (EBD) in **september 2014**
- Based on the HQE Performance pilot project a « pragmatic » and participatory framework for the environmental assessment of new buildings will be set up
- **1 steering committee and 7 working groups**
 - LCA common rules (WG1), environmental performance display (WG2), LCA data (WG3), economical stakes (WG4), users (WG5), integration at urban scale (WG6), usage quality (WG7)
- **Short term - until 2015**
 - Voluntary involvement launched by the State and precisng the involvement of stakeholders to use and feed the EBD
 - Development of the first version of the EBD (WG1 to WG3)
 - Capitalisation phase
 - Assess the economical impact, the performances levels and how stakeholders use the «new approach»
- **Mid term (from 2016)**
 - Discussions on the opportunity to set up a label for the environmental performance of buildings.



Next steps for the HQE association

- The HQE association is developing a new LCA-based labelling system with a multicriteria framework with LCA based information + health, indoor air quality, comfort (acoustic, thermal, visual), social and economy → sustainability assessment





DF 57 — Life cycle assessment in the building sector:
analytical tools, environmental information and labels

Thank you very much for your attention !

Any questions?