club alpin français
fédération française des clubs alpins et de montagne

Mont-Blanc France
“Nouveau Refuge du Goûter”
Sustainable house high altitude 20.10. 2011
Vattenhallen Science Center LTH

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
Région RhôneAlpes
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mont-blanc SAINT GERVAIS
ADEME Agence de l'Environnement et de la Maîtrise de l'Energie
agence de l'eau rhône méditerranée corse
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Name: Mika Paloluoma
Birth date: 18 march 1966
Birthplace: Holland
Nationality: Swiss and Finnish

Studies:
1974-1980 school in Finland
1980-1982 school in Sweden
1985 International Baccalaureat (IB) in Switzerland
1988-1994 Master in Architecture University of Geneva

Languages:
Swedish and Finnish : mother tongues
French, English : fluent
German : good

Professional career:
1992-1993 Feddersen&Herder, Berlin, Germany
1994-1997 in Switzerland, Germany, Finland and Spain
1997-2000 FHM Arkitekter Stockholm, Sweden

2000- (current employer) GROUPE H, Geneva, Switzerland

References at Groupe H:
PALAIS de l'EQUILIBRE – EXPO-02.
GLOBE O INNOVATION – CERN Geneva
STUDIOS 1 AND 15 SWISS RADIO HEADQUARTERS - Lausanne
SHOPPING CENTRE RADUGA IN ST.-PETERSBOURG - RUSSIA
CITYDEL Administratif centre MOSCOW - RUSSIA
MONTENEGRO - prospection of the LITORAL for development in tourism
CENTRE SOCIAL PROTESTANT (CSP) - Geneva.
SHOPPING CENTRE VICTORIA – UFA RUSSIA
Ongoing projects :
Hôtel du Parc - Montreux
Pavillon 2 - France
Domaine des Gets - France
Refuge du Gouter – France

View from Chamonix: the Mt-Blanc and the Aiguille du Goûter

View from Chamonix: the Mt-Blanc and Gouter

The old Refuge

View towards Mt-Blanc from the Gouter

Our client:

The French Federation of Alpine & Mountain Clubs.

280 regional clubs and more than 80’000 members.

The French Alpine Club is the owner of about 100 shelters, ‘refuges’, managing them and their maintenance.

Facing the challenges of environmental protection, the French Alpine Club aims to ensure that all its construction operations are and will be:

SUSTAINABLE:

-Governance
-Economy
-Social Solidarity
-Environment

HEQ: (High Environmental Quality)

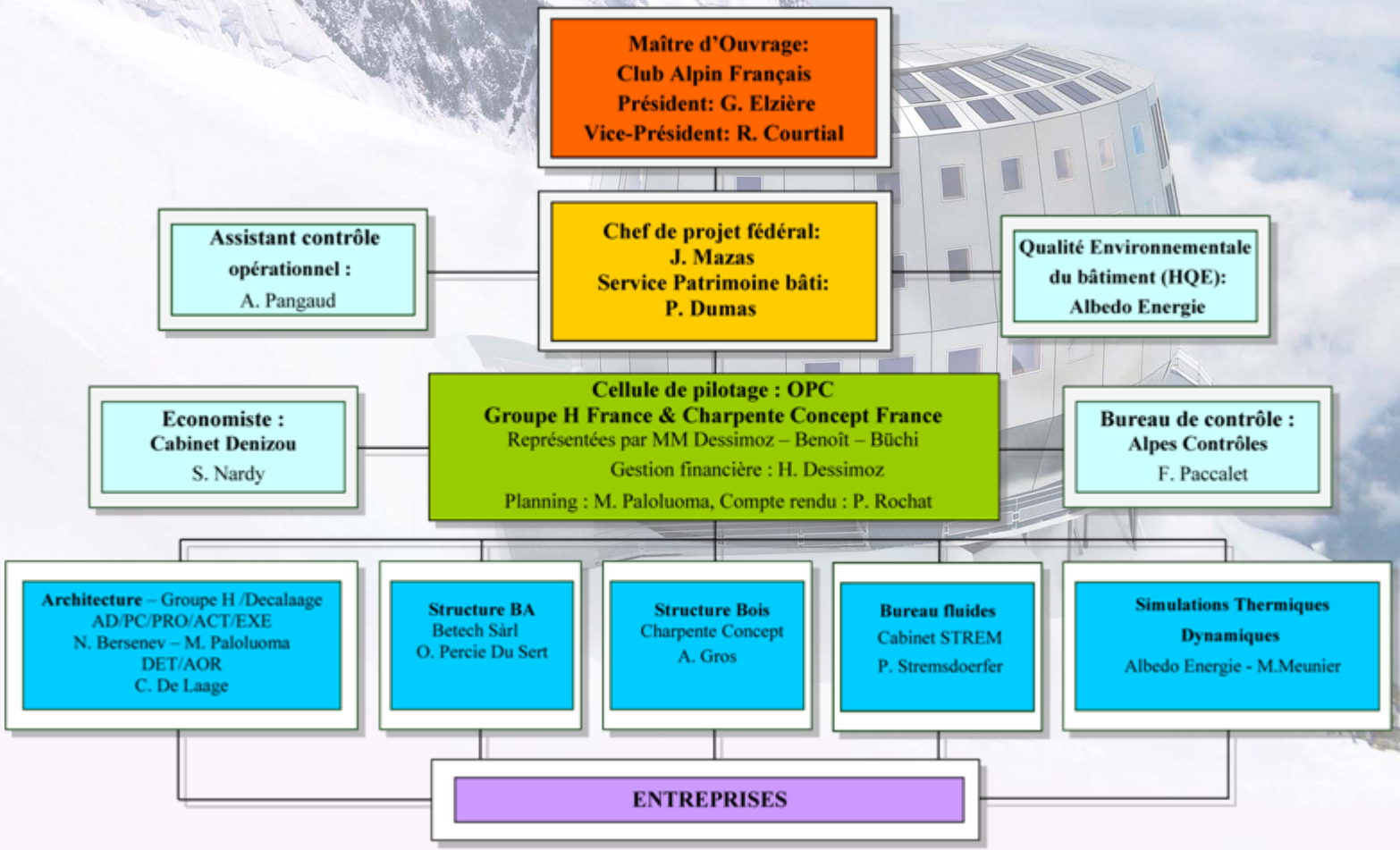
-A label achieved in France only by respecting strict quality and environmental criteria, submitted to controlling during all designing and building phases

The Refuge du Goûter is the laboratory, landmark for all future Refuges

George ELZIERE,
President
of French Alpine Club
(Club Alpin Français)

The Project Organization

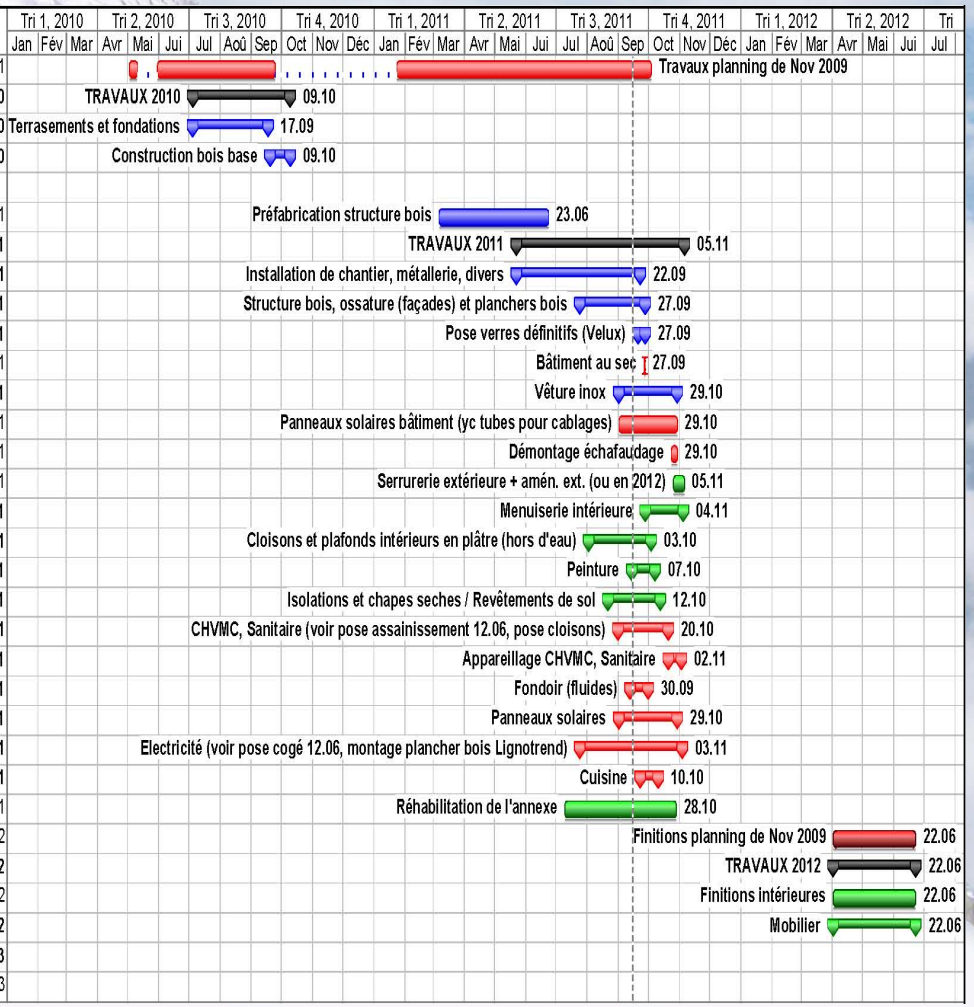
Organization Chart



The Project Organization

Planning

N°	Nom de la tâche	Durée	Début	Fin
1	Travaux planning de Nov 2009	292 jours	Lun 03.05.10	Lun 03.10.11
2	TRAVAUX 2010	77 jours	Lun 05.07.10	Sam 09.10.10
3	Terrasements et fondations	61 jours	Lun 05.07.10	Ven 17.09.10
14	Construction bois base	16 jours	Lun 20.09.10	Sam 09.10.10
21				
22	Préfabrication structure bois	80 jours	Lun 07.03.11	Jeu 23.06.11
23	TRAVAUX 2011	139 jours	Lun 23.05.11	Sam 05.11.11
24	Installation de chantier, métallerie, divers	101 jours	Lun 23.05.11	Jeu 22.09.11
37	Structure bois, ossature (façades) et planchers bois	55 jours	Lun 25.07.11	Mar 27.09.11
65	Pose verres définitifs (Velux)	6 jours	Mer 21.09.11	Mar 27.09.11
67	Bâtiment au sec	1 jour	Mar 27.09.11	Mar 27.09.11
68	Vêture inox	50 jours	Ven 02.09.11	Sam 29.10.11
75	Panneaux solaires bâtiment (yc tubes pour cablages)	50 jours	Ven 02.09.11	Sam 29.10.11
76	Démontage échafaudage	6 jours	Lun 24.10.11	Sam 29.10.11
77	Serrurerie extérieure + amén. ext. (ou en 2012)	10 jours	Mer 26.10.11	Sam 05.11.11
78	Menuiserie intérieure	33 jours	Mer 28.09.11	Ven 04.11.11
84	Cloisons et plafonds intérieurs en plâtre (hors d'eau)	53 jours	Mer 03.08.11	Lun 03.10.11
90	Peinture	20 jours	Jeu 15.09.11	Ven 07.10.11
92	Isolations et chapes seches / Revêtements de sol	45 jours	Lun 22.08.11	Mer 12.10.11
98	CHVMC, Sanitaire (voir pose assainissement 12.06, pose cloisons)	43 jours	Jeu 01.09.11	Jeu 20.10.11
103	Appareillage CHVMC, Sanitaire	11 jours	Ven 21.10.11	Mer 02.11.11
105	Fondoir (fluides)	16 jours	Mar 13.09.11	Ven 30.09.11
109	Panneaux solaires	50 jours	Ven 02.09.11	Sam 29.10.11
112	Electricité (voir pose cogé 12.06, montage plancher bois Lignotrend)	87 jours	Lun 25.07.11	Jeu 03.11.11
127	Cuisine	15 jours	Ven 23.09.11	Lun 10.10.11
129	Réhabilitation de l'annexe	95 jours	Dim 10.07.11	Ven 28.10.11
130	*Finitions planning de Nov 2009*	60 jours	Lun 02.04.12	Ven 22.06.12
131	TRAVAUX 2012	60 jours	Lun 02.04.12	Ven 22.06.12
132	Finitions intérieures	60 jours	Lun 02.04.12	Ven 22.06.12
133	Mobilier	60 jours	Lun 02.04.12	Ven 22.06.12
135	TRAVAUX 2013	45 jours	Lun 01.04.13	Ven 31.05.13
136	Démontage de l'ancien Refuge	45 jours	Lun 01.04.13	Ven 31.05.13



The REFUGE du GOUTER, is situated at an altitude of 3'835 m on the long route up to the summit of Mont-Blanc where mountaineers from every corner of the world gather every year.

The new shelter will replace the old structure built in 1960, now obsolete and not environmentally friendly. It will be demolished.

For its size (120 beds) and altitude, the REFUGE du GOUTER is a considerable enterprise. Construction started in summer 2010, and the inauguration is scheduled for July 2012. The new REFUGE du GOUTER is a construction introducing the principles of sustainable development at an altitude of 3'835 m.

The building is of High Environmental Quality – HEQ

There are 15 HEQ targets, mainly :

1. Integration between the building and its environment.
2. Use of wood from forests managed sustainably.
3. Weak disturbances during construction phase.
4. Careful energy management.
5. Careful water management.
6. Careful waste products management.
7. Careful management of the maintenance.

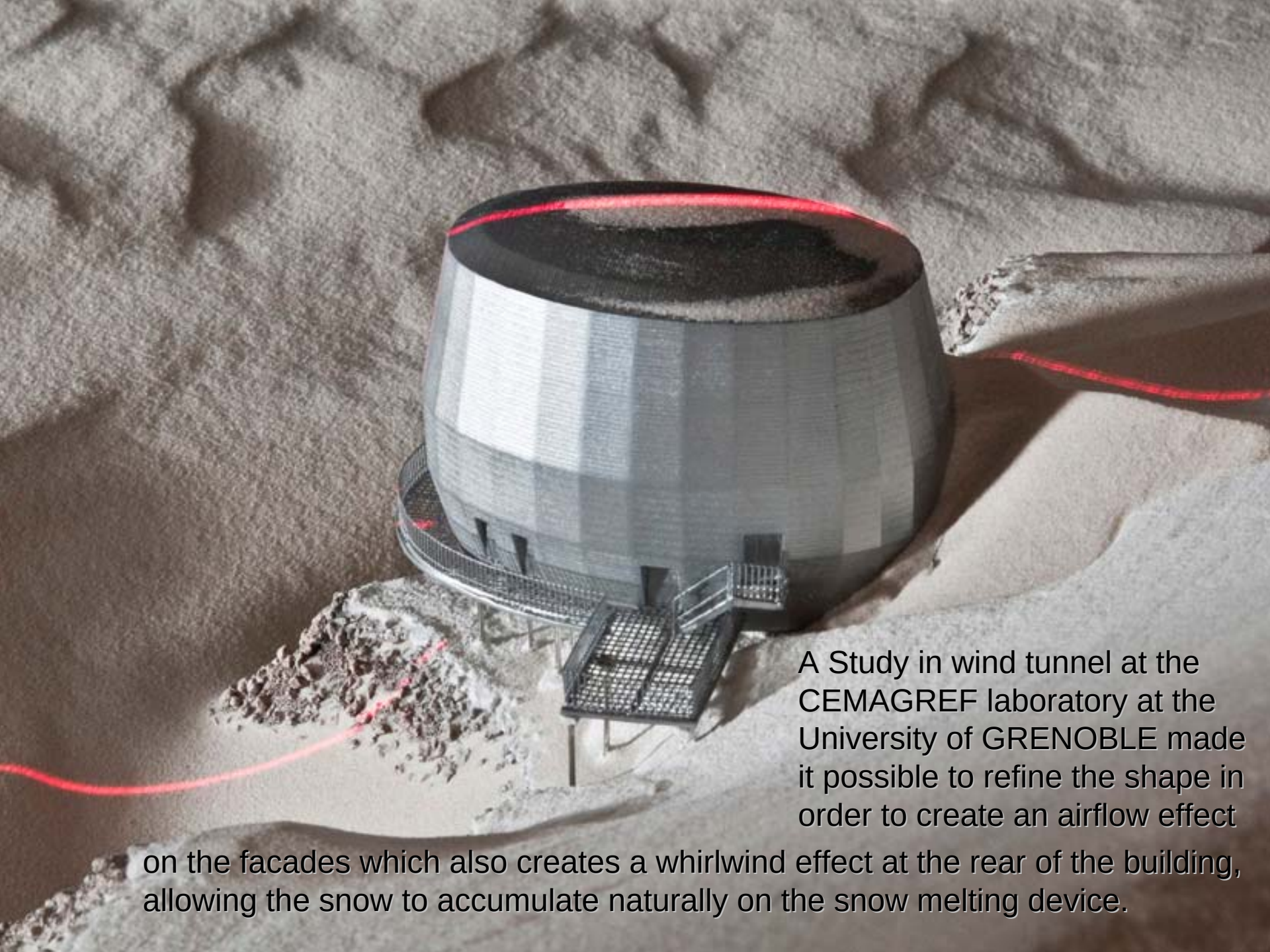
-Keeping down carbon emissions during the construction work, the exploitation of the new shelter, and it’s future demolition.

-Special mission assigned to the Cabinet ALBEDO, a consultant specialized in HEQ and with whom all the designing processes have been coordinated .

The architecture and engineering are the work of the creators of the: ‘Palace of Equilibrium’ (Swiss national exhibition in 2002). Charpente-Concept, wood engineering, and Groupe H, architecture.

The representation of the terrestrial globe, a world first, is a wooden sphere, 40 m in diameter and 27 m in height.

It is now re-erected at the CERN in Geneva, known as the ‘Globe of science and innovation’, a building for expositions and conferences arranged by the CERN.



A Study in wind tunnel at the CEMAGREF laboratory at the University of GRENOBLE made it possible to refine the shape in order to create an airflow effect on the facades which also creates a whirlwind effect at the rear of the building, allowing the snow to accumulate naturally on the snow melting device.

External envelope in stainless steel elements that can resist average winds of 240 km/hour and important temperature variations.

Its facets, like the Mont-Blanc, will be illuminated by the sun.

Act locally:

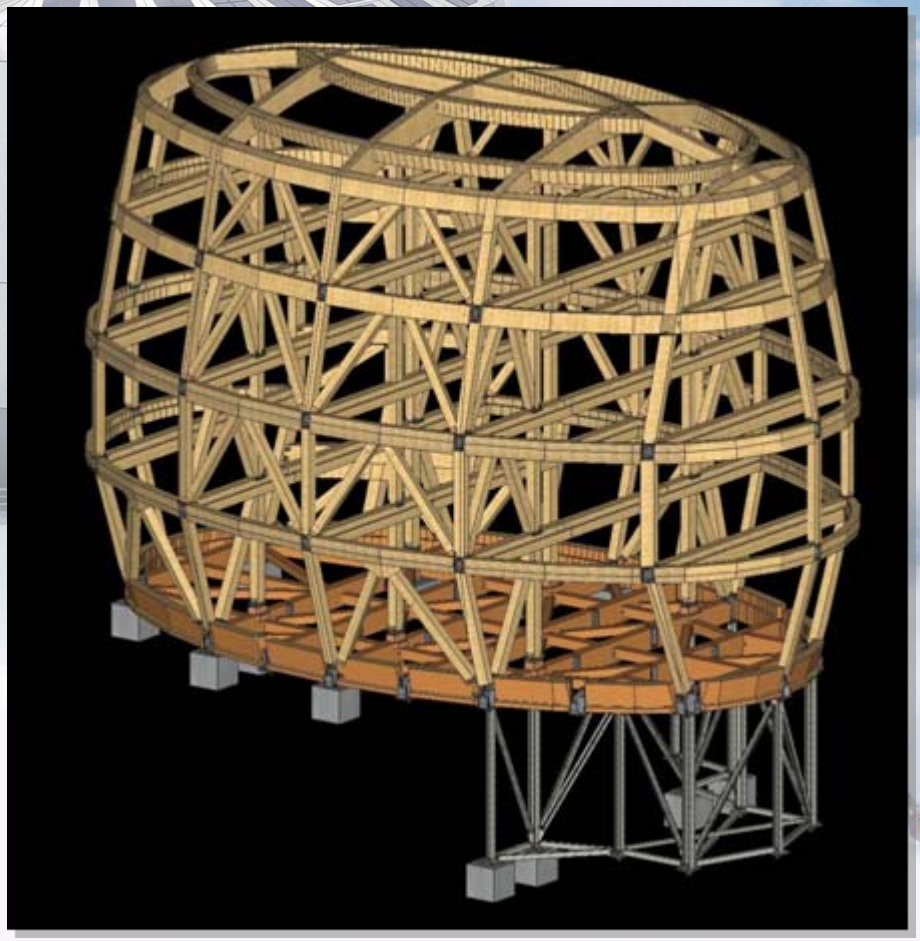
The structure of the building is in pine spruce or fir equivalent to a volume of 400 m^3.

To keep down CO2 emissions, linked to transportation, wood was sourced from the Commune de Saint-Gervais, with the ‘PEFC Label’ for the sustainable forest management.

The traceability was clearly identified by the engineers who have been assisted by the children from Saint-Gervais who went into the forest for marking the wood.

The wood was cut, turned, glued and shaped by local companies.

The structure is ‘GL28 laminated wood’, whose structural resistance makes it possible to reduce the size of the sections and the total weight. The structural elements are joined together by resin glued. The adhesives used are free of formaldehydes and are biodegradable.



Wooden floors are made of hollow caissons, integrating cabling and acoustics, easy to move due to light weight.

Insulation of the facades and the roof are in recycled wood fiber. It is one of the most efficient on the market. By day it stores the heat, and emits it at night.

Think globally:

The constraints of building at high altitude were incorporated at the design stage:

-The construction method is based on modules prefabricated in the valley.

-Sized for transportation, max 550kg for the helicopter per rotation, they are assembled on site as a construction game.

-This optimized prefabrication for handling at a level of man power reduces pollution and waste from construction to a minimum.

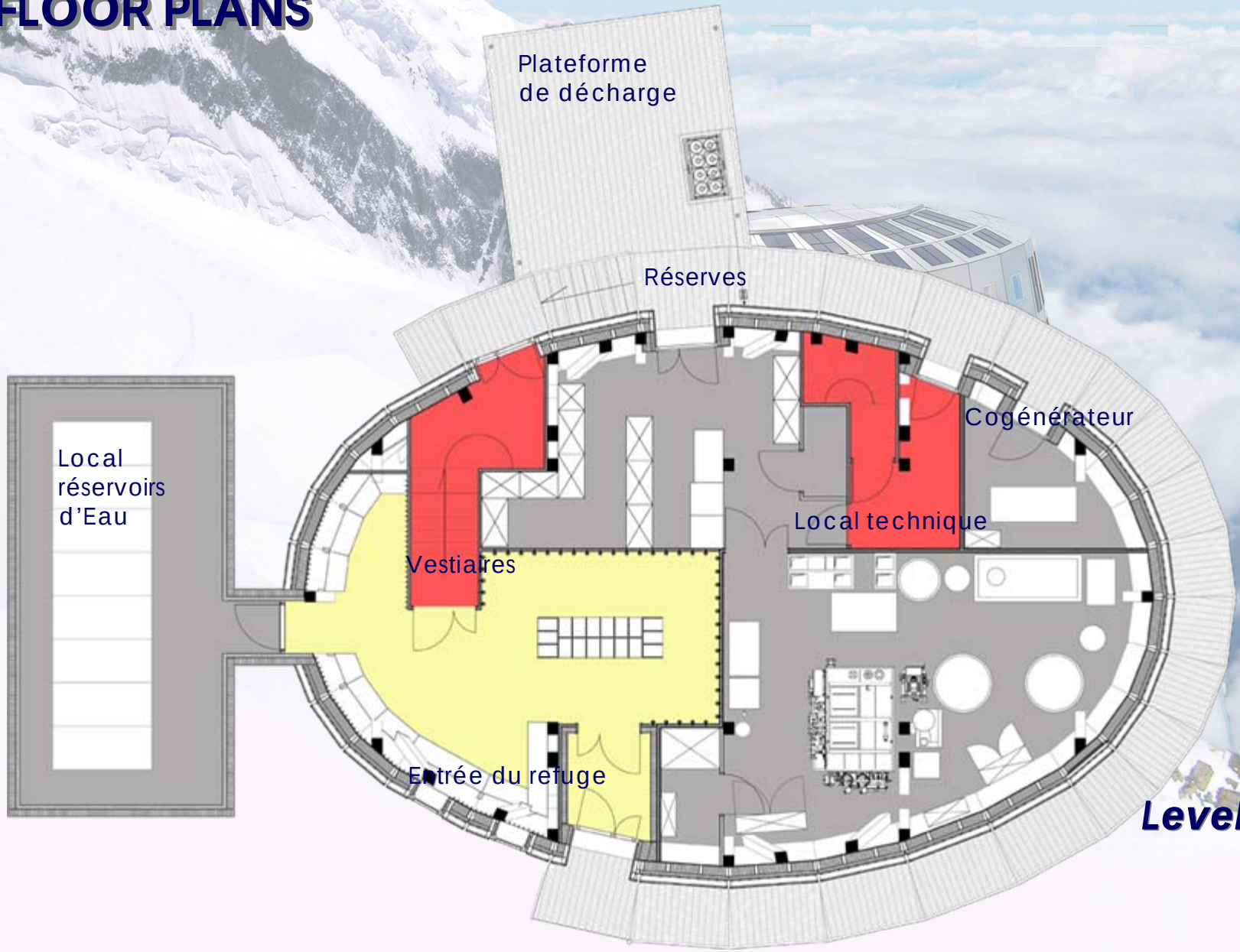
A disposal area was created at the rear of the building + a crane and a scaffold for installation and assembly of the prefabricated parts.

The combination of these resulted in the reduction by 30% of the rotations of the helicopters.

EXTERIOR VIEWS

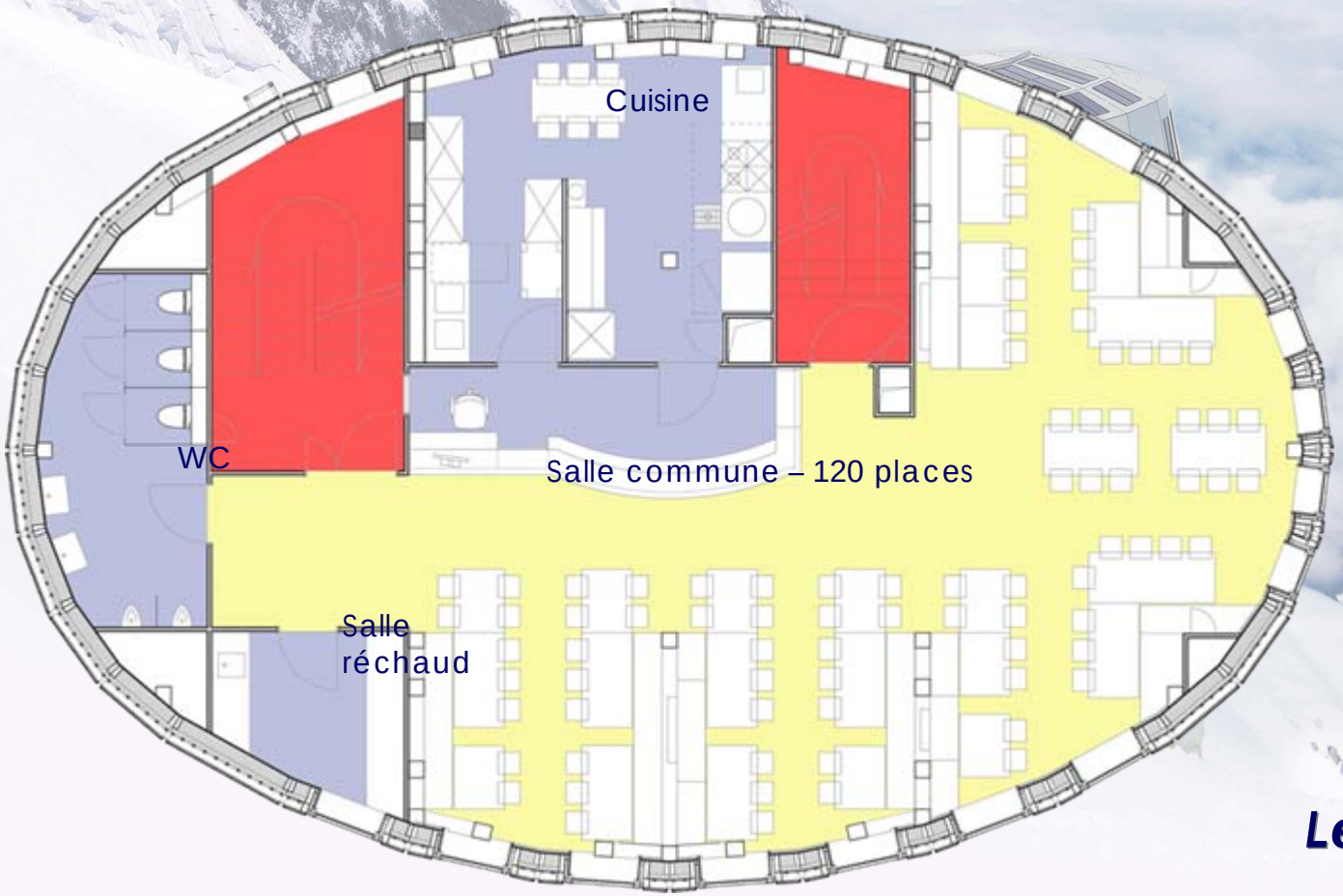
EXTERIOR VIEWS

FLOOR PLANS



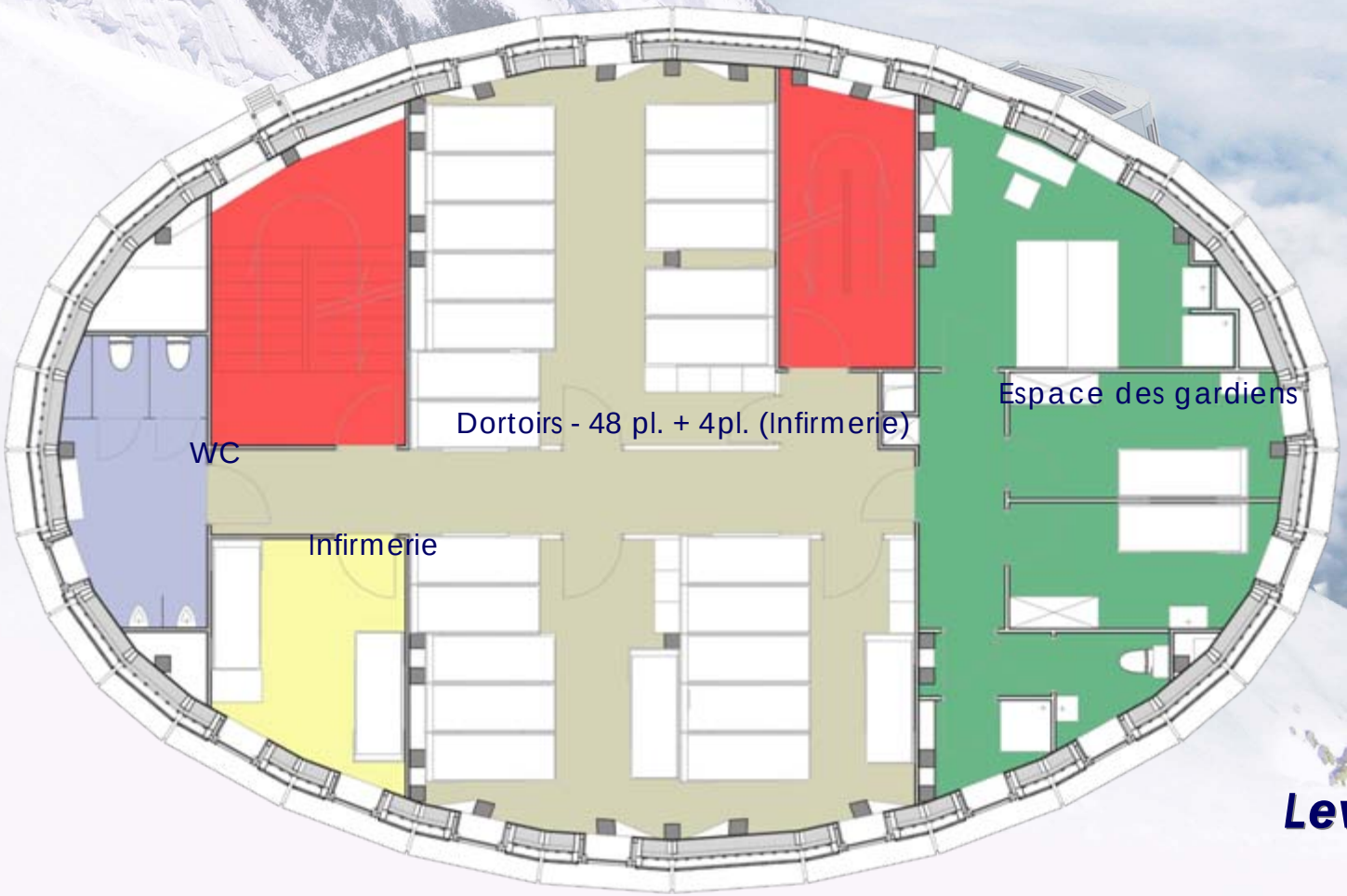
Level 0

FLOOR PLANS



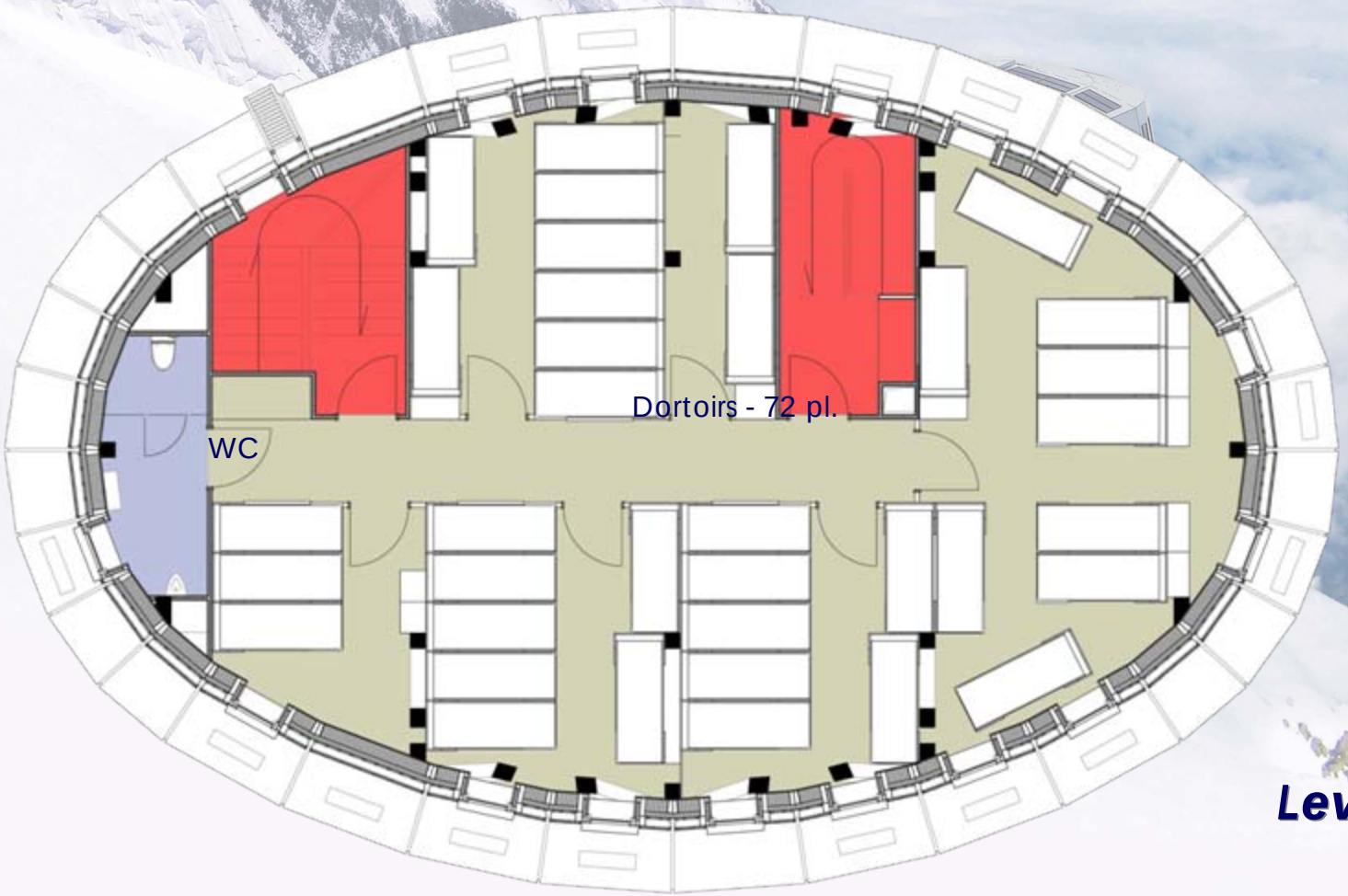
Level +1

FLOOR PLANS



Level +2

FLOOR PLANS



Level +3

DINING ROOM

DINING ROOM

DORMITORY

BUILDING WORKS 2010

BUILDING WORKS 2010

BUILDING WORKS 2011: May 30th

BUILDING WORKS 2011: June 24th

BUILDING WORKS 2011: July 01

BUILDING WORKS 2011: July 15th

BUILDING WORKS 2011: 29 July 29th

BUILDING WORKS 2011: August 5th

BUILDING WORKS 2011: August 12th

BUILDING WORKS 2011: August 19th

BUILDING WORKS 2011: August 31st

BUILDING WORKS 2011: September 9th

BUILDING WORKS 2011: September 28th

Team spirit :

We can underline the importance and the quality of architects and engineers who have studied the feasibility of the project and identified the technologies to meet with the ambitions of the Client. They ultimately have worked together to make this exceptional construction possible.

If architects and engineers are able to design the building of their dreams in their agencies, they must still convince the building company managers of their ability to fulfill this dream at 4 000 m height.

We thank the efforts of the building companies, the helicopter pilots, ... who shared our vision and the challenge of our project.

The official opening of the NEW REFUGE du GOUTER will be in july 2012.

Albedo consultant:

Toward zero emission building

GROUPE h

DECALAAGE

CHARPENTE CONCEPT
Genève - Paris - Haute-Savoie - Vaud
INGENIEURS ET DESIGNERS DU BOIS

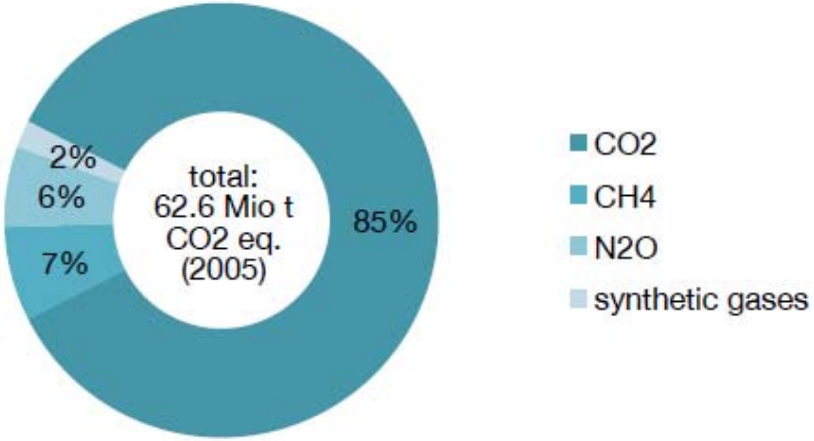
Strem
Ingénieurs en fluides

ALBEDO
énergie

Denizou

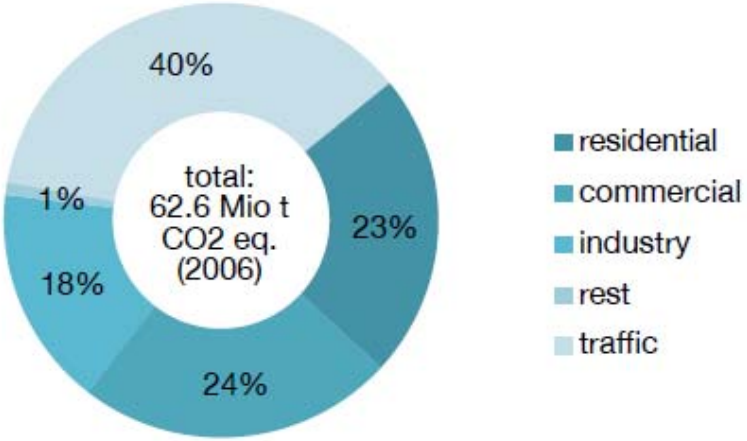
BETECH

Context : CO_2 emission



Green House Gasses

Source: BFE 2007



CO_2 Emissions / Sectors

Source: BFE 2007

Source ETHZ 2010

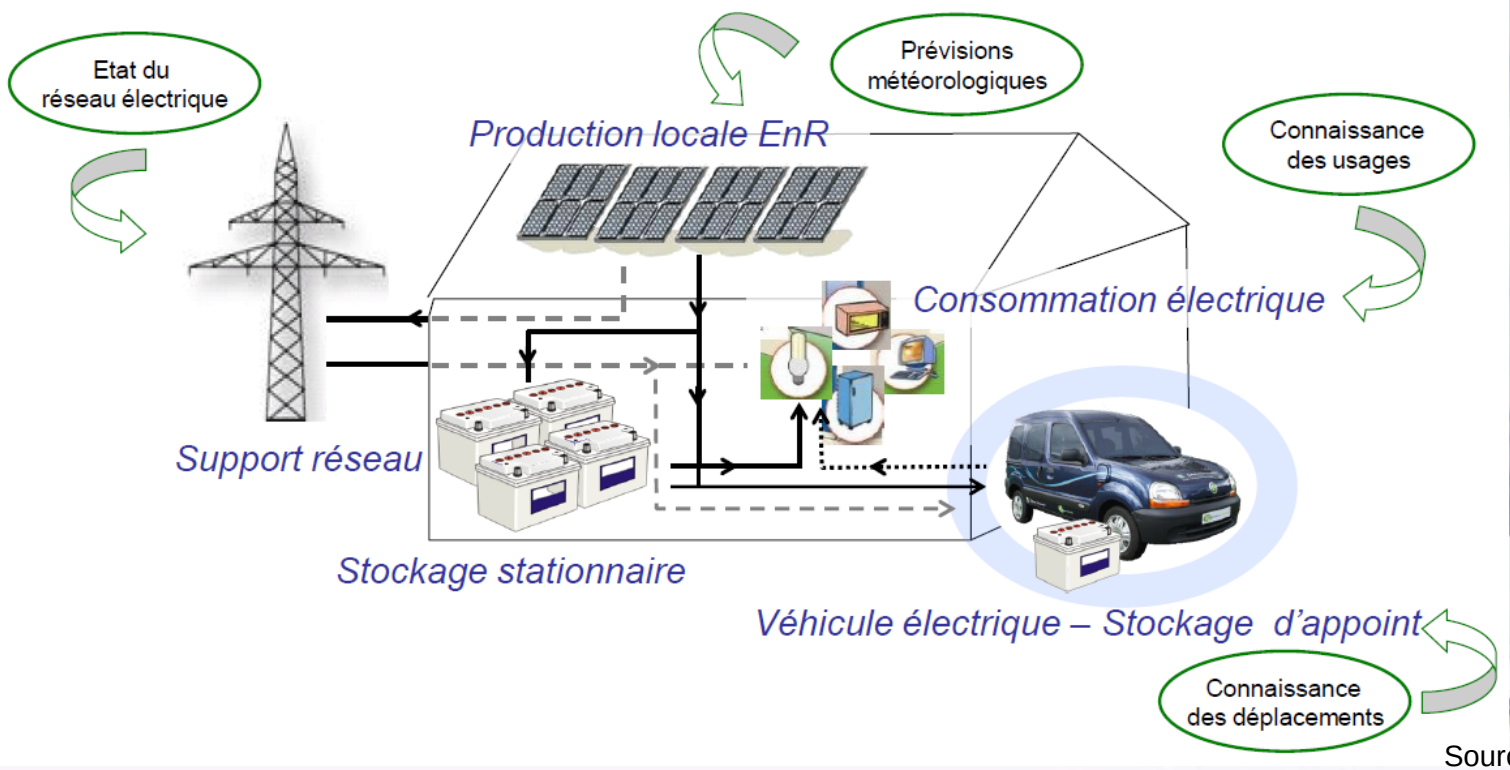
The new paradigm
"Towards Zero-Emissions Architecture"

People have been heating with the help of combustion processes ever since man discovered how to make fire, using wood and fossil fuels like coal or natural gas to keep their homes warm and snug. The CO2 problem and climate change, however, have put a major question mark over the method.

Therefore we are facing a paradigm shift ...: not just away from combustion technologies and towards seasonal energy storage, but also from simple energy-saving towards zero emissions.

Source ETHZ 2010

Future trends :
Solar + Home + Transport

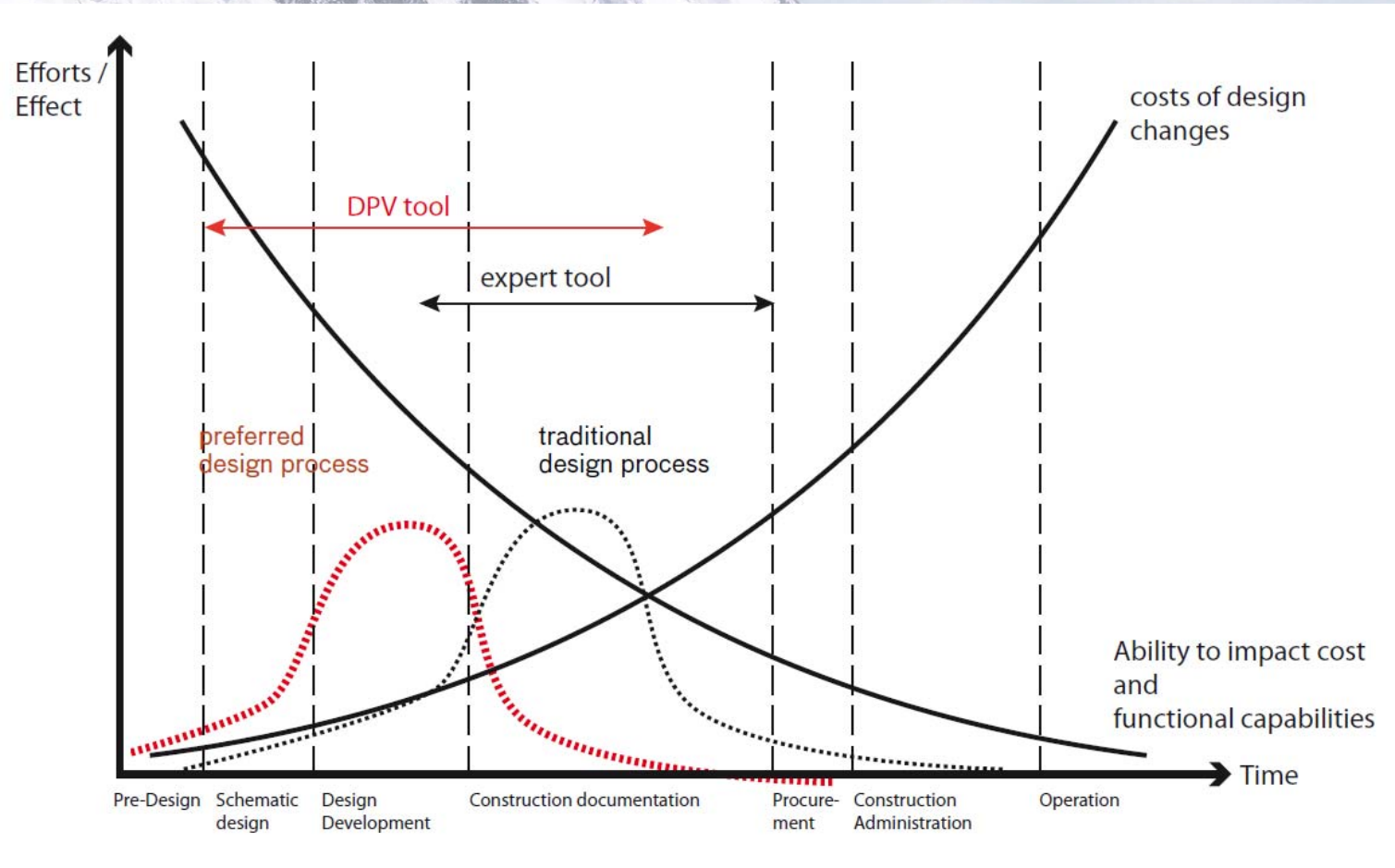


Source CSTB

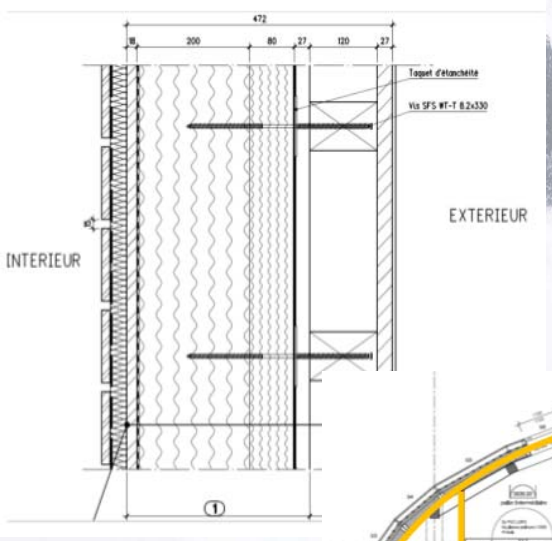
Refuge du Goûter : constraints

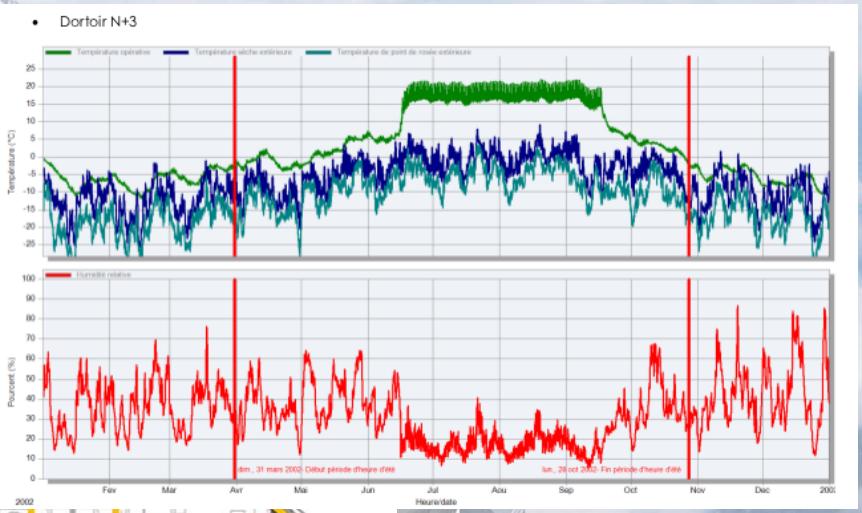
- Mountaineer safety
- 120 climbers each night
- Self-sufficiency
- No liquid water
- No energy except the sun
- No reject in nature

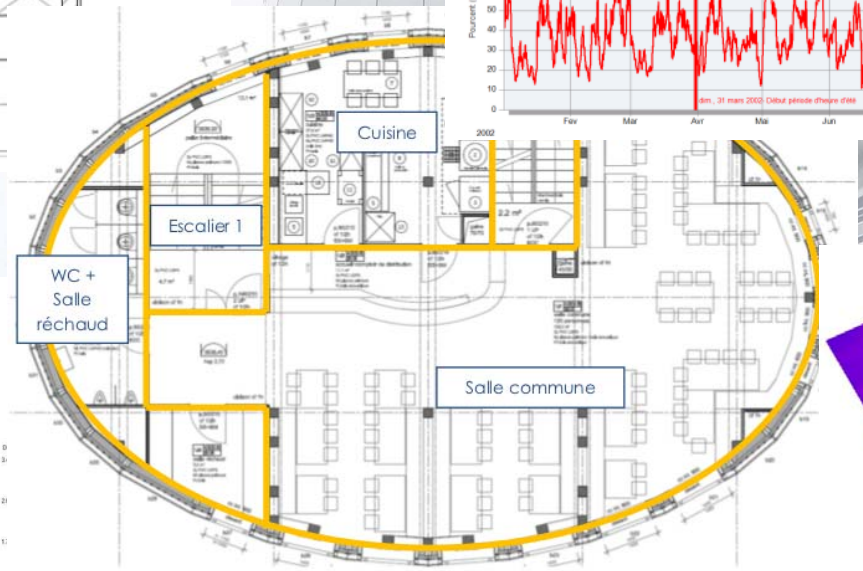
Design vs Architecture

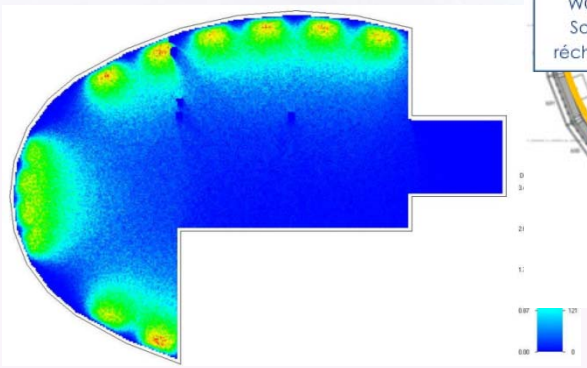


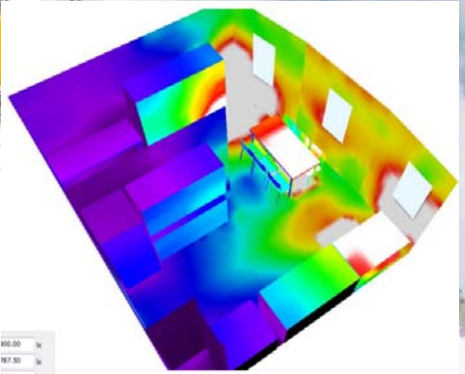
Simulation tools



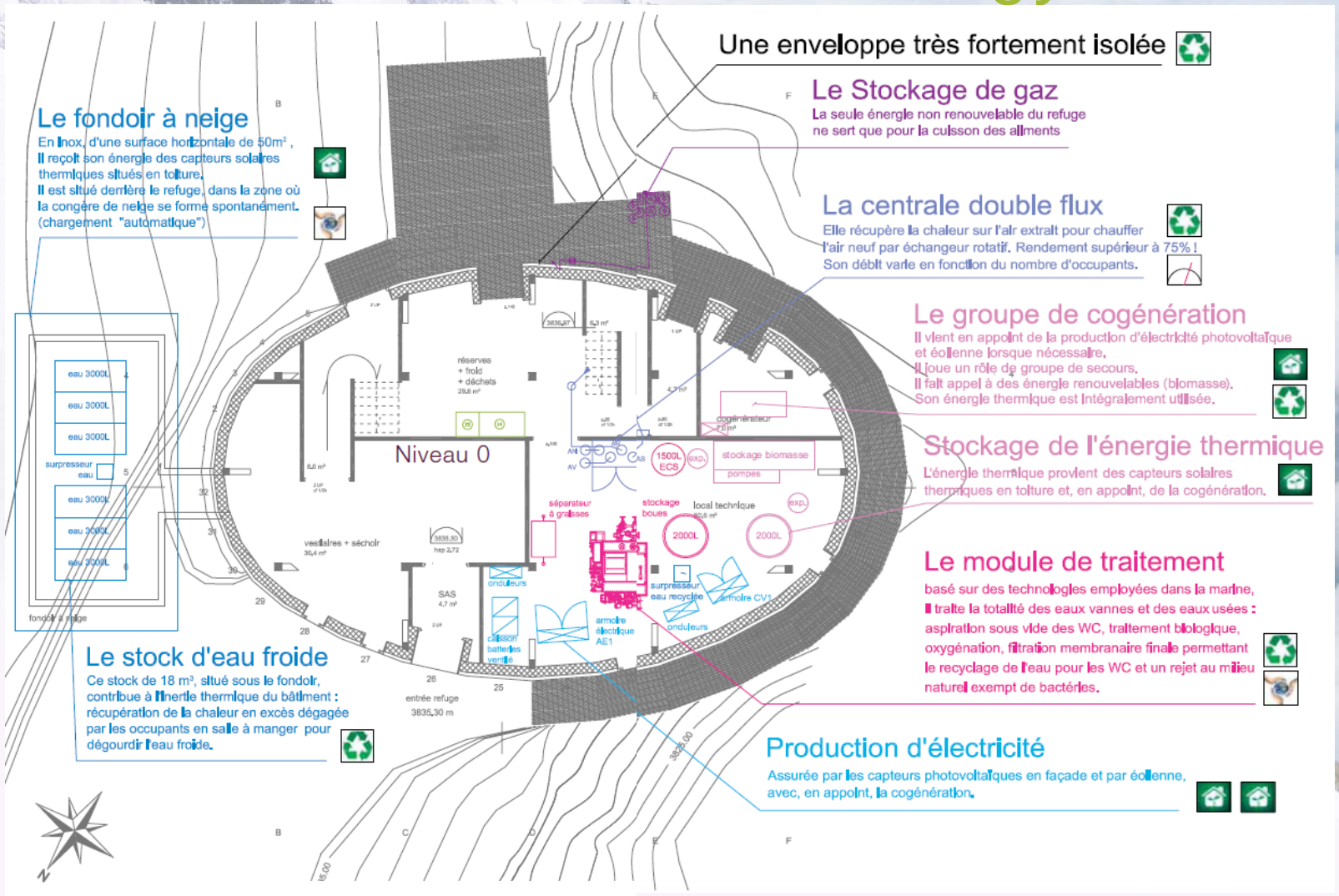




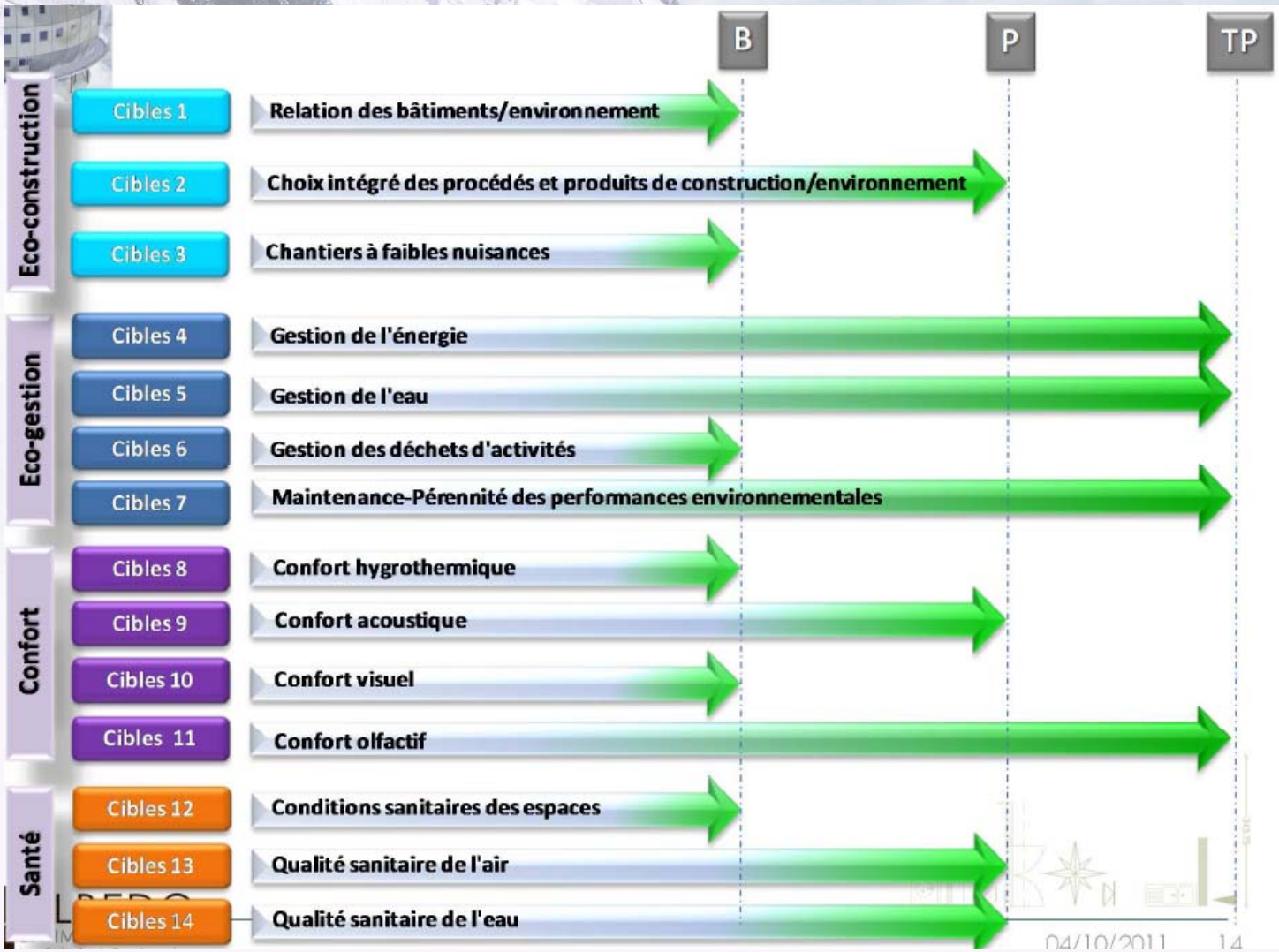




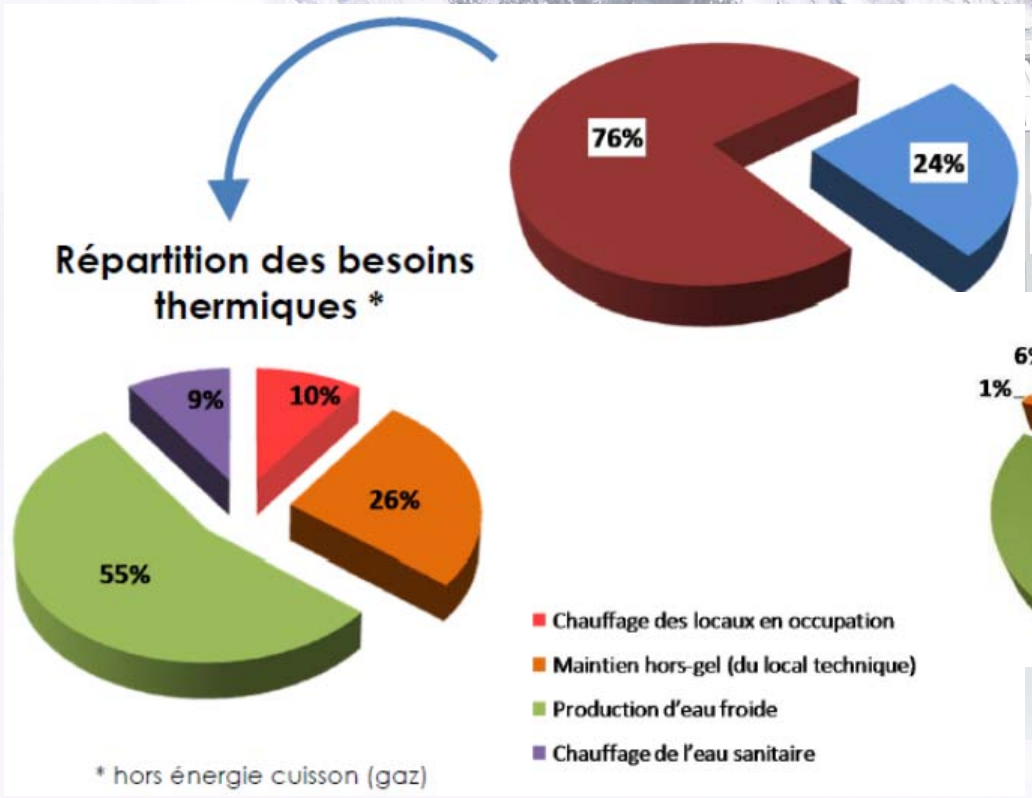
Innovation & technology

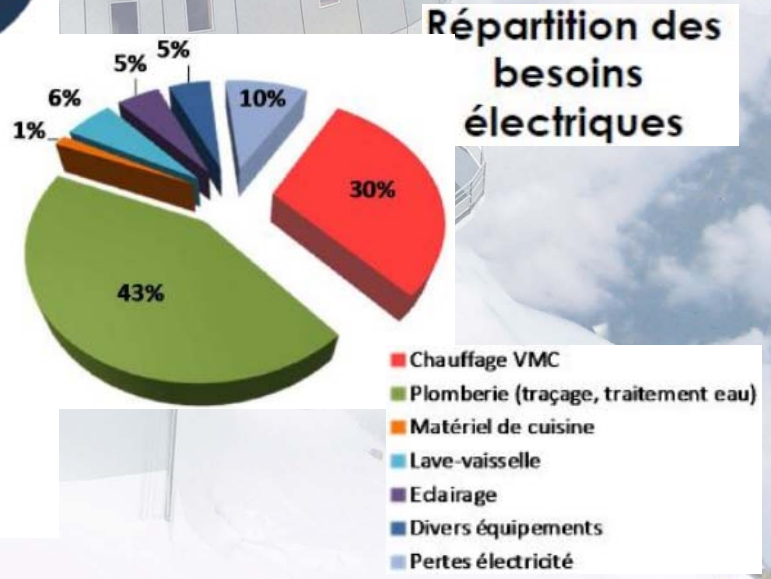


HQE Evaluation (High Quality Environment)

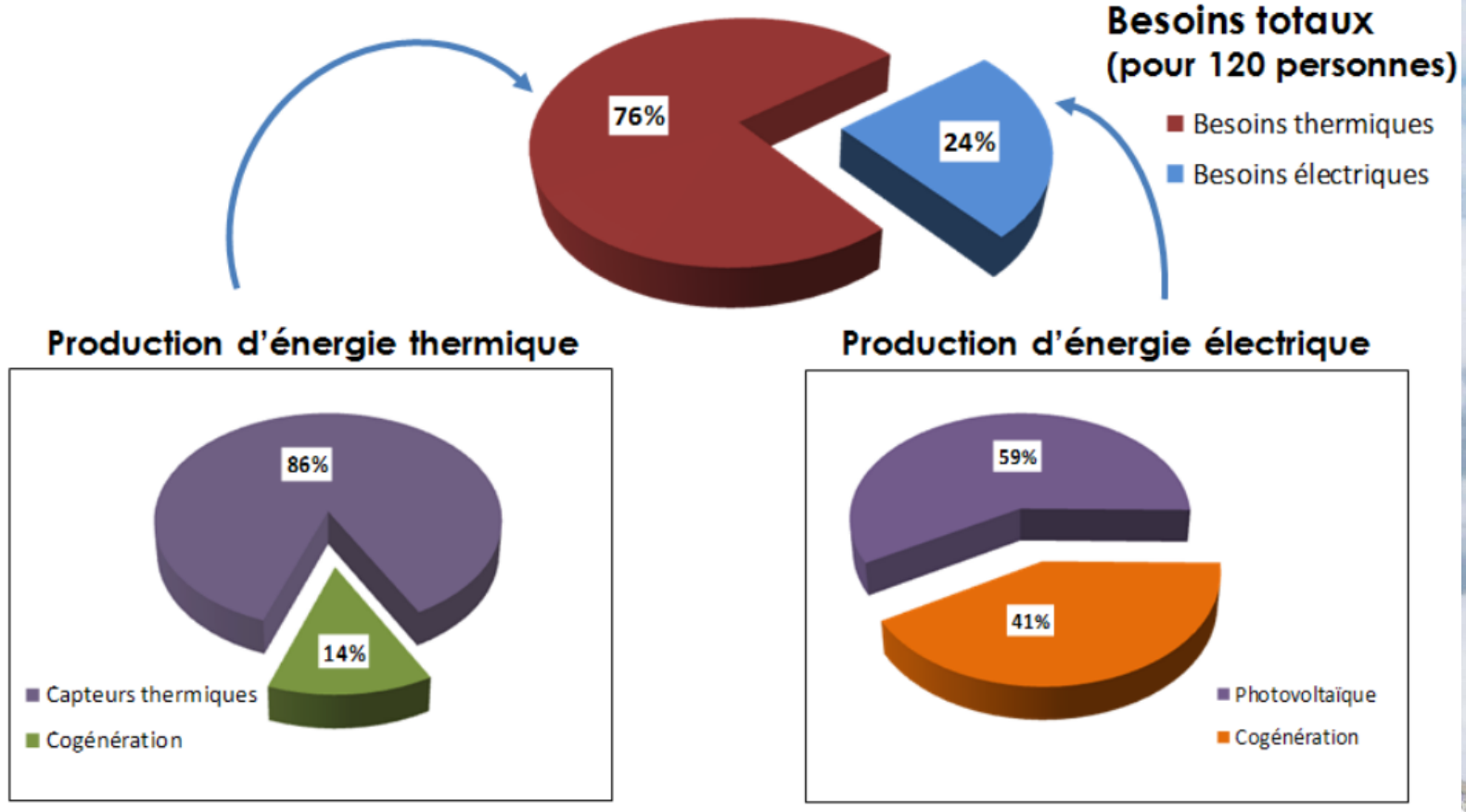


Energy Balance





Energy balance



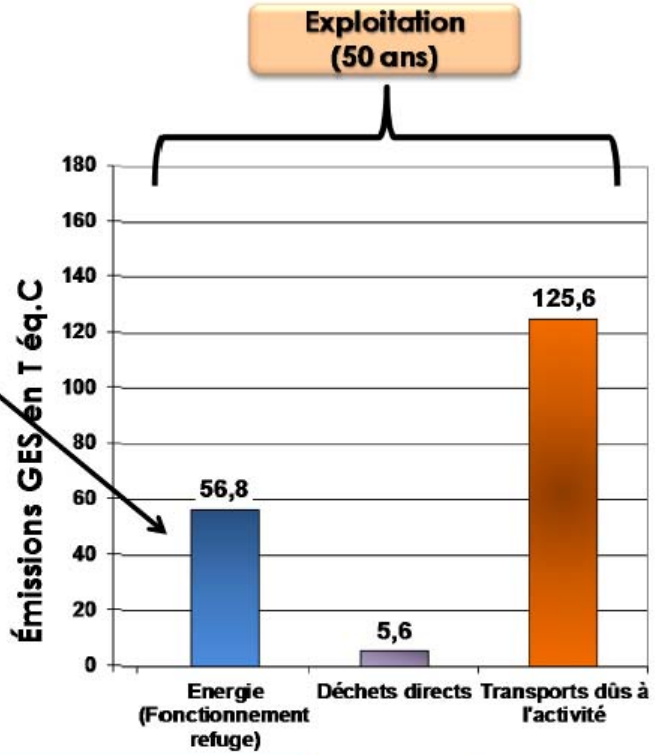
Carbon Balance : energy

Emissions liées à l'utilisation de combustibles fossiles

57 T éq.C

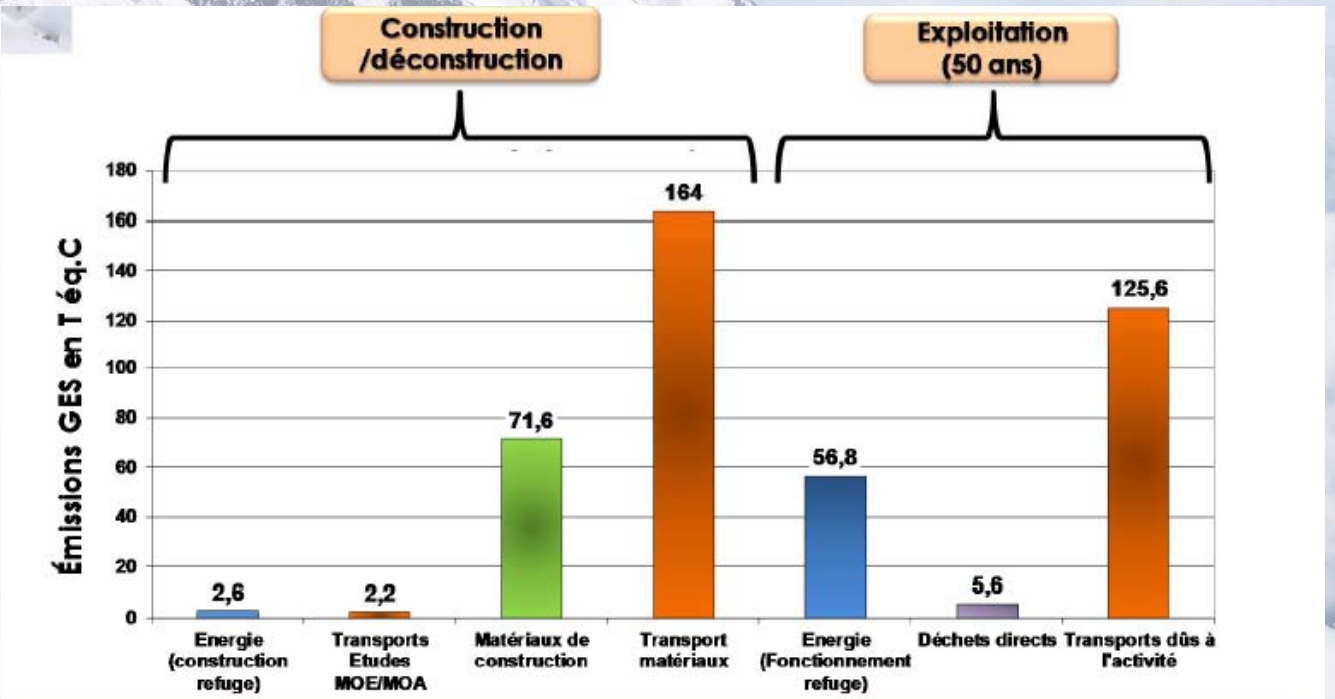
soit 1 140 kg éq.C/an

soit 35 500 km en voiture de 7 CV



Emissions GES par poste

Global 50 years carbon balance



Emissions GES	Total en T éq.C	Ratio en kg éq.C /m².SHON (1)
Refuge du Goûter	**428**	569
Même refuge en vallée	163	217

Another 8 hours to the Mont-Blanc..

After this unique experience of designing and building an energy autonomous refuge at 3835m, our team reached the required skills for the future of

« Zero Emission Buildings »

…if we are able to do it at 3835m, there is no excuse not to be able to do it at low altitude !!

(Thomas Buchï , wood engineer, in *Le bois ma passion 2011*)

GROUPE h

DECALAAGE

CHARPENTE CONCEPT
Genève - Paris - Haute-Savoie - Vaud
INGENIEURS ET DESIGNERS DU BOIS

Strem
Ingénieurs en fluides

ALBEDO
énergie

Denizou

BETECH

Thank you!