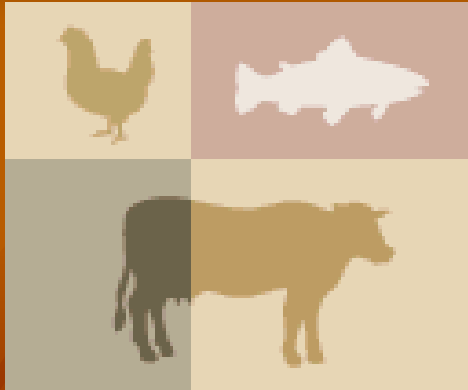




4 F Crops

Bologna, 17 Sep 2008



CROPS

FIBER FEED FOOD
FUEL





**Isolkenaf : natural insulation panels,
for not “insulating” Kyoto**

K.E.F.I. Project

Offices : Via Pieve, 85

42016 GUASTALLA

(Reggio Emilia)

Tel. +039 0522 834502

Fax +039 0522 835008

Production : Via Arginello, 48

46030 DOSOLO

(Mantova)

Tel. +39 0375 899116

Fax +39 0375 838137



www.kenaf-fiber.com

K.E.F.I. Project

Presentation

- **The Kenaf**
- **Isolkenaf panel characteristics**
- **Economic & Social contents :**
**Building insulation /Energy consumption/
/Pollution (Emission)**

K.E.F.I. Project



The Kenaf

K.E.F.I. Project

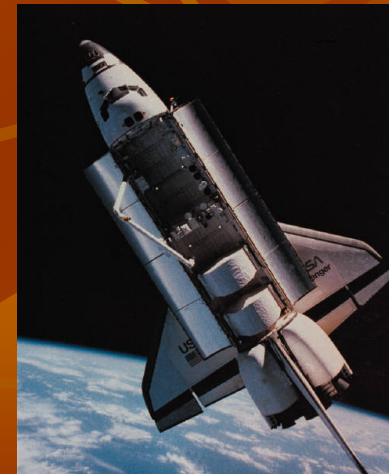


Kenaf plant

The Kenaf

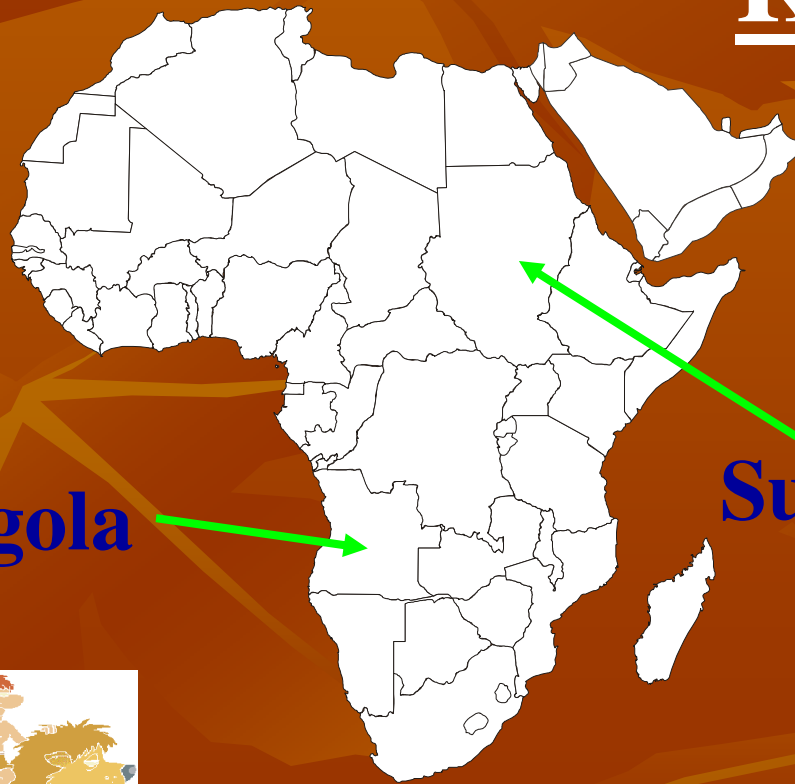
A Plant “hereafter”

Stargate



K.E.F.I. Project

Kenaf Origin



Angola

Sudan



Kenaf seeds



K.E.F.I. Project

Botanic definition

- Annual Dicotyledonous
- *Malvaceae* family
- *Hibisceae* tribe



K.E.F.I. Project

Climatic needs

- Germination : 15 – 20 °C
- Growth : 20 – 25 °C (optimum)
- 400 - 600 mm water for whole cycle



K.E.F.I. Project

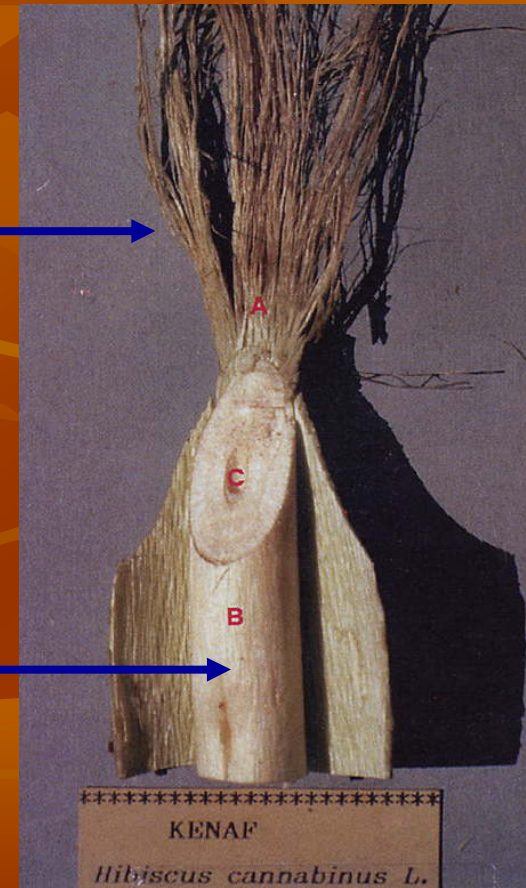
Kenaf plant



Bast

Flower

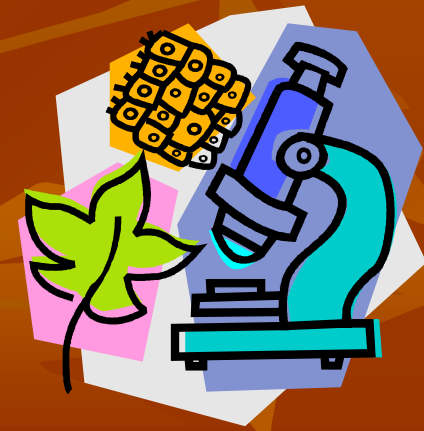
Stalk



K.E.F.I. Project

Chemical Composition (%)

■ Cellulose	:	45
■ Hemicellulose	:	25
■ Lignin	:	18
■ Pectin	:	5
■ Other	:	7



K.E.F.I. Project



Kenaf Fiber

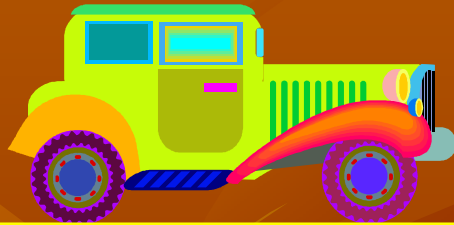
K.E.F.I. Project



Kenaf Stalk

K.E.F.I. Project

Kenaf Applications



Car Panels



Chipboard



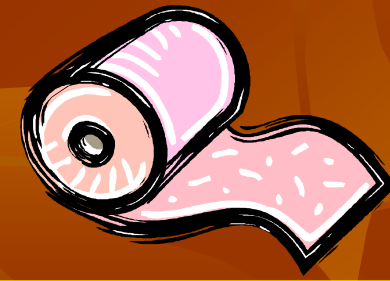
Horse bedding



Yarn



Building insulation



Paper pulp

K.E.F.I. Project

Building Insulation

Panel



K.E.F.I. Project

Panel set

- Isolkenaf** : **Kenaf vegetable fibre**
- Isolmix** : **Colored synthetic fiber waste**
- Isolcell** : **White paper waste**
- Recolan** : **White polyester fibre waste**



Progetto K.E.F.I.

Fibre made Panel

with NO glues



K.E.F.I. Project

Fibre made Panel

“dry

tridimensionally

thermobound”



Progetto K.E.F.I.

Binder :

Thermofusibile Polyester Fiber

or

Thermofusibile Natural Fibre



K.E.F.I. Project

Main production parameters

70.000 m³/h of Air

Specific gravity : 20 → 100 Kg/m³

Thickness : 8 → 140 mm

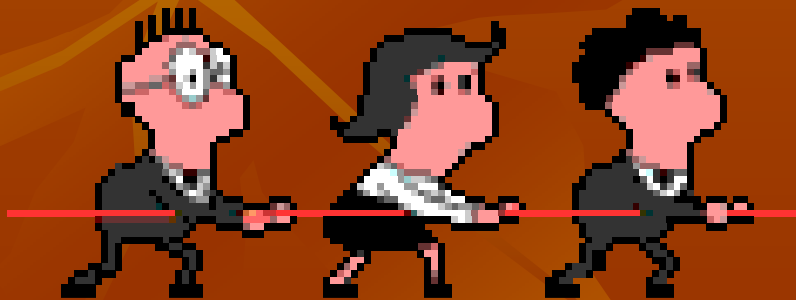


K.E.F.I. Project

High resistant

Fibre made

Panel



K.E.F.I. Project

Panel to

Thermic and Acoustic

Insulation

AT THE SAME TIME



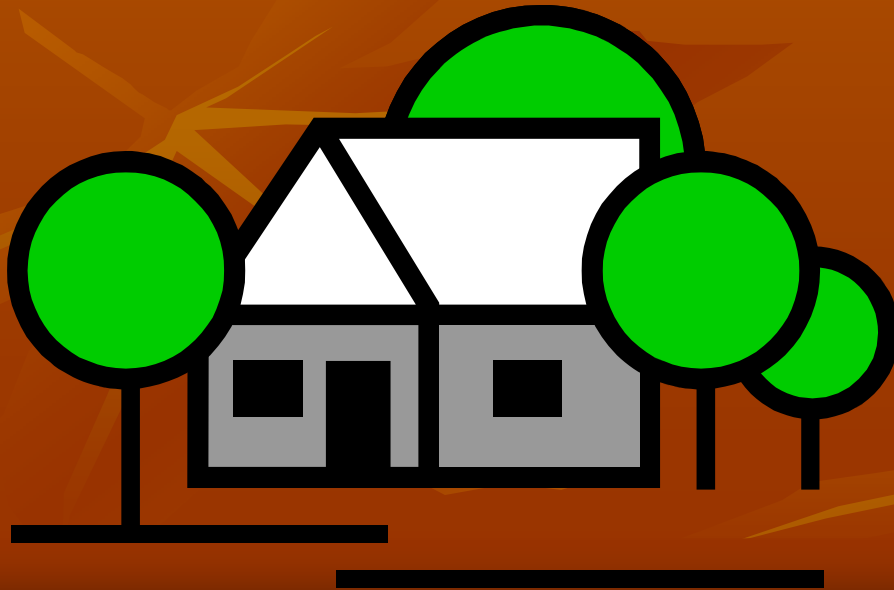
K.E.F.I. Project

ISOLKENAF

Panel characteristics

Eco-sustainable

material



K.E.F.I. Project



Isolkenaf panel

K.E.F.I. Project

Isolkenaf

Floor : 10 mm - 60 Kg/m³

Tensile

KPa

UNI 8071

6,8

Elong.

%

19

Dimensional stability

- 25 °C

+ 70 °C

UNI 8069

- 0,30

%

0,56



K.E.F.I. Project

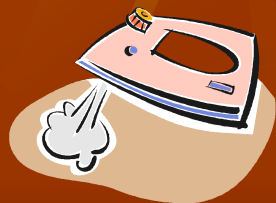
Isolkenaf

Floor : 10 mm - 60 Kg/m³

H₂O absorption

%

EN 12087



8,4

H₂O steam transmission

Permeability

Diffus. Resist.

UNI 8054

Kg/(m.s.Pa)

μ

98.10⁻¹²

1,90

K.E.F.I. Project

Isolkenaf

Floor : 10 mm - 60 Kg/m³

Putrefaction Resist.

**Several Bacteria species
8 days at 33 °C**

Resists

Pollutants release

8 days in distil. H₂O

None



K.E.F.I. Project

Isolkenaf

Floor : 10 mm - 60 Kg/m³

Thermic conductivity

UNI 7891

W/(m.°K)

10 °C

20 °C

0,039

λ

0,041



K.E.F.I. Project

Isolkenaf

Floor : 10 mm - 60 Kg/m³

Acoustic insulation improvement

Trampling insulation

Building via aerial

UNI EN ISO 140/6

UNI EN ISO 140/3

UNI EN ISO 717/2

UNI EN ISO 717/1

500 Hz (Band 100 – 4000 Hz)

$\Delta = 39$ dB

58 dB



K.E.F.I. Project

Isolkenaf

Floor : 10 mm - 60 Kg/m³

Fire
behaviour

Heat
behaviour

DIN 4102

Class

Up to 250 C°

2*

No deterioration

*** After fireproof treatment**



K.E.F.I. Project

Isolkenaf

50mm - 40 Kg/m³

Tensile

KPa

UNI 8071

5,5

Elong.

%

15

Dimensional stability

- 25 °C

+ 70 °C

UNI 8069

- 0,25

%

0,53



K.E.F.I. Project

Isolkenaf

50 mm - 40 Kg/m³

H₂O absorption

%

EN 12087

8,5



H₂O steam transmission

Permeability

Diffus. Resist.

UNI 8054

Kg/(m.s.Pa)

μ

110 .10⁻¹²

1,70

K.E.F.I. Project

Isolkenaf

50 mm - 40 Kg/m³

Putrefaction Resist.

Several Bacteria species

8 Days at 33 °C

Pollutants release

8 days in distill. H₂O

Resists

None



K.E.F.I. Project

Isolkenaf

50 mm - 40 Kg/m³

Thermic conductivity

UNI 7891

W/(m.°K)

10 °C

20 °C

0,039

λ

0,040



K.E.F.I. Project

Isolkenaf

50 mm - 40 Kg/m³

Building acoustic insulation via aerial

UNI EN ISO 140/3

UNI EN ISO 717/1

500 Hz (Band 100 – 4000 Hz)

62 dB



K.E.F.I. Project

Isolkenaf

50 mm - 40 Kg/m³

Fire
behaviour

Heat
behaviour

DIN 4102

Class
2*

Up to 250 C°

No deterioration

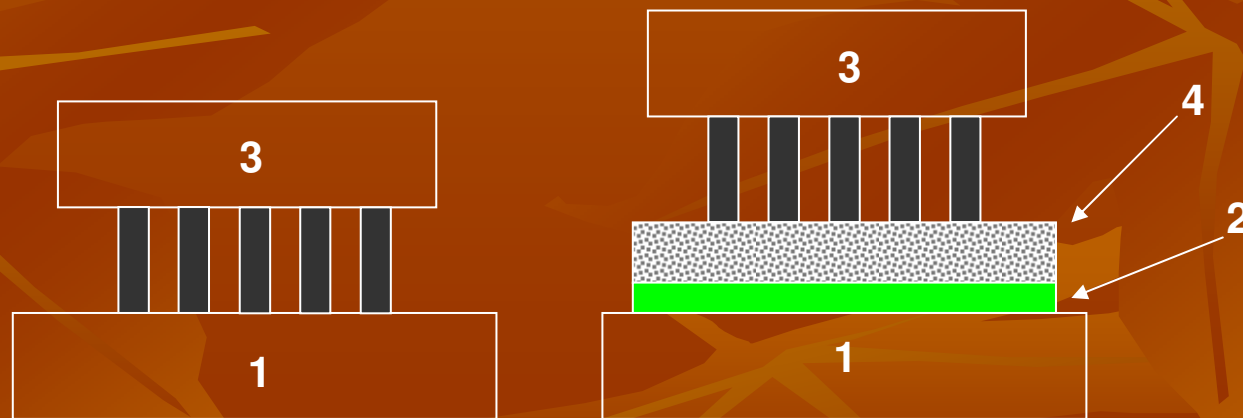
* After fireproof treatment



K.E.F.I. Project

Floor Acoustic requirement (dB)

1. Reinforced concrete slab 140 mm
2. Tested component 1,5 x 1,5 m
3. Standardized ISO trampling device
4. Granite block 7 cm thickness / 107 Kg/m²



UNI EN ISO 140/6 - UNI EN ISO 717/2

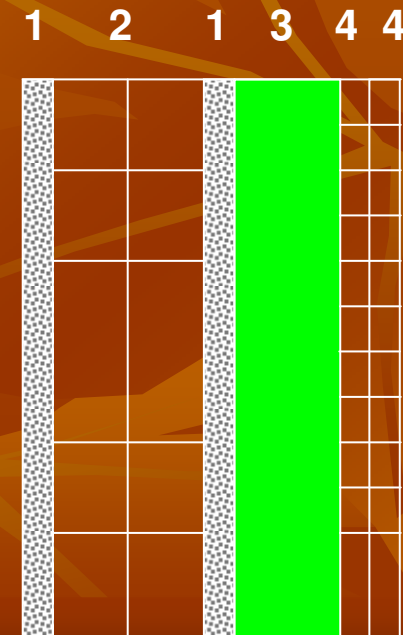


K.E.F.I. Project

Wall Acoustic requirement (dB)

- 1 - Cementitious mortar plaster 10 mm
- 2 - Hollow brick wall 80 mm
- 3 - Interspace with insulation Panel
- 4 - Plasterboard slab frame 12,5 mm

UNI EN ISO 140/3 - UNI EN ISO 717/1



K.E.F.I. Project

Some Materials peculiarities

	Kg/m ³	λ	μ	Thermic capacity (J/KgK)
■ Reinforced concrete	2400	1,8	100	850
■ Ytong concrete	800	0,17	3	1050
■ Rock wool	80	0,040	1	900
■ Wood fibre	160	0,040	5	2100
■ Sinthetyc	30	0,037	60	1440
■ <u>Vegetable fibre</u>	<u>30</u>	<u>0,040</u>	<u>1,5</u>	<u>>1600</u>
■ Water	1000	0,58		4170
■ Air	1,2	0,12	1,7	986
■ Ice	900	2,23		0



K.E.F.I. Project

Application : Wall



CARATTERISTICHE TECNICHE

Dimensioni: pannelli da: Cm 60 x 140
Cm 120 x 140

SPESSORE: 30, 40, 50, 60, 80, 100, 120, 140
DENSITÀ: 20, 30, 40, 50, 60, 80 Kg./Mc
REAZIONE AL FUOCO: classe B 2 secondo DIN4102
UMIDITÀ DI ASSORBIMENTO: 7% - 8%
TRASPIRABILITÀ: μ 1 - 2
CONDUCIBILITÀ TERMICA: $\lambda = 0.039$ W/m K
POTERE FONOASSORBENTE:
Rw: 60 dB (controparete su forato);
Rw: 55,5 dB (intercapedine tra forato e doppio UNI);
 α : 0,6220 Kg/mc sp: 40mm
Trattamento antitarmico non richiesto.
Le fibre di kenaf non sono attaccabili da insetti, tarme e coleotteri.

Isolkenaf 50 mm/50 Kg m3

K.E.F.I. Project

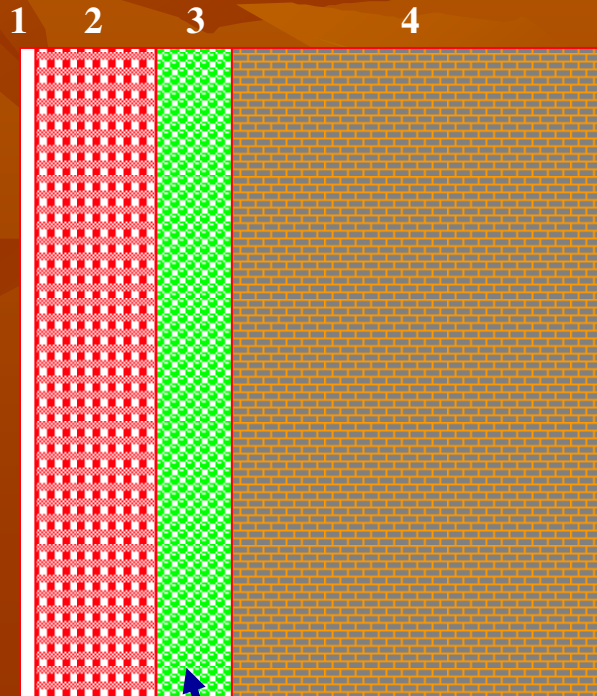
Application : Façade (Outer Wall)

1 : Plaster

2 : Hollow brick 80 mm

3 : Isolkenaf panel

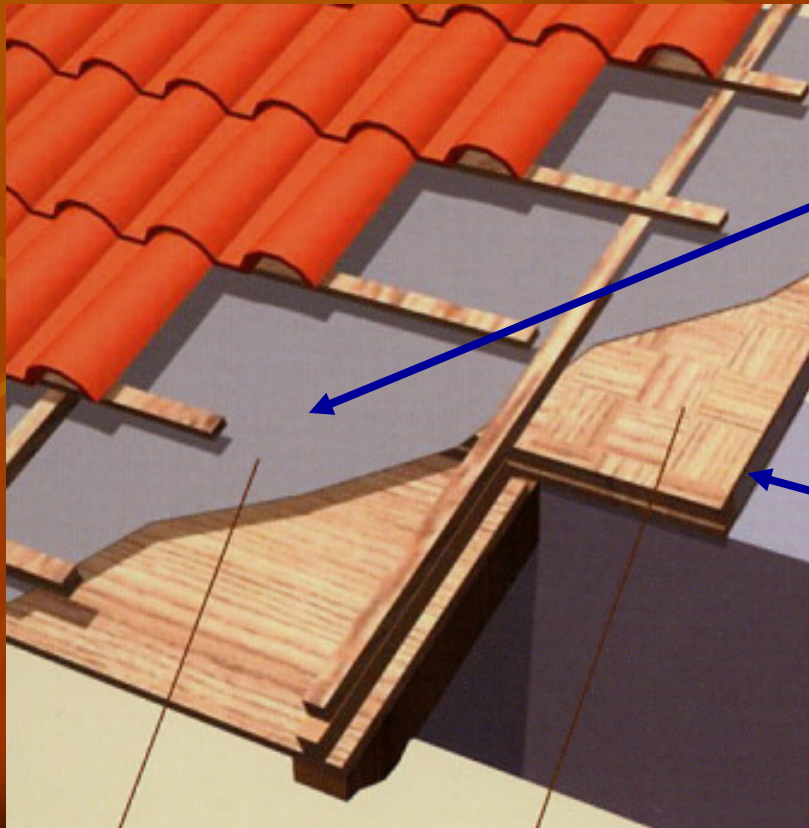
4 : Bearing wall 25 cm



Isolkenaf 50 mm/50 Kg m3

K.E.F.I. Project

Application : Roof



Rainproofer

Frame holding :

Isolkenaf

50 mm / 80 Kg m³

Progetto K.E.F.I.

Application : Roof



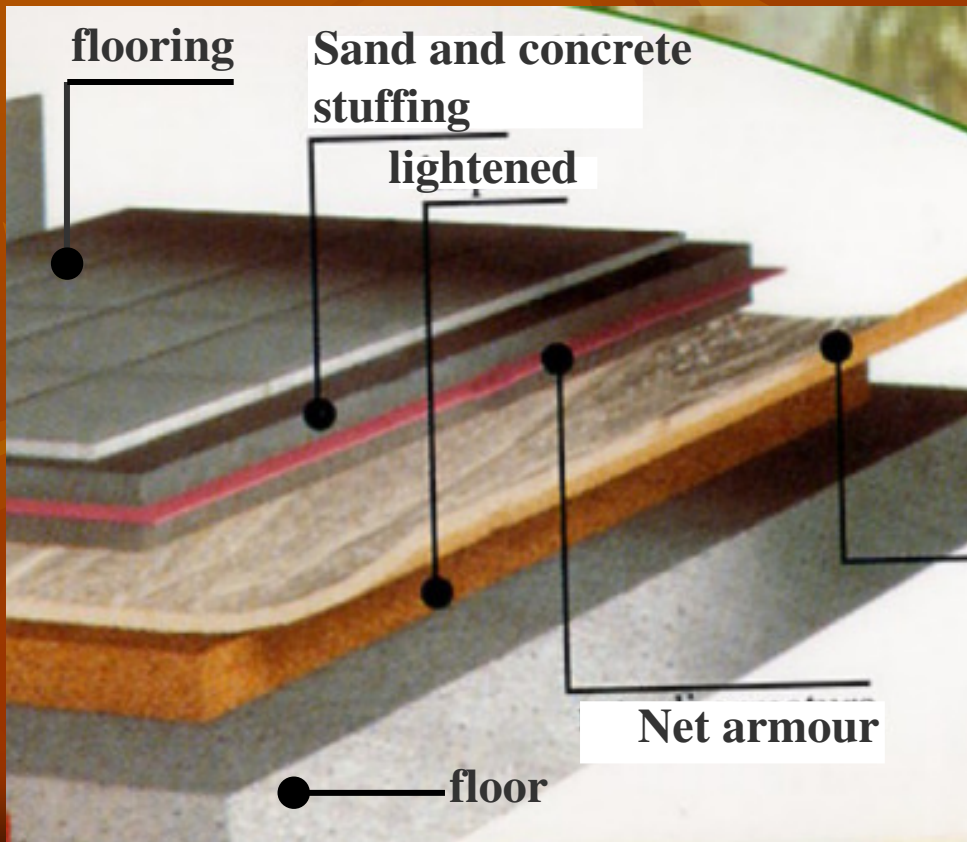
- 1- Covering counter lister
- 2- Ventilation listers
- 3- Wood fiber high density 2+2 cm

4- ISOLKENAF (6 cm panel)

- 5- Rafter
- 6- Matchboard on the roof
- 7- Insulator interposed lister
- 8- Transpiring sheath
- 9- High transpiring steam barrier

K.E.F.I. Project

Application : Floor



Isolkenaf Panel

K.E.F.I Project

Energetic efficiency in Building

Legislativ Decree 19/08/2005 n° 192

Official Gazette 23/09/2005

Application Directives 2002/91/CE

Ordinary Supplement n° 58

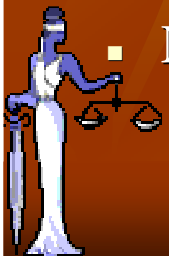


K.E.F.I. Project

Law 447/D.M. 5/12/97

Max allowed noise levels (dB)

		Hospital	Hotel	School	Office
▪ Apparent soundproofment	R'w	55	50	50	50
▪ Front soundproofment	D'w	45	40	48	42
▪ Trampling noise	L'w	58	63	58	55
▪ Max noise	Las Max	35	35	35	35



K.E.F.I. Project

Building yard check

- 1 - Civil plaster
- 2 - Hollow brick 80 mm
- 3 - Isolkenaf panel 50mm-50 Kg/m³
- 4 - Air 1 cm
- 5 - Render 1 cm
- 6 - Special hollow brick 120 mm

Analyser : Delta OHM HD 2110

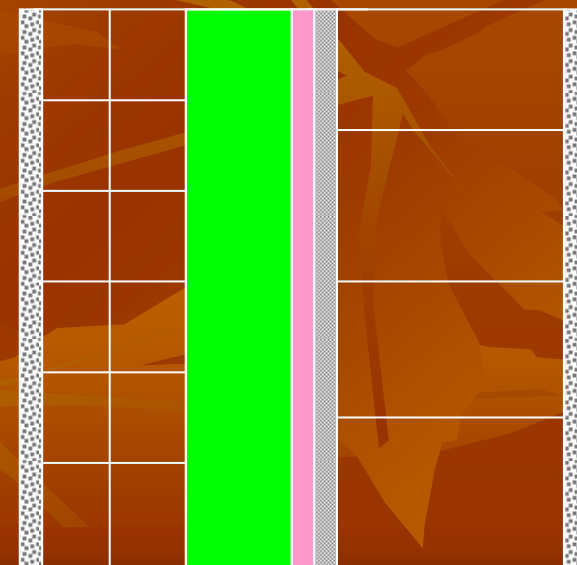
Rose noise generator CEL 513

Dodecahedral speaker JA 12

Amplifier HT 150

UNI EN ISO 140/3 - UNI EN ISO 717/1

1 2 3 4 5 6 1



R' w = 53 dB (500 Hz)

K.E.F.I. Project

Building yard check

UNI EN ISO 140/3 - UNI EN ISO 717/1

- 1 – Civil plaster
- 2 – Hollow brick 80 mm
- 3 – Isolkenaf panel 50mm - 50 Kg/m³
- 4 - Air 1 cm
- 5 - Render 1 cm

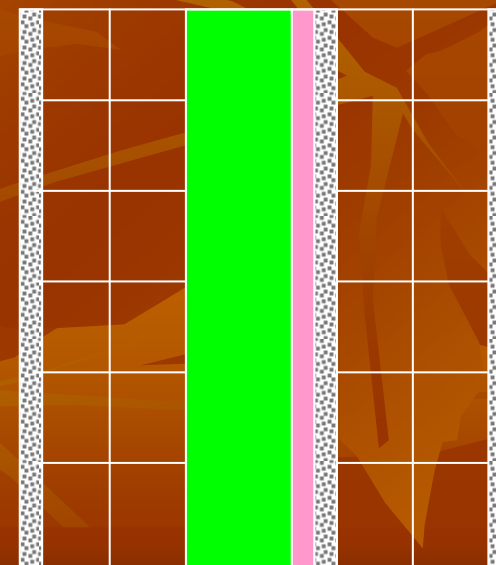
Analyser Delta OHM HD 2110

Rose noise generator CEL 513

Dodecahedral speaker JA 12

Amplifier HT 150

1 2 3 4 5 2 1



$R'_{w} = 50 \text{ dB} \text{ (500 Hz)}$

K.E.F.I. Project

Isolkenaf

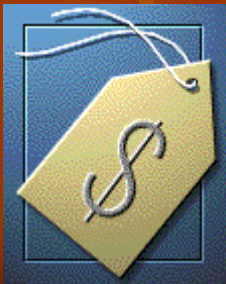
- Renewability
- **Eco-sustainability**
- Resilience
- **Lighness**
- Quality



K.E.F.I. Project

Relative selling price

Isolkenaf	100
Rock Wool	60
Wood fiber	90 / 145
Polyurethane	80
Polistyrene	90 / 120



K.E.F.I. Project

Running developments

- **Fireproofing optimization : Class 1**
- **Accelerated aging test**
- **Measure of thermic inertia (capacity)
for heat maintenance**



K.E.F.I. Project

Economic & Social aspects

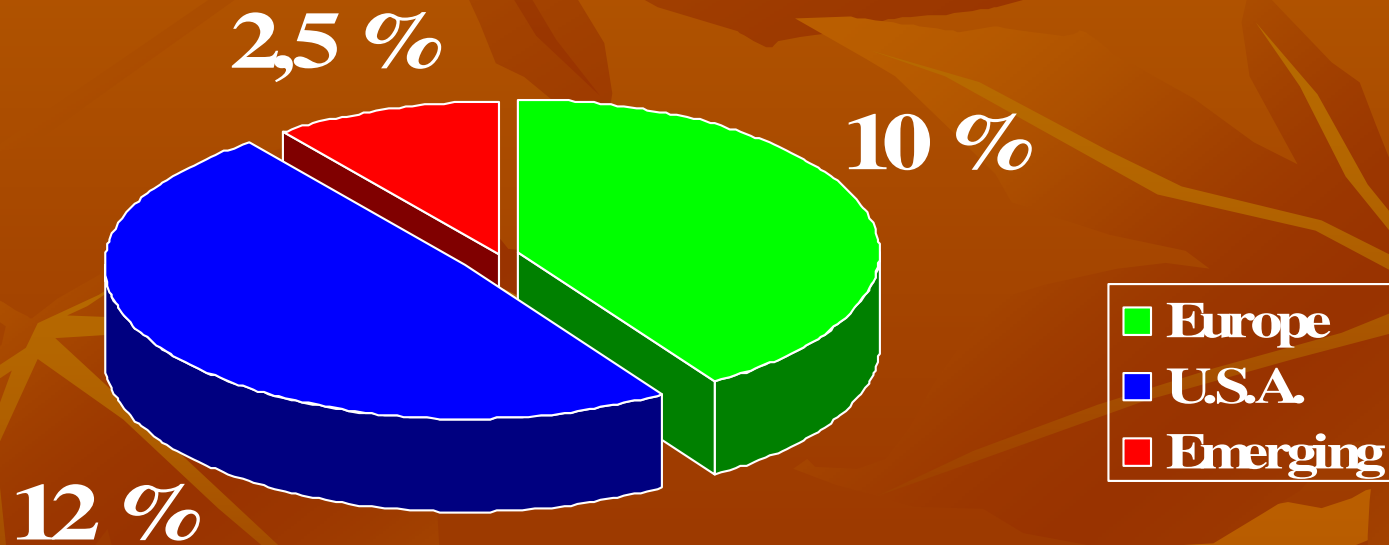
- **Building insulation**
- **Energy consumption**
- **Pollution**



K.E.F.I. Project

Building investments

2500 Million of Billions of € (World)

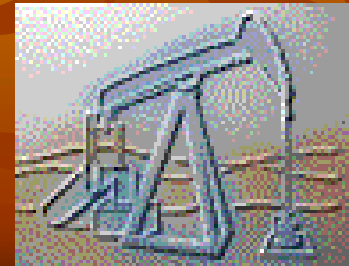
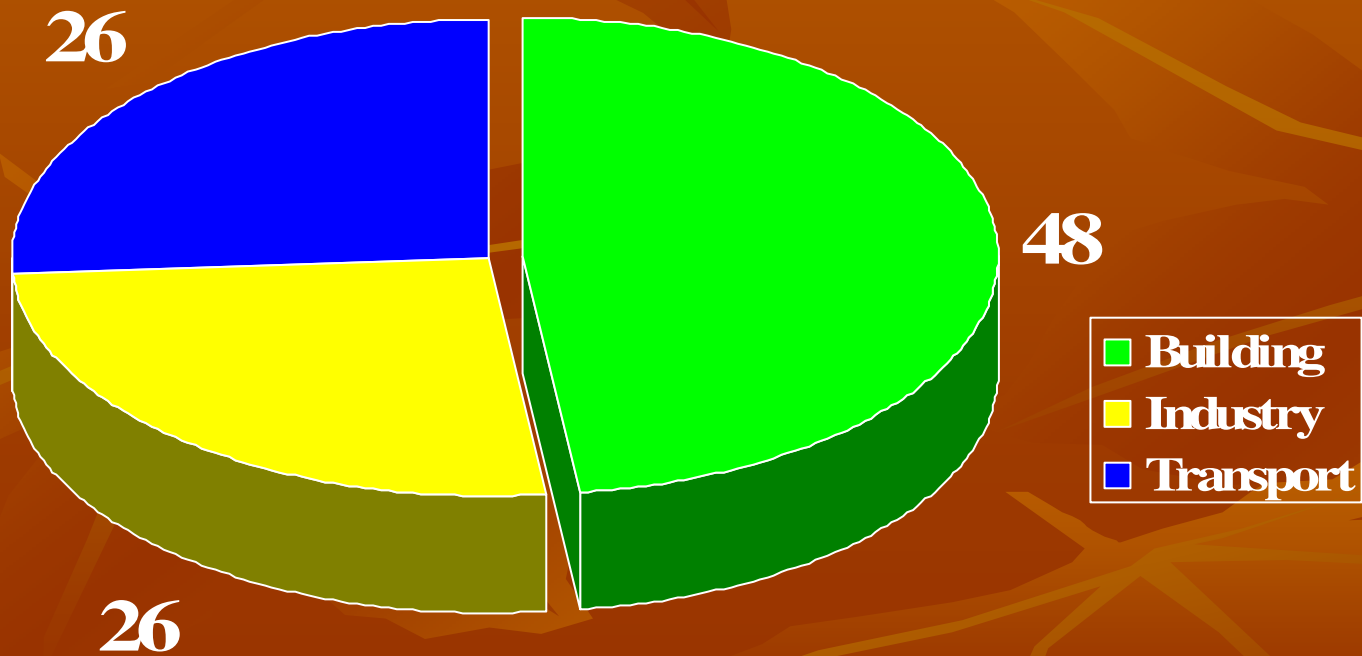


In many countries, building investments :
> 50% of total investments



K.E.F.I. Project

Energy Consumption % (World)



K.E.F.I. Project

Italian “Records”

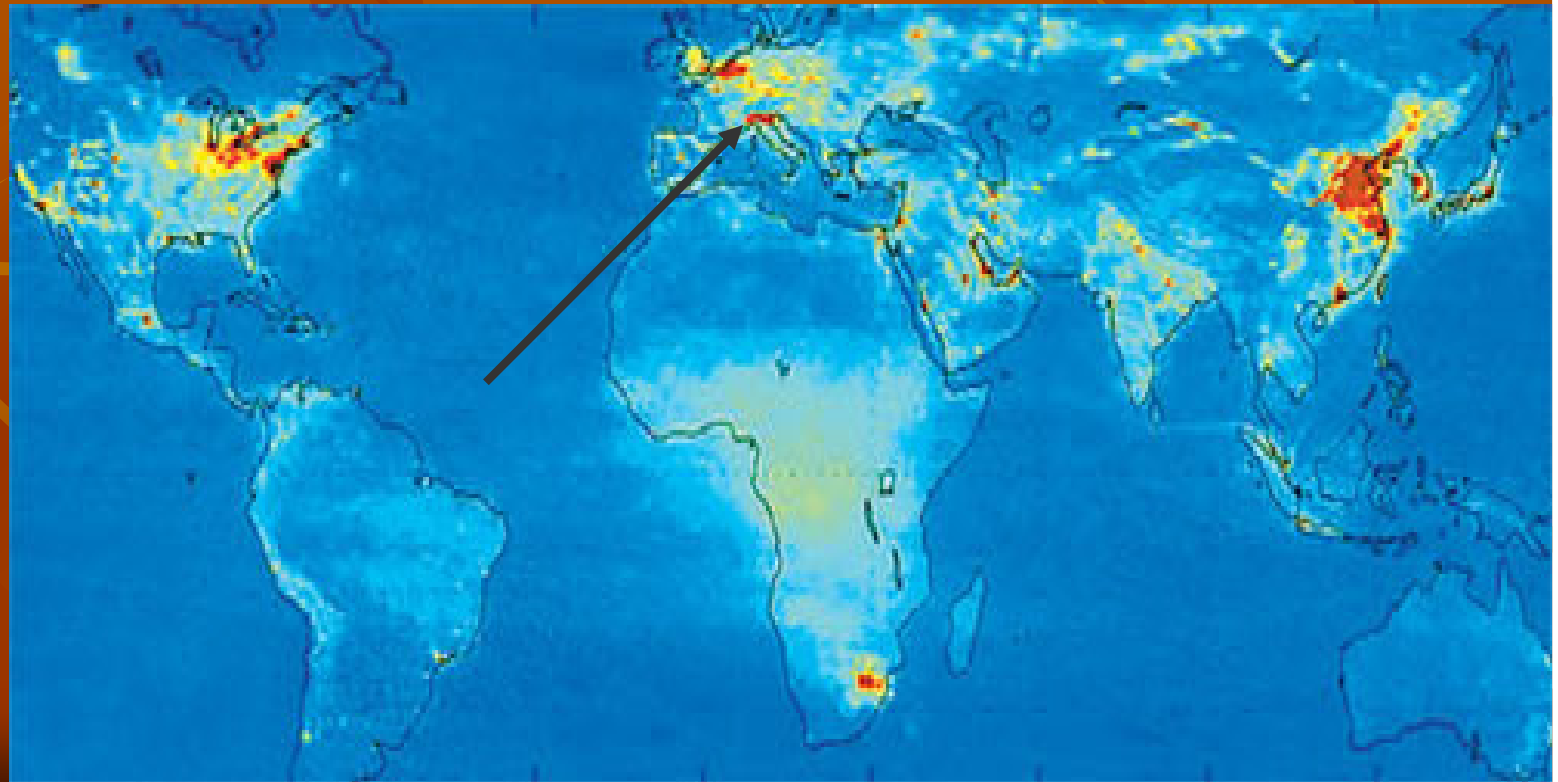
- **Pianura Padana : one of the highest polluted area in EU and in the World**



K.E.F.I. Project

Earth Pollution From Satellite

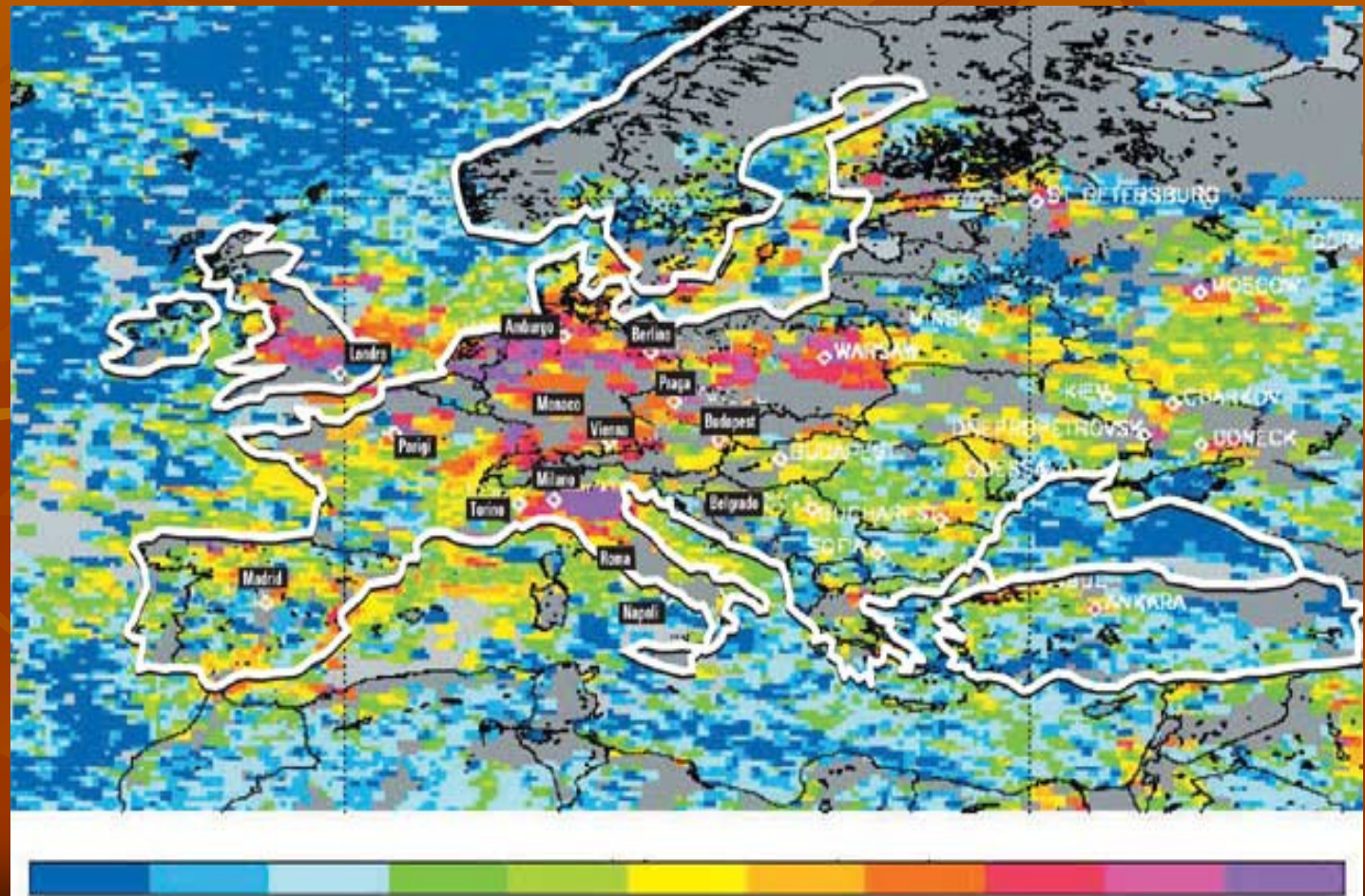
World



K.E.F.I. Project

Earth Pollution from Satellite

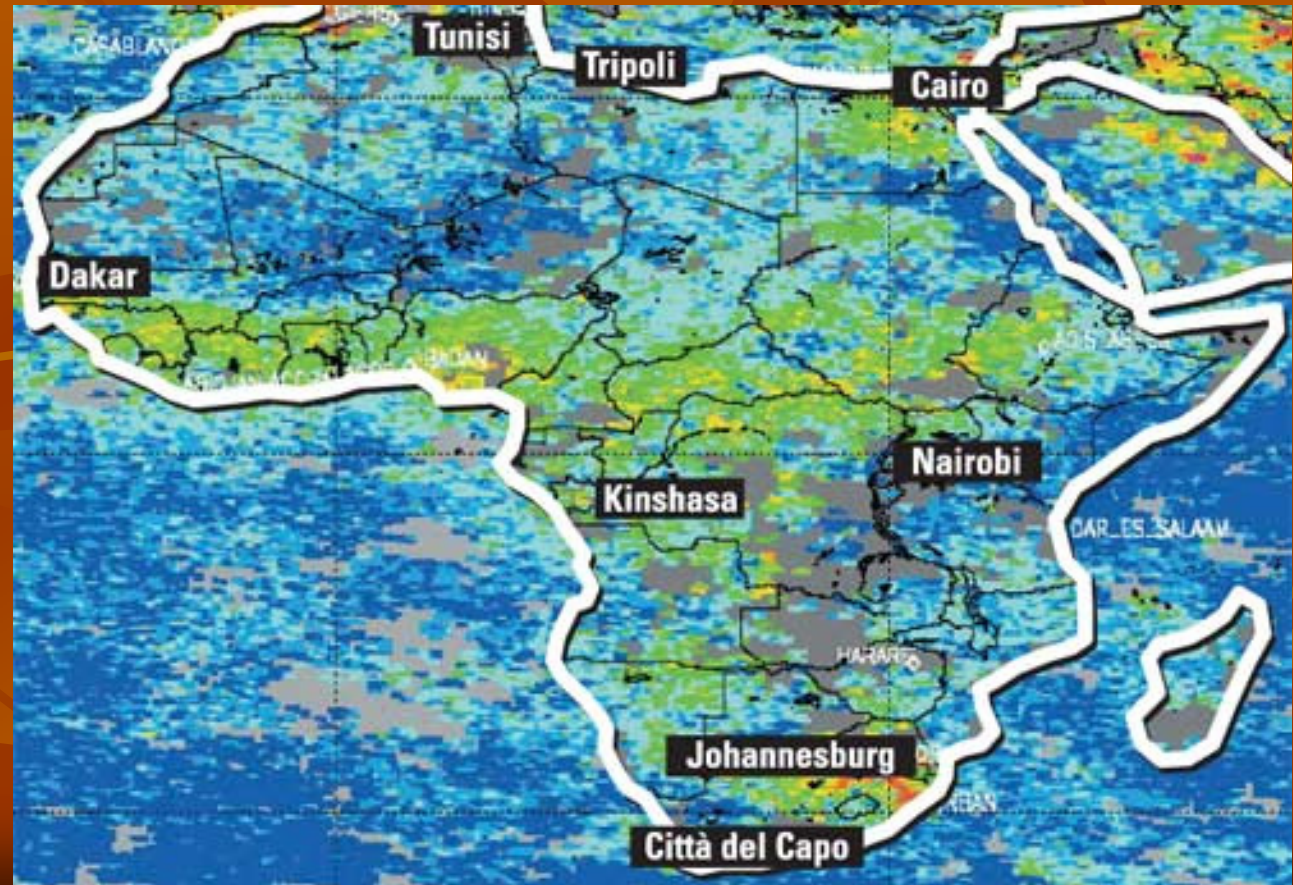
Europe



K.E.F.I. Project

Earth Pollution from Satellite

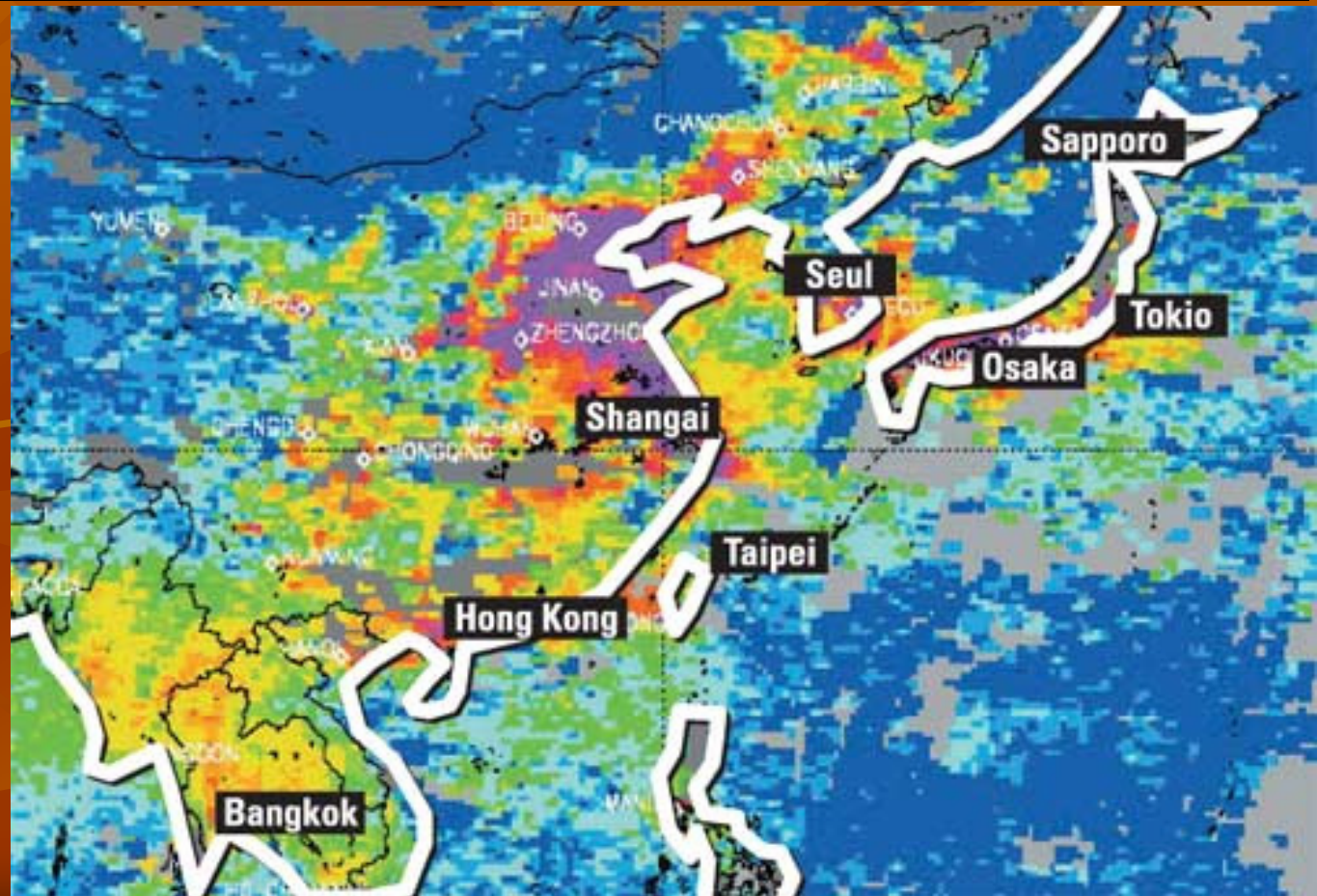
Africa



Progetto K.E.F.I.

Inquinamento Terra dal Satellite

Asia

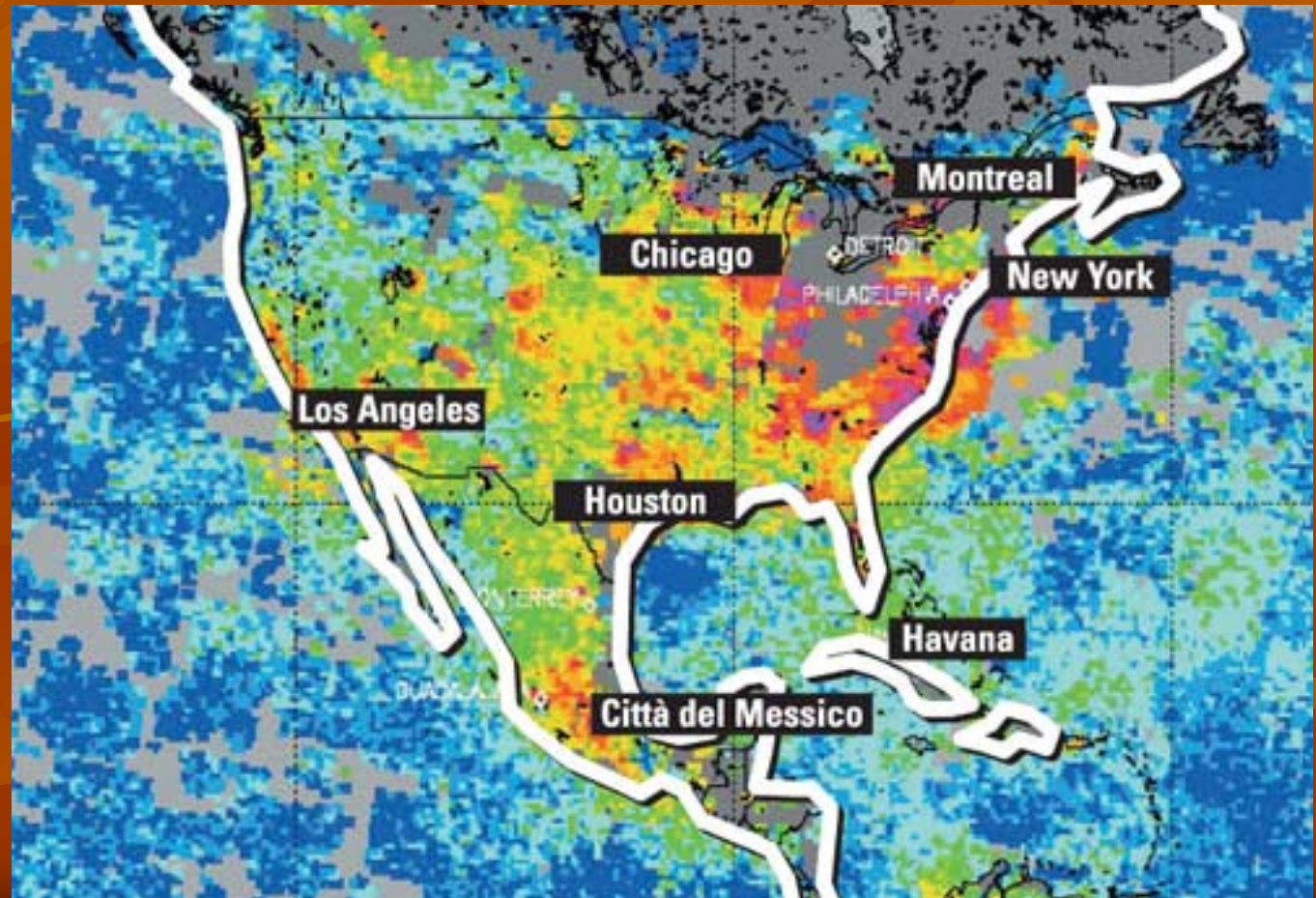


K.E.F.I. Project

Earth Pollution from Satellite

North

America



K.E.F.I. Project

And KYOTO.....???????



K.E.F.I. Project

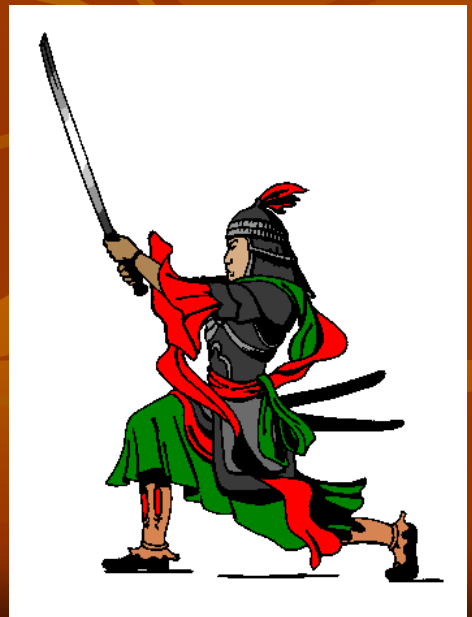
...but who cares of Kyoto!!!

WWF: “ Kyoto policy in Italia: who saw it ?”

...”By the way, in our country only, when a new rule is created, the approach is to try to modify it instead of applying it.”

ITALY - Kyoto target : - 12 % Emission 10 / Y

Italy – 10/Y Later : + 6 % Emission!



K.E.F.I. Project

Kyoto follow-up



BALI 2007

K.E.F.I. Project

ONU Conference in Bali

Climatic Changes

Four Messages

- **Climate bill : alone, can not reach the goals**
- **MT CO₂ emitted price : up to 60-90 \$ on 2020**
- **Agreement Govern.s , Consumers, Companies**
- **Aeolic and Nuclear increase**

K.E.F.I. Project

ONU Conference in Bali

Climatic Changes

Four Messages synthesis

- Start-up (really) of :
 - Renewable Sources
 - “Zero emission” Building
 - “Green Economy” : Products & Services



K.E.F.I. Project

ONU Conference in Bali

Climatic Changes : Running plans

USA : Clinton plan

- **Acceptance of Kyoto protocol !!!!!!!!**
- **- 20% electrical consumption**
(Building, Electrical Appliances)
- **25% Electricity by renewable sources (2025)**
- **To double Funds to Energy reseach**



K.E.F.I. Project

ONU Conference in Bali

Climatic Changes : Running plans

Great Britain (1st law to Climatic Change)

- Greenhouse gas Emission :
- 32% (2020), - 60% (2050)
- Way : renewable sources, Building Energy saving, more Efficient Products



K.E.F.I. Project

ONU Conference in Bali

Climatic Changes : Running plans

Germany :

- **Greenhouse gas Emission :**

- 40 % (2020), - 80 % (2050)

- **Use renewable sources (2020) :**

Electricity : 30%, Heating : 14%, Fuel : 17%

- **Planned 29 different actions**



K.E.F.I. Project

ONU Conference in Bali

Climatic Changes : **Running plans**

Italy : **Late..... (strange!!!!!!)**

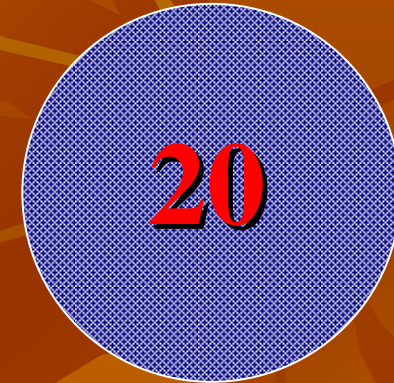
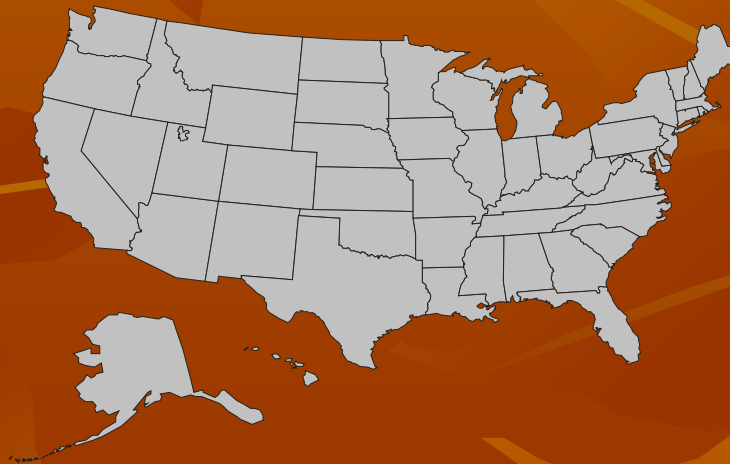
- Greenhouse gas Emiss.: : - 19% (2012)
- 500MM € Innovative Energy & Sustainability
- Dpef : 11 sectors of action but no operative plans
(innovation excluded)



K.E.F.I. Project

ONU Conference in Bali

Largest CO₂ Emitters : USA



Total emission (BIL / MT)

Pro-capite emission (MT)

K.E.F.I. Project

ONU Conference in Bali

Largest CO₂ Emitters: **India**

1343



1

Total Emission (BLI / MT)

Pro-capite Emission (MT)

K.E.F.I. Project

ONU Conference in Bali

Largest CO₂ Emitters : Cina

6.200



4,8

Total emission (BLI / MT)

Pro-capite Emission (MT)

K.E.F.I. Project

ONU Conference in Bali

Largest CO₂ Emitters : **Italy**

570



9,8

Total Emission (BLI / MT)

Pro-capite Emission (MT)

K.E.F.I. Project

ONU Conference in Bali

Largest CO₂ Emitters : U.K.

560



9,4

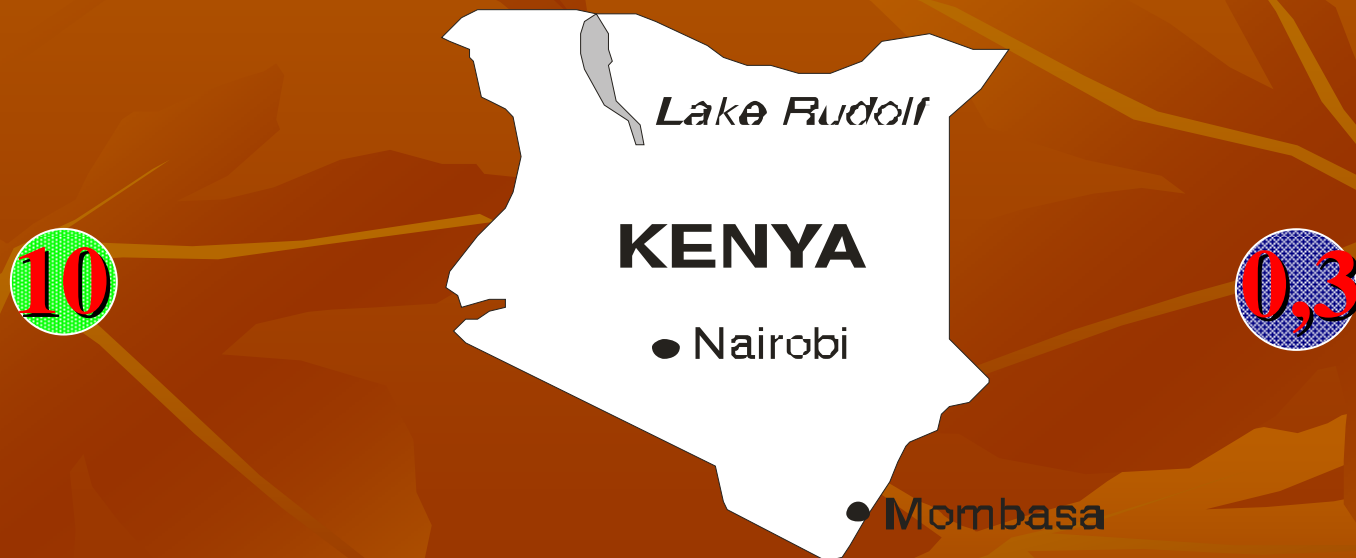
Total Emission (BLI / MT)

Pro-capite Emission (MT)

K.E.F.I. Project

Conferenza ONU di Bali

Largest CO₂ Emitters : **Kenia**



Total Emission (BLI / MT)

Pro-capite Emission (MT)

K.E.F.I. Project

ONU Conference in Bali

Largest CO₂ Emitters : **Australia**



Emissioni Totali (BLI / MT)

Emissioni pro capite (MT)

K.E.F.I. Project

Energy saving by Insulation

- Building “NOT Insulated” : Energy Cost / Y = 100
- Building “Insulated” +
Solar panels : Energy Cost / Y = 20 - 30



Saving : 70 / 80 % !!!!!!!!

K.E.F.I. Project

Protocol “Nature Plus” (Germany)

Building Insulation by codified Products :
(New or Restored)

**Get a State Loan, 40% of which
is**

Unsecured



K.E.F.I. Project

Low Energy Prefabricated : “Atika

- **Integrated control of Light, Temperature, Humidity**
- **Roof Inclination, House Orientation & Shape, Windows**
- **Solar Panels, Heat Pump**
- **Scheduled Windows and Curtains Opening/Closing**



Velux Project

K.E.F.I. Project

“Zero Emissions” Project

- **Place : Angeli di Rosora (AN)**
- **Date : 25 Giugno 2008**
- **Event : First italian house at “Zero impact”**
- **3 Floors house , 6 Flats, Various measurements**



K.E.F.I. Project

“Zero Emissions” Project

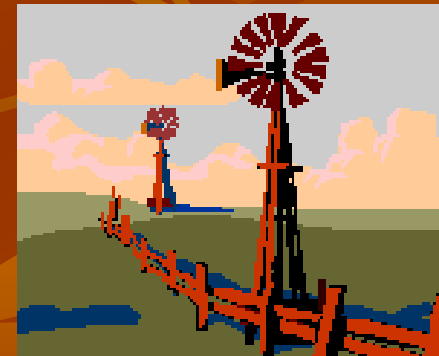
- **Some 40 partners**
- **Low consumption Electrical Appliances (- 30%)**
- **Specialized companies in :**
 - **Tecnology**
 - **Furnishings**
 - **Components**
 - **Software Expert**



K.E.F.I. Project

“Zero Emissions” Project

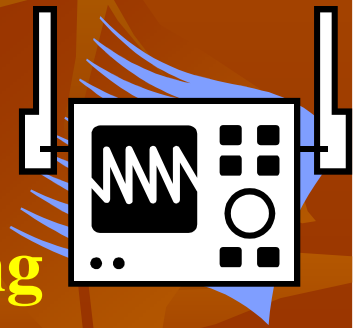
- **For each function, minimum energy consumption**
- **Maximum Walls & Frames insulation**
- **Photovoltaic Panels**
- **Geothermic Pump (- 100 m), heat exchange**



K.E.F.I. Project

“Zero Emissions” Project

- **Water electrolysator : $O_2 + H_2$**
- **H_2 Storage Battery and Electricity production**
- **Rain-Water collection and re-use**
- **Sensors to consumption continuous monitoring**



K.E.F.I. Project

“Zero Emissions” Project

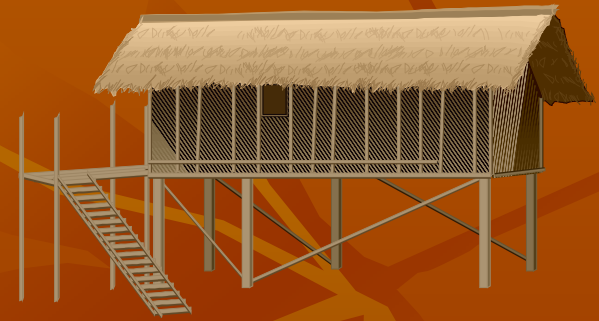
- **Present cost : + 15/20 %**
- **Cost reduction by technology expansion**
- **Future cost (estimate) : + 10/15 %**



K.E.F.I. Project

Building Change (“must”):

- **From “Low” Technology**



- **To “High” Technology**



K.E.F.I. Project

Future Certifiable Building Technology

- **In yard, wet foundations only**
- **Walls produced by specialized industry**
- **Wall frontal detachable : explorability**
- **Modular technique**



K.E.F.I. Project

Building Insulation Reason Evolution

- **Living comfort**
- **Economic saving**
- **Pollution reduction (“must”)**



K.E.F.I. Project

Kenaf Contribution to Ecology
via Building Insulation



- **CO₂ absorption to C utilization (life cycle)**
- **O₂ release (emission)**
- **Usage in insulating Panel production**
- **Energy consumption decrease**
- **CO₂ production/emission reduction**



K.E.F.I. Project

Isolkenaf : Conclusions

Natural Panels Building Insulation:

- 1) Eco - Sustainability / Renewability**
- 2) Thermic / Acoustic at the same time**
- 3) Light but Resistant**



K.E.F.I. Project

Isolkenaf : Conclusions

Natural Panels Building Insulation:

- 4) **Wide range of Density, Thickness, Dimension**
- 5) **Selling prices matching market's**
- 6) **Excellent general performances**



K.E.F.I. Project

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K.E.F.I. Project

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KENNEVO

Kenaf Fiber 100% Natural Panels



K.E.F.I. Project

Many thanks for your attention

