

# The value and sustainability of natural slate

*R&D and sustainability in the mining sector*

Conferencia Internacional  
Green & Smart Mining Regions  
*Valladolid, 20<sup>th</sup> March 2018*

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*Project Engineer - PhD*

**CUPA INNOVACIÓN**

- 1. CUPA INNOVACIÓN**
- 2. LIFE CYCLE ASSESSMENT**
- 3. SUSTAINABLE R&D PROJECTS**
  - i. GEOSTONE**
  - ii. THERMOSLATE**
  - iii. STONETACK**
- 4. EUROPEAN LINES OF INTEREST**

# 1. CUPA INNOVACIÓN

## 2. LIFE CYCLE ASSESSMENT

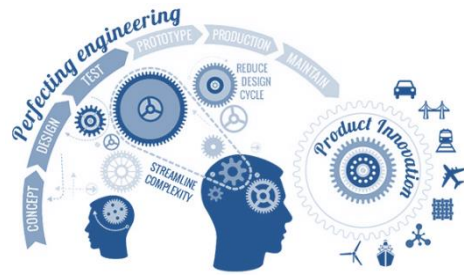
## 3. SUSTAINABLE R&D PROJECTS

i. GEOSTONE

ii. THERMOSLATE

iii. STONETACK

## 4. EUROPEAN LINES OF INTEREST



### The Division...

- R&D company of the Group
- Works jointly with other divisions of CUPA GROUP
- R&D and Innovation projects

### Research Lines...

- Sustainability and revaluation of residues
- Innovative products with natural stone
- More efficient products and processes
- Industry 4.0



European Committee for Standardization

Chairmanship of the  
Sub committee CEN/TC 128/SC 8  
*“Slate and Stone products for roofing”*



Collaboration in TASK 59 SHC  
(International Energy Agency)

*“Deep Renovation of historic buildings towards lowest possible energy demand and CO2 emission (NZEB)”*

Products developed by CUPA INNOVACIÓN...



CUPACLAD  
by CUPA-GROUP

thermoslate  
by CUPA-GROUP

STONETACK®  
by CUPA-GROUP

STONE PANEL  
by CUPA-GROUP



CUPA INNOVACIÓN

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**2. LIFE CYCLE ASSESSMENT**

3. SUSTAINABLE R&D PROJECTS

i. GEOSTONE

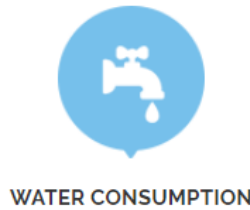
ii. THERMOSLATE

iii. STONETACK

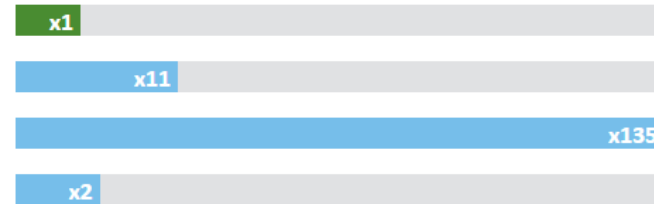
4. EUROPEAN TOPICS OF INTEREST

**Natural Slate as an *ECOLOGICAL & SUSTAINABLE* choice**

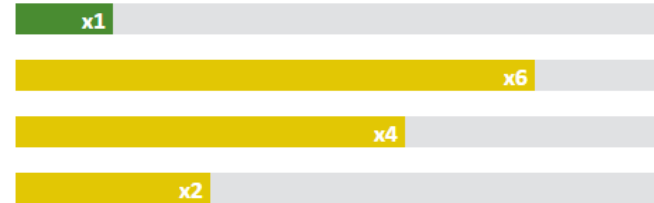
- Water consumption: 0.165 L/m<sup>2</sup> slate
- Energy Consumption: 0.701 MJ/ m<sup>2</sup> slate
- Atmospheric Pollution: 0.048 kg CO<sub>2</sub> eq/m<sup>2</sup> slate



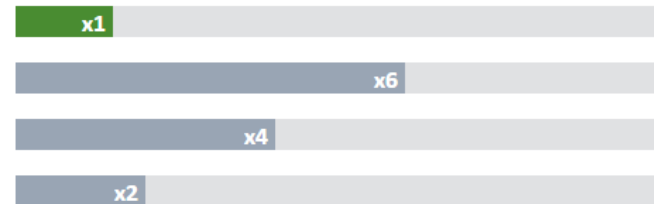
**Natural slate**  
Source: <http://goo.gl/U5pRga>  
**Fibre cement**  
Source: <http://goo.gl/7uHYne>  
**Zinc**  
Source: <http://goo.gl/uMYybL>  
**Terracotta**  
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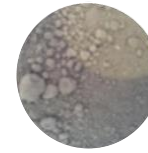


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*Premises for the R&D project...*

- Production of slate residues
- Pollution associated to Portland cement



Slate powder



CO<sub>2</sub> emissions

*Background...*

- Research field on Alkali Activated Cements → **GEOPOLYMERS**

PRECURSOR

- Metakaolin
- Fly ash
- Blast furnace slag
- ...



ACTIVATING SOLUTION

- NaOH
- Waterglass
- Silicates of Na or K
- ...



*The R&D project...*

- Aim of GEOSTONE: to develop **ECO-FRIENDLY** and **SUSTAINABLE** alkali activated cements from slate residues such as **SLATE POWDER**

*Slate powder as a potential precursor...*

- Fly ash
  - Metakaolin
  - Slate powder
  - Granite powder
- }  $\text{SiO}_2$
- }  $\text{Al}_2\text{O}_3$

*Some data...*

- Revaluation of the residue
- Composition similar to other precursors
- Appropriate particle size

*Characterization...*

	Slate powder	Portland cement
Compressive strength	↑	↓
Chemical performance	↑	↑
Freeze/thaw resistance	↑	↑
High T <sup>a</sup> (1000°C)	↑↑	↓↓
Environmental performance	↑	↓

*Formulation of the Alkali Activated Cement...*



*Sustainable Products and Potential Uses*



• Stonepanel GEO



• Precast concrete

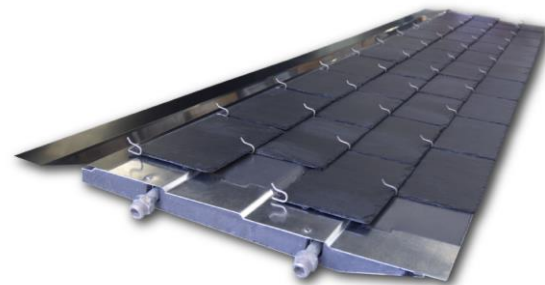


• OPC substitution

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The product...

- Natural slate thermal panel
- DHW and pool heating
- Heat transmission → Slate powder resin

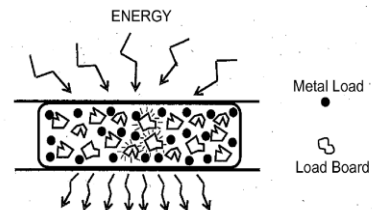


Certifications...

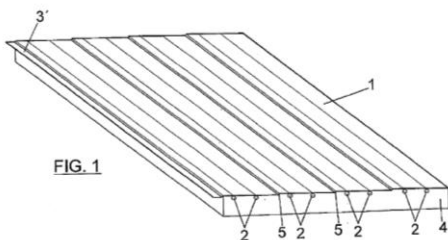


Industrial protection...

- Slate resin

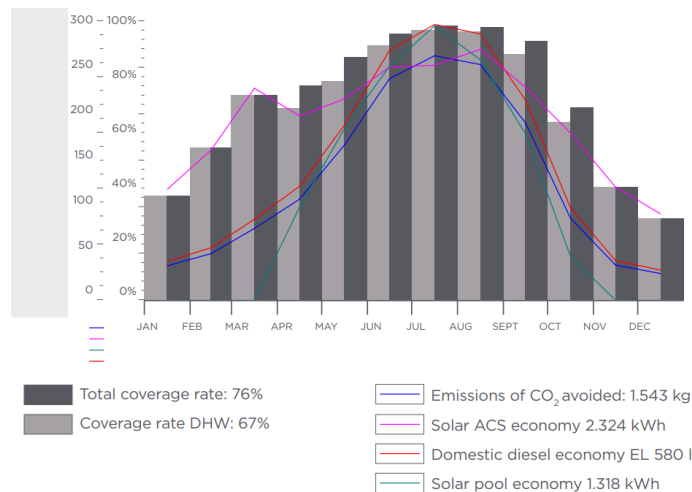


- Thermal panel



Innovation & Sustainability...

- 2/3 less electricity/fossil fuel consumed
- Reduction in CO2 emissions
- Reduction of slate powder residue



**50%**  
Hot water cover rate

**1,1 tn**  
Emissions of CO<sub>2</sub> avoided

**410 l**  
Diesel savings

**20°**  
Average temperature of the pool

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## The product...

- Natural slate auto adhesive panel
- Less environmental impact for the slate process



## Sustainability thanks to...

- Recovery of slate residues
- Less slate waste to dispose of
- Rejected slates separated while producing
- Factory close to production of slate waste

## Industrial protection...

② Fecha de presentación:  
01.09.2015

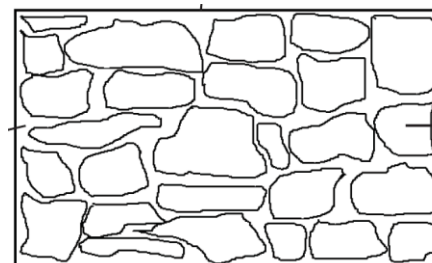
④ Fecha de publicación de la solicitud:  
09.09.2015

⑦ Solicitantes:  
CUPA INNOVACIÓN, S.L.U. (100.0%)  
Carneiras-Macal, 32  
36213 Vigo (Pontevedra) ES

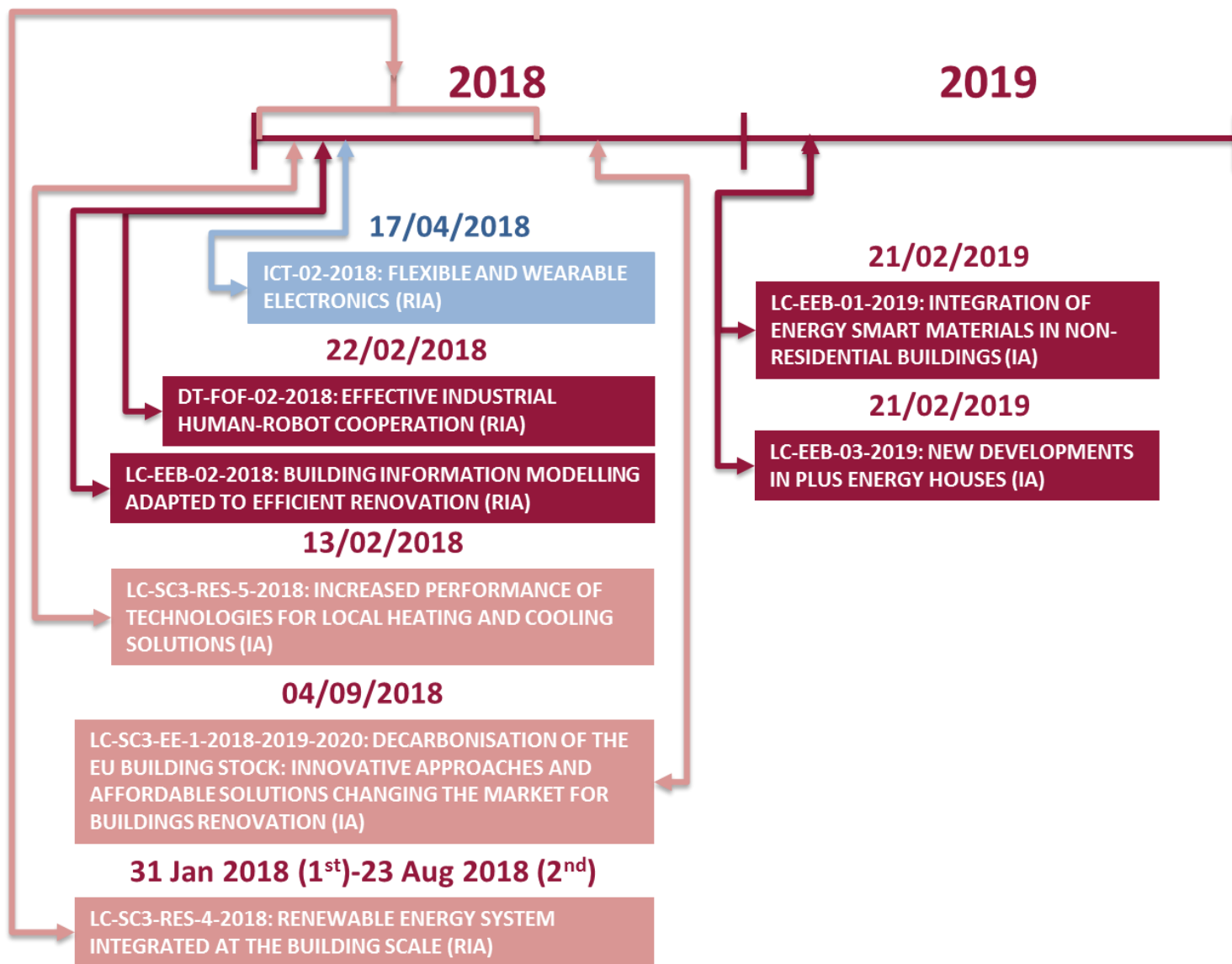
⑦ Inventor/es:  
FERNANDEZ FERNANDEZ, Javier

⑦ Agente/Representante:  
CARVAJAL Y URQUIJO, Isabel

⑤ Título: PLACA PARA EL REVESTIMIENTO DE PAREDES



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**THANK YOU FOR YOUR ATTENTION**

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*Project Engineer - PhD*

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