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SANITSER LIFE12 ENV/IT/001095

Deliverable Action D.1

Final Conference
Location: SE.TE.C. srl company, Civita Castellana

Author: SE.TE.C. SRL

Date: 10/03/2017

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With the contribution of the
LIFE financial instrument of
the European Community

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1. Programme

1.1. Programme in English

1.2. Programme in Italian

2. Presentation

The presentation of the final conference was unique. The representatives of the various partners (Minerali Industriali, SETEC, GEMICA and LCE) presented the project with the results, alternating in the display of their expertise and showing the data obtained to the guests.

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Project: LIFE12 ENV/IT/001095

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SANItaryware production: use of waste glass
for **S**aving **E**nergy and **R**esources

Technological innovation as industrial development opportunity

Coordinating beneficiary: Minerali Industriali S.r.l.

Associated beneficiaries: G.E.M.I.C.A. S.r.l.
Life Cycle Engineering
SETEC S.r.l.

MINERALI INDUSTRIALI

G.E.M.I.C.A.

SETEC

LIFE CYCLE ENGINEERING

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EARLIER STUDIES

2009: Minerali Industriali and the Earth Science Department of the University of Milan started a collaboration to study the introduction of glass cullet in partial replacement of Na-feldspar (traditional flux agent) for sanitary-ware ceramic production.

Problems to overcome:

- **Eventual changes in rheology of the slips;**
- **Pyro-plasticity effects on large ceramic bodies;**
- **Effects of thermal gradient upon firing on large and complex shape bodies having SLG;**
- **Glaze reformulation to match the new thermal cycles.**

2012: SANITSER PROJECT

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Main Project Objectives

Reduction of firing temp. of 80-100°C

Saving of natural resources

CO_2 emission reduction

Recycling of urban waste

Reduction of Industrial production costs

Environmental impact improvement

Improving the environmental impact of the sanitaryware production process replacing natural raw materials (up to 40-50%) with glass cullet from urban waste disposal and other recycled materials in the ceramic blends formulation.

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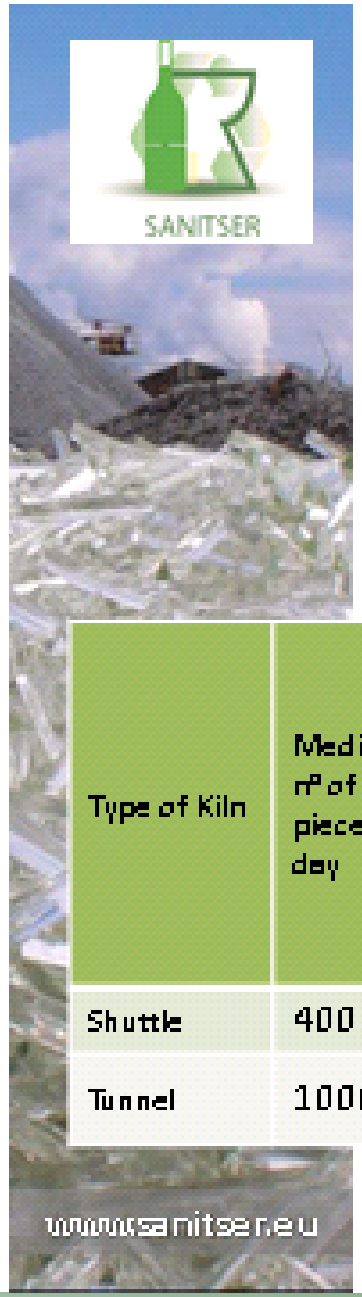

Expected results:

SAVING ENERGY: 16-18%

Standard firing temperatures for Vitreous China Sanitaryware are between 1230°C and 1250°C with firing cycles around 16-20 h.
The SANITSER formulation will make possible a firing cyde between 1150°C and 1190°C with a reduction also of the dwell time at max temperature. **The estimated saving of thermal energy is about 16% -18% with firing cycles around 14-16 h.**

ENERGY SAVING - ECONOMIC BENEFIT

Type of Kiln	Medium n° of fired pieces per day	Consumption of energy for each kg of fired product [kcal]	Energy saving of 18% [kcal/kg of fired product]	Energy saving [kcal/day] (Considering a medium weigh of one ceramic article of 20 kg)	Energy saving [Nm³ of methane per day]	Energy Saving in €/day (Considering methane cost of 0,35 €/Nm³)
Shuttle	400	2100-2400	≈ 396	3.168.000	386,3	135,1
Tunnel	1000	1200-1600	≈ 250	5.000.000	609,8	213,4

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ENERGY SAVING - ENVIRONMENTAL BENEFIT

Decrease of firing temperature of about 80-100°C makes possible a significant reduction of gas emissions form the kilns during the firing process.

Type of kiln	Saving of Nm^3 of methane per day	Saving of Nm^3 of methane per year	Reduction of emission of CO_2 [kg/year]
Shuttle (400 pieces)	386,3	84.986 (considering 220 working days per year)	169.972
Tunnel (1000 pieces)	609,8	201.234 (considering 330 working days per year)	402.468

SAVED PRIMARY RESOURCES: 40-50%

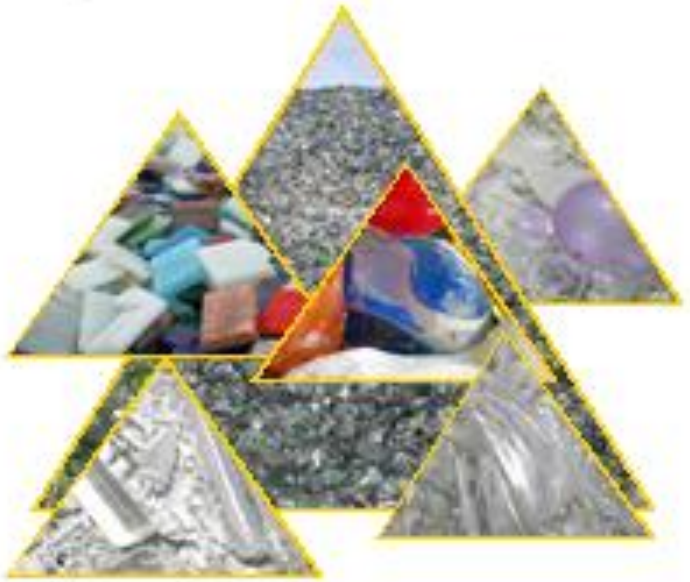
In the formulation of bodies and glazes studied as significant part of recycled glass, granite and vitreous chinas craps were used in order to reduce the total consumption of natural raw materials up to about 40% -50%.
The intent is also to reduce production costs, rising industrial competitiveness and promoting a shift from a traditional man-labor-oriented to a technology-driven manufacturing.

RAW MATERIALS INVOLVED IN TESTING

Re-use of recycled products and production waste for ceramic industry

GLASS CULLET WASTE FROM URBAN WASTE DISPOSAL: 100% RECYCLED POST CONSUMER
As defined in section 7.8.1.1 c, UNI EN ISO 14021

SPECIAL GLASSES FOR GLAZE (tv monitor, lamp, neon, boric glass): 100% RECYCLED PRE and POST CONSUMER
As defined in section 7.8.1.1 c, UNI EN ISO 14021



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RAW MATERIALS INVOLVED IN TESTING

Re-use of recycled products and production waste for ceramic industry

CERAMIC PITCHER: 100% RECYCLED PRE CONSUMER
As defined in section 7.8.1.1 c, UNI EN ISO 14021

Ceramic pitcher BVC – vitreous china

Minerali Industriali Group has facilities to recycle the ceramic pitcher throughout Italy, Europe and Latin America.
The ceramic pitcher is regularly recovered, crushed and ground, to be reused alone or in mixture, as a component of the ceramic blends.

Benefits in using ceramic pitcher:

- The pitcher is not completely inert → slight fluxing action that allows the feldspar content of the body to be reduced while maintaining the same degree of vitrification
- High alumina content (23-24% by weight) → allows the vitrification/deformation ratio to be optimised, if used to suitably replace quartz and feldspar
- By using scrap in place of a portion of the quartz it is possible to vary the coefficient of expansion of the body and above all to mitigate the negative impact of α→β quartz transformation, especially in the case of rapid firing

RAW MATERIALS INVOLVED IN TESTING

Re-use of recycled products and production waste for ceramic industry

F60PB: 100% RECYCLED PRE CONSUMER
As defined on section7.8.1.1 c, UNI EN ISO 14021

Na/K - feldspar resulting from the recovery and treatment of the ornamental stone "wastes", obtained from the historical white granite quarries Montorfano and pink granite Baveno, in the north of Lake Maggiore. In 1992 (renovated in 2012) the Mining Concessions for the exploitation of feldspar and associated minerals are issued by the Mining District of Turin, with **mining projects aimed exclusively at the recovery of the landfills material.**

The result is an innovative project that converts something considered a mining waste into a raw material, creating a benefit to the environment avoiding the opening of new mines.

MINERALI INDUSTRIALI PILOT PLANT

Installed and covered magnetical separator

Drier with connection to the improved de-dusting system

Connections within the plant

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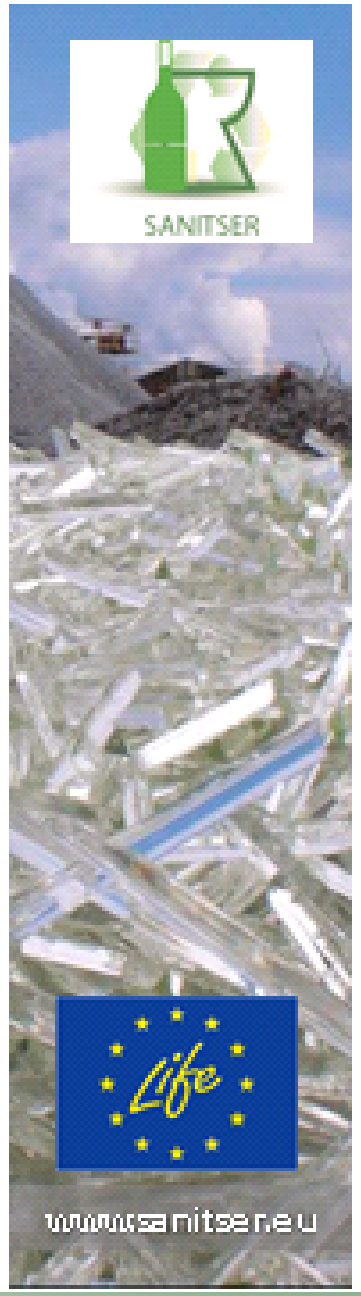

Main actions of SANITSER project:

- Definition of new formulations for slips bearing glass;
- Definition of the new production processes using the modified firing time-temperature cycles at lower temperature;
- Glaze composition revision in the light of new firing time - temperature cycles;
- Determination of environmental impact parameters (Life Cycle Assessment).

Definition of new formulations

Among all the formulations of bodies and glazes containing glass and other recycled materials tested during the project, we identified those most suitable for production and capable of ensuring the technological characteristics of the finished ceramic pieces, when compared with current standards required by the market.

To define the new compositions we also considered the content of recycled materials:

- **SANITSER 13** slip contains **more than 40%** of recycled materials (glass, pitcher and granite);
- **PSI 113** glaze contains **more than 15%** of recycled glass.

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SETEC PILOT PLANT

Ball clay dissolving first phase preparation

After 1 day or in the same day

Kaolin + other raw materials dissolving second phase preparation

After 2-3 days

Casting

Demoulding and hardening

After 1 day

Drying

After 1 day

Finishing + inspection

After 1 day

Glazing

After 1 day

Firing

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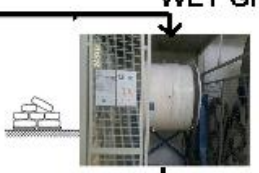
GEMICA PILOT PLANT

WEIGHT THE RAW MATERIAL

DUST ASPIRATION SYSTEM
near the balance and
up the tubolar mill

WET GRINDING



SIEVING THE GLAZE

FINAL PRODUCT

MAGNETIC SEPARATOR

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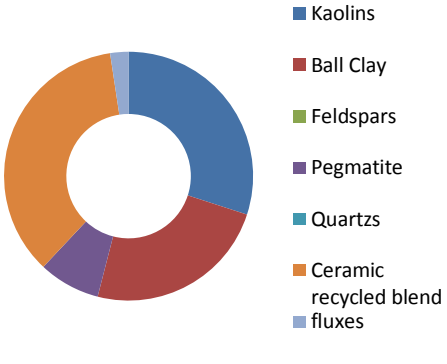
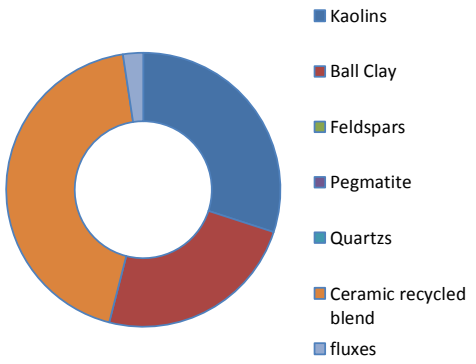
Starting from the excellent results obtained with Sanitser 7, which has determined the optimal content of recycled glass, we continued the research with the aim of improving the formulation, further increasing the content of recycled products.

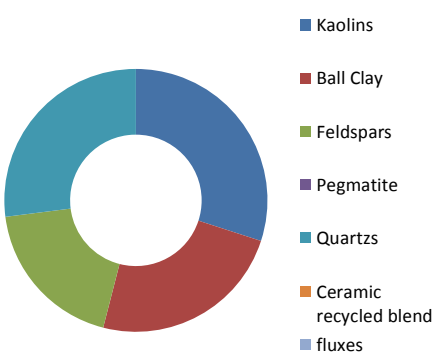
SANITSER 7 (%)



SANITSER 13 (%)



Traditional VC (%)



Sanitser 13, whose composition is shown in pictures above and which has a **content of recycled products > 40%,** appears to be the best among all of the compositions tested. Therefore, it was selected as the formulation to be used for the pre-industrial tests to be held at SETEC pilot and then on industrial scale.

The new formulation contains low quantity of quartz!

This is a very important achievement in the aim of reducing the risk connected to the use of substances containing free crystalline silica

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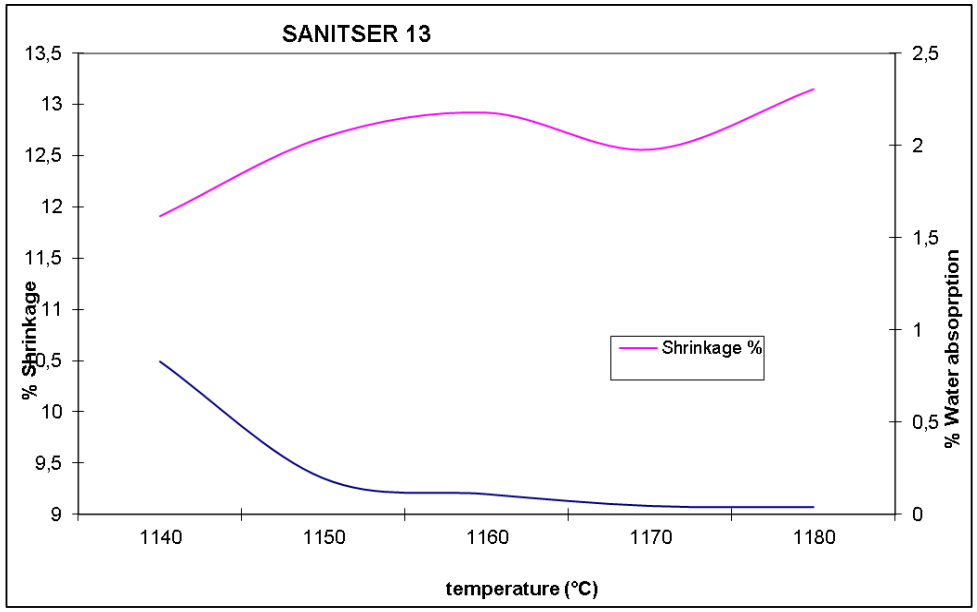

The SANITSER 13 shows an optimal temperature of firing lower than the other bodies, of about 1150-1170°C. The water absorption and total shrinkage values, obtained in the body, show a vitrification plateau in 20-30 degrees.

Temperature (°C)	Shrinkage %	Water absorption %
1150	12.56	0.196
1160	12.68	0.110
1170	12.96	0.05

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Table. Characteristic data obtained from Sanitser slip compared with industrial vitreous china slip.

(Each value is the mean of five determinations).

Technical parameters	Industrial slip fired at 1250°C RSD% ≤ 5.0	Sanitser 13 slip fired at 1165°C RSD% ≤ 5.0
Density (g/cm³)	1.800 -1820	1830
Moisture (%)	32-35	34.3
Viscosity (°G)	280-305	240-260
Sodium silicate deflocculant (%)	0.17	/
Sodium carbonate deflocculant (%)	0.07	0.02
Polyacrylate deflocculant (%)	/	0.02
Thixotropy (after 1 minute) (°G)	25-35	10-20
Deformation (mm)	40-43	43
Thickness after 1 h (mm)	6.5-7.0	6.6
Modulus of rupture (MOR) (kg/cm²)	24-25	25.3
Resistance to bending after firing (MPa) (UNI 4543 required a value > 39.50 MPa)	49.5	55.7
Linear fired Shrinkage (%)	12-13	12.6
Water absorption (%) (EN 997 and UNI 4543 required a value < 0.5%)	< 0.5	0.1-0.2

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Fritsch Particle Sizer 'analysette 22'

Meas.No. 176	Date 10-29-2014	Time 18:14	Operator Mutter	ID 7645	Serial No. 123456

SE.TE.C. S.r.l. Civita Castellana Renzicchi/Martini
Cliente : SETEC srl
Campione : VC BODY for SANITSER13 prog LIFE
Data : 28-10-2014
Analisi : via " UMIDA " alimentatore A/22Compact
veicolo : H2O distill. us-30"

Measuring Range	0.31 [µm] - 300.74 [µm]	Pump	100[rpm]
Resolution	62 Channels (17 mm / 114 mm)	Stirrer	0[rpm]
Absorption	12.00 [%]	Ultrasonic	100
Measurement Duration	8 [Scans]		

Modell Independant

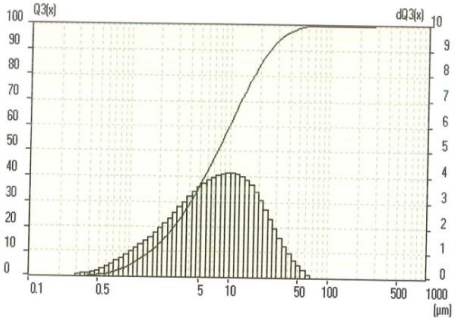
Fraunhofer Calculation selected.

Interpolation Values... C:\Programmi\a22__32\FRITSCH\fritsch\HIMNT_1.FPS

****** %	<	0.30 µm	0.71 %	<	0.50 µm	4.38 %	<	1.00 µm
35.82 %	<	5.00 µm	60.43 %	<	10.00 µm	75.29 %	<	15.00 µm
84.66 %	<	20.00 µm	90.43 %	<	25.00 µm	93.97 %	<	30.00 µm
98.60 %	<	45.00 µm	99.91 %	<	63.00 µm	100.00 %	<	75.00 µm
100.00 %	<	90.00 µm	100.00 %	<	105.00 µm	100.00 %	<	125.00 µm
100.00 %	<	150.00 µm	100.00 %	<	200.00 µm	100.00 %	<	250.00 µm

Interpolation Values... C:\Programmi\a22__32\FRITSCH\fritsch\10_90.FPV

10.00 %	<	1.64 µm	20.00 %	<	2.82 µm	30.00 %	<	4.14 µm
40.00 %	<	5.68 µm	50.00 %	<	7.54 µm	60.00 %	<	9.89 µm
70.00 %	<	12.93 µm	80.00 %	<	17.23 µm	90.00 %	<	24.55 µm
100.00 %	<	67.42 µm						



Micron	% Fraction passing for SANITSER 13	% Passing Fraction for VC Standard
5	**35.82**	41.39
10	60.43	62.83
25	90.43	89.88
30	93.97	93.89
45	98.60	99.12
63	99.91	99.99

Percentage of particles	Average diameter (micron) SANITSER 13	Average diameter (micron) VC Standard
D50	**7.54**	6.61
D90	24.55	25.14

Vitreous China body: SANITSER 13 granulometric distribution

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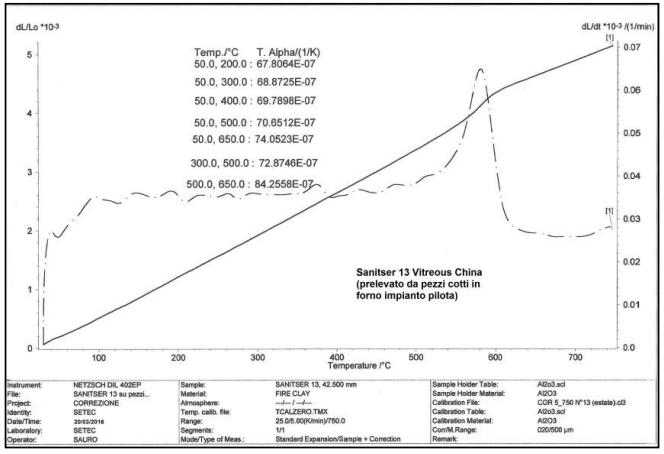
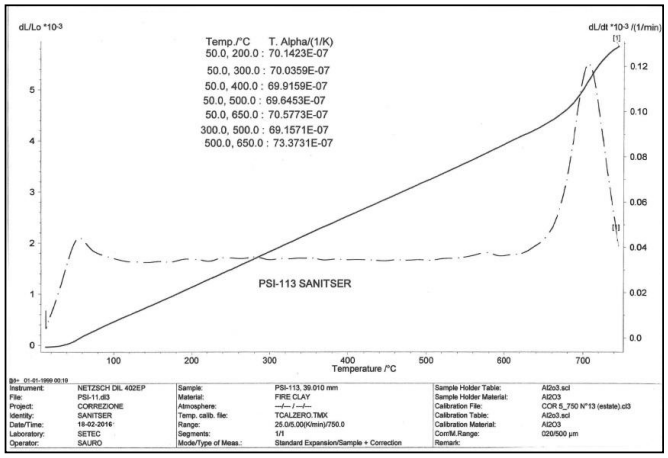
Table. Comparison of dilatometric coefficients obtained from Sanitser 13 slip compared with industrial standard vitreous china slip.

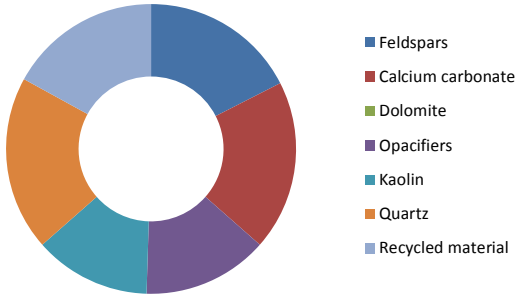
Temperature range (°C)	Dilatometric coefficient α in Vitreous china standard (1/K)	Dilatometric coefficient α in SANITSER 13 body (1/K)	Dilatometric coefficient α in SANITSER PSI-113 (1/K)
50-200	65.6 x10^{-7}	67.8 x10^{-7}	70.1 x10^{-7}
50-300	64.5 x10^{-7}	68.9 x10^{-7}	70.0 x10^{-7}
50-400	65.5 x10^{-7}	69.8 x10^{-7}	69.9 x10^{-7}
50-500	66.7 x10^{-7}	70.7 x10^{-7}	69.6 x10^{-7}
50-650	71.2 x10^{-7}	74.1 x10^{-7}	70.6 x10^{-7}
300-500	69.5 x10^{-7}	72.9 x10^{-7}	69.2 x10^{-7}
500-650	84.6 x10^{-7}	84.3 x10^{-7}	73.3 x10^{-7}



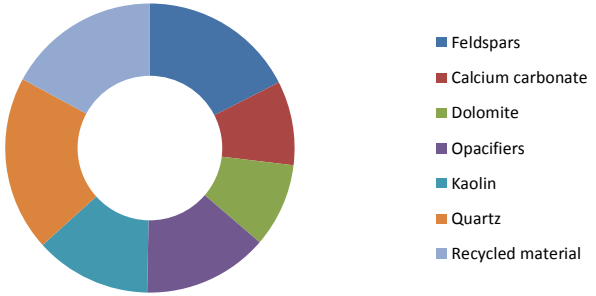


The challenging research to find a new glaze that can be used with the new slip formulation and processed with the new firing cycle ended with the glaze **PSI 113,** whose composition is shown in the table below and which has a **content of recycled products >15%.**

PSI-109B

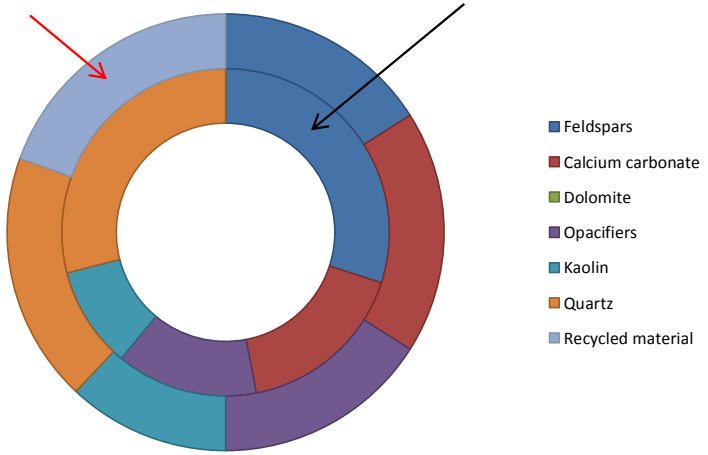


PSI-111-matt



Glaze PSI-109B was utilized in the pilot plant phase. Glazes PSI-113 and PSI-111 (matt white) were used in the preindustrial and industrial phases; they were also prepared in different colors. A special anti-bacterial product was added.

PSI-113 Traditional glaze



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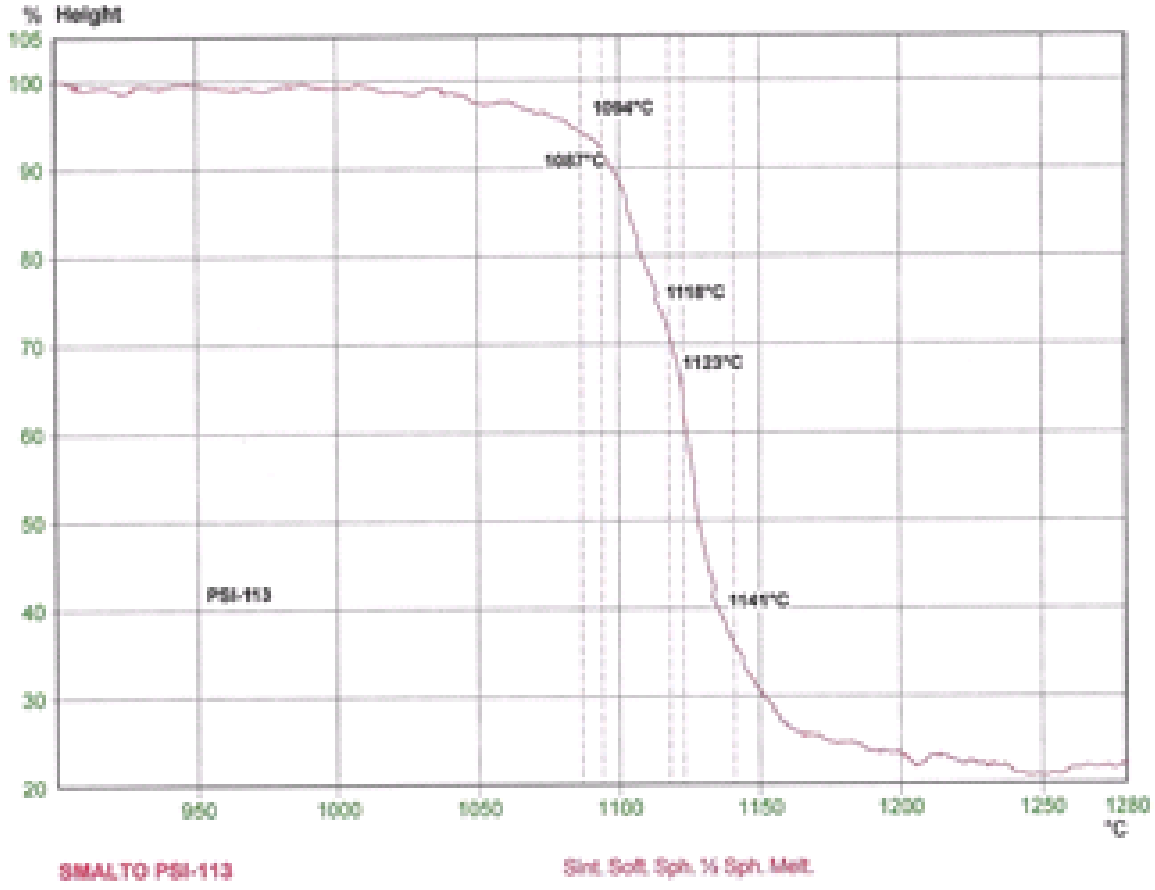
PSI-113 enamel was chosen for the industrial production, since it is the one which provides the best tone of white. It is also even the fuse. The higher fusibility of the glaze (a lower softening and melting temperature) allows to fire the sanitary ware pieces at 1165 °C.



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Preservation of surface brightness and luminosity (norm UNI 4543)

(1) alkalis contact (NaOH 5%) at 160°C for 30m;
(2) acids contact (HCl 50% and H_2SO_4 1:3 at room temperature and for 72h;
(3) Resistance to thermals hocks (5 cycles repeated of heating at 110°C in a calcium-chloride water-solution and quenching in ice-water;
(4) Resistance to water and vapour.
(5) Dyes contact at room temperature and for 72h;
(6) Resistance to abrasion by Al_2O_3-sand for 210s:

Test	Results
alkalis contact (1)	Any loss of reflectivity on the glaze surface;
acids contact (2)	Any loss of reflectivity on the glaze surface;

Test	Results
Resistance to thermal shocks (3)	No sign of crazing, peeling or settling-crack in the samples analysed.
Resistance to water and vapour (4)	No sign of crazing, peeling or settling-crack in the samples analysed.

Test (5)	Results
Potassium permanganate	No stain due to chemical materials remain after the washing and use of cleaning device.
Methylene blue	No stain due to chemical materials remain after the washing and use of cleaning device.

Test	Results
Al2O3-sand for 210s (6)	No defects appear, never abrasion

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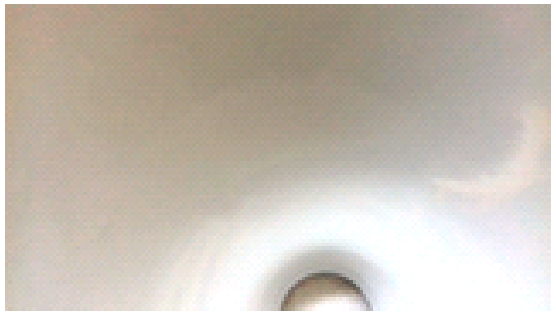
Colorimetric control

Characteristics	PSI-109 glaze	PSI-113 glaze	Standard glaze
Luminosity (by Spectroeye)	92.98	94.22	91.22
Brightness (gloss degree at 60°)	143.2	144.6	> 140
Surface roughness (micron)	Ra < 0.10 Rt < 0.83	Ra < 0.08 Rt < 0.66	Ra < 0.12 Rt < 0.8



PSI-109

PSI-113

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Fired pieces (pre-industrial tests in SETEC pilot plant)

Pieces made with SANITSER 13 and glaze PSI-113

Wash basins produced using slip SANITSER 13 and coloured glaze PSI

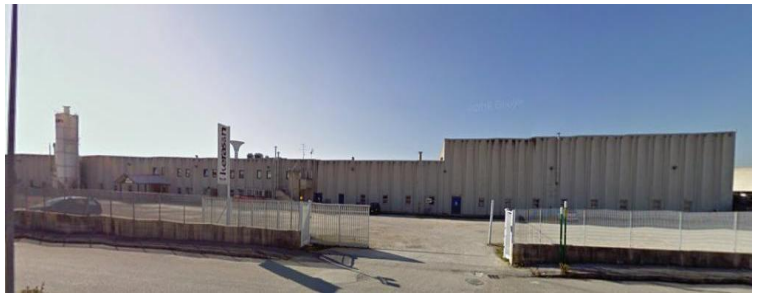
Wash basin produced using slip SANITSER 13 and glaze PSI with anti-bacterial additive

Industrial test:

Production of at least **1760** pieces in 8 different shapes

Companies involved in the tests:

KERASAN SRL
SCARABEO CERAMICHE SRL
ALICE CERAMICA SRL
CERAMICA AMERINA SRL



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ENVIRONMENTAL ACHIEVEMENTS

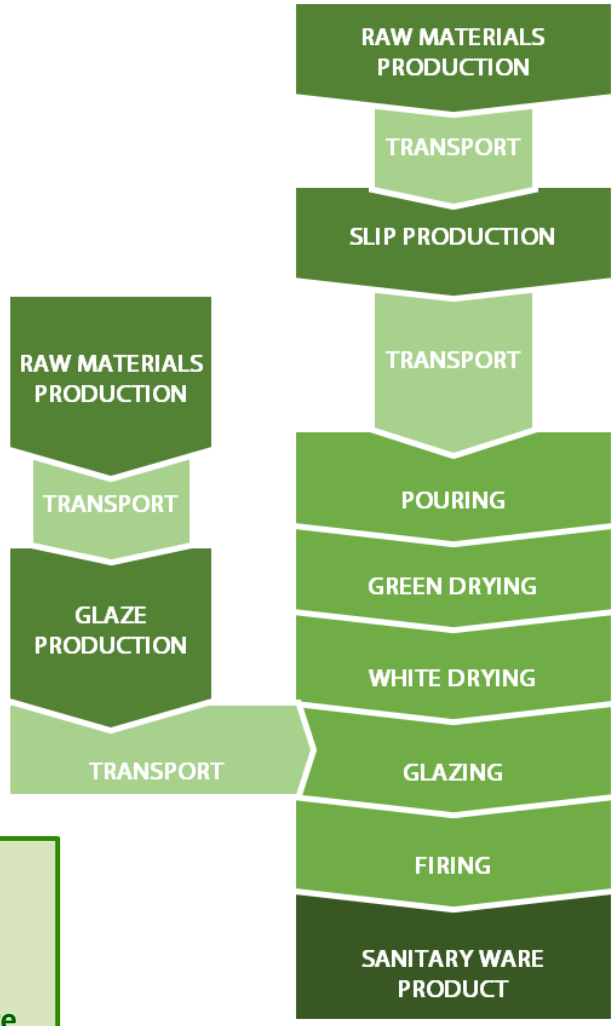
*Environmental benefits of SANITSER process respect to traditional technology are quantified through a **Life Cycle Assessment (LCA)**, a scientific and internationally recognized methodology.*

Reference standards:

ISO 14040:2006 Life cycle assessment - Principles and framework

PCR 2012:01 V 2.01, "Construction products and construction services"

System boundaries:
From cradle to industry gate



Comparison:

Traditional production process
VS
SANITSER innovative process – Industrial stage

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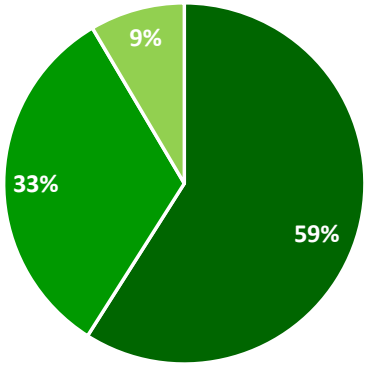
ENVIRONMENTAL ACHIEVEMENTS

Recycled content of SANITSER product **41 %**



- Primary material
- Pre-consumer secondary material
- Post-consumer secondary material

ISO 14021:2016

Reduction of **CO_{2eq} emission** from firing: **- 18 %**

Reduction of raw materials **transportation distances**: **- 45 %**

Pre-consumer material:
Material diverted from the waste stream during a manufacturing process, excluded reutilization.

Post-consumer material:
Material generated by households or by facilities in their role as end-users of the product which can no longer be used for its intended purpose.

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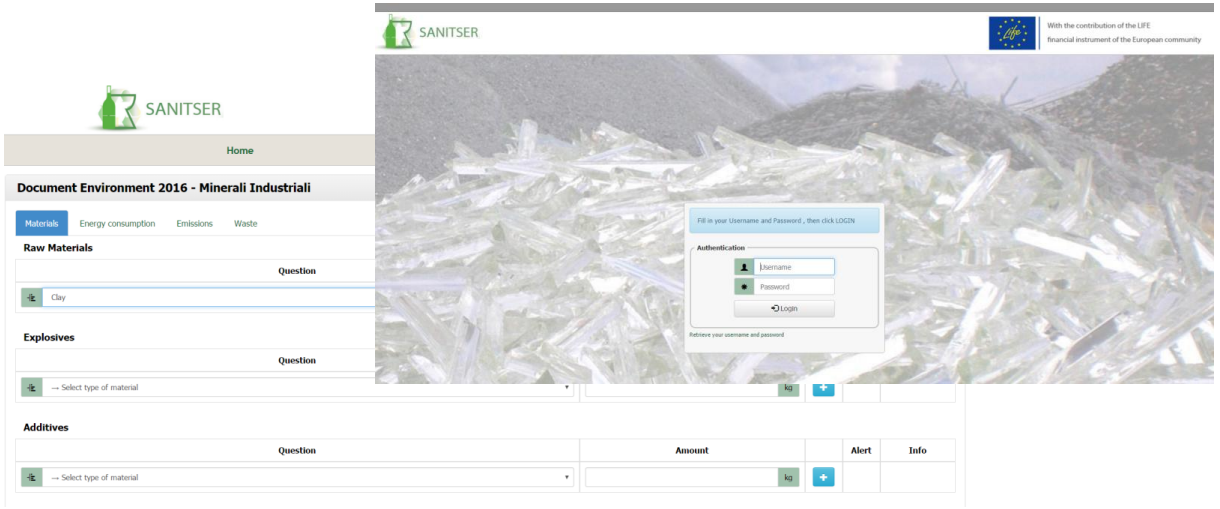
ENVIRONMENTAL ACHIEVEMENTS

Web based tool

During the project a web based tool was designed and developed to:

- **Collect quantitative data** according to the Life Cycle Assessment (LCA) approach
- **Calculate the main environmental indicators** for evaluating the performance of the processes involved at different production level

Link: www.sanitser-tool.eu



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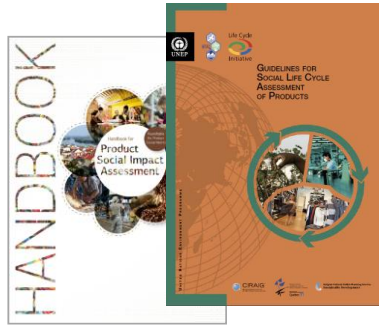
SOCIAL ACHIEVEMENTS

*Social aspects related to the new SANITSER process are assessed throughout the **Social Life Cycle Assessment (SLCA)**, a quali-quantitative recognized approach along the whole life cycle*

Reference standards:

Guidelines for Social Life Cycle Assessment of Products (UNEP/SETAC, 2009)

Handbook for Product Social Impact Assessment (Roundtable for Product Social Metrics 2014)



Decrease of risk from silica exposure

Silicosis is a form of **occupational lung disease** occurring after inhalation of crystalline silica dust, potentially present in all production processes involving materials containing silica.

All over the traditional sanitary ware production process, risk of Silicosis can be find in stages involving **quartz** or semi-finished products containing it (e.g. slip), since quartz is mainly composed by Silica in its **crystalline form**.

ECONOMIC ACHIEVEMENTS

*Costs over the life cycle of SANITSER process compared to the traditional technology are evaluated using the **Life Cycle Costing (LCC)**.*
(reference standards: ISO 15685-6:2008).

Total operational and maintenance cost reduction: 5 – 10 %

Reduction is mainly due to:

- Raw materials used for body composition
- Energy saved during the firing process

TAVOLA ROTONDA
10 MARZO 2017
h 15.00

- Prospettive future di applicazione ed estensione dello studio anche al fire clay

- EPD – Dichiarazione ambientale di prodotto

- Problematiche del distretto di Civita Castellana e opportunità legate alla ricerca

- Tool per il calcolo della LCA (se LCE lo ritiene, potremmo eventualmente fare una dimostrazione delle funzionalità del tool che hanno sviluppato)

SANITSER

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Thank you

3. List of participants

www.sanitser.eu

SANITSER

PROGETTO SANITSER

Convegno 10 Marzo 2017

Civita Castellana, 10 Marzo 2017 *Pag. __ di___*

Nome	Cognome	Azienda	Firma
VITTORIO	COSTA	MINERALI IND	
CARLO	CIVATI	MINERALI IND.	
TIZIANO	MESTRINER	MINERALI IND.	
Ian	Costa		
ALESSANDRO	PAVON	UNI. TORINO	
FABRIZIO	BECCI	ITIS	
LORIS	LEMBO	ITIS	
VERONICA	LILLI	ITIS	
YURI	FERRUZZI	ITIS	
FABRIZIO	MASSIMI	ITIS	
ROBERTA	BERARDI	IDEAL STD	
ELEONORA	PARIS	UNIVERSITÀ di CAMERINO	
ELENA	CUCCHETTO	Consulente Minerali	
Gertrud	van Leijen	van Leijen consul. Minerali Ind.	
RAFFAELLA	CELICA	CENTRO CERAMICA	
ELISABETTA	MARTINI	SETEC	
UGO	BALDI	IL MELOGRANO	
DANILO	PIERDOMINICI	CONSULENTE DI AZIENDA	
ANDREA	CUSI	CONFINDUSTRIA CERAMICA	
Elena	Patriquali	Delta	

MINERALI INDUSTRIALI

GEMICA

SETEC

Engineering

MINERALI INDUSTRIALI Srl
Contact : Daniela Tabacchi
Tel : +39 015 9517057 – Email : info@sanitser.eu

With the contribution of the LIFE financial instrument of the European Community

SANITSER

PROGETTO SANITSER

Convegno 10 Marzo 2017

Civita Castellana, 10 Marzo 2017 *Pag. __ di___*

Nome	Cognome	Azienda	Firma
CIMA N.	ANDREA		
THOMAS	CECCARELLI		
DANIELE	PINARDI		
CRISTIANO	PESCETELLI		
MATTIA	ROCCHI		
LORENZO	SALUSTRI		
DIEGO	INNOCENZI		
PAOLO	ZEZZA		
MARIALUISA	VALLORANI		
MELISSA	DANIELI		
ELEONORA	COLETTA		
SARA	RICCI		
DANILO	BONCRAZIO		
FRANCESCO	PILEGGI		
ELISA	RAMBALDI	CENTRO CERAMICO	
PAOLA	MANCINI	IMERYS - SPICA	
ALESSANDRO	FERRARI	IMERYS	
MIRKO	ZORFI	IDEAL STANDARD	
MARIO	MASSIOTTI B.	C. FLAMINIO	
FERDINANDO PASTORELLI	PASTORELLI	E. MORA	

SANITSER

PROGETTO SANITSER

Convegno 10 Marzo 2017

Civita Castellana, 10 Marzo 2017 *Pag.__ di___*

Nome	Cognome	Azienda	Firma
POZZOVIVO	ALESSANDRO		
SILVIO COSTANTINI	FERRI		
DANIELE	MIRAUTA		
FEDERICO	MANONI		
FLORIN	LUCA		
VALERIO	CASOLI		
LUCA	VALERIANI		
CARLO	CHERUBINI		
GIOVANNI	SILVERI		
MICHELE	MARSUCCI		
MARCO	DELLA CORTE		
SARA	FERRACUTI		
Fabio	CALVANECCI		
ANTONIO	ALTISSIMI		
GIULIANA	BONVICINI	CENTROCERAMICO	
GIANLUCA	ANDORNO	KERASAN	
VINCENZO	PERUGINI	LIBERO PROFESSION.	
MARCO	CENCIONI	GALASSIA SpA	
TULLIO	LIBERATORE	GALASSIA SpA	
SERGIO	CARABECCI	IMERYS	

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PROGETTO SANITSER

Convegno 10 Marzo 2017

Civita Castellana, 10 Marzo 2017 *Pag. __ di___*

Nome	Cognome	Azienda	Firma
ETTORE	[illegible]	GEMICA	
[illegible]	[illegible]	[illegible]	
[illegible]	GHIRELLI	Zschimmer & Schwarz	
ASSUNTA	FILARETO	LCE	
Siewert	Horst	Minerali	
Eugenio	SALVAIA	ITERYS	
GIANLUCA	BALDO	LCE	
MARCO	PASQUETTI	TECHNITAL	
ROBERTO	NOFRI	EUROARCS	
SANDRA	RAIMONDI	SPICA	
MICHEL	LOOSER	VALDAMA	
GIOVANNI	GALESTI	S. GAMARRO	
SAVINA	PIANESI	DELTA	
DANIELA	TABACCHI	MIN. INDUSTRIALI	
ROBERTO	CECCARELLI	CERAMICA GLOBO	
GIOVANNI	SANTINI	ITALCHAROTTE	
MAURO	CONTI	F.A.	
ALESSANDRO	BENELLI	EURCARGE	
ELEONORA	FAGGIANI	UNITUS	

SANITSER

PROGETTO SANITSER

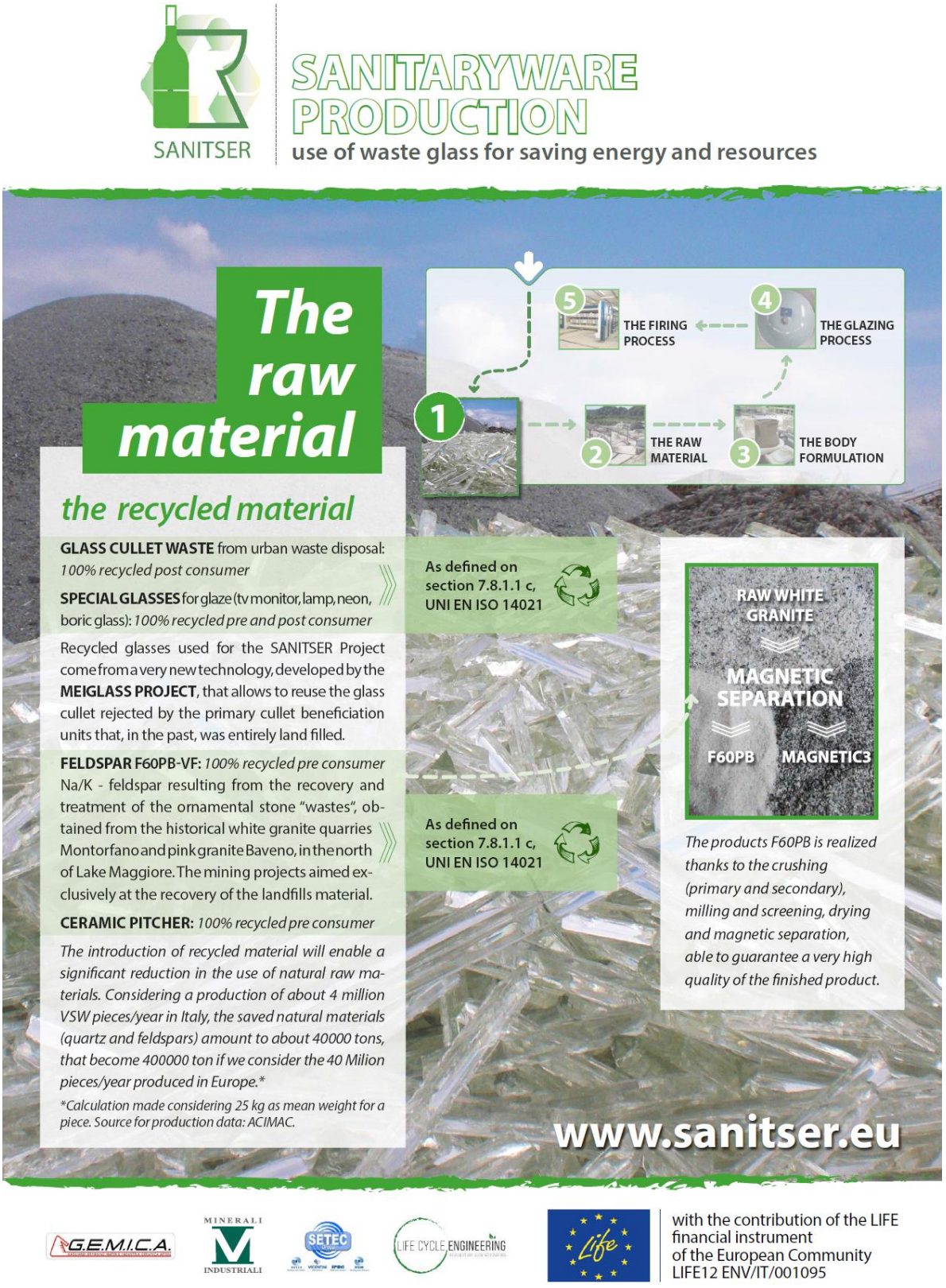
Convegno 10 Marzo 2017

Civita Castellana, 10 Marzo 2017 *Pag. __ di___*

Nome	Cognome	Azienda	Firma
STEFANO	ORTOLANI	GRANDINETTI SRL	
EDMUND	IMBRAH	UNIVERSITY	
Phanindra	Maddala	University	M. Phanindra
FRANCESCO	RADICA	UNIVERSITÀ CAMERINO	
PAOLO	TOMEI	SETEC	
ELISA	LANARI	SETEC	

4. Posters

Were printed for the final conference of the SANITSER project five explanatory posters and exhibited in the SETEC pilot plant.



SANITSER

SANITARYWARE PRODUCTION

use of waste glass for saving energy and resources

The raw material

the virgin material

Ceramic products are obtained by making extensive use of natural raw materials, mainly clay materials, fluxes as feldspar and/or quartz sand, together with additional raw materials (e.g. talc, carbonates, wollastonite, zircon, borates, lithium minerals).

VITREOUS CHINA BODY

- Clays
- Kaolin
- Quartz
- Feldspars

To be partially substituted by recycled product: glass, granite and pitcher

GLAZE

- Kaolin
- Calcium carbonate
- Zirconium Silicate
- Quartz
- Feldspars
- ZnO

To be partially substituted by recycled special glasses (boric and alkali glass)

SAVING OF NATURAL RESOURCES

In the studied formulation of bodies has been used more than **40%** of recycled glass, granite and Vitreous China scraps. Also the **new glaze formulations contain between 17-20% of recycled materials**.

www.sanitser.eu

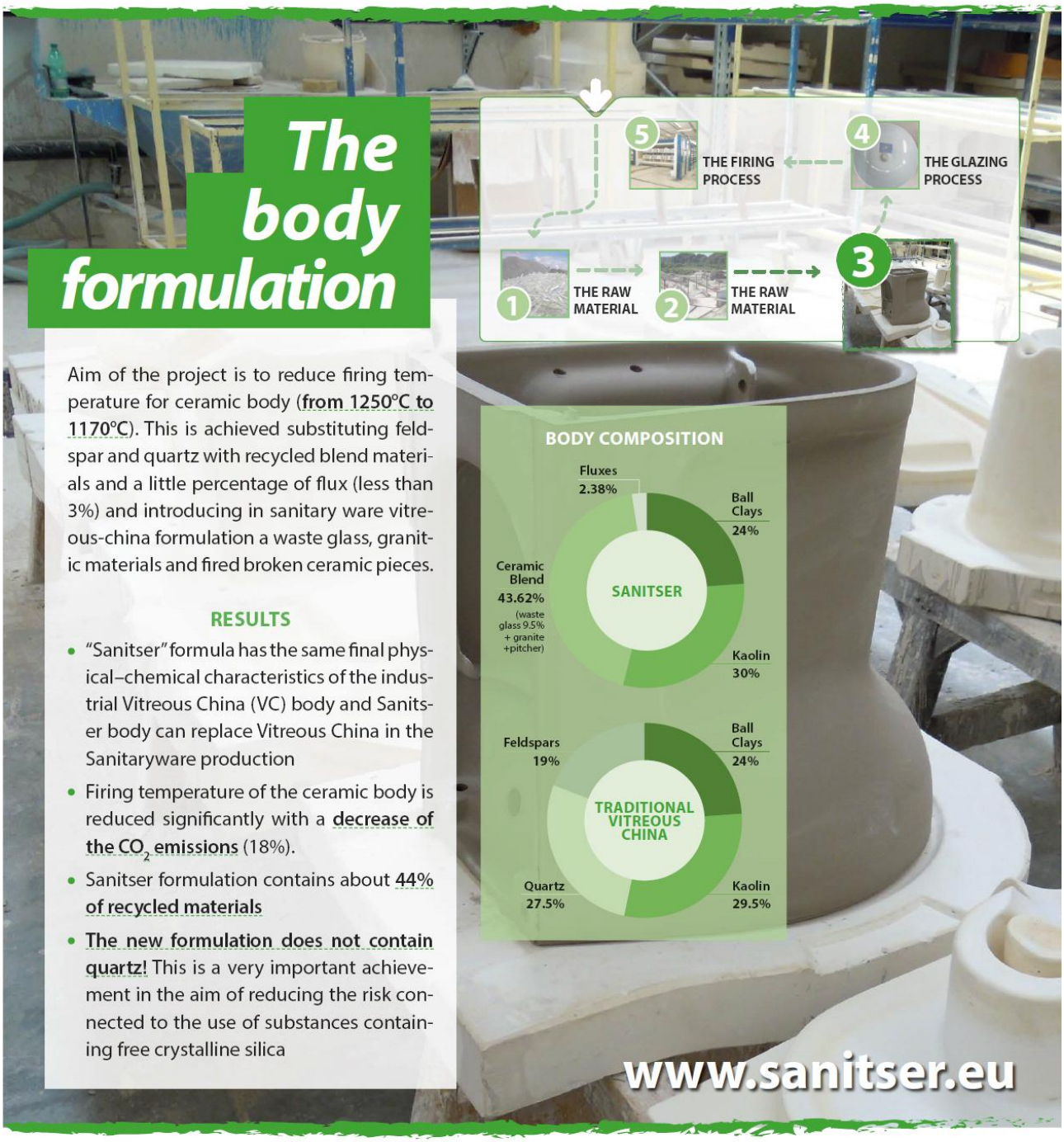
G.E.M.I.C.A. MINERALI INDUSTRIALI SETEC LIFE CYCLE ENGINEERING

with the contribution of the LIFE financial instrument of the European Community
LIFE12 ENV/IT/001095

SANITSER

SANITARYWARE PRODUCTION

use of waste glass for saving energy and resources



Aim of the project is to reduce firing temperature for ceramic body (**from 1250°C to 1170°C**). This is achieved substituting feldspar and quartz with recycled blend materials and a little percentage of flux (less than 3%) and introducing in sanitary ware vitreous-china formulation a waste glass, granitic materials and fired broken ceramic pieces.

RESULTS

- "Sanitser" formula has the same final physical–chemical characteristics of the industrial Vitreous China (VC) body and Sanitser body can replace Vitreous China in the Sanitaryware production
- Firing temperature of the ceramic body is reduced significantly with a **decrease of the CO_2 emissions** (18%).
- Sanitser formulation contains about **44% of recycled materials**
- **The new formulation does not contain quartz!** This is a very important achievement in the aim of reducing the risk connected to the use of substances containing free crystalline silica

with the contribution of the LIFE financial instrument of the European Community
LIFE12 ENV/IT/001095

SANITSER

SANITARYWARE PRODUCTION

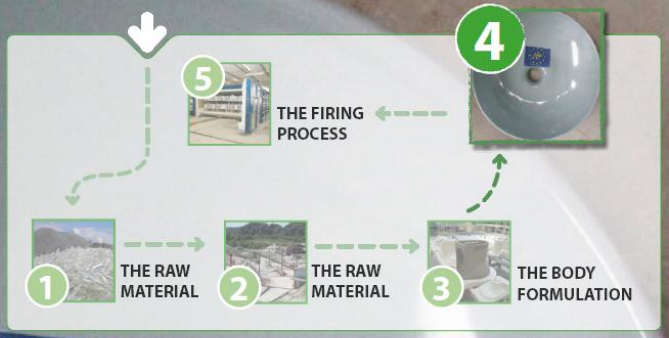
use of waste glass for saving energy and resources

The glazing composition

The challenging research to find a new glaze that can be used with the new slip formulation and processed with the new firing cycle ended with the **glaze PSI 113**, which has a content of recycled products of nearly 20%.

The innovative PSI-113 glaze formulation is able to achieve the same **qualitative and aesthetic characteristics** of traditional one, verified by correspondence of the final sanitary ware product with the standards EN 4543 and EN 997.

Glazes were prepared in **different colors** and with the addition of a special anti-bacterial agent.



RAW MATERIALS	USED IN PRE-INDUSTRIAL & INDUSTRIAL PHASE: PSI-113 (%)	USED IN PRE-INDUSTRIAL & INDUSTRIAL PHASE: PSI-111 matt (%)	USED IN PILOT PLANT: PSI-109B (%)
Na-Feldspar Na Extra 75	16,2	17,5	17,4
Calcium carbonate	18,3	9,4	18,7
Dolomite	/	9,4	/
Zinc oxide	4,0	2,0	2,0
Zirconium	11,9	12,2	12,3
Kaolin	11,9	13,1	13,1
Quartz QLZ-FF	18,3	19,6	19,5
White Glass recovery VBI-FF	11,0	11,0	10,8
Boric Glass VB-FF	8,5	6,1	6,2

RECYCLED PRODUCT

www.sanitser.eu

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LIFE12 ENV/IT/001095

SANI

SANITSER

SANITARYWARE PRODUCTION

use of waste glass for saving energy and resources

The firing process

The use of recycled materials in sanitary ware vitreous-china formulations in place of feldspar and quartz permits to **reduce the firing temperature of the ceramic body from 1250°C to 1170°C**.

The firing curve obtained for the Sanitser slip is of about 17 hours, in comparison to that of a conventional industrial cycle that has duration of about 19-22 hours.

The use of small and medium-sized businesses for industrial tests allowed the verification of the easy **applicability and transferability** of the project-related technology. Only comparatively modest readjustments of process parameters or slip/glaze composition are necessary to achieve the most performing configuration.

- The use of Sanitser slip implies a lower firing temperature and a shorter firing cycle confirming **an important decrease of energy and CO_2 emissions** (- 18% if compared to the traditional sanitary ware process)
- All the performed tests confirm that the low firing temperature does not affect the functional, technical or aesthetic features of the end-products, which are fully comparable to those of actual commercial products.

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Life

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5. Pictures

Seminar photos

SANITSER

Coffee break zone in pilot plant

Posters disposition in pilot plant


The firing process


The glazing composition
Glaze composition

Visit pilot plant

Laboratory SETEC visit

Round table future prospective

6. Press articles

Il Messaggero | viterbo@ilmessaggero.it www.ilmessaggero.it | Martedì 14 Marzo 2017

Redazione: Via Marconi, 17 T 0761/340044-341147 F 0761/304925

Incidenti
Auto ribaltate due feriti a Corchiano e sulla Cassia
A pag. 37

Sport, volley
Tutti i risultati dei tornei regionali: bene i team ortani
A pag. 39

Sport, calcio
Verso il derby con Civ
il Monterosi punta in
Arriva una partita verità per i rossoblù di D'Antoni, att
dalla Flaminia per verificare le ambizioni al salto di cat
Gobattoni a pag. 39

Il riciclo fa bene alla ceramica

▸L'impiego di vetro dalla raccolta differenziata abbatte i costi e migliora l'ambiente
▸Presentati al distretto civitonico i dati del progetto, finanziato dall'Unione europea

L'impiego del vetro riciclato dalla raccolta differenziata può abbattere i costi di produzione dell'arredo bagno. Un progetto pilota, presentato nei giorni scorsi nel distretto ceramico industriale di Civita Castellana, ha fornito risultati molto soddisfacenti. I risultati hanno incontrato l'interesse di aziende e sindacati, visto che col vetro riciclato negli impasti di base si avviano consistenti risparmi sui costi, oltre a trarre benefici per l'ambiente e ricadute sull'impatto sociale. Il progetto "Life Sanitser", è stato cofinanziato dalla Unione europea ed ha preso il via dal 2013. Tra le aziende promotrici anche quelle - come Minerali Industriali e Gemica - che forniscono gli impasti di base alle aziende del distretto.

Alla illustrazione dei risultati è stato evidenziato come l'impiego di materiali riciclati fino al 40% negli impasti - e di quasi il 20% nello smalto - comporti un notevole risparmio di risorse primarie, la riduzione del ciclo di cottura dei pezzi, con una conseguente riduzione dell'emissione di Co2 pari al 18%. Oltre a questo, diminuisce il rischio connesso all'esposizione dei lavoratori alla silice.

Baldi a pag. 37

ARREDO BAGNO Industria ceramica

Cosmonauta
I Gang mettono in concerto il '77

C'era una volta il punk. Concerto dei Gang al circolo Arci del Cosmonauta (via dei Giardini 11), sabato prossimo alle 22. Una serata concerto con la storica folk-band marchigiana che presenterà l'ultimo lavoro "Calibro 77", raccolta di canzoni che racconta in musica la memoria del movimento del '77 e ripercorrere la storia di lotte degli anni '70. L'evento, riservato ai soci Arci, sarà l'occasione per promuovere il tesseramento (possibile attraverso il portale Arci portale.arci.it/preadesione/ilcosmonauta/).

Ingresso al concerto a sottoscrizione.

Dai tiroc
alle assu
Fattoria
dà l'esen

FORMAZIONE

La fattoria soc
portunità di la
altro fiore all'o
perativa "Fatto
sempre impegn
venti a vantag
ne con disabil
che dei minori.
fatti le assunzi
di 22 tirocini,
in due anni.
Queste le cifre
la cooperativa
sulla Tuscano
2015 a oggi, nel
ranzia giovani
programma
Regione e riv
tra i 15 e i 29 an
iscritti a scuola
tà, che non lav
seguono corsi

Il vetro rivoluziona la ceramica

▶L'impiego del materiale riciclato negli impasti porterà a forti riduzioni dei costi produttivi e benefici per l'ambiente

▶Il progetto Life saniter, cofinanziato dall'Unione e è già stato presentato alle aziende del distretto civit

INDUSTRIA

Si aprono nuovi orizzonti per la ceramica del comparto sanitario, prodotta nel distretto industriale di Civita Castellana. La novità arriva dall'utilizzo del vetro riciclato negli impasti di base, che spalanca scenari molto interessanti soprattutto per quello che riguarda i risparmi nei costi di produzione, benefici per l'ambiente e ricadute sull'impatto sociale.

Lo dicono i dati finali del progetto Life Saniter, cofinanziato dalla Unione europea, iniziato nel 2013 e presentato nei giorni scorsi alle imprese del comprensorio e alle associazioni imprenditoriali. A illustrarlo le aziende promotrici Minerali Industriali, Gemica, Setec Group e Life Cycle engineering, che hanno portato a termine la ricerca.

Gli obiettivi iniziali sono stati tutti confermati dai risultati: l'introduzione di materiali riciclati fino al 40% negli impasti - e di quasi il 20% nello smalto - comporta un notevole risparmio di risorse primarie; riduzione del ciclo di cottura di circa 80-100 gradi rispetto a quello tradizionale, con una conseguente riduzione dell'emissione di Co2 pari al 18%. Oltre a questo, viene registrata una diminuzione del rischio connesso all'esposizione dei lavoratori alla silice.

SI RIDUCE L'IMPIEGO DELLA SILICE NEI TEST CON CICLO TERMICO A BASSA TEMPERATURA

Il tutto porta a una consistente riduzione dei costi operativi. Il progetto ha visto una prima fase di sperimentazione in laboratorio, una seconda fase sugli impianti pilota costruiti dalle aziende partner appositamente per il progetto, ed una terza fase di test pre-industriali e industriali realizzabile grazie alla partecipazione di quattro aziende: Kerasan, Scarabeo, Ceramica Alice, Ceramica Amerina, le quali hanno permesso la produzione di circa 2000 pezzi.

I risultati sono stati presentati da Daniela Tabacchi (della Minerali Industriali che fornisce materie prime al settore) Elisabetta Martini (Setec e Gemica) Assunta Filareto (Lce). Per l'occasione sono state aperte le porte dell'impianto pilota della Setec, nella quale sono stati visionati i pezzi prodotti durante i test portati in cottura con il ciclo termico a bassa temperatura.

Successivamente si è svolta anche una tavola rotonda, moderata dall'ingegner Domenico Fortuna della Setec. Erano presenti Raffaella Cerica (per il Centro ceramico) e Gianni Calisti (Federlazio), oltre a una delegazione di studenti del liceo scientifico di Civita Castellana.

Ugo Baldi

CIVITA CASTELLANA La presentazione dei risultati del progetto Life saniter

Civitella d'Agliano

Al via nuova cava. «Con la videosorveglianza»

Civitella d'Agliano, partono i lavori alla cava in località Perazzeta. La ditta Fratelli Nocchi ha firmato la convenzione col Comune per dare l'avvio al progetto su circa 10 ettari compresi tra l'autostrada e l'area di servizio Tevere Est. «Abbiamo inserito numerosi paletti in modo da poter controllare cosa entra e cosa esce», spiega il sindaco Giuseppe Mottura. Intanto, il comitato Tutela Valle del Tevere-Alto Lazio ha lanciato una colletta tra le famiglie e le associazioni di Civitella e servono 22mila per la parcella a Vanessa Ranieri, avvocatessa ambientalista e legale Wwf nel processo contro Manlio Cerroni (già ingaggiata contro la cava a poche centinaia di metri, in località Ontaneto, poi scongiurata perché la Socim ha rinunciato al progetto). «La ditta Fratelli Nocchi – afferma Mottura – ha tutte le carte in regola per procedere. L'autorizzazione fu pubblicata sul bollettino regionale a febbraio del 2016, quindi c'era un anno di tempo per avviare i lavori. Abbiamo inserendo un impianto di videosorveglianza per monitorare il passaggio dei camion e la sistemazione della strada installando un semaforo. Il progetto non prevede un ripristino, pertanto una volta finiti gli scavi rimarrà un laghetto». Non come avvenuto nella vicina località Pascolaro, dove i Fratelli Nocchi sono stati imputati per traffico illecito di rifiuti in un'area di 142 ettari (processo penale prescritto), destinata invece a bonifica.

F.Lup.

Incidenti

Cassia nord e C due le persone

Due incidenti strad di poche ore sulle s Tuscia. Due i feriti, trasportati all'ospe Belcolle. Il primo è Corchiano poco pri l'auto condotta da u è ribaltata mentre via della Repubblic direzione di piazza nei pressi del centr Soccorsa prima da poi dagli uomini de trasferita in elicott all'ospedale del ca le cure del caso. Il t rimasto bloccato e sono arrivati anch carabinieri per i ri Il secondo incident è verificato nel pri pomeriggio a Viter Cassia nord, all'alt mobilificio. Alla g vettura c'era un'ot Bolsena, che non h ferite gravi ma è st comunque traspo ospedale a Belcoll personale del 118, accertamenti del c intervenire sul po gli uomini dei vigil già impegnati in u intervento. Anche stabilire la dinami intervenuti i carab