SANITSER

SANITSER - LIFE12 ENV/IT/001095

Deliverable Action D1

2nd Seminar Proceedings

Tecnargilla 2014, Rimini

Author: Minerali Industriali

Date: 25/09/2014

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

Table of content

Programme	Pg. 3
Presentations	5
List of Participants	56
Pictures	58

1. Programme

SE.TE.C., Minerali Industriali, G.E.M.I.C.A. ed LCE
hanno il piacere di invitarLa alla

Presentazione del Progetto LIFE12 ENV/IT/001095

SANITSER

Produrre ceramica in modo eco-sostenibile risparmiando risorse

25 Settembre 2014

www.sanitser.eu

Sala Diotallevi 2, Area Sud, Rimini Fiera *(vedi mappa sul retro)*
via Emilia 155, 47921 Rimini (RN), Italy
Tel: +39 0541 744111
Fax: +39 0541 744828
www.tecnoargilla.it

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

SANITSER

Programma della giornata

10h00 Registrazione dei partecipanti.

10h30 Ing. Mattia D'Agostini (SETEC srl)

10h50 Ing. Eugenio Salvaia (Minerali industriali)

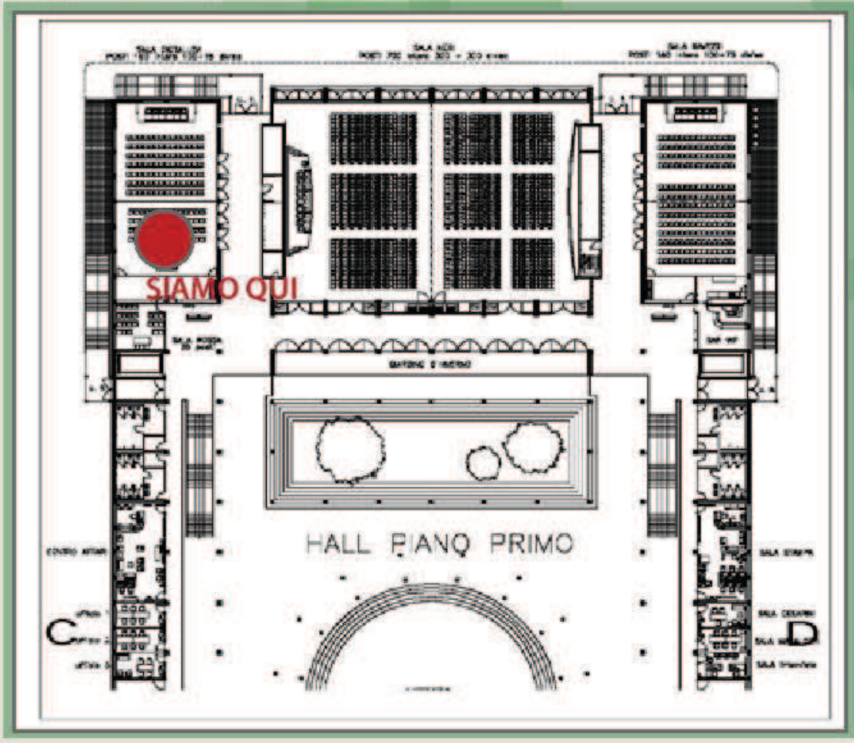
11h10 Ing. Assunta Filareto (LCE)

11h30 Dott.sa. Gertruud van Leijen (Consulente per Minerali Industriali) :

11h45 Domande e dibattito.

12-13h00 Buffet fuori dalla sala

Mappa Area sud, Rimini fiera



www.sanitser.eu

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

2. Presentations

- *Presentation of project objectives, environmental benefits and key achievements so far*, by SETEC
- *LIFE projects: technological innovation as industrial development opportunities*, by Minerali Industriali
- *Life cycle assessment and environmental data collection,* by LCE

SANITSER

SANITARYWARE PRODUCTION

Use of waste glass for saving energy and resources

01/07/2013 – 31/03/2017

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

www.sanitser.eu

SE.TE.C. Group

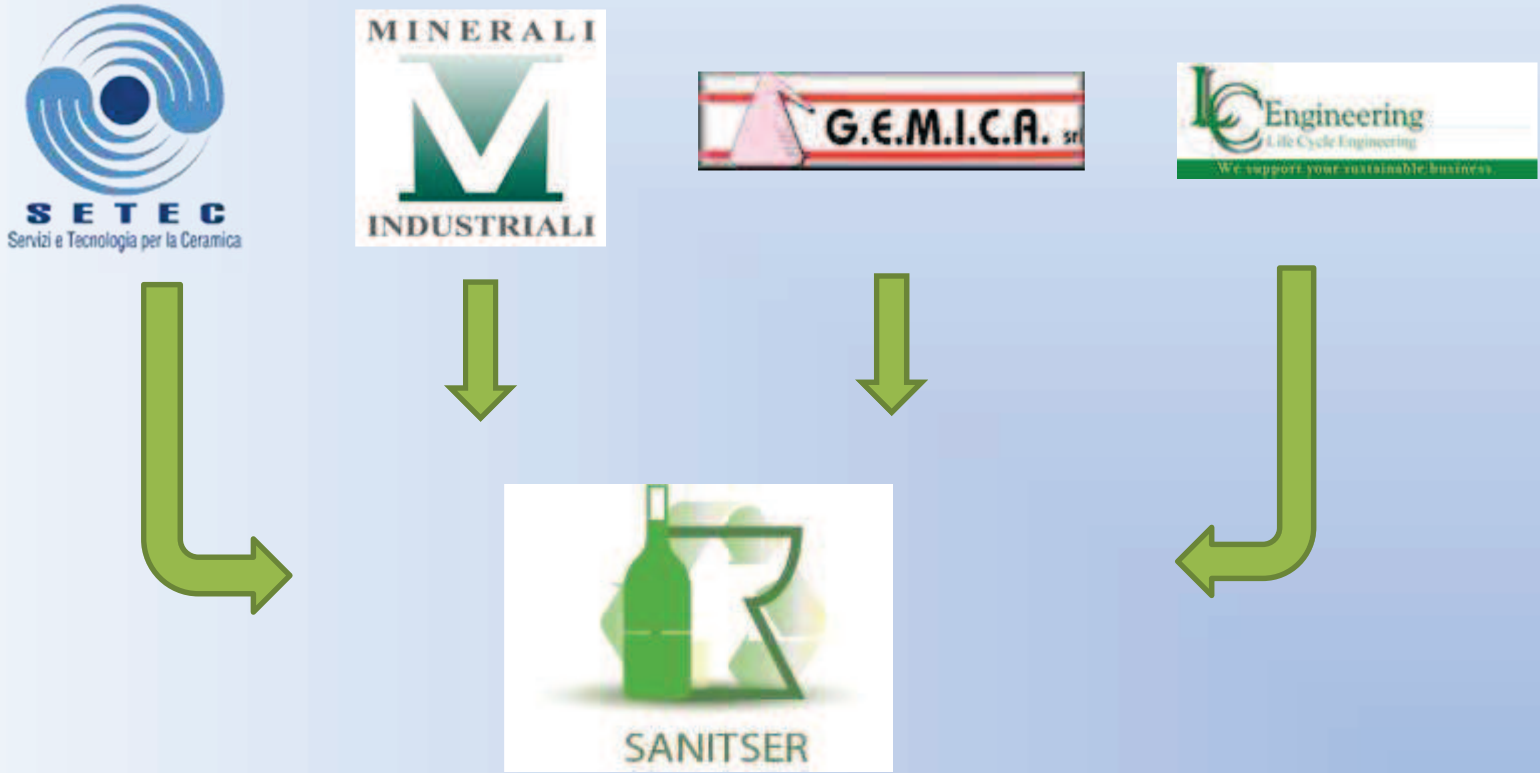
SE.TE.C. GROUP is one of the world leaders in service and technology for the production of sanitary-ware & table-ware. It has done business in the ceramic sector for over 20 years. Its customers include some of the most well known producers of sanitary-ware and table-ware in the world.

SE.TE.C. head quarter is located in Civita Castellana (VT) Italy

www.setecsrl.it

SANITSER

PARTNERS



SANITSER

PROJECT OBJECTIVES

Use of waste glass in ceramic Sanitaryware Formulation

Reduction of industrial production costs

- Reduction of virgin raw materials
- Reduction of firing temp. of 80-100°C.

Reduction of environmental impact

- Recycling of urban waste
- CO_2 emission reduction

EXPECTED RESULTS

SAVING OF ENERGY

Standard firing temperatures for Vitreous China Sanitaryware are between 1230 °C and 1250 °C with firing cycles around 14-16 h. The formulation studied in the SANITSER project will make possible to realize firing cycle with temperatures between 1150 °C and 1190 °C with the intention to reduce also the stay time at Max. temperature with an estimated save of thermal energy of about 18%

-18%

SANITSER

EXPECTED RESULTS

SAVING OF NATURAL RESOURCES

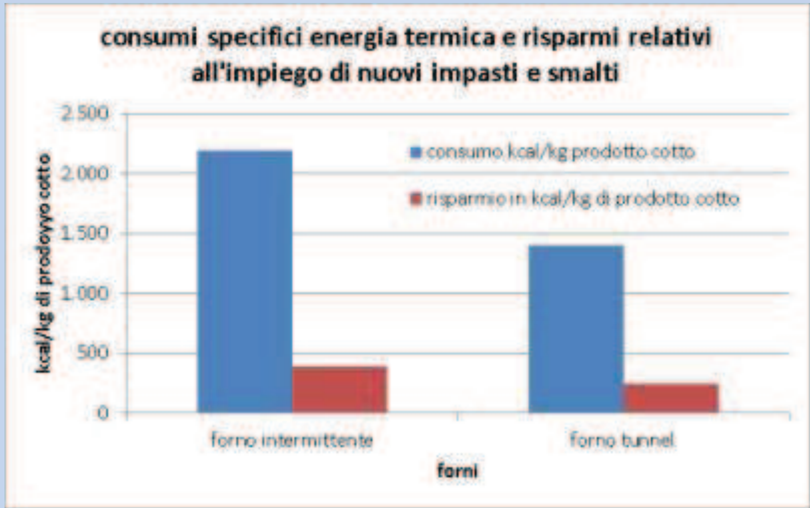
In the studied formulation of bodies and glazes it will be used a significant part of recycled glass, granite and Vitreous China scraps in order to reduce the total consumption of natural raw materials up to about 40%

-40%

ENERGY SAVING ECONAMICAL BENEFIT

Type of Kiln	Medium n° of fired pieces per day	Consumption of energy for each Kg of fired product in Kcal	Energy saving of 18% (in Kcal for each Kg of fired product)	Energy saving in Kcal per day (Considering medium weigh of one ceramic article of 20 Kg)	Energy saving in Nm^3 Methane per day	Energy Saving in €/day (Considering methane cost 0,35 €/Nm^3)
Shuttle	400	2100-2300	≈ 396	3.168.000	386,3	135,1
Tunnel	1000	1200-1600	≈ 252	5.040.000	614,6	215,1

Lower calorific Value of methane: 8200 kcal/Nm^3



SANITSER

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 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 in Kg/year
Shuttle (400 pcs/day)	**386,3**	**84.986** (Considering 220 working days / year	**169.972**
Tunnel (1000 pcs/day)	**614,6**	**202.818** Considering 330 working days / year)	**405.636**

SANITSER

ENERGY SAVING
GENERAL CONSIDERATION

Today in Italy are manufactured about 4,5 millions of sanitary ware per year and in Europe (including Turkey) the production is of about 50 millions pcs.

Country	Million of pcs./year [A]	Ton of fired product per year	Energy saved in Kcal/year [B]	Energy Saved in Nm^3 / year of Methane	Saving of CO_2 emission in Kg/year	Corresponding reduction of cars on the road / year [C]
Italy	4,5	90.000	29.070.000	3.545.000	7.090.000	1969
Europe	50,0	1.000.000	323.000.000	39.390.243	78.780.488	21.883

[A] data obtained by ACIMAC
[B] it is assumed a weighed average of the different kind of kilns of 1749 Kcal/kg, with a medium saving of 323 kcal/kg
[C] cars produce an average of 180 g/km of CO_2 considering annual average distance of 20.000 km.

Vitreous China Body Formulations

SANITSER 1, 5, 7

Raw material	SANITSER 1 (%)	SANITSER 5 (%)	SANITSER 7 (%)
Ball clays	24	24	24
Kaolin	30	30	30
Glass filler "GS-VF (Recovery glass)	10	12	9.5
Pitcher "BVC-VF (V.C. grinded scraps)	8 **28 %**	8 **41 %**	8 **35.62%**
Feldspar "F60-PBVF (Recovery granite)	10	21	18.12
Quartz	18	5	/
Talc	/	/	2.38
Pegmatite Flos 7	/	/	8

SANITSER

Rehological Characteristics

SANITSER 1, 5, 7

Rheological characteristics	Standard Vitreous China	SANITSER 1	SANITSER 5	SANITSER 7
Specific Weight	1800	1805	1806	1809
Water (%)(added to the body)	32	35	35	30
Viscosity	305	295	300	302
Thixotropy	32	35	38	30
Sodium silicate (%)	0.165	0.140	0.150	0.100
Sodium carbonate (%)	0.07	0.07	0.07	0.07
Barium carbonate (%)	0.05	0.05	0.05	0.05

The new bodies show rheological characteristics similar to the standard but with lower concentration of required sodium silicate especially in body n° 7

SANITSER

Greification Curves

SANITSER 1, 5, 7

1. The Greification curves are obtained reporting the total shrinkage (%) and the water absorption (%) of the ceramic mass as a function of firing temperature.
2. The aim of these first tests is to obtain new formulation with an optimal range of firing temperatures in the range 1160 and 1180° C.

Parameter	Standard Vitreous China
Total shrinkage (%)	11.0-12.5
Water absorption (%)	< 0.5

Shrinkage (%)

Temperature (°C)	SANITSER 1	SANITSER 5	SANITSER 7
1160	10.28	**11.08**	**11.06**
1180	10.65	**11.28**	**12.01**

Water abs. (%)

Temperature (°C)	SANITSER 1	SANITSER 5	SANITSER 7
1160	3.07	1.39	**0.45**
1180	2.69	**0.34**	**0.17**

www.sanitser.eu

SANITSER

Characterization of SANITSER 7

Characteristic	SANITSER 7	STANDARD V.C.
Resistance to bending (kgf/cm^2)	24.29	24
Thickness in 60 minutes (mm)	6.8	6.9
Thickness in 90 minutes (mm)	8.3	8.5
Deformation (mm)	46	43

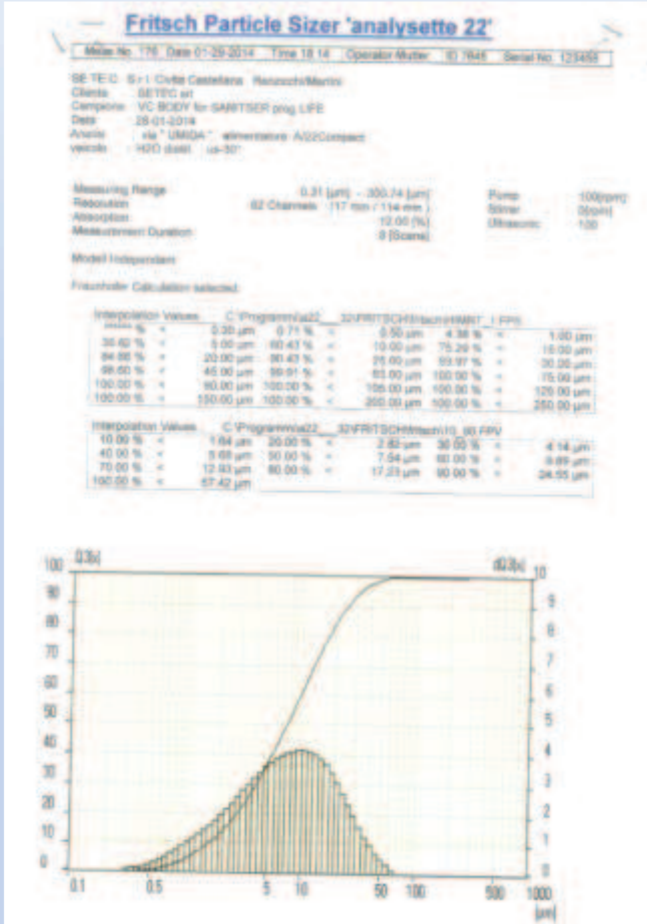
www.sanitser.eu

SANITSER

Granulomentric distribution of SANITSER 7

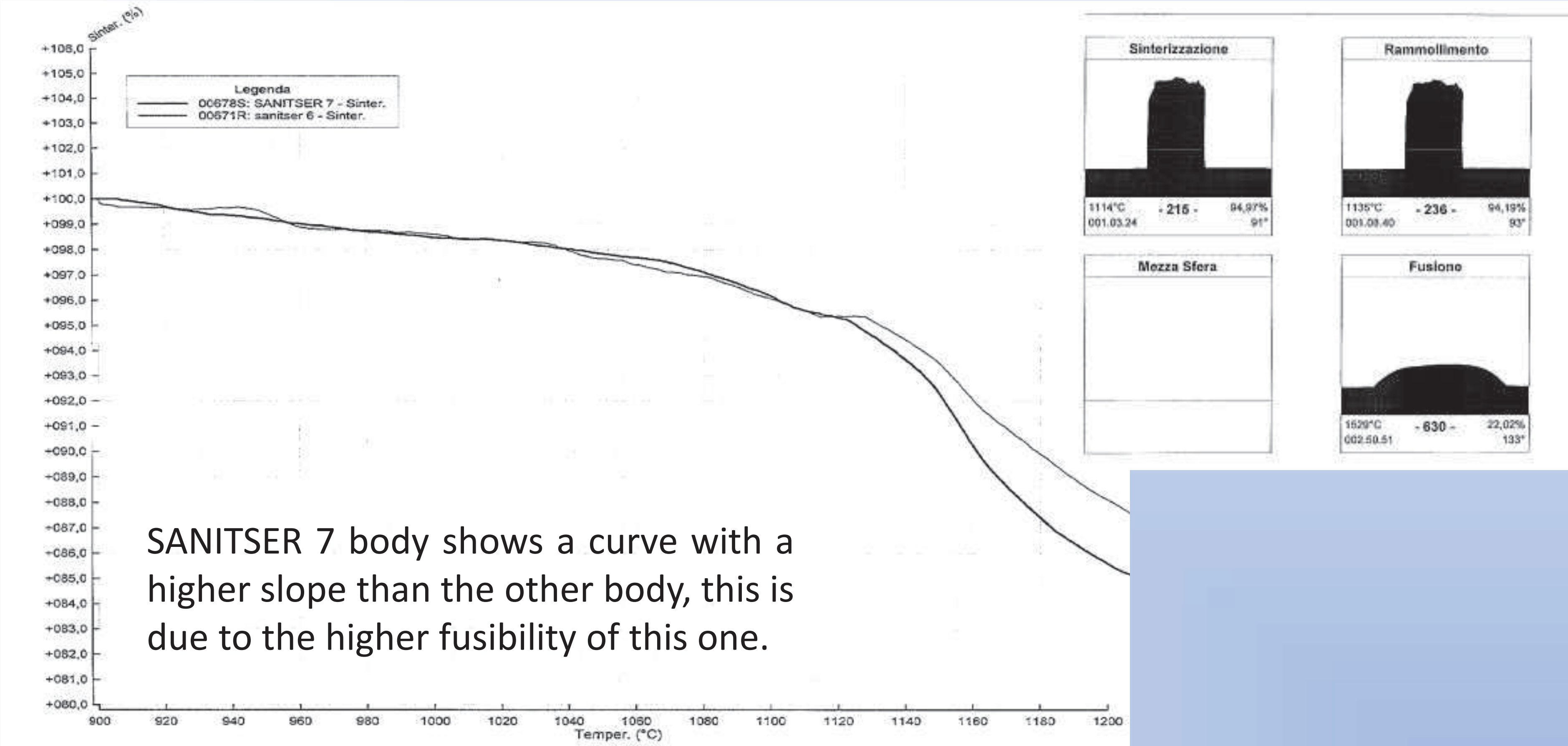
Micron	% Fraction passing for SANITSER 7	% Passing Fraction for VC Standard
5	**35.82**	41.39
10	**60.43**	62.83
25	**90.43**	89.88
30	**93.97**	93.89
45	**98.60**	99.12
63	**99.91**	99.99

Percentage of particles	Average diameter (micron) SANITSER 7	Average diameter (micron) VC Standard
50%	**7.54**	6.61
90%	**24.55**	25.14



SANITSER

Heating Microscope Test of SANITSER 7



SANITSER 7 body shows a curve with a higher slope than the other body, this is due to the higher fusibility of this one.

SANITSER

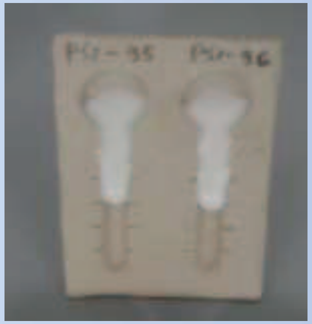
SETEC's Pilot Plant
Semi-Industrial casting test

www.sanitser.eu

SANITSER

Glaze Formulation by G.E.M.I.C.A for SANITSER 7

Raw material	PSI-95 (%)	PSI-97 (%)
Feldspar	19.14	19.04
Calcium carbonate	20.57	20.47
Zinc oxide	4.31	4.29
Zirconium	6.22	8.5
Kaolin	14.35	14.29
Quartz QLZ-FF	23.44	21.43
Glass recovery VBI-FF	11.96	11.91



www.sanitser.eu

SANITSER

SETEC’s Pilot Plant
Semi-Industrial glazing test

PSI 95

PSI 97

Next Steps and New Formulations

Raw material	SANITSER 7 (%)		SANITSER 13 (%)	
Ball clays	24		24	
Kaolin	30		30	
Glass filler "GS-VF“ (GLASS)	9.5		9.5	
Pitcher "BVC-VF“ (SCRAPS)	8	**35,62 %**	8	**43.62%**
Na/K – feldspar "F60-PBVF“ (GRANITE)	18.12		26.12	
Pegmatite Flos 7 – VF	8		/	
Talc	2.38		2.38	

SANITSER

Conclusions

The introduction of recycled glasses, processing waste granite and grinded V.C. scraps in the body formulation for sanitary ware makes possible, without affecting the quality of final product, to obtain the following benefits:

- **Reduction of production costs**
- **Less exploitation of natural resources**
- **Reduction of C02 emission**
- **Speeding up of firing cycle**

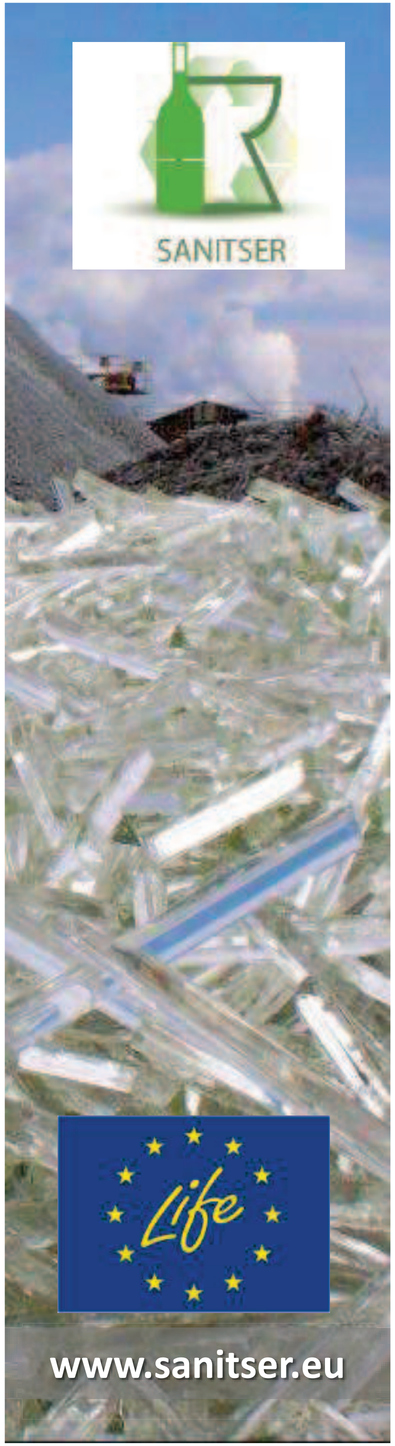
25 Settembre 2014 - Tecnargilla

Project: LIFE12 ENV/IT/001095

SANITSER

SANITaryware production: use of waste glass for Saving Energy and Resources

Life+ Projects : technological innovation as industrial development opportunity



Projects Co-financed

By the European Union

LIFE+ Programme

2006 – 2013

Minerali industriali S.r.l.

and sister companies

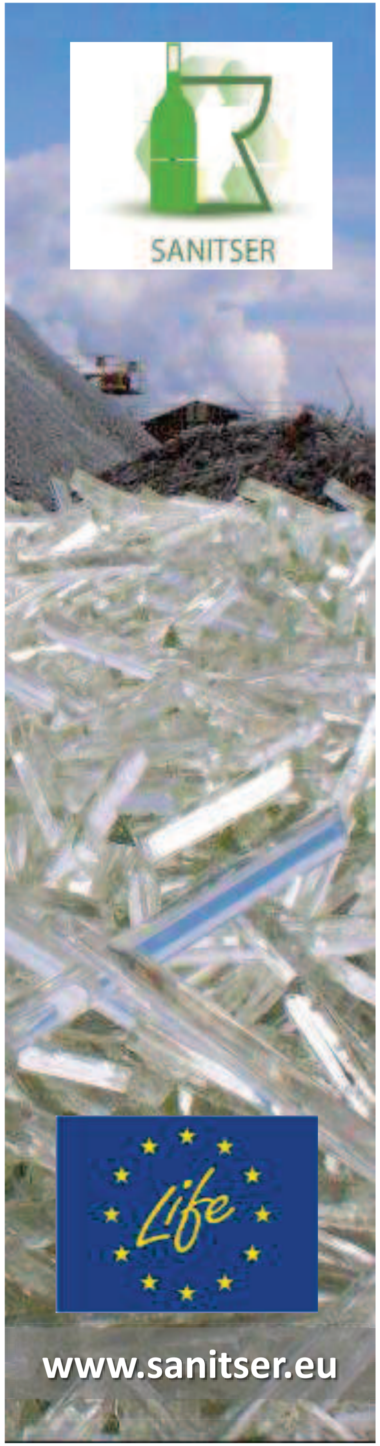
MINERALI INDUSTRIALI

Life

SASIL

MEIGLASS - LIFE06 ENV/IT/332
NOVEDI - LIFE07 ENV/IT/361
VALIRE – LIFE08 ENV/IT/00421
SASIES - LIFE10 ENV/IT/346
UNIZEO - LIFE10 ENV/IT/347
FRELP - LIFE12 ENV/IT/000904
SANITSER - LIFE12 ENV/IT/001095

SANITSER
www.sanitser.eu
SASIL
RESEARCH PRODUCTION ENVIRONMENT
JOANNEUM RESEARCH
Period: 2006-2009
Coordinator: SASIL S.p.A
Partner: JOANNEUM RESEARCH
MINIMISING ENVIRONMENT IMPACT GLASS LANDFILLED ACHIEVEMENT SAVING SUPPLY
MEIGLASS
LIFE+ ENVIRONMENT N° 332/06
NORD ITALY GLASS
SEPARATED COLLECTION OF GLASS
1.000.000 tons
PRIMARY RECOVERY UNITS
PLASTIC 2,5 % 25.000 ton
METALS 2,5 % 25.000 ton
REJECTS 20 % 200.000 tons
GLASS 75 % 750.000 tons
RESEARCH
RESEARCH & DEVELOPMENT
INNOVATIVE TECHNOLOGY FOR TREATMENT AND THE USE OF ALL COMPONENTS PRESENT IN WASTE
PRODUCTION
SASIL PRODUCTION PLANT
WATER TREATMENT
DRY TREATMENT
PLASTIC TREATMENT
PLASTIC PYROLYSIS
obtaining OIL and GAS
COGENERATION TURBINE
160.000 tons/year
GLASSWARE
equal to 400million of bottles
25.000 tons/year
CERAMICS
equal to 1 million of m²
10.000 tons/year
BRICKS
equal to 1.000 "100mq" housing
ENVIRONMENT
• DECLINING CO₂ EMISSIONS
to around 54.000 ton/year as a result of LOWER ENERGY REQUIRED for melting recycled glass instead of raw materials → equal to the emissions of 33.000 cars for 1 year to 15.000 km/year
• REDUCTION OF THE USE OF RAW MATERIAL
replaced by recovered glass and therefore LOWER MINING → equal to some 10.000 m² of quarry area covered by about 1.000 forest trees
• IMPROVING ENERGY EFFICIENCY
through the full recovery of heat and electricity by the COGENERATION turbine → equal to the annual consumption of 10.000 housing
... and all that, until 2005, went to landfill!
Sasil S.p.A. – reg. Dosso – 13862 Brusnengo – BI – tel 015-985261 – fax 015-985980 – www.sasil-life.com



SASIL
RESEARCH PRODUCTION ENVIRONMENT

Provincia di Biella

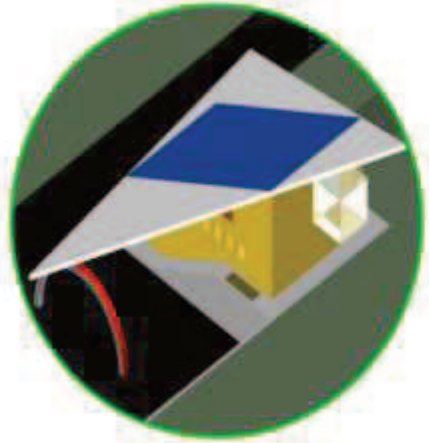
NOVEDI Project

NO VEtro in DIscarica

From GLASS destined to landfill
through the production of an INNOVATIVE material
to the realization of a ECO-SUSTAINABLE building

NOVEDI
NOVEtro
inDIscarica

FOAM GLASS



START PRODUCTS
(currently delivered to landfill)

Mosaic glass, artistic glass,
glass from TV screens, Lamps, Textile Fiber
glass, Solar and photovoltaic panels

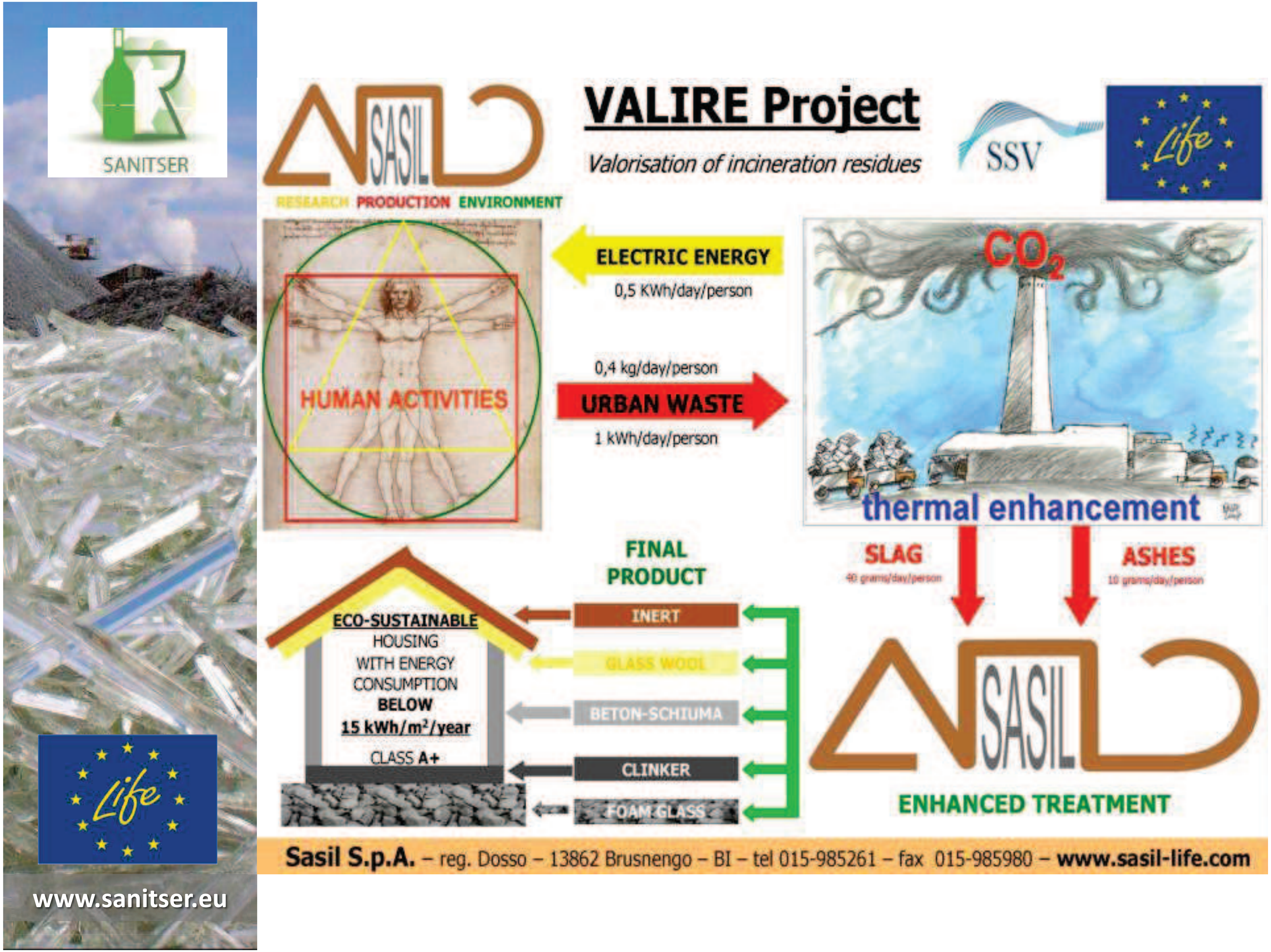
FINAL PRODUCT
FOAM GLASS

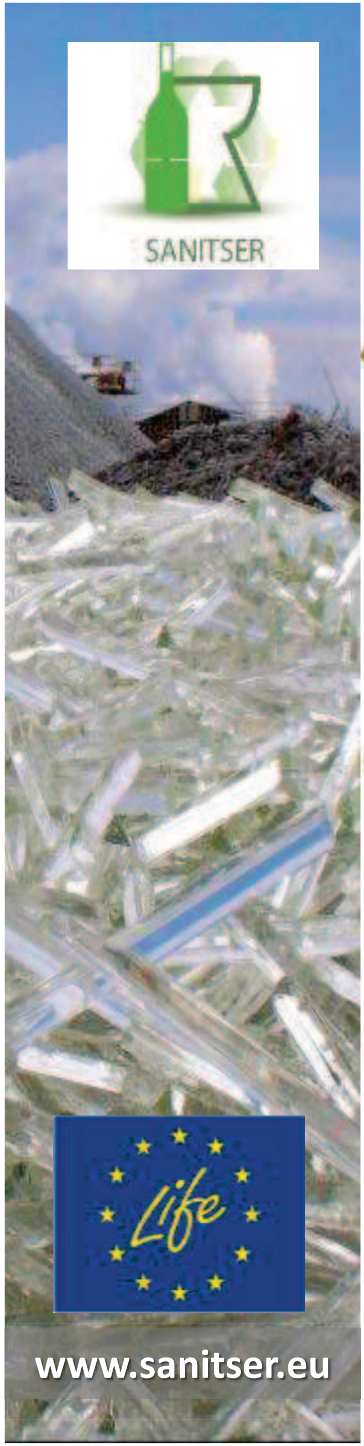
- Low Density
- High mechanical strength
- High resistance to fire
- Low thermal transmissivity

END USED

Production of lightweight concrete with high insulating power for the construction of environmentally sustainable buildings

Sasil S.p.A. – reg. Dosso – 13862 Brusnengo – BI – tel 015-985261 – fax 015-985980 – **www.sasil-life.com**


SANITSER
www.sanitser.eu
SASIL
RESEARCH PRODUCTION ENVIRONMENT
VALIRE Project
Valorisation of incineration residues
SSV
Life
ELECTRIC ENERGY
0,5 KWh/day/person
HUMAN ACTIVITIES
0,4 kg/day/person
URBAN WASTE
1 kWh/day/person
CO_2
thermal enhancement
SLAG
40 grams/day/person
ASHES
10 grams/day/person
FINAL PRODUCT
INERT
GLASS WOOL
BETON-SCHIUMA
CLINKER
FOAM GLASS
ECO-SUSTAINABLE HOUSING WITH ENERGY CONSUMPTION BELOW 15 kWh/m²/year
CLASS A+
SASIL
ENHANCED TREATMENT
Sasil S.p.A. – reg. Dosso – 13862 Brusnengo – BI – tel 015-985261 – fax 015-985980 – www.sasil-life.com



SASIL
RESEARCH PRODUCTION ENVIRONMENT

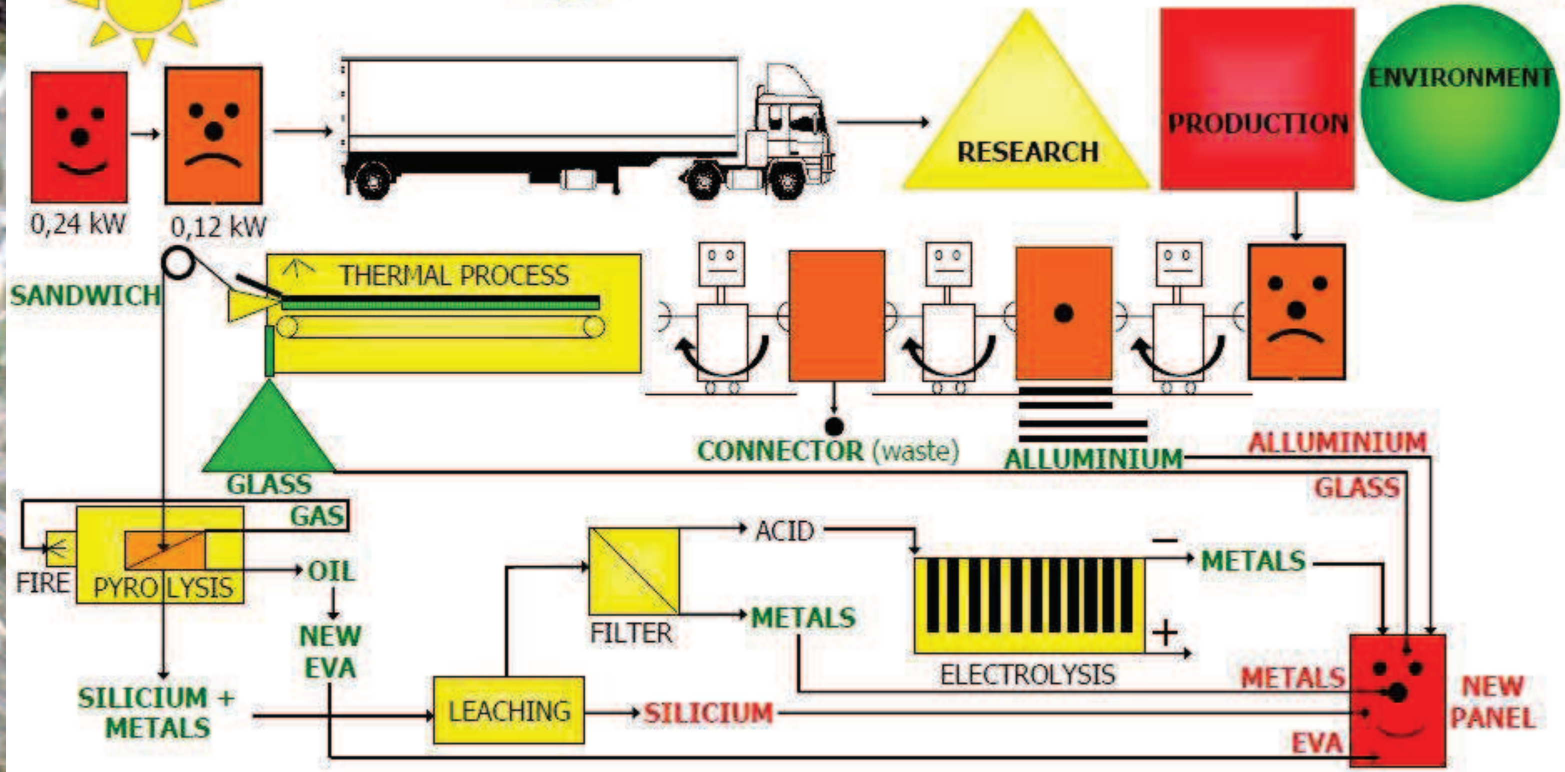
SSV

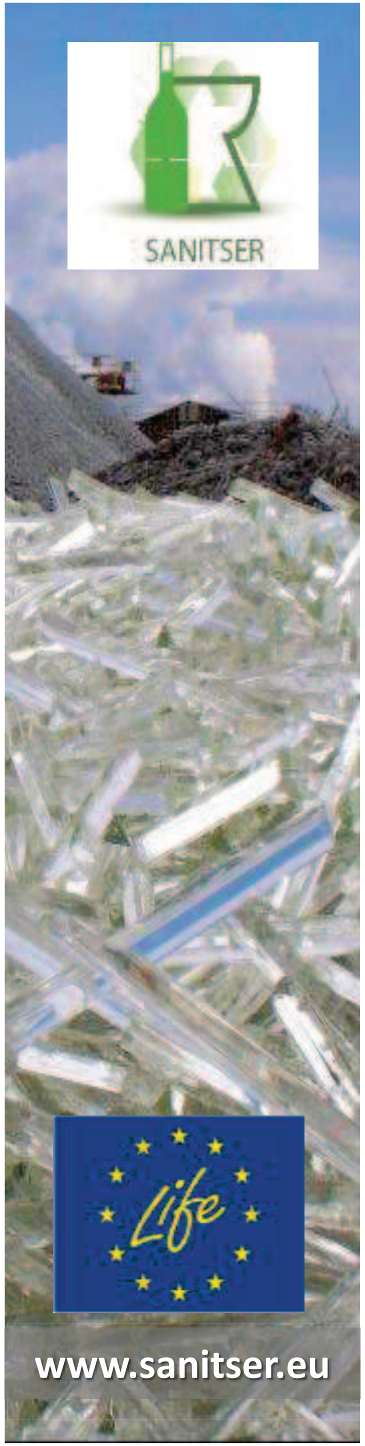
PV CYCLE

FRELP Project

Full Recovery End of Life Photovoltaic

Project LIFE+ 2012
ENV/IT/000904/12





Project LIFE10 ENV/IT/347 «UNIZEO»

« Urea-based nitrogenous fertilizers coated with zeolite: reducing drastically pollution due to nitrogen »

Coordinating beneficiary: **Minerali Industriali S.r.l.**

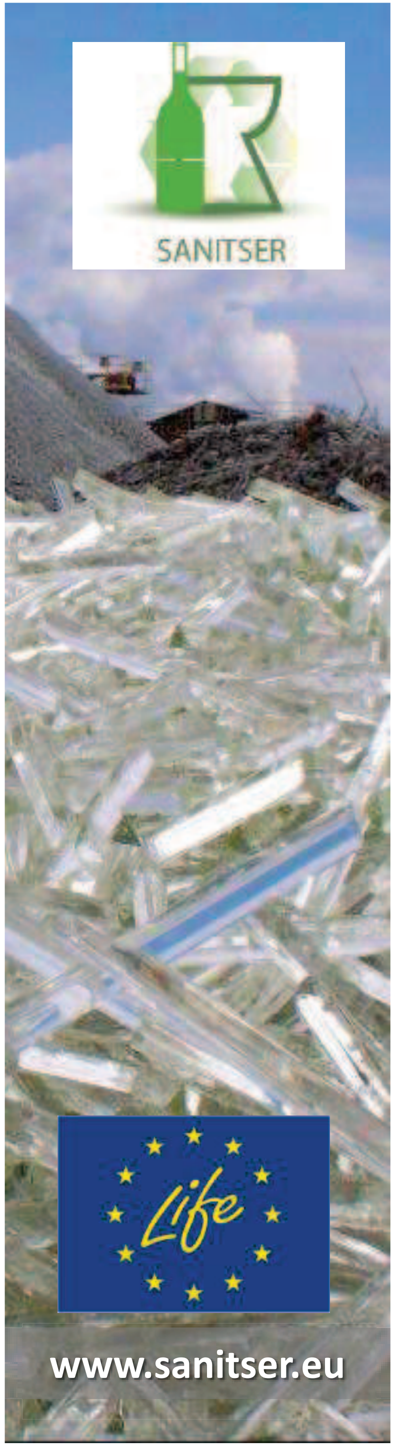
Associated beneficiary: **Medilabor di Odore Dott. Carlo**

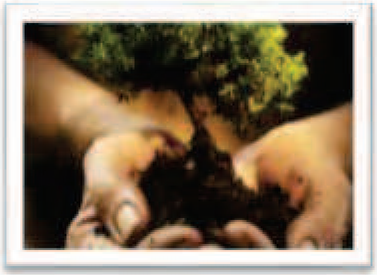
Main objectives and expected results :

• Functioning pilot plant with a production capacity of **1000 ton** per year;
• Granules of urea-based fertilizer coated with Zeolitite tested in agricultural lots and one golf course in **total 2500 Ha;**
• **Reduction of needed urea in the tested farmland with 30-40%**
• Drastic **reduction of nitrates** in groundwater and aquifers **and nitrogen** (ammonia) in air;
• **45%-50% of reduction of loss of nitrogen in atmosphere and leaching;**
• **Crop yield in the test lots increase** with respect to that produced with the normal chemical fertilizers;
• Increased knowledge and awareness amongst target group of growers on water and air pollution by nitrates and the advantage of the new product.

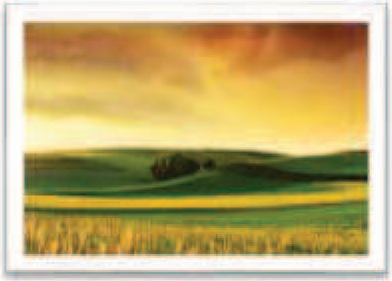
UNIZEO

www.unizeo.eu





Reduction of the waste currently destined for landfill



Landscape protection

Reduction of CO_2 emission and energy consumpton

Project: LIFE10 ENV/IT/346 « SASIES »

'Sludges from agglomerated stones industry for environmental sustainability (acronym SASIES)'

Objectives and expected results:

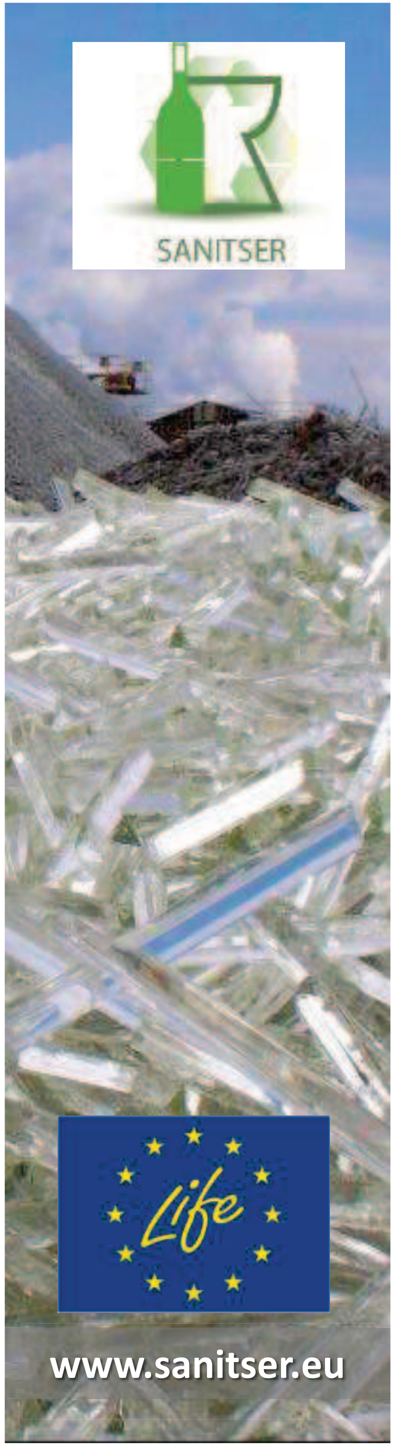
• Proven possibility of recycling the entire amount of sludges that come from the processing of siliceous and carbonate agglomerated stones, reducing waste going to landfill, which is currently **345,000 tons at a European level**;

• Saving more than **75% CO_2 emissions** in the processing and disposal of waste;

• Effective recycling of stone sludges from agglomerated stones production, reducing the need to dig raw materials. Reduction of the current costs for waste disposal.

santamargherita

MINERALI INDUSTRIALI



SANITSER

Sanitaryware production: use of waste glass for saving energy and resources

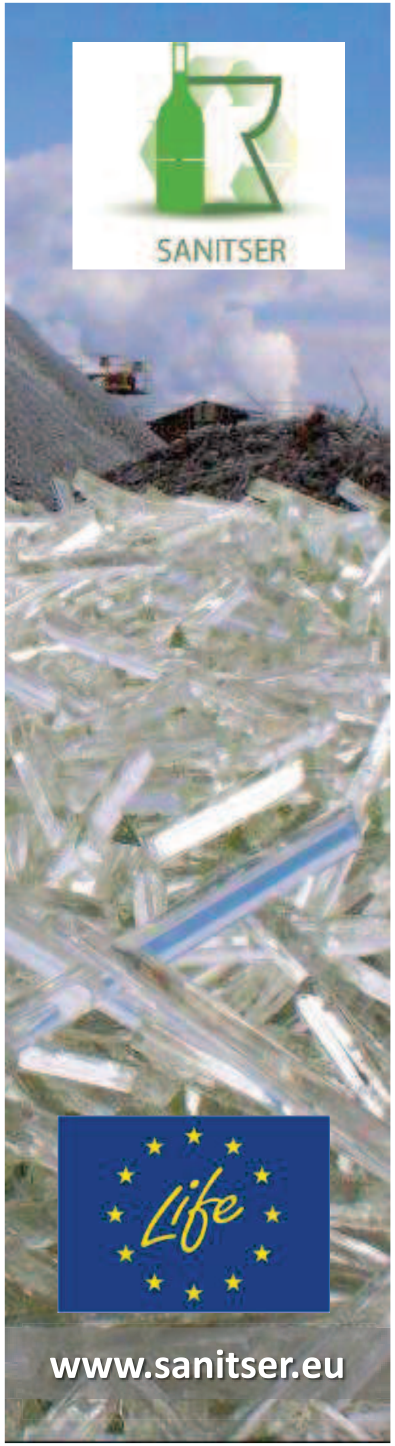
www.sanitser.eu

Coordinating beneficiary: Minerali Industriali S.r.l.

Associated beneficiaries: G.E.M.I.C.A. S.r.l.
Life Cycle Engeneering
SE.TE.C. S.r.l.

Main objective:

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.

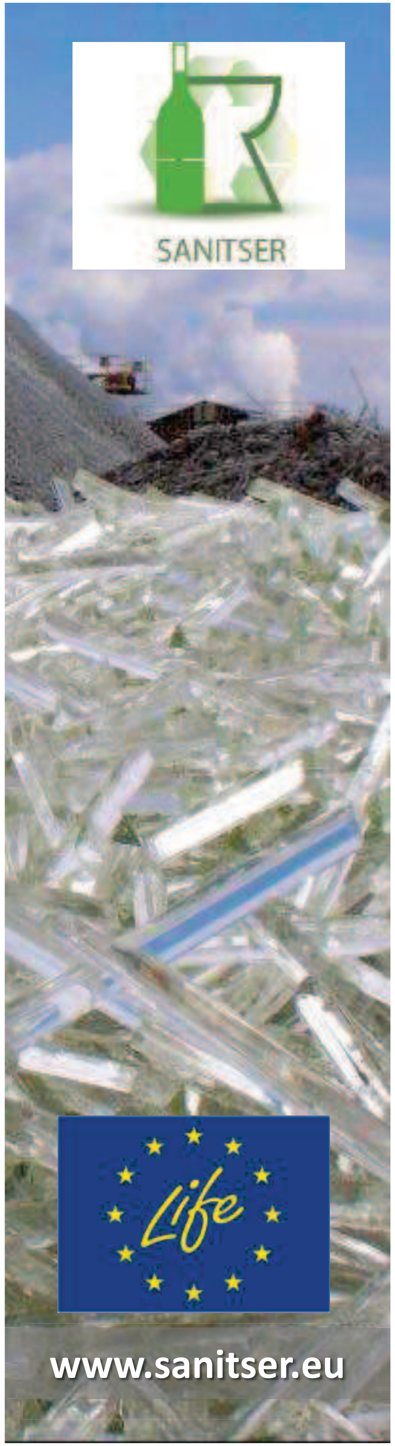


EARLIER STUDIES

Use of processed glass cullet waste in ceramic is supported by the following reasons:

- Chemical compatibility of soda lime glass and vitreous sanitaryware ceramics, since both are characterized by Na_2O and CaO, acting as main fluxes [M. Dondi, T. Manfredini et al, 1995];
- Abundance of glass phase (50-65%) in the output products [M. Dondi et al., 1999; G. Baldi et al., 2001]: soda lime glass is already a glass phase and contributes both to obtain the dominant amorphous phase in vitreous sanitaryware ceramics and to change the sintering process shifting it to lower temperatures-shorter times than the traditional one;
- Flexibility of VSW-making process, wich renders it possible to mix glass with other raw materials without modifying significantly the manufacturing cycle [G. Baldi et al., 2001; A. Moreno et al.,2000; A. Brusa et al., 1999]

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.



EARLIER STUDIES

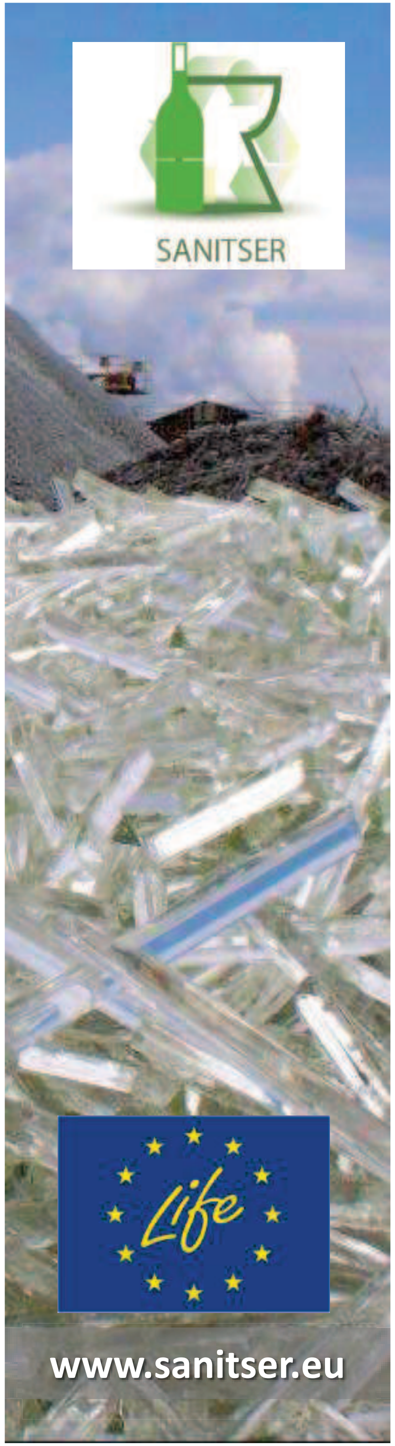
This study has considered three main aspects:

1 - how SLG affects the sanitary-ware ceramic transformations at high temperature, in terms of mullite nucleation and growth, to mark the effects of activation energy reduction and to pose the basis for a successive determination of optimal firing time and temperature;
2 - how far SLG influences the technological properties of the final product, as a function of time and temperature;
3 - how SLG-bearing slips, properly adjusted to warrant processability, transform upon firing, in terms of final phases.

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



Main actions:

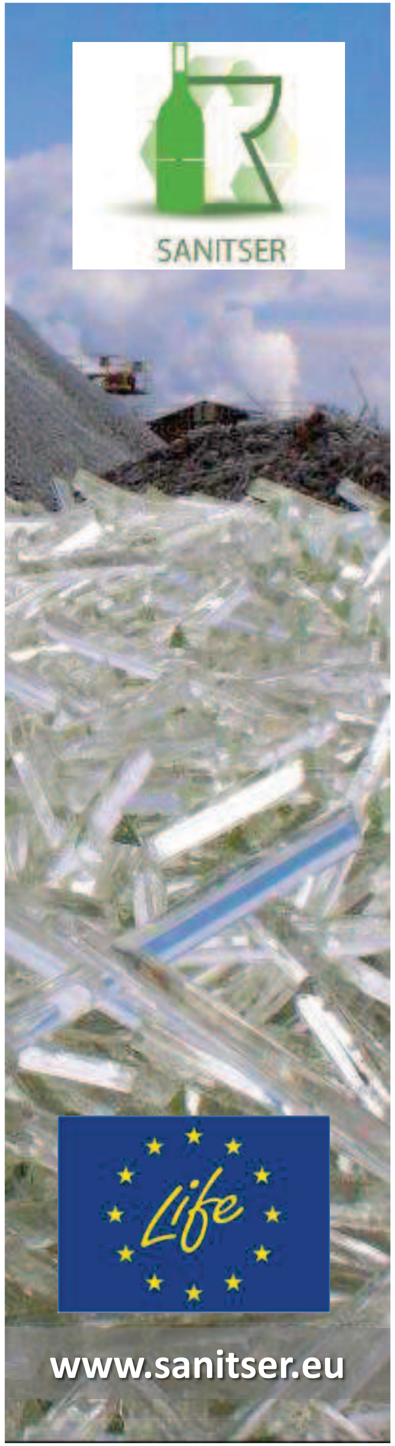
- Definition of new formulations for slips bearing SLG and of production processes using the modified firing time-temperature cycles at lower temperature;
- Glaze composition revision in the light of new firing time - temperature cycles;
- Determination of environmental impact parameters (Life Cycle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

Expected results:

SAVED PRIMARY RESOURCES: 40-50%

SAVED ENERGY: 16-18%

SANITSER



RAW MATERIALS INVOLVED IN TESTING

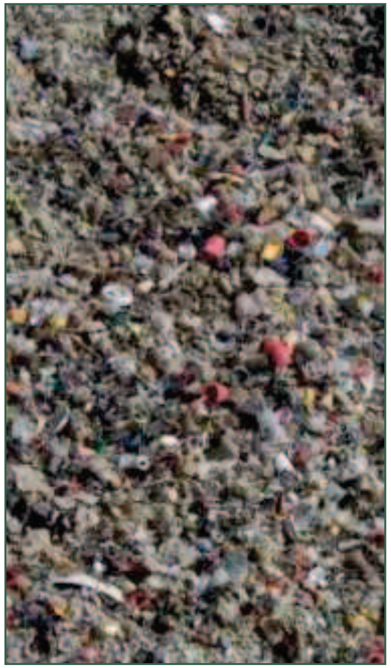
Re-use of recycled products and production waste for ceramic industry

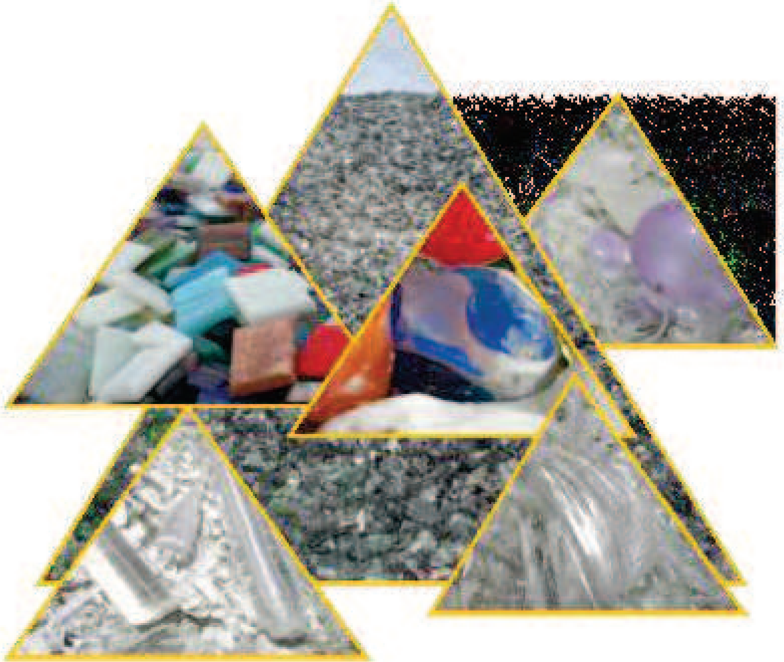
GLASS CULLET WASTE FROM URBAN WASTE DISPOSAL: 100% RECYCLED POST CONSUMER

As definied on section 7.8.1.1 c, UNI EN ISO 14021

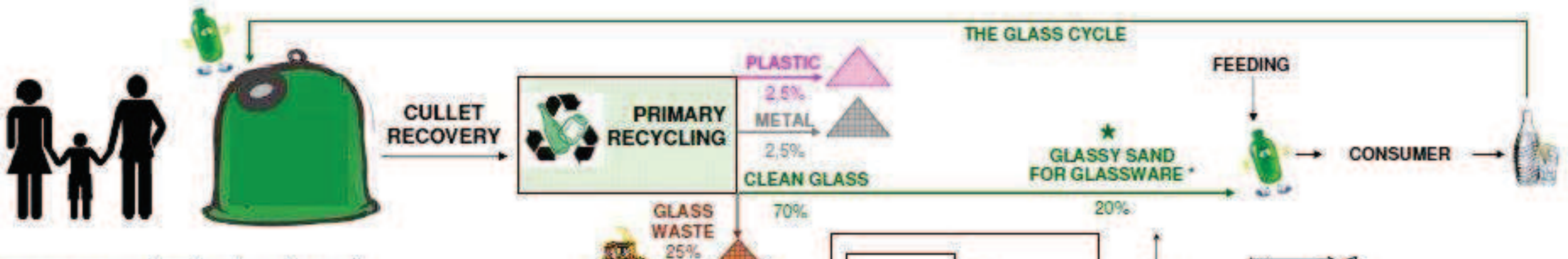
SPECIAL GLASSES FOR GLAZE (tv monitor, lamp, neon, boric glass): 100% RECYCLED PRE and POST CONSUMER

As definied on section 7.8.1.1 c, UNI EN ISO 14021

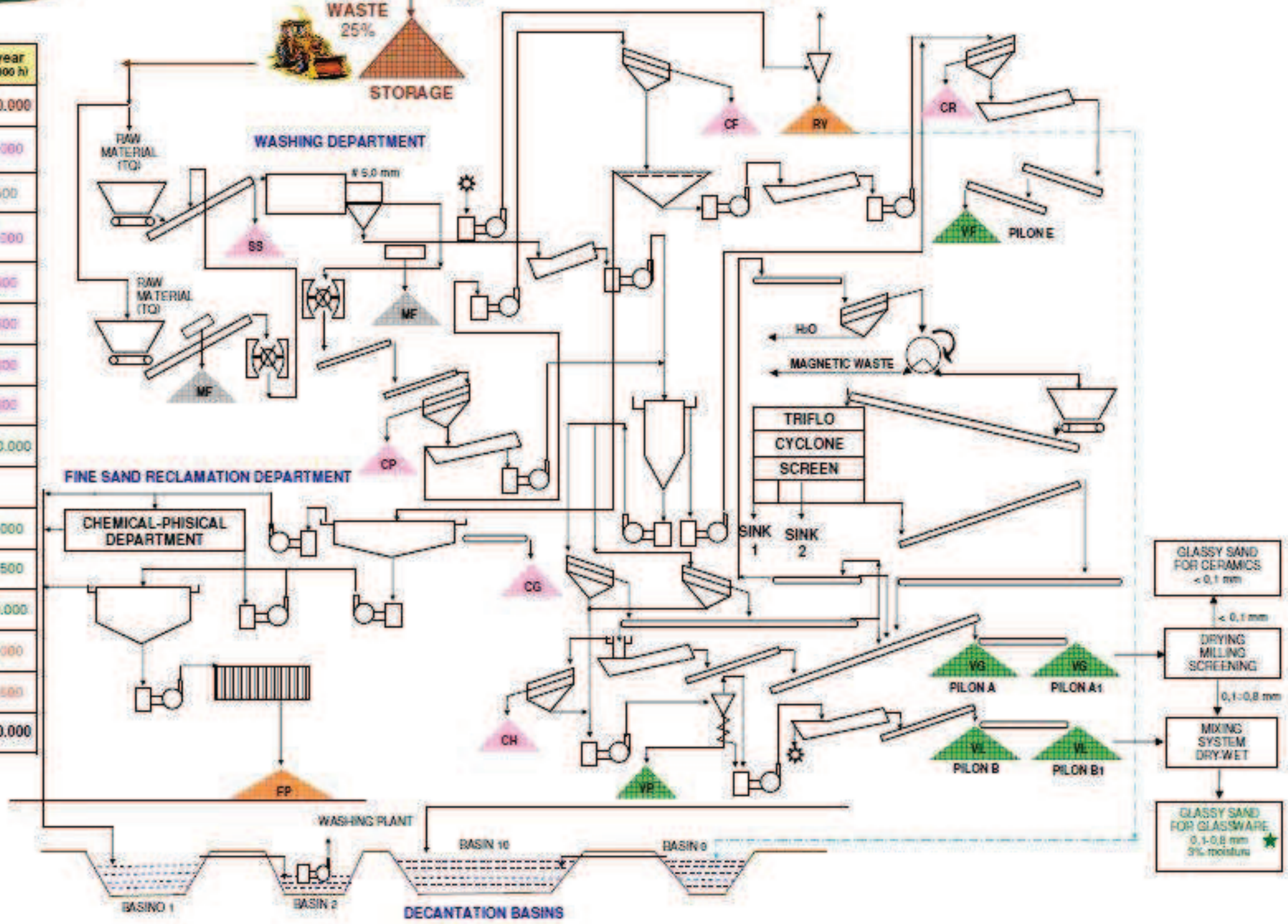




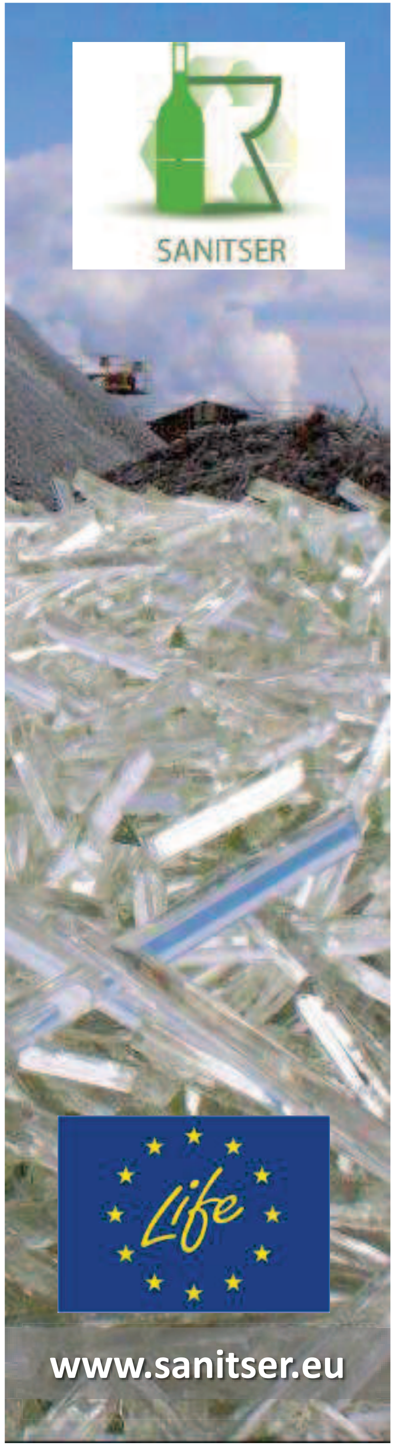
Vetro GS - 100% Riciclato "post consumer" - Schema di processo



	TYPE MATERIAL	%	t/h	kg/h	t/year (6.000 h)
TG	RAW MATERIAL	100	40		200.000
SS	UP SCREEN WASTE (glass + ceramic – recycle)	3,0	1,2	1200	6.000
MF	FERROUS MATERIAL	0,25	0,10	100	500
CP	CORK – PAPER – PLASTIC – ALLUMINUM - GLASS	2,5	1,0	1000	5.000
CF	FINE PAPER and GLASS	0,25	0,10	100	500
CG	FLOATING PAPER	0,15	0,06	60	300
CR	REWLIM PAPER + GLASS	0,15	0,06	60	300
CH	HYDROVETRO PAPER + GLASS	0,15	0,06	60	300
VG	COARSE GLASS	50	20		100.000
VM	MILLED GLASS		/		
VF	FINE GLASS	4	1,6		8.000
VP	SPIRAL HEAVY GLASS	1,25	0,5		2.500
VL	LIGHT GLASS	35	14		70.000
FP	FILTERPRESSED MATERIAL	2,5	1,0	1.000	5.000
RV	VARIOUS RECOVERY	0,8	0,30	320	1.600
	TOTAL	100	40	3.900	200.000



SASIL S.p.A. - Brusnengo
FLOW SHEET
GLASS WASHING PLANT

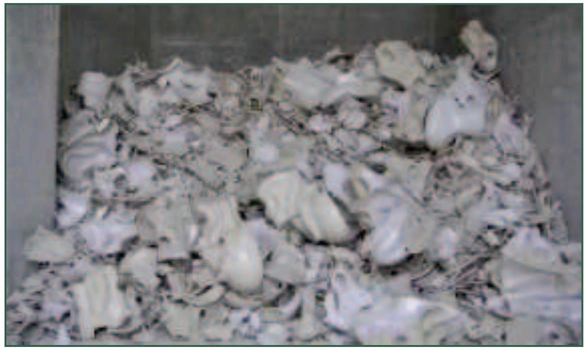


RAW MATERIALS INVOLVED IN TESTING

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

CERAMIC PITCHER: 100% RECYCLED PRE CONSUMER

As definied on section 7.8.1.1 c, UNI EN ISO 14021

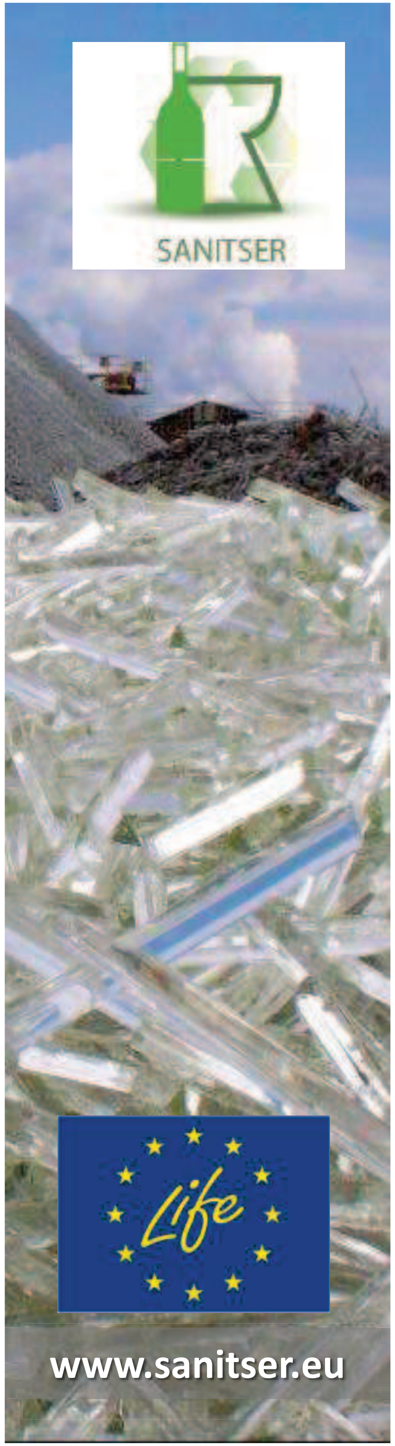


Ceramic pitcher BVC – vitreous china

Ceramic pitcher BFC – Fire clay

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.



RAW MATERIALS INVOLVED IN TESTING

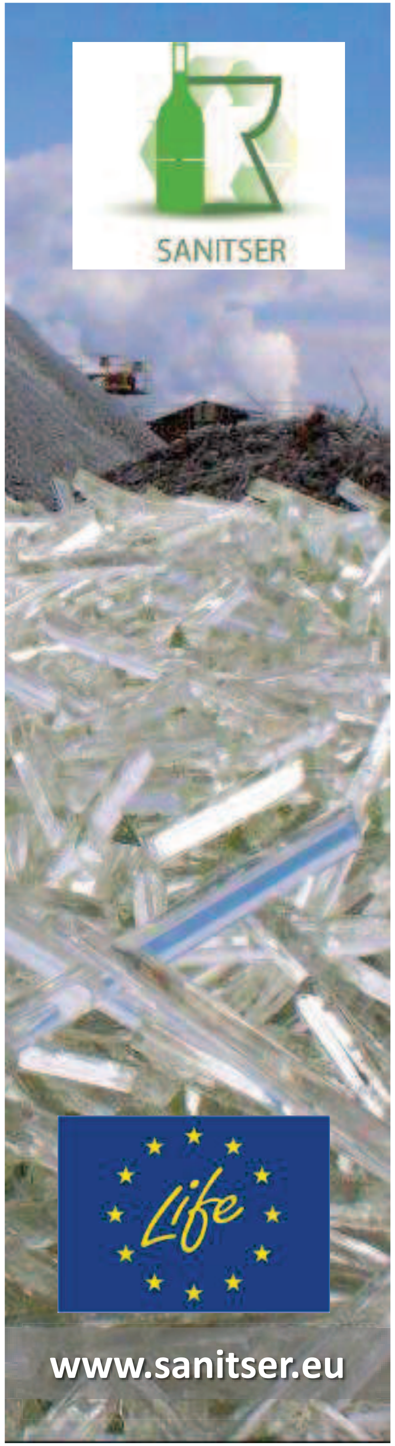
Re-use of recycled products and production waste for ceramic industry

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.



RAW MATERIALS INVOLVED IN TESTING

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

Glass cullet +

Ceramic pitcher +

F60PB

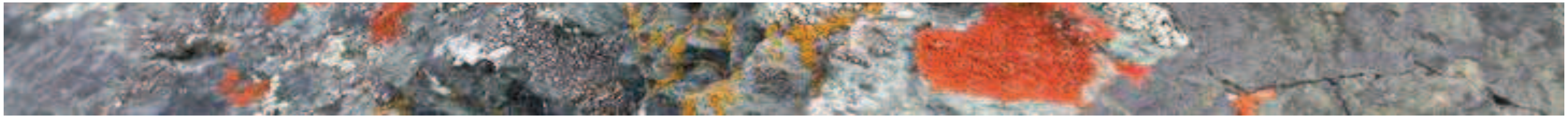
HARD MATERIAL COMPONENT

H.M.C.

Realization of a dedicated line for the integrated treatment of glass cullet + ceramic pitcher + granit

SANITSER

Thank you



Sanitary ware production: use of waste glass for saving energy and resources

SANITSER

Assunta FILARETO, Life Cycle Engineering

TECNARGILLA - 25th September 2014 -

SETEC Group

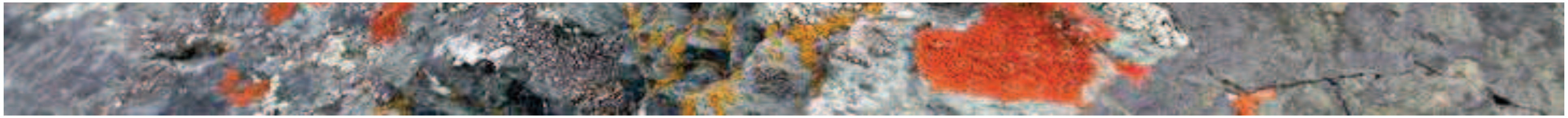
VICENTINI

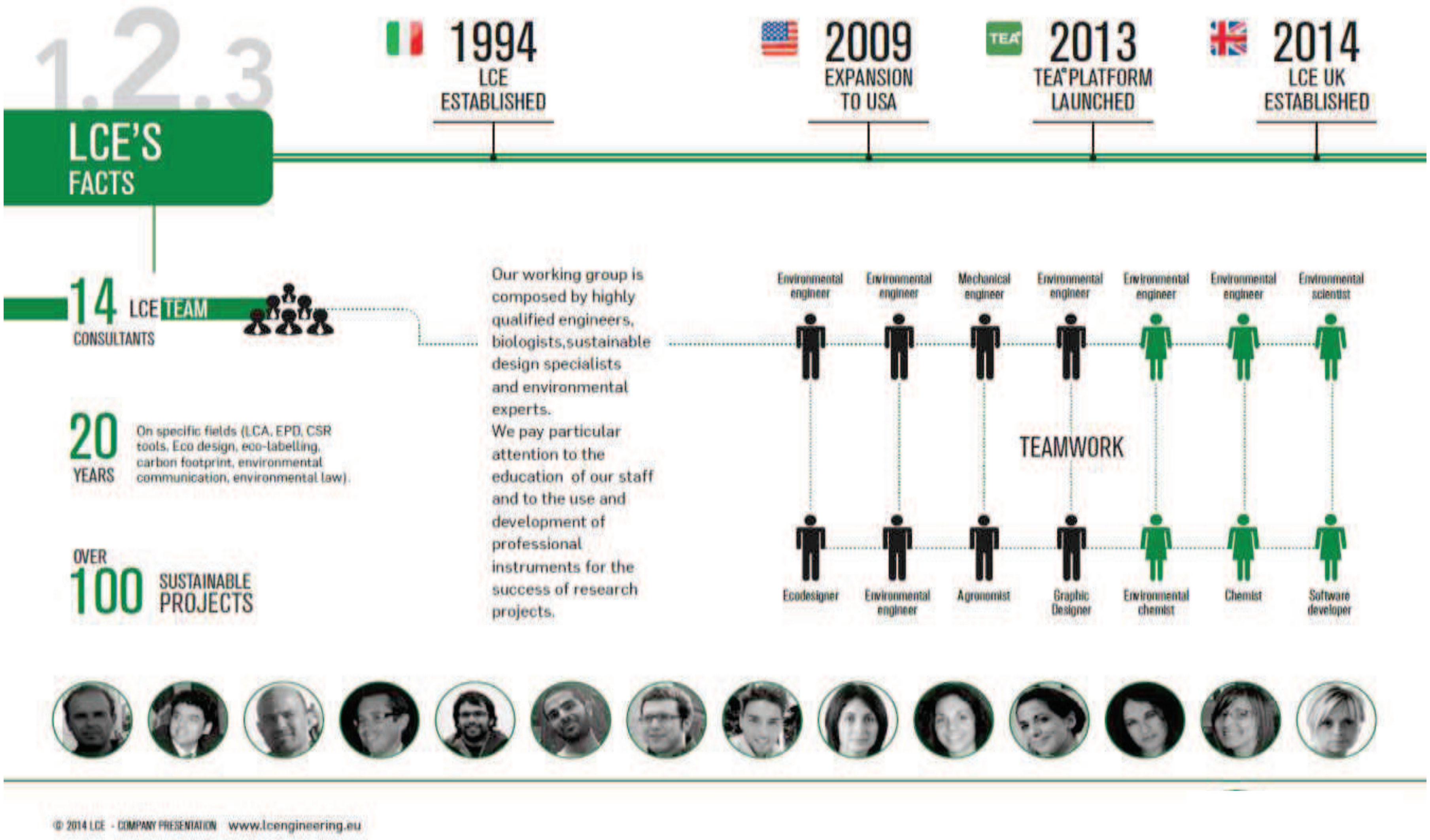
IPEG

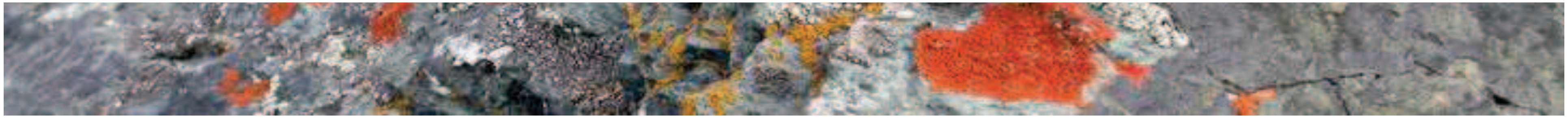
MINERALI INDUSTRIALI

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

LIFE CYCLE ENGINEERING




1.2.3
LCE'S FACTS
1994 LCE ESTABLISHED
2009 EXPANSION TO USA
TEA
2013 TEA® PLATFORM LAUNCHED
2014 LCE UK ESTABLISHED
14 CONSULTANTS LCE TEAM
20 YEARS On specific fields (LCA, EPD, CSR tools, Eco design, eco-labelling, carbon footprint, environmental communication, environmental law).
OVER 100 SUSTAINABLE PROJECTS
Our working group is composed by highly qualified engineers, biologists, sustainable design specialists and environmental experts. We pay particular attention to the education of our staff and to the use and development of professional instruments for the success of research projects.
Environmental engineer
Environmental engineer
Mechanical engineer
Environmental engineer
Environmental engineer
Environmental engineer
Environmental scientist
TEAMWORK
Ecodesigner
Environmental engineer
Agronomist
Graphic Designer
Environmental chemist
Chemist
Software developer
© 2014 LCE - COMPANY PRESENTATION www.lcengineering.eu



WHERE WE ARE AND WHERE WE WORK

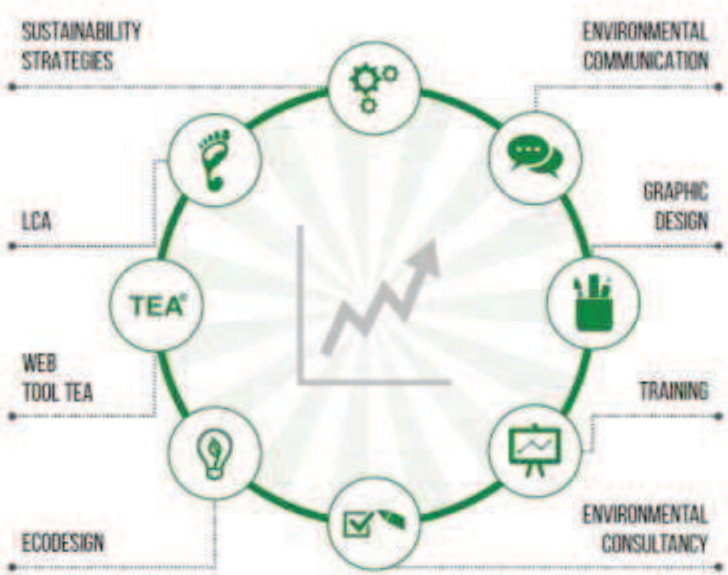
Headquarters
Life Cycle Engineering
C/O Environment Park
Via Livorno, 60 - 10144
Torino - Italy

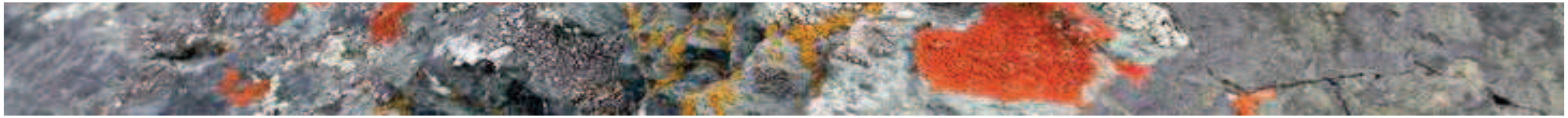
Venice Office
Life Cycle Engineering
Via Roma, 29/A
31021 - Mogliano Veneto
Treviso - Italy

Life Cycle Engineering
UK limited
NOTTINGHAM Newstead
House, Pelham Road
Nottingham, UK NG5 1AP

www.lcengineering.eu
info@lcengineering.eu

LIFE CYCLE ENGINEERING
we support your sustainable business





LCE role in the project

Dissemination activities: www.sanitser.eu

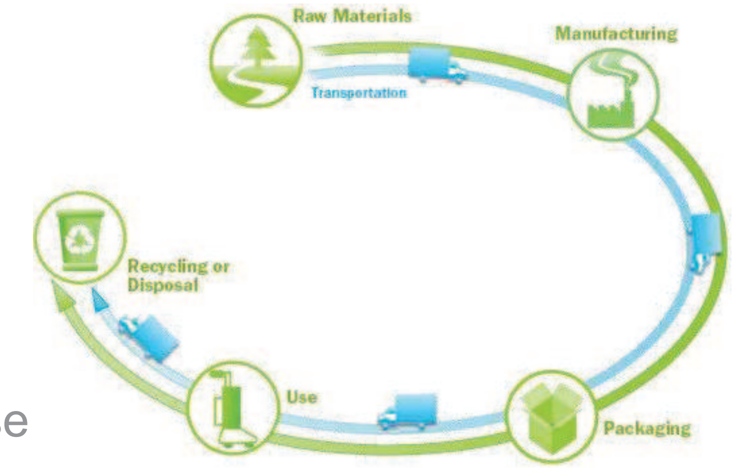
LCE role in the project

Evaluation of environmental, social and economic performances of two systems for sanitary ware production:

1. **Traditional** system
2. **Innovative** system: introduction of relevant amount of glass cullet waste (from urban waste disposal) in the ceramic blends formulations instead of virgin materials

life cycle assessment (LCA), life cycle costing (LCC) and social LCA will be adopted

- **Scientific** methodologies
- Regulated by **ISO Standards**
- Supply chain taken into consideration from raw materials production to final product delivery, use and end of life scenarios



LCE role in the project

A customized Web tool for data collection and calculation is designed and developed

1. Qualitative and quantitative **data collection** for LCA, SLCA, LCC purposes → **On-line questionnaire** for each partner involved in the project
2. Evaluation of **environmental, social and economic performances** for each process involved (raw materials extraction, blends formulations, etc.) → **Performances** of raw materials formulations, glazes and pilot plant
3. Evaluation of **environmental, social and economic performances** for the produced sanitary ware → **Performances** of each sanitary ware produced

WEBTOOL – Environmental data collection

LEVEL 0: **Webtool analysis and environmental data collection**

LEVEL 1

Database (DB)

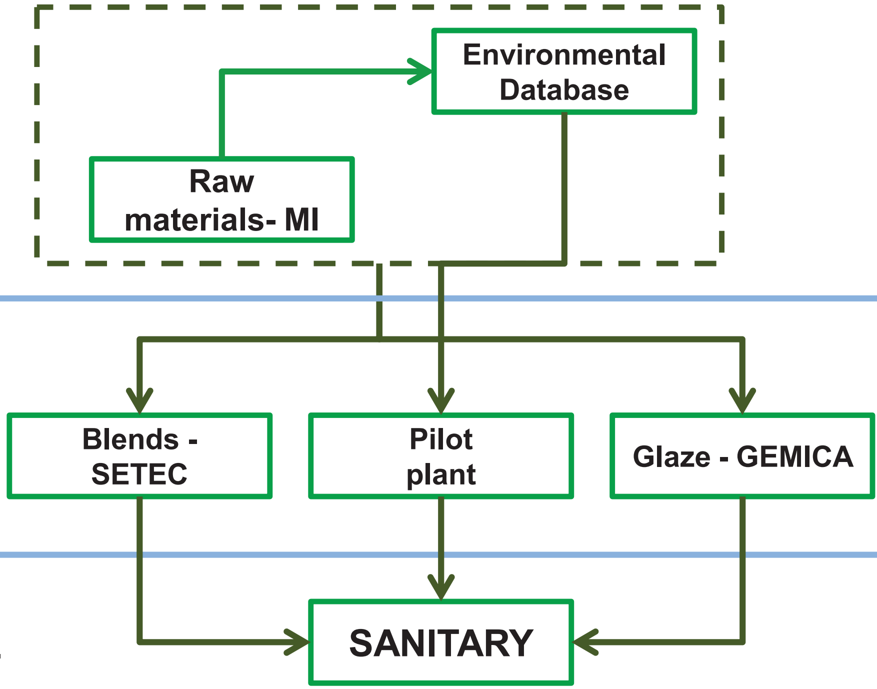
User that provides data about raw materials

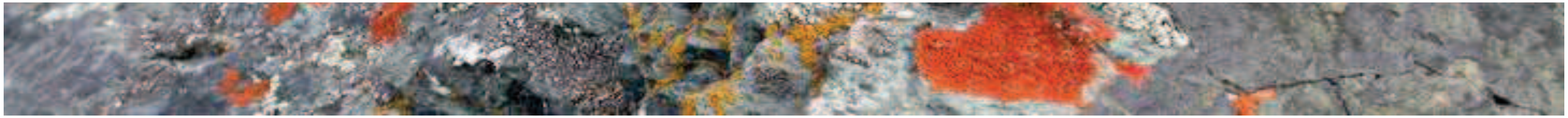
LEVEL 2

User who enters data related to mixture, pilot plant and glaze.

LEVEL 3

Admin SANITSER brings together info about mixture, glazes and plant.



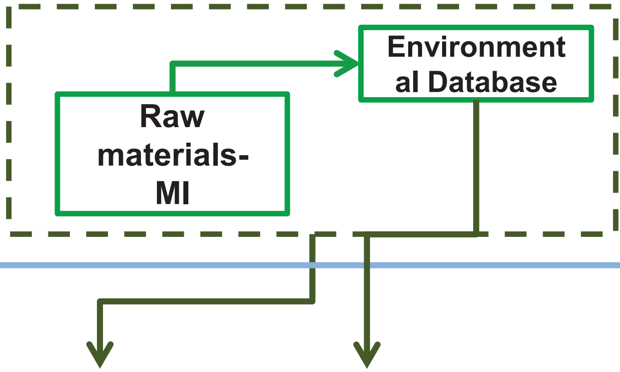


WEBTOOL – Environmental data collection

LEVEL 1

Database (DB)

User that powers the DB relative to raw materials

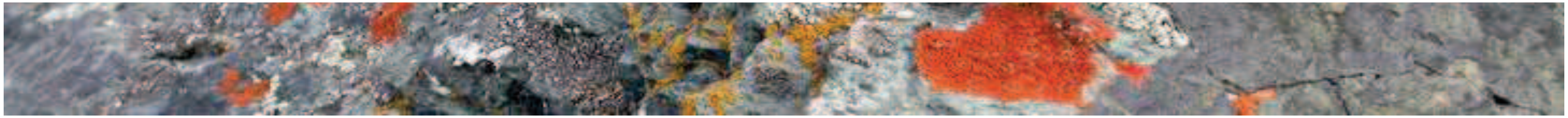


Data collection - Materials

MATERIAL | ENERGY | EMISSIONS | TRANSPORTS | WASTE

NAME	amount	udm	note
KAOLIN		kg	
CHALK		kg	
GLASS for RECYCLING		kg	
QUARTZ		kg	

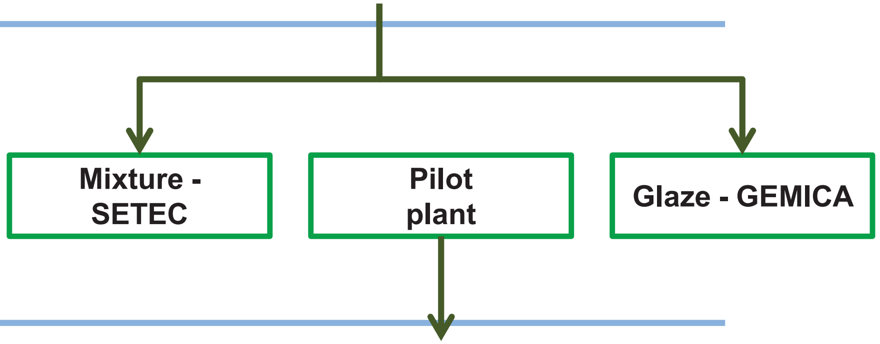
SAVE SEND



WEBTOOL – Environmental data collection

LEVEL 2

User who enters data related to mixture, pilot plant and glaze.

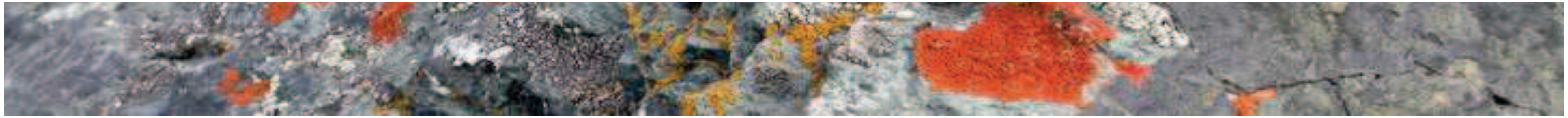


Data collection - Energy

MATERIAL | ENERGY | EMISSIONS | TRANSPORTS | WASTE

NAME	amount	udm	note
ELECTRICITY ITALY		kWh	
METHANE		nm3	
DIESEL		l	
WATER WELL		l	
WATER SUPPLY		l	

SAVE SEND



WEBTOOL – Environmental data collection

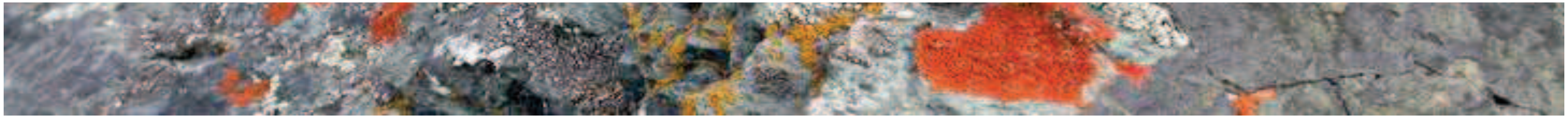
LEVEL 3

Admin SANITSER brings together info about mixture, glazes and plant

REPORT

Risults per kg

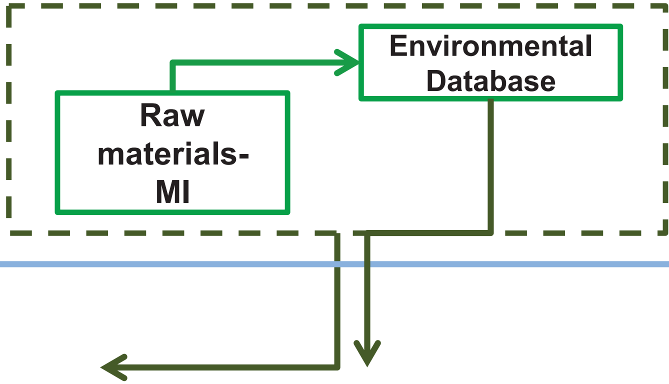
TOTALE	GWP	GER	BLU WATER	Raw material saved	Hazardous waste	Not Hazardous waste
	[kg CO2eq]	[MJ]	[litri]	[kg]	[kg]	[kg]
ENERGY						
MATERIALS						
EMISSIONS						
WASTE						
TRANSPORTS						
TOTALE	GWP	GER	BLU WATER	Raw material saved	Hazardous waste	Not Hazardous waste
CALCOLI TOT	[kg CO2eq]	[MJ]	[litri]	[kg]	[kg]	[kg]



WEBTOOL – Environmental data collection

LEVEL 3

Admin SANITSER brings together info about mixture, glazes and plant.



REPORT SANITARY

Environmental indicator: GER

TYPE RECIPE	ELETRICTY [MJ]	METHANE [MJ]	DIESEL [MJ]	]WATER SUPPLY [MJ]	WATER WELL [MJ]	GER [MJ]
RECIPE SANITARY 1						
RECIPE SANITARY 2						
RECIPE SANITARY 3						
RECIPE SANITARY 4						

Life Cycle Engineering – Torino, Italy

This presentation has been prepared by Life Cycle Engineering with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporating our General Terms and Conditions of business and taking account of the resources devoted to it by agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above.

In line with our environmental policy we purchase paper for documents distributed by us in print for this project only from European Eco-labelled manufacturers.

TORINO
Via Livorno, 60 - 10144 - Torino - Italy
Tel +39 011 225.73.11 - Fax +39 011 225.73.19
e-mail: info@studiolce.it

MOGLIANO VENETO
Via Roma, 29/A - 31021 - Mogliano Veneto - Treviso - Italy
Tel +39 041 8220684 - Fax +39 011 225.73.19
e-mail: info@studiolce.it

3. List of Participants

www.sanitser.eu

SANITSER

Tecnoargilla, Rimini, 25/09/2014

NAME	AZIENDA	FIRMA
ELISABETTA MARTINI	SETEC SRL	Elisabetta Martini
ANTONIO FORTUNA	SETEC SRL	
ASSUNTA FILARETO	LCE	Assunta Filareto
BALDO GIANLUCA	LCE	
CARLO VISENTIN	ESARC	
Eugenio SALVAIA	Minerali Industriali	E Salvaia
MASSIMO LAGRIMANTI	SETEC	
LEONARDO FORTUNA	SETEC	
SAURO RENZICCHI	SETEC	
SAVORGNANO MARCELLO	CALIL	
GERTRAUD VANLEIJEN	consul. MI	
DANIELA TABACCHI	Minerali Industriali	Daniela Tabacchi
MARCO CALCAGNI	SETEC SRL	
GINO MOLINARI	SETEC SRL	Gino Molinari
ROBERTO ANSELMI ~~MATTIA D'AGOSTINI~~	SETECMX	
MATTIA D'AGOSTINI	SETEC srl	
CAN TORMAN	LIK CAST	
ANTONIO	MIBAS	

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

www.sanitser.eu

SANITSER

Tecnoargilla, Rimini, 25/09/2014

NAME	AZIENDA	FIRMA
[illegible]	[illegible]	[illegible]
SERGIO VITALI	CERAMICA ANDINA	[illegible]
DANIELE REBECCHI	NETZSCH	[illegible]
HUSEYIN KARA	OPTIMAL	[illegible]
MICHELE TESOLIN	/	[illegible]
MECCHI ENRICO		[illegible]
MARCO CENCIONI	GALASSIA spa	[illegible]
MAURO RAVAZZINI	REM	[illegible]
CORRADO RACCHI	REM	[illegible]

MINERALI INDUSTRIALI

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

SETEC Group

LC Engineering

MINERALI INDUSTRIALI Srl
Contact : Daniela Tabacchi

With the contribution of the LIFE financial instrument of

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

4. Pictures

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