



FEDERCHIMICA  
CONFINDUSTRIA

## 7th National Conference on Sustainable Chemistry

**ALLNEX ITALY S.r.l.**

***“Waste as a resource: recovery of raw materials from industrial waste water”***

Loris Rostirolla (HSE manager)



**allnex**  
The Coating Resins Company

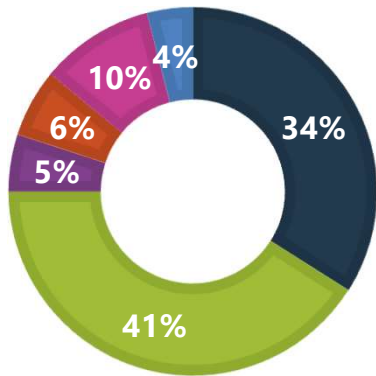
# allnex in the world



- 33 production plants, 23 research centers, 6 JVs, 4000 employees on 5 continents

# An overview of our resins for powder coatings

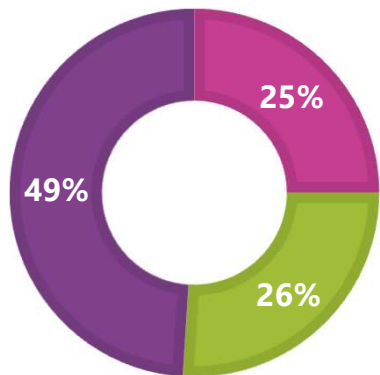
## Markets



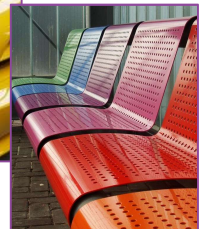
- Metals
- Aluminum extruded
- Automotive
- Agricultural, Construction and Earth movement equipment
- Domestic appliances
- Other



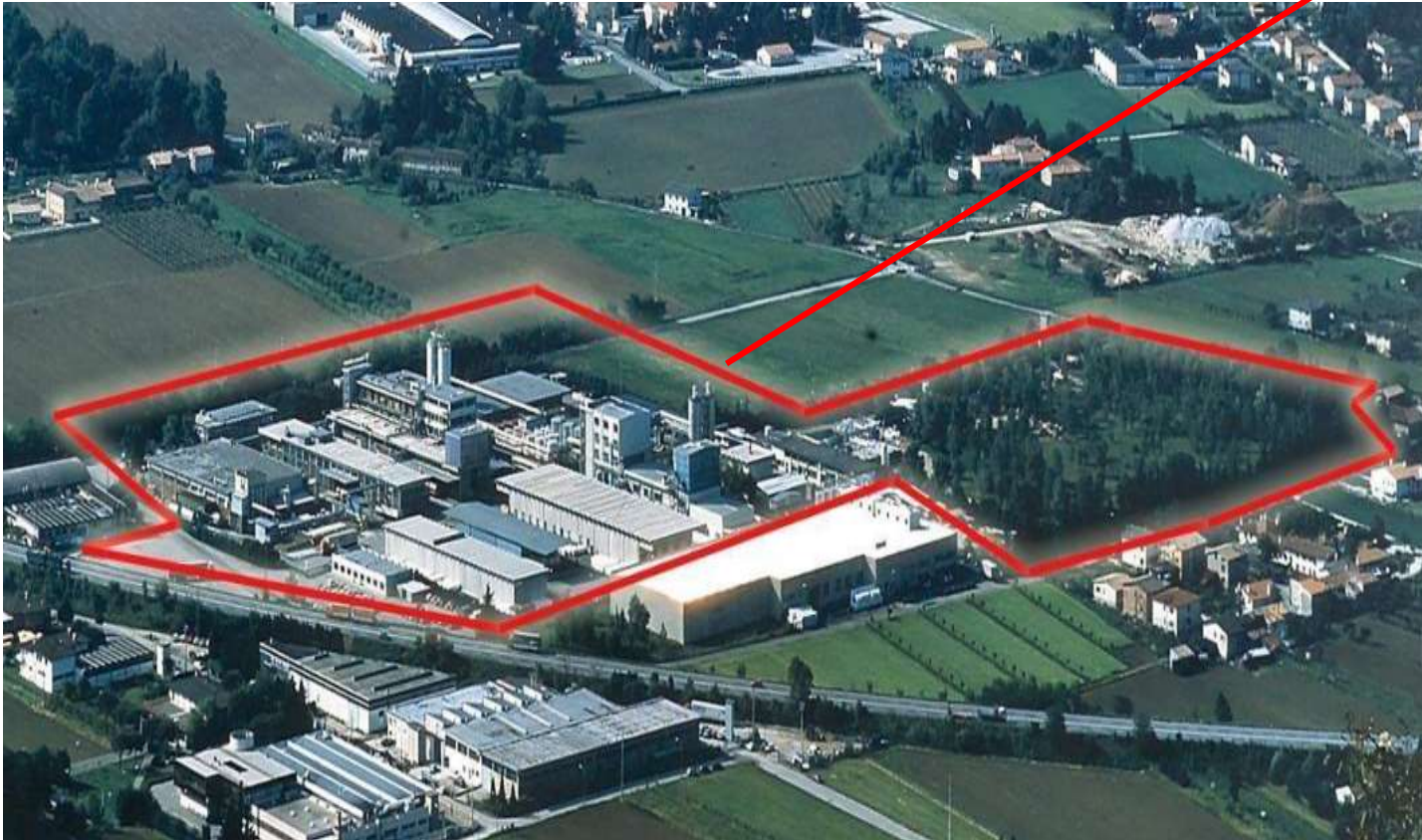
## Geographical areas



- Asia Pacific
- Americas
- Europe, Africa & Middle East (EMEA)

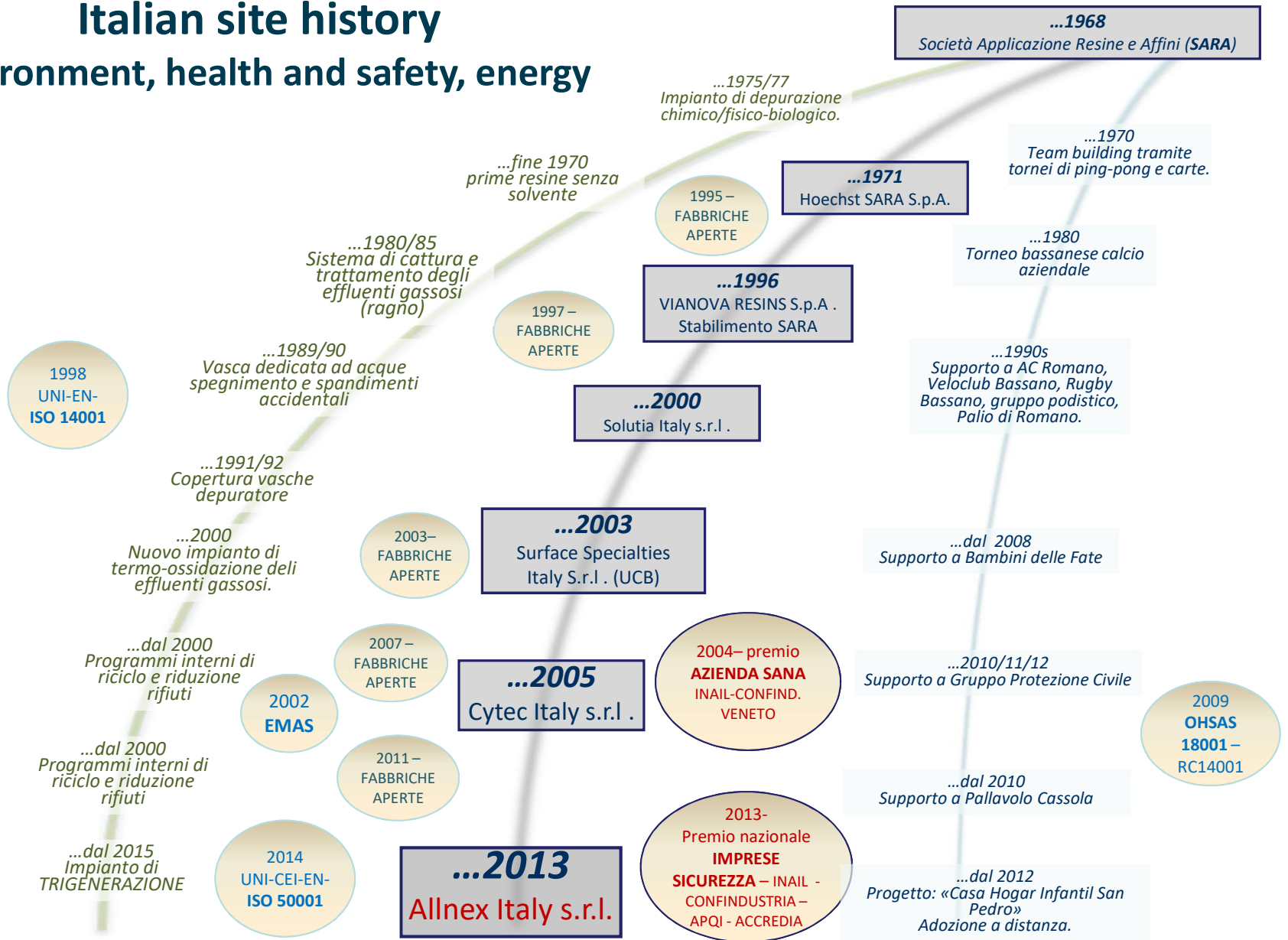


# Location: Romano d'Ezzelino, Vicenza, Italy



# Italian site history

## environment, health and safety, energy



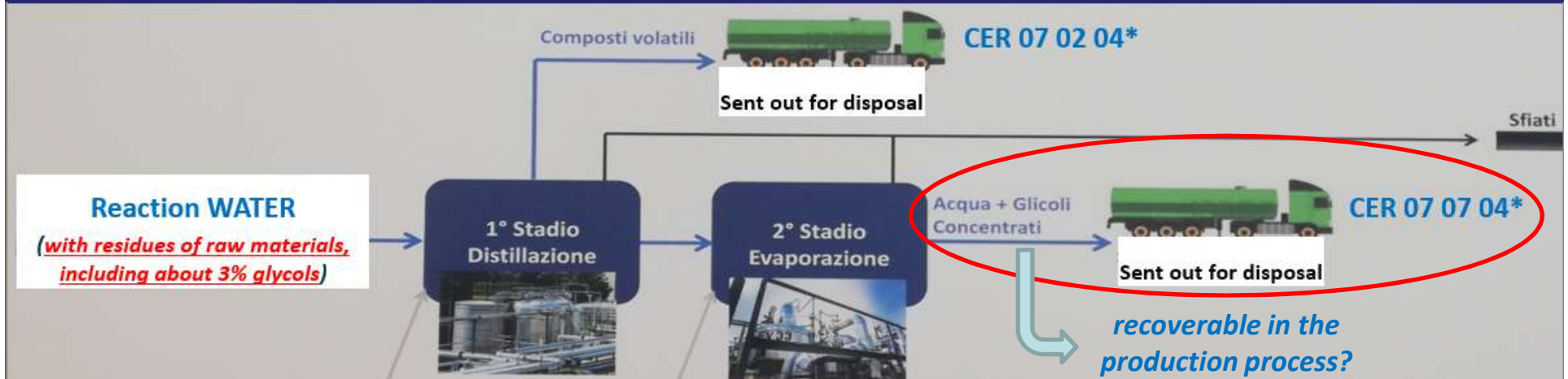
# Endothermic synthesis of polyester resin



## Reaction water pretreatment



# Opportunity: recovery of the raw material "glycols"



## Phases of project realization

RECOVERY ATTEMPTS MADE IN PREVIOUS YEARS, ABANDONED CAUSE (INDUCED) COLORING OF THE FINISHED PRODUCT

### Phase 1: STUDIES TO UNDERSTAND THE CAUSES OF (induced) COLORING OF FINISHED PRODUCT

**Conclusions:** color most likely originates from a chelation of multivalent cations with cations with phthalate anions.

**A phthalic acid/Fe complex (probably Fe III) is therefore responsible.**

This "coloring" compound could be assumed formed due to the presence, in the reaction waters, of unreacted residues of polyvalent acids (*suspended solids*) and of "Fe" present in some sections of the transfer pipes.

# segue... Fasi di realizzazione del progetto

## Phase 2: AND EVALUATION OF TECHNIQUES FOR THE REMOVAL OF THE COLORING COMPOUND

1-) **Hydrophobic Pervaporation:** Selective removal of the glycol in the vapor phase through a hydrophobic membrane.

2-) **Nanofiltration + hydrophilic pervaporation:** selective removal of impurities in the liquid phase with partial concentration and subsequent final dehydration of the product.

3-) **Removal of polyvalent acids** (*suspended solids*) and "Fe" at the origin.

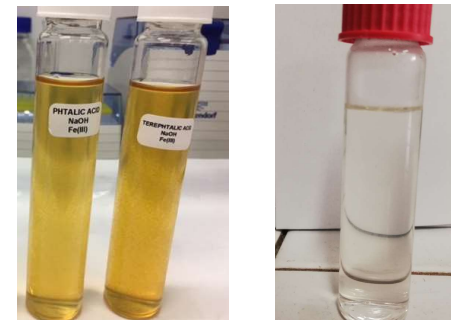
SIGNIFICANT ECONOMIC COMMITMENT  
(>250,000€)

MODERATE ECONOMIC COMMITMENT  
(<20,000€)

## Phase 3: OPTION 3 IMPLEMENTATION

1- Installation of filters in transfer lines to retain polyvalent unreacted acids (*suspended solids*).

2- Replacement of existing pipes with stainless steel pipes.



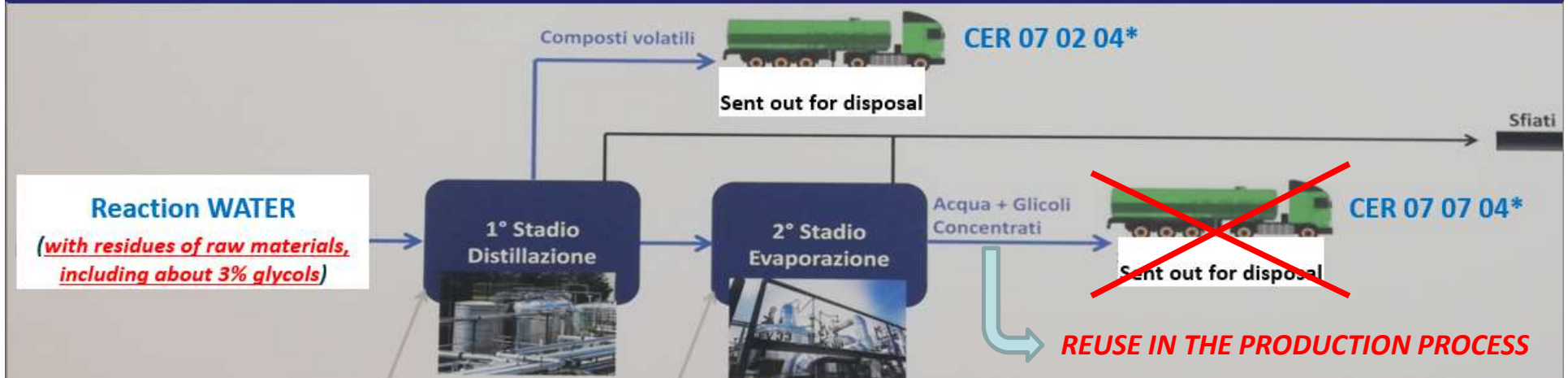
*Concentrated glycol before and after the OPTION 3 implementations*

## Phase 4: EXECUTION OF RECOVERY TEST IN PILOT PLANT AND THEN IN INDUSTRIAL BATCHES

The synthesis tests with glycol recovered from reaction waters gave positive results.



# Recupero della materia prima “glicoli”



## Benefits obtained / obtainable

**ENVIRONMENTAL IMPACT:** DECREASE OF APPROXIMATELY 1000 TONS/y OF WASTE (CER 07 0704\*)

**SAVINGS:** > 500.000€/y saved → raw material purchase + waste disposal *(no longer necessary)*

### OTHER EMERGING/CONSEQUENT OPPORTUNITIES:

the residual reaction water offers the ideal prerequisites for being able, after treatments, to be used as process water, with consequent savings of groundwater resources of approximately 50,000 m<sup>3</sup> / year.

THANKS FOR YOUR ATTENTION

