# Ruetasolv DI and LS 500 as Benzyl alcohol replacement

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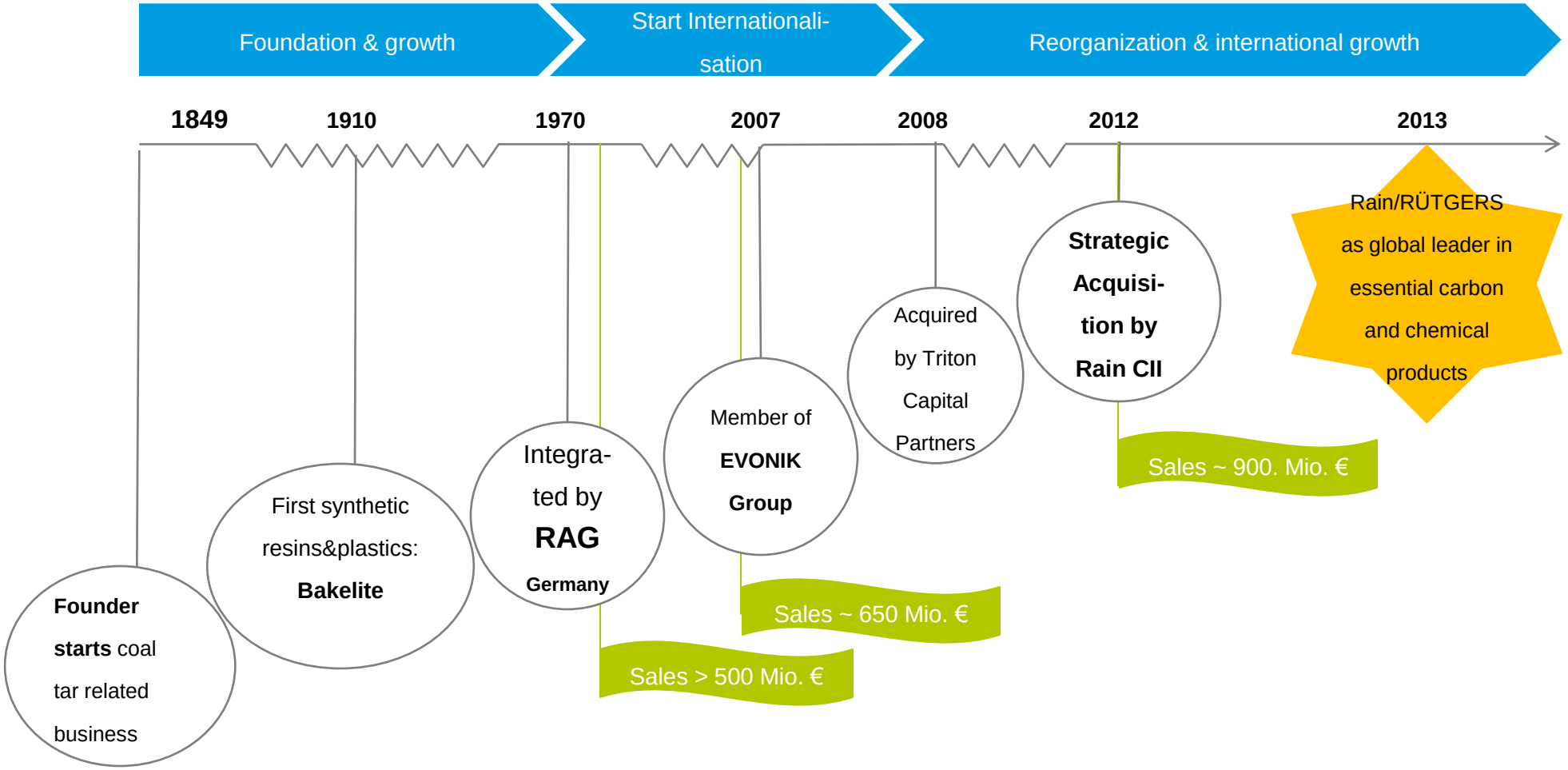
# Agenda

- Rütgers at a glance
- Chemical capability
- Fields of application in the coating area
- Benzyl alcohol replacement
  - Ruetasolv DI / LS 500 blend
  - Evaporation losses
  - Curing behavior
  - Viscosity
  - Mechanical properties
- Conclusion
- Outlook

# RÜTGERS at a glance

## More than 160 years of leadership and technical excellence



# RÜTGERS at a glance

## With new owner Rain global leader in carbon chemicals

Manufacturer of **carbon and petro based chemical** feedstock for various industries

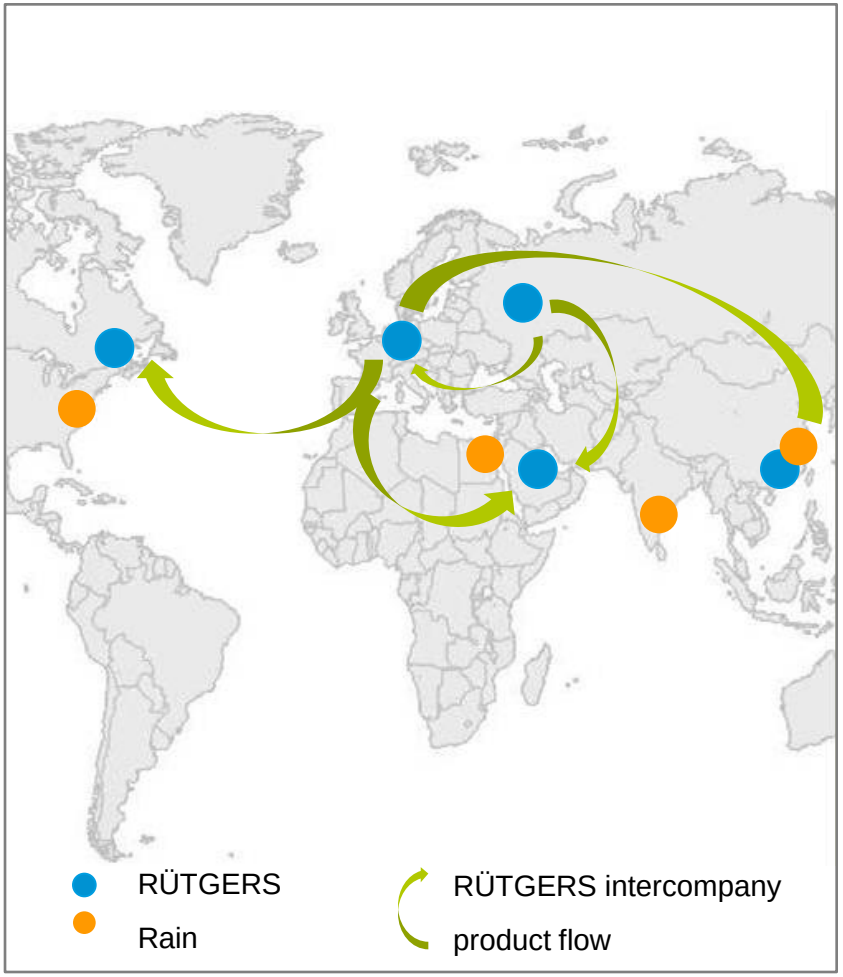
More than **160 years** of market leadership

**1200** employees, 7 languages

Annual production capacity: **1.400.000** mt

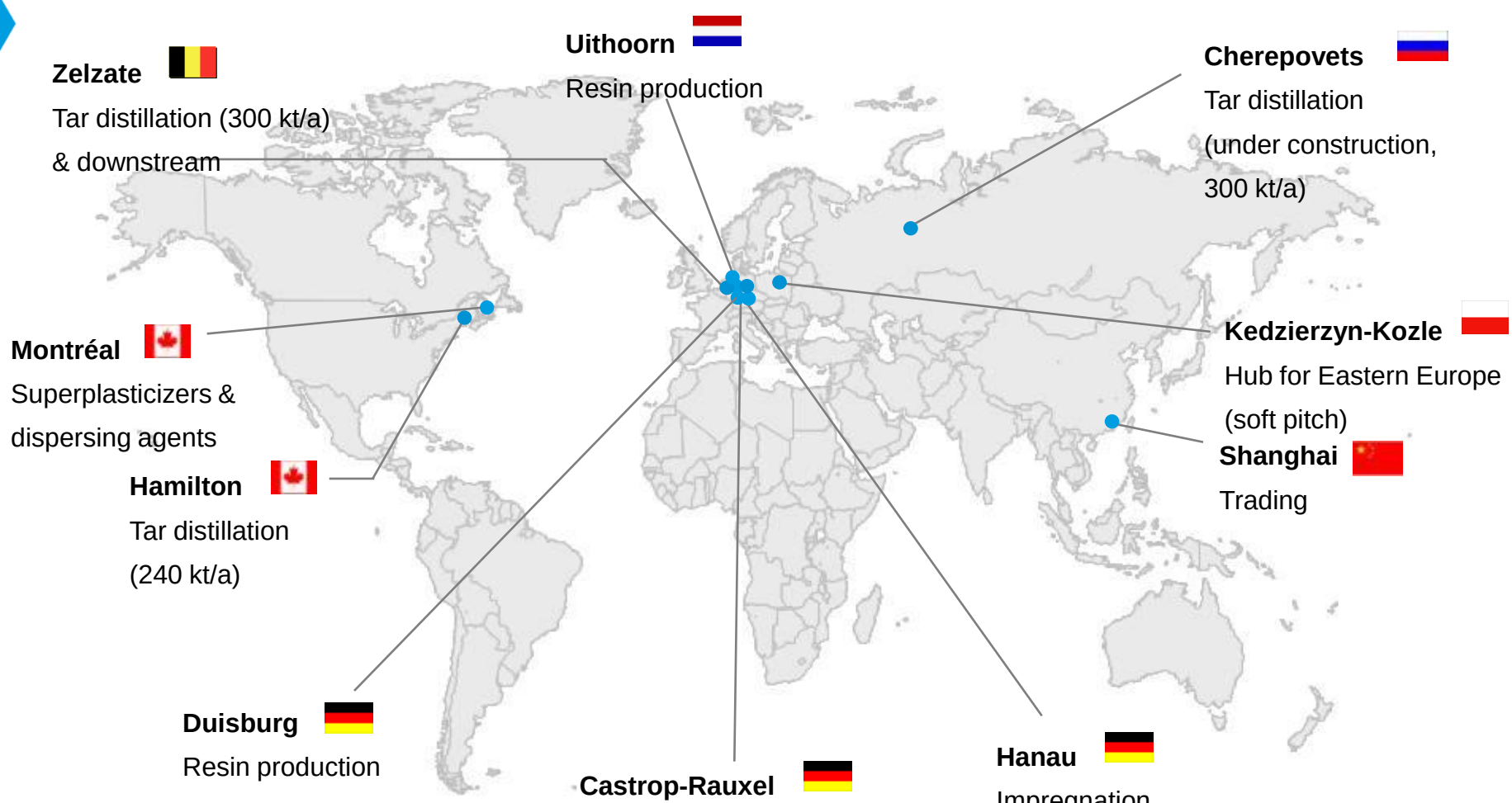
Deliverer to customers around the globe:
_ aluminum industry
_ tire industry
_ coating industry
_ automotive delivery industry
_ chemical industry
_ construction industry

Since 2013 part of Rain CII
Rain/RÜTGERS: Network of 21 locations in 9 countries on 4 continents



# RÜTGERS at a glance

## 3 coal tar distillation facilities, 6 downstream production facilities, 1 trading office




→ International, integrated and close-to-customer sites network paired with deep sea access

# RÜTGERS at a glance

## Business Line Resins and Modifiers: Overview



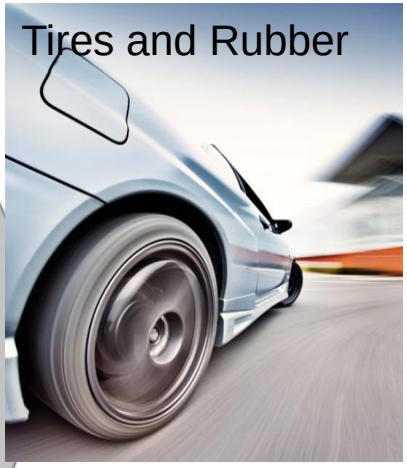
### Trade names and products

- **NOVARES®:** High performance hydrocarbon resins
- **RUETASOLV®:** Isopropylated naphthalene and biphenyl
- **NOVABOOST®, NOVADEST®:** Fuel additives, solvents
- **MULTIRES®:** Standard resins

# RÜTGERS at a glance

## Application scope of resins and modifiers



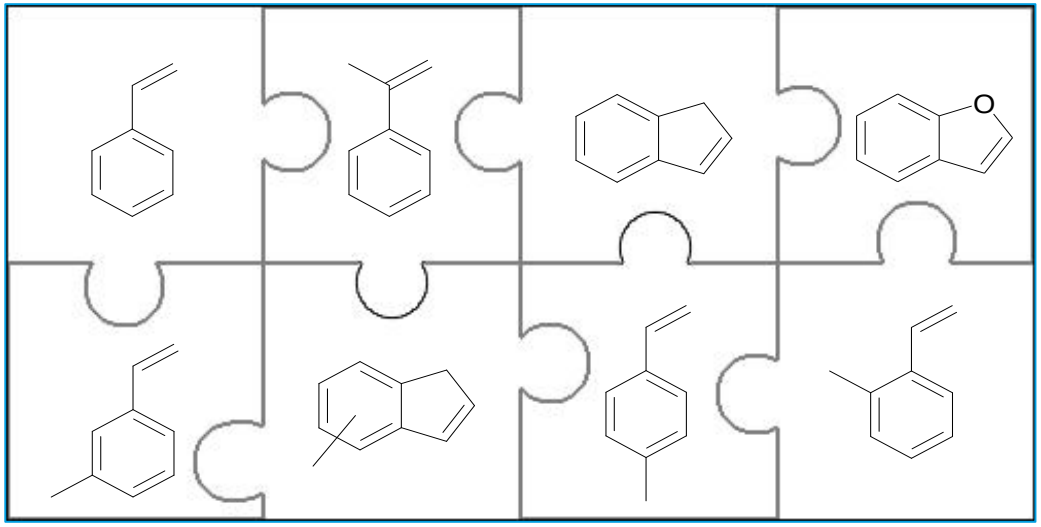



**Application scope of resins and modifiers of RÜTGERS**

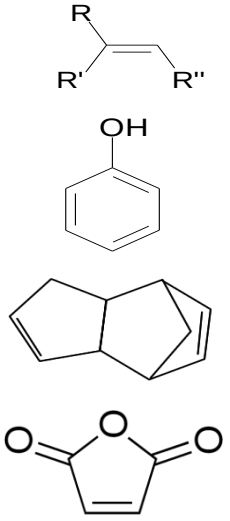

# Chemical capability

RÜTGERS Novares has the unique process to separate components of C9 feedstock into monomer enriched fractions. This allows us to deliver special products on demand, particularly when structure/performance mechanism becomes evident in applications.

**Feedstock**




**Additional reactants**



# Fields of application in Coating Area


Solvent resistance, Corrosion protection

Adhesion, Salt spray resistance

Key properties

Viscosity, Chemical resistance

Flexibility, Hydrophobicity

# Low leaching diluents

Novares LS 500 + Ruetasolv DI

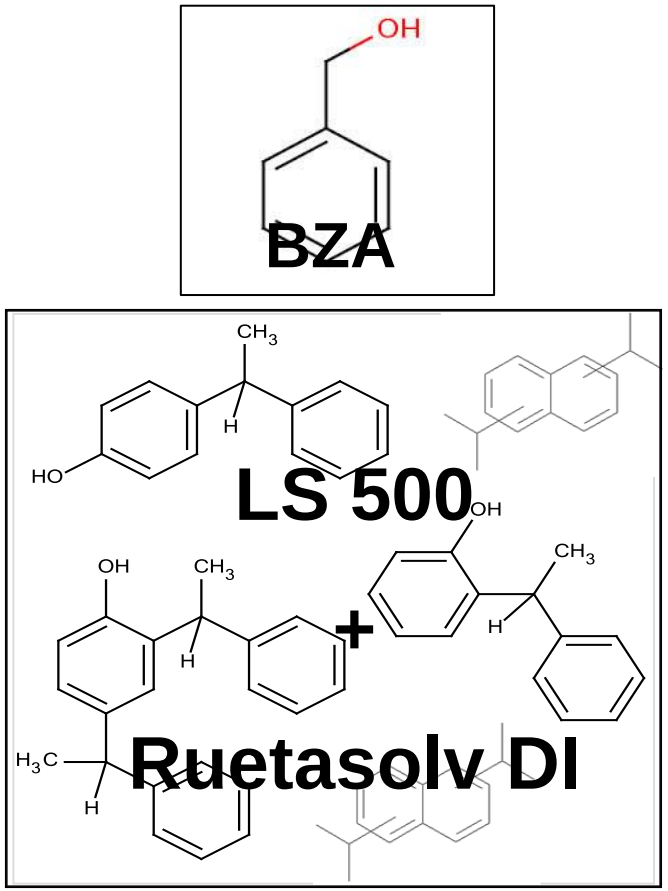
*as*

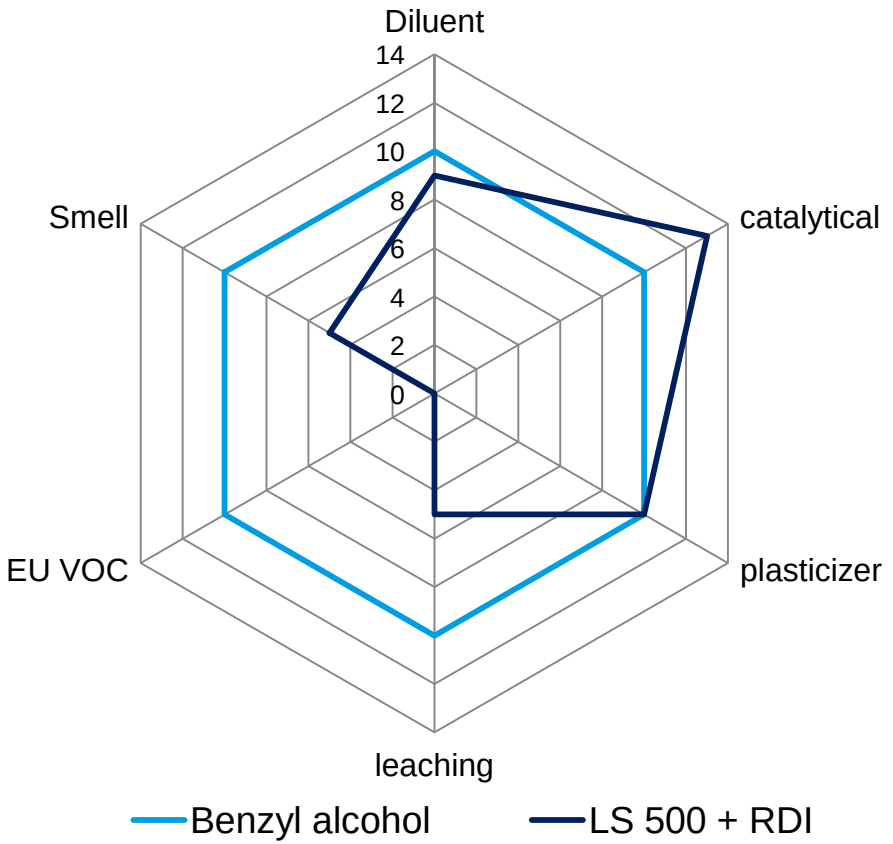
*Low leaching*

Benzyl alcohol alternative

# Low leaching diluents

## LS 500/R DI blend




→ The bulky structures in LS 500 and RDI blending lead to similar application properties without the major disadvantage of BZA.

# Low leaching diluents

## LS 500/R DI blend

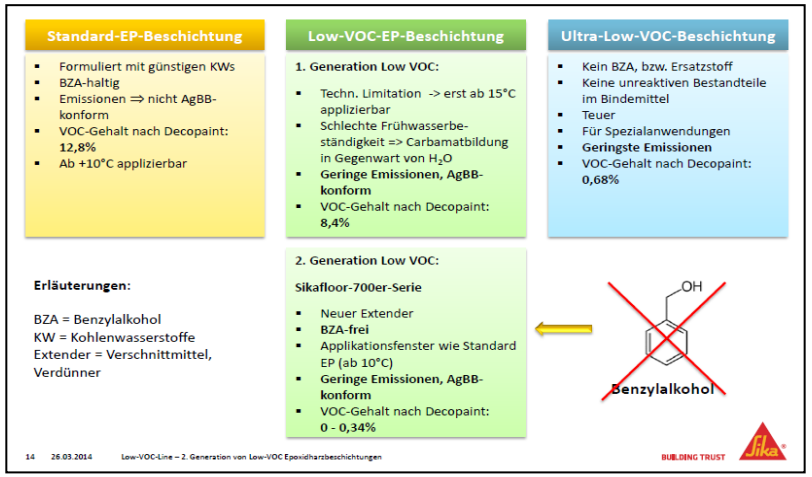
### Activities to avoid benzyl alcohol in Coatings

EPIKOTE™ Resin 874L-X-90 and EPIKURE Curing Agent 3175… Since it does not contain any benzyl alcohol or plasticizer, its long-term performance is excellent.

Momentive Specialty Chemicals Inc.

By eliminating Benzyl alcohol, Interline 975P reduces solvent emissions, eliminates the risk of solvent retention, and minimizes the occurrence of taste or smell in potable water tanks during storage, the company says

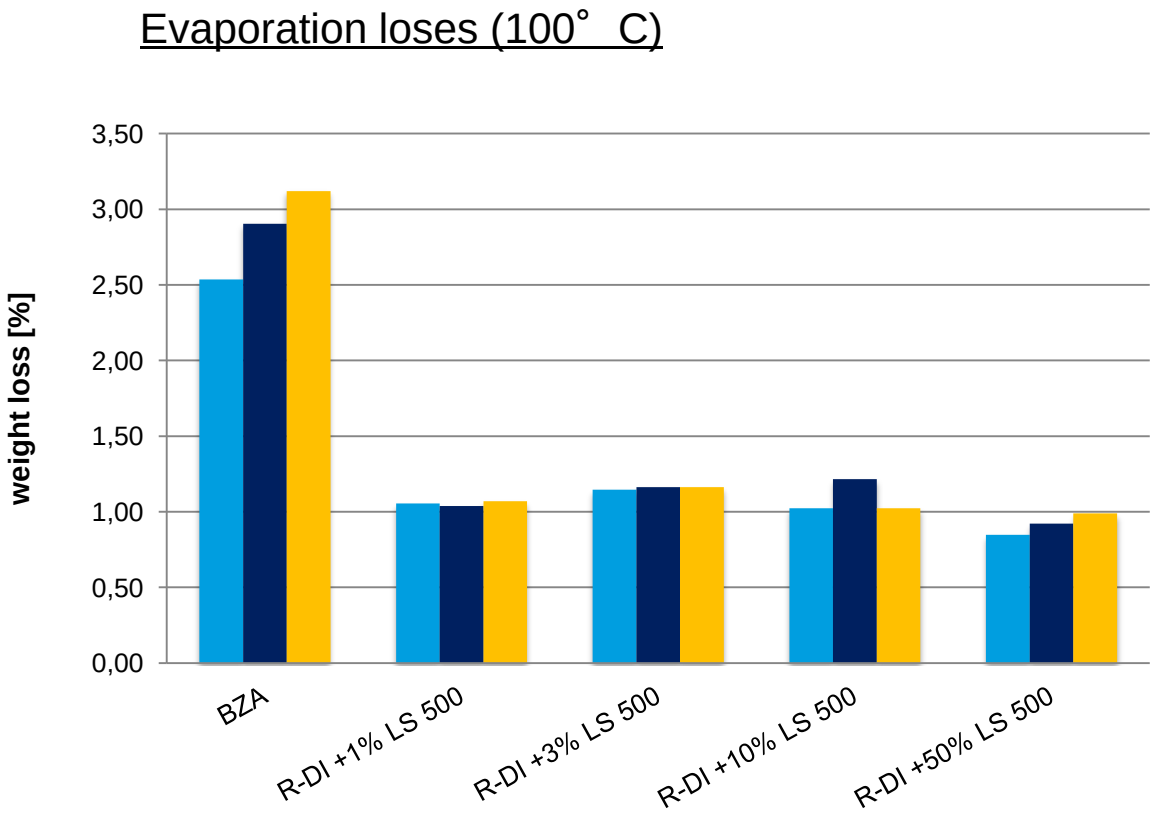
----**AkzoNobel/ Adds Potable Water Lining/**Friday, June 27, 2014




There is considerable movement away from BZA in global coatings companies!

# Low leaching diluents

## Evaporation losses




**Recipe(hardener):**

44 % IPDA

44 % BZA or LS 500/RDI

12 % liquid Bisp. A epoxy resin

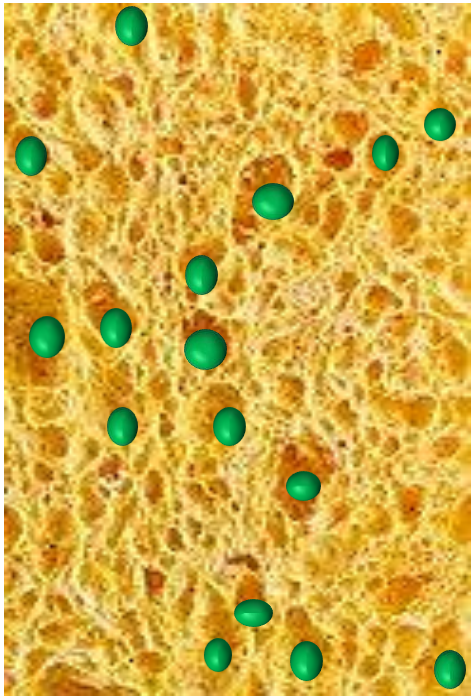
**In formulation:**

Epikote 828 **2 : 1** Hardener formulation

→
- High weight loses of BZA, even at RT (1,8%)
- Novares products show only 1-1,1 % weight loses at high temperature

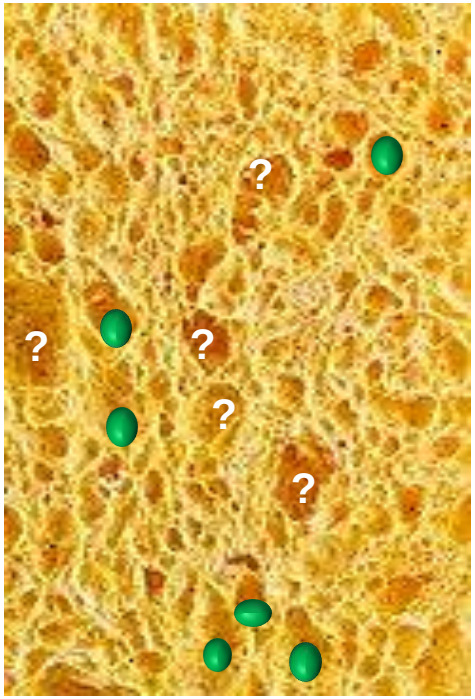
# Low leaching diluents

## Evaporation losses



3 h at 100° C

3% weight lose on total

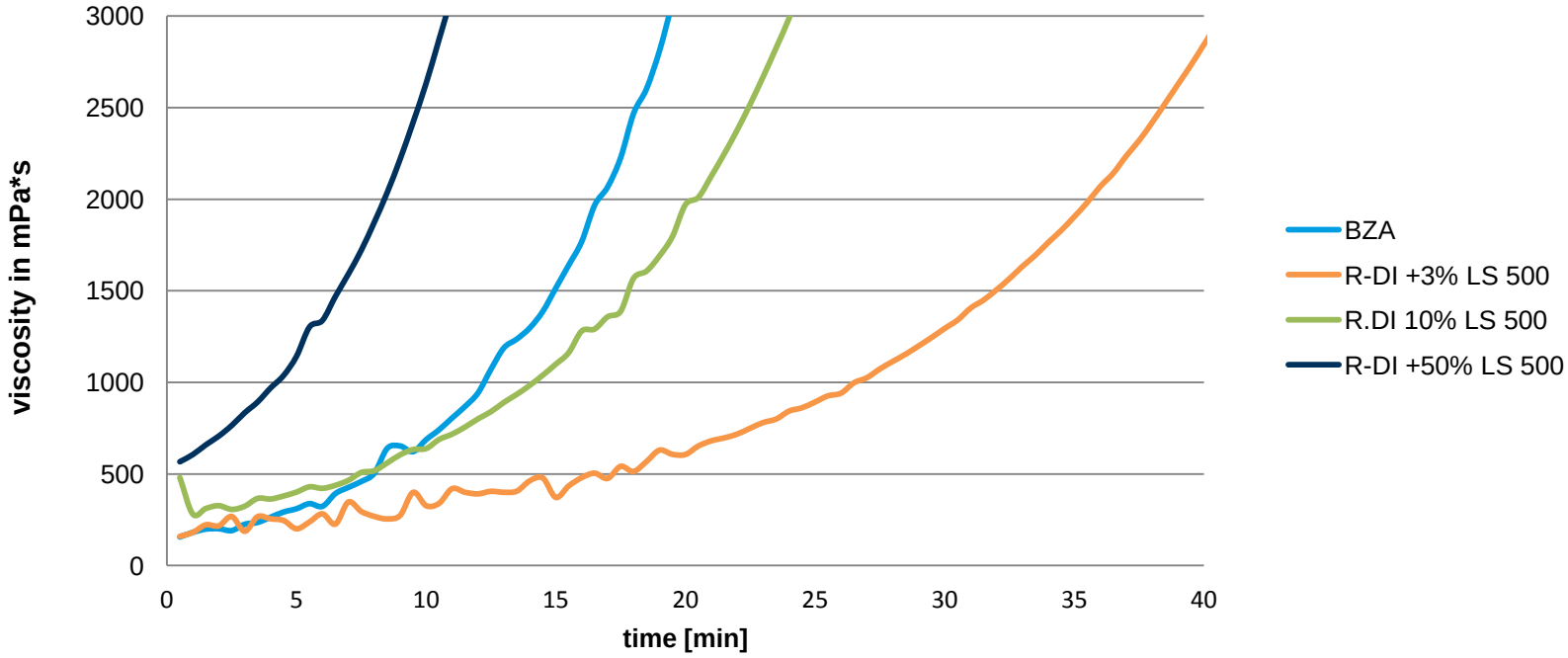



→ As EP coatings containing BZA don‘t shrink during drying. Leave of BZA after drying is undermining the compactness of polymer network.

# Low leaching diluents

## Curing behavior

### Curing behavior

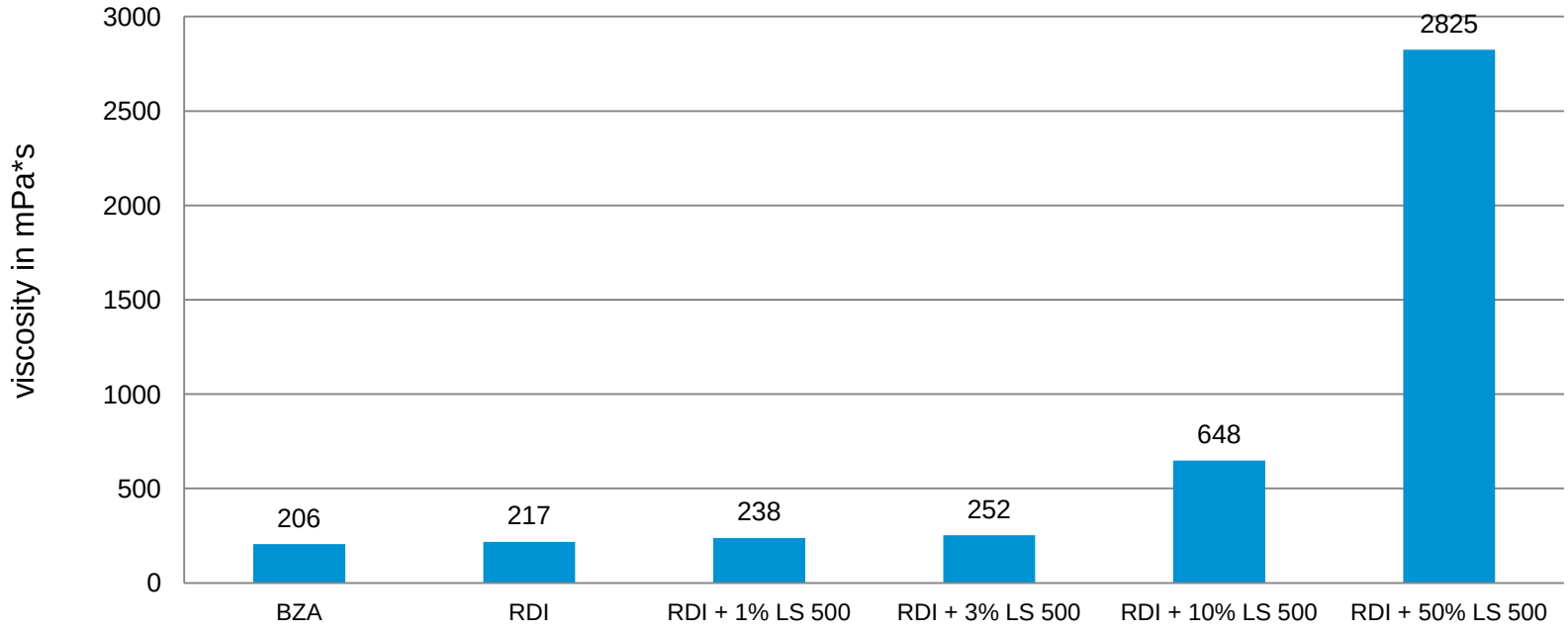



→ The performance of benzyl alcohol in acceleration could be matched with a combination of LS 500 and Ruetasolv DI

# Low leaching diluents

## Viscosity

Effect on viscosity - hardener formulation

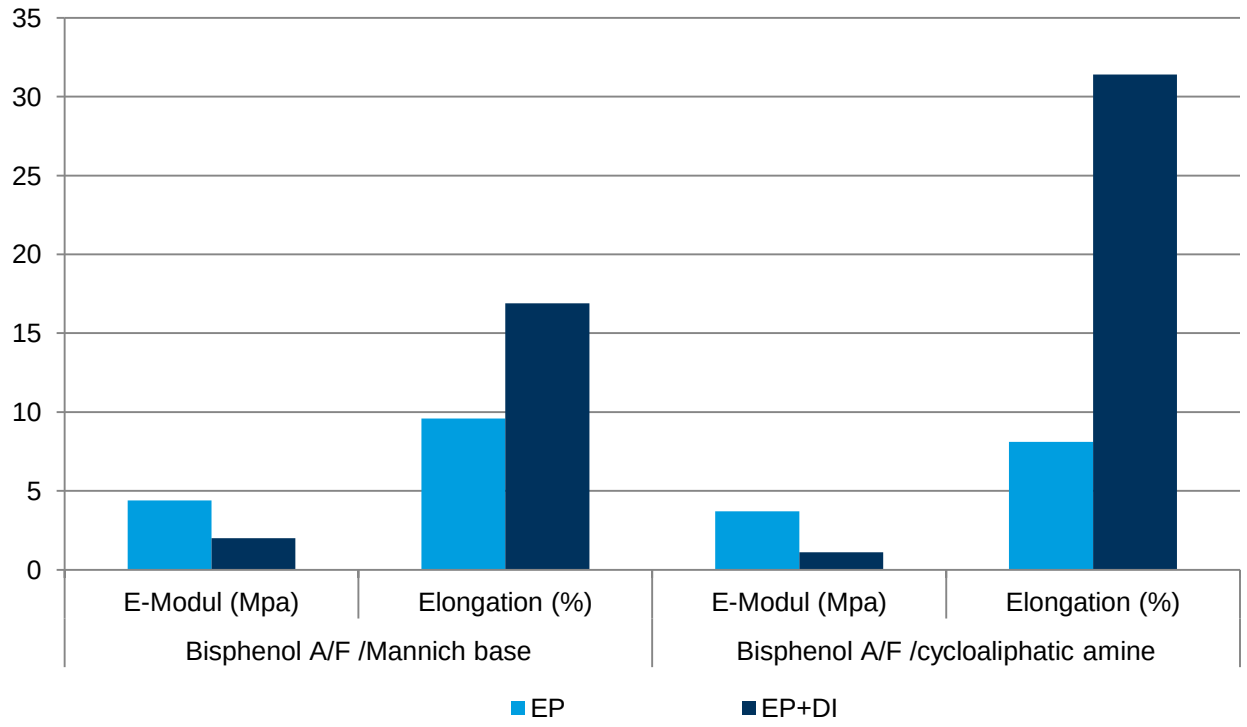



→ Depending on formulation replacement of BZA needs pre-trial to establish the right combination ratio on Ruetasolv DI and LS 500

# Low leaching diluents

## mechanical properties

### Mechanical properties




→ Ruetasolv DI increases elongation and reduces stiffness of epoxy floor coatings. It is more efficient than some aliphatic plasticizers (Araldite)

# Conclusion

A combination of Ruetasolv products and LS 500 can be used to replace Benzyl alcohol.
Following effects can be found in the final formulation:

- Zero Voc at RT, only 1% after 3 h @ 100 ° C compared to 3,5 % with BZA
- Curing behavior can be adjusted with LS 500
- around 10 % LS 500 comes closest to BZA

# Thank you very much for your attention.

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