# Market overview 2015

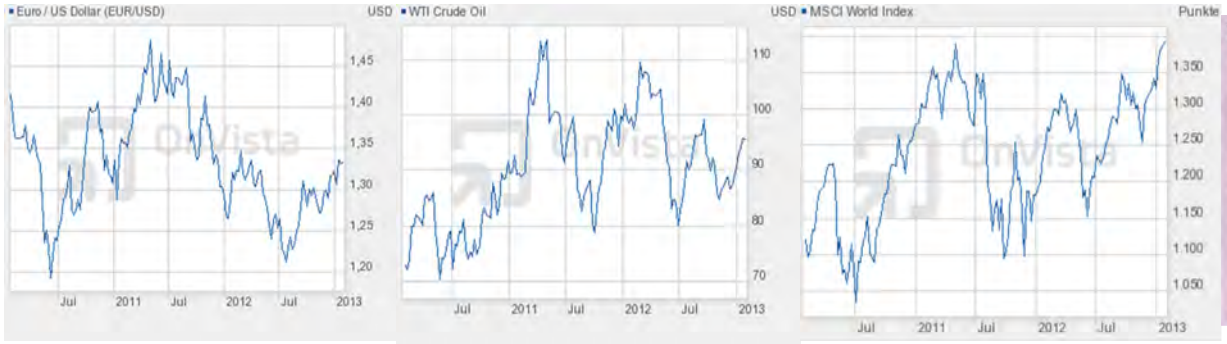
## Overview of the European market for Radiation Curing

David Helsby Rahn Zurich

# Unpredictable ?

RADTECH
RADTECH
RADTECH
EUROPE

Crude oil; Raw materials; Freight rates; Interest rates; Currency; Stock Markets





Europe butyl acrylate contract vs spot prices

RADTECH
RADTECH
RADTECH
EUROPE

"It's tough to make predictions, especially about the future."
Yogi Berra

## Predictions from 2011

According to the new market report by Global Industry Analysts, the global printing inks market is projected to reach USD 18.2 billion by the year 2017.

The global market for Printing Inks is projected to reach USD 18.2 billion by the year 2017, driven by the mounting popularity of environment friendly inks, and incessant technology innovations that are opening up newer growth avenues including relatively new markets such as UV and ink jet inks

## Predictions from 2014

A new report by Allied Market Research, titled World UV Curable Inks — Market Opportunities and Forecasts, 2014 – 2020, forecasts that the world UV curable inks market will garner a revenue of $3.5 billion by 2020, registering a CAGR of 15.7 percent during 2015–2020.

# How the following data was compiled

- Radiation curing is still a niche market and data is not collected in the major chemical studies.
- Data compiled from Raw Material manufacturers, various trade associations and private marketing reports.
- Main discrepancies are between Raw Material totals versus Finished Formulation totals and source of manufacture versus sale.
- Sub-totals can be estimated from calculating the formulation percentages of Radiation Curing materials within Finished Formulations.
- Radtech Europe is planning to carry out a Market Survey within its membership.

# Global Energy Curing Market 2015

RADTECH RADTECH RADTECH EUROPE

## Approx. 533 K MT.  EMEA estimated as 164 K MT. 2015

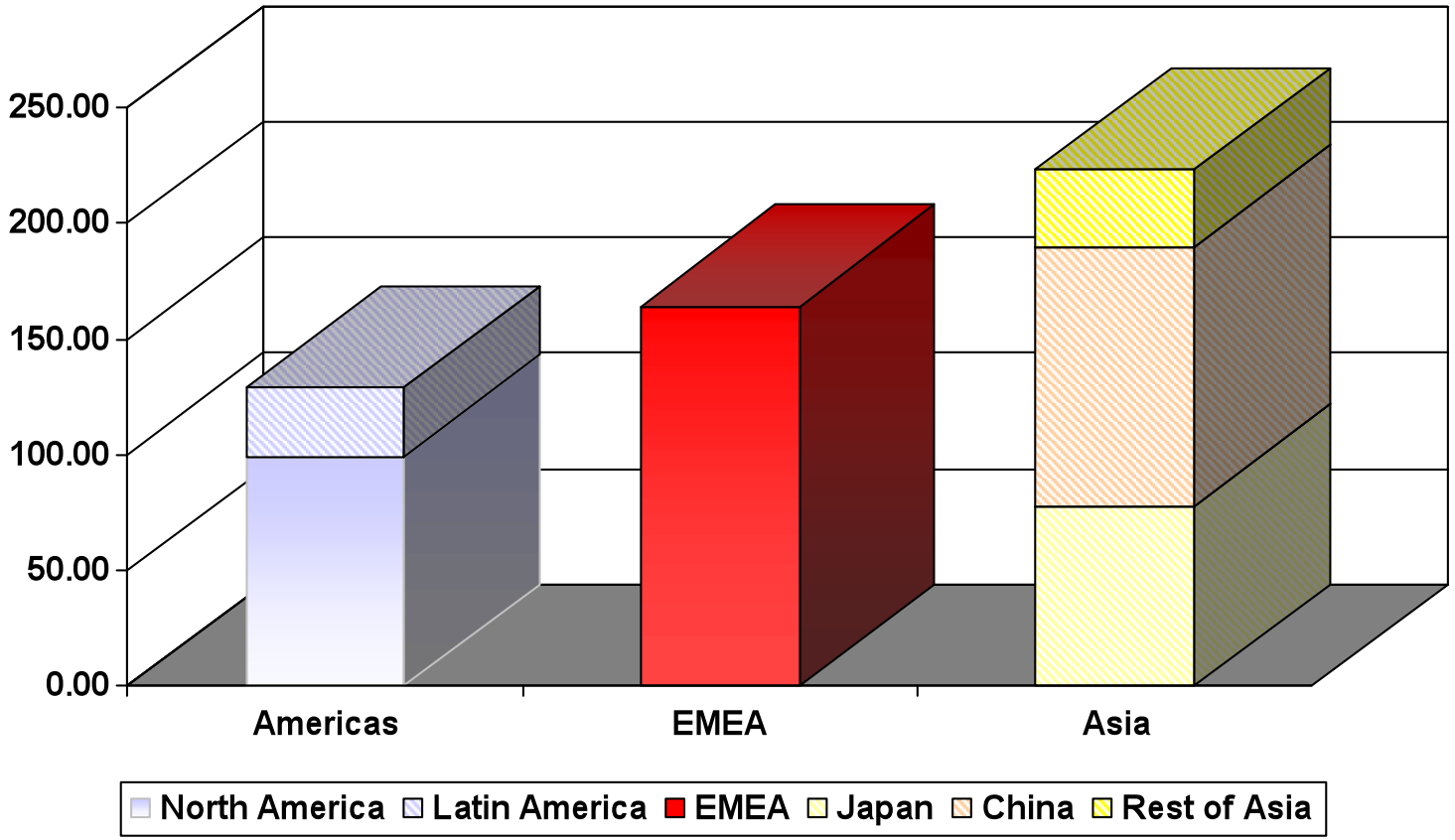
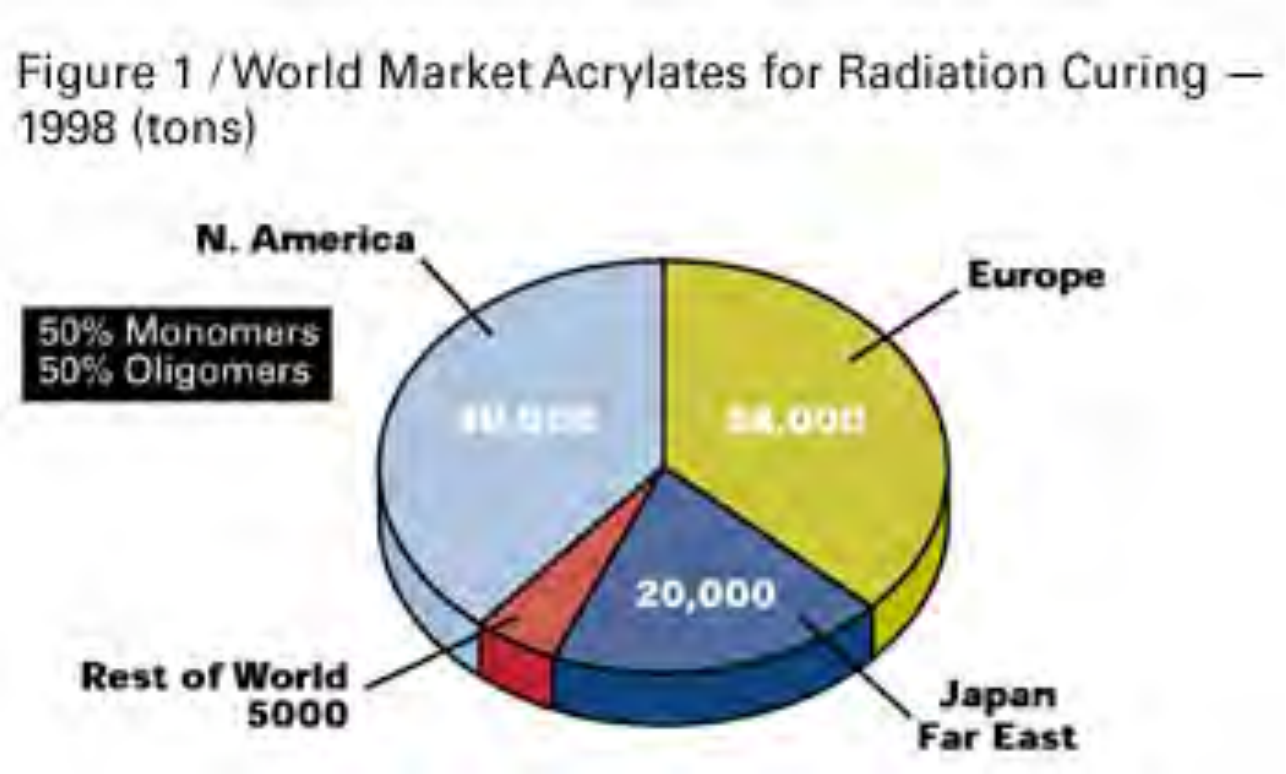
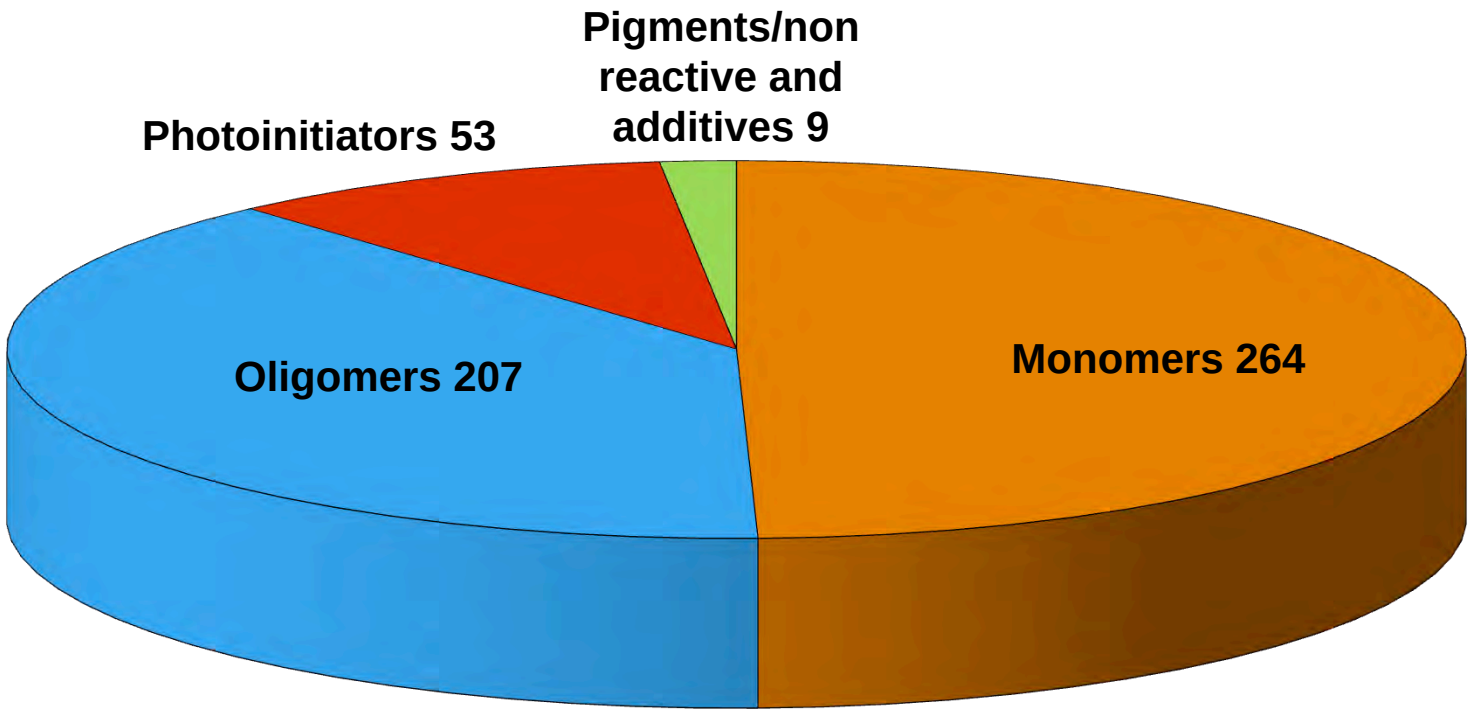


Figure 1 / World Market Acrylates for Radiation Curing — 1998 (tons)




Total 103000 mt.

# Energy Curing “Raw Materials”



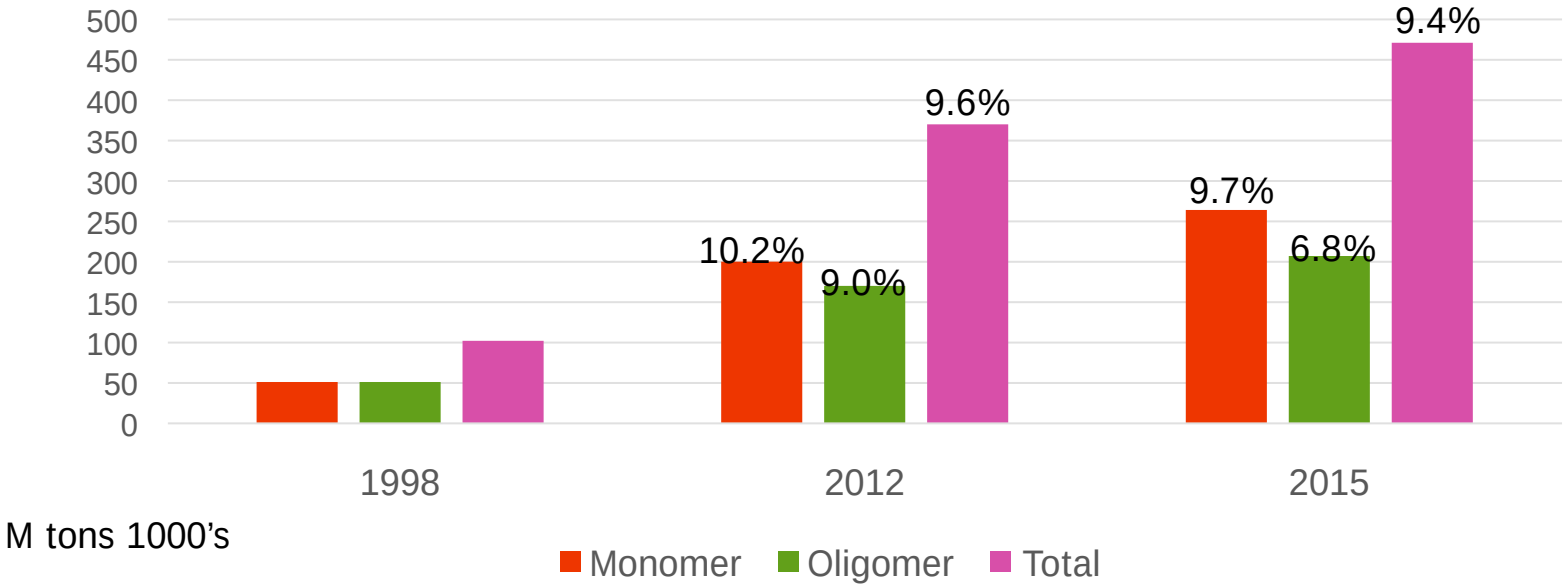

(in 1,000 mt)

Worldwide formulated Usage 2015: 533000 mt

1998 Monomer/Oligomer split 50/50

2015 Monomer/Oligomer split 56/44

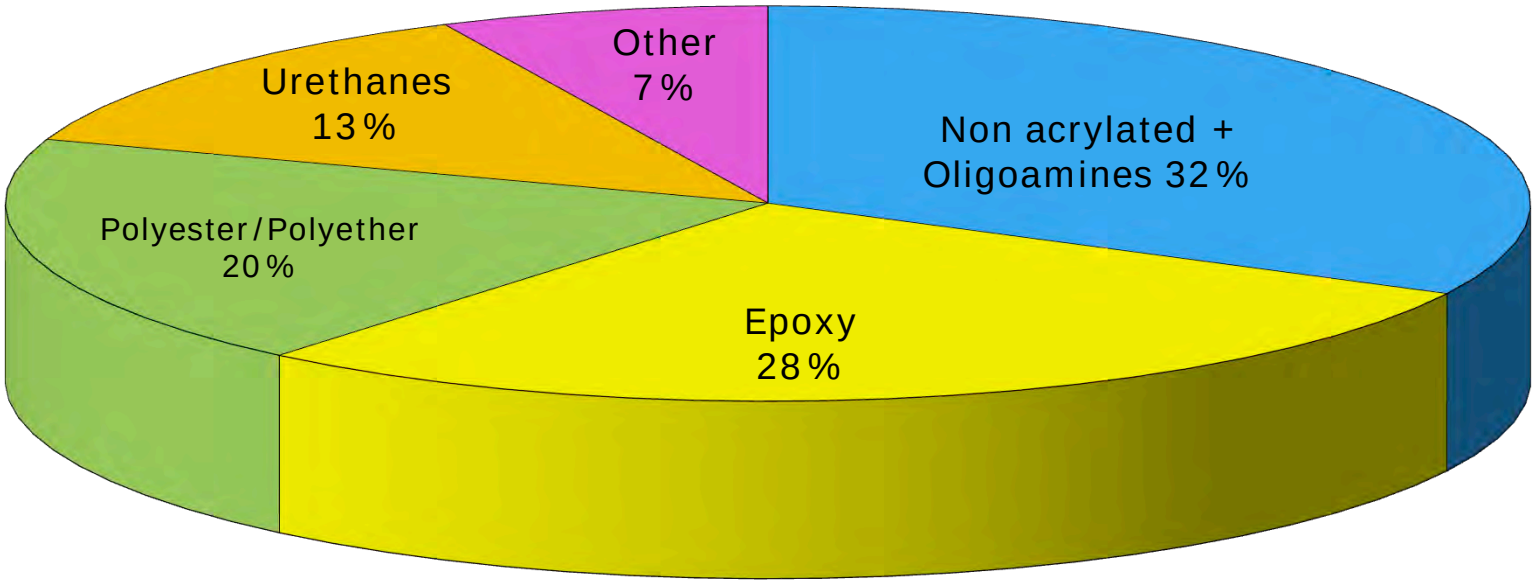
# Monomer/Oligomer CAGR Global




In 1998 a study showed a 50/50 spilt of Monomer (low viscosity acrylates) and Oligomers (high viscosity acrylates). By 2015 the split is 56/46.

This change is the result of a major shift in the formulation concepts of products used in the emerging new Applications.

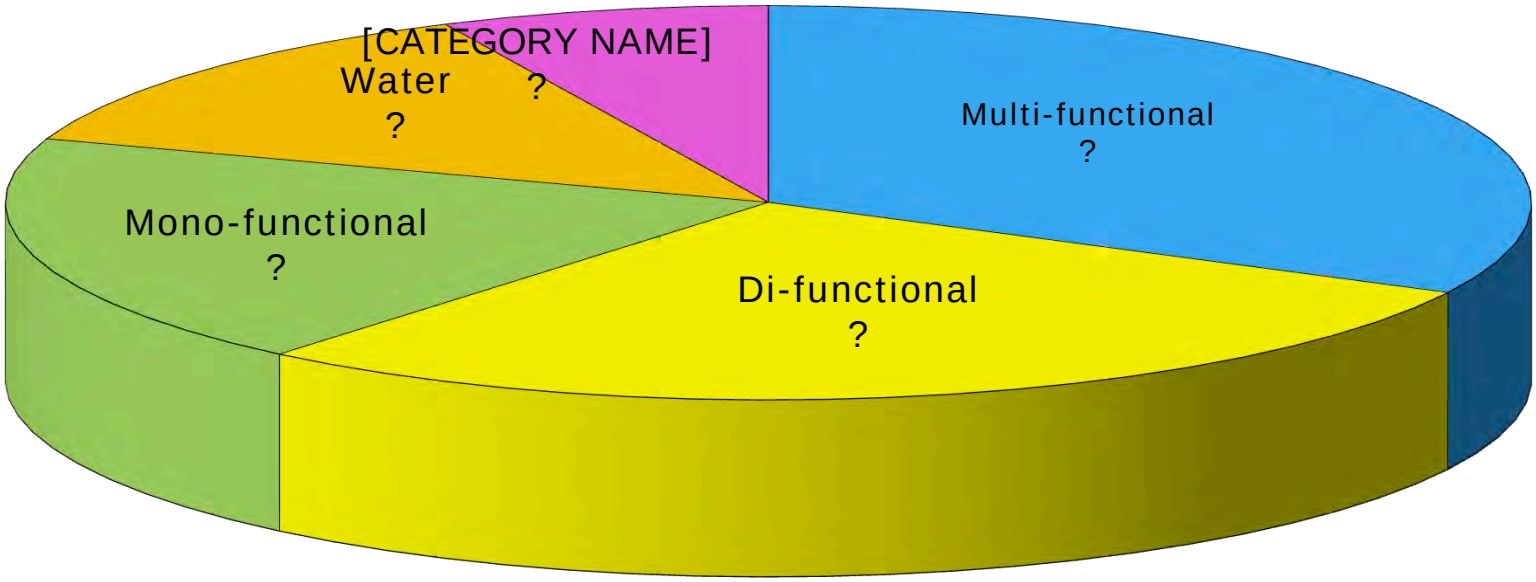
# The Oligomer Market (in %)




Worldwide Usage 2015: 207,000 mt. (acrylates/methacrylates).

Trends: reduction in Epoxy and increases in PUDs and Polyester/Polyether. General reduction in the percentage contibution to the finished formulation.

# The Monomer Market (in %?)

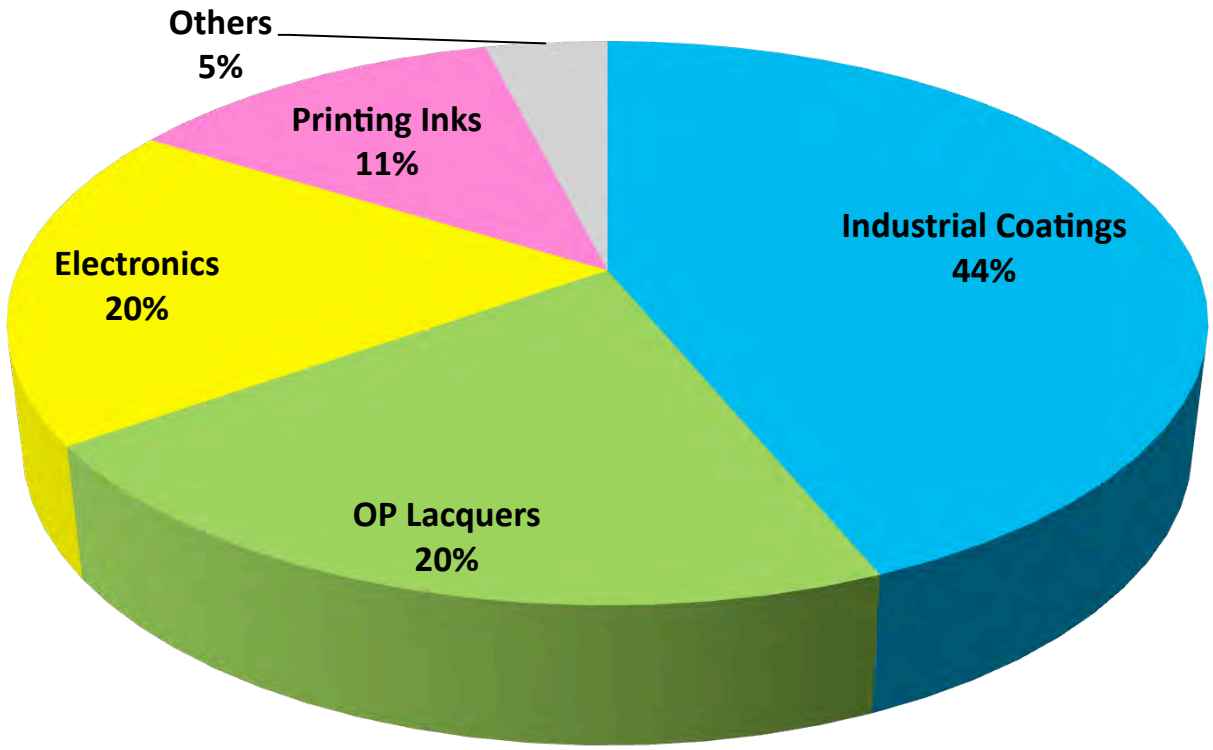



Worldwide Usage 2015 264,000 mt (acrylates/methacrylates)

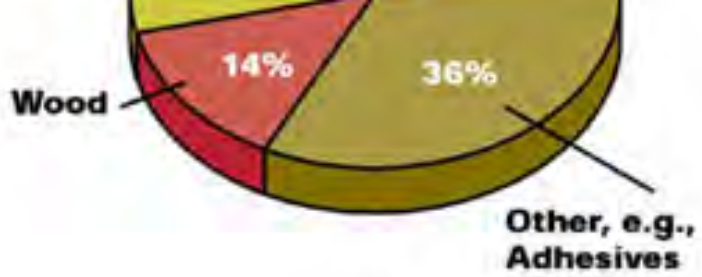
Trends: Monomers (Low viscosity acrylates and diluents)

Once considered as only diluents are becoming more the building blocks of the formulation.

# Energy Curing Applications Global

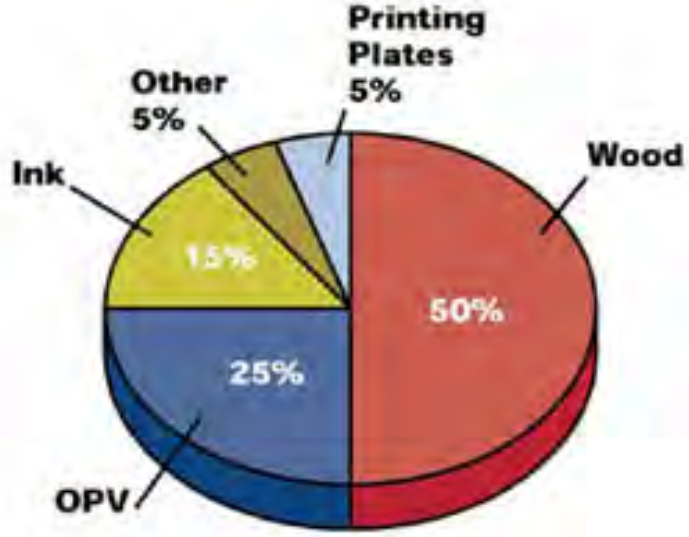



Worldwide Usage 2015: 533000 mt. Percentage reduction in high viscosity Applications, increase in low viscosity applications such as Flexo, Inkjet, Rapid Prototype, 3D Printing and Others.

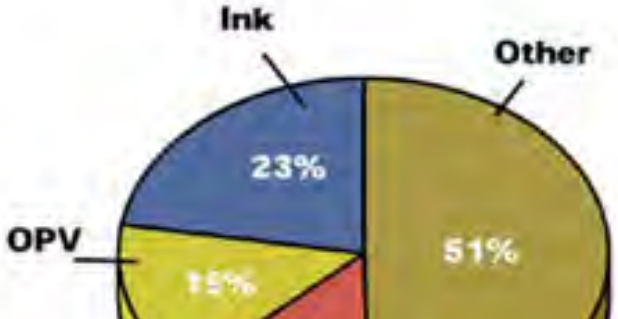



US

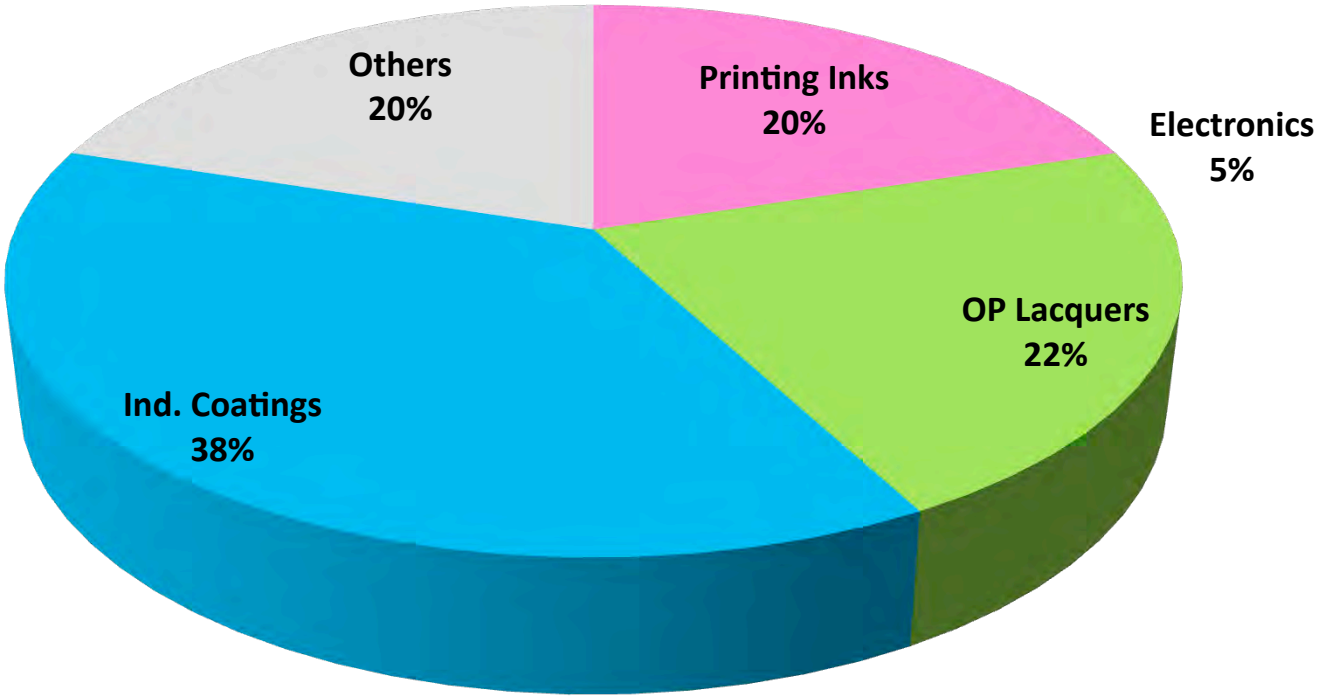
# 1998 Study




Europe



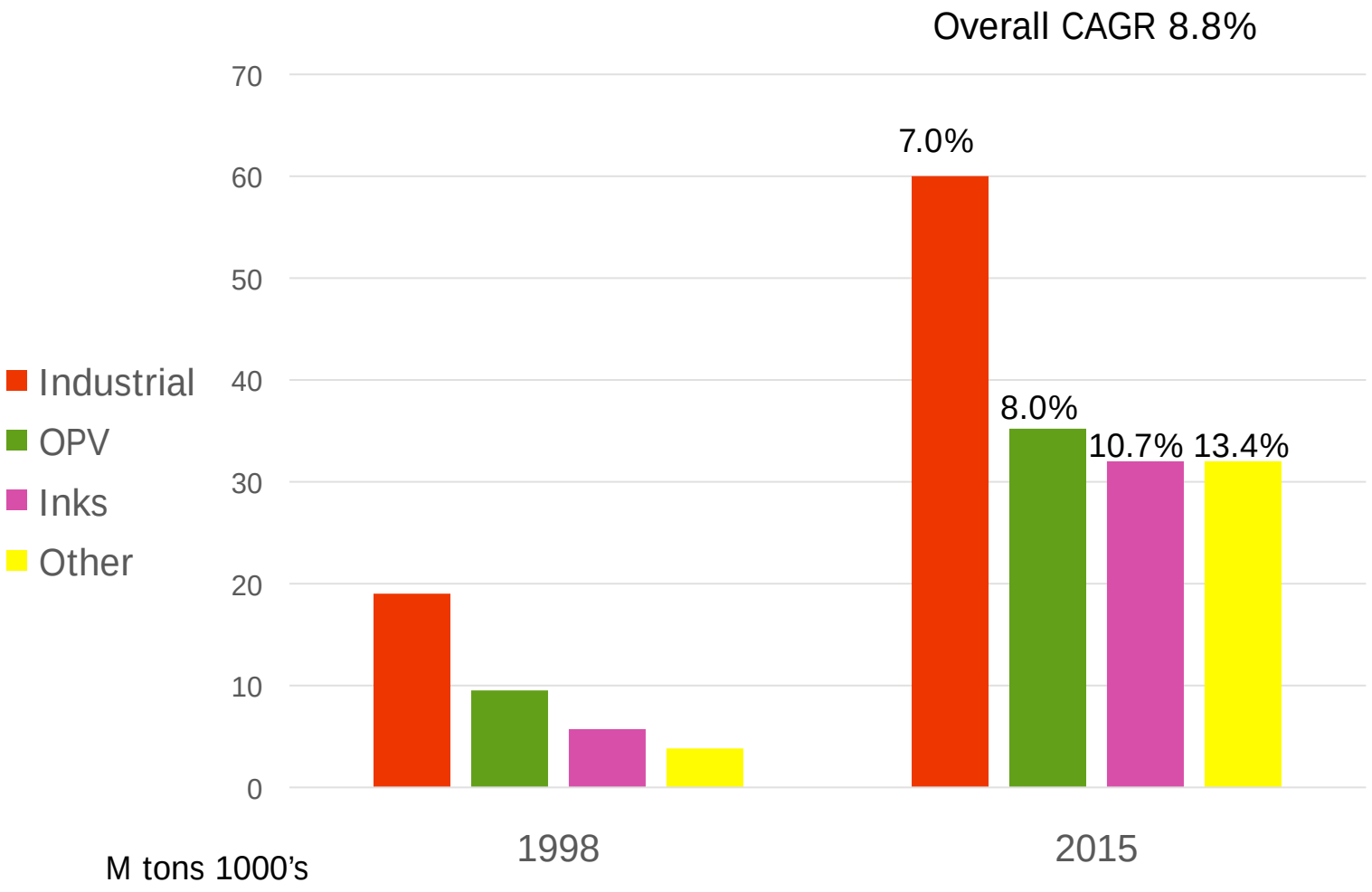
# Energy Curing Applications Europe




Europe Usage 2015: 164,000 mt.

Ink market increases its % share due to; increased penertration into Food packaging and emerging low viscosity systems, Flexo and Inkjet. Largest share increase is Others?

# Applications CAGR Europe



# Others

Applications taken from the Innovation Sessions of Radtech

- Adhesives
- Offline/onsite, concrete, marble repair
- Real 3D writing
- Coating of plant seeds
- Paper modification (i.e. banana leaf )
- Car repair, glass, body, Windshields
- Transparent and conductive Coatings
- Ink jetted Solar panels
- Easy cleanable spray coatings
- Time/temp indicator films
- Textile, industrial and clothing
- UV cured optical materials
- Production of contact lenses
- Medical, enzyme encapsulation, biometric cellular coats, catheter tubes
- Dental
- Pipes, internal and external
- Circuit boards, solder resists, potting
- Thermal transfer ribbon
- Bank notes
- Glass fiber composites
- Sandpaper
- Rapid prototyping/ 3D printing
- Coating on military vehicles
- Cosmetic fingernail decoration
- Membrane switches

And many more.....

# A major shift in formulation concepts

Until the end of the 90s most products had:

- A high viscosity
- Applied at a low film weight (1.0 micron )
- When pigmented, at a high level (av. 20%)
- Fast Curing (450m per min)

- Oligomers formed major building blocks for end properties.
- Monomers contributed to mainly viscosity reduction.

The emerging new product types have:

- Low viscosity
- Applied or produced at a high film weight. (25 micron )
- When pigmented, at a low level (av. 5% )
- Relatively slow Curing

- Oligomers can only play a small part as an “additive oligomer”
- Monomers are now the main building blocks.

Monomers should now be investigated for their differences and contribution to the physical properties of an end formulation.

Oligomers should be investigated for the minimum addition level required to enhance physical characteristics.

# Trends

- All applications are becoming more toxicity conscious.
- Energy costs under greater scrutiny. (LED)
- Narrowing of raw material specifications.
- End specifications are more stringent.
- No change agreements becoming common place
- Re-emergence of EB systems.

Of course Cost will never go away

And nor will HSE

# Regulatory: Compliance: Restrictions

REACH – Now the real work begins with the filling of the dossiers made more difficult with the lack of Analytical capacity available.

Challenges to suitability of RMs for registration is increasing budgeted costs and causing concern.

Even greater cost expected from reformulation of end products.

Down stream exposure data difficult to obtain.

Regulations – Swiss ordinance, German ordinance, RoHS (UV versus LED)

Compliance – Nestlé list , TetraPak, IKEA, Sony, BCF, and growing.

Restrictions – NIAS, Contamination, Solvent, Stabilizer (e.g. MEHQ), Catalysts (e.g. Tin), various Photoinitiators including Benzophenone, various monomers from the compliance lists, BisPhenol A, and .....

## What comes next?

# Thank You!!

*Here's to a successful Radtech USA 2016*