



Slovakia



Hungary



United Kingdom

Green chemistry – key to a sustainable future

Katalin Barta

European Parliament

13.11.2013.



Germany

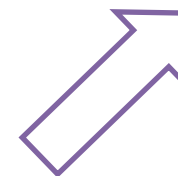


UNIVERSITY OF CALIFORNIA
SANTA BARBARA

USA

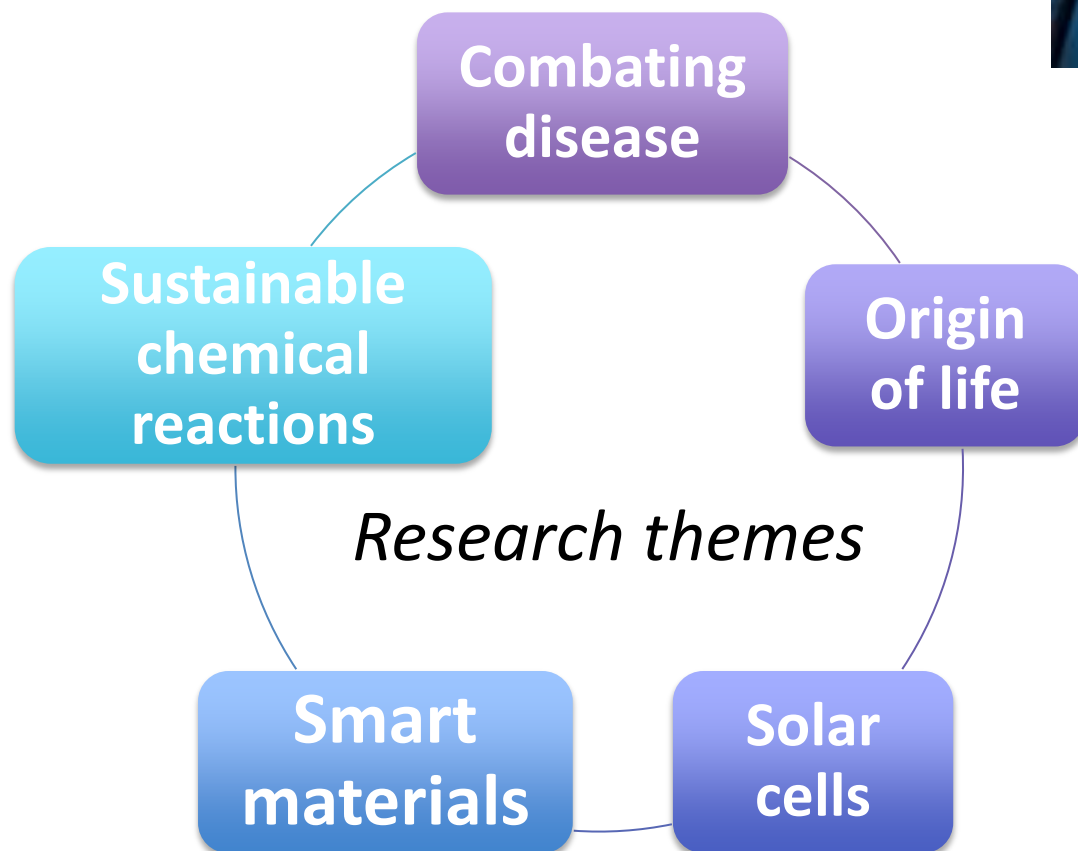


The Netherlands



University of Groningen - Stratingh institute

- Dedicated to excellence in chemistry and molecular sciences
- Interdisciplinary research
- Excellent international reputation



Prof. Ben Feringa



Prof. Kees Hummelen

Water and air pollution



Persistent organic pollutants

Halogenated chemicals

Heavy metals



Non-biodegradable waste



Do we understand the toxicology of the chemicals we use/produce?



BPA : Bisphenol-A

Now banned in Europe

... is still present in other food containers

- Endocrine disruptor
- Effects on the brain
- Reproductive disorders

Also linked to

- Breast Cancer
- Heart disease

Which molecule is the next harmful one?

How long will our resources last?



Rhodium

Used in a number of industrial processes



Non-renewable petroleum

96% of all products

10 billion tons of fossil fuel per year

Useful carbon

Fuels

In only ~ 50 years reserves will completely run out...

Can we continue down this path?



SO_2 , NO_x , CO

CO_2

**Negative image
of chemistry**



Toxic chemicals

Non-biodegradable waste



Heavy metals

Organic chlorinated
pollutants

Green chemistry

Design chemical reactions this way:

- NO waste in the first place
- NO solvent, or use water
- All starting materials should end up in the product
- Design for function AND low toxicity
- Renewable starting materials

The 12 principles of green chemistry



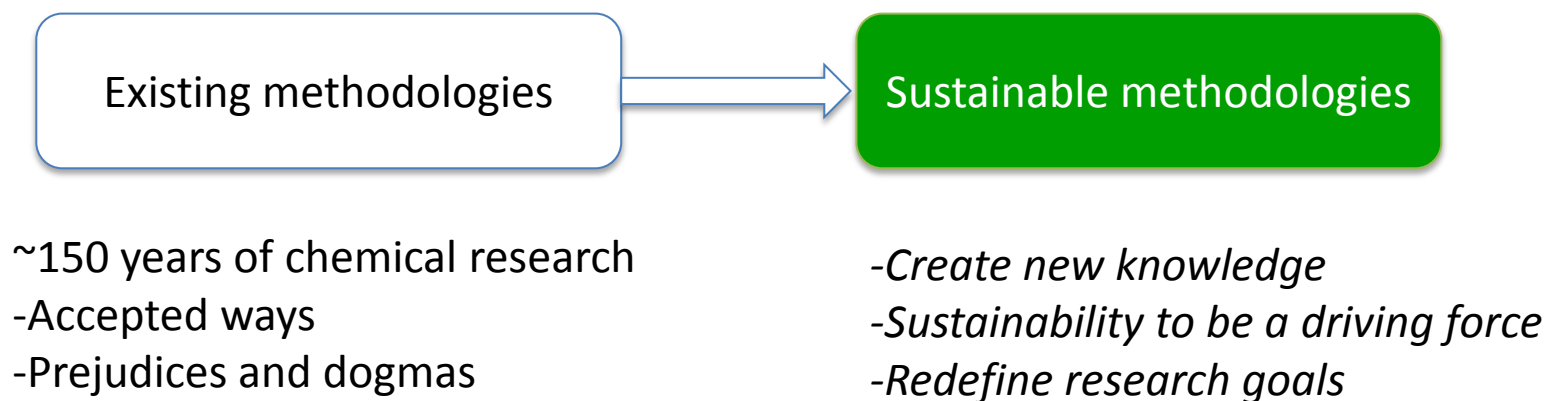
P. T. Anastas
Yale University

A new way of thinking about chemistry and chemicals ...

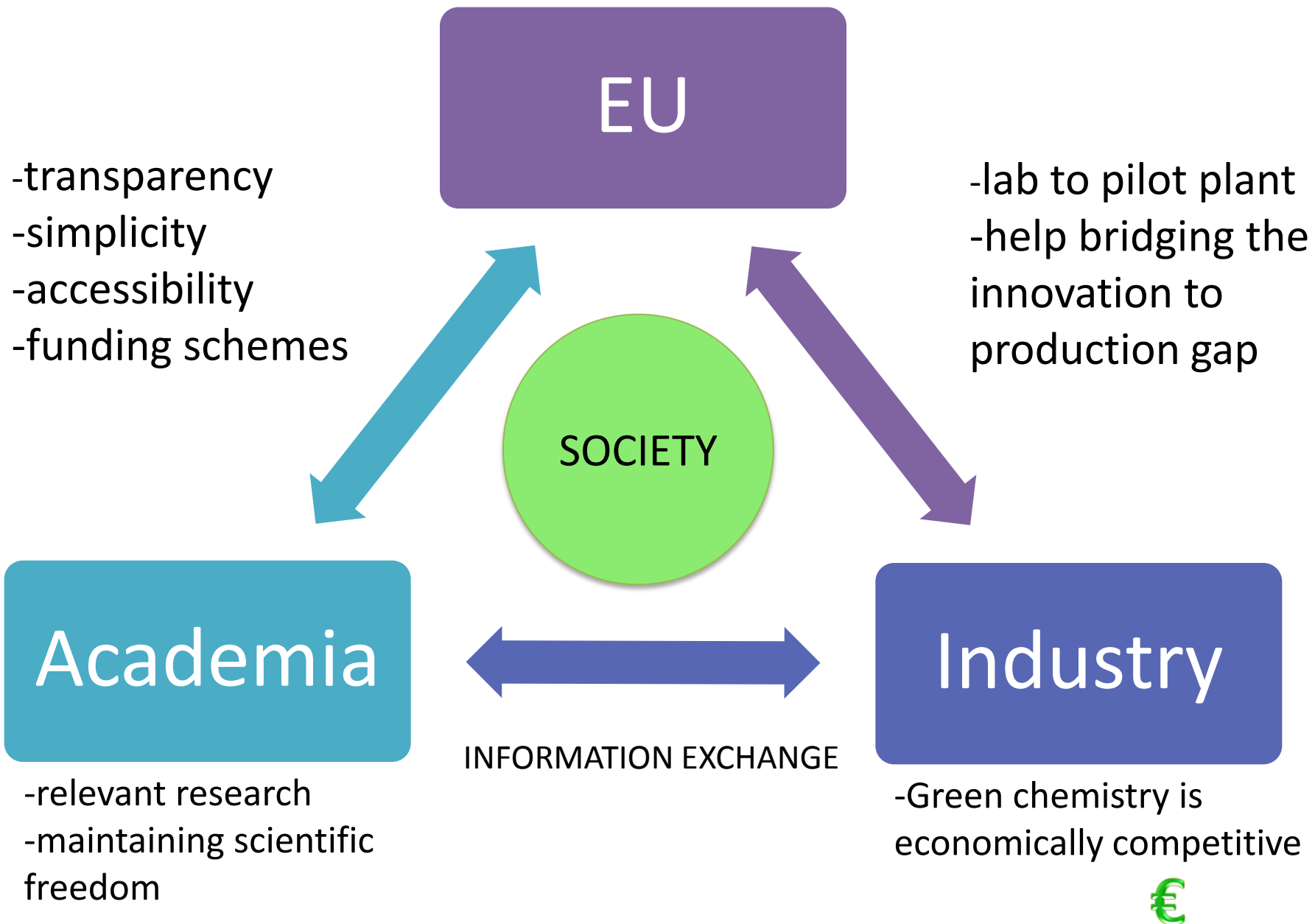
Green chemistry in practice

So why is it so difficult?

To design a chemical reaction which is entirely in agreement with the principles of green chemistry is a highly challenging task
=> **cutting edge basic** research needed!

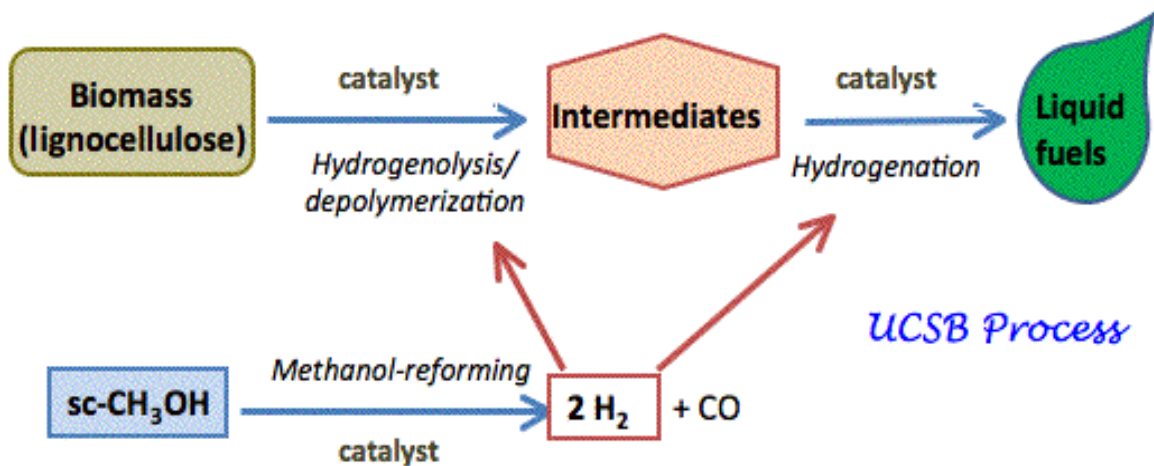


Can we do it? **YES! Change our mindset!**

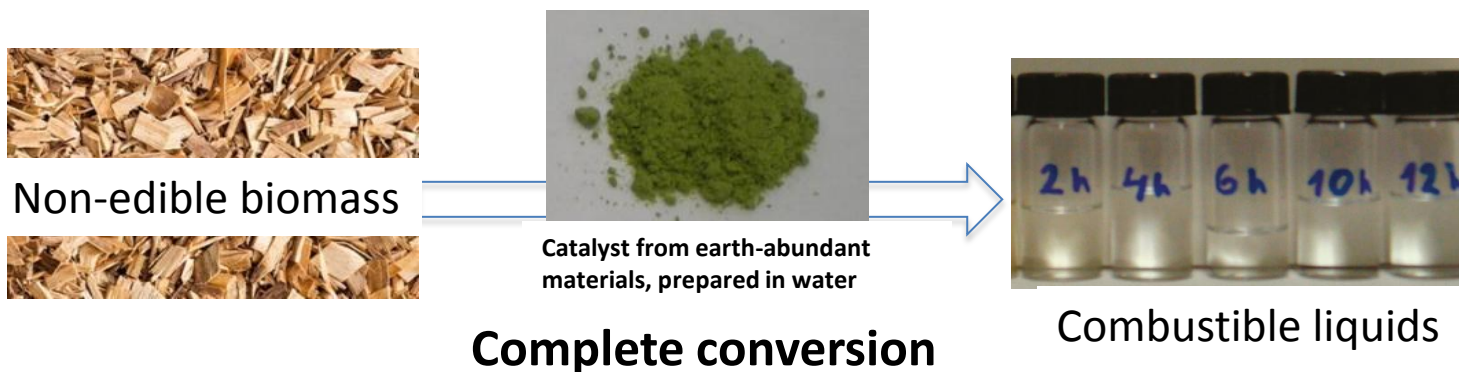


Funding can make a difference...

With Prof. Peter Ford at the University of California



K. Barta, T. D. Matson, M. L. Fettig, A. V. Iretskii, S. Scott, P. C. Ford, *Green Chemistry* **2010**, 12, 1640-1647;
T. D. Matson, K. Barta, A. V. Iretskii, P. C. Ford, *J. Am. Chem. Soc.* **2011**, 133, 14090-14097



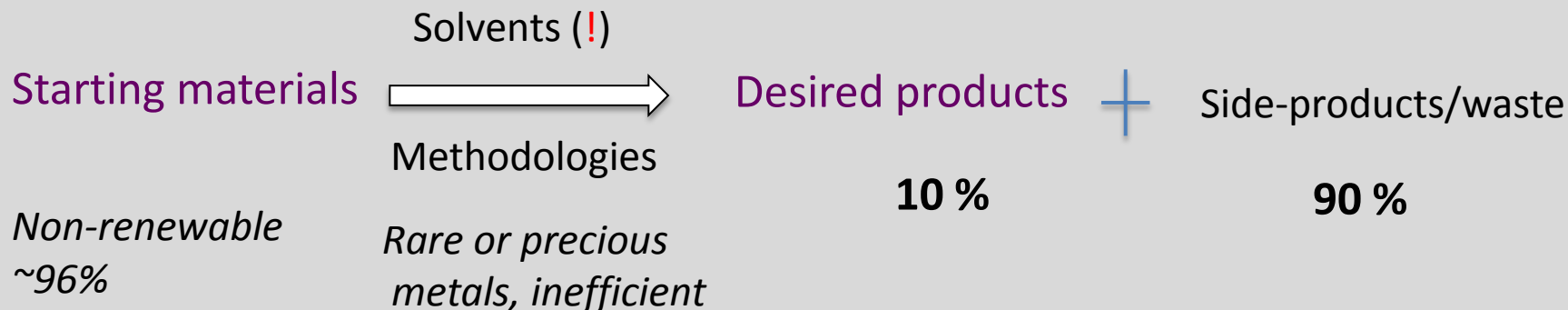
K. Barta, University of Groningen

Thank you!

Existing vs. desirable chemical industry

Current situation (simplified)

Past 150 years of research



Academia

Paradigm shift

Industry

Sustainable chemical industry

New research questions

