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The Dutch Chemical Industry's partnership with education

Nelo Emerencia

Manager Education & Innovation VNCI

Secretary Dutch Chemistry Board

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The Dutch Chemical Industry

- Turnover: 50 billion € (2009)
- Contribution to NL export: 17%
- 5-6% growth p.a.
- Employment: 66.000
  - Higher educated: 15.000
- R&D investments: 1.4 billion €

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Dutch Chemistry Board directs innovation

September 2005: Chemistry is identified as key sector

June 2006: Business plan

October 2007: Innovation programme

December 2007: Approval Dutch Minister of Economic Affairs

Participants:

- Industry: AKZO, Dow, DSM, Shell, Unilever, Octoplus (SME), Lankhorst, VNCI (sector organisation), KNCV (professionals)
- Universities: RUG, TUD, TU/e, UU
- Higher education applied science: HAN
- Independent chairman (Rein Willems, formerly Shell)

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Ambitions Dutch Chemical Sector

Sustainably increase welfare and well being

Concrete goals:

1. **Economic**: Double contribution of chemical industry to GDP in 10 years (growth is a *conditio sine qua non* for innovation)
2. **Societal**: Halve CO_2-emissions from the use of fossil sources in 25 years (*innovation* is needed here)

Expand needed technological competences to global excellence

These are *ambitions*, not agreements nor predictions.

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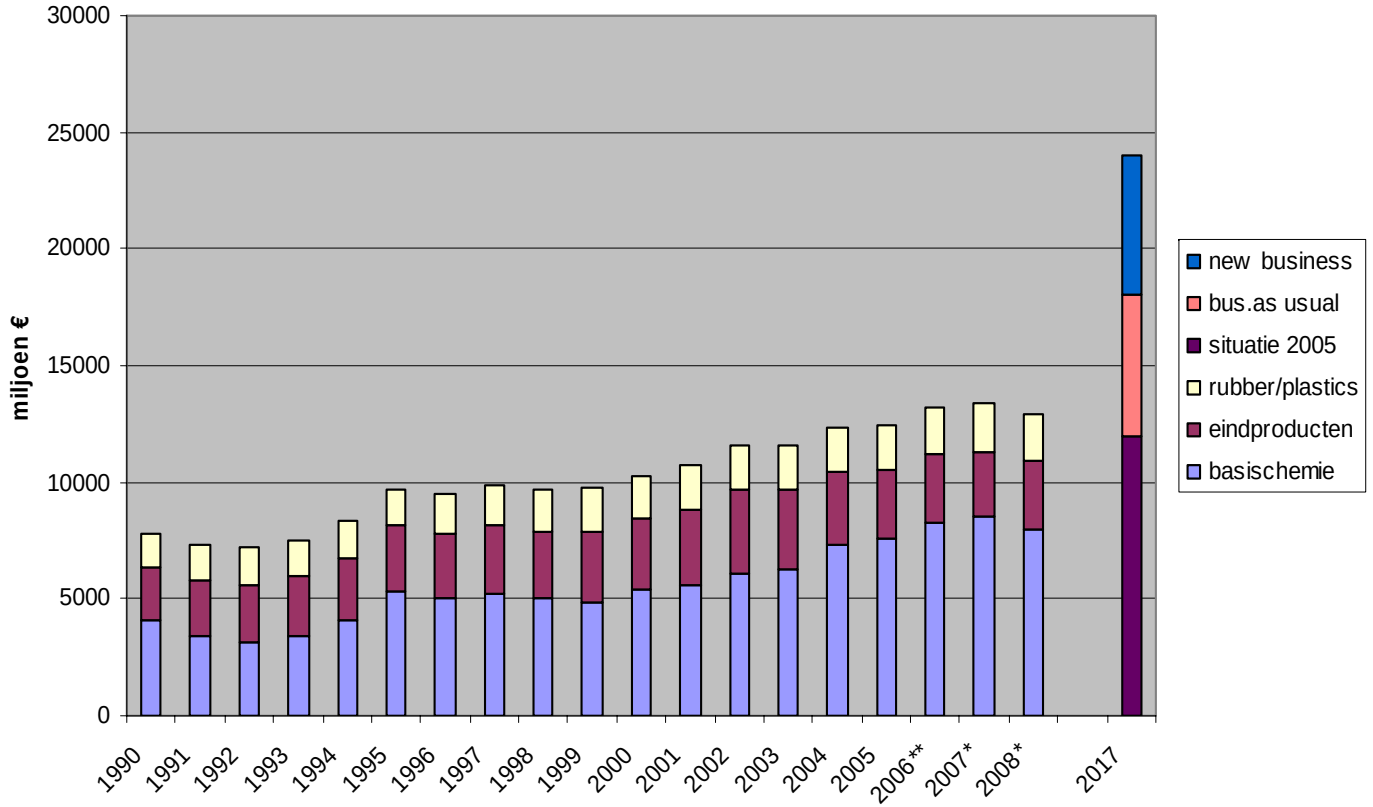
Double contribution to GDP in 10 years



Bruto: incl. afschrijvingen; TW marktprijzen: productie – intermediair gebruik plus saldo belastingen – subsidies plus verschil toegerekende – afgedragen BTW; Totale TW van ca € 12 miljard is 2,3 % van BBP Nederland

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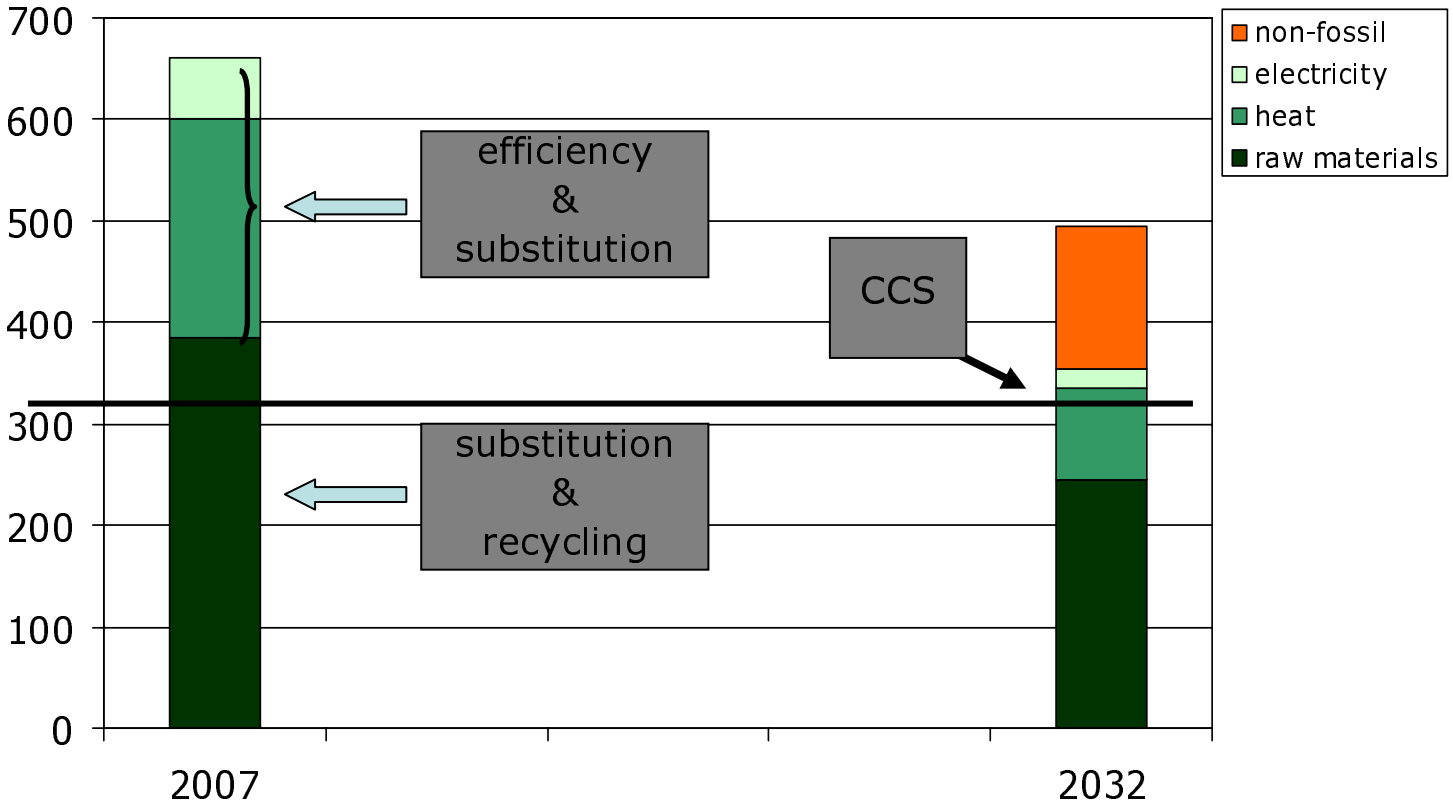
Halve CO_2-emissions ex fossil in 25 years



In 2008: approx. 20 million metric tons CO_2-emission

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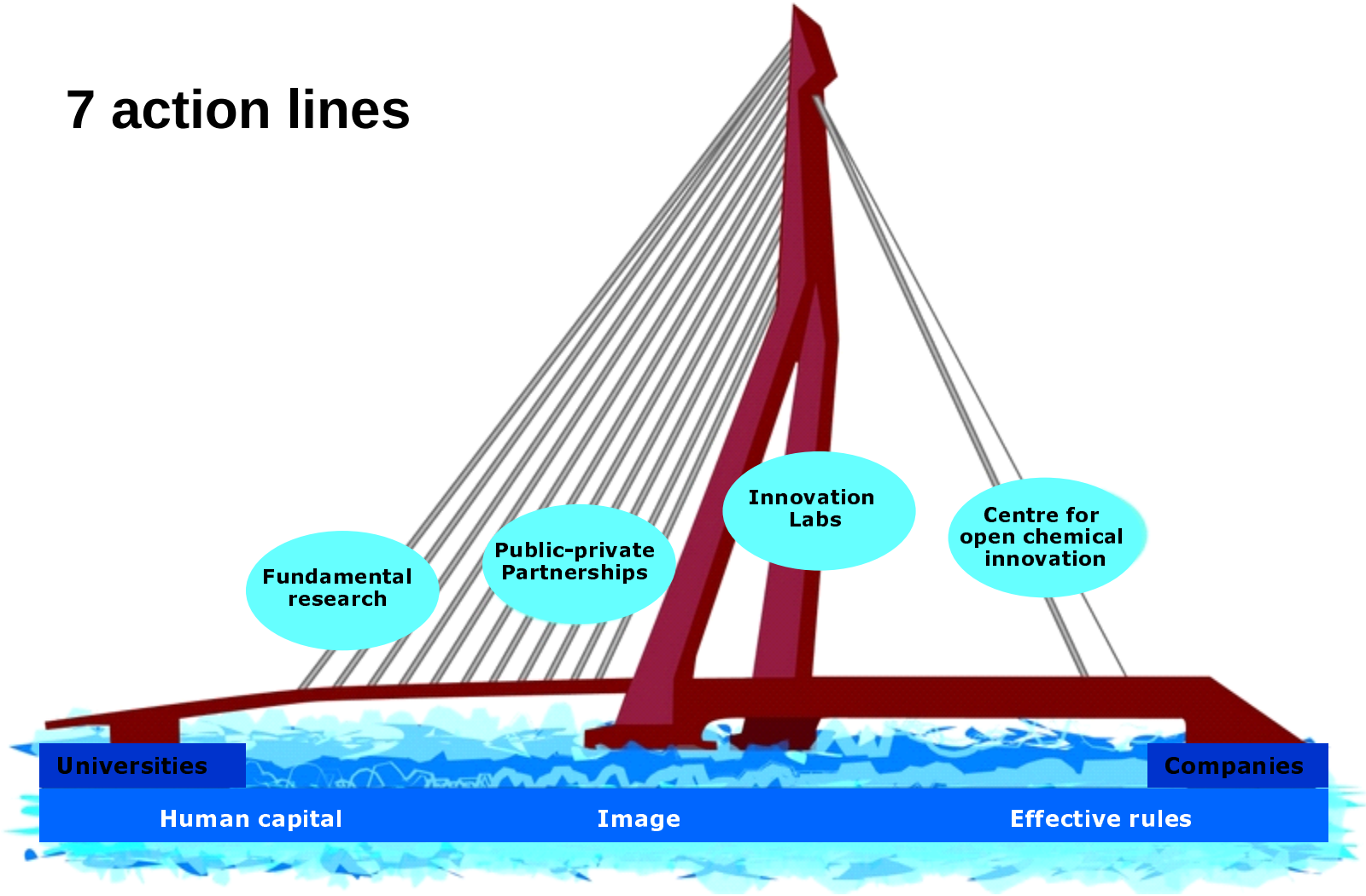
Dutch Chemicals Sector Innovation Programme

7 action lines



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Dutch Chemicals Sector Innovation Programme – Innovation lines & ambition

4 innovation lines - *public private partnerships*

- Scientific excellence and expertise
- International competitiveness and innovation drive

Contribution to overall goals	**1 Materials**	**2 Biotechnology for specialties**	**3 Catalysis**	**4 Process-technology**
Double contri-bution to GDP (*in 10 years*)	35-45%	20-30%	15-25%	10-25%
Halve use of fossil-resources (*in 25 years*)	20-30%	15-25%	10-25%	20-30%
Extra savings in value chain	> 25%		> 10%	

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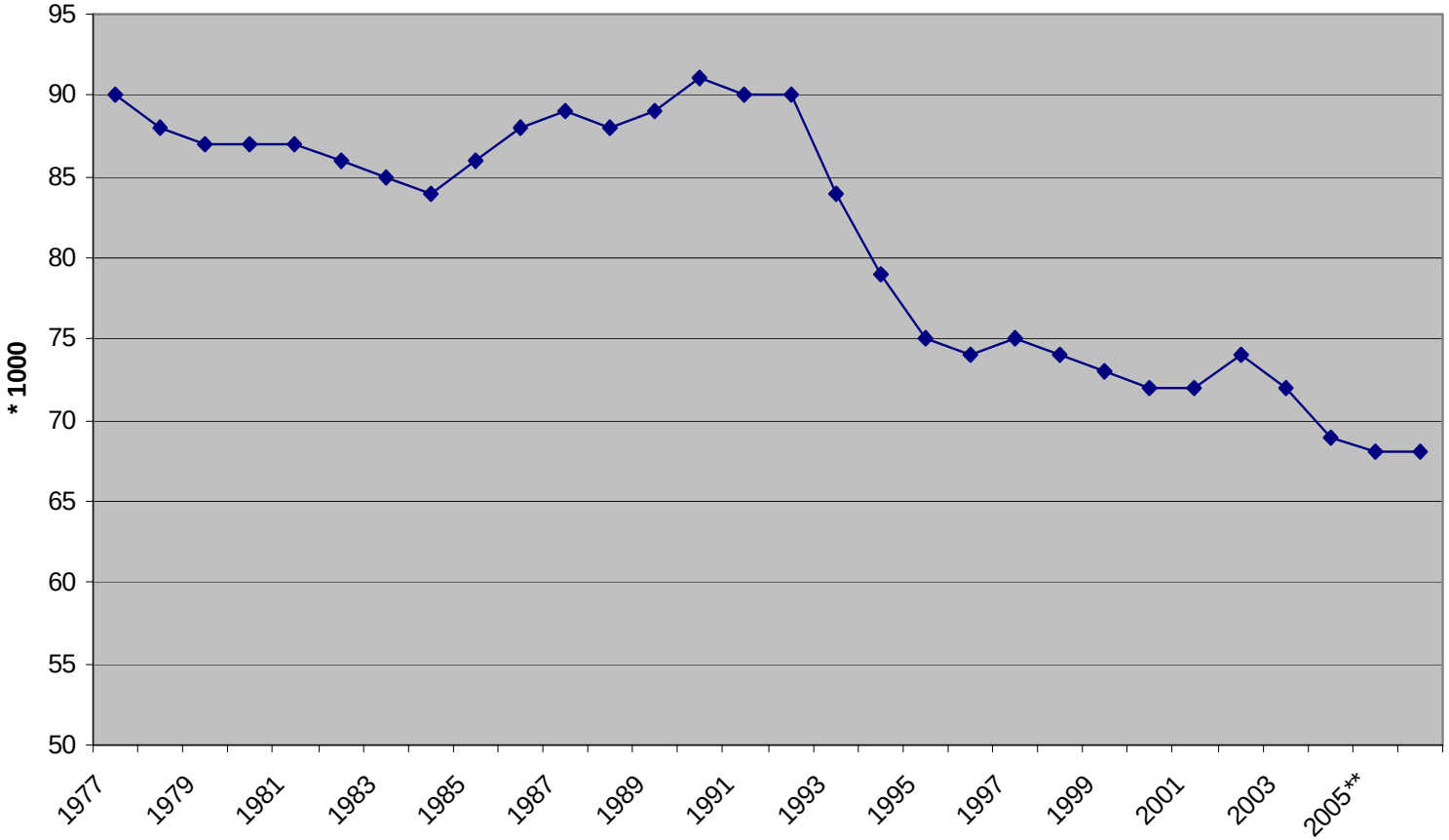
Working persons NL chemical industry



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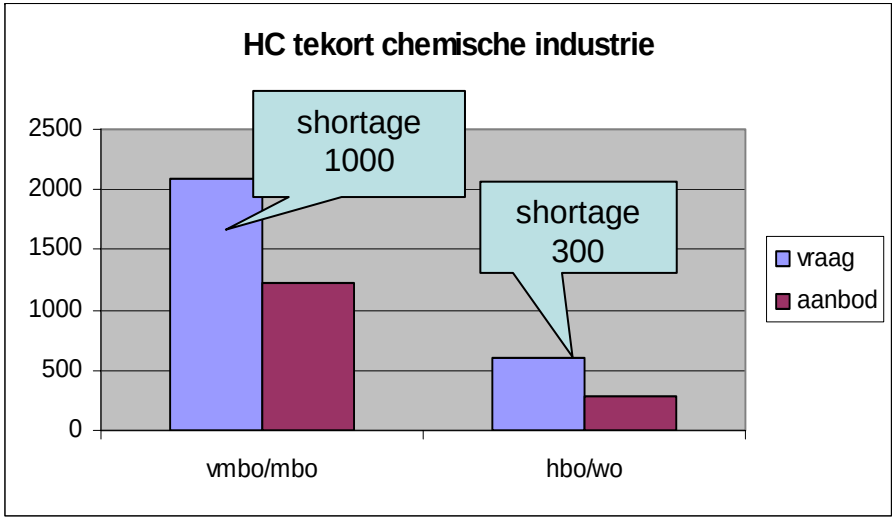
Human capital shortage per year



- Survey
- 61% of companies have problems
- Most affected: 44% (v)mbo
- 67%: will become worse in coming years

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Causes HR shortage in chemistry

- **Poor image chemistry study**
  - Versus high image of other sectors
- **Inadequate education material used, education system § method**
  - Not appealing to youngsters, too early decision on study path
- **Low (self) esteem and status of chemistry teacher**
  - Not enthusiastic in teaching chemistry
- **Dwindling alignment education – industry**
  - Insufficient knowledge of developments in industry
- **Perceived high investments for new business**
  - Low numbers of starters / entrepreneurs in chemistry
- **Poor image and lack of knowledge of chemical industry**
  - Lack of clear sight on career opportunities affecting entrants
  - Low threshold to leave
- **Outdated recruitment style**
  - Unable to meet expectations of graduates

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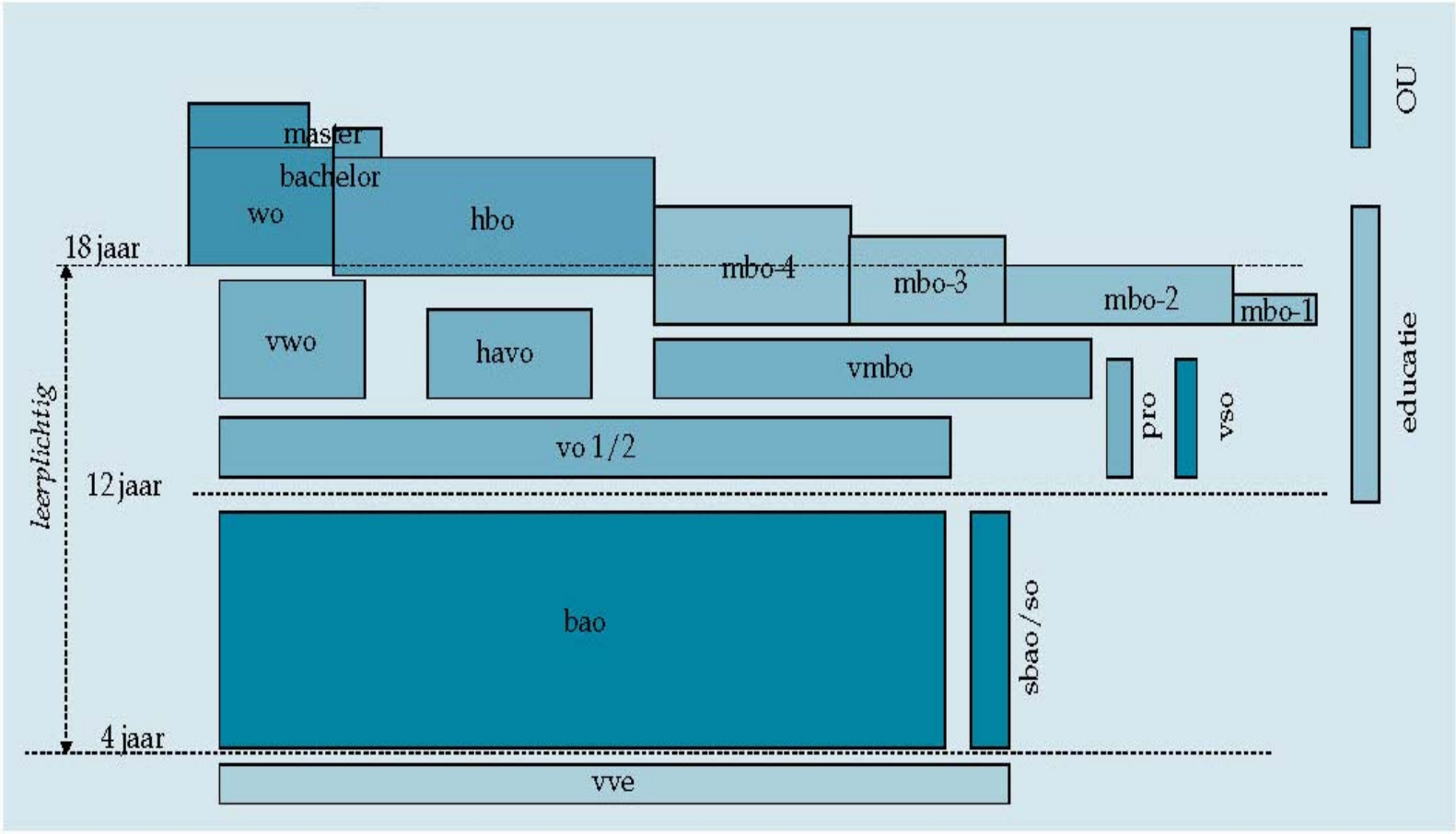
The risks of no action

- **Unable to meet expectations of innovative power of chemical sector**
  - Affect industry, academic society, value chain
- **Loss of opportunities: threat to industry and academic society**
  - Potential brain drain, impact on economy
- **Loss of appeal to HR talents**
  - Talented bèta people will go to other sectors or abroad

The Dutch education system



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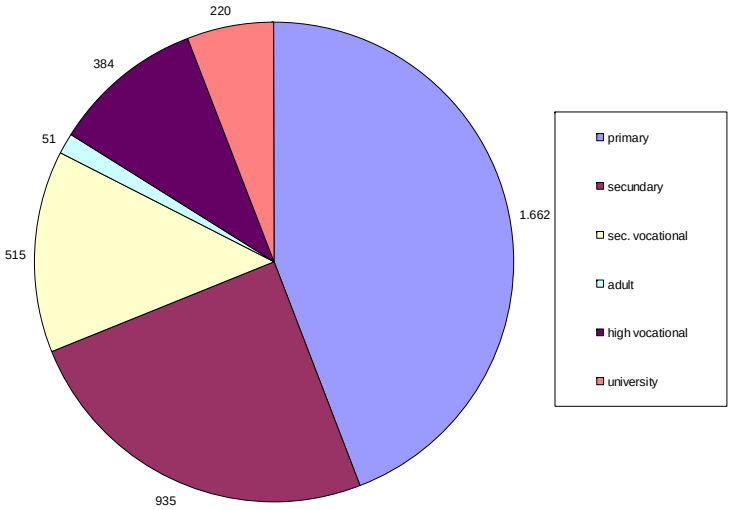
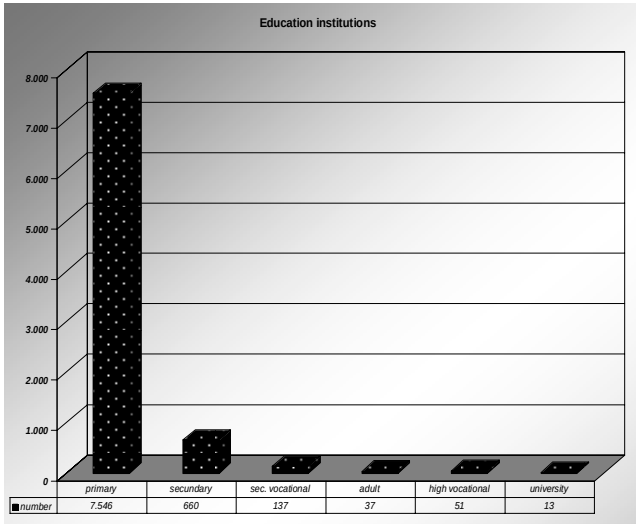
NL Students / education institutions – 08/09





Total: 3.767 *1000 persons in education

expenditures education 2008

M€	37,6
as % of GDP	6,3
per capita, €	2.290

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Promoting chemistry!

Stichting C3

1993: foundation C3 (Communication Centre Chemistry)

- VNCI, KNCV, NVON: industry, professionals, teachers
- Later: process technology education organisation, scientific research, applied science
- Focus: youth
- Develops school material and activities: action driven! Implemented by regions; coordinated by a network
- Demonstrating societal relevance of chemistry!



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Promote chemistry in primary school

- Focus: kids up to 12 years
- Also addressing teachers, assistants in schools, student-teachers
- Various programmes

Results 2008:

- Children lab at 13 events, 43 days, 13.287 kids did experiments
- 35.000 ‘experiments fan’ distributed (10 experiments)
- 237 speech packages
- Stand at 5 events promoting education material

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Promote chemistry at vocational schools

- Focus: youth 15-16 years
- Workshops for teachers and students
- Process and lab
- Various programmes
- Week of process technique

Results 2008:

- Week of process technique in 8 regions, 3.600 students (80 schools) visiting 47 companies and 6 schools for secondary vocational education
- Educational website on rubber and plastics
- 1.000 students secondary vocational joined interactive workshop on plastics

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Promote study or career in chemistry

- Focus: youth 14-18 years
- Website is focal point
- Annual Study Fair: exchanging experiences with students and young employees

Results 2008:

- 3.400 visitors at stand during Study Fair (4,5% of total)
- 31.000 flyers distributed
- 3 new videos on jobs in chemistry
- Included Applied Science and interactive site on life Secrets

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Context – concept teaching material

Government-installed committee to renew chemistry education

- New mode for teaching chemistry
  - Aligning with reality of 21st century youth
- Teachers are ‘owners’ of material, participating in developing, testing, using, updating
- Jointly with industry, university and input from students
- Examples:
  - Self healing materials; nano coatings; fertilisers in the industry; green chemistry; antibiotics
- Available via website
  - Easily updated

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Roadmap Human Capital Chemistry

Addressing:

- Promoting chemistry in education
  - C3 material
- Assisting teachers in keeping abreast of industry developments/trends
  - Concept – context modules
- Improving interface education – industry
  - Regional / local networks
- Promoting entrepreneurship in chemistry
  - Innovation labs / Centre for Open Chemical Innovation
- Updating recruiting methods and improving transparency of career opportunities in chemistry
  - Employability project

Life Long Learning

- The Netherlands: 20% of 25-65 age population is in learning process (vs 12,5% Lissabon)
- In 2008: 17%
- Extra: post-initial learning 15-65 age population
  - 2008: 1,5 million people (15,7% of this age bracket)

Reshaping University landscape

- **Focus and mass**: at least 100 new students per faculty
  - Integral approach education and research
  - Cooperation between universities
  - 7 faculties for BSc chemistry / chemical technology (down from 10)
    - Faculty size 250-300 students and 75% yield
  - Ample offer of international MSc courses
  - Selected focus for R&D

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New scheme Chemistry University landscape

		Innovatielijnen			
Focusgebied	zwaartepunt	Biotechnologie/voeding/farma	Materialen	Katalyse/ duurzame processen	Procestechnologie
Duurzame chemie en chemische biotechnologie	Katalyse en synthese	M	M	H	L
	(Bio)procestechnologie	M	M	L	H
	Voedingschemie en technologie	H	L	M	M
	Duurzame energie	M	L	H	H
Materiaal wetenschappen, fysische chemie en nanotechnologie	Polymeren	L	H	L	L
	Vaste stof chemie en functionele materialen	L	H	H	M
	Spectroscopie	M	M	M	L
	Theoretische chemie	M	M	M	L
Levens- en biomedische wetenschappen	Medicinale, bioorganische en synthetische chemie	H	M	M	L
	Biomedische chemie	H	L	L	L
	Structuurbiologie	H	L	L	L
	Chemische biologie	H	L	M	L
	Colloïdchemie en surfactanten	H	H	M	L
	Supramoleculaire chemie	M	H	L	L

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On to the future: needed skills

HLG Chemicals
Education and attracting talents: foundation of innovation and competitiveness.
Which skills needed to realise SusChem vision (Biobased Economy)?
And how will educational institutions and government assist?

In The Netherlands: Platform Agro – Paper – Chemical Industries

- Working together with other disciplines
- Different language, different approaches
- Defined a common vision and selected 3 routes
  - Proteins, bio-intermediates (building blocks), bio-products (ex plant)

Cooperation indicating: new combination of skills are needed!

The Netherlands are home to large international companies:
AkzoNobel, DSM, Shell, Unilever, Philips

Hundreds of SMEs (part of larger corporation as well as independent)

- All will play a role in a BBE
- Have participated in the Future Skills Project of ETP SusChem