

# Sustainable development and sustainability transitions



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## About myself

I am professor of Innovation and Sustainable Development at **ICIS**,  
(Maastricht University and professorial fellow at **UNU-MERIT**)

Maastricht University

Inaugurele rede



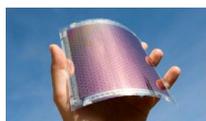
## Topics I have worked on

- Environmental policy instruments and technic change
- Sustainability transitions
- Green technology diffusion & adoption
- Innovation Policy
- Organic PV
- Waste management transition in NL
- Sustainable mobility
- Circular economy
- Urban Labs
- Social innovation



### Maastricht-LAB

- Ontstaan als katalysator in zoektocht naar nieuwe vormen van stadsontwikkeling
- Tijdelijk platform (tot 2014)
- Drie pijlers:
  - Nieuwcoalities
  - Experimenteren
  - Kennisuitwisseling



## My personal transition

- From econometrics to a multidisciplinary researcher
- With a special interest in methods and theory, and topics of green innovation, sustainability transitions and policy
- I am a critical methodological pluralist



## Books I have written with others



What's the biggest change  
*(in terms of innovation)*  
you have seen in your life?



## All these innovations have changed life

- Which means that they are having an impact on society



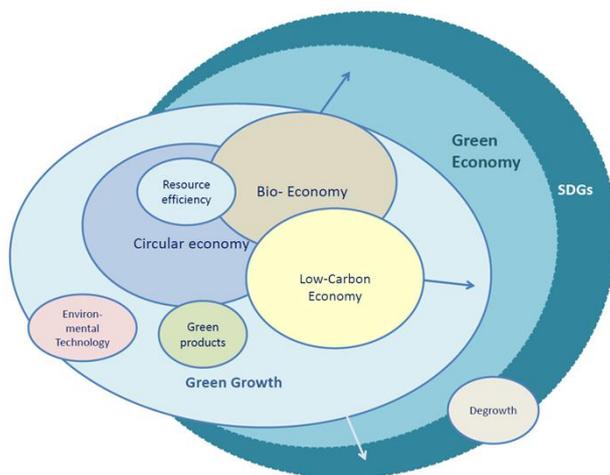
I am fascinated by historical processes of change, especially how we are part of these

Sustainable development is about remaking the world but what is positively involved in this, can we achieve this, if not, why not?

## Different types of innovation

- ✓ Product improvement
- ✓ Cleaner technologies
- ✓ Green ICT
- ✓ Waste management
- ✓ System innovation (requiring transitions)
  - Circular economy
  - Energy transition
  - Bio-economy
  - Another economy (more local, humane, inclusive, responsible)

## Different economies and types of eco-innovation



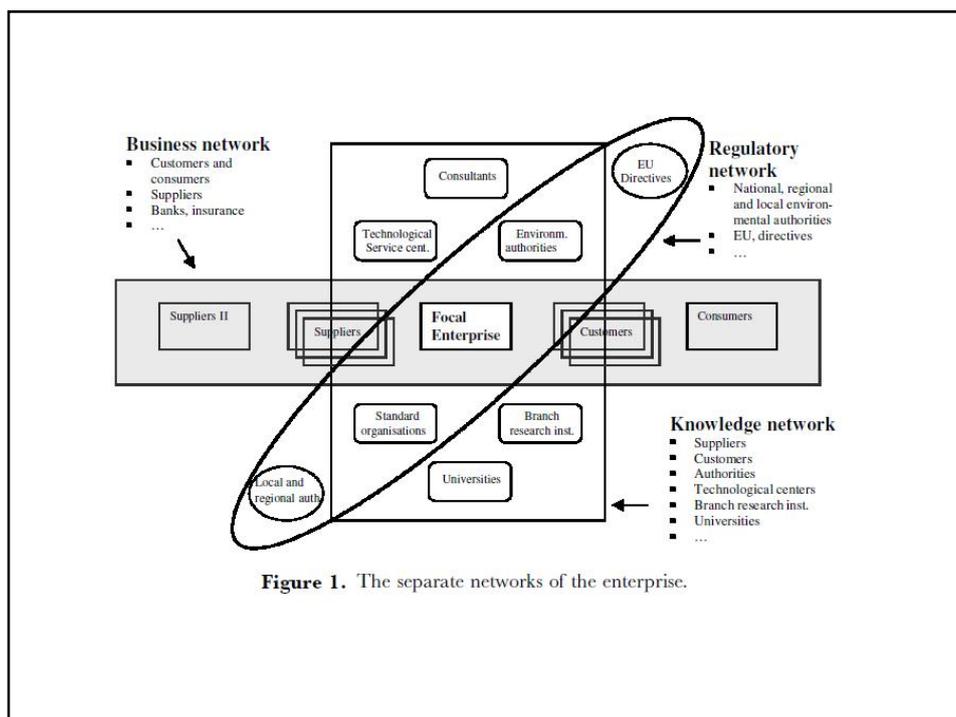
What do we know about innovation for sustainable development?

## Capabilities, willingness and cooperation are key elements

- Eco-innovation requires capabilities to eco-innovate, a willingness to spend money for utilising identified opportunities of innovation, and cooperation when part of the knowledge needed to innovate is not available internally.
- The willingness stems from various sources: pressures for cost-reduction, commercialisation prospects (demand from green customers), pressures from regulation, NGOs, clients, the parent company, feelings of obligations.

## The business case for eco-innovation

- An interesting finding from case analysis, is that companies respond differently to environmental stimuli not only because of differences in the pressures to which they are subjected, but also because the business case is understood differently (Gunningham in *Shades of Green: Business, Regulation, and Environment*, 2003)
- The most far-reaching response did not occur in the region with the most strict regulations, nor was the company's financial situation the best predictor.
- Pro-environmental behaviour is found to depend on "*how open and responsive managers are in dealing with regulator and environmental groups, how imaginatively and energetically they scan for win-win solutions, and what kind of calculus they employ in evaluating the business benefits of investments in environmental improvements*" (pp. 155–156.)



## 3 types of lock-in

- Sectors are locked into particular technologies, which lead companies to focus their attention to (non-disruptive) incremental innovation
- Policy is locked into fragmented policy approaches which somehow have to be aligned to SD goals
- Societies are locked into energy sources and combustion technologies, patterns of consumption that are material intensive and produce large amounts greenhouse gasses (Carbon lock-in)

## Transformative innovation

- Is broad in scope and radical in character
- It is about the implementation of a system-wide novelty
- It involves a wide diversity of actors and often takes decades to move from margins to mainstream
- It is dynamic and non-standardised
- It is disruptive from the viewpoint of incumbent actors (including users)

Sustainable development requires  
transformative innovation  
in the form of  
sustainability transitions

## Sustainable development is

- a process of change in which
  - the exploitation of resources,
  - the directions of investments,
  - the orientation of technological development,
  - and institutional change
  - are all in harmony
  - and enhance both current and future potential
  - to meet human needs and aspirations'
- (WCED, 1987)



- Sustainable development ties together concern for the carrying capacity of natural systems with the social challenges facing humanity (poverty, happiness, ..).
- It is about protection (of environmental amenities) *and* creation (of well-being and greater happiness)

## SD as a balance between economy environment and social issues

- Economic: An economically sustainable system must be able to produce goods and services on a continuing basis, to maintain manageable levels of government and external debt, and to avoid extreme sectoral imbalances which damage agricultural or industrial production.
- Environmental: An environmentally sustainable system must maintain a stable resource base, avoiding over-exploitation of renewable resource systems or environmental sink functions, and depleting non-renewable resources only to the extent that investment is made in adequate substitutes. This includes maintenance of biodiversity, atmospheric stability, and other ecosystem functions not ordinarily classed as economic resources.
- Social: A socially sustainable system must achieve distributional equity, adequate provision of social services including health and education, gender equity, and political accountability and participation.  
(Jonathan M. Harris, June 2000)

## SD as a moral obligation

- A just, more equitable world, in which hunger is eliminated, people have access to basic services (including education), are not excluded from decision-making, in which income is distributed more equally, in which there is an ethos of responsibility and respect for others, including nature and animals.

## Sustainability values

- Recognition of interdependence
  - Self-determination
  - Diversity and tolerance
  - Compassion for others
  - Upholding the principle of equity
  - Recognition of the rights and interests of non-humans
  - Respect for the integrity of natural systems
  - Respect for the interests of future generations
- (Porritt, *Capitalism as if the world matters*, 2007, p. 314)

## Strong and *weak* sustainability

- SD as non-decreasing welfare (Pezzey 1989, 1992)
- Environmental losses are accepted as long as they are compensated by economic gains (weak sustainability)

## SD is subjective and normative

- Sustainable development derives from social consensus on what we consider to be unsustainable and what constitutes progress, something that will differ across nations and localities.
- “SD is political concept, replete with governance questions” (Farrell et al. 2005)

## Domain definitions

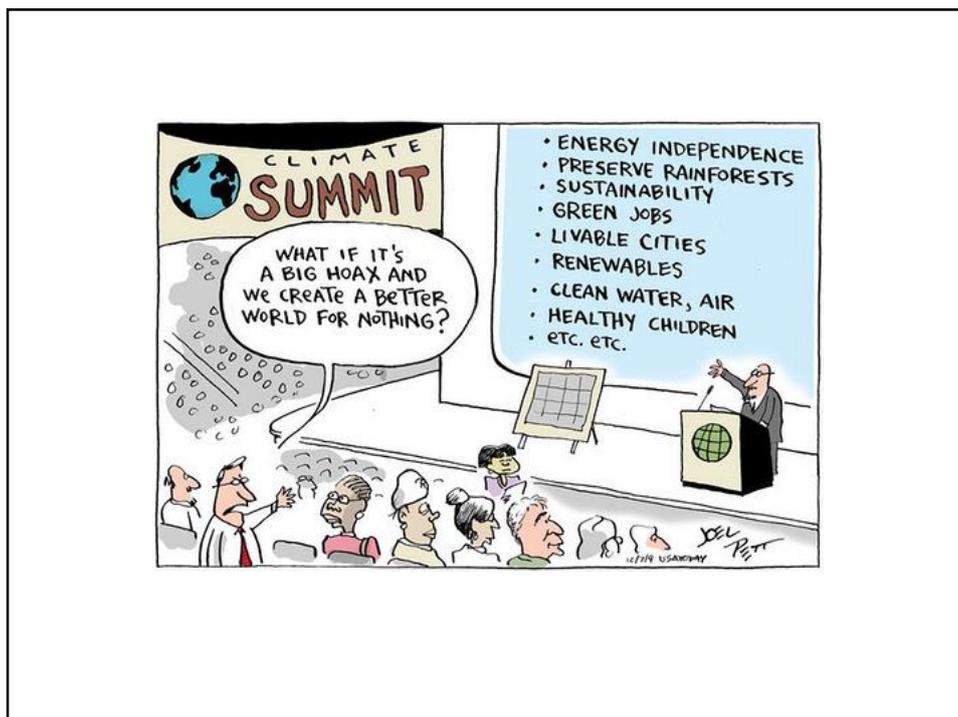
- In the case of energy, there is a consensus that only renewable energy is sustainable
- There is no agreed definition of what sustainable mobility is
- In the case of agro-food, we have disagreement about organic farming being sustainable (having to do with the larger land requirements)

## Different valid viewpoints

- I fully trust climate change researchers / I don't fully trust the results of climate change models
- Geo-engineering is a necessary / dangerous way of dealing with climate change
- The risks of nuclear power are something to be contained (through risk control) or to be avoided
- With time substitutes for depletable resources will be found vs we should recycle materials
- We are working too much vs we are not working hard enough
- ...

## Being sustainable





## Sustainable development

- Is a universalist notion ( a set of nice words!)
- Whose translation in practical action is contested (because of practical implications and different values)
- Het betekent van alles en (verplicht daardoor) tot niets
- DO en MVO zijn ingevoegd in de heersende gang van zaken en te weinig verbonden met innovatie en transitie

Bron: Verhagen, Onze gezamenlijke toekomst. Een tussenbalans van duurzame ontwikkeling, 2007

## Do we need the term SD?

What does SD as a  
*universalist and concretely contested*  
concept add?

## SD makes us reflect about

- Our needs and priorities
- The link between natural environment, economy and society
- Long-term system effects
- Risks
- Whether gains in one area are achieved at the cost of something else
- Innovation and transitions

## My own argument

- There are no technological solutions to SD
- SD is an ongoing process that requires multiple transitions in:
  - Energy, mobility and food systems
  - Resource use
  - Corporate behaviour
  - Governance
  - Knowledge production
  - Hearts and minds of people
  - People's lifestyles

- *For every complex problem, there is a solution that is simple, neat, and wrong ... (attributed to H. L. Mencken)*
- *One has to make up his mind whether he wants simple answers to his questions – or useful ones... ....you cannot have both—Joseph Schumpeter*
- *What this world needs is a different world – Kamagurka*

## About capitalism

- Capitalism is often viewed as the culprit of the ecological crisis
  - It is efficiently serving consumer needs, giving people what they want, *versus*
  - It is fuelling desire and is associated with exploitation of nature and people
- What we need is a Capitalism *as if the world matters* (Jonathan Porritt) and saner, more sustainable forms of growth (Dani Rodrik)

## A transition in capitalism



*Competitive markets are wonderful—so long as, in the spirit of Adam Smith, they benefit many of us while serving some of us. **What we are seeing instead are markets of entitlement, which benefit some of us at the expense of many of us:** markets for subprime mortgages, markets for executive compensation, markets for housing that favor absentee owners over local residents, markets that are destroying the planet by what they allow us to ignore as externalities – **Henry Minzberg** in *Rebalancing Society**

## What business is doing in terms of SD

- Cleaner production
- Greener products
- Environmental management and auditing systems (EMAS)
- Corporate social responsibility (CSR)
- Charity (community work)
- ....

## Official CSR policy

Companies were asked whether they have official policies in place to address the 10 CSR issues and whether quantitative targets have been defined to measure and improve corporate performance.

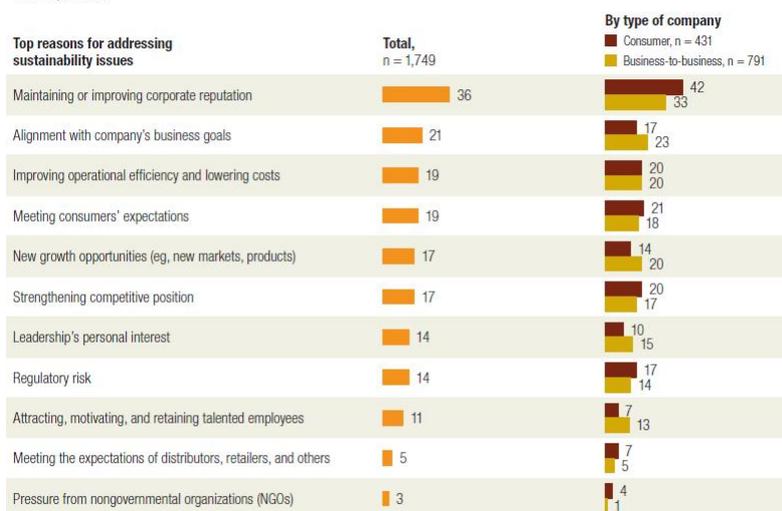
	Policy	Quantitative targets
	%	%
1. Health and safety	96	69
2. Corruption prevention	96	39
3. Labor rights	90	35
4. Transparency of business practice	86	41
5. Fair trade and fair procurement	71	28
6. Income equality and fair wages	71	28
7. Climate change	63	55
8. Ecological diversity	53	31
9. Education	41	37
10. Poverty	18	4
<i>Average issue coverage</i>	68	37

60% of the companies have policies on at least 7 of the 10 CSR issues.  
 34% of the companies have set quantitative targets for at least 5 CSR issues.



## Companies' motivations for sustainability actions

% of respondents<sup>1</sup>



<sup>1</sup> Respondents who answered "don't know" are not shown.

From: McKinsey Global Survey results How companies manage sustainability, p. 3

## CSR has been evaluated negatively

- The incremental approach of CSR has not made any impact on the massive sustainability crises that the world faces, many of which are worsening at a pace that far outstrips any CSR-led attempts at improvement.
- **CSR is usually a peripheral corporate function, even when a company has a CSR manager or a CSR department. Shareholder-driven capitalism is pervasive, and its goal of short-term financial measures of progress contradicts the long-term stakeholder approach to capitalism that is needed for CSR to have any meaningful results.**

Bron: Visser

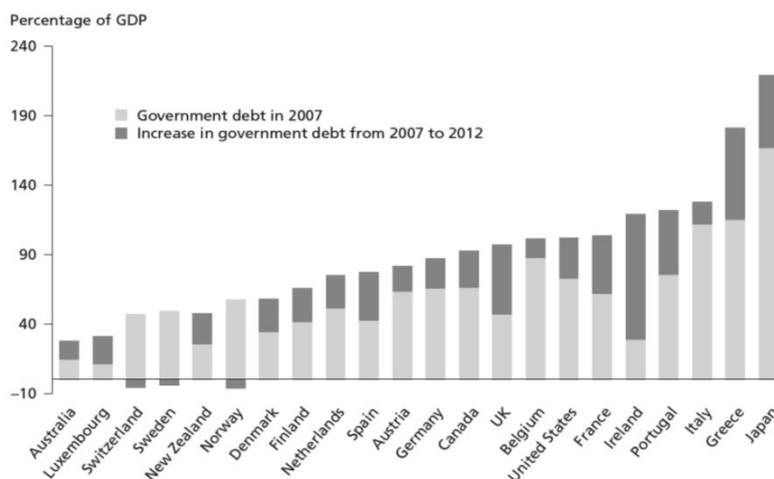
## Fair trade: a globalisation success



## Going into debts

- Imposes costs on future generations
- Was a major factor in the 2008 crisis
- Creates a continuing need for economic growth

### Increase in government debt after the financial crisis



Source: Streeck (2013) based on OECD Economic Outlook, Statistics and Projections database



Transitions to more sustainable systems of energy, mobility, housing & resource use



## Examples of “sustainability transitions”

- In energy: moving to renewables (solar PV, CSP, biofuels, geothermal, hydro, ...)
- In mobility: bicycles, modal shift, intermodality, green cars, reducing the need for transport
- In waste management: waste prevention, recycling and re-use
- Resource efficiency as a cross-cutting challenge (together with responsible behaviour)

Transitions based on  
transformative innovation

## Transformative innovation

- Is broad in scope and radical in character
- It is about the implementation of a system-wide novelty (system innovation)
- It involves a wide diversity of actors and often takes decades to move from margins to mainstream
- It is dynamic and non-standardised
- It is disruptive from the viewpoint of incumbent actors (including users)

Source: Fred Steward, *Breaking the Boundaries. Transformative change for the Common Good*, 2008

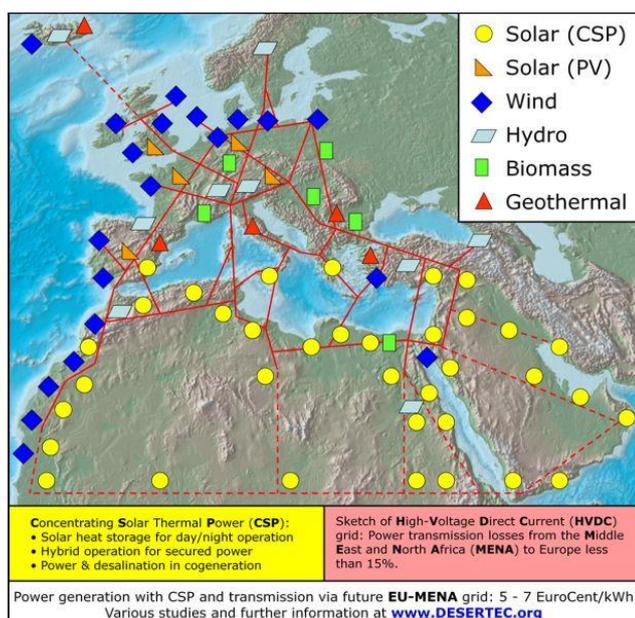
## Possemarré (DE)



- Passive homes with heat exchange system (100 m deep)
- New destination of old factory
- Located near public transport hubs to Dusseldorf and Wuppertal
- Urban element in green environment (Neadertal)
- Different age groups
- Working and living
- KfW loans for eco-houses

## DESERTEC

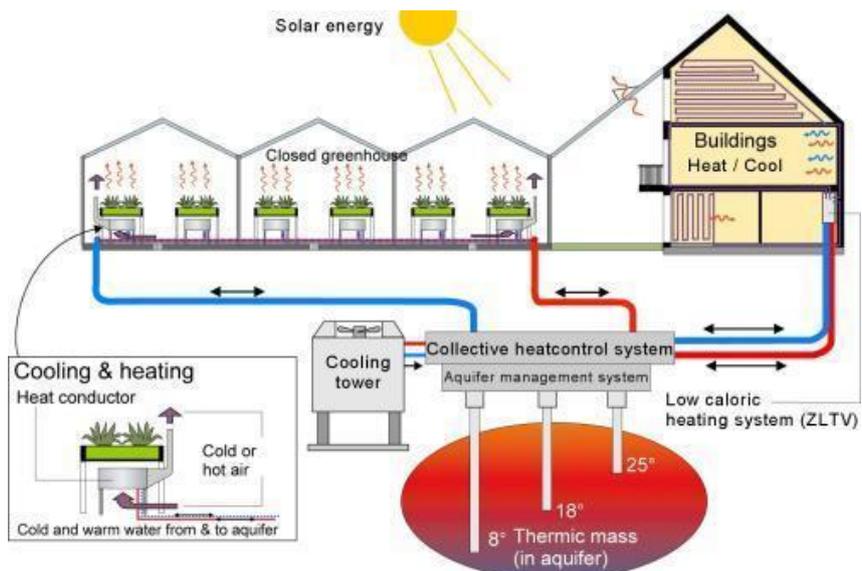
- Concentrating Solar Thermal Power (CSP) plants in the Sahara-desert
- Parabolic mirrors heat oil in troughs to 500 C
- Clean electrical power that can be transmitted via High Voltage Direct Current (HVDC) transmission lines with relatively little transmission loss to Europe (10-15%).
- Heat storage tanks (e.g., molten salt tanks)
- Waste heat may be used to desalinate sea water.
- An element in HVDC- supergrid across Europe



# Cradle to cradle bio-mimicking



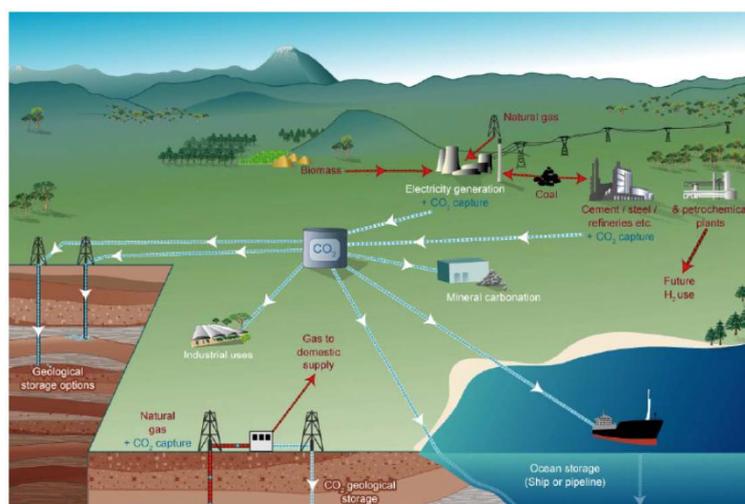
## The energy-producing greenhouse



# Vehicle to Grid (V2G)



# Carbon capture and sequestering as a techno-fix



## Sustainability gains may be found within existing regimes and in alternative regimes

- Fossil fuels use can be made more sustainable:
  - Carbon capturing and sequestering
  - Fuel efficient ICE cars
  - Weatherproofing of homes
  - ...
- But we should also explore alternative trajectories in a prudent way

## Themes about transformative innovation

- They are about systems
- Sociotechnical elements
- Multiple configurations (non-standardised)
- There are dynamic
- Sustainability benefits have to be secured and not just taken for granted
- From small steps to step change (hybrid forms, branching, new combinations, ..)

## Sustainability transitions include two challenges

1. A long-term change to alternative technologies and infrastructures,
2. Ensuring that values and consumer criteria change in the same move.

Source: Kemp and van Lente (2011)

## The first challenge

- Transformative change is disruptive, causing resistance from powerful companies and users
- Regime-changing options compete with regime-improving options in an unlevel playing field
  - ETS favours the co-burning of biomass;
  - consumers favour fuel-efficient cars over electric cars for reasons of costs and range)
- Hybrid forms and fit-stretch patterns offer a way out

## The second challenge

- Renewables have their own set of problems: visual intrusion (wind power), high costs (solar PV), energy security (CSP from deserts), ..
- Better and more cheap public transport promotes mobility, public bike compete with public transport, not with cars.
  - à Sustainable energy is about *sustainable use of renewables* and sustainable mobility is about *reducing car mobility*;
  - à The second challenge adds costs and difficulties to the first challenge

## Looking at different transitions

- In the transitions to modern sanitation and water management, sustainability benefits were achieved but also missed
- In the ongoing transition to sustainable mobility, the issue of material-intensity of mobility and excessive mobility are not being addressed

Source: Cohen (2010)

## A transition in values

- More responsible & communal
- Less materialistic
- Self-improvement
- Sufficiency



## The high price of materialism

- People who are highly focused on materialistic values have lower personal well-being and psychological health than those who believe that materialistic values are relatively unimportant.
- People with a strong materialistic orientation are likely to watch a lot of television, compare themselves unfavourably with people whom they see on television, be dissatisfied with their standard of living and have low life satisfaction.
- People who hold materialistic aims as central to their values have shorter, more conflicting relationships with friends and lovers.
- From **Tim Kasser** *The high Price of Materialism*



People believe in materialism because society is so materialistic, and society is so materialistic because many people believe that materialistic pursuits are a path to happiness.

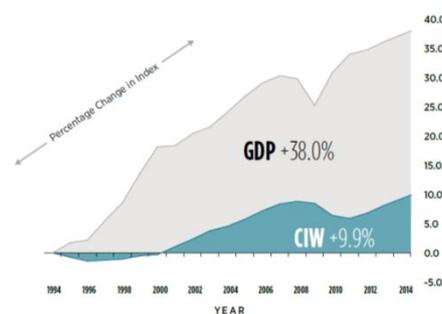
# A good life as a societal orientation

The [EU Quality Life Expert Group](#) followed the suggestion of the Sen-Stiglitz-Fissouri report to pay more attention to eudaimonic measures for well-being, dealing with psychological functioning, the fulfillment of human potential or a life worth having. Time use survey may be used for determining whether time activities are experienced as pleasurable.

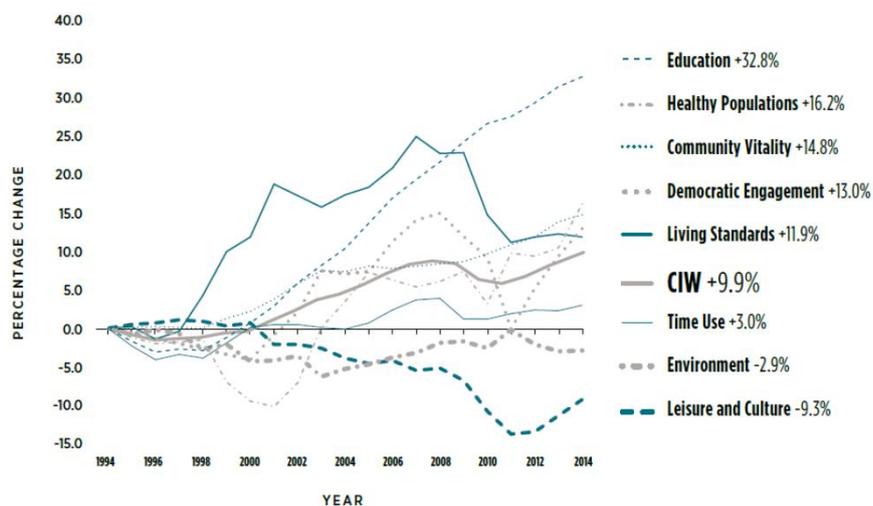
An example of a composite index is the Canadian Index for Well-being (CIW)



Trends in the Canadian Index of Wellbeing and GDP (per capita) from 1994 to 2014



Trends in the Canadian Index of Wellbeing and Its Eight Domains, 1994 to 2014



## A transition in life styles and habits

- Slow time
- Eating less meat
- Refraining from high-mobility life
- Better work-family balance
- More mindful (less poverty of mind)
- Doing things that are meaningful
- *De kunst van het goede leven, waarin het ware, het schone en het goede samenkomen – Bram van de Klundert*



- Transformative innovation presents a difficult issue for policy as it involves substantive risky investments, conflicts between emergent and incumbent actors and reconfiguring the traditional sectoral and policy boundaries (Steward, 2008)
- At present neither innovation policy nor sustainability policy are configured to allow a serious pursuit of transformative innovation

- “Bij alle definities en omschrijvingen van duurzaamheid (...) wordt voorbij gegaan aan moeilijke afwegingen en keuzes. Er wordt gesproken in termen van een ´balans`, het voldoen aan het een zonder dat dit ten koste gaat van het ander, zoveel mogelijk positiefs en zo weinig mogelijk negatiefs, enzovoorts. Duurzaamheid is een soort vredig eindbeeld. Duurzame *ontwikkeling* daarentegen, het proces om dichterbij dat eindbeeld te komen, draait om het maken van prioriteiten, lastige afwegingen en pijnlijke keuzes.”

(Flor Avelino)

The transition perspective  
offering (some) hope

## Some historical examples of transitions

1. From sail to steamships UK (1840-1890)
2. From horse-drawn carriage to automobiles US (1870-1930)
3. From cesspools to sewer systems NL (1870-1930)
4. From pumps to piped water systems NL (1870-1930)
5. From traditional factories to mass production (1870-1930)
6. From crooner music to rock 'n' roll US (1930-1970)
7. From propeller-aircraft to jetliners US (1930-1970)
8. Transformation of Dutch highway system (1950-2000)
9. Ongoing transition in NL electricity system (1960-2004)
10. Pig meat: From mixed farms to bioindustry (1930-1970)
11. Emergence of horti-culture (1900-1970)

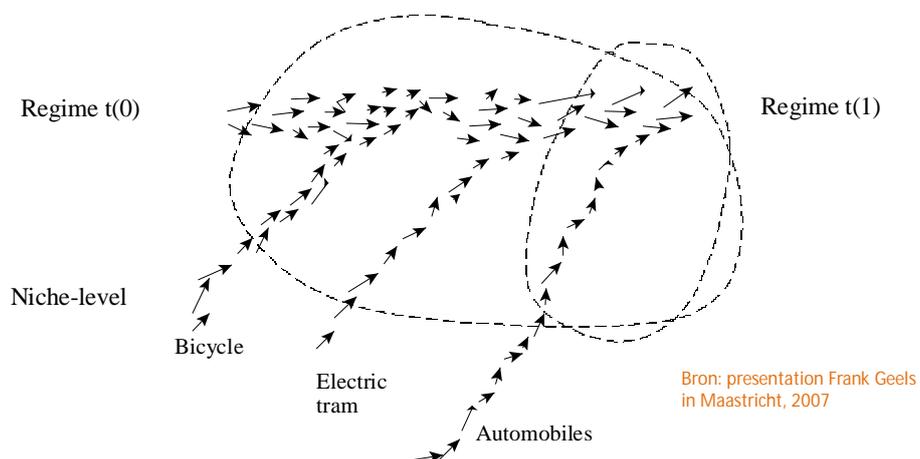
From presentation Frank Geels in Maastricht, 2007

## A transition is not caused by a technology or single factor

- Multiple developments are involved, many of which preceded an innovation
- Example of cars:
  - Suburbanisation *preceded* the use of cars
  - Car use went hand in hand with an increase in mobility and new practices (vacations, recreational trips, ..)
  - There was a process of niche proliferation: races, doctors, farmers, middle class, ...
  - The features of cars changed in reaction to societal demands besides user demands



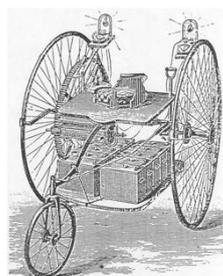
## Automobiles were last step in longer transformation process



## Emergence of automobiles in niches

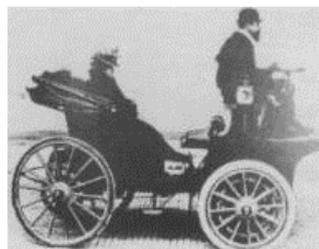
### 3.1. Electric vehicles:

- Light tricycles
- Heavy coaches



EV used in:

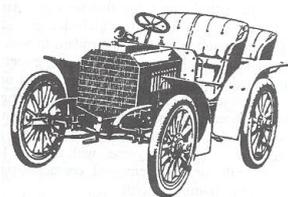
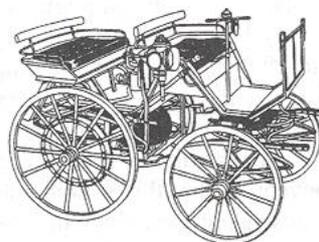
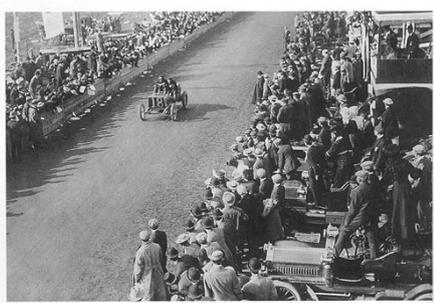
- Parks, promenading
- Taxi-niche (EVC, 1898-1902)
- Speed racing
- Long-distance racing (failed)



Bron: presentation Frank Geels in Maastricht, 2007

Gasoline cars, used in:

- a) racing
- b) touring (adventure, practicing health, repair skills)



Build on: petrol infrastructure,  
repair network, cultural enthusiasm

Bron: presentation Frank Geels  
in Maastricht, 2007

## The gasoline car outcompeting other types of cars

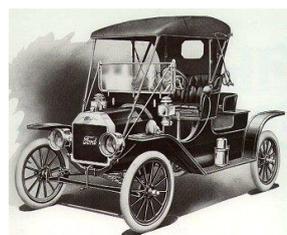
	1900	1905
Electric cars	1.575	1.425
Steamers	1.681	1.568
Gasoline cars	936	18.699
Total	4.192	21.692

Towards practical use: Doctors, salesmen, taxi

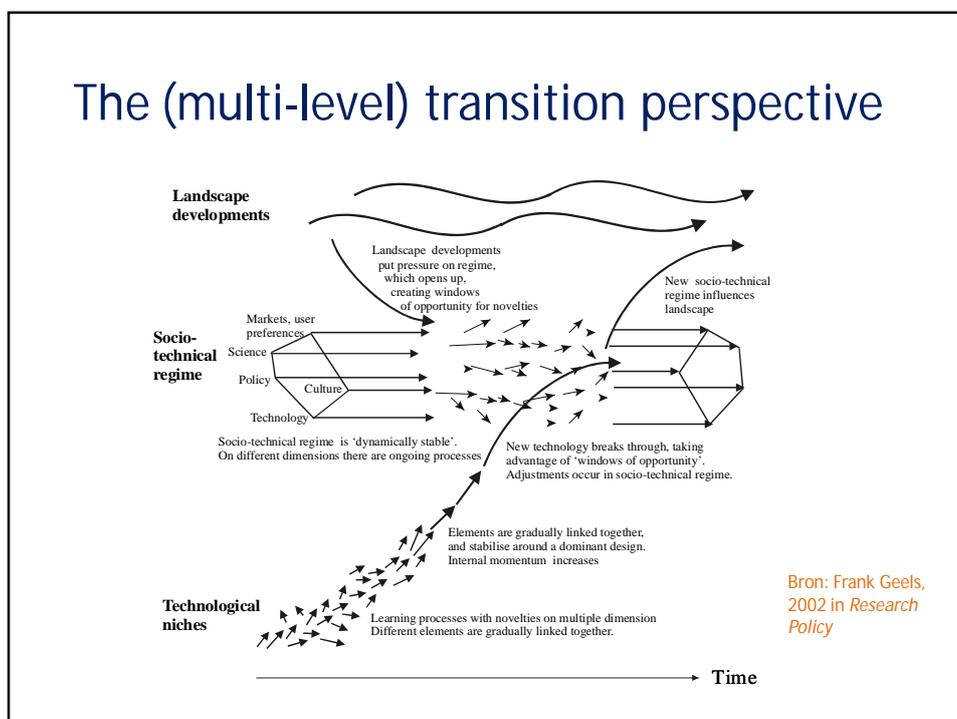
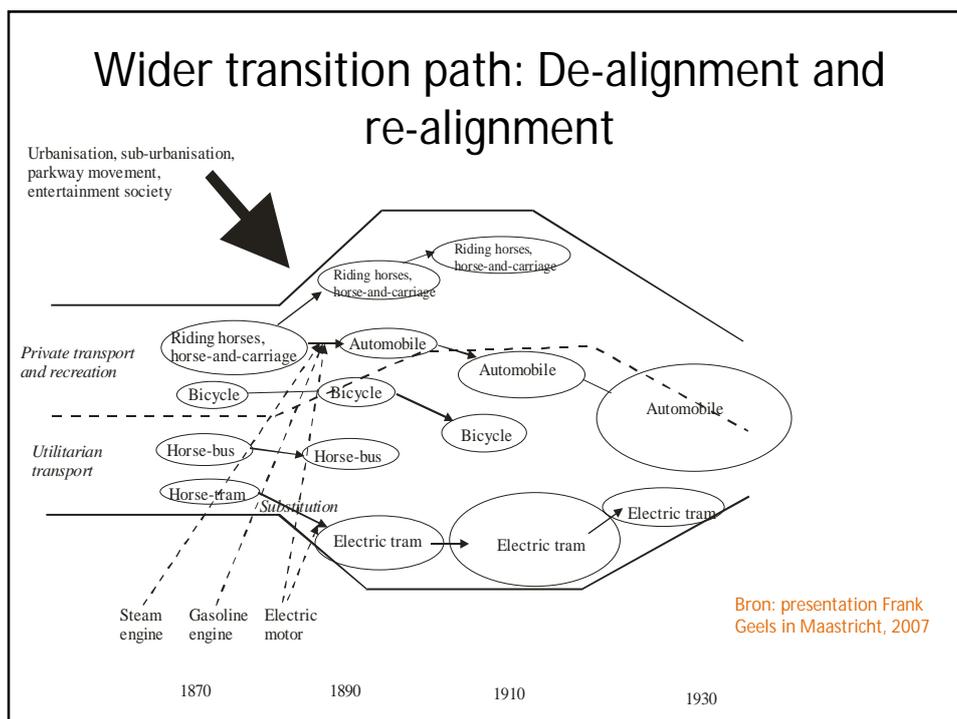
T-Ford dominant design: cheap, strong, sturdy

**Opposition: Accidents, speeding**

**Institutional defusion:**  
Speed limits, driver licenses,  
driving schools, traffic rules



Bron: presentation Frank Geels in Maastricht, 2007

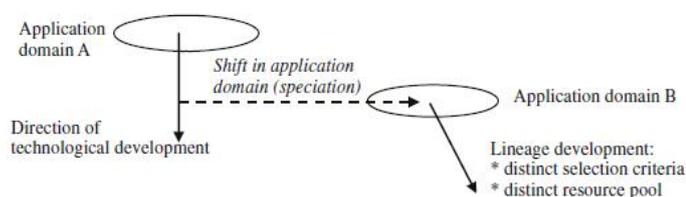


## What are niches?

Places in which novel configurations develop and grow

Niches are application domains with distinct selection criteria and resource pools

In which there may be an element of deliberate protection



Speciation in technological development (Levinthal 1998: 223)

## Regimes

### Regimes as socio-technical systems

- "a mutually aligned, established set of technological artifacts, use patterns, institutional contexts, regulations, infrastructures etc. that prevail for delivering a specific service, e.g. personal mobility" (Truffer et al., 2008, p. 1361)

### A practice-centered view of regimes

- "the whole of implicit and explicit rules and associated ways of thinking that guide practical behaviour of professional people and which is being reconfirmed by everyday practice" (Loeber)

## What is behind the idea of regimes?

- The idea that practices and structures “reproduce” each other (duality of structure)
- New practices require well-developed systems for their use, but such systems require users, companies, professionals for their development (“chicken and egg” problem → Lock-in )
- Regime actors favour regime-preserving change (it is in the interest of many people to stay with the present regime)

## Examples of regimes

- Supply-oriented education
- Supply-oriented system of health care
- Car-based mobility
- Regime of centralised electricity production

## What is not a regime?

- Even when people quite regularly combine different modes of travel, **there is no regime of intermodal travel**:
  - There are no organisation one can turn to for this offering informational services, booking and billing services
  - **Intermodal travel is used when it is not convenient or practice to use a car or bus for the whole trip** (but transport systems are not organised towards this end).

## Other non-regimes

- Bicycles
  - Cradle-to-Cradle products
  - Decentralised electricity production
- They are “niches” with some regime-like features (niche-regimes)

## The landscape consists of the wider context consisting of

- Roads, towns, cities, ..
- Values, beliefs, norms, ..
- Aspirations and concerns of people
- Political associations,
- Prices, taxes, ..
- Life styles
- International relations in the global economy



"In a U.S.-China trade war, who has more to lose?"



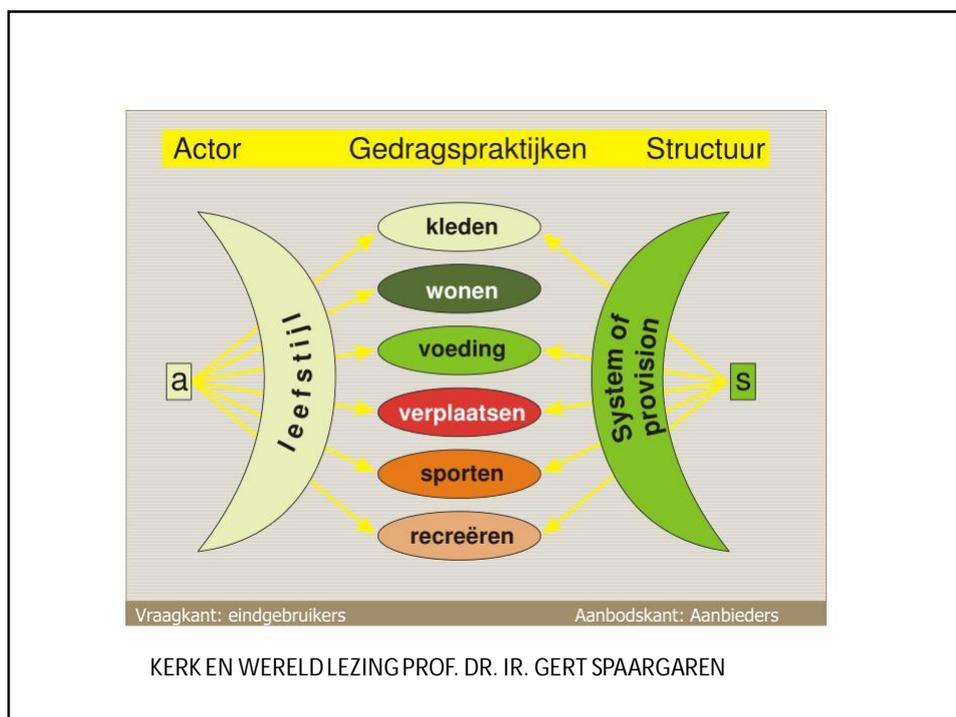
## De burger-consument

Kenmerken van de 'moderne' burger consument?



'de' burger-consument = 'zo goed als de situatie toestaat'

KERK EN WERELD LEZING PROF. DR. IR. GERT SPAARGAREN



## Over transities

- Een mens kan van A naar B gaan maar een samenleving niet (die evolueert).
- In onze complexe samenleving met hindermacht en gegroeide afhankelijkheden kun je niet een nieuw systeem ontwerpen en realiseren. Dat is onmogelijk om ten minste twee redenen:
  - *Geen actor heeft het benodigde overzicht en overwicht*
  - *Het nieuwe is niet op alle onderdelen beter maar scoort slechts beter op een deelaspect; pas na langdurige verbetering en aanpassing en verandering van de omgeving kan het nieuwe doorbreken.*

## Tussen droom en daad ...

- **Er is het bestaande én het nieuwe**, naast elkaar (co-existentie), waarbij het nieuwe te maken heeft met de *ingesteldheid* van de maatschappij op het bestaande en in zekere zin ook belang heeft bij het voortbestaan daarvan. Het is een misvatting om te denken dat we het nieuwe slechts hoeven te willen en dat dit er als vanzelf zal komen.
- Talrijke weerstanden in de vorm van institutionele inertia en 'vanzelfsprekendheden' moet overwonnen worden
- Nieuwe werkwijzen en technologieën zijn ook niet beter op alle onderdelen maar behoeven meestal aanpassing en verandering

## Lastige vraagstukken voor transitie-professionals

- Hoe ga je om met het conflict tussen korte termijn mogelijkheden en lange termijn wenselijkheden?
- Hoe ga je om met de spanning tussen economisch en duurzaam?
- Hoe ga je om met de noodzaak van bescherming en het blootstellen aan kritiek?
- Hoe ga je om met de spanning tussen flexibiliteit en standaardisering?

Bron: Kemp and Grin (2008)



## Suggesties

- Plaats korte termijn handelingen in een lange termijn perspectief, waarborg een systeem-innovatief idee
- Maak leerprocessen leidend in plaats van haalbaarheid
- Wees kritisch op eigen aannamen, zoek de kritiek op, wees niet te beschermend
- Kies niet te snel voor een bepaalde configuratie, heb oog voor relevante trends in de samenleving
- Werk met partijen die open staan voor verandering en ga daar allianties mee aan
- Houd er rekening mee dat sommige spelers zich niet te ver van hun achterban kunnen verwijderen zonder hun gezag op het spel te zetten

Bron: Kemp and Grin (2008)

## Karakteristieken van transitie-experimenten

Inhoud	Proces
Het transitie-experiment heeft een van te voren gearticuleerde duurzaamheidsvisie die maatschappelijke voordelen combineert met voordelen voor gebruikers (die zich voortdurend afvragen: "What's in it for me?").	Gebruikers én overheden zijn betrokken bij de keuze en opzet van het experiment waardoor draagvlak ontstaat. Hierdoor wordt vanaf het begin rekening gehouden met gebruikerswensen en support van overheden, die daardoor geëngageerd zijn.
Het project gaat uit van een maatschappelijke probleem waarvoor je oplossingen zoekt (en is dus niet oplossingsgericht maar probleemgestuurd).	Er vindt terugkoppeling van de resultaten van leeracties plaats naar de actoren (leerproces en leereffect).
Het project is opgezet volgens een 'open systeem' design dat ruimte laat voor aanpassing en oog heeft voor toekomstige verbreding van het experiment (opschaling).	De betrokkenen zijn bereid om langdurig met elkaar samen te werken, wat vroegtijdig afhaken voorkomt.

Inhoud	Proces
Leerdoelen zijn leidend. Men kan er voor kiezen om juist in een moeilijke omgeving iets uit te voeren en om het experiment bloot te stellen aan kritiek.	Tegenslagen worden geaccepteerd en mogelijke weerstand geanticipeerd. Door met tegenstanders in dialoog te treden worden zij op een constructieve manier in het proces betrokken.
Er is tijd genomen voor de opzet van het experiment, en andere opties zijn ook verkend.	Het project speelt in op trends en ontwikkelingen in de technologie, culturele verandering etc.
De keuze voor een configuratie is een afgewogen keuze, en niet simpelweg het voorstel van de technologie-aanbieder.	Er is aandacht voor kennisoverdracht naar andere partijen (gemeenten, nationale overheid, partnerngemeenschappen met soortgelijke problemen) via een communicatiestrategie.
Initiator en gebruiker (er)kennen elkaar. Hierdoor kunnen behoeften, drijfveren en knelpunten van de doelgroep meegenomen worden in het experiment, waardoor aanjager / initiator geloofwaardig en betrouwbaar overkomt.	Terugkoppeling van de resultaten vindt plaats naar een strategisch niveau, bijvoorbeeld een stuurgroep of denktank van een programma voor systeem-innovatie. Die stuurgroep moet zorgdragen voor een goede portfolio van experimenten.

## De resource nexus

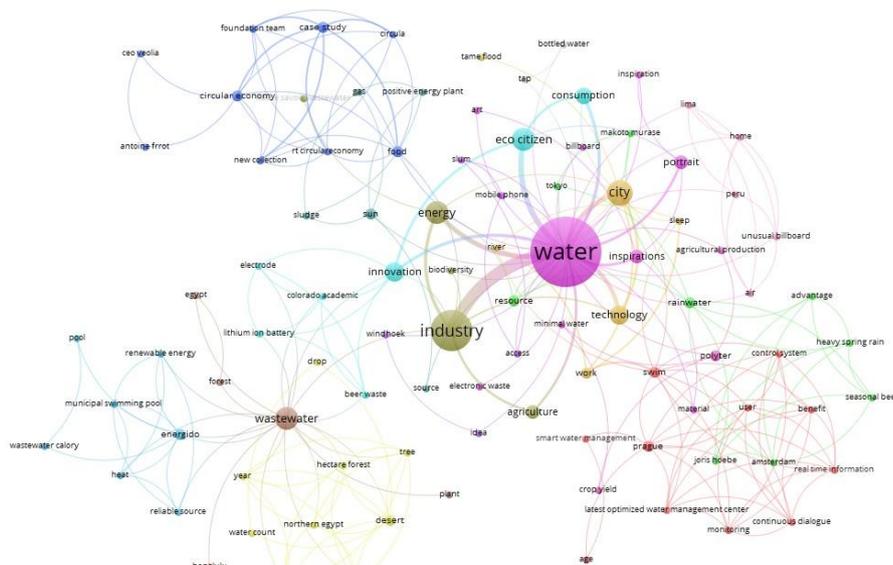
- **Cities around the world** are involved in **three transitions**: the shift away from fossil fuels (**energy transition**), flood protection and alternative systems of water provision (**water transition**) and the creation of a circular economy (**resource transition**)
- These different transitions have started to influence one another but the interplay is poorly studied and for this reason not taken up well in plans and investment decisions of private, public and semi-public actors
- → **Positive opportunities for change are missed and negative spillover effects are not prevented through proactive management**
- Examples of synergies are: using the water in abandoned coal mines (or other aquifers) for heat/cold storage, energy storage via pumped hydro power, recovery of heat in warm household water, sewage sludge as a fuel in cement factories (using renewable energy for dewatering the sludge), avoiding sewage overflows (via green roofs and gardens with less tiles), energy renovation projects as projects for upskilling unemployed people (youngsters, status holders), co-housing based of green construction

## CIRCULAIRE ECONOMIE EN WATER

### GEVOEL VAN URGENTIE NEEMT TOE

- We hebben op dat gebied internationaal een toonaangevende positie: biogas uit organische reststromen, fosfaat uit afvalwater, olie en vet als biobrandstof, en ammoniak als bio-fertilizer, zoals we dat hier bij Nijhuis doen. Een prachtig voorbeeld is het [Nutrient Platform](#) dat met alle stakeholders, inclusief de overheid, in Nederland én Europa aan tafel zit om wettelijke barrières uit de weg te ruimen, bijvoorbeeld voor het vermarkten van teruggewonnen fosfaat. Dat begint echt te lopen en trekt internationaal veel aandacht. Binnen dat circulaire denken ga je ook andere keuzes maken in het hele ketenontwerp. Als je weet dat je bepaalde stoffen kunt hergebruiken, ga je je proces anders inrichten.
- We worden in Nederland tegelijkertijd geroemd om onze integrale aanpak, we onderscheiden ons met ons uitgekende 'ecosysteem' van publiek en privaat, met technologische knowhow én een uitstekend governance model.

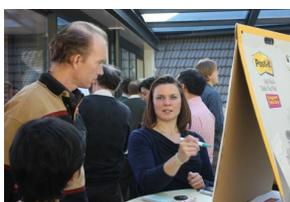
Bron: Blog Menno Holterman 17/06/2016



Source: the Veolia page for all water cases

## The transition perspective

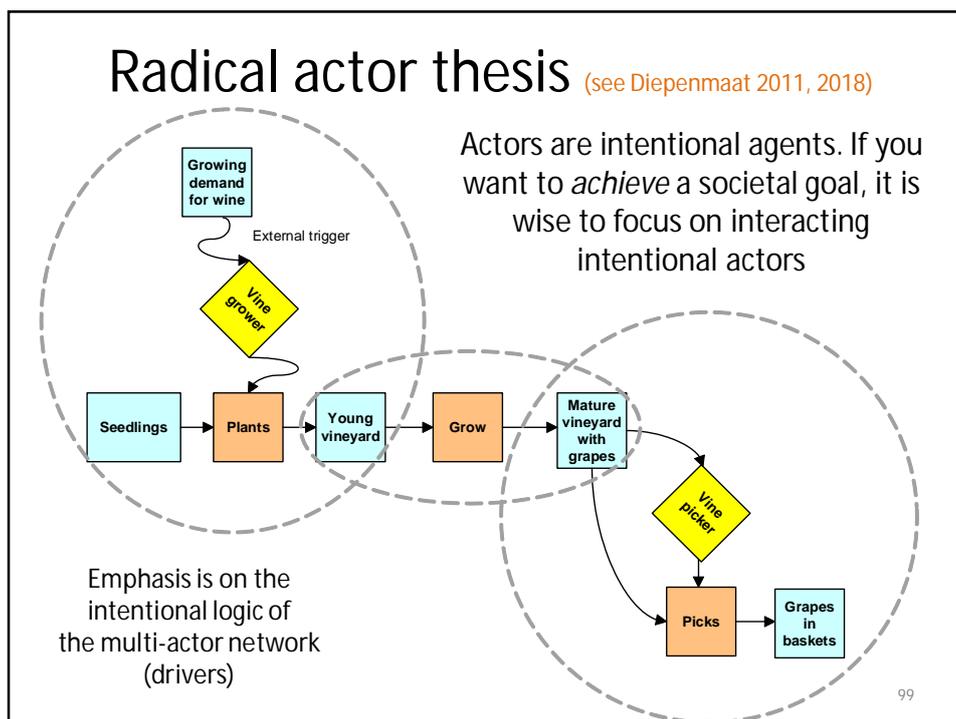
- Looks at dynamics at multiple levels (niches, landscape, in regimes), how are these interrelated?
- Looks beyond individual sectors (energy from waste, telematics for health care, mobility)
- Draws on multiple disciplines (innovation studies, political science, sociology, institutionalist theory, ..)
- Allows for cooperation with practitioners (in formulating transition experiments, Reflexive Monitoring in Action, Soft systems analysis, ...)



## Transitions that we need

- Away from fossil fuels
- Circular economy
- Corporate responsibility
- A good life (less consumerist)
- More inclusive and less inequality
- Humanisation of the economy
- More local?





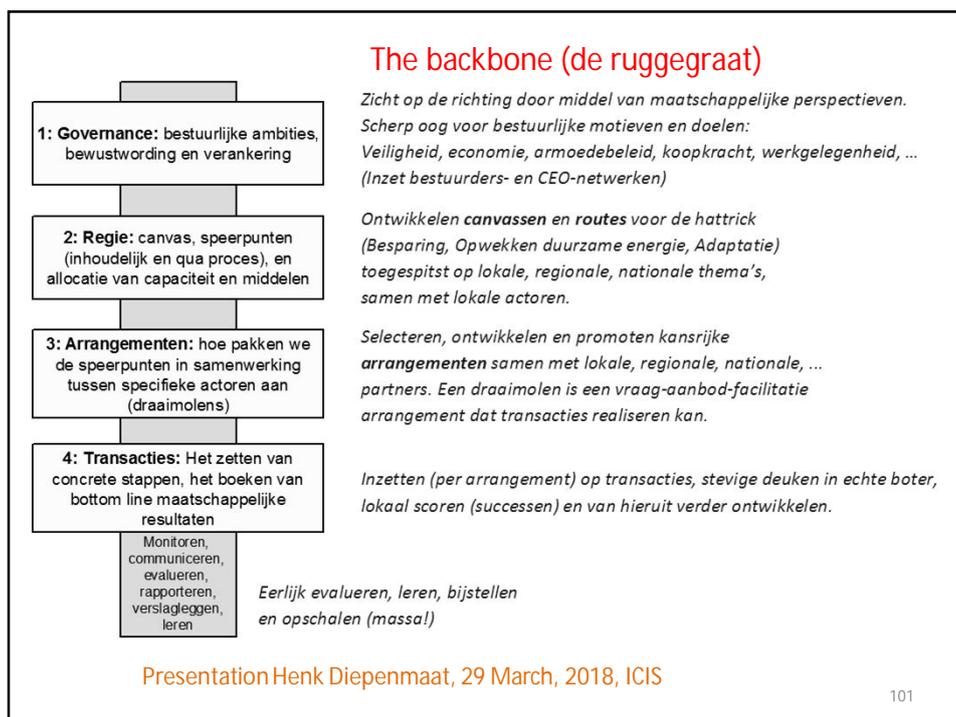
## Key to managed change is an intentional understanding of players

- This holds true for the process manager
- This holds true for the knowledge broker
- This holds true for the participants, as they construe the composite intentional logic

PAIR analysis was specifically designed in order to support obtaining this understanding.

Presentation Henk Diepenmaat, 29 March, 2018, ICIS

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## Takeaways