17/03/2015

How do Sustainable Energy Action Plans and pilots stimulate the economy and employment?

Dieter Cuypers Energyville @VITO
Unit Smart Energy & Built Environment

What actions are we considering?

'reducing the CO2 emissions and final energy consumption' [European Union, 2010]

- Energy efficiency
- Renewable energy production

Consider a SEAP in the perspective of carbon neutrality to **avoid lock-ins**!

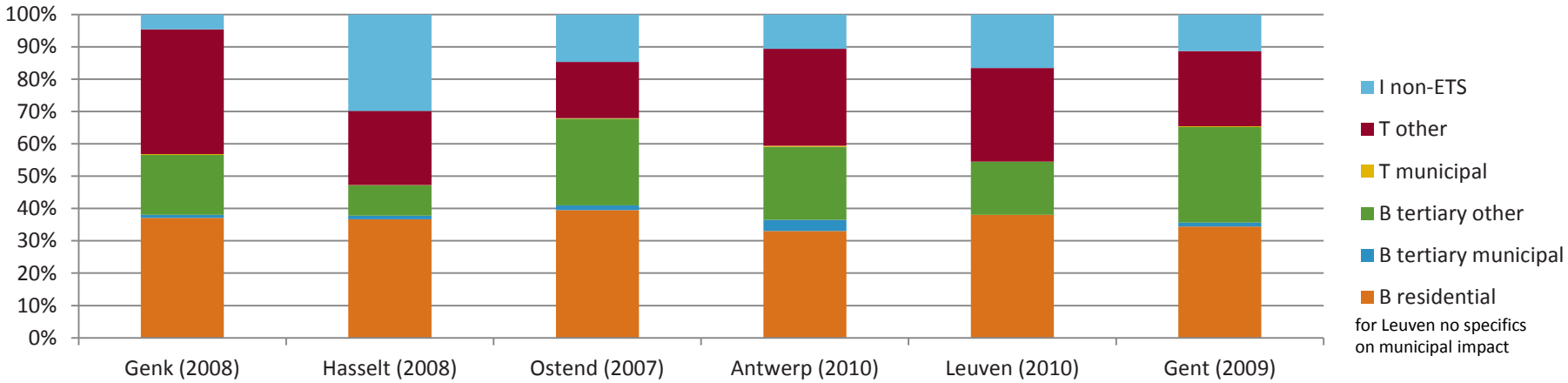
It's about **long-term objectives** to avoid stupid short-term solutions which result into more costly solutions in the long run.

© 2013, VITO NV

In which sectors?

- **Buildings** (residential + non-residential + infrastructures)
- **Transport & mobility** (including infrastructures)
- Energy production
- (Industry / agriculture + nature)

'Actionable'



[Source: State of sustainable city planning in Flemish Cities http://www.stepupsmartcities.eu/Portals/51/Documents/4point2%20Reports%20for%20web/4point2%20%20STEP%20UP%20state%20of%20sustainable%20city%20planning-Ghent%20learning%20network_web[1].pdf]

© 2013, VITO NV

From cost to benefit?

The question ‘how to finance the implementation of a SEAP’ can be turned into the question ‘how can a SEAP provide for employment and business opportunities?’

Further expanding the scope: from SEAP to SD

© 2013, VITO NV

Building elements (1):
Activating Local Multipliers

© 2013, VITO NV

Elements **(1): local multipliers**

Gunter Pauli (Club of Rome, ZERI):

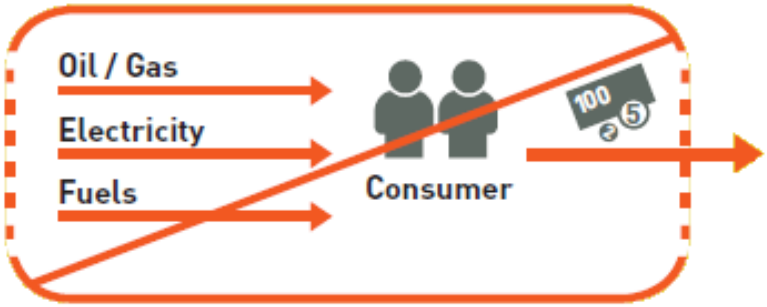
'when money circulates fast in the local economy, the economy grows locally,

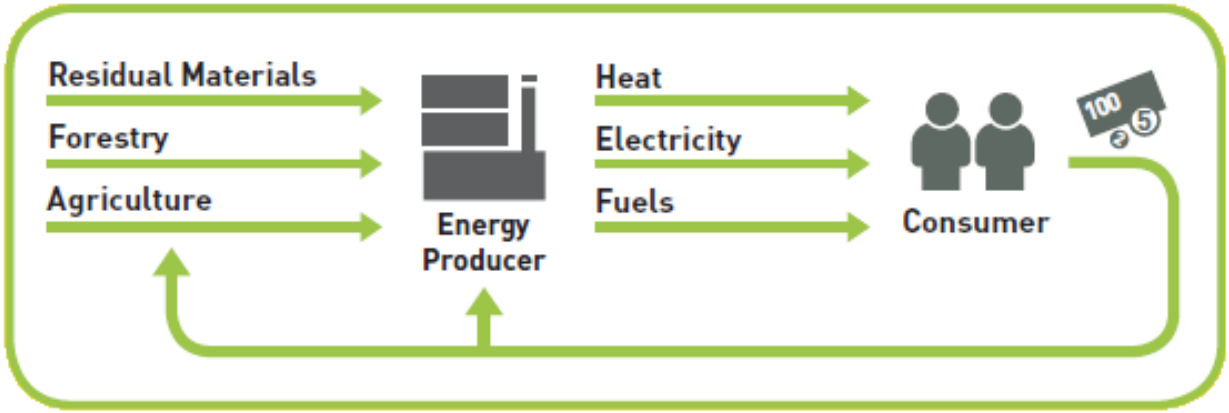
when money used for satisfying basic needs flows out of the country, the local economy shrinks'

[translated from Desmet et al. 2013: 105 on Gross National Happiness]

© 2013, VITO NV

Elements **(1): local multipliers**

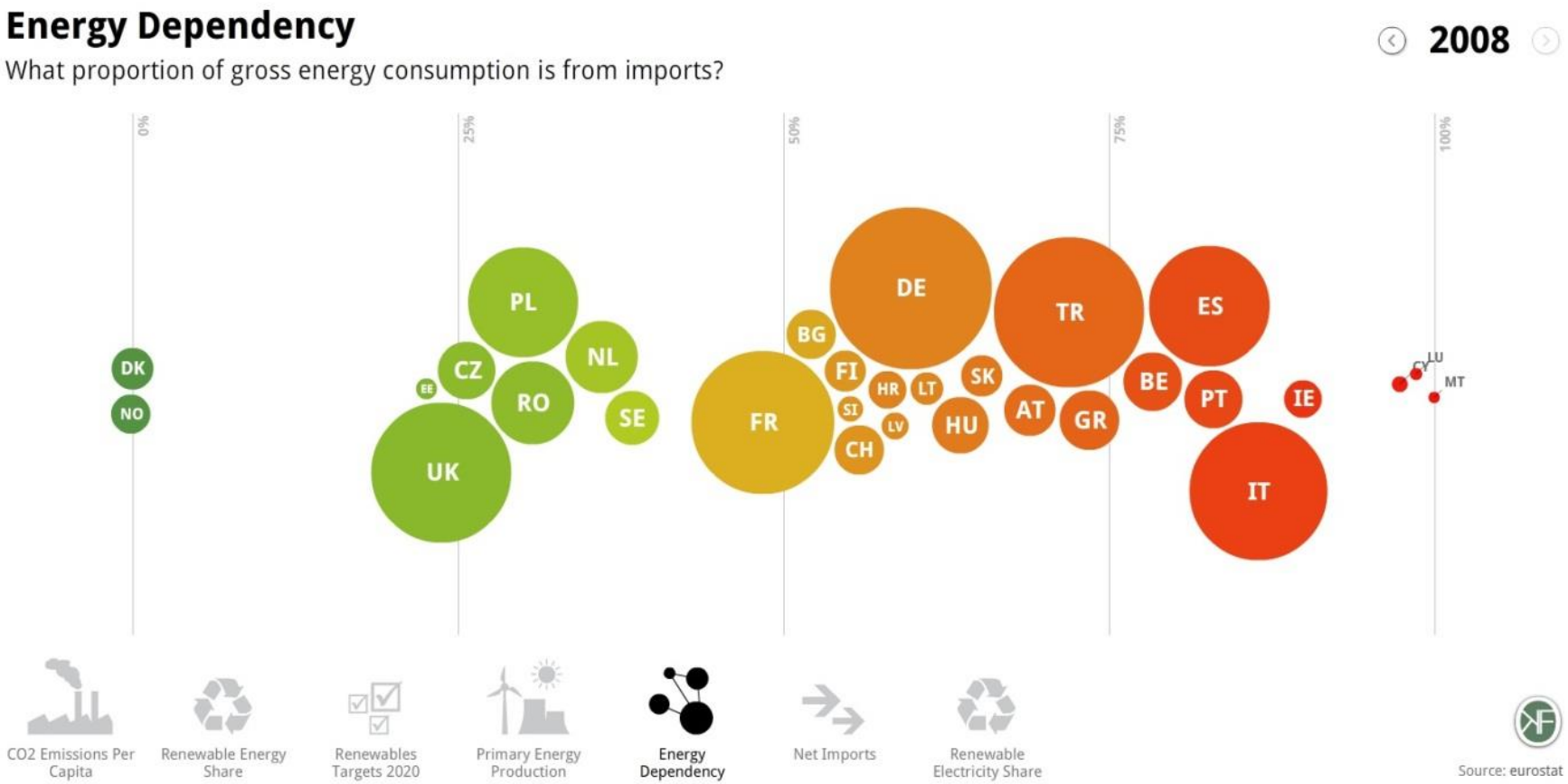




Güssing Renewable Energy (AT): *'money stays in the region and the air clean'* [www.gussingrenewable.com]

© 2013, VITO NV

Elements **(1): local multipliers**



[http://energy.publicdata.eu/ee/vis.html]

© 2013, VITO NV

Elements **(1): local multipliers**

Case: Leuven Climate Neutral 2030

Leuven spends some **250 Mio Euro / year on (fossil) energy**

Leuven household's share in this is **100 Mio Euro/year**

With a yearly investment of about **50 Mio Euro / year** all dwellings in the city could be renovated by 2050, and the corresponding outward money leak could virtually dry up.

© 2013, VITO NV

Elements **(1): local multipliers**

Main investments compatible with SEAP/carbon neutrality goals (not exclusively):

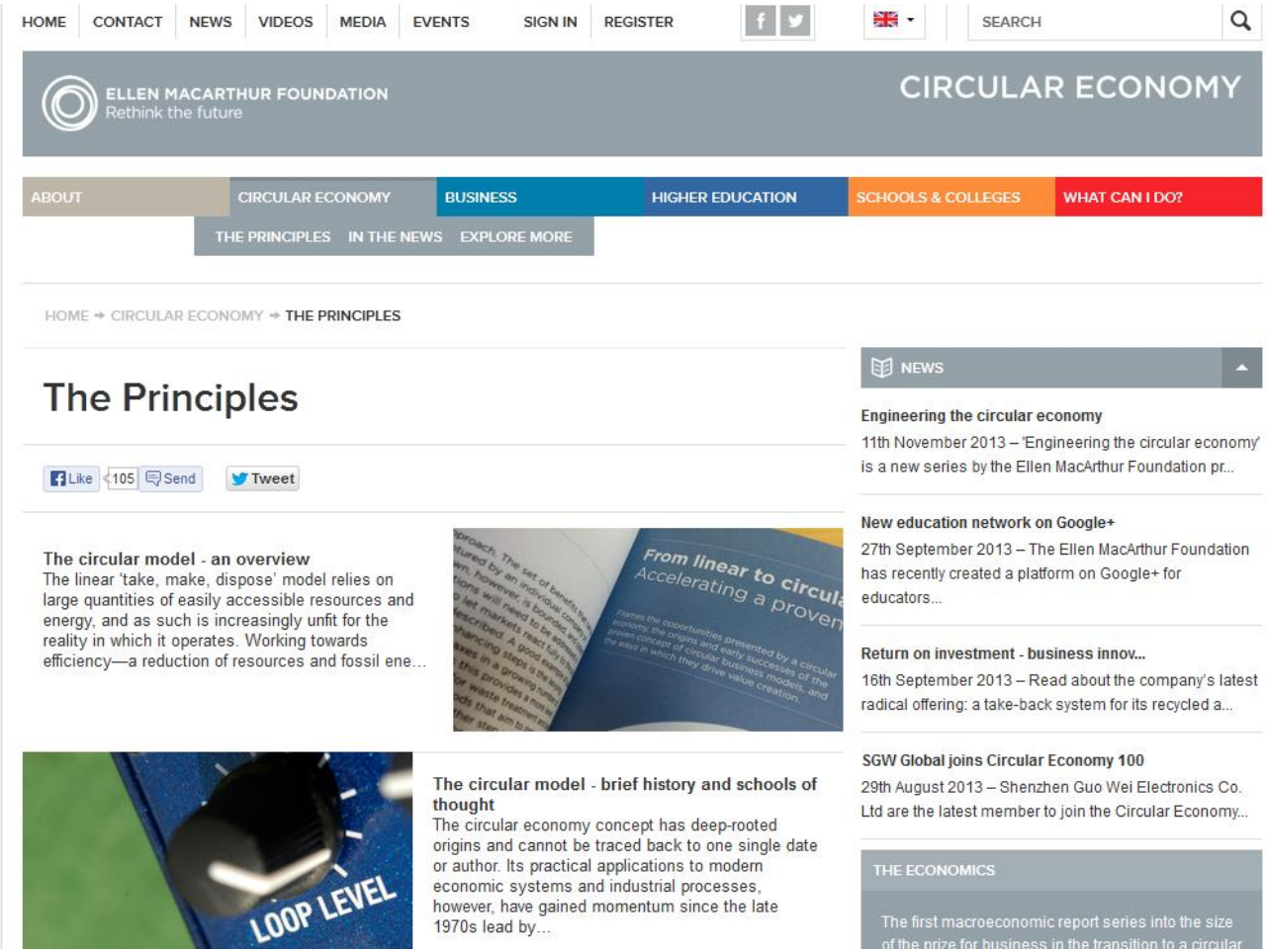
- Building stock retrofit
- Modal switch towards soft & public transport
- Local decentralized energy production

All require substantial input from the local economy (labour intensity / both high & low skill)

+ other secondary benefits!

© 2013, VITO NV

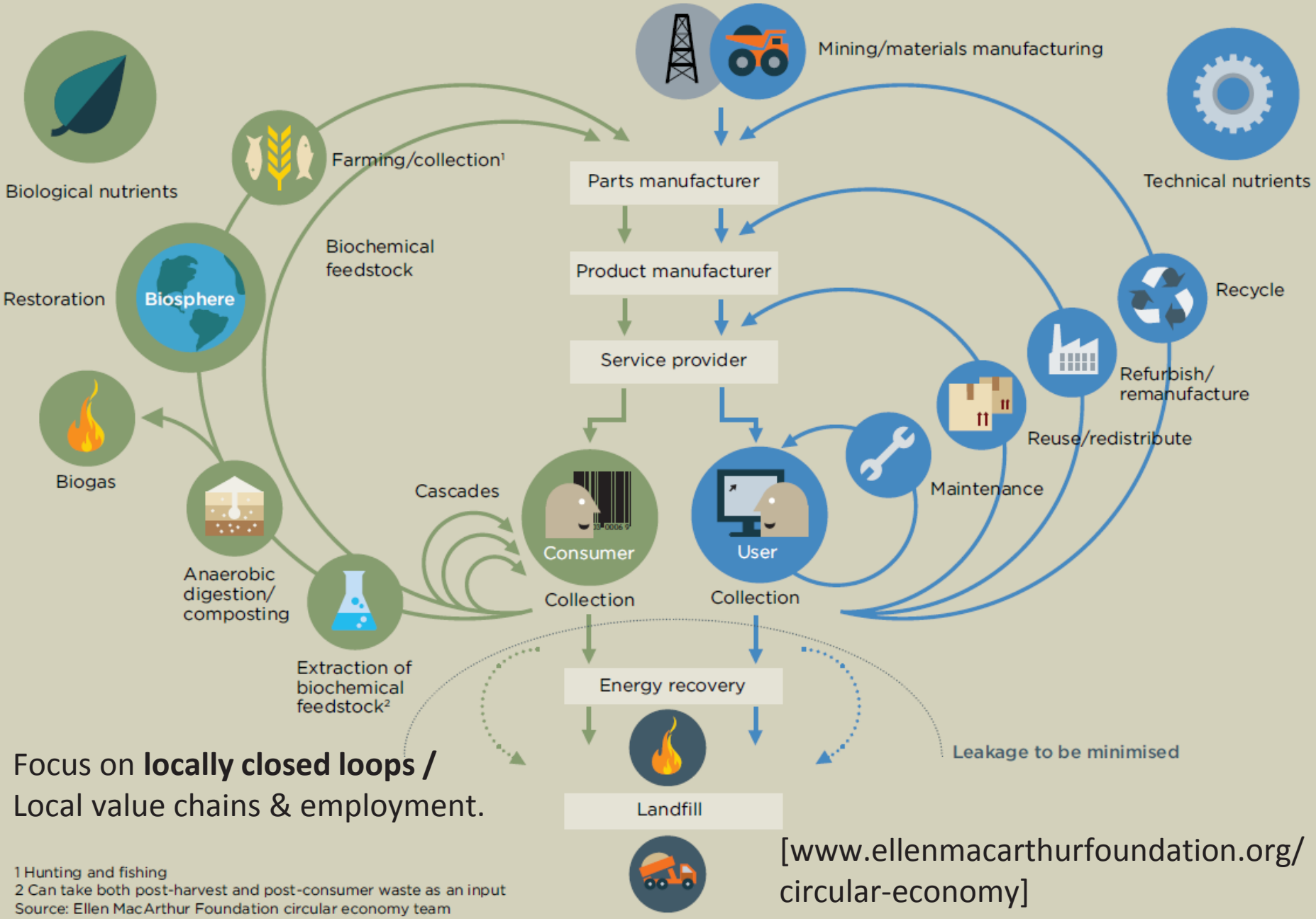
Elements **(1): local multipliers**



[http://www.ellenmacarthurfoundation.org/circular-economy but also: http://www.wrap.org.uk/content/wrap-and-circular-economy]

© 2013, VITO NV

FIGURE 6 **The circular economy—an industrial system that is restorative by design**



Focus on **locally closed loops /**
Local value chains & employment.

[www.ellenmacarthurfoundation.org/circular-economy]

1 Hunting and fishing
2 Can take both post-harvest and post-consumer waste as an input
Source: Ellen MacArthur Foundation circular economy team

Building elements (2):
Adopting another economic perspective

© 2013, VITO NV

Elements **(2): changing the concept of economy**

From *supply chain management* towards *value chain management* .

From *'How can the consumption be increased'* towards *'What are the values & assets we want to create'.*

From *quantitative* growth towards *qualitative* growth.

© 2013, VITO NV

Elements **(2): changing the concept of economy**

Jeffrey Sachs: Why We Need a New Macroeconomics

The Huffington Post, 18.11.2013

'Since the 2008 financial crash, our country has been reeling without getting its economic policy right. What we needed then, and need now, is a new kind of macroeconomics; one that ***aims for investment-led growth, not consumption-led growth****. But investment-led growth can't be achieved by a temporary stimulus. It requires a* ***very different kind of strategy and policy****. Investment-led recovery requires a* ***clear identification of our society's longer-term needs****, needs that can be filled through complementary investments by the public and private sectors. Think of railroads and farms in the late 19th century; highways, cars, and suburbs in the 1950s; and information technology, smart grids, and low-carbon energy for our time. And it requires a* ***set of public policies to spur those investments, in part by using smart public investments to help leverage a private-sector investment boom****.'*

[http://www.huffingtonpost.com/jeffrey-sachs/why-we-need-a-new-macroec_b_4297896.html]

© 2013, VITO NV

Elements **(2): changing the concept of economy**

From ‘payback time’ to ‘willingness to pay’.

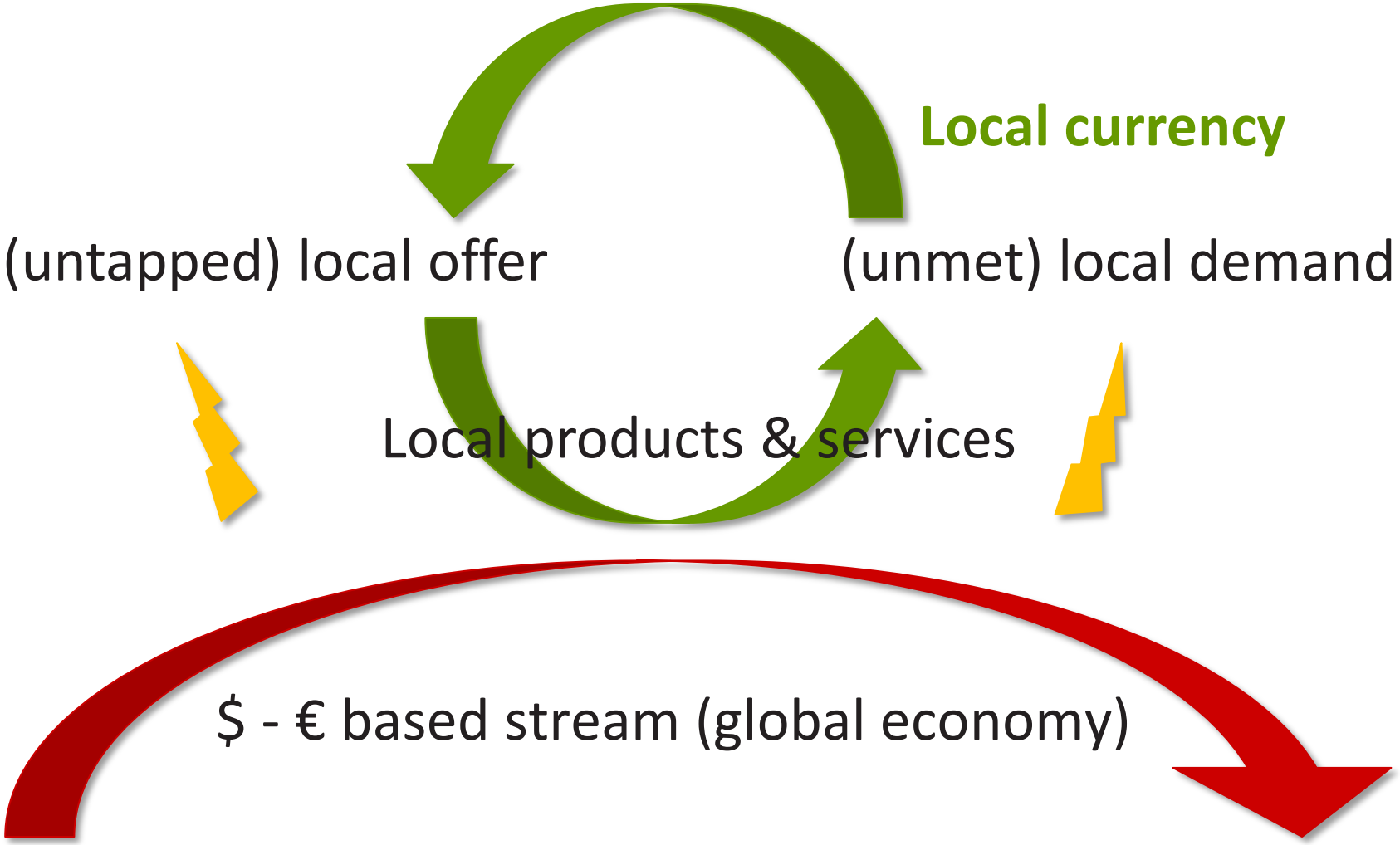
Model 1 ($ 5.000)

Model 2 ($ 75.000)

Payback time model 2 = ∞

© 2013, VITO NV

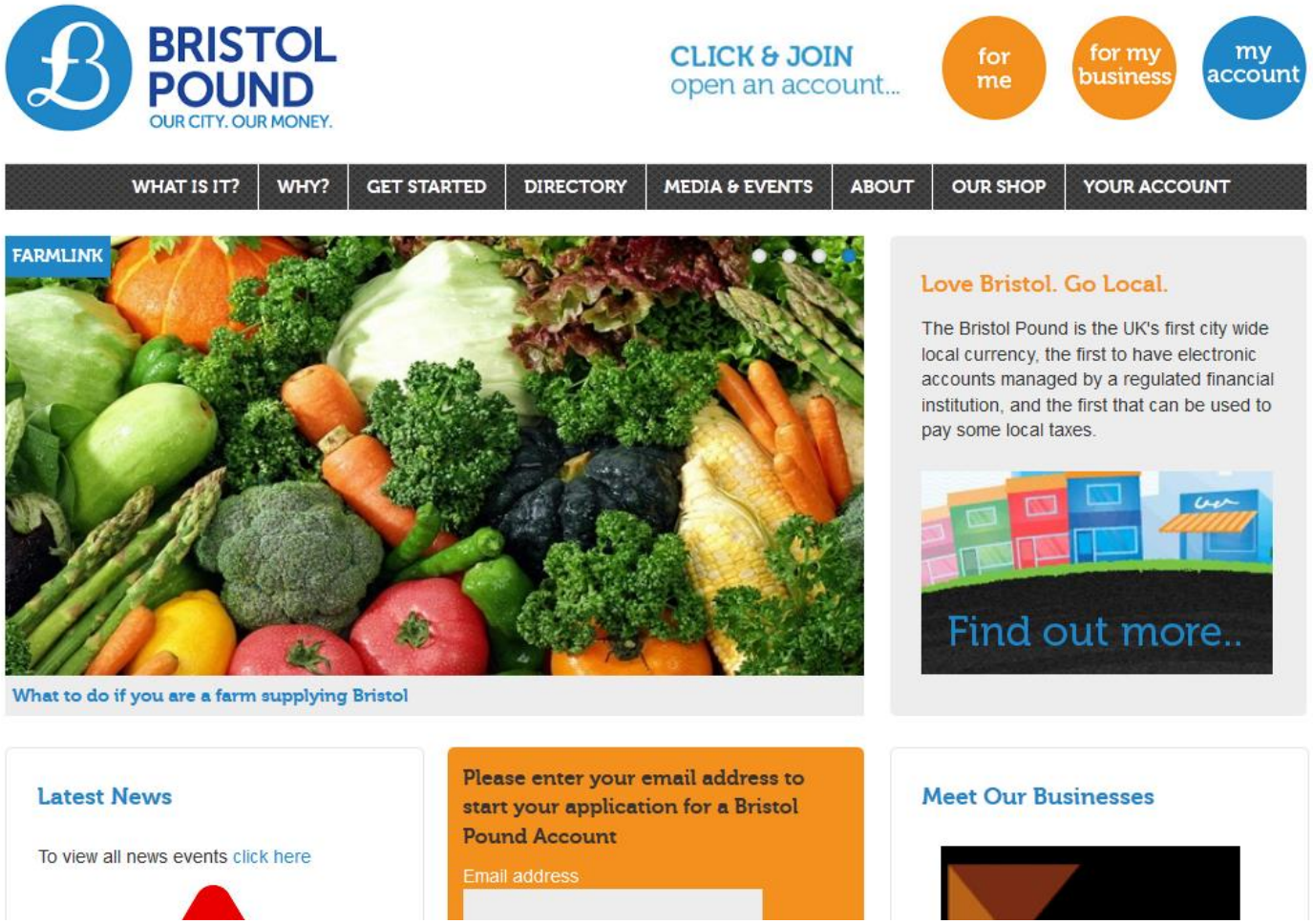
Elements **(2): local currency opportunities**



[Bernard Lietaer http://www.clubofrome.org/?p=4478]

© 2013, VITO NV

Elements **(2): local currency opportunities**



[http://bristolpound.org]

© 2013, VITO NV

Elements **(2): local currency opportunities**

*'A major **transport provider** is expected to start accepting fares in the currency and the community interest company that runs the scheme is in talks with an **energy company** about paying bills using the Bristol pound. It is also intent on persuading the **city council**, which has a turnover of £1bn a year, to procure services in Bristol pounds.'*
[www.theguardian.com/uk-news/2013/aug/22/banks-bristol-pound]

Why Bristol's eco aura won it European Green Capital 2015 status
…It's big on slow food, urban farmers' markets, city farms and free-range thinking (think street art, independent shops, an independent mayor, and a local currency – the Bristol Pound is now widely accepted)…
[www.theguardian.com/travel/2015/jan/24/bristol-green-capital-2015-eco-sustainable]

© 2013, VITO NV

Building elements (3):
Opportunities in the building sector

© 2013, VITO NV

Elements **(3): building sector opportunities**

Why invest in a large retrofit of the European building stock?

Primary benefit: energy savings mostly at negative cost over life cycle

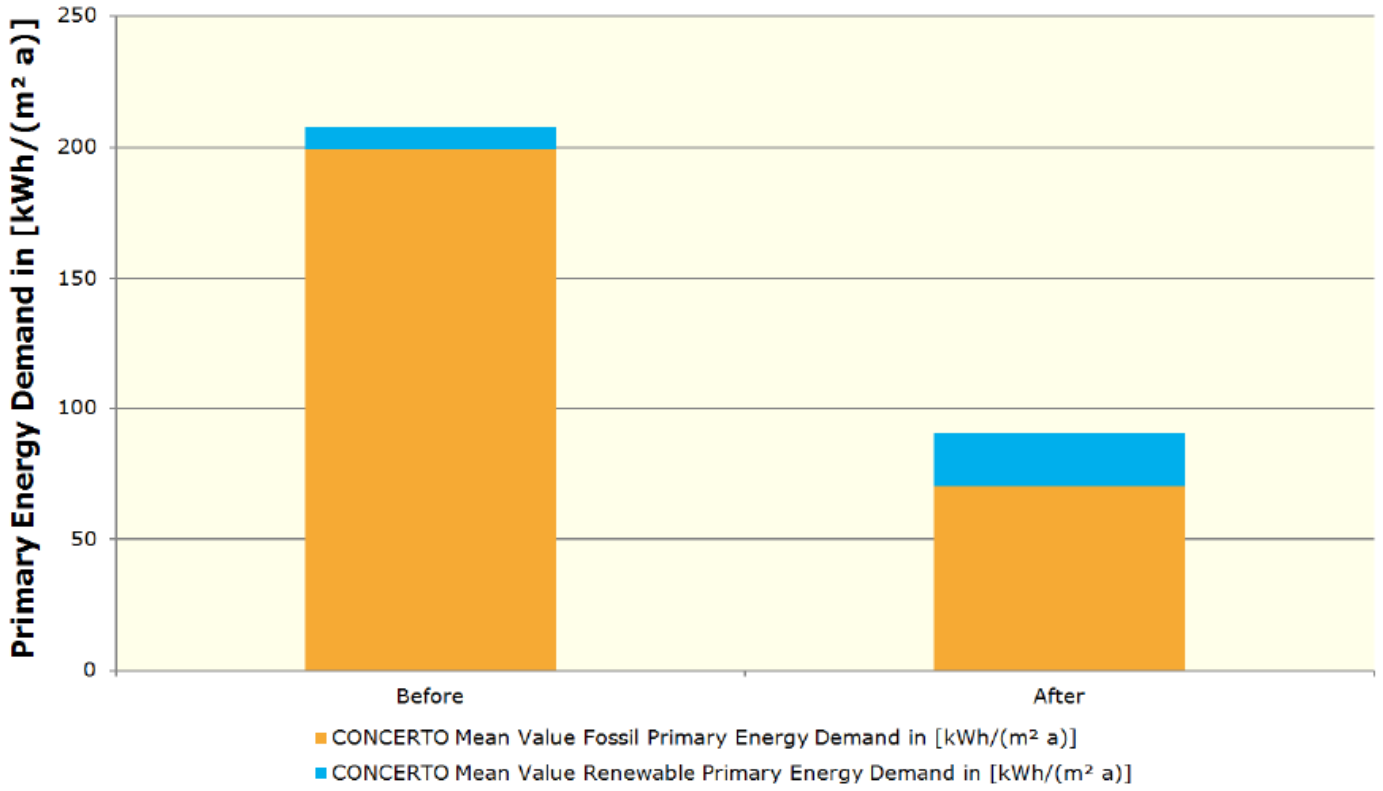
Secondary benefits:

- reduced carbon emissions
- increased environmental quality / healthiness inside & outside buildings / comfort & productivity
- reduced energy dependency (fossil sources)
- increased real estate value
- increased (temporary) local employment & economy

© 2013, VITO NV

Elements **(3): EU Concerto final results**

Primary energy demand (calculated) – space heating, refurbishments - mean Value



DFIU, EE, ÖÖW: Data Status: 08.10.2013

[http://concerto.eu]

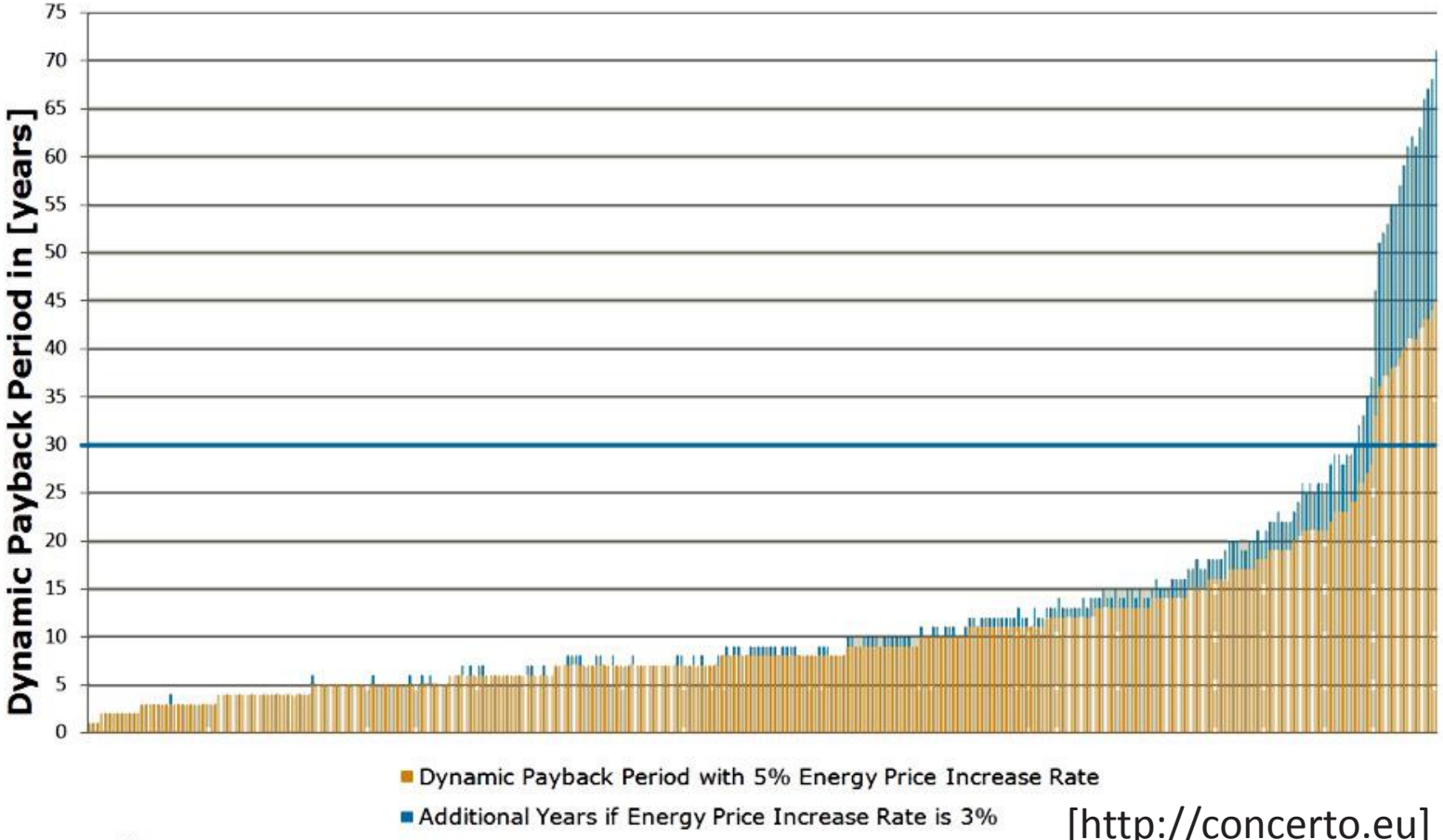
vito vision on technology

© 2013, VITO NV

Elements **(3): EU Concerto final results**

Dynamic Payback Period, demand-based (calculated) for Refurbishments, Residential Buildings

(n=333, no grants considered, VAT included, price level 2010, discount rate: 3%, energy price increase rate 3% and 5%, highest 9 values have been cut)



DFIU, EE, ÖÖW: Data Status: 13.10.2013

[http://concerto.eu]

Elements **(3): EU Concerto final results**

Concerning the payback time…

- **No secondary benefits included yet!**
- *'In case of new buildings energy-efficient solutions can already be realized within a comparative framework of average building costs / financial budget - a prerequisite is the integral design.'*
- *'The situation in the area of additional thermal insulation is differentiated. The economic advantageousness depends on conditions such as: coupling with maintenance, current price level, baseline (initial situation in energy terms), etc.'*

[http://concerto.eu]

© 2013, VITO NV

Elements **(3): Renovate Europe preview**

RENOVATE EUROPE

What if… we **reduce the energy demand of the existing EU building stock by 80% by 2050** as compared to 2005

… energy use from an average 200 kWh/m²/yr to 40 kWh/m²/yr

- *'Raise the renovation rate of the existing building stock to 3% per year by 2020 and maintain that rate to 2050*
- *Ensure that all renovations are deep or staged deep renovations to avoid "lock-in"*
- *Drive the formulation and implementation of an effective policy and legal framework for the achievement of our ambition'*

[http://concerto.eu]

© 2013, VITO NV

Elements **(3): Renovate Europe preview**

RENOVATE EUROPE

Primary benefits: value of energy savings exceeds investment costs

Secondary benefits:

- New local direct jobs: up to 2 million by 2020
- Reduced fuel poverty, increased health/productivity, reduced air pollution, reduced public health expenditure
- Significant boost to local economy and recovery, increased tax revenue (tax losses from fossil fuels included) / reduced social expenditure

[Næss-Schmidt et al. 2012, http://concerto.eu]

© 2013, VITO NV

Elements **(3): Renovate Europe preview**

Societal benefits by country

Country	% EU GDP	In 2020 (€bn)	Up to 2018 (€bn)	# Jobs 2020
BE	3.0	5.25	8.92	60,000
DE	20.5	35.87	60.98	410,000
DK	1.9	3.36	5.71	38,000
ES	8.4	14.70	24.98	168,000
FR	15.8	27.65	47.00	316,000
IE	1.2	2.10	3.57	24,000
IT	12.5	21.87	37.18	250,000
NL	4.7	8.23	13.98	92,000
PL	3.0	5.25	8.92	60,000
UK	13.8	24.15	41.05	276,000

[http://concerto.eu]

© 2013, VITO NV

Elements **(3): investment / employment ratio?**

Different sources point to **1 FTE-year created per**

€ 50.000-100.000 investments in building retrofit activities in EU – take **€ 75.000** as a rule of thumb.

Bear in mind that public financial levers generate up to 10-fold private investment. Play it intelligently!

Note: direct-indirect jobs often not specified.

[IEEP 2013; Næss-Schmidt et al. 2012; Schneider et al. 2011; Volkerink et al. 2012]

© 2013, VITO NV

Elements **(3): investment / employment ratio?**

[IEEP 2013] note:

'However, it is important to note that these benefits occur at the time of programme implementation and can only be maintained if the programme is continued. As soon as the loan repayments are higher than new investments the overall picture changes and net impact on GDP becomes negative (Prognos, 2013).'

[Næss-Schmidt et al. 2012] general methodological note:

Ex post effect often smaller than ex ante estimate; overall potential includes behaviour that would have taken place even without policy; rebound effects; transaction costs often neglected.

On the other hand, secondary benefits often not accounted for.

© 2013, VITO NV

Building elements (4):
Opportunities in the transport sector

© 2013, VITO NV

Elements **(4): transport sector opportunities**

'From economics of mobility towards economics of access'

'As physical realities, cities are the co-location of activities **to avoid the need to travel**'

[UN-Habitat 2013]

© 2013, VITO NV

Elements **(4): transport sector opportunities**

'The potential employment effect of investing €1 billion in sustainable transport in the EU has been estimated in one study to be 21,500 full time jobs (Sustainlabor 2013). ***A sustainable transport policy is likely to overcompensate job losses in car manufacturing*** *through more jobs in manufacturing of buses, light railways, subways, and railways; planning, managing and maintaining these systems another study shows (European Parliament, 2010). For the EU 25, estimates suggest around 900,000 people are employed in urban public transport.* ***The number of direct jobs in public transport amounts to about 1–2 percent of total employment****, underpinning the stronger relevance of public transport investment for job generation (ETUC 2012).'*

[IEEP 2013]

© 2013, VITO NV

Elements **(4): transport sector opportunities**

Sustainlabour study: **47.000 Euro/FTE** for direct + indirect temporary jobs

'21,500 full time jobs: 16,700 jobs associated with constructing new infrastructure and manufacturing new transport vehicles/equipment, the supply of materials for the construction of sustainable transport infrastructures and the manufacture of transport vehicles equipment; and 4,800 jobs created by increases in household spending by those employed in direct and indirect jobs. (UNEP, 2011)'

[Sustainlabour 2013]

© 2013, VITO NV

Elements **(4): transport sector opportunities**

'The number of direct jobs in public transport amounts to about 1–2 percent of total employment. ***Public transport investments in Europe have an average job multiplier effect of 2 to 2.5.*** *Studies in Europe and the United States show that about 30 jobs are created for each €1 million invested in public transport infrastructure, and 57 jobs for the same level of investment on the transport operations side.'*

[IEEP 2013]

'Worldwide, it has been estimated that ***every US$1 of value created by public transport is linked to the further value creation of US$4****. In addition,* ***'every direct job in public transport is linked to four jobs in other sectors of the economy'****. Similar multipliers are observed in the US with more than 36,000 jobs created for every US$1 billion invested in public transport.'*

[UN-Habitat 2013]

© 2013, VITO NV

Building elements (5):
Opportunities in the energy sector

© 2013, VITO NV

Elements **(5): energy sector opportunities**

The ***Energiewende*** is becoming a fact

© 2013, VITO NV

Elements **(5): energy sector opportunities**

Global Clean-Energy Market Size 2000-2012

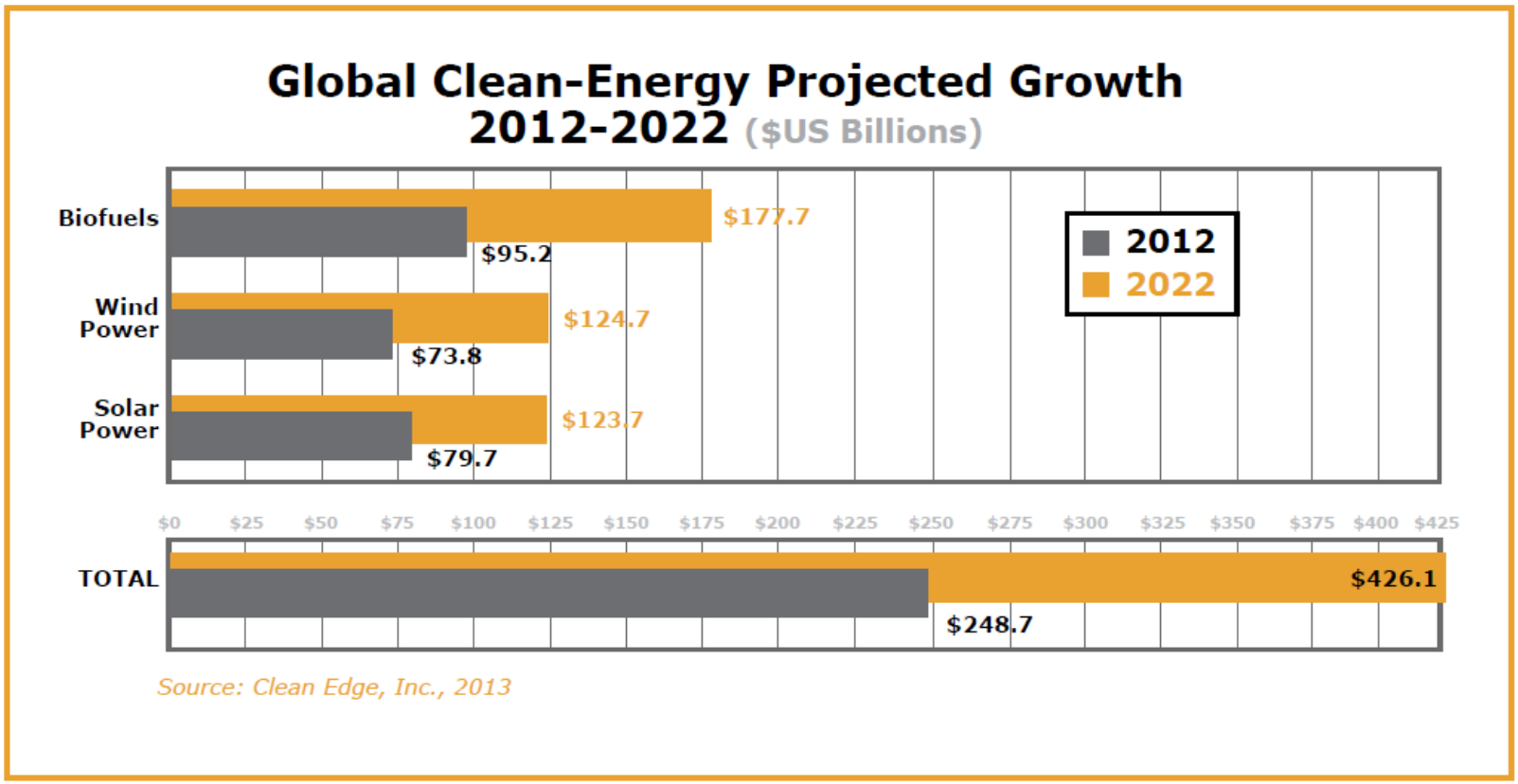
Year	Solar PV Global Market Size (in $Billions)	Wind Power Global Market Size (in $Billions)	Biofuels Global Market Size (in $Billions)
2000	$2.5	$4.0	N/A
2001	$3.0	$4.6	N/A
2002	$3.5	$5.5	N/A
2003	$4.7	$7.5	N/A
2004	$7.2	$8.0	N/A
2005	$11.2	$11.8	$15.7
2006	$15.6	$17.9	$20.5
2007	$20.3	$30.1	$25.4
2008	$29.6	$51.4	$34.8
2009	$36.1	$63.5	$44.9
2010	$71.2	$60.5	$56.4
2011	$91.6	$71.5	$83.0
2012	$79.7	$73.8	$95.2

Source: Clean Edge, Inc., 2013

Global clean energy outlook [Pernick et al. 2013]

© 2013, VITO NV

Elements **(5): energy sector opportunities**



Global clean energy outlook [Pernick et al. 2013]

© 2013, VITO NV

Elements **(5): energy sector opportunities**

'The fundamental global market drivers for clean technology remain largely intact'.

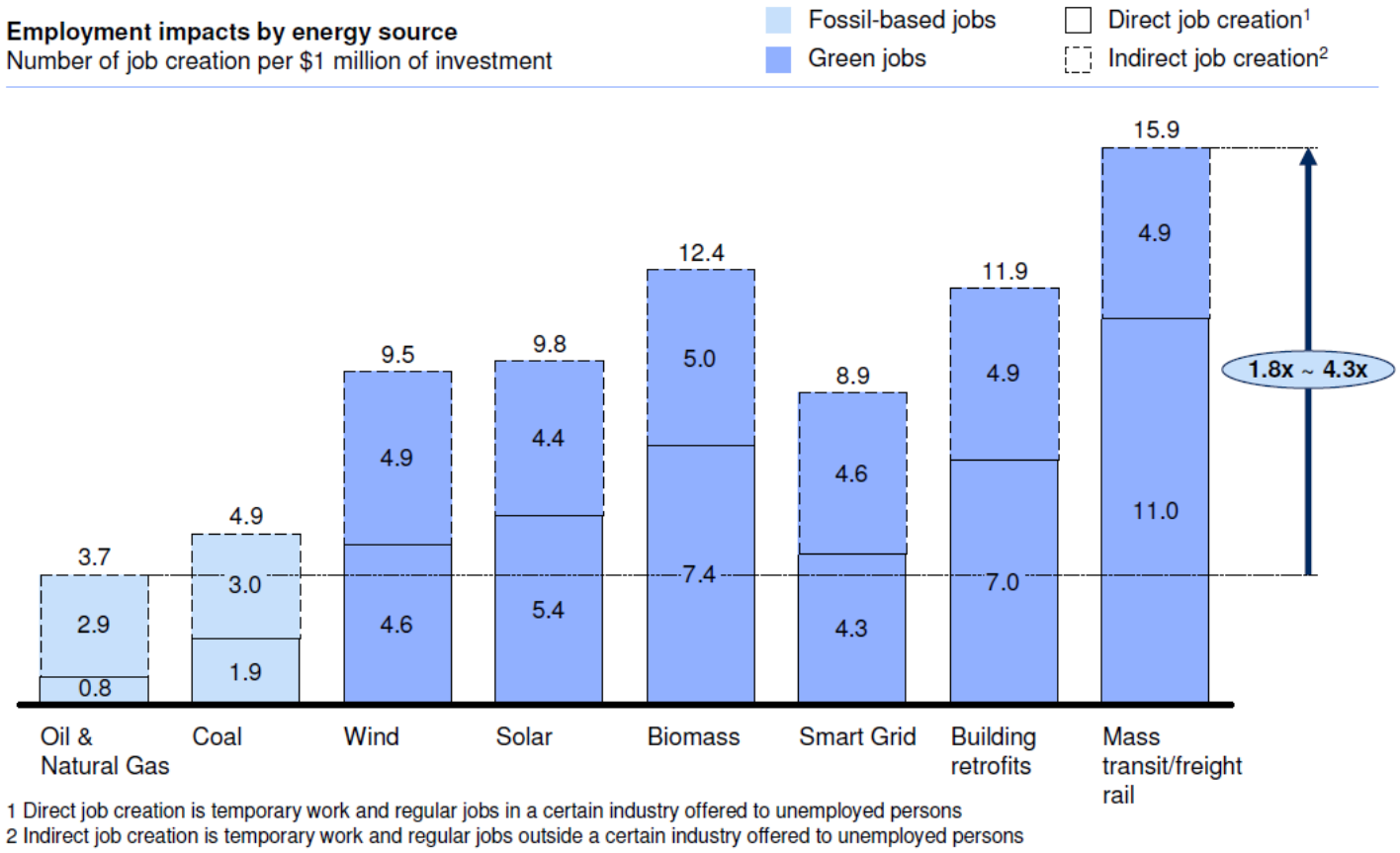
...' ***resilience and adaptation are becoming critical business and policy drivers as organizations scramble to meet a literally changing landscape****.' ... 'increasingly lower prices for clean-tech goods and services are helping wind and solar power reach cost parity in both utility-scale and distributed markets, making the value proposition increasingly attractive.'*

[Pernick et al. 2013]

© 2013, VITO NV

Elements **(5): energy sector opportunities**

Job creation with clean energy technologies is much higher than with fossil fuels:



[McKinsey 2012]

© 2013, VITO NV

Elements **(5): investment / employment ratio?**

Orders of magnitude based on previous graph:

- Oil & gas: > 250.000 $/FTE
- Coal: 200.000 $/FTE
- **Wind, solar, smart grids: 100.000 $/FTE**
- Building retrofit, **biomass: 85.000 $/FTE**
- Public transport, freight rail: 62.500 $/FTE

© 2013, VITO NV

Elements **(5): energy sector opportunities**

McKinsey notes:

'Cities are faced with numerous challenges and competing priorities, and often find it hard to analyze and select highest value sustainability levers - Many initiatives are often hard to implement for reasons that may have to do with economic, technological, policy / regulatory, social acceptance or extra-jurisdictional constraints'

[McKinsey 2012]

© 2013, VITO NV

Elements **(5): energy sector opportunities**

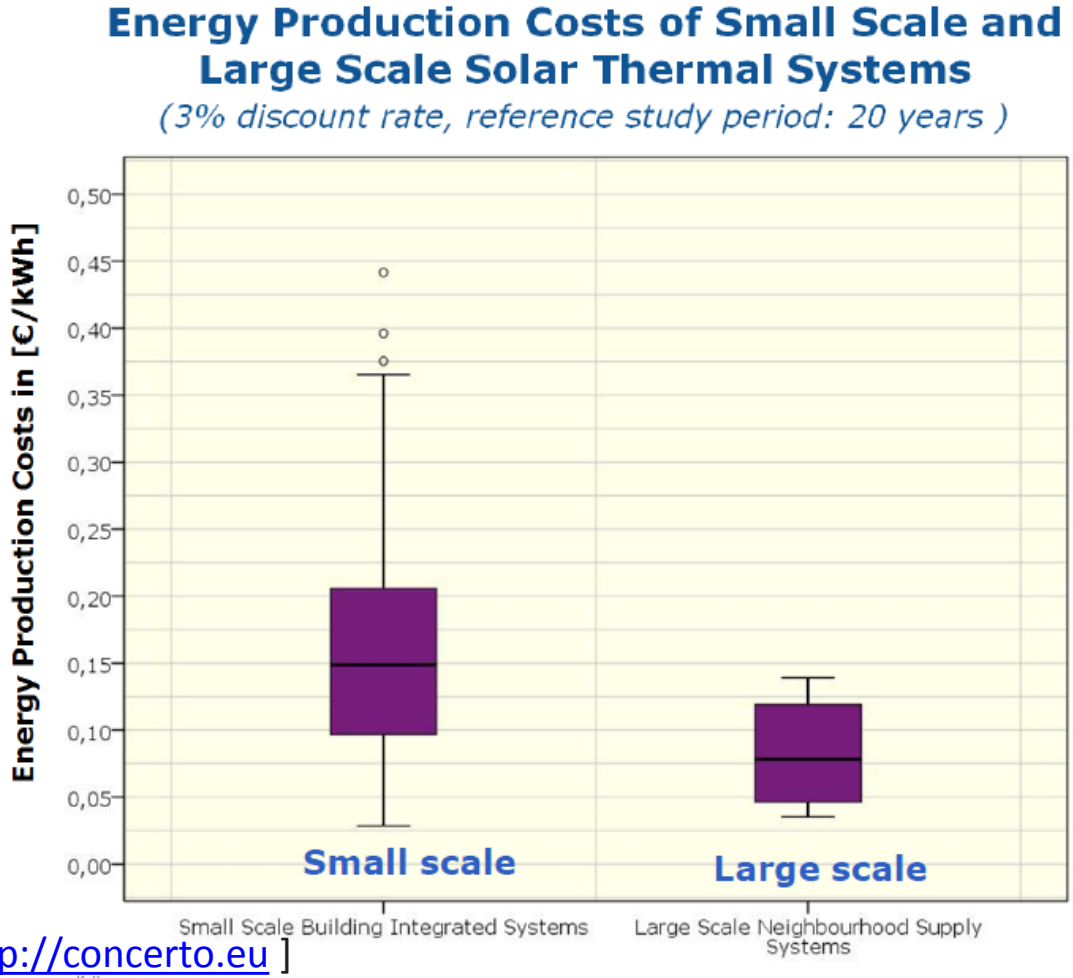
'Kammen et al. (2006) estimate that the installation of 1 MWa of wind turbine capacity creates between 0.7-2.9 times as much permanent employment vis-à-vis a comparable natural gas combined cycle (NGCC) power plant, whilst the installation of 1 MWa of rooftop solar PV creates an estimated 7.8 times more employment than a NGCC power plant. In addition, the impact on local employment tends to be higher as the demand for system installers and maintenance engineers is more likely to draw from the local labour pool.'

[Hammer et al. 2011]

© 2013, VITO NV

Elements **(5): energy sector opportunities**

Exploit **scale advantages** at the neighbourhood / urban level!



[Pictures: solar island Almere (NL) Graph: http://concerto.eu]

© 2013, VITO NV

Building elements (6):

Assembling the green urban economy – a whole systems approach

© 2013, VITO NV

Elements **(6): the green urban economy**

ICLEI & GIZ Discussion Paper on Green Urban Economy – Conceptual basis and courses for action:

'A Green Urban Economy should contribute to reaching the following goals:

1. *An eco-effective and eco-efficient economic structure*
2. *Creation of green jobs*
3. *Poverty eradication and inclusiveness*
4. *Urban form and design for eco-effective infrastructures*
5. *Energy and resource efficiency in the physical infrastructure*
6. *Renewable energy production and sourcing*
7. *A valued urban ecosystem*
8. *Innovation, research and development*
9. *Stakeholder involvement' ...*

[GIZ & ICLEI, 2012]

© 2013, VITO NV

Elements **(6): the green urban economy**

ICLEI & GIZ Discussion Paper continued:

'By identifying a series of smaller operational parts, which make up the economic activities within the city, ***cluster effects*** *can be determined and potential for industrial-symbiosis can be identified amongst others. As a result resource flows can be optimized, and* ***return on investments beyond the individual product or service*** *can be achieved. (…)*
The approach embodies a challenge to local governments and city actors ***to develop entirely new instruments*** *(eg carbon trading in Tokyo)* ***and to apply existing instruments in a new way*** *(eg city properties only being offered to potential buyers who guarantee high energy standards),* ***thereby engaging all economic actors in a much more direct way.*** *(...)*
The success to green economies will greatly depend upon the channels of outreach, information collected, developed and innovated, and made accessible via ***knowledge hubs, education and training*** *etc.'*

[GIZ & ICLEI, 2012]

© 2013, VITO NV

Building elements (7):
Role of regulatory framework and policy

© 2013, VITO NV

Elements **(7): regulatory framework / policy**

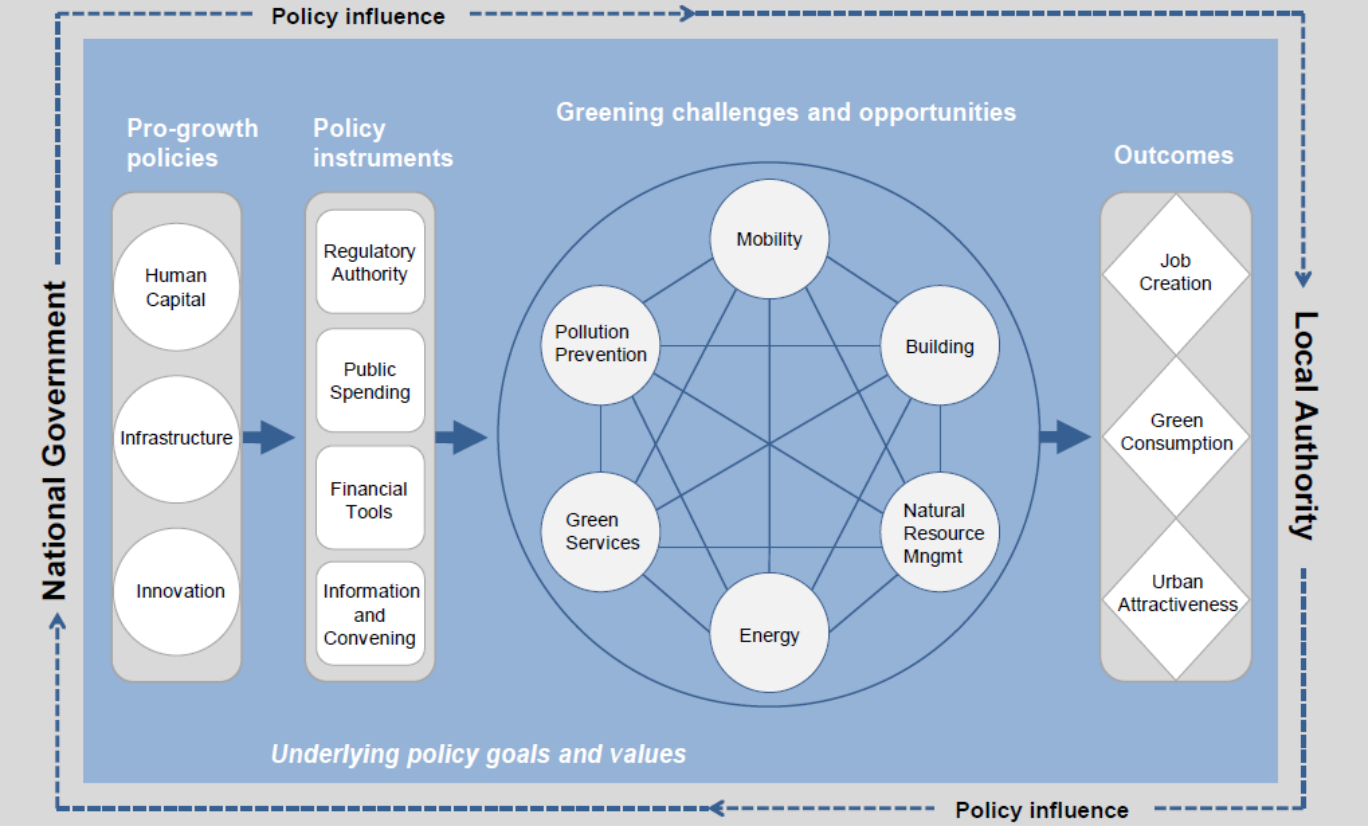
How ***NOT*** to do things:

[www.businessspectator.com.au/article/2013/8/21/solar-energy/spains-solar-stupidity]

© 2013, VITO NV

Elements **(7): regulatory framework / policy**

OECD: Cities and Green Growth - A Conceptual Framework



[Hammer et al. 2011]

© 2013, VITO NV

Elements **(7): regulatory framework / policy**

Backdrops: underlying policy goals & values, baseline conditions

OECD notes:

'In some cases, officials may not even realise how their views have been shaped by these two backdrops, in that the goals, values and baseline conditions might represent long-standing operating procedures, technologies or market practices. Changes might thus be manifested in incremental terms, rather than in paradigm-shattering or generation-skipping technological terms.'

[Hammer et al. 2011]

© 2013, VITO NV

Elements **(7): regulatory framework / policy**

Why are things not happening? [Næss-Schmidt et al. 2012] [OECD 2013]

- **Market failures**
  - Handling project risks and acquiring financing *(unknown black box)*
  - Energy costs are a small share of overall costs
  - Externalities are not being internalized
  - Households have too short term perspective
- **Regulatory failures**
  - Rent regulation
  - Energy subsidies
  - Regulation of public investment and ownership of buildings *(see your own facility management)*
- **Policy failures**
  - Lack of integration: policy silos / no whole systems approach
  - Lack of knowledge & capacity/competences
  - Lack of proper data acquirement & monitoring

© 2013, VITO NV

Elements **(7): regulatory framework / policy**

Final policy reflection…

Han Vandevyvere : 'Today the societal challenges are huge, there is plenty of work to be done, and at the same time there is plenty of unemployment.

It's a shame.'

Thomas Rau: *'in nature there is no unemployment'*

© 2013, VITO NV

Acknowledgements

Thanks to Han Vandevyvere (VITO) for providing the basis of theis presentation and the discussions, Erika Meynaerts (VITO) and Indra Van Sande (City of Ghent Gent) for their precious inputs

References (1)

Desmet et al. (2013), Bruto Nationaal Geluk – Bhutan inspireert de wereld, Lannoo (Gross National Happiness)

European Union (2010), How to develop a sustainable energy action plan

GIZ & ICLEI (2012), Discussion Paper: Green Urban Economy - Conceptual basis and courses for action

Hammer, S. et al. (2011), Cities and Green Growth: A Conceptual Framework, OECD Regional Development Working Papers 2011/08, OECD Publishing

IEEP (2013), Review of costs and benefits of energy savings

McKinsey (2012), Discussion on GHG Emissions, Energy Efficiency and Green Economy with the City of Ghent, internal presentation

Næss-Schmidt, H., Hansen, M., von Utfall Danielsson, C. (2012), Multiple benefits of investing in energy efficient renovation of buildings, Copenhagen Economics / Renovate Europe

OECD (2013), Green Growth in Cities, OECD Green Growth Studies, OECD Publishing

© 2013, VITO NV

References (2)

Pernick R., Wilder C., Winnie, T. (2013), Clean Energy Trends 2013, Clean Edge

Schneider, H. et al. (2011), Marktstudie CO2-besparingpotentieel ESCo's in utiliteitsbouw, BuildDesk Benelux

Sustainlabour (2013), Green Jobs and Related Policy Frameworks - An Overview of the European Union

UN-Habitat (2013), Planning and Design for Sustainable Urban Mobility, Earthscan

Volkerink, M. et al. (2012), Bouwen en banen - Werkgelegenheidseffecten van energiebesparing in de gebouwde omgeving, CE Delft

EU Concerto final conference presentations:

www.concerto.eu/concerto/news-and-events/concerto-premium-events/concerto-conference-presentations.html

© 2013, VITO NV