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08/01/2014

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

Han Vandevyvere, dr. ir. arch., Unit Transition Energy & Environment

What actions are we considering?

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

- Energy efficiency
- Renewable energy production

In which sectors?

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

'*Actionable*'

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

From cost to benefit?

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

Further expanding the scope: from SEAP to Smart City to SD

Building elements (1):
Activating Local Multipliers

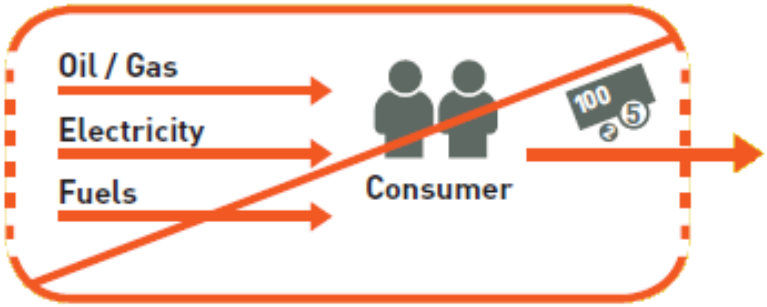
Elements **(1): local multipliers**

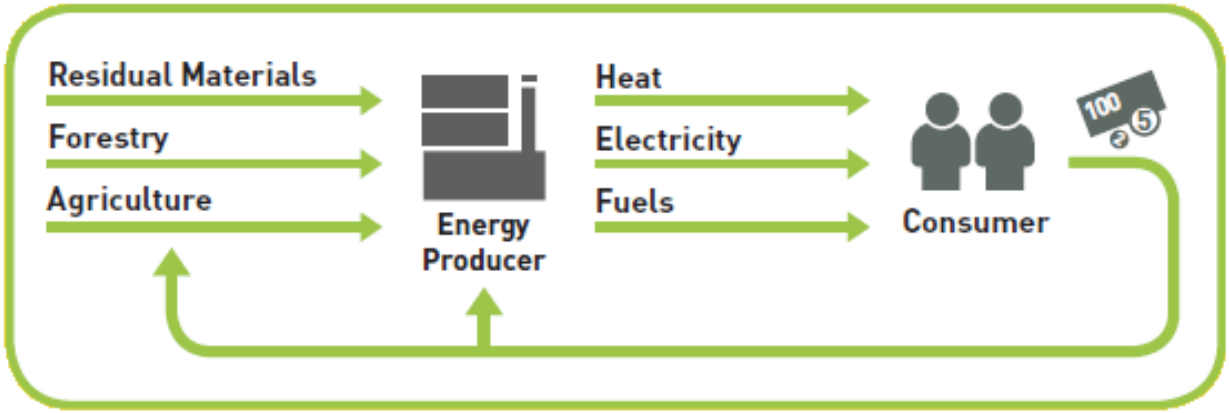
Gunter Pauli (Club of Rome, ZERI):

'when money circulates fast in the local economy, than the economy grows locally, when money used for satisfying basic needs streams out of the country, than the local economy shrinks'

[translated from Desmet et al. 2013: 105]

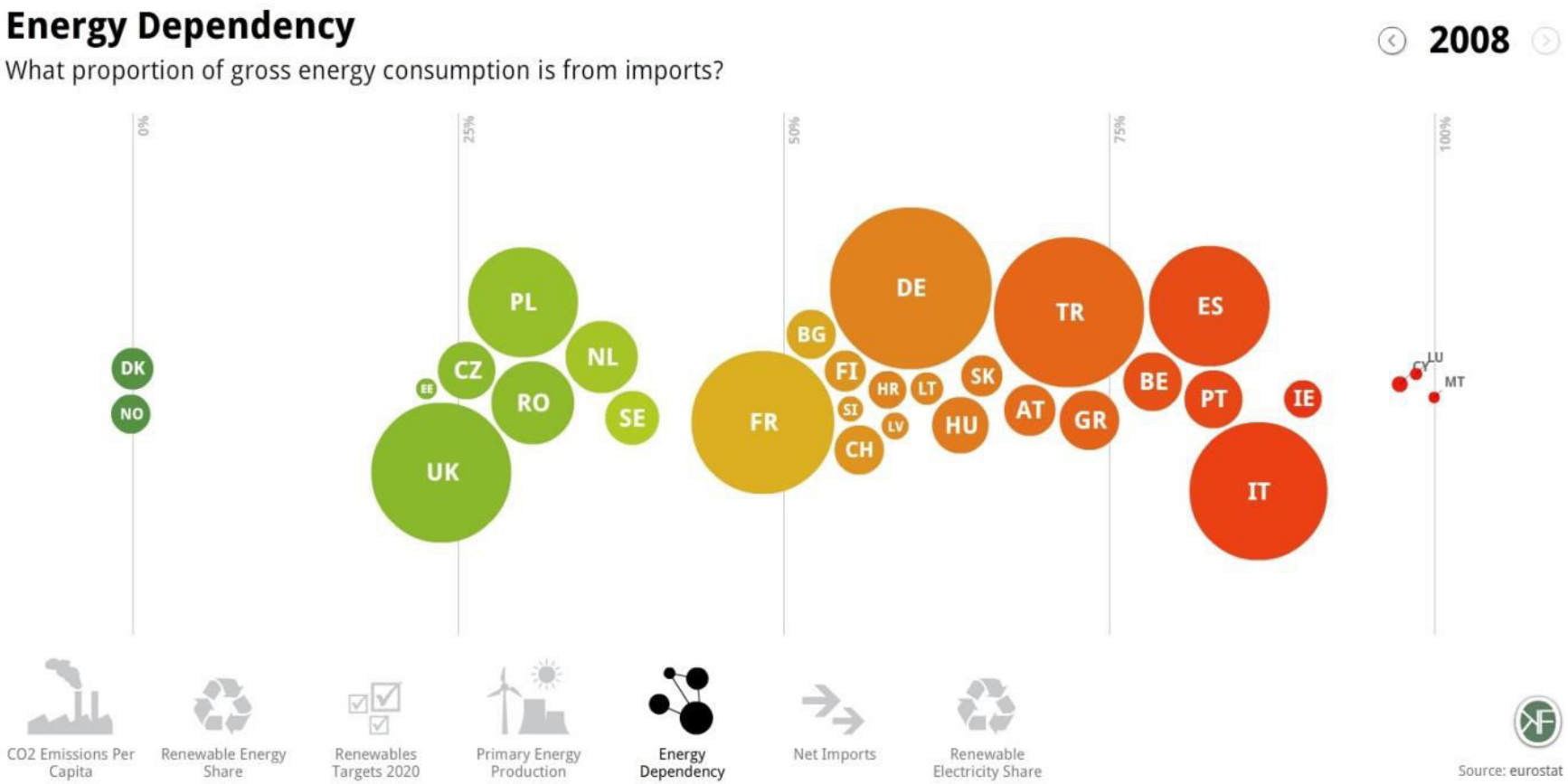
Elements **(1): local multipliers**





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

Elements **(1): local multipliers**



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

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.

Elements **(1): local multipliers**

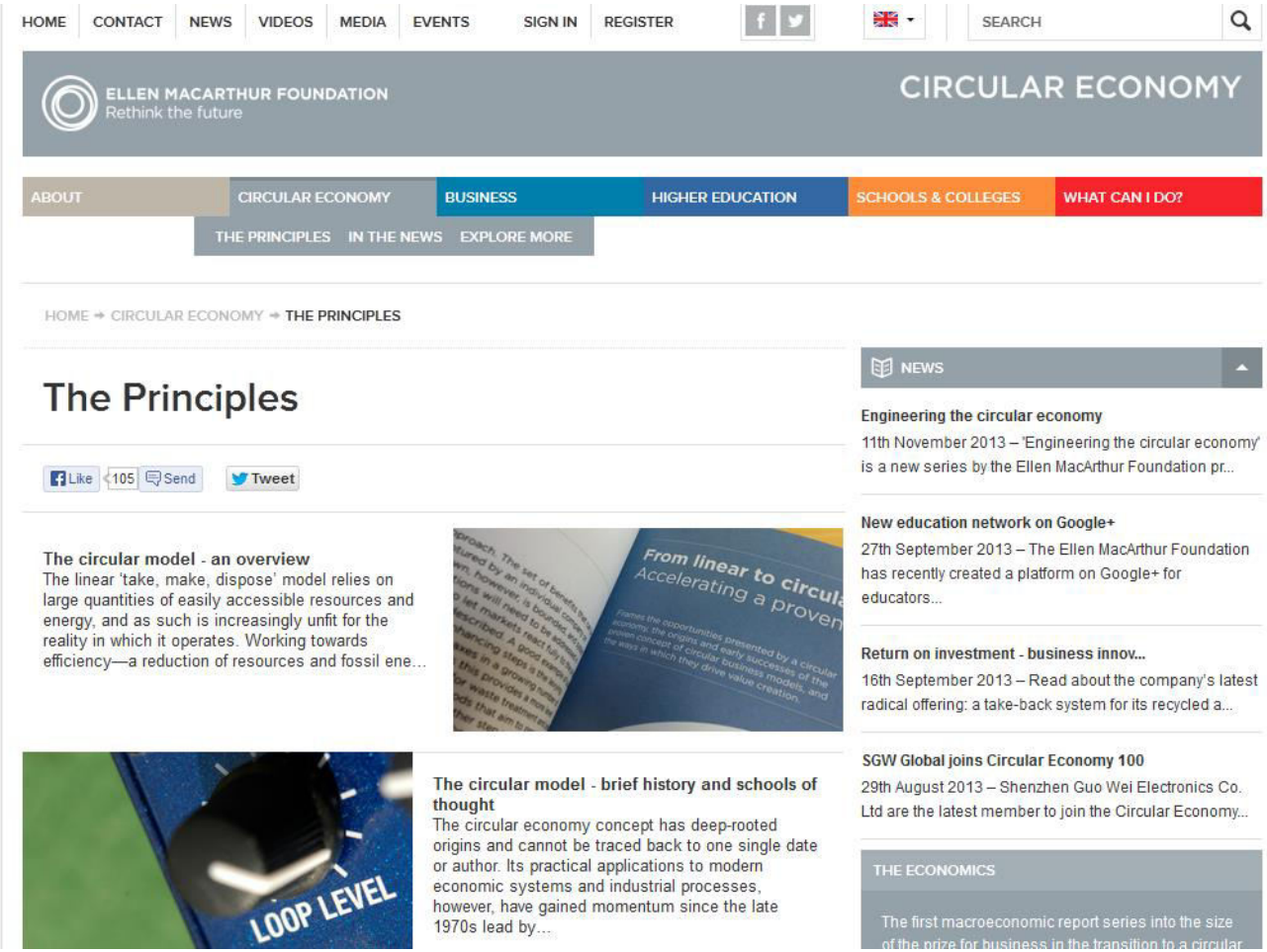
Main investments compatible with SEAP/carbon neutrality goals (not exclusively):

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

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

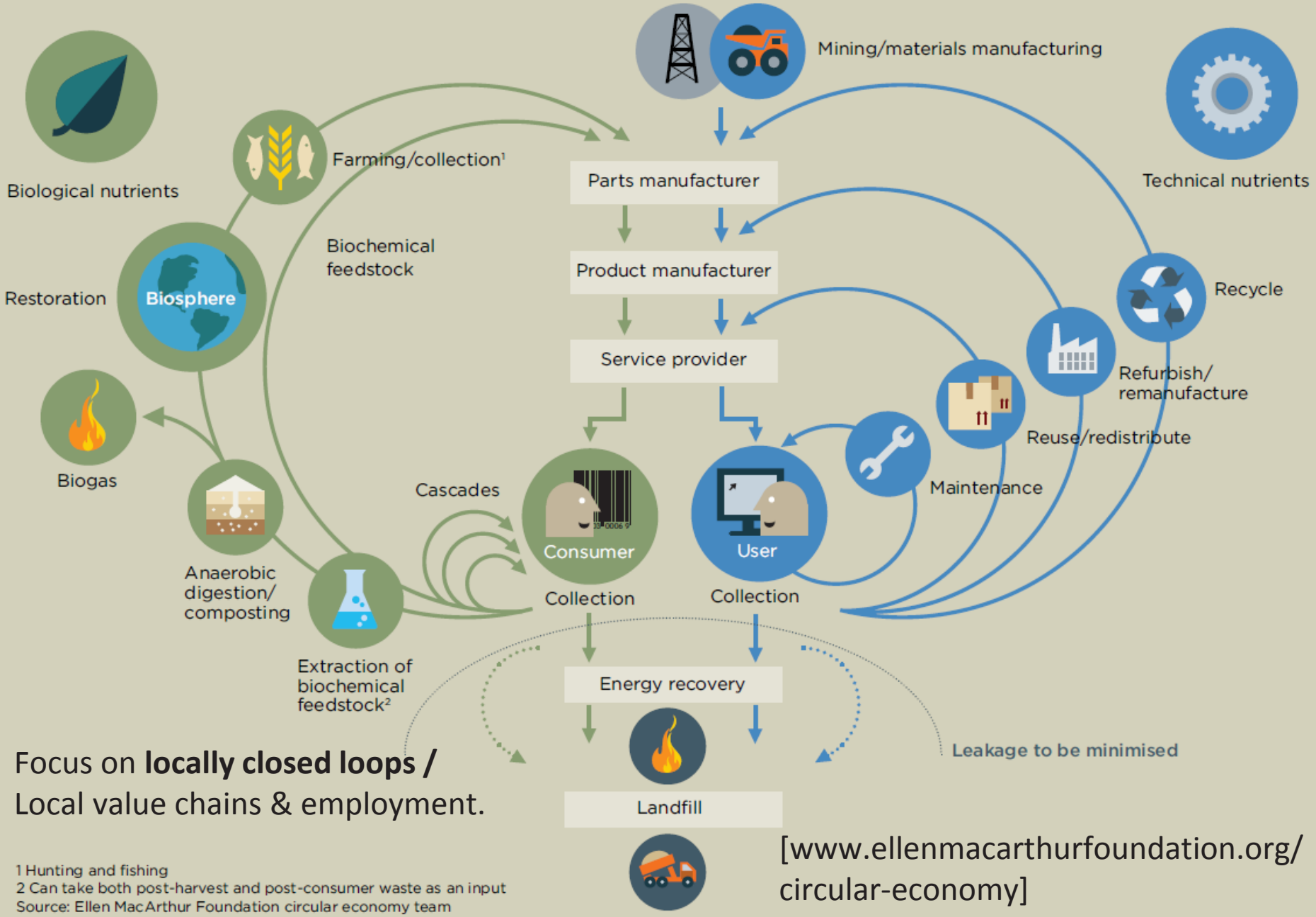
+ other secondary benefits!

Elements **(1): local multipliers**



[http://www.ellenmacarthurfoundation.org/circular-economy]

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



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

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

[www.ellenmacarthurfoundation.org/circular-economy]

Building elements (2):
Adopting another economic perspective

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.

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]

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

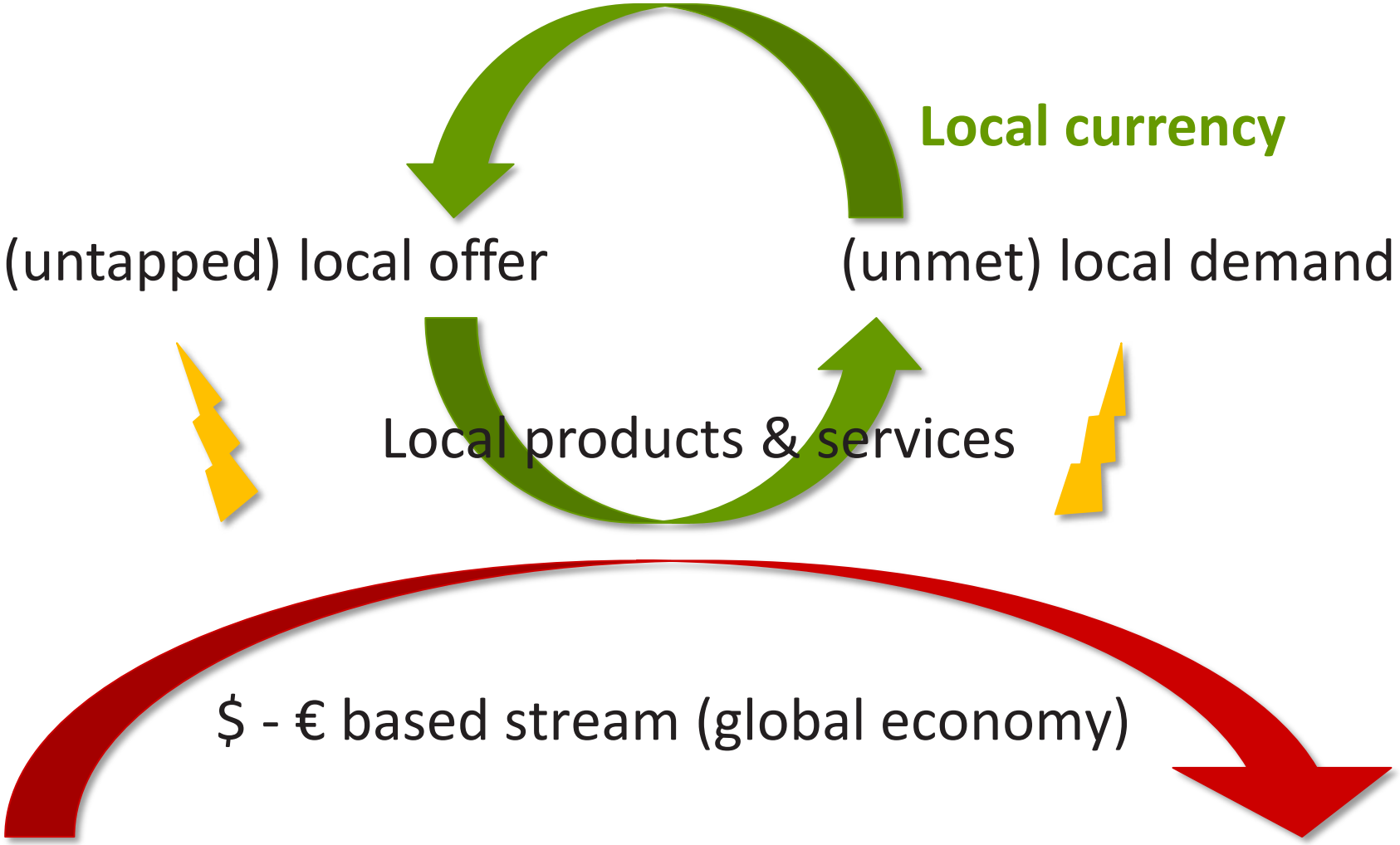
From ‘payback time’ to ‘willingness to pay’.

Model 1 ($ 5.000)

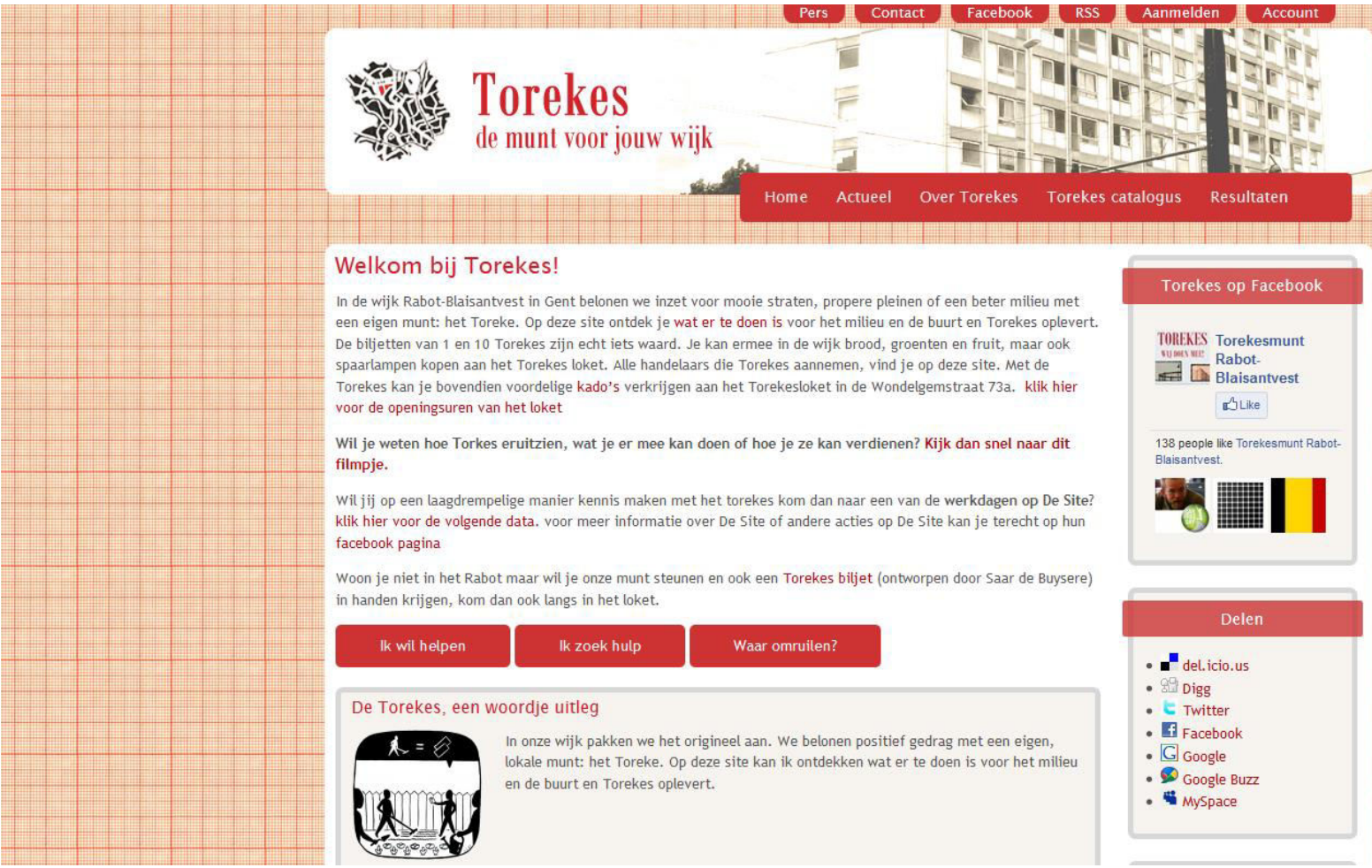
Model 2 ($ 75.000)

Payback time model 2 = ∞

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

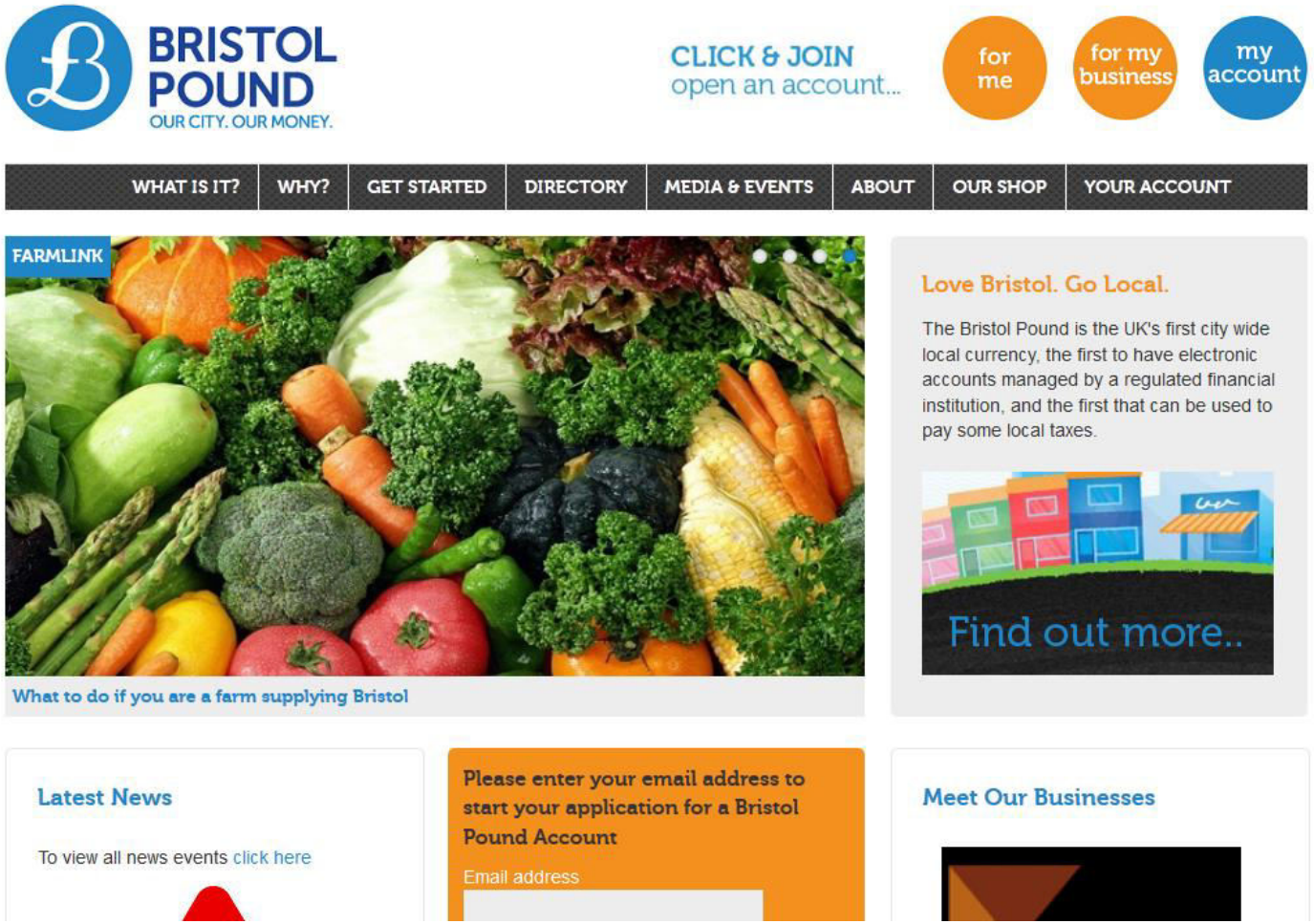


Elements **(2): local currency opportunities**



[www.torekes.be]

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



[http://bristolpound.org]

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]

Building elements (3):
Opportunities in the building sector

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

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

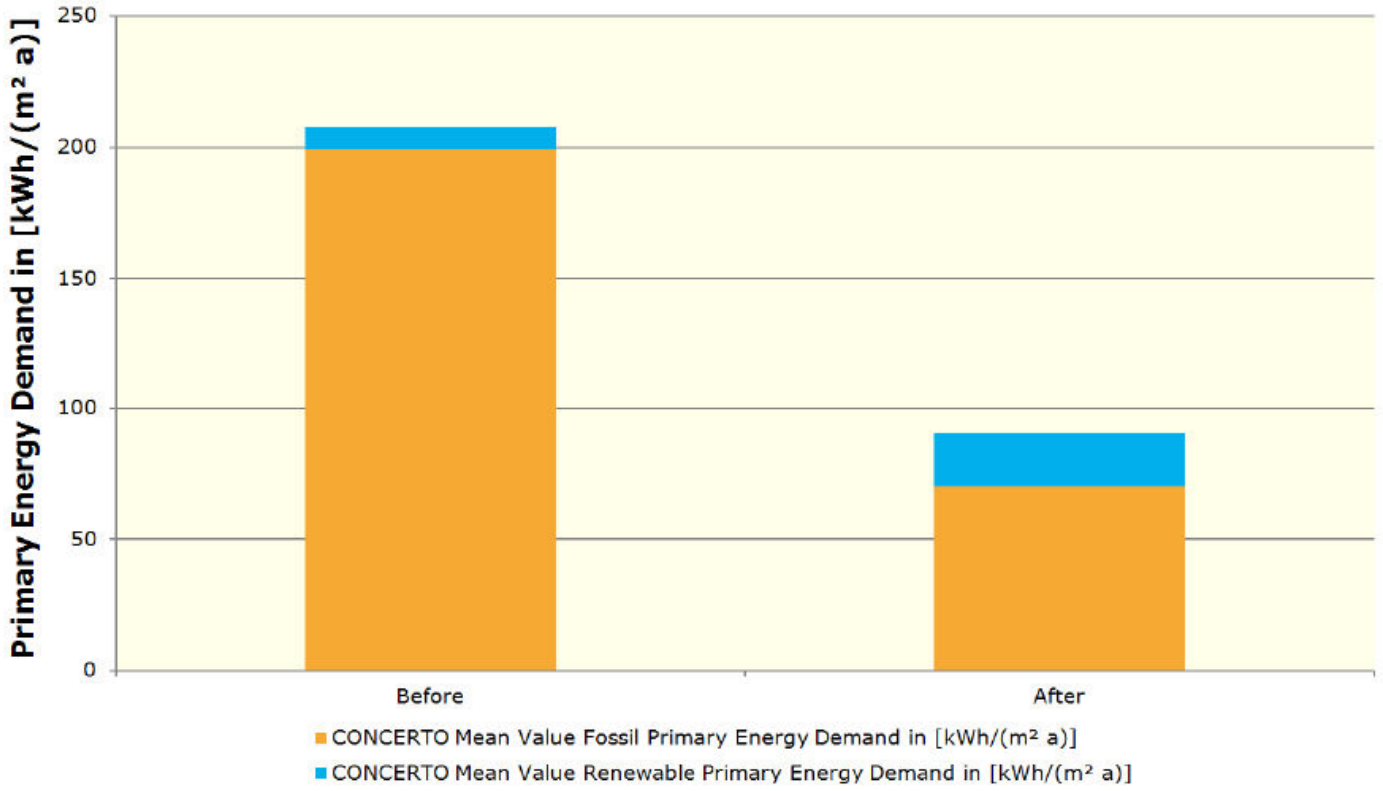
Primary benefit: energy savings mostly at negative cost over life cycle

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

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]

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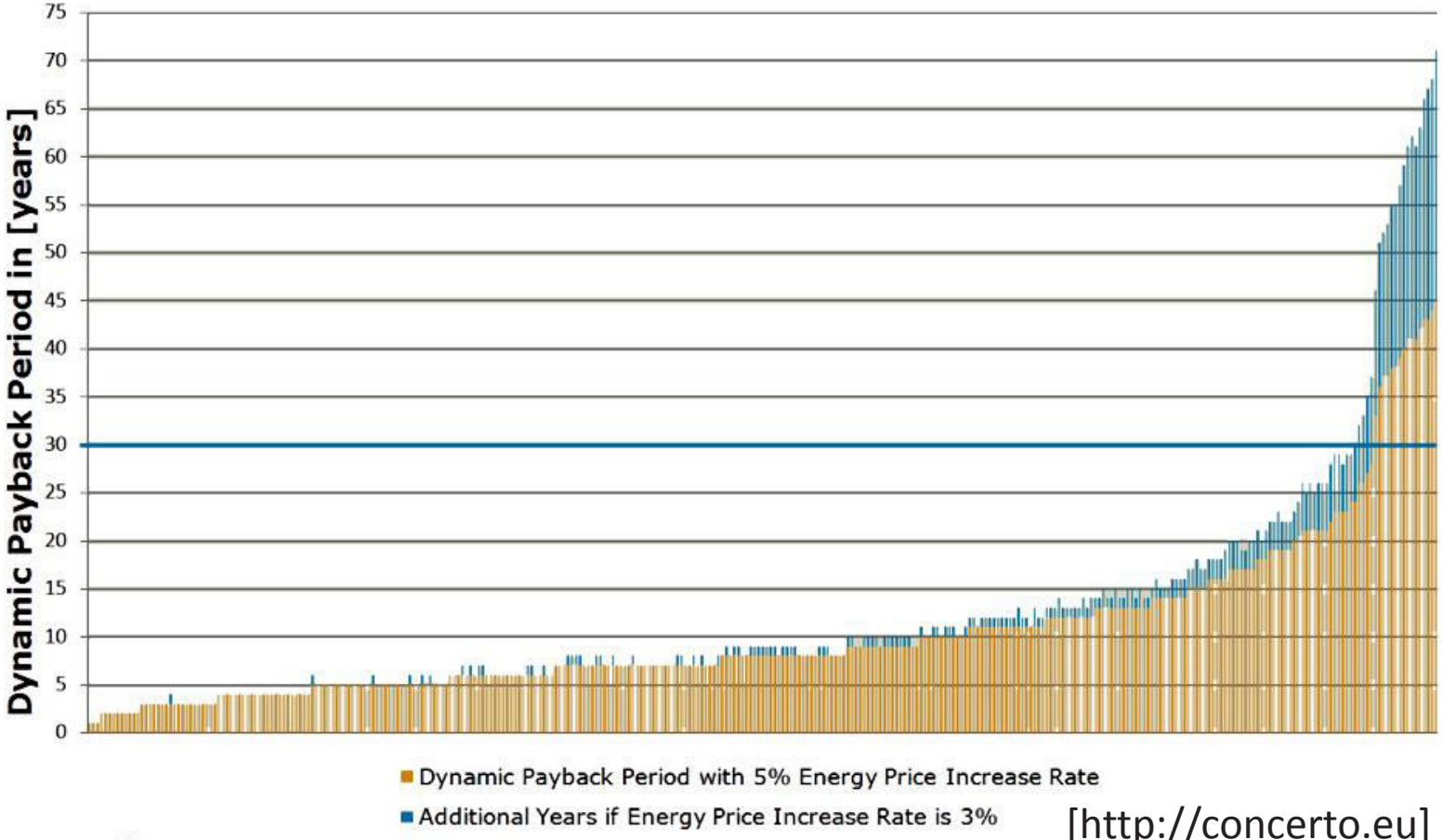
Elements **(3): EU Concerto final results**

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]

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]

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

RENOVATE EUROPE

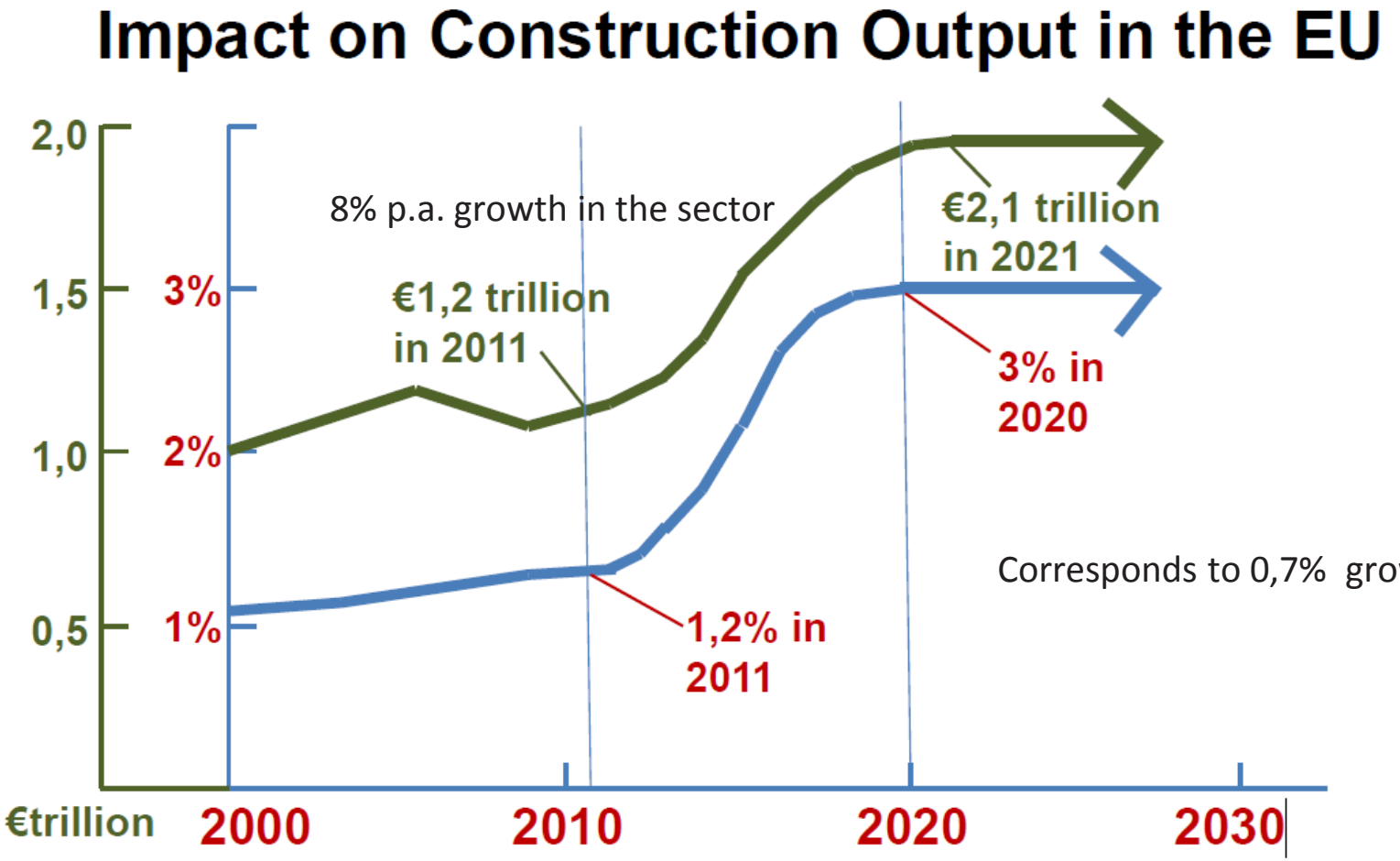
Primary benefits: value of energy savings exceeds investment costs

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]

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



Corresponds to 0,7% growth of GDP

[http://concerto.eu]

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]

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

Different sources point to **1 FTE-year created per** 50.000-100.000 Euro investments in building retrofit activities in EU – take **75.000 Euro** as a rule of thumb.

Thereby public financial levers generate up to 10-fold private investment.

Note: direct-indirect jobs often not specified.

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

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.

Building elements (4):
Opportunities in the transport sector

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]

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]

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.'*

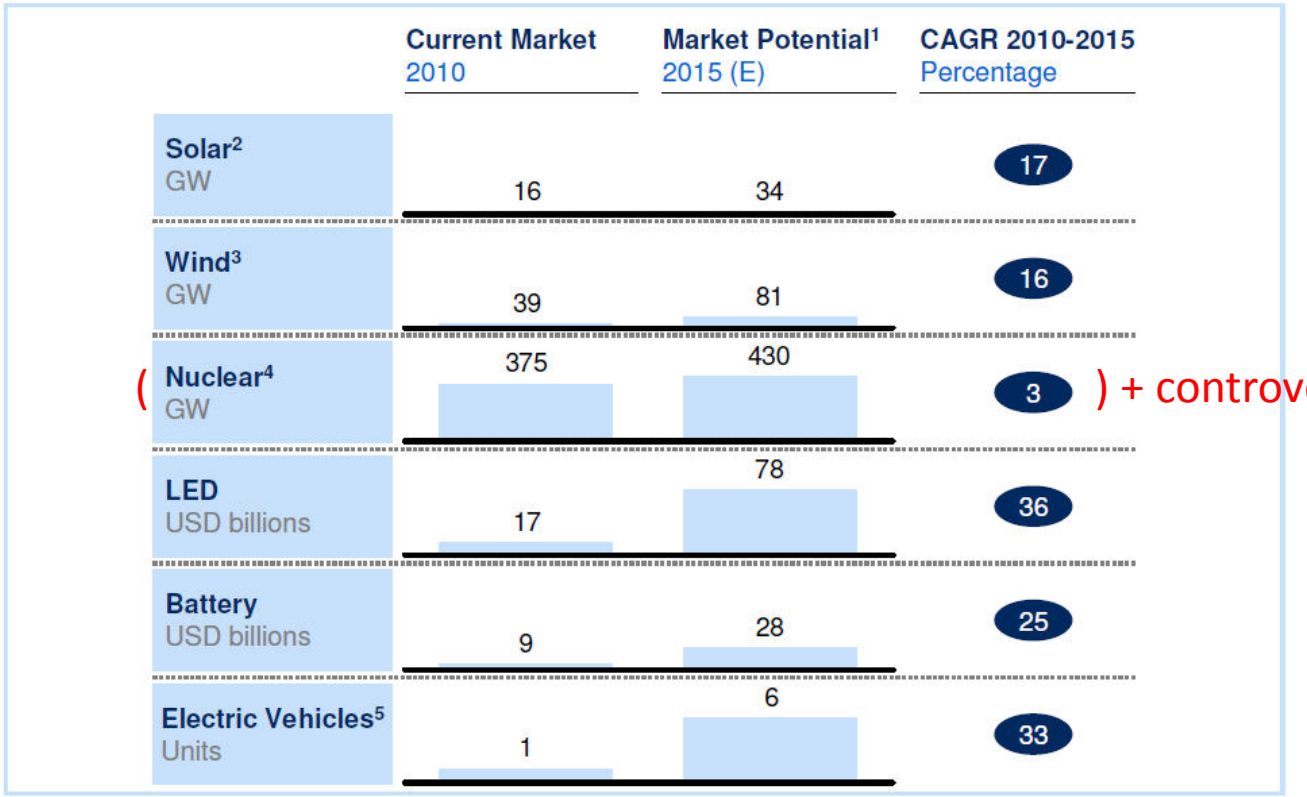
[UN-Habitat 2013]

Building elements (5):
Opportunities in the energy sector

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

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

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



( ) + controversial

1 Newly added capacity or the market size of the given year, except for nuclear
2 Total installed capacity 2010 = 39 GW; 2015(E) = 168 GW
3 Total installed capacity 2010 = 197 GW; 2015(E) = 509 GW
4 Accumulated capacity in 2015; yearly addition varies by project
5 Including Hybrid, Plug-in Hybrid, and Battery EV

SOURCE: iSuppli; BTM; UDI; Hybrid cars; Global Insight; government report; expert interview; team analysis 5

Global cleantech outlook (CAGR = compound annual growth rate) [McKinsey 2012]

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

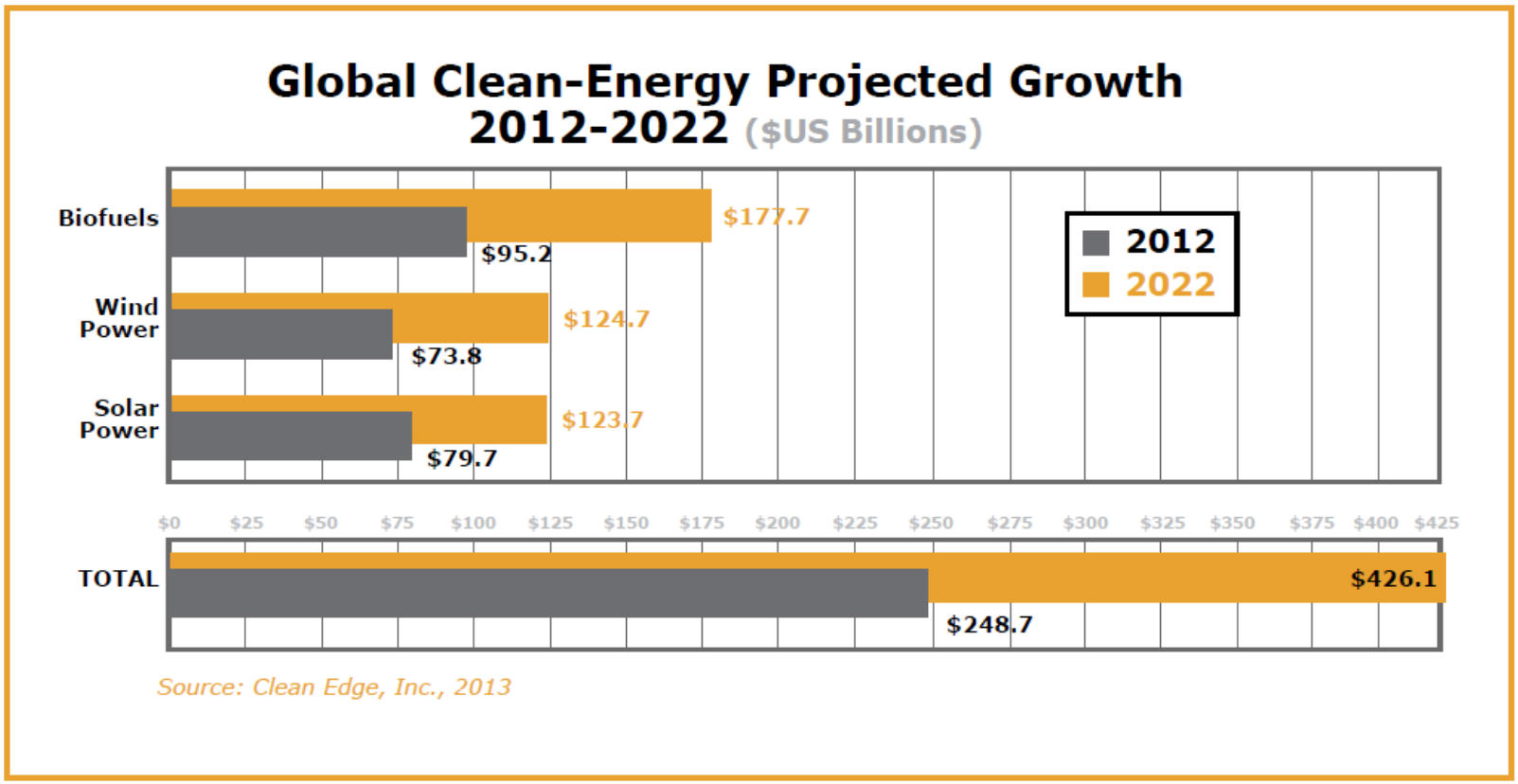
Global Clean-Energy Market Size 2000-2012

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]

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



Global clean energy outlook [Pernick et al. 2013]

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

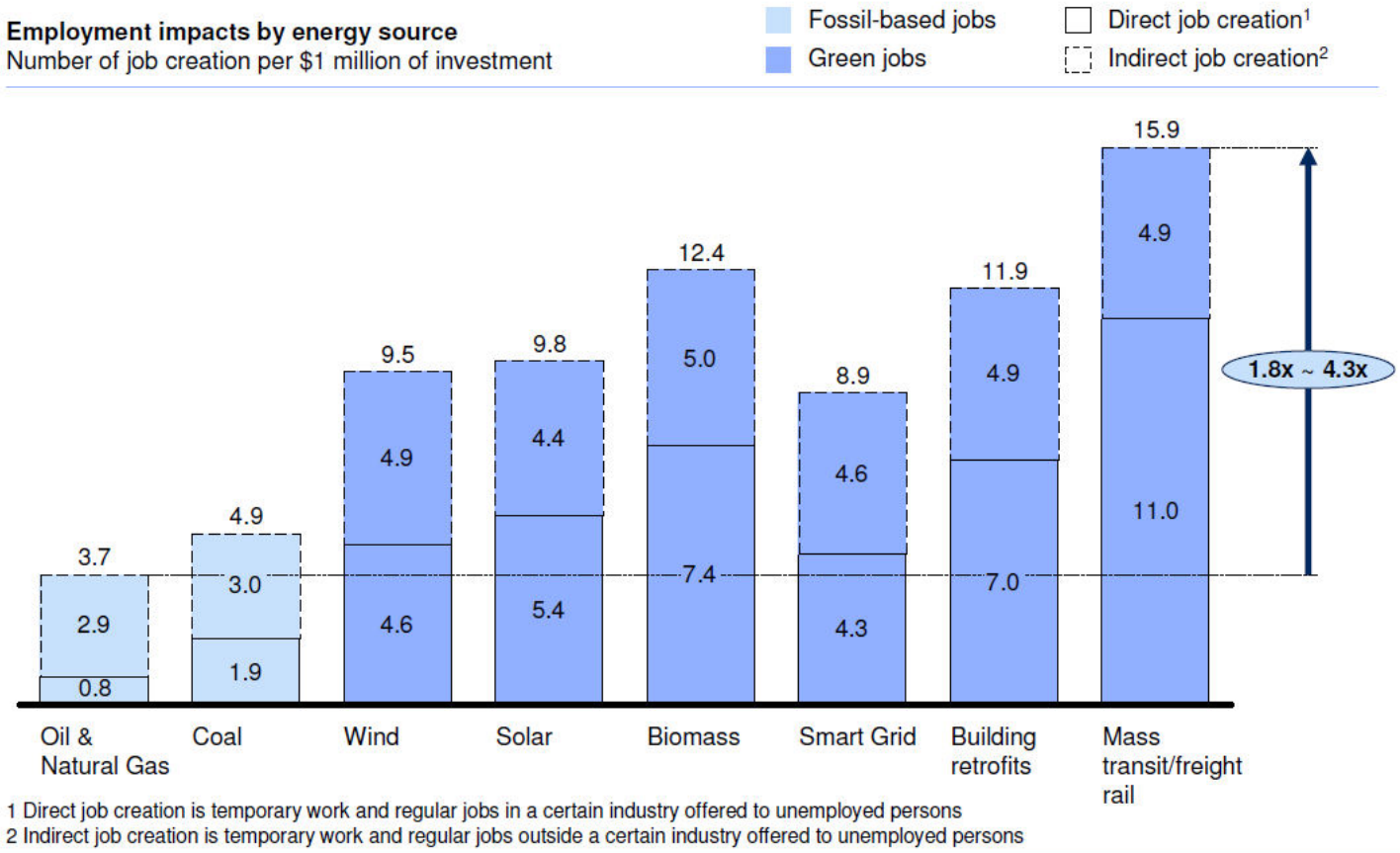
'The fundamental global market drivers for clean technology remain largely intact'.

...' ***resiliency 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]

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

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



[McKinsey 2012]

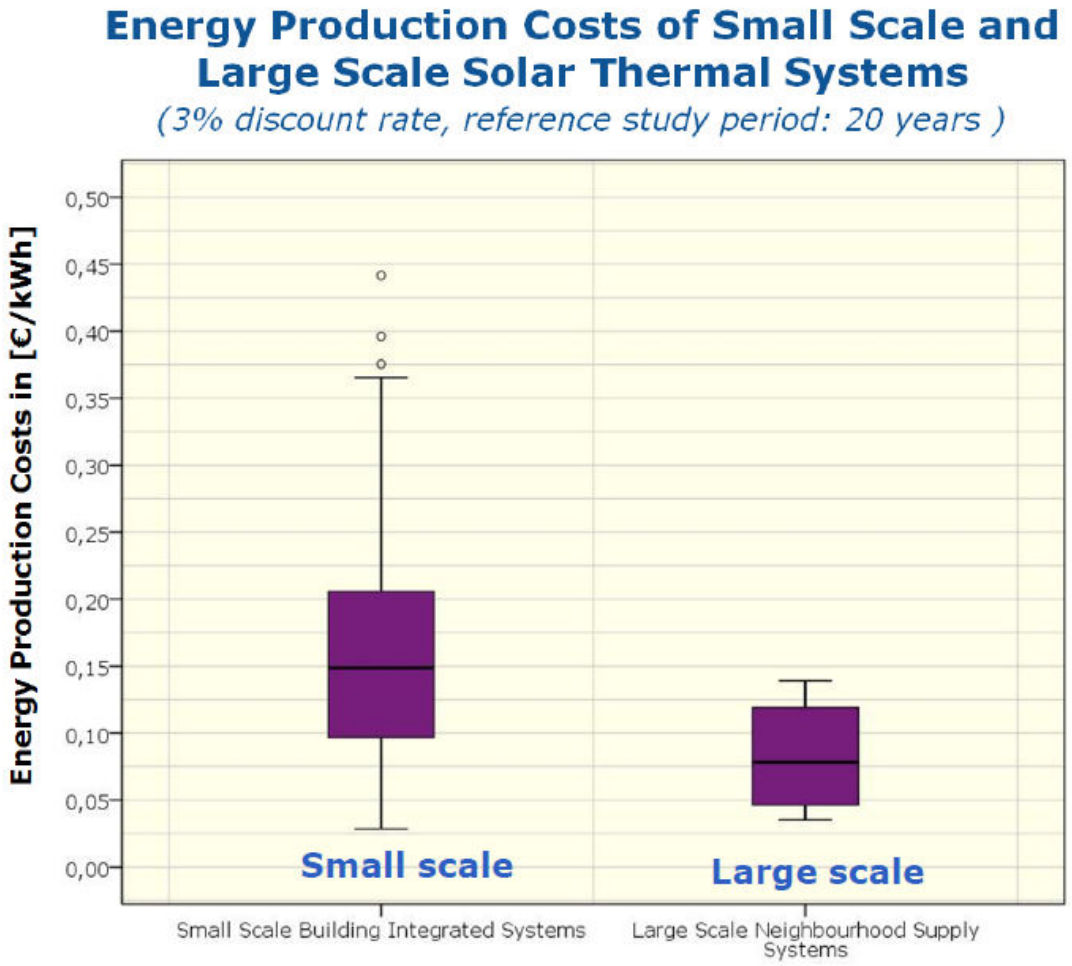
Elements **(5): investment / employment ratio?**

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

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

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



[http://concerto.eu]

Building elements (6):
Role of regulatory framework and policy

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
  - 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
- **Policy failures**
  - Lack of integration: policy silos / no whole systems approach
  - Lack of knowledge & capacity/competences
  - Lack of proper data acquirement & monitoring

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

Final policy reflection…

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'*

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