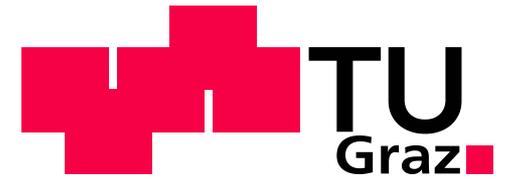


Circular economy and green growth

Hans Schnitzer



Verein StadtLABORGraz

Innovationen für urbane
Lebensqualität

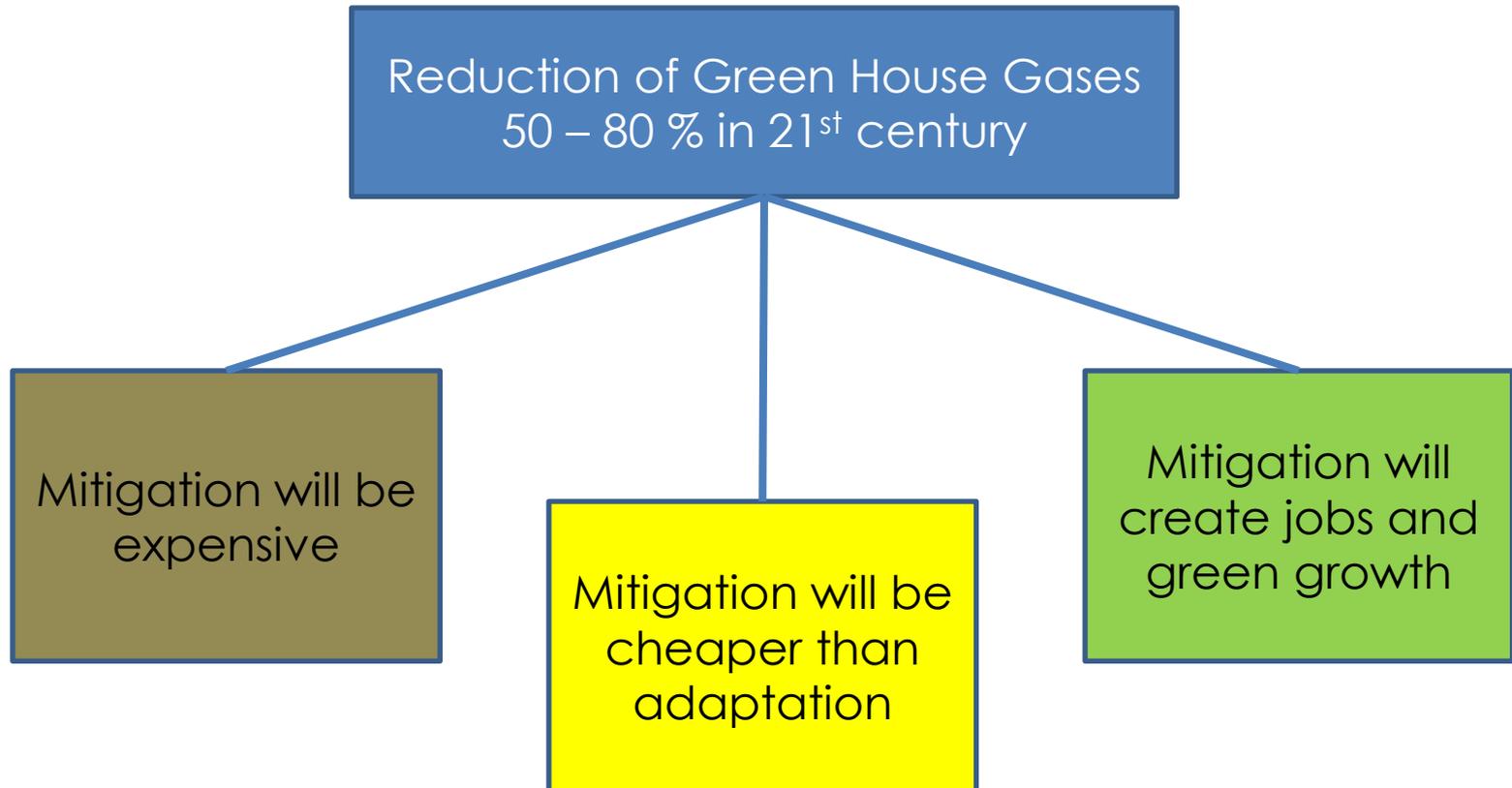
- 📍 This set of slides has been prepared for a presentation in a closed group and not for a general public!
- 📍 It does not fulfill the requirements of a scientific publication regarding citations and sources of figures
- 📍 This set of slides should not be distributed farther
- 📍 This set of slides should not be cited!

We are in a new industrial revolution

- 📍 1st Industrial revolution
 - Energy: coal
 - Mobility: railways
 - Information: printing
- 📍 2nd Industrial revolution
 - Energy: oil, electricity (large central plants)
 - Mobility: cars, planes
 - Information: telephone
- 📍 3rd Industrial revolution
 - Energy: decarbonisation, renewable (decentral, prosumers)
 - Mobility: multimodal
 - Information: INTERNET (decentral, prosumers)

Climate change as driving factor

Three different opinions



- Europe will soon be hit by deadly 'once-in-a-century' extreme weather every year
- Water scarcity
-

The EU roadmap to a Low-Carbon economy will:

- 📍 Save money
- 📍 Create 15 Mio. New jobs
- 📍 Improve Europe's global competitiveness
- 📍 The green growth can lead a way out of the economic crisis

Three different opinions: for emission reduction and economic growth

- 📍 Emission reduction is compatible with economic growth
- 📍 Emission reduction is limited by economic constraints
- 📍 Emission reduction will create new jobs and fasten economic growth

Emission reduction will be a systems change

- 📍 Of today's high-emission, low-efficiency energy systems
- 📍 Change of markets and economic system
- 📍 New technologies
- 📍 Changed regulatory structure
- 📍 Change political and governance

What is green growth?

Break through in

- 📍 Technologies for Renewable Energies
 - 📍 Technologies for energy storage
 - 📍 Network technologies (electricity, gas, water, heat, ...)
 - 📍 Bio-based industry
 - 📍 Energy and materials efficiency
 - 📍 Mobility
 - 📍 Production (factory 4, 3d-printing, ...)
 - 📍
-
- 📍 Supported by ICT

Building directive

As example how systems can be changed

Under the Energy Performance of Buildings Directive:

- 📍 energy performance certificates are to be included in all advertisements for the sale or rental of buildings
- 📍 EU countries must establish inspection schemes for heating and air conditioning systems or put in place measures with equivalent effect
- 📍 **all new buildings must be nearly zero energy buildings by 31 December 2020 (public buildings by 31 December 2018)**
- 📍 EU countries must set minimum energy performance requirements for new buildings, for the major renovation of buildings and for the replacement or retrofit of building elements (heating and cooling systems, roofs, walls, etc.)
- 📍 EU countries have to draw up lists of national financial measures to improve the energy efficiency of buildings

Energy performance of buildings

DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT
AND OF THE COUNCIL of 19 May 2010

Article 9: Nearly zero-energy buildings

- 📍 1. Member States shall ensure that:
 - (a) by 31 December 2020, all new buildings are nearly zero- energy buildings; and
 - (b) after 31 December 2018, new buildings occupied and owned by public authorities are nearly zero-energy buildings

‘nearly zero-energy building’ means a building that has a

- very high energy performance, as determined in accordance
- The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources,
- including energy from renewable sources produced on-site or nearby

Who will be influenced by this legislation?

- 📍 Building industry
- 📍 Agriculture and forestry
- 📍 Heating equipment industry
- 📍 Energy utility companies (electricity, district heating, oil, gas, biomass, ...)
- 📍 Economics
- 📍 Research, innovation
- 📍 Politics
- 📍 Final consumer
- 📍 ... who not???

Biobased for growth

PPP on biobased industries

The vision is

- 📍 that of a competitive, innovative and sustainable Europe
- 📍 leading the transition towards a post-petroleum society
- 📍 while decoupling economic growth from resource throughput and environmental impact.

Founded on:

- 📍 Locally sourced and produced plant and waste derived material
- 📍 with bio-refineries at the heart

Focus of biobased industries

- 📍 Feedstocks: a sustainable biomass supply with increased productivity and building new value chains
- 📍 Biorefineries: optimise efficient processing through R&D and upscaling at large-scale demo-projects
- 📍 Markets, products and policies: develop markets for biobased products and optimizing policy frameworks

Biobased industry's vision

- 📍 In 2030 the European biobased economy will be flourishing, with biorefineries playing a key role in the reindustrialization of rural Europe.
- 📍 Based on demands of a more conscious and resource-efficient society and market, versatile biomass supply chains will feed full-scale integrated biorefineries and sustainably process biomass into a spectrum of **marketable products and energy**

Biobased industry's objectives

By 2030:

- 📍 Reindustrialize Europe
- 📍 Diversify farmer's income
- 📍 Enable 30% of chemical production to become biobased
- 📍 Supply 25% of Europe's transport energy needs
- 📍 Support the European market for biobased fibre and polymers
- 📍 Realize a new generation of biobased materials

The ZERO marginal cost society

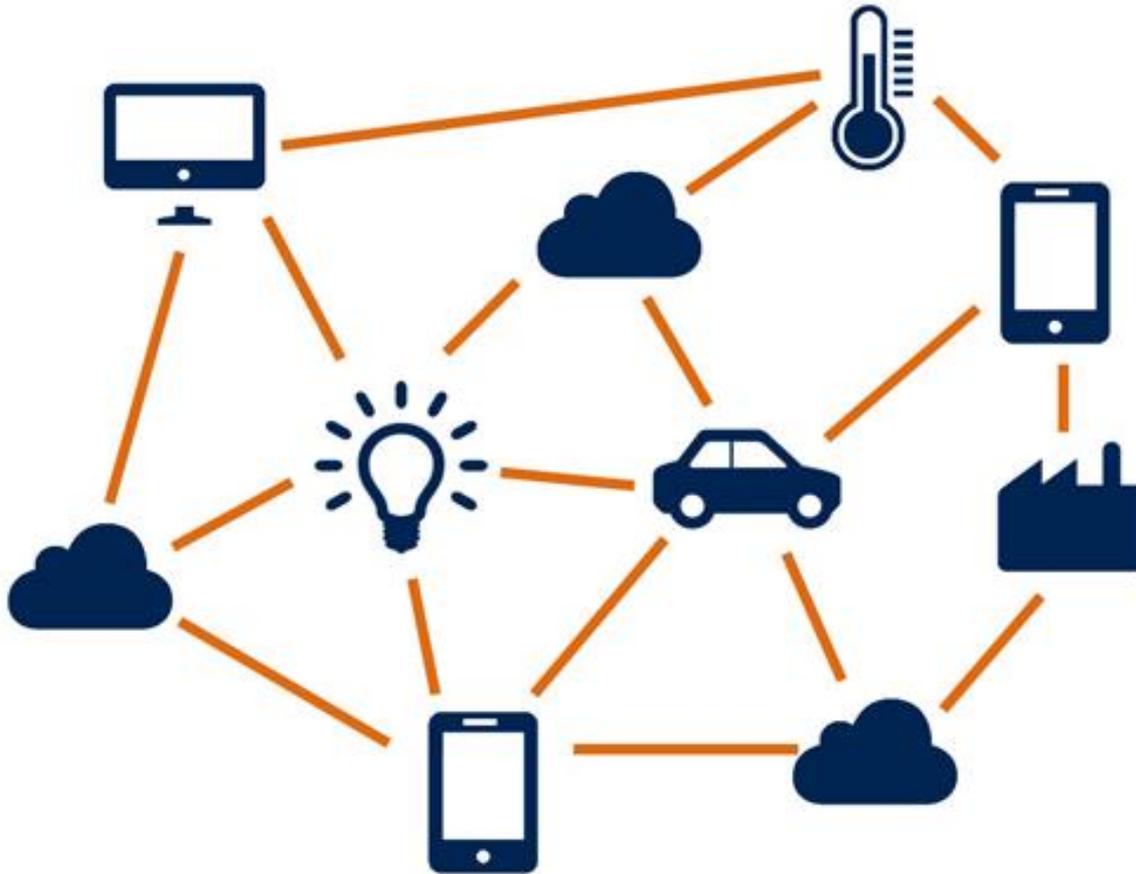
After Jeremy Rifkin

Expenditures will move to first cost mainly:

- 📍 Passive house with almost no heating costs
- 📍 PV roofs with no more electricity costs
- 📍 Electric cars with almost no fuel costs
- 📍 Notebook and SKYPE: no more communication costs
- 📍 Membership in a downstreaming club: free videos and films (YOUTUBE, ...)
- 📍 INTERNET radio – free music online
- 📍 MOOCs (massive open online courses) for free education
- 📍 E-books: millions of free books to download
- 📍 ...

INTERNET of things

- 📍 Things will communicate without people being involved



Factory 4.0

- 📍 Zero emissions
- 📍 3D printing (at home?)
- 📍 Tailor made mass production
- 📍 Based on bio-resources and renewable energy

Financial and commercial sector

Repairing the financial system

- 📍 Sharing economy – use or own
- 📍 Platform economy (Amazon, Alibaba, ...)
- 📍 New services
 - UBER
 - airbnb
- 📍 Crowd financing
 - Kickstarter
 - SOLID Invest
- 📍 Investments
 - Fossil Fuel Divestment: Divestment is the opposite of an investment – it simply means getting rid of stocks, bonds, or investment funds that are unethical or morally ambiguous.

Financing by pre-orders

People do not believe in banks anymore

- 📍 Tesla has 400.000 pre-orders for its new model 3
- 📍 They made 400.000.000 \$ within a few days for investments in developing the car and building new factories

It's designed to sell in much higher volumes than the Model S and X. So far, Tesla has only built a little over 100,000 cars in total; with the help of a higher-volume model like the Model 3, Musk wants to make a half million cars per year by 2020. To do that, he needs the Gigafactory — a massive battery factory the company is building in partnership with Panasonic in Nevada — to ramp up, because today's supply of lithium ion cells just can't keep up with EV production otherwise.





MOON - the most accurate lunar globe

Oscar Lhermitte and Kudu

The first topographically accurate lunar globe, displaying the current lunar phases at any given time.

London, UK

295% £73,994 21
funded pledged days to go



UDOO X36: The Most Powerful Maker Board Ever

UDOO

10 times more powerful than Raspberry Pi 3

Boston, MA

378% \$378,454 45
funded pledged days to go



The Edie Windsor Coding Scholarship Fund for LGBTQ women

Lesbians Who Tech

Supporting and helping LGBTQ women learn how to code.

San Francisco, CA

18% \$18,541 27
funded pledged days to go



Clairy: The Most Amazing Natural Air Purifier

Clairy

Clairy combines the power of nature and technology with the beauty of design to eliminate indoor pollution and analyze it.

San Francisco, CA

252% €225,170 10
funded pledged hours to go



TRINUS - The Affordable All-Metal 3D Printer

Kodama, Inc.

Made of industrial-grade parts. Transforms into a laser engraver in 60 seconds. Trinus is the professional 3D printer you can afford.

San Francisco, CA

1902% \$951,441 9
funded pledged days to go



VIE SHAIR: Pain-Free Sociable Headphones

Vie Style Inc.

Yamaha's renowned technology ensures high quality sound. Open-air frame for ultimate comfort. Closed-air frame for privacy.

Tokyo, Japan

116% \$174,371 40
funded pledged hours to go



New Robot to Explore the Depths of Yellowstone Lake

Global Foundation for Ocean Exploration

We are engineers and explorers who plan to help Yellowstone scientists make what could be tomorrow's greatest discoveries.

West Mystic, CT

47% \$47,282 13
funded pledged days to go



Spin - The Gyroscopic Spintop

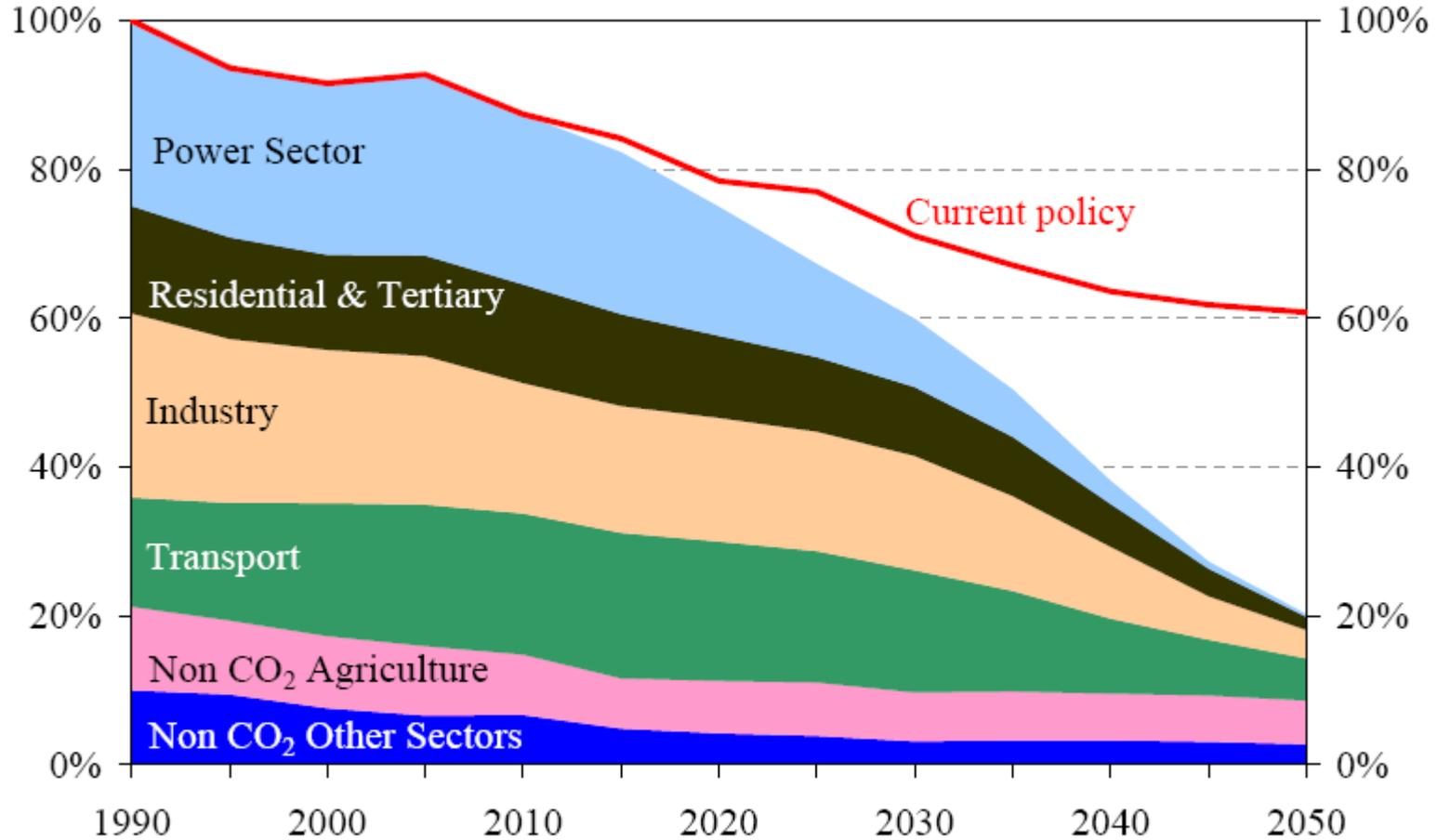
Simplifyk

A mechanical spin top with strange behaviors that also acts as a gyroscope in a harmonious and mind bending form.

Burbank, CA

685% \$102,831 11
funded pledged days to go

EU GHG emissions towards an 80% domestic reduction (100% = 1990)



Source: EUROPEAN COMMISSION (2011): A Roadmap for moving to a competitive low carbon economy in 2050.

Technological change or behavioral change

People don't
resist **CHANGE**
they resist being
CHANGED

Richard Beckhard; he was a pioneer in the field of organizational development