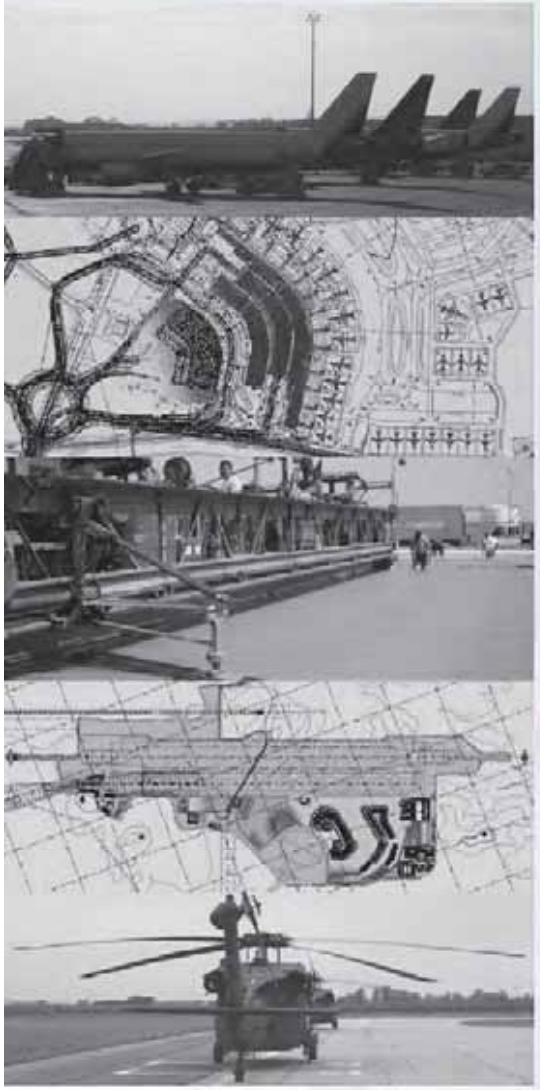
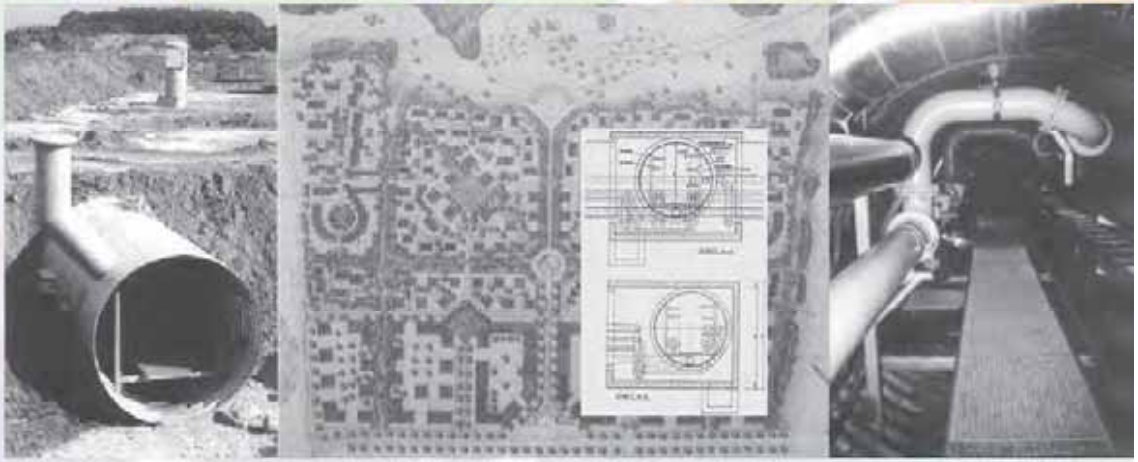




Sustainable urban development in Germany - a situation report after 20 years

1

URBAN SUSTAINABLILITY

axel laistner consulting

UNDERSTANDING THE BASICS

knowing the rules of the world we live in

SUSTAINABLE URBAN PLANNERS

developing humane & creative multifaceted teams
that can achieve sustainable cities

SUSTAINABLE URBAN DEVELOPMENT

developing concepts for humane cities
think about value – and how to retain it
break up the tristess – use water and plants
setting examples – leadership pays off

KNOWING THE RULES OF THE WORLD WE LIVE IN

fundamental principles

Understanding the Basics

MATERIAL AND ENERGY BALANCE & FLOWS

You can't destroy mass / energy – it only goes somewhere else

⓪

Ain't nothing disappearing !

Σ MASS = 0

Whatever material we put in we get out

in some form or other (with the notable exception of nuclear reactors – you know Einstein... $E = mc^2$)

①

Energy is always only converted !

Σ ENERGY = 0

No energy is ever lost

in conversion or transfer processes it only takes on other more or less useful forms and it can be transferred from one body / substance to another.

②

Heat always flows from warm to cold !

Gravity always knows which way is down !

Time always knows only the past !

Σ ENTROPY > 0

The natural direction of flow

can only be partially reversed in confined spaces by exerting usable energy forms

Sorry, there's nothing we can do about time !

Climate Change

International Panel on Climate Change (IPCC) Report 2007

- Climate Change is HERE!
- So how is our future going to be?
- News Last Week:

1. Global Temperature = +2° in 2050 now expected – not in 2100 – react now immediately or accept the consequences. ("2052 - A Forecast for the Next Forty Years" byJorgen Randers - Club of Rome)

2. New Antarctic Ice Shelf Melting Mechanism discovered – much faster melting processes and glaciers speeds sliding off Antarctica are now expected (Alfred-Wegener-Institute for Polar and Ocean Science – Bremerhafen / Germany)

Source:
International Panel on Climate Change(IPCC) – WMO / UNEP; "Climate Change 2007";
ISBNs: 978 0521 88009-1; 70596-7; 88010-7; 70597-4; 88011-4; 70598-1 http://www.ipcc.ch
(last access 21.09.2009)
http://www.clubofrome.de/aktuelles.html (last access 15.05.2012)
"**Klimawissenschaftler entdecken neue Schwachstelle des antarktischen Eisschildes**"
http://www.awi.de/de/aktuelles_und_presse/pressemitteilungen/detail/item/climate_scientists_discover_new_weak_point_of_the_antarctic_ice_sheet/?cHash=c3926d4358d21e4cf4b63315ac3761bb (last access 15.05.2012)

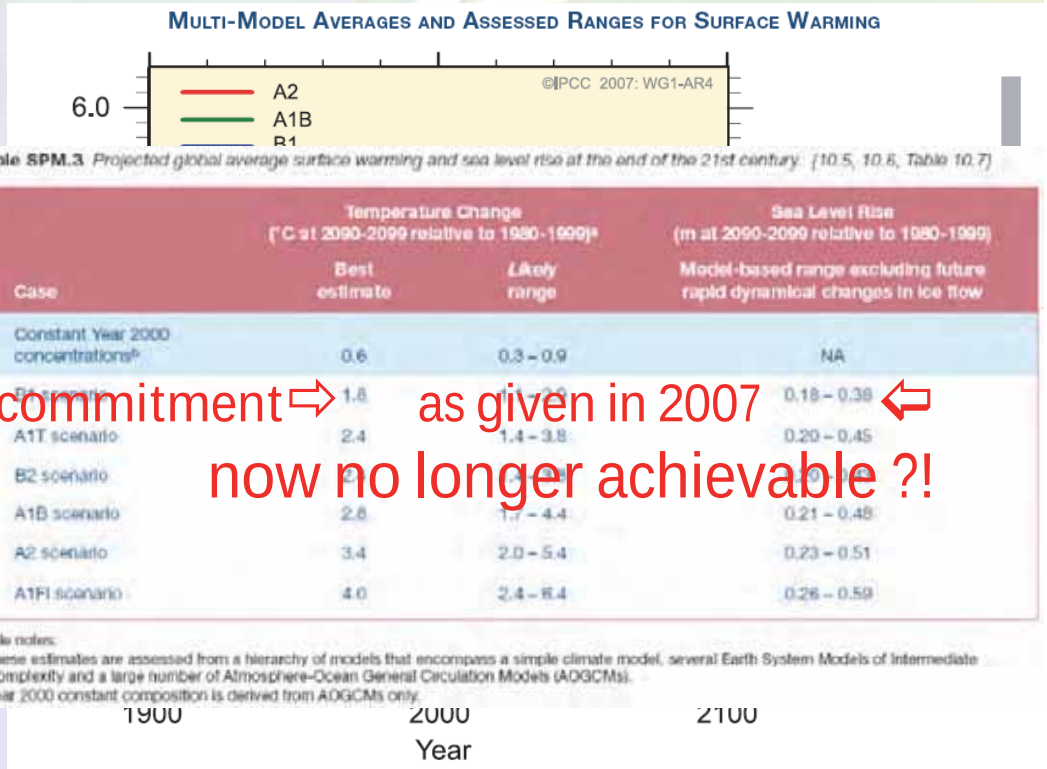


Table SPM.3 *Projected global average surface warming and sea level rise at the end of the 21st century. {10.5, 10.6, Table 10.7}*

Case	Temperature Change (°C at 2090-2099 relative to 1980-1999)[a] Best estimate	Likely range	Sea Level Rise (m at 2090-2099 relative to 1980-1999) Model-based range excluding future rapid dynamical changes in ice flow
Constant Year 2000 concentrations[b]	0.6	0.3 – 0.9	NA
B1 scenario	1.8	1.1 – 2.9	0.18 – 0.38
A1T scenario	2.4	1.4 – 3.8	0.20 – 0.45
B2 scenario	2.4	1.4 – 3.8	0.20 – 0.43
A1B scenario	2.8	1.7 – 4.4	0.21 – 0.48
A2 scenario	3.4	2.0 – 5.4	0.23 – 0.51
A1FI scenario	4.0	2.4 – 6.4	0.26 – 0.59

Table notes:
[a] These estimates are assessed from a hierarchy of models that encompass a simple climate model, several Earth System Models of Intermediate Complexity and a large number of Atmosphere-Ocean General Circulation Models (AOGCMs).
[b] Year 2000 constant composition is derived from AOGCMs only.

G8 commitment ⇨ as given in 2007 ⇦
now no longer achievable ?!

Figure SPM.5. *Solid lines are multi-model global averages of surface warming (relative to 1980–1999) for the scenarios A2, A1B and B1, shown as continuations of the 20th century simulations. Shading denotes the ±1 standard deviation range of individual model annual averages. The orange line is for the experiment where concentrations were held constant at year 2000 values. The grey bars at right indicate the best estimate (solid line within each bar) and the* ***likely*** *range assessed for the six SRES marker scenarios. The assessment of the best estimate and* ***likely*** *ranges in the grey bars includes the AOGCMs in the left part of the figure, as well as results from a hierarchy of independent models and observational constraints. {Figures 10.4 and 10.29}*

Climate Change

International Panel on Climate Change (IPCC) Report 2007

- Climate Change is HERE!
- A closer look at the consequences to our lives!
- Any temperature change above (maybe at) 2°C has likely serious consequences on a SPECIES level !

And this means the HUMAN SPECIES !!

G8 commitment ⇨

If we continue to ⇨ think this is just a ⇨ political mindgame ⇨ and continue to ⇨ squander our time⇨

Source:
International Panel on Climate Change(IPCC) – WMO / UNEP; "Climate Change 2007";
ISBNs: 978 0521 88009-1; 70596-7; 88010-7; 70597-4; 88011-4; 70598-1 http://www.ipcc.ch
(last access 21.09.2009)

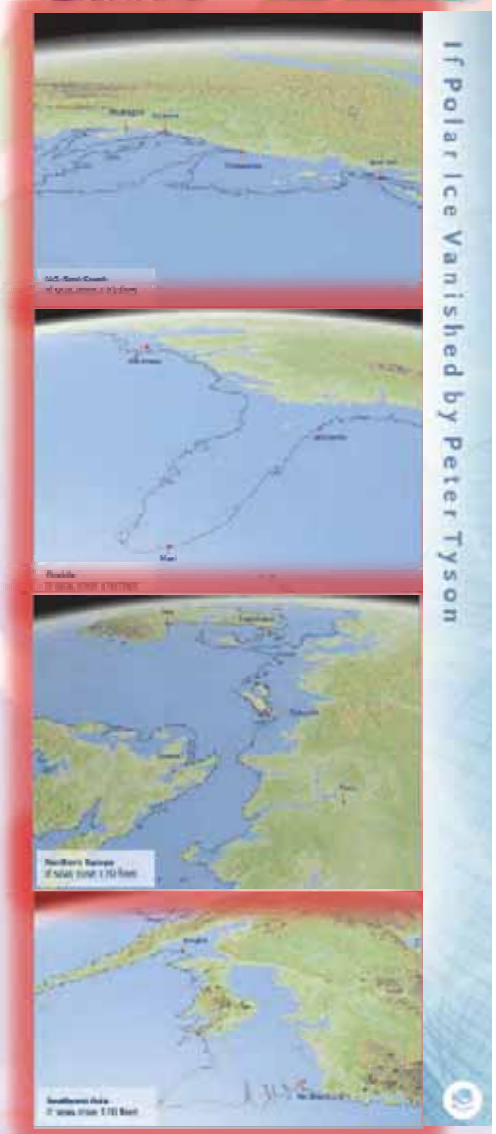
Climate Change

International Panel on Climate Change (IPCC) Report 2007

- Climate Change is HERE!
- So how is our future going to be?
- Where Will our coasts be when Greenland is becoming ice free ?
  - sea level rise total ~ 7m
  – time line ~ first felt effects in 100 years – ice free in several 1000 years OR FASTER as some indicators since 2007 suggest !?

- And where once Antarctica melts ?
  - sea level rise total ~ 70m
  – time line ~ unknown, but effects expected if dynamic ice flow dominates (as discovered since 2007)

Don't forget – while Greenland melts – down under doesn't wait either !!



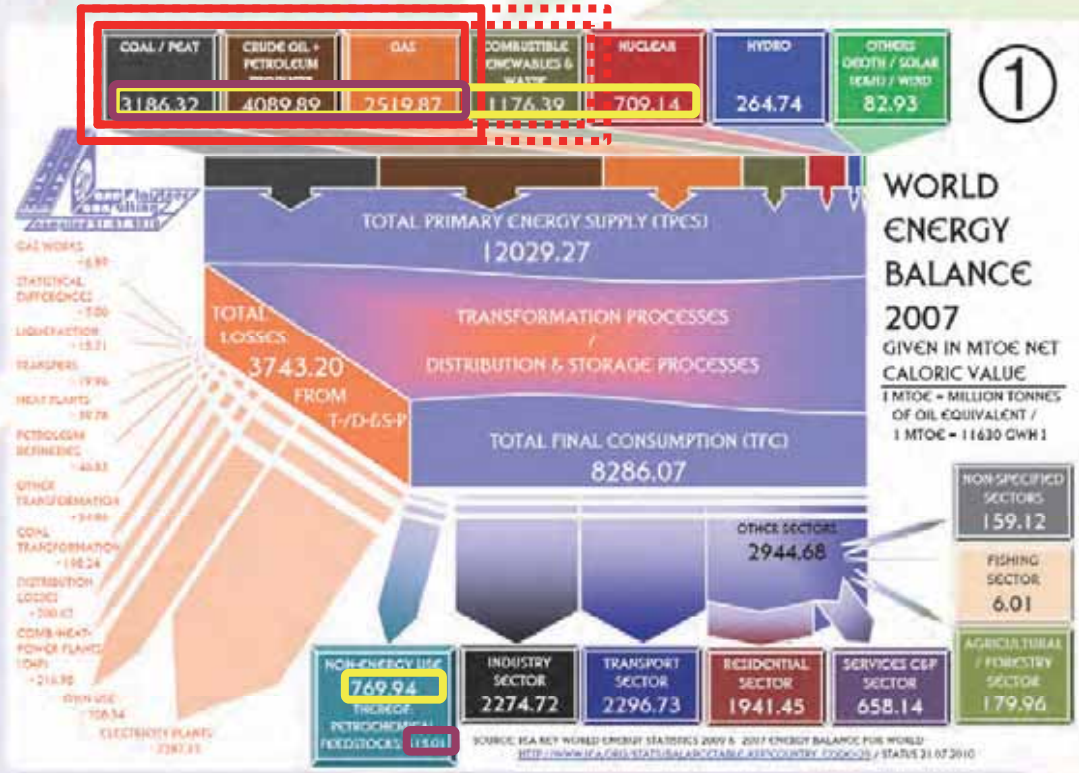
Source:
NOVA "If polar ice vanished by Peter Tyson" – http://www.pbs.org/wgbh/nova/earth/mapping-sea-level-rise.html
(last access 15.05.2012)
International Panel on Climate Change(IPCC) – WMO / UNEP; "Climate Change 2007";
ISBNs: 978 0521 88009-1; 70596-7; 88010-7; 70597-4; 88011-4; 70598-1 http://www.ipcc.ch
(last access 21.09.2009)

The Squandering of Our Inheritance

Energy Use of the World

- climate relevant energy sources:
  91.2% (81.4%)
- loss by energy use of raw-material resources each year:
  ~ 14 non-energy use materiel supply years
- loss by burning of total non-renewable petro-chemical raw material resources each year:
  ~ 18 non-energy use materiel supply years

Source: see diagram



The Squandering of Our Inheritance

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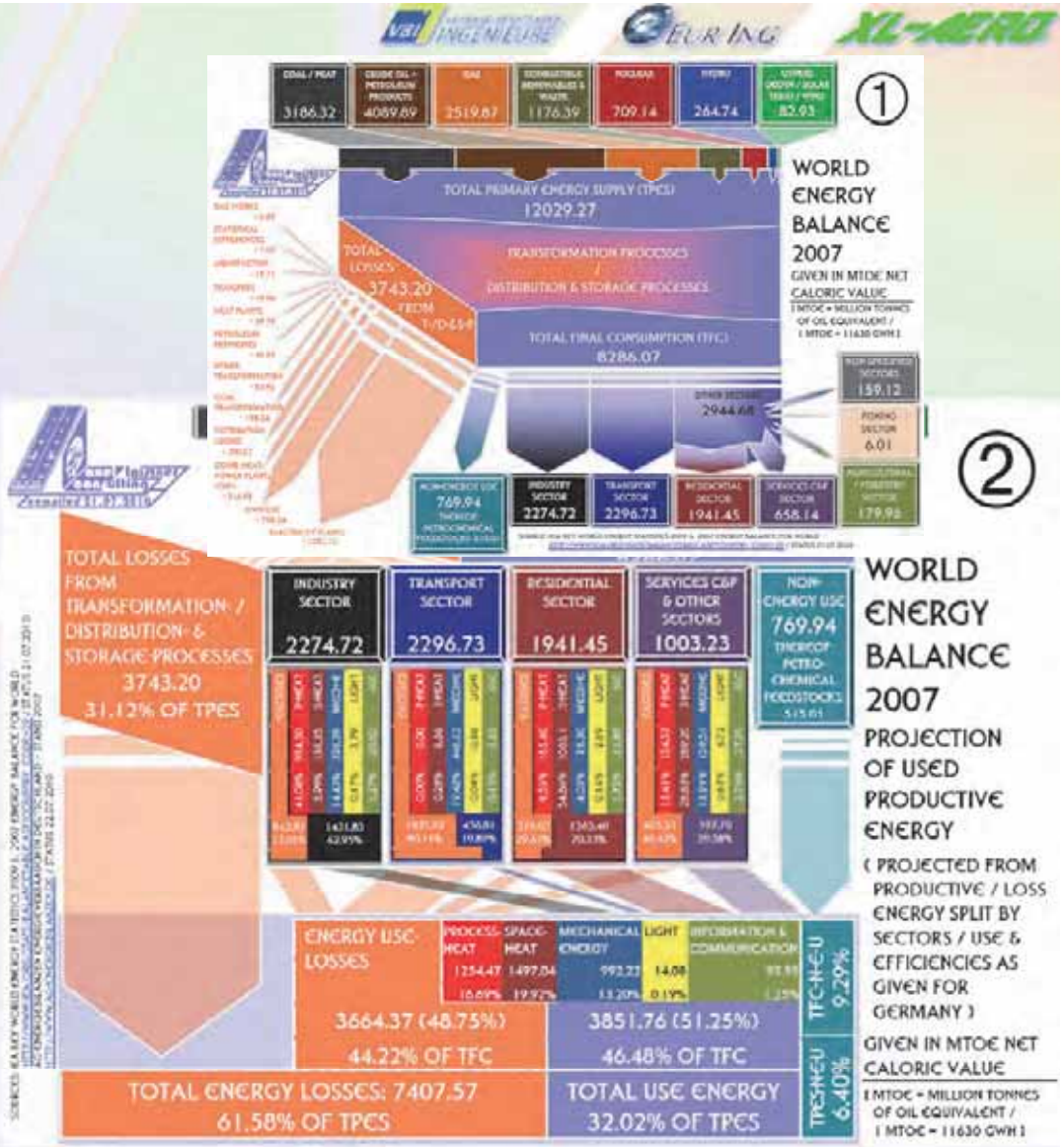
- loss by energy use of raw-material resources each year:
  ~ 14 non-energy use materiel supply years
- loss by burning of total non-renewable petro-chemical raw material resources each year:
  ~ 18 non-energy use materiel supply years

-total world energy system losses:

estimated 62%

Source: see diagram



THE TRANSFORMATION PROCESSES MANTRA

① AVOID !

② REDUCE !

③ COMBINE !

When you use mass & energy – what needs to be lost ?

- ✓ Don't use high transformation processed materials or energy when you don't need to.
- ✓ Don't use higher processed materials or energy than you need to.

- ✓ Only use what you need.
- ✓ Know why you need how much, for what reason, and in what capacity.
- ✓ Understand what you could do without, and know the reasons why and when your going to cut it.

- ✓ Understand which materials or energy forms can be combined or reused.
- ✓ Where is the "loss / waste" of one system the carrier or useful material or energy of another?

Sources: Gerd Ebbinghaus Management Consulting

DEVELOPING HUMANE & CREATIVE MULTIFACETED TEAMS THAT CAN ACHIEVE SUSTAINABLE CITIES

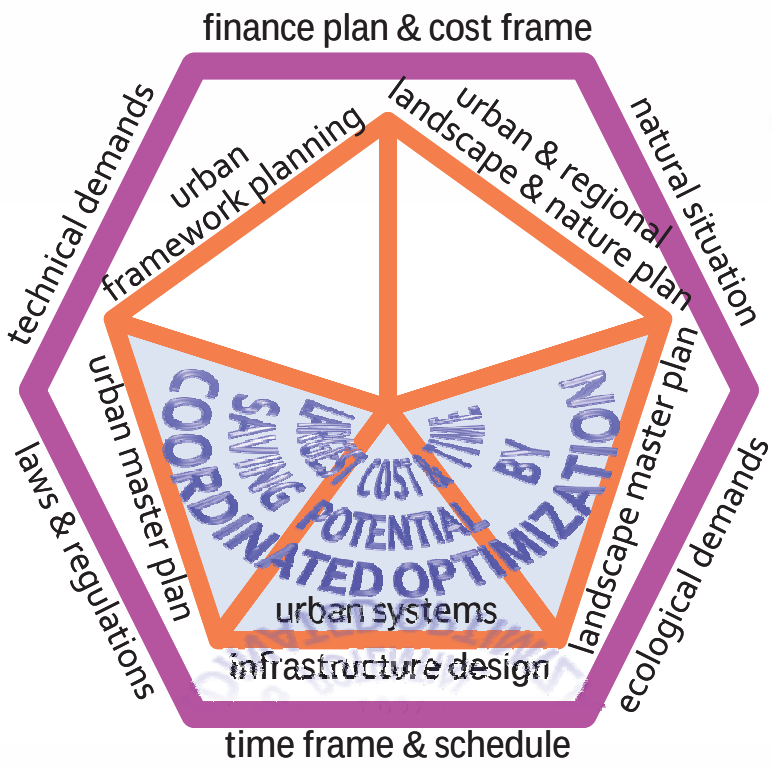
urban sustainability – by whom ?

11

Sustainable Urban Planners

Developing Concepts for Humane City Designers

Integrated Project Design Elements



Sources: pictures © & data: alc UG(hb) – POET GmbH

Understanding the team requirements to succeed

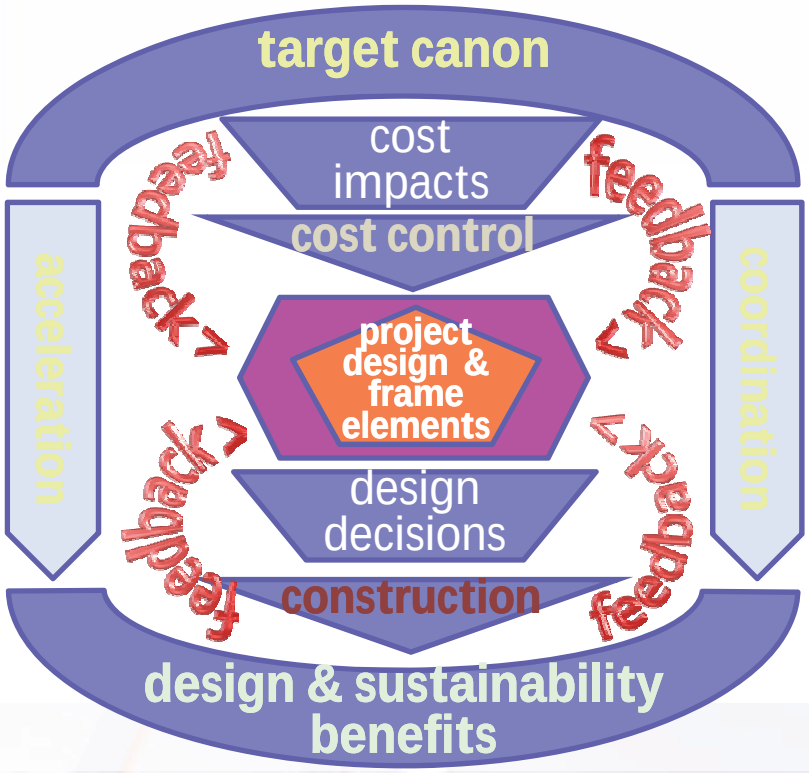
POET IngGmbH & IfEU GmbH 1982 – 2003/2012 as examples

- ✓Setting up interdisciplinary teams of engineers, architects, landscape designers, economists, geographers
- ✓Understanding and solving their communication difficulties
- ✓Integrating their work processes
- ✓Working at the interface of research and implementation
- ✓Creating synergy through diversity

Project Sustainability success rating through 30 years: ~80%

Developing Concepts for Humane City Designers

Integrated Design
In a network optimization process



Sources: pictures © & data: alc UG(hb) – POET GmbH

Understanding the team requirements to succeed

POET IngGmbH & IfEU GmbH 1982 – 2003/2012 as examples

- ✓Creating decision opportunities for political bodies & decision makers
- ✓Integrating development drivers, investment & organization and designer
- ✓accelerating collective work processes
- ✓transfering technology from research to reality
- ✓being comprehensively sustainable: social – environmental – economical

Project Sustainability success rating through 30 years: ~80%

SUSTAINABLE URBAN PLANNERS

sustainability = is a way of growing personalities

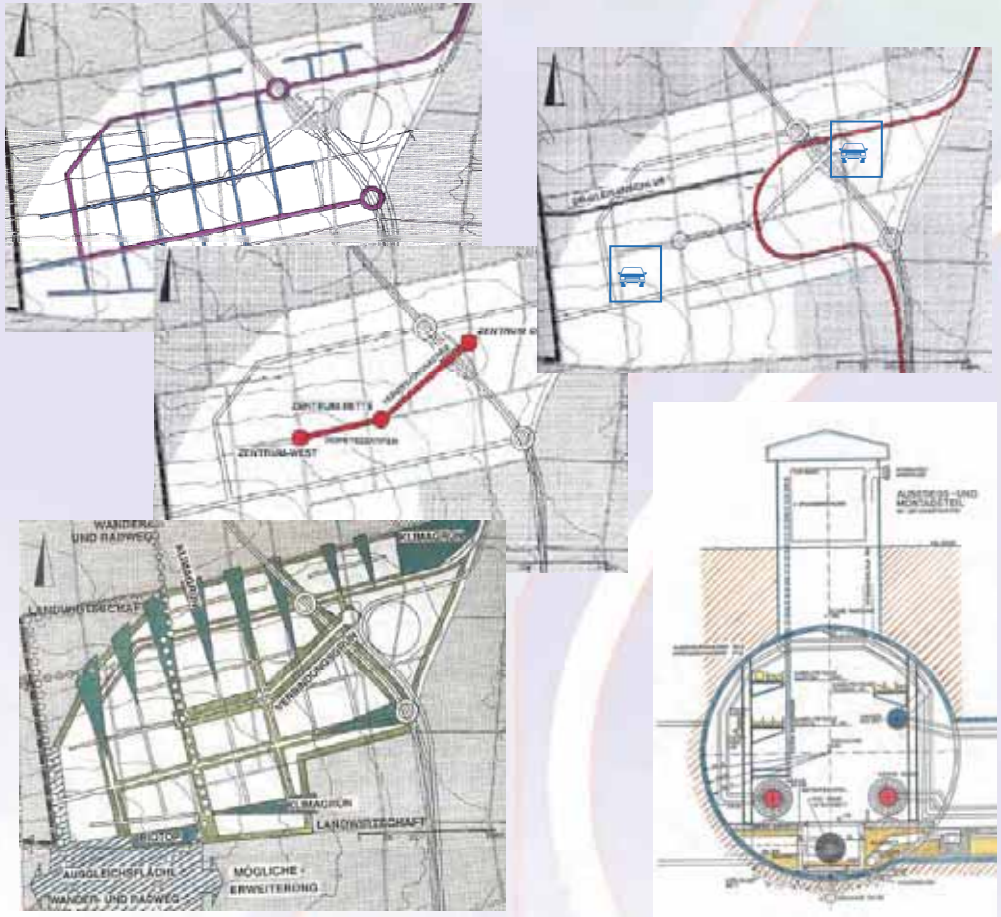
DEVELOPING CONCEPTS FOR HUMANE CITIES

thoughts and projects of the 1990s and how they held up in time

14

Sustainable Urban Development

Developing Concepts for Humane Cities



Sources: pictures © & data: alc UG(hb) – POET GmbH

Understanding the peoples' needs: food – roofs – jobs

Mainz 1989 – 1994 model research

Target:

to develop a sustainable urban development with a high emphasis on project economics (CAPEX & LCC) as well as achieving optimal longevity of systems and infrastructure.

Focusing Questions:

What devalues business properties ?

What devalues public infrastructure investment ?

What makes humans LIKE a business area or a work place ?

What environmental aspects should be looked at when starting the planning process ?

SUSTAINABLE URBAN DEVELOPMENT

just imagine – to retain the value of business areas

Developing Concepts for Humane Cities

Developing ideas and an understanding how they do

Lauchheim 1982 to 1994

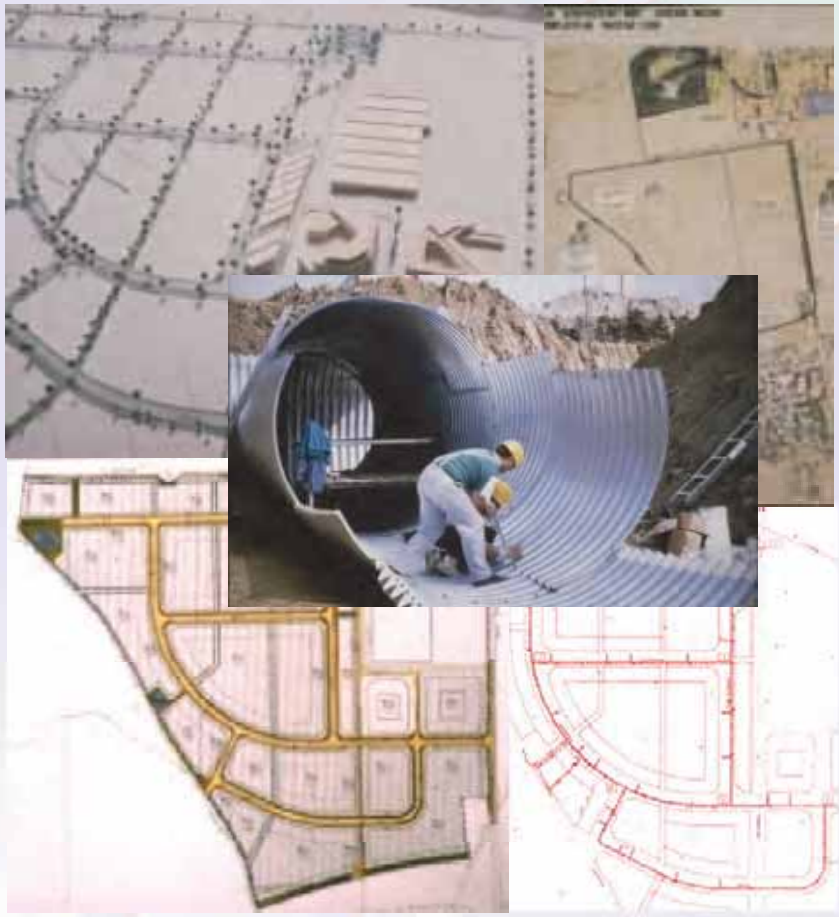
biotopes and business parks DO MIX

Returning plants into inner city environments

Experimenting with naturally flowing open water

Sources: pictures © & data: alc UG(hb) – POET GmbH, GOOGLE Earth 2012/2008 GeoContent

Developing Concepts for Humane Cities



Sources: pictures © & data: alc UG(hb) – POET GmbH

Understanding the towns' needs: sales & income

Wachau 1991/93 a need for speed

High competition market for available business zones **– a race between the townships –** the first wins the investors & businesses, that last go empty:

Project schedule:

Feb 1991 – POET contracted to assist Wachau

May 1991 – POET presents Master Plan for approval / commencement of tender process

June 1991 – Start of construction works on development

Sept 1991 – first private investor starts building on his property

Oct 1993 – all development works and CHP plant completed and in operation – business park ~ 40% filled

Developing Concepts for Humane Cities

Sources: pictures © & data: alc UG(hb) – POET GmbH, GOOGLE Earth 2006 GeoContent

Understanding the towns' needs: sales & income

Wachau 1991/93 design & speed

Special project characteristics:

Utility Tunnel system

having a sufficient supply system density and number (sewage, potable water, district heating, electrical power (20kV & 400V), telephone, lighting, security & safety systems)

High Green Quality Zoning

Above Ground Strom Drainage & Permanent Water Pond Retention

Defined High Quality road cross section and limited property access scheme

All serve to enable the area to retain its value and avoid the usual time degradation of industrial and business areas.

Sustainability success: Our rating after 20 years: 100%

Developing Concepts for Humane Cities

Understanding the towns' needs: sales & income

Wachau 2012

Situation characteristics:

Utility Tunnel system fully functional
one incident: 20kV cable joint faulty – no damage to UT & other systems, small localized corrosion at two items

High Green Quality Zoning – still jointly financed and maintained with property owners

Water Ponds create "picnic-like" lunch areas – business managers report higher work moral in the area

Area full except 4 lots, all properties of companies leaving or going under were easily at retained value taken up by new investors

Sustainability success: Our rating after 20 years: 100%

Sources: pictures © & data: alc UG(hb) – POET GmbH, GOOGLE Earth 2006 GeoContent

SUSTAINABLE URBAN DEVELOPMENT

just imagine – to have it succeed then and now

Developing Concepts for Humane Cities

Understanding the sub-urban needs: growth on the fringes

Sources: pictures © & data: alc UG(hb) – POET GmbH, GOOGLE Earth 2005 DigitalGlobe

Fahrland 1992/95 housing for 2 capitals
High competition market for available housing zones **– a race between the townships –** the first wins citizens, the last go empty: west of Berlin, north of Potsdam fringe of a federal & a state capital
capture part of the market Bonn to Berlin
Project specialties:

- Combination of condensed urban housing with a villa park
- Segregation of vehicle and pedestrian traffic – cars &car parks are at the back side
- Economic comparison project – utility tunnel vs. conventional development
- Services center: shopping center & kindergarten

Developing Concepts for Humane Cities

Understanding the sub-urban needs: growth on the fringes

Sources: pictures © & data: alc UG(hb) – POET GmbH , GOOGLE Earth 2005 DigitalGlobe

Fahrland 1992/95 design to 2012

Special project characteristics:

Utility Tunnel system

having a sufficient supply system density and number but not fully completed technically and with business model & maintenance problems

High Green Quality Zoning

Open Storm Drains & high ground water table

Defined High Quality segregated road-parking-walkway system & create a construction & interruption free supply and an extraordinary urban / rural biotope

2012 kindergarden & shops still missing

Sustainability success: Our rating after 18 years: ~75%

SUSTAINABLE URBAN DEVELOPMENT

just imagine – to again compete and "succeed"

Developing Concepts for Humane Cities

Sources: pictures © & data: alc UG(hb) – POET GmbH, GOOGLE Earth 2009 GeoBasis

Understanding the cities' needs: but being torpedoed

Leipzig Kiebitzmark 1993 -1996
Urban housing development for 1000 units or 4000 humans – as a combination high density / low density / villa setup with tram way connection

Utility Tunnel system – planned but not built

noise protection against a motorway by developing a construction material dump as local park scape – by 2009 not realized

High Quality segregated road-parking-walkway system – broken up partially by later master plan modifications

construction & interruption free urban / rural biotope – by 2009 not realized

Sustainability success: Our rating through 13 years: ~50% at best

just imagine – to not fully succeed >> don't give up !

Developing Concepts for Humane Cities

Sources: pictures © & data: alc UG(hb) – POET GmbH , GOOGLE Earth 2001 GeoContent

Understanding producers' needs: PEHD prototype

Lauchheim 1994 - 1995
Testing a new UT hull material – PEHD – at our home town development

sustainable rural housing based on the knowledge gained in Wachau and Fahrland

Houses with cisterns collecting rainwater from the roofs for brown water systems and garden irrigation

Open Ditch Storm Drains as defined Green Axes

By now all properties marketed and all lots build except 2

Sustainability success: Our rating after 18 years: 100%

Developing Concepts for Humane Cities

Sources: pictures © & data: alc UG(hb) – POET GmbH

Understanding what you have: looking at materials

Lauchheim 1982 - 2012 examples

- ✓Fighting for segregation of storm and black water – and winning by now
- ✓Understanding ditch construction – from a maintenance problem to a self-sustaining biotope
- ✓Retaining walls from site excavated local rock
- ✓Setting examples that others did follow
- ✓Anchor sustainable concepts in urban government – and develop them with society and its changes

Sustainability effects: Our success rating through 30 years: 100%

Summary on urban sustainable development:

1. Accept the human sustainability triangle: economy – ecology – society
2. Understand the needs of human beings to live and work in humane environments on all items
3. Use creativity to achieve a win-win situation for business and investors with the public
4. Apply technology to ensure optimal development economy using life-cycle-costing
5. Maintain sustainability by organizing a mutually beneficial cooperation of users
6. Instill “pride in our area” by involving inhabitants and businesses continuously

What's holding us back ?

A world wide lack of knowledge and comprehension of system complexity as synergy generator & driver

So listen-up consultancy & city managers !
We need to mix teams as they're needed – not what is management comfortable !

SUSTAINABLE URBAN PLANNERS
need creative cross-subject education backgrounds

contact details :

axel laistner consulting UG(hb)
Dipl.-Ing. Dr. techn. Axel Laistner

Rosenstr. 6 / P.O. Box 02
73466 LAUCHHEIM
Germany

t: +49(7363)81658-0
f: +49(7363)81658-5
m: +49(173)6631522
axel.laistner@laistnerconsult.de
www. laistnerconsult.de

SPEAKERS DETAILS

professional experience

20 years

in urban development
and airport projects
with a 100 % proven track record of

– ON TIME – IN BUDGET –
– STATE OF THE ART –

educated in

mechanical & civil engineering

business administration

27

Thank You for Your Attention !

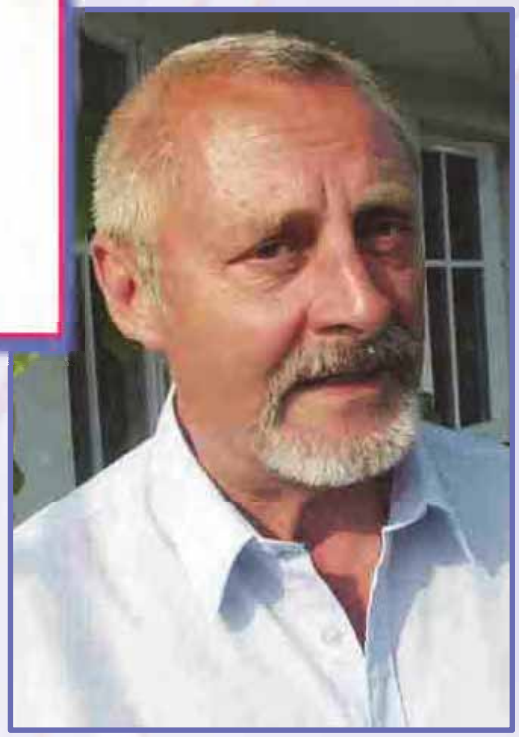
COAUTHORS DETAILS

contact details :

Dipl.-Ing.(FH) Dipl.-Ing.(FH)
Hermann Laistner

Hardtsteige 29
73466 LAUCHHEIM
Germany

t: +49(7363)9669-0
f: +49(7363)9669-39
poet.lauchheim@online.de



professional experience

52 years
in urban development
and civil engineering projects

43 years
as legal expert witness
for civil engineering

27 years
as elected member of town
and regional councils

educated in

civil engineering & surveying

Thank You for Your Attention !

UNDERSTANDING THE BASICS

Mass & Energy Basics:

POET Ing GmbH / axel laistner consulting UG(hb):
Dr. Axel Laistner (POET/alcUG) – all graphics and texts unless specifically referenced otherwise. 1993 – 2012

Gerd Ebbinghaus Management Consulting - www.ge-mb.de – last accessed 18.02.2011
"AVOID – REDUCE – COMBINE" Theme

SUSTAINABLE URBAN DEVELOPMENT

Stadt Mainz: Modellvorhaben Mainz Ökologischer Wirtschaftspark Mainz-Süd – Schlussbericht 1994 – IfEU GmbH / POET GmbH – p 80, 82, 98

MARKKLEEBERG – Wachau – Urban Business Park Development – POET IngGmbH; Dr. Axel Laistner (POET/alcUG); VOEST ALPINE KREMS FT (VAKF); www.googleearth.com – Image © 2010 GeoContent / AeroWest

FAHRLAND – Am Königsweg – Sub-Urben Housing Development – POET IngGmbH (GROLL); Dr. Axel Laistner (POET); www.googleearth.com – Image © 2010 AeroWest

LAUCHHEIM – Hardsteige – Rural Housing Development – POET IngGmbH; Dr. Axel Laistner (POET); www.googleearth.com – Image © 2010 GeoContent

LAUCHHEIM – other experiences – Rural Housing Development – POET IngGmbH; Dr. Axel Laistner (POET); www.googleearth.com – Image © 2010 GeoContent

LEIPZIG – Kiebitzmark – urban housing development – POET IngGmbH; Dr. Axel Laistner (POET); www.googleearth.com – Image © 2012 GeoBasis

SUSTAINABLE URBAN PLANNERS

POET Ing GmbH / axel laistner consulting UG(hb):
Dr. Axel Laistner (POET/alcUG) – all graphics and texts unless specifically referenced otherwise. 1993 – 2012