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MountEE
sustainable community building

20 Jahre
Umweltverband
Vorarlberger Gemeindehaus

Energieinstitut Vorarlberg

SS PEKTRUM

IEE/11/893

Input Vorarlberg in Kiruna

- Presentation of services and tools
- Energetic optimization of public buildings
- Ecological optimization of public buildings
- The Service « Sustainable Buildings for Communities » and the « Communal Building Pass »

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Institutions and Services in Vorarlberg

DI Sabine Erber

20 Jahre Umweltverband Vorarlberger Gemeindehaus

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Energieinstitut Vorarlberg

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We advise, educate and research into the efficient use of energy and renewable energy sources.

Founded in 1985
Employees 40
Contractors approx. 40
Budget 2012 approx. Euro 4,19 m

Vorarlberg unser Land

VKW Vorarlberger Kraftwerke AG

Vorarlberger Illwerke AG

VEG

VOLKSBANK VORARLBERG

12 sponsors

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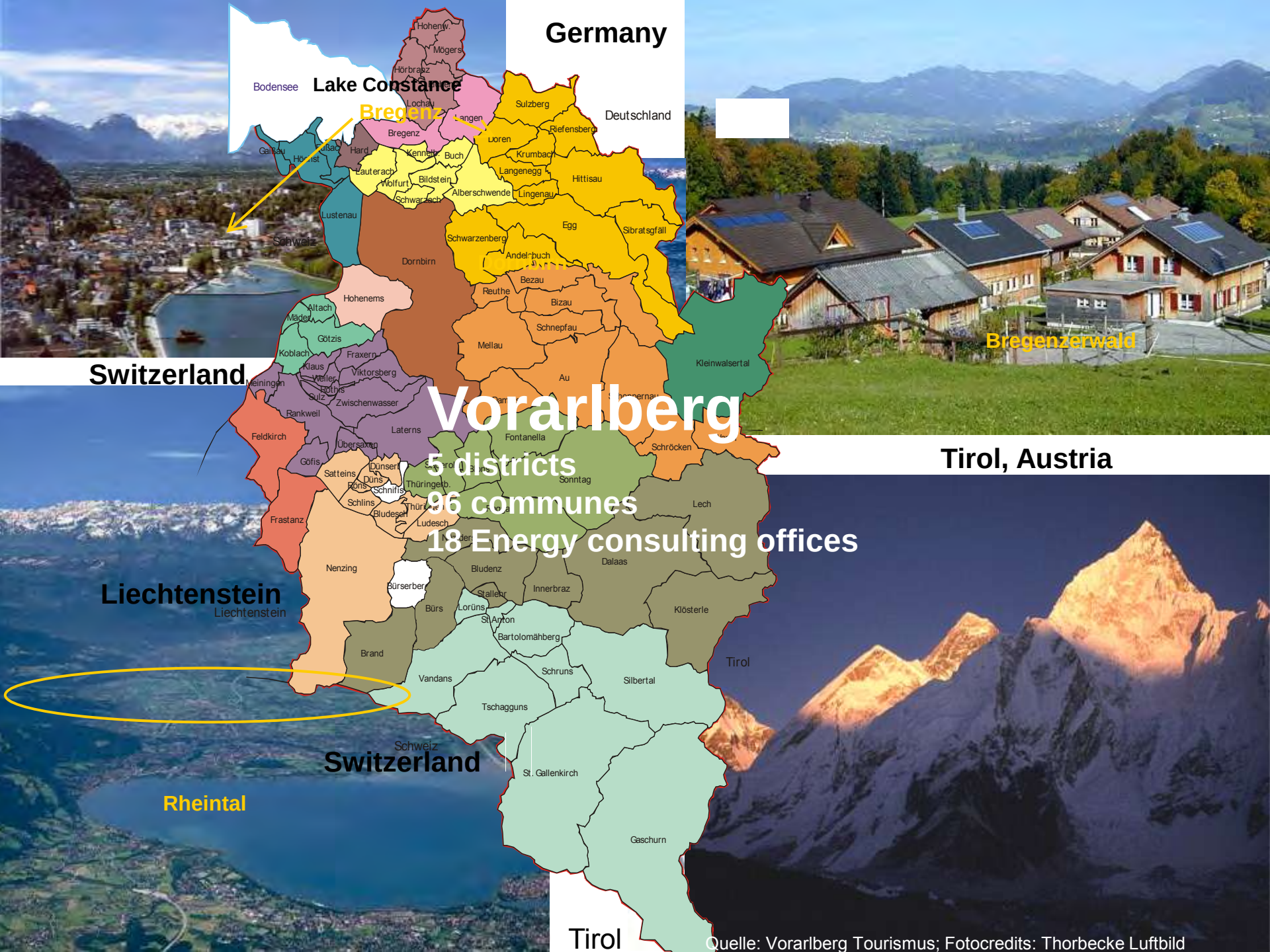
Departments

- Energy efficent buildings
- Solar architecture - passive house
- Energy consulting
- Ecological and biological buildings
- Community service
- Company service
- Mobility and transportation
- Renewable energy sources and heating engineering

12 sponsors



Quelle: Vorarlberg Tourismus; Fotocredits: Thorbecke Luftbild

Panorama Bregenz - Switzerland

- 2 nd smallest province of Austria
- 2.601 km² land area
- ¾ of the land area are mountains
- 368.200 inhabitants
- 38 m² floor space per person (2008)
- 130.000 appartments
- 85.000 buildings
- 1.500 subsidised new buildings per year
- 3.000 subsidised renovations per year
- 80 architects offices
- 50 technical agencies
- 60 property developers, builders
- 1.500 construction companies

Quelle: EW Vlbg. Online am 31.3.2011

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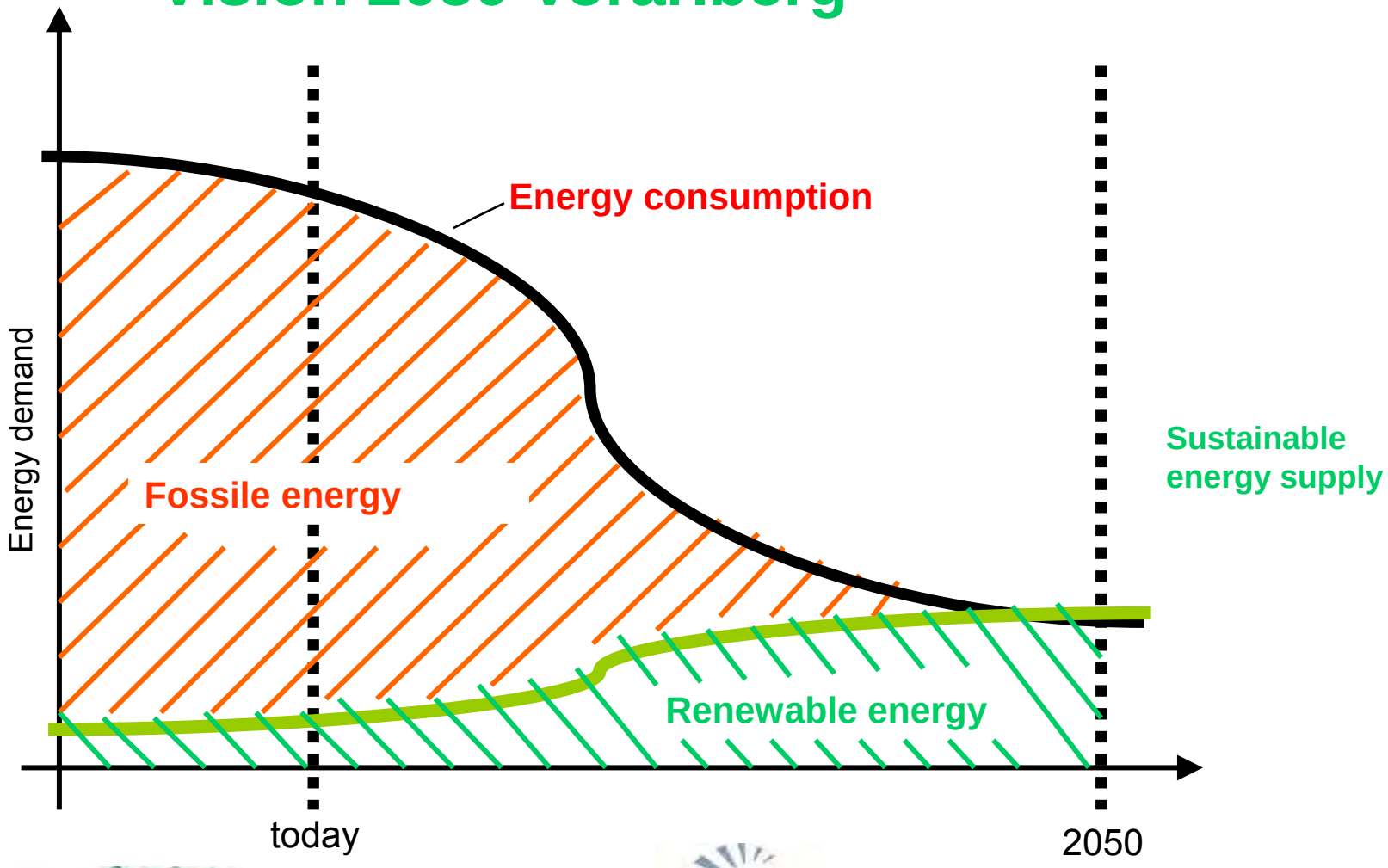
The path to energy autonomy in Vorarlberg

Vision 2050 Vorarlberg



Ecological housing subsidy - history

2009 Five levels of subsidy
focus on renovation: loan with no interest
focus on levels 4 and 5

2008 Building ecopass online -
Renovation consulting increased

2004 Ecological housing subsidy
for new construction and renovation

2002 First ecological catalogue of measures
according to today‘s model for new buildings

2001 Criteria for full subsidy
Replaces existing extra subsidy

2000 Social aspects + ecology
Vorarlberg energy-saving house + 16 ecological measures

1989 Social aspects + energy
Vorarlberger energy-saving house

1950 Social aspects

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Ecological Building Ecopass

WOHNBAUFÖRDERUNG - ÖKOLOGISCHER WOHNBAU - NEUBAU / ALTBAU 2008

G E B Ä U D E A U S W E I S

Gebäudeart	Mehrwohnungshaus	Gebäudeerrichtung	2008	Jahr
Wohneinheiten (WE)	12	Letzte Sanierung erfolgt	-	Jahr
Objektadresse	Errichterweg 9	Baukosten	1.380	€/m² WNF lt. Förderung
Postleitzahl, Ort	6850 Dornbirn	Wohnungskosten	2.180	€/m² WNF lt. Förderung
Parzelle-Nummer	Gp. 1234/12, Gp. 1234/13, Gp. 1234/14			

Förderung	Richtlinie 2008	Nutzfläche	1.020	m² (WNF laut Förderung)
Förderkategorie	Neubau	Bruttogrundfläche konditioniert	1.276	m^2_{BGFh}
Förderstufe	2	Heizgradtage	3.647	Kd (HGT 12/20)
Erhaltungswürdig	nein	HWB spezifisch max. zulässig	50,0	kWh/m^2_{BGFh} u. Jahr
Nutzflächenzahl	55	HWB spezifisch	16,8	kWh/m^2_{BGFh} u. Jahr
Kompaktheit (A/V)	0,7	Heizwärmebedarf (HWB)	21.437	kwh/Jahr

Planung Standort	Behaglichkeit und Funktionalität	A	67%	8 von 12 Ökopunkten
	Flächenbedarf und Grundbedarf		75%	9 von 12 Ökopunkten
Energie	Heizwärmebedarf	B	82%	82 von 100 Ökopunkten
Haustechnik	Energieversorgung	C	100%	25 von 25 Ökopunkten
	Wärmeverteilung, Warmwasser		62%	31 von 50 Ökopunkten
	Wasser und Elektrische Energie		50%	4 von 8 Ökopunkten
	Ökologische Bewertung		61%	23 von 38 Ökopunkten
Materialwahl	Ökoindex 3	D	77%	17 von 22 Ökopunkten
	Lebensdauer und Wartung		82%	19 von 23 Ökopunkten
Innenraum	Emissionsfrei	E	80%	8 von 10 Ökopunkten
	Ökologische Gebäudequalität		**75%**	**226 von 300 Ökopunkten**

50 ecological measures

max. 300 ecopoints

5 topics with 10 criteria

Degree of performance

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Ecological Building Ecopass

5 topics, 10 criteria, 50 ecological measures, max. 300 ecopoints

Planning Location	Comfort and functionality	A	xx% - x of 14
	Surface and ground demand		xx% - x of 14
Energy	Heating requirement	B	xx% - xx of 100
Building services	Energy sources	C	xx% - x of 32
	Heating supply, warm water		xx% - x of 55
	Water and electrical energy		xx% - x of 20
Material selection	Ecological assessment	D	xx% - x of 38
	Eco-index 3		xx% - x of 22
	Durability and maintenance		xx% - x of 20
Interior space	Emission-free	E	xx% - x of 12
	Ecological building quality		**xx% - xxx of 327**

Energy consulting offices in Vorarlberg

Energy counsulting offices

www.energieinstitut.at / Beratung

Programme Vorarlberg

29 participating communities

380 persons involved in e5 teams

these team members have spent 18.000 hours since the beginning of the programm

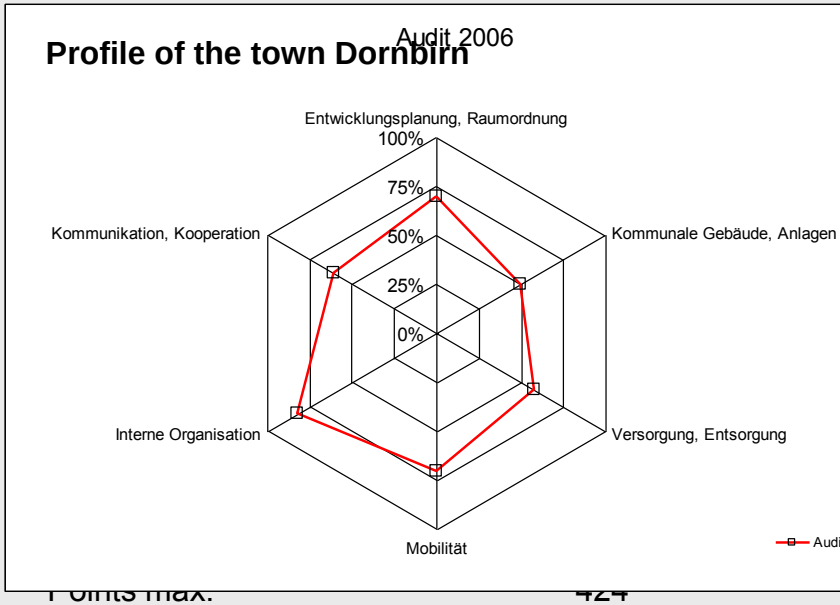
plus 1.800 projects completed

7.000 hours of continuous training provided

30 guidelines are available

36.000 tons of CO2 saved

Half of Vorarlberg is member of the e5 programm



Points max.	424
Points achieved	271
Percentage achieved	**64%**

25% 37% 50% 62% 75%

Europe - 10 regions with 500 communities with 100.000 inhabitants

50% european energy award

75% european energy award EDLD

Communities awarded with **5e** in Vorarlberg

Zwischenwasser, Langenegg, Mäder, Feldkirch, Wolfurt

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Energetic optimization of public buildings

DI Sabine Erber

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Passive house - principles

Max. **10** W/m² **heating load**

Max. **15** kWh/(m²a) specific **heating demand**

Max. **42** kWh/(m²a) specific **final energy value**

Max. **120** kWh/(m²a) specific **primary energy value**

Excellent outer wall insolation Compactness of the surface	$U \leq 0{,}15$ W/(m²K) Without termal brigdes
South orientated Reduced shading	Passive solar energy use
High quality windows (glas+frame)	$U_w \leq 0{,}8$ W/(m²K), g-value around 50 %
Airtightness	$n_{50} \leq 0{,}6$ per hour
Air heat recovery	Efficiency of heat recovery ≥ 75 %
Energy efficient equipment	Efficient electricity saving household equipment
Water heating with renewable energy	Solarpanels for warm water or photovoltaic plus heating pump

m² = heated living area

Quelle: Passivhaus Institut Darmstadt

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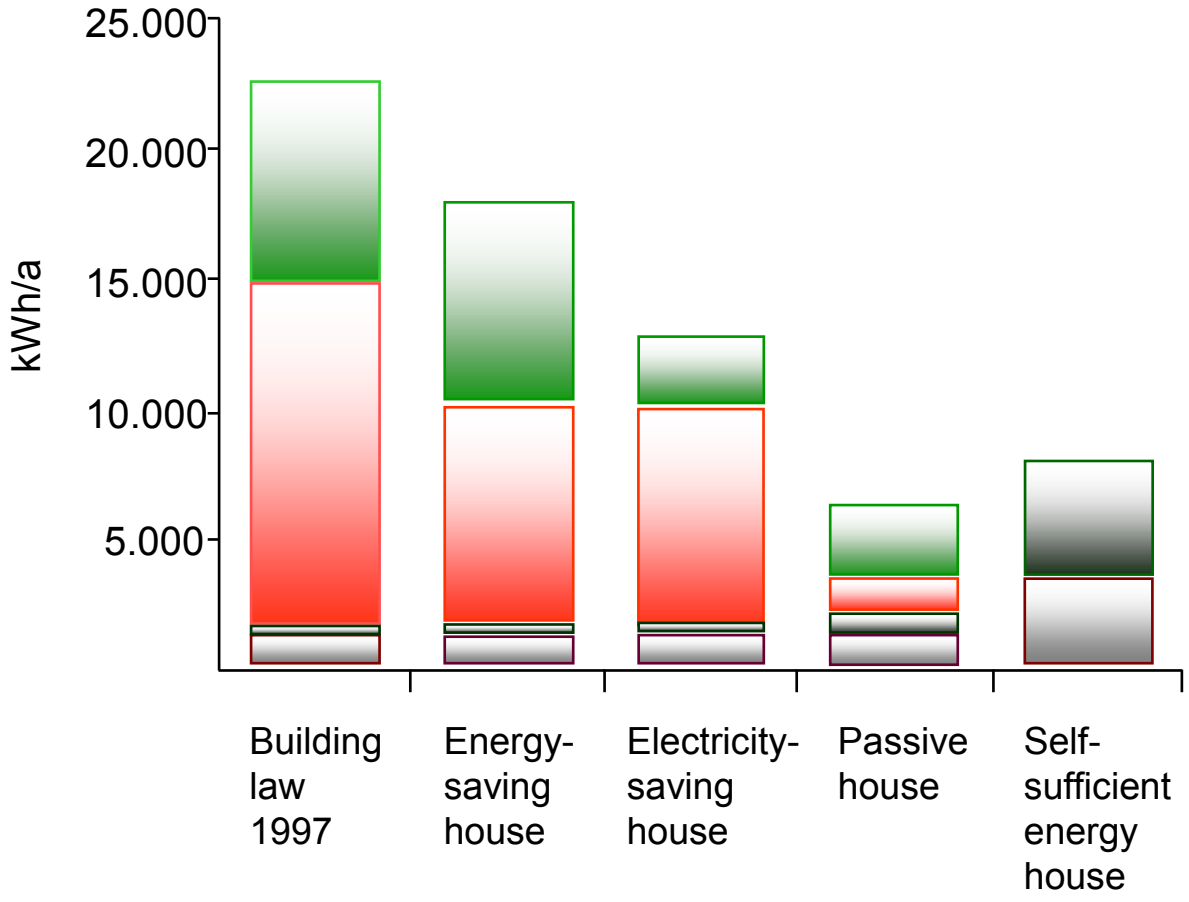
Used energy comparison



Single family house
130 m² NF (ufa)
170 m² EBF (gba)

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Community Center St. Gerold

- Built 2008
- Heating demand
  12,8 kWh/m2/a PHPP
- Heating demand in Kiruna
  46 kWh/m2/a PHPP

- First certified public passive house in Vorarlberg
- Construction costs1,9 Mil.€, 4.468 €/m^2
- Architect cukrowicz. nachbaur architekten

Community Center St. Gerold

Optimization:
1. Step
Glass U-Value 0,6 to 0,4W/(m²k)
Glass g-Value 0,53 to 0,6 (soon available)
(St. Gobain Concept Glas SGG Climatop positive)

Result: 33 kWh(m²a)

2. Step
All Wall U-Value from 0,157 to 0,1W/(m²k)

Result: 29 kWh(m²a)

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Community Center St. Gerold

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Energiebezugsfläche: 527,9 m²

	Verwendet:	Jahresverfahren	PH-Zertifikat:	Erfüllt?
Energiekennwert Heizwärme:	**29**	**kWh/(m²a)**	**15 kWh/(m²a)**	**nein**
Drucktest-Ergebnis:	**0,6**	**h⁻¹**	0,6 h⁻¹	**ja**
Primärenergie-Kennwert (WW, Heizung, Kühlung, Hilfs- u. Haushalts-Strom):	**67**	**kWh/(m²a)**	120 kWh/(m²a)	**ja**
Primärenergie-Kennwert (WW, Heizung und Hilfsstrom):	**67**	**kWh/(m²a)**		
Primärenergie-Kennwert Einsparung durch solar erzeugten Strom:		**kWh/(m²a)**		
Heizlast:		**W/m²**		
Übertemperaturhäufigkeit:	**0**	**%**	über 26 °C	
Energiekennwert Nutzkälte:		**kWh/(m²a)**	15 kWh/(m²a)	
Kühllast:	**0**	**W/m²**		

Kennwert mit Bezug auf Nutzfläche nach EnEV

Nutzfläche nach EnEV: 925,1 m²

			Anforderung:	Erfüllt?
Primärenergie-Kennwert (WW, Heizung und Hilfsstrom):	**38**	**kWh/(m²a)**	**40 kWh/(m²a)**	**ja**

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Energetic Optimization

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Things we look for:

Planning:

- Economical calculation of energy efficient parts of the building or the whole energy concept
- Dimensioning of parking space for bikes

Shell:

- Limitation of heating and primary demand close to Passive House Level
- CO^2 equivalent max. 38 $kgCO2/m^2$
- No active cooling, but clever planning to avoid overheating
- Prevention of Heatbridges
- Free cooling at night

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Energetic Optimization

Building Services:

- Preverential use of renewable energy sources, for example heat pump, district heating, biomass
- Installation of a ventilation system with heat recovery (air change rate between 0,1 and 2,5 h^{-1} regulated with CO^2 measurement)
- Installation of a PV plant
- Energy efficient lighting

Intensity of illumination	Installed capacity max.
100 lx	4,5 W/m²
300 lx	10,0 W/m²
500 lx	15,0 W/m²

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School Bezau

- Built 2008 (1972)
- Heating demand
  17,0 kWh/m2/a
- Construction costs
  7,5 Mil.€, 1411€/m^2
- Architect Broger

School Mähdle

- Built 2010 (1974)
- Heating demand
  15,0 kWh/m2/a
- Zero energy building
- Total costs 3,8 mil. €
- Construction costs
  3,8 Mil. €, 1.332 €/m^2
- Architect Gerhard Zweier

Fotograph: Raimund Dörler

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Ecological Optimization in Service Package

Karl Thorgele

Ecological and healthy Buildings

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Municipal Office of St. Gerold

Ecological Optimization

Environmental Impacts of Building Materials

- OI3 – Index (PEI, GWP, AP)
- Generly avoided Materials HFC, PVC, Woods from primeval forest, PAH
- Using renewable and regrowing materials
- Using regional allocated and traditioned materials

Healthy Buildings

- Reduzing chemical Inputs Formaldehyde, PAH, VOC, Biocide, Plastizisers
- untreaded naturaly products from mineral sources (clay, lime) or regrowing materials (wood, sheeps wool, flax,...)

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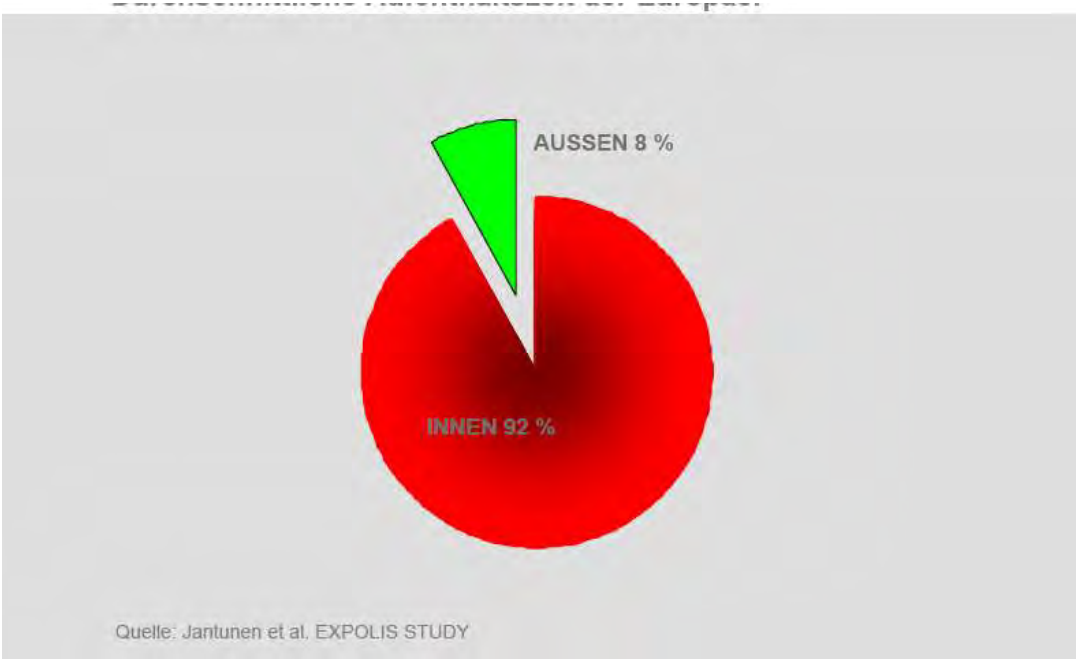
MEAN RETNTION TIME - EUROPE

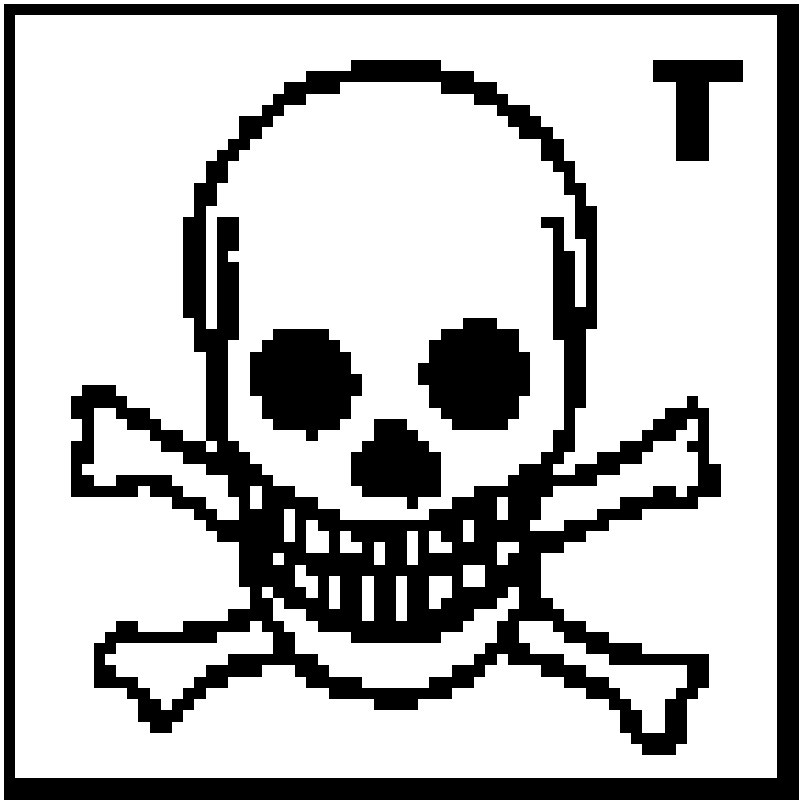
More than 90 % of our Lifetime we stay indoors

Home, Kindergarten, School, Office, Hospital, Retirement Home, Leasure Park, Store, Car,...



Building Products

Not all available Products are Healthy or hazard-free



METHODES

- Baubook
  - Guideline for ecological planning
  - Guideline for ecological material selection
  - Criteria for ecological choise of building materials
  - Green Tendering – ready made text
  - Database for green products
- Ecosoft
  - Calculation of environmental inpacts
    PEI, GWP, AP

Reducing Chemical Inputs – measurable Success

Volatile Organic Compounds

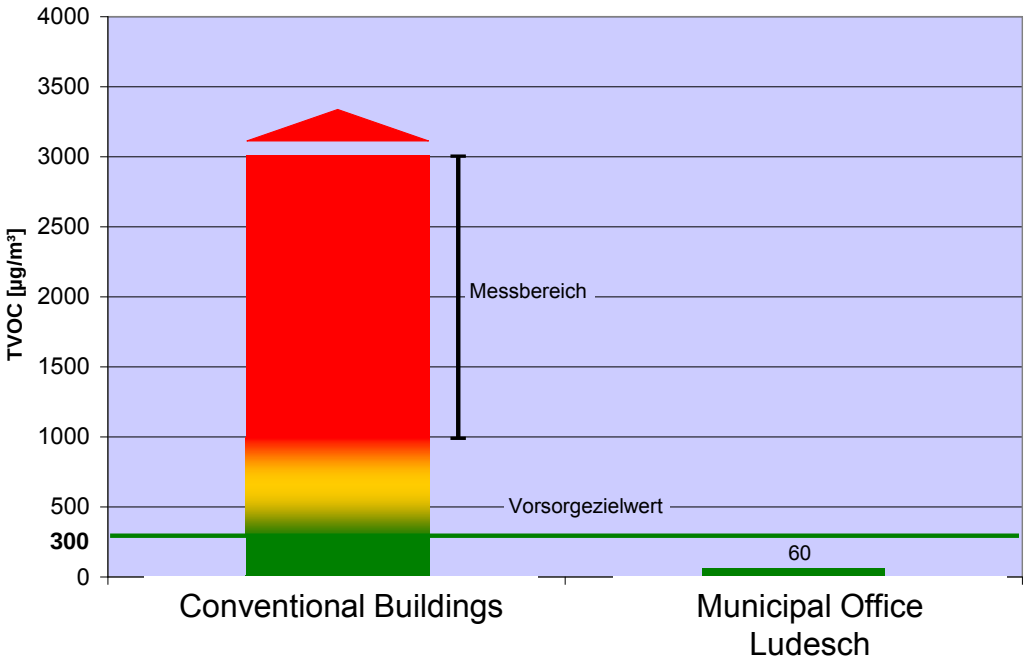
More than 90 % can be avoided

Formaldehyd

About 60 % to 70 % can be avoided

PAK, Biocide

Can be generly avoided (indoor)



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The Service « Sustainable Buildings for Communities » and the « Communal Building Pass »

Dietmar Lenz

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Umweltverband Vorarlberg

- Association of local authorities
- Umweltverband Vorarlberg = Public authority
- All 96 municipalities in Vorarlberg are (voluntary) members
- Main topics: waste management, green public procurement, sustainable construction

Service Package Sustainable Construction – Team

- Umweltverband Vorarlberg: process coordinator, support in questions of tender law
- Energy Institute: energetic optimization
- Spektrum GmbH: ecological optimization

Sustainable building – service package

Modules

Module 0 **Presentation of modules and results**

with the communal authorities

Module 1 **Preliminary planning**

definition of ecological aims in a program, supervision in competition

Module 2 **Optimization of planning, tendering procedure**

monitoring of offers

Module 3 **Realisation**

Information for craftsmen, Product declaration, Product control,

Module 4 **Control of success**

Building site control, Measurements

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Modul 1 – Preliminary Planning

- Development of specific energy efficient and environmental criteria together with the decision makers (and planners)
- Formulation of an « eco-program », usually basis for a decision in a political board
  All criterias have to be fullfilled by all planers and craftsmen
- Supervision in architectural competition: support in developing tendering documents, validation of projects in the competition

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Modul 2 – Optimization of planning, tendering procedure

- Development of a material-, construction and energy concept
- Basis for call for tender
- Environmental check of all call for tender documents
- Generation of specific eco-criteria with the database « baubook – ökologisch ausschreiben »
- Assistance in tender law

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Modul 3 – Realisation

- Craftsmen Information
- Checking of all products craftsmen are going to use (product declaration list)
- Approval of product declaration list

Modul 4 – Control of success

- Controlling of products in use at the building site
- Diverse measurements: blower door test, indoor air quality, ...

- **Main aim: We support municipalities by achieving their goals.**
  We help them getting what they want.

Referencens

- We support municipalities in Vorarlberg by realizing building types like (since 2006: 54 public buildings)
  - Center of municipalities
  - Schools
  - Kindergarten
  - Social center
  - Fire station
  - ...

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Communal Building Pass

- **Benchmark for ecological and energetic quality of buildings**
- **Tool in an Excel template**
- **Max. 1000 points**
- **Subsidies of County Vorarlberg depend on amount of points**
- **Maximum 4 % higher subsidies (of usual 25 to 30 % aids)**
- **9% higher construction cost deductable**
- **(similar) English ENERBUILD - Tool ist available here: www.enerbuild.eu**

Projekt

					Gesamt	0	
Nr.			Titel	Musskriterium (M)	max. Punktzahl	erreichte Punkte	
A			Prozess- und Planungsqualität		*max. 200*	0	
A	1.	1	Definition überprüfbarer energetischer und ökologischer Ziele - ökologisches Programm	M	15	0	
A	1.	2	vereinfachte Berechnung Wirtschaftlichkeit		15		
A	1.	3	Produktmanagement - Einsatz regionaler, schadstoffarmer und emissionsarmer Bauprodukte und Konstruktionen		130	0	
A	1.	4	Detaillierte Überprüfung der Energiebedarfsberechnungen (PHPP)		45		
A	1.	5	Fahrradabstellplätze		25	0	
B			Energie und Versorgung		max. 500	0	
B	1.		Nachweis nach PHPP		max. 500	0	
B	1.	1	Energiekennwert Heizwärme PHPP	M	230	0	
B	1.	2	Primärenergiekennwert PHPP	M	135	0	
B	1.	3	Emissionen CO_2-Äquivalente nach PHPP	M	135	0	
B	1.	4	PV-Anlage		50	0	
B	1.	5	differenzierte Verbrauchserfassung und Nutzerschulung	M	10		
B	1.	b	alternativ: Nachweis gem. OIB RL 6		max. 500	0	
B	1.	1b	Heizwärmebedarf HWB	M	400	0	
B	1.	2b	Primärenergiebedarf (Einführung nach Vorliegen der überarbeiteten OIB Richtlinie 6)	M	0		
B	1.	3b	Emissionen CO_2-Äquivalente (Einführung nach Vorliegen der überarbeiteten OIB Richtlinie 6)	M	0		
B	1.	4b	PV-Anlage		50	0	
B	1.	5b	differenzierte Verbrauchserfassung und Nutzerschulung	M	10		
B	1	6b	Energieeffiziente Beleuchtung		50	0	
C			Gesundheit und Komfort		max. 150	0	
C	1.		Thermischer Komfort		max. 100	0	
C	1.	1	Thermischer Komfort im Sommer	M	100	0	
C	2.		Raumluftqualität		max. 75	0	
C	2.	1	Messung Raumluftqualität		75	0	
D			Baustoffe und Konstruktion		max. 150	0	
D	1.		Vermeidung kritischer Stoffe		max. 30	0	
D	1.	1	Vermeidung von PVC		max. 30	0	
D	2.		Ökologie der Baustoffe und Konstruktionen		max. 125	0	
D	2.	1	$OI3_{BG3,\ BZF}$ ökologischer Index der Gesamtmasse des Gebäudes	M	125	0	
				Gesamt	max. 1000		

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Communal Building Pass

Content:

A. Quality of Process and Planning 225 points

Definition of ecological programm, economic calculation, PHPP check

B. Energy and Supply 500 points

Heating Demand. Primary Energy Demand, CO^2 Emission, Photovoltaics, Light

C, Health and Comfort 125 points

Summer use, Air quality

D. Materials and Construction 125 points

Prevention of PVC, grey energy

Baubook « ökologisch ausschreiben »

LINK

How to convince decision makers?

- Focusing on lifecycle costs and not on investment costs (taking subsidies into consideration when proving economic feasibilty)
- Making sustainable construction cost efficient: define energetic/ecological standard in an early stage
- Better air quality and less environmental impact for only 2% extra costs due to an environmental choice of materials

How to convince decision makers?

- Competition between municipalities: everyone wants to be the best
- Making sustainable construction easier than doing it in a conventional way

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Thank you for your attention!

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