

Energy Efficiency Policies in Germany and Europe

Insights and experiences about the development and implementation of energy efficiency policy

TUEWAS EE Seminar

Himalya Hotel, Kathmandu, 18th April 2011

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Agenda

- Status and way ahead
- Approaches and principles
(fast track and sustainable framework development, campaigns)
- How to develop a roadmap and how to implement the policies
- Barriers during the implementation and lessons learned
- Discussion



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List of content

- The European energy roadmap
- The national energy roadmap of Germany
- The already existing roadmap of the state of Baden-Württemberg
 - experiences and feedback regarding the general acceptance
 - first results from the impact monitoring
- Other helpful aspects for a successful implementation
- A brief overview of the economic framework and promotion programs



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The main goal: Sustainable energy supply



Norbert Roettgen,
Minister of environment, Germany

- Quote:
- „In fifty years time history-books may show that we failed to lay the foundations for a new age...
- ...or they may show, that we succeeded, thanks to our far-sighted thinking because our policies did not loose sight of the needs of our children and grandchildren.“



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European energy roadmap

„Climate-agenda 2020“(Year 2007)

Until 2020

- 20% reduction of the emissions for global warming
- 20% increasing energy efficiency
(=20% less energy consumption)
- rising up the use of renewable energy up to 20%
(that means 3 times more)
- 10% share of bio-fuel in mobility

Until 2050

- 60-80% reduction of the emissions for global warming compared with industrial countries
- 50% reduction compared with the average of all countries



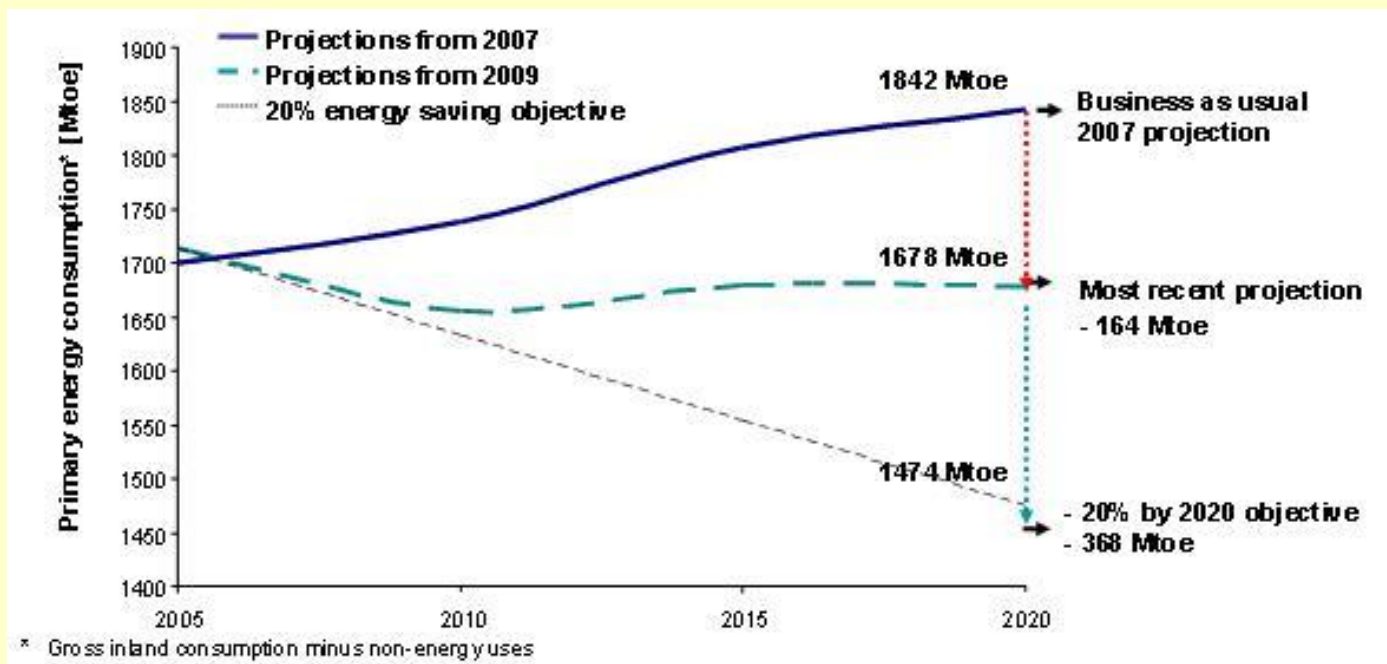
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European energy roadmap

„Climate-agenda 2020“ (Year 2007)

- If we keep staying on business-as-usual: → + 50% growth of emissions for global warming until 2030 (incl. growth of population) (szenario of the internat. energy agency)



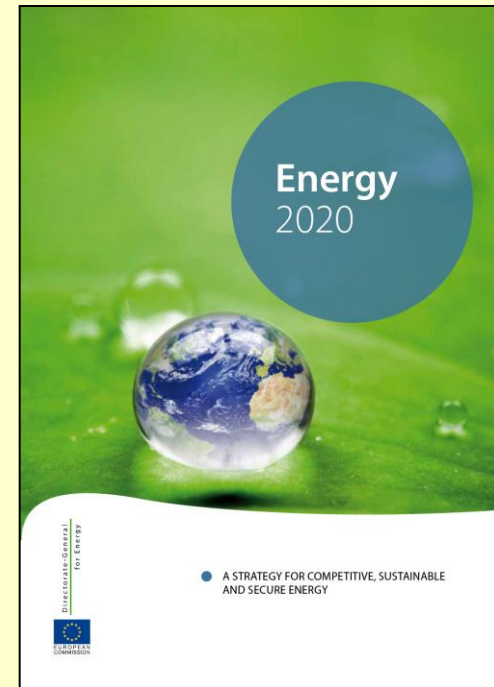
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European Energy-Strategy 2020 (11/2010)

How to reach the goals ⁽¹⁾

- Request on low energy standard for public and residential buildings (new and existing)
- public sector: leading by example
- Duty to check the efficiency of heating and cooling systems every year
- easy visible energy-labels on public buildings
- duty to show an energy-label to people, being interested in buying or renting this building



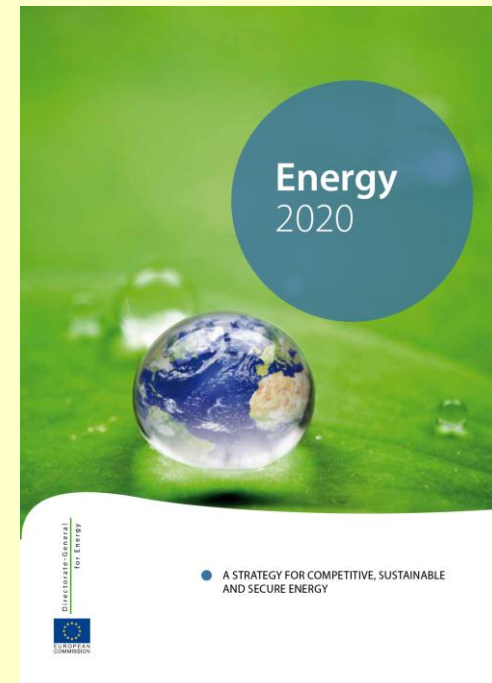
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European Energy-Strategy 2020 (11/2010)

How to reach the goals (2)

- Incentives for a better energy efficiency for industry for ex. favourable taxes for companies who carry out energy-management
- Financial support: subsidies and cheap interests for both owners and tenants
- Alternative financing: for ex. contracting
- More independent information
- Extending the offer or qualification



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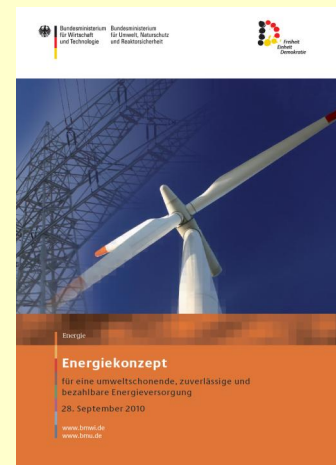
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energy roadmap for Germany

<u>general goals (reduction of ...%)</u>	<u>2020</u>	<u>2050</u>
– Emissions for global warming:	- 40%	-80-95 %
– Primary energy:	- 20%	- 50 %
– Consumption of electricity:	- 10%	- 25 %
– Energy for mobility	- 10%	- 40 %
– <u>Share of renewable energy</u>		
• Energy consumption:	18 %	60 %
electricity	35 %	80 %



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energy roadmap of Germany

main items and goals

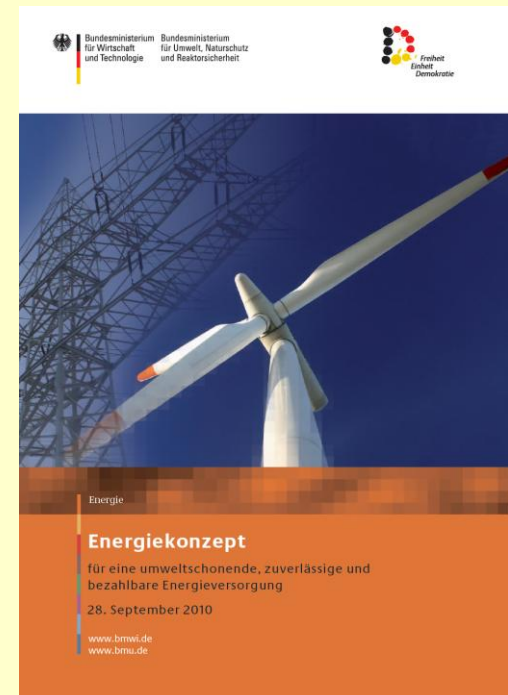
Energy efficiency at **buildings**

- To double the installment-rate and modernization-rate from 1 up to at least 2% /a
- 20% reduction of energy for heating until 2020
- 80% reduction of primary energy for heating until 2050
 - „nearly zero-emission-building“



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energy roadmap of Germany

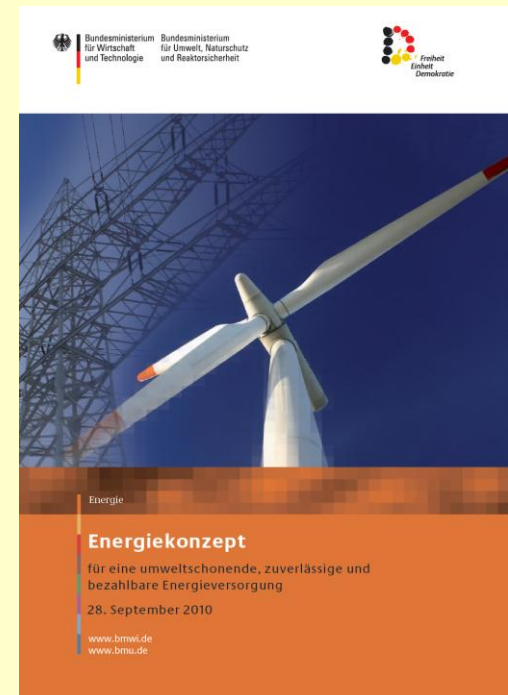
measures and special features

- Low-energy-standard for new buildings
- duties to update the energy efficiency of buildings:
 - a) insulation of tubes of the heating system
 - b) replacement of heating systems older than 30 years
 - c) insulation of the roof or at least upper ceilings
- If you renovate the front / wall you are forced to combine that with insulation
- Various promoting programs:
 - Susidies for using renewable heatings
 - cheap loans for modernization measures



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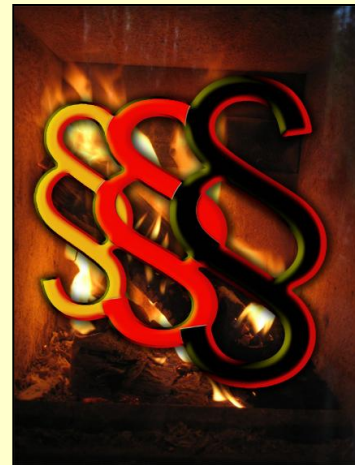
Law for use of renewable energy for heating systems

- New constructions (any kind of building) must provide a 15 % share of renewable energies for heating and hot water production (since 1st of January 2009)
- solar thermal energy, bio energy, heat pump
- Alternative: highly efficient insulation or warmth, produced by combined-circle
- Special law for existing residential buildings in the state of Baden-Wuerttemberg:
in case of the heating system is replaced, you must provide 10 % share of renewable energies for heating and hot water production
- Handcraft is in duty to consult the investor, to sign a document about the realization,
-> this must be handed out to the government



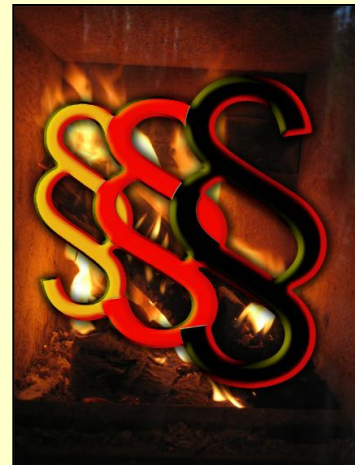
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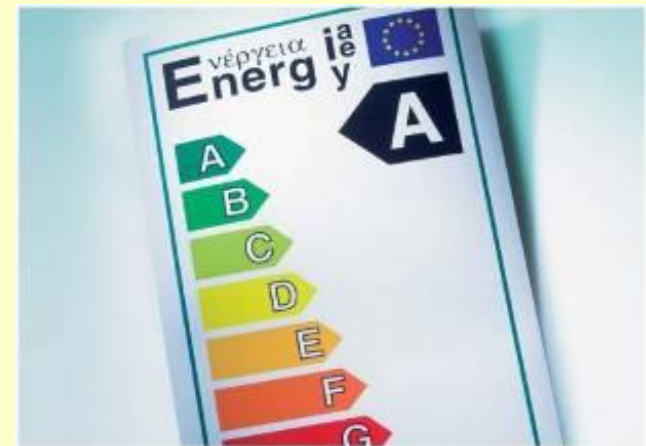
Renewable energy sources act

- Promoting program to extend production of electricity from renewables: sun, wind, water, biogas, geothermal,
- Operator gets money for every kWh (feed-in tariffs)
- Rate is guaranteed for 20 years
- Payed by grid operator or energy supplier
-> allocated on the price for electricity
Last year 2 ct / kWh now 3,5 ct / kWh



Label for energy consumption

- Labelling of the energy consumption of products
→ transparency for the consumer by using coloured labels indicating the quality of energy efficiency
- Elektronik devices:
so far: dishwasher, washing machine, fridge,...
soon: TV, computer, notebooks, tools, ...
- In future also labels will be introduced for non-electrical products, but products causing/influencing energy-consumption for example tires, ...



energy-certificate for buildings „energy-ID“, „energy-passport“

- Shows easily the energetic quality of the building
- Since 2002 for new houses
- Since 2008 also for old houses
- have to be shown to people who intend to buy or rent the building
- Must contain proposals and possibilities to improve the energy efficiency of the building
- → energy becomes more relevant in property market



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ENERGIEAUSWEIS für Wohngebäude
gemäß den §§ 16 ff. Energieeffizienzverordnung (EnEV)

Berechneter Energiebedarf des Gebäudes 2

Energiebedarf

Primärenergiebedarf „Gesamtenergieeffizienz“
kWh/(m²·a)

0 50 100 150 200 250 300 350 400 >400

Endenergiebedarf CO₂-Emissionen
kWh/(m²·a) kg/(m²·a)

Nachweis der Einhaltung des § 3 oder § 9 Abs. 1 der EnEV (Vergleichswerte)

Wärmeeintrag durch Gebäudehülle
Gesamtwert kWh/m²·a
EnEV-Grenzwert kWh/m²·a

Wärmeeintrag durch Lüftung
Gesamtwert kWh/m²·a
EnEV-Grenzwert kWh/m²·a

Endenergiebedarf „Normverbrauch“

Energietyp	Abgebener Endenergiebedarf in kWh/(m²·a)	Wärmeeintrag	Lüftung	Gesamt in kWh/(m²·a)

Erneuerbare Energien

• Direktbedarf alternativer Energieerzeugungssysteme nach § 9 EnEV von Baubeginn bis zum 31.12.2011

Erneuerbare Energiequellen werden genutzt für:

☐ Heizung ☐ Warmwasser

☐ Lüftung

Lüftungskonzept

Die Lüftung erfolgt durch:

☐ Fensterlüftung ☐ Schächtlüftung

☐ Lüftungsfächer ohne Wärmerückgewinnung

☐ Lüftungsfächer mit Wärmerückgewinnung

Vergleichswerte Endenergiebedarf

0 50 100 150 200 250 300 350 400 >400

Erläuterungen zum Berechnungsverfahren

Die vorstehende Berechnungsverfahren ist nach der Energieeffizienzverordnung angegeben. Insbesondere werden standardisierter Bauteileigenschaften angegeben. Die angegebenen Werte stellen Richtwerte dar. Die tatsächlichen Werte können abweichen. Die angegebenen Werte sind nach der EnEV pro Quadratmeter Gebäudenutzfläche (m²) angegeben.

* Heizwärme in kWh/m²·a - Endenergiebedarf in kWh/m²·a - Lüftungswärmebedarf

Use of nuclear power: attitude is changing

- 2000 government and power-suppliers had an agreement to decrease nuclear power until the 2020-ies
- sept. 2010 the next German government had extended the operational life in average for approx. 12 years
- As conditions were set:
 - upgrade of safety-features
 - spending at least 50% of the additional generated benefits on renewable energies
- After the nuclear crisis in Japan government changed behaviour (was forced to change by the people)
 - 7 nuclear power-plants were cut off immediately
- Probably the extending of the operational life will be withdrawn



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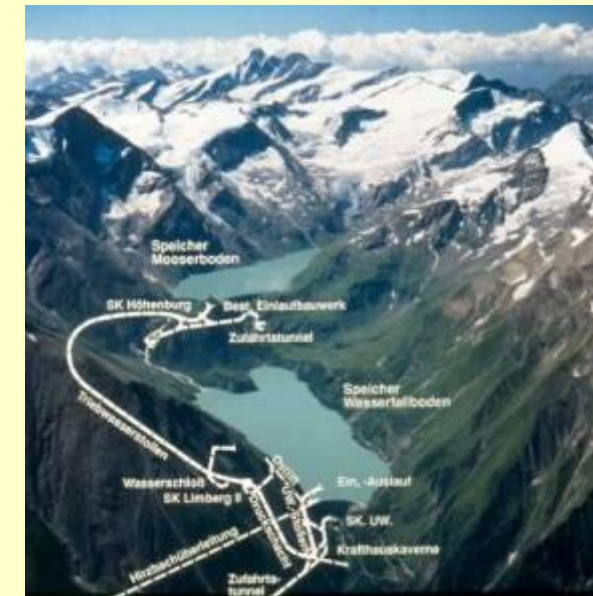
Use of nuclear power: consequences of cut-off

- Now the transition to renewable energy have to be accelerated to compensate the predicted lack of electricity- supply (lack hasn't occurred yet)
- Renewable energy with extraordinary peak levels during the day („wether-energy“) have to replace nuclear base load in the main supply
- → extending the grid
→ finding new storage-solutions
→ using more and more energy efficiency
- Absence of the 50%-payment from the power-suppliers (they have already stopped them)
- taking legal action and claim for compensation if the promised extending of the operational life not comes true



We have to increase renewables

“yes, we can”



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Energy situation in the state of Baden-Wuerttemberg

- Main figures of Baden-Wuerttemberg
- Consumption and supply of energy
- Energy roadmap
- monitoring and experiences



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Main figures of Baden-Wuerttemberg

- In the south west of Germany, one of 16 states
- Area: 35.740 km²
- Total population: 10.75 million people
- appox. 5 mill. private households
- 8 million manufacturing units
- Most of them small and middle size
- 250 billion turnover
- Export rate 47%
- well-known trademarks: Mercedes, Porsche, Bosch, Wuerth, Voith, Stihl, Festo, Liebherr, SAP, ...

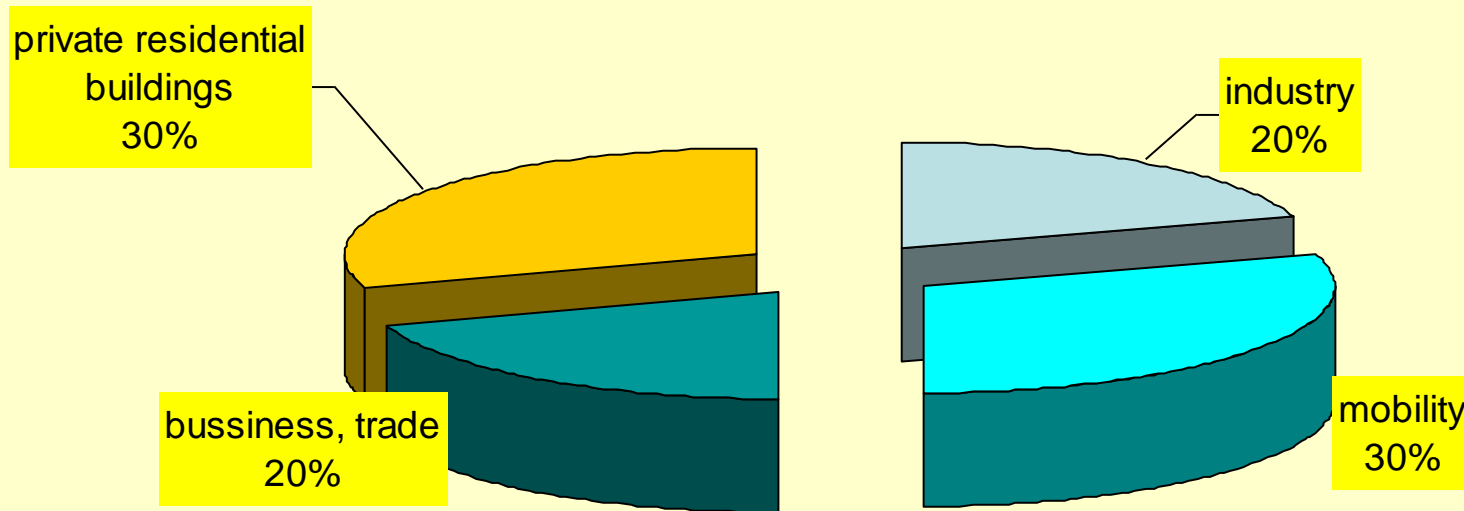


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Energy consumers Baden-Württemberg

1.065 PJ = 296 Mrd. kWh = 36,3 Mio. t SKE (ca. 30 billion liters oil)

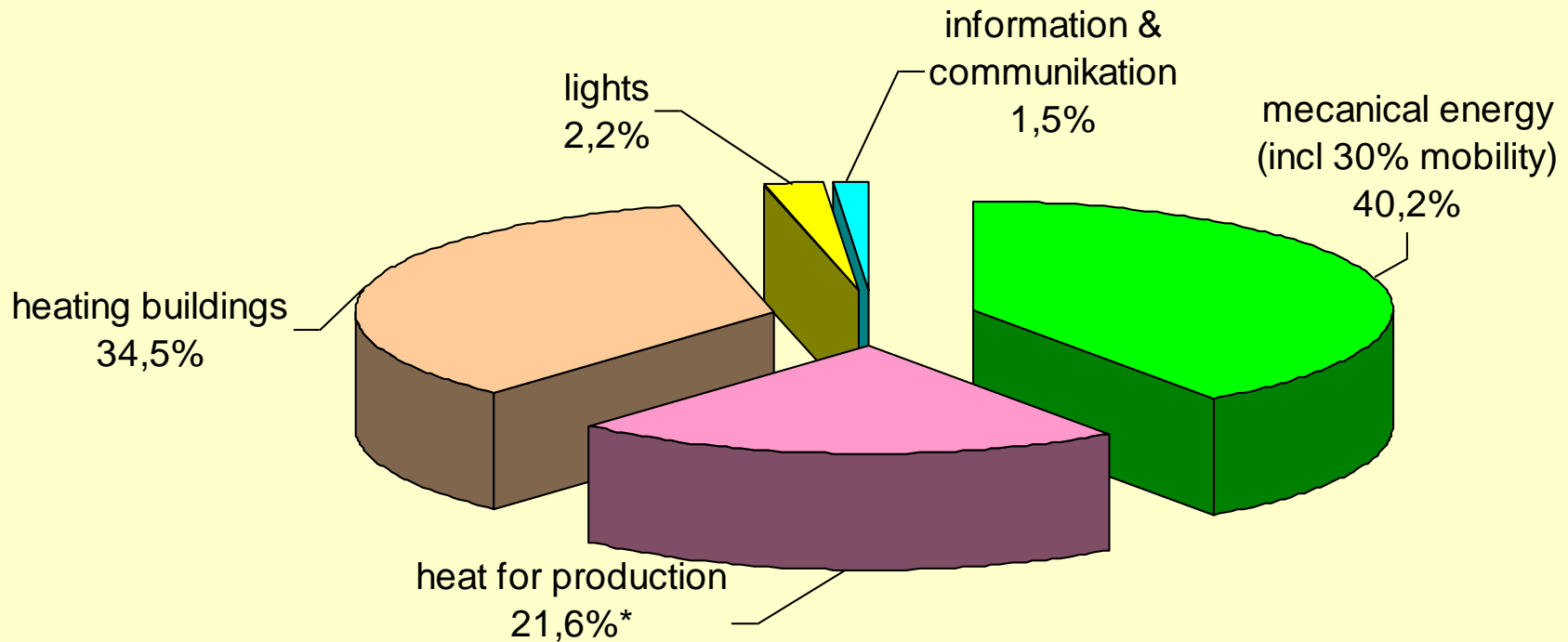


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Energy consumers Baden-Württemberg

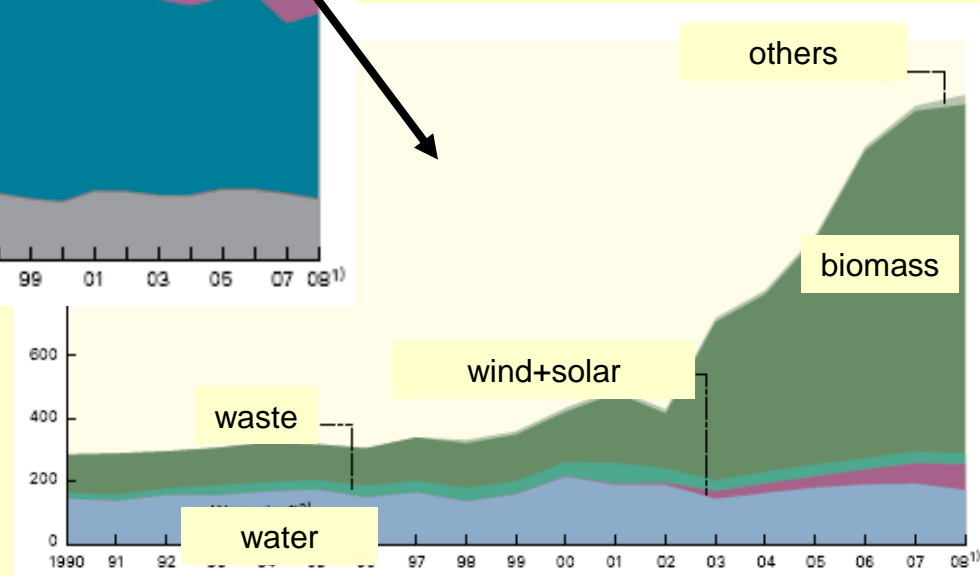
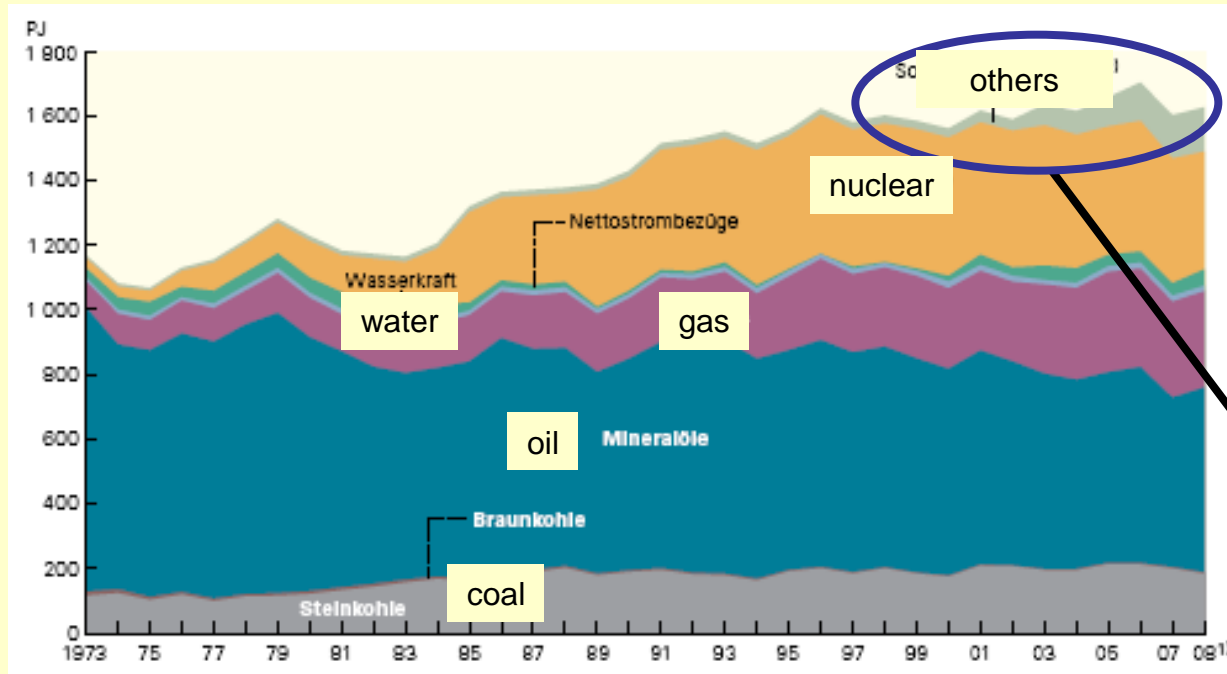
Insgesamt: 1.065 PJ = 296 bill. kWh = 36,3 Mio. t SKE (ca. 30 billion liters oil)



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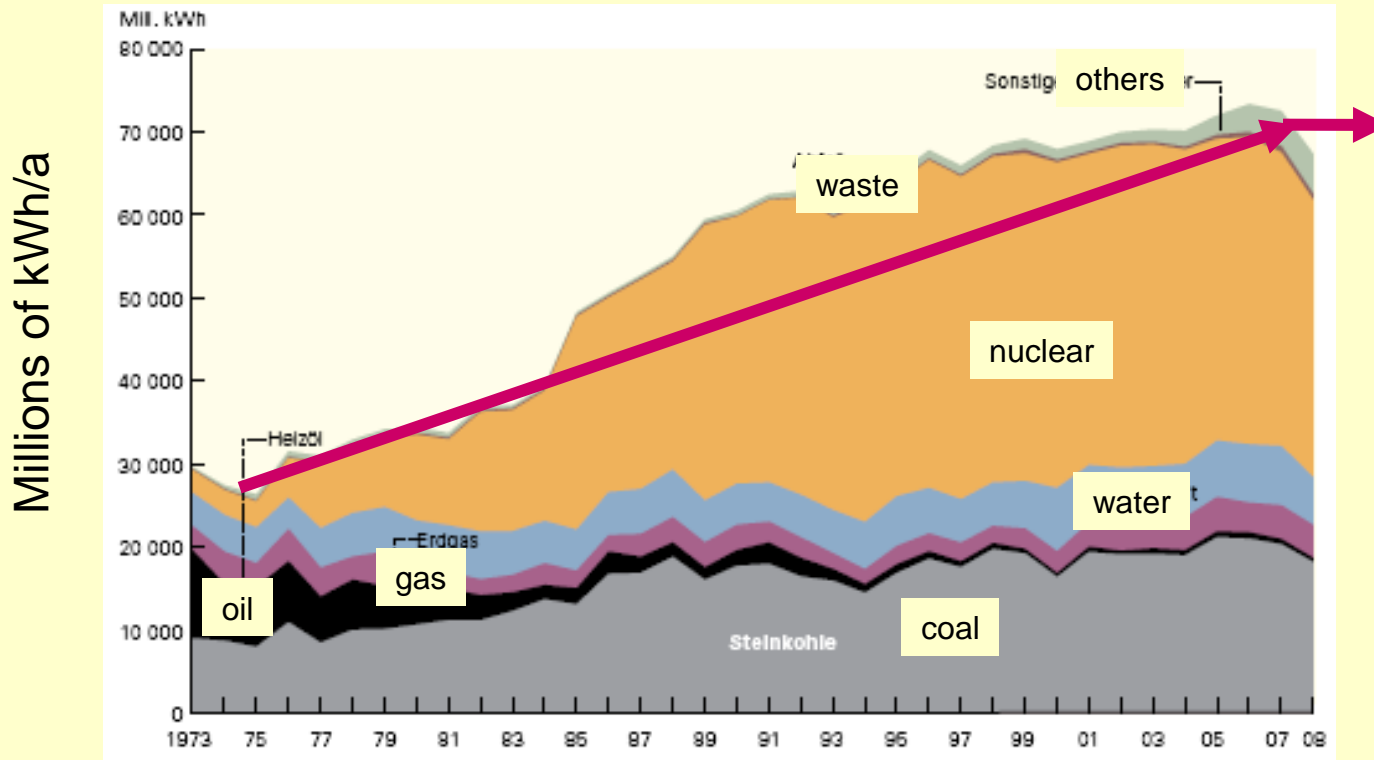
Primary energy in B.W.



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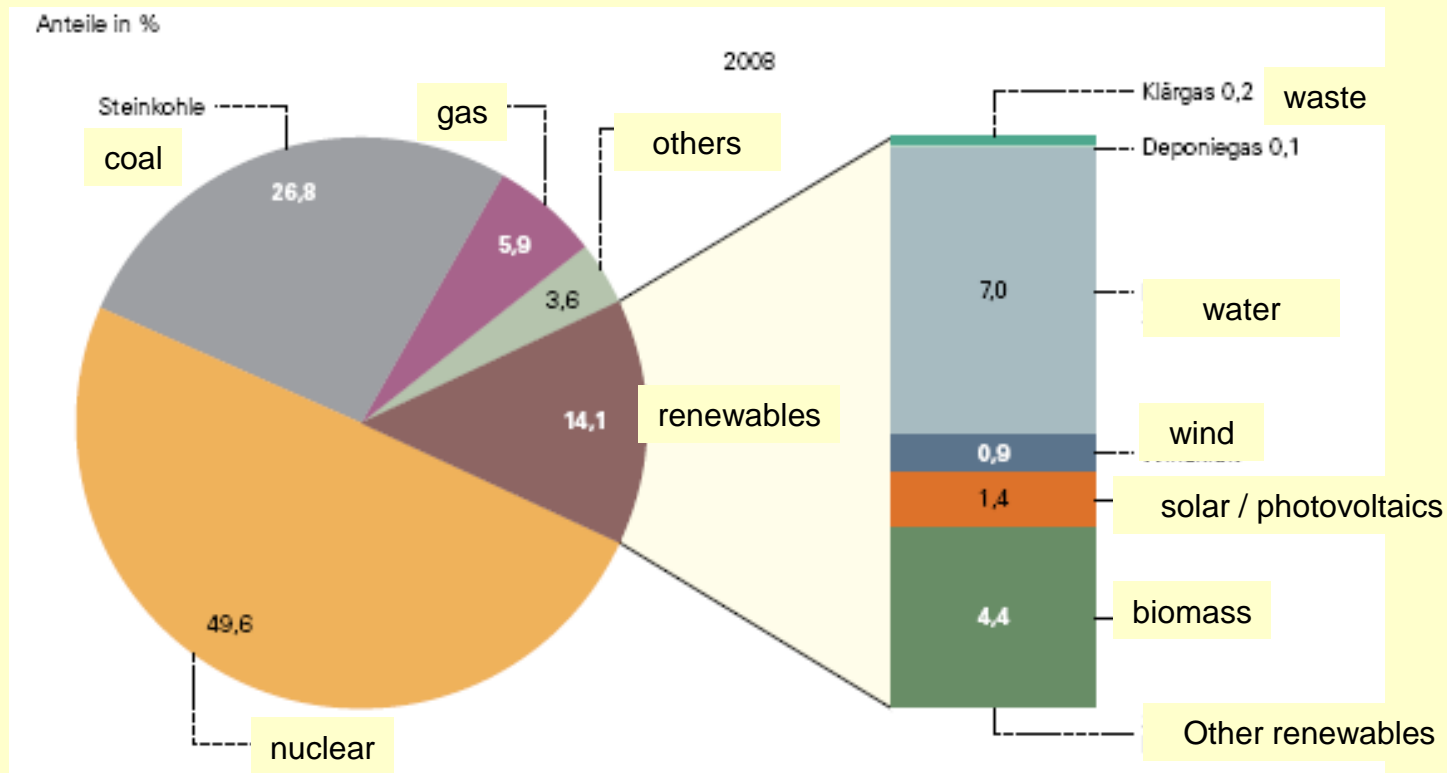
Power generation in BW



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Power generation in BW



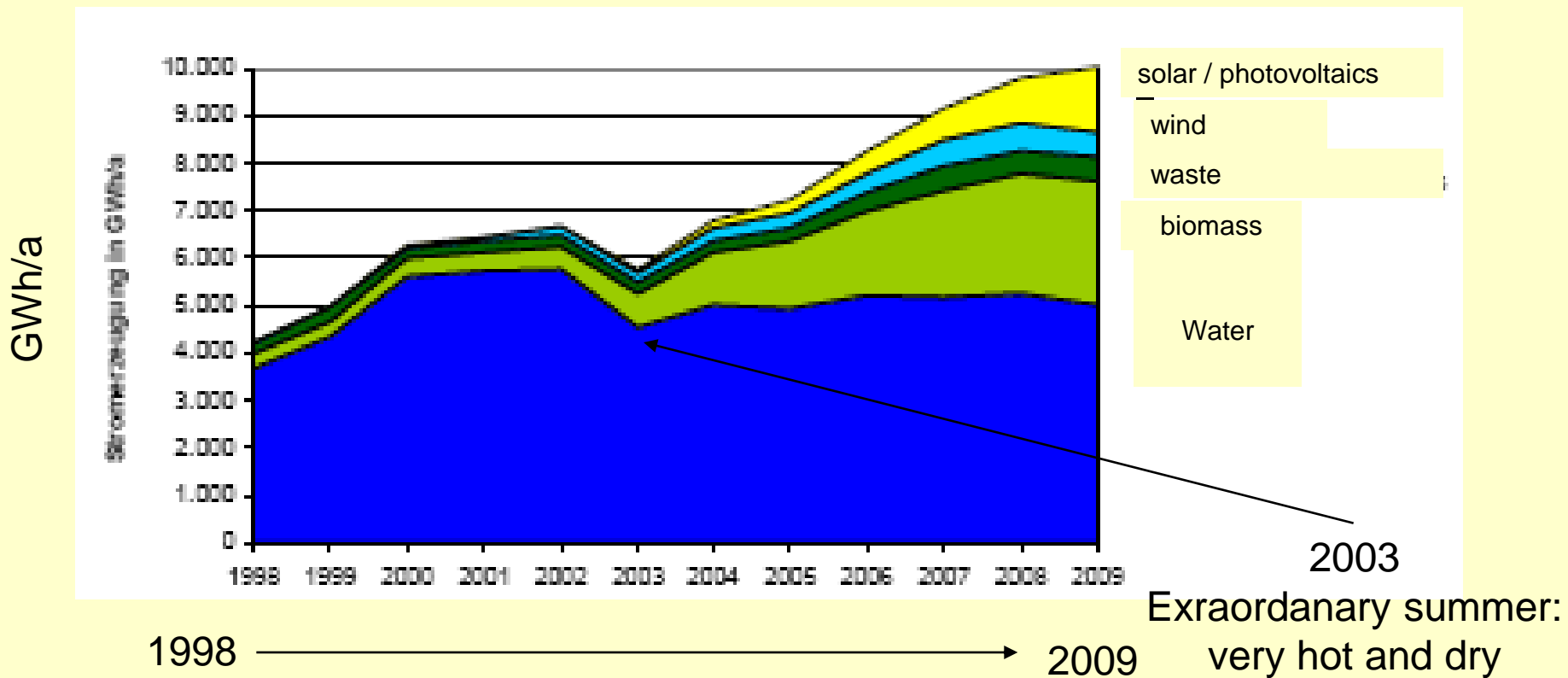
Bruttostromerzeugung in Baden-Württemberg 2007 und 2008 nach Energieträgern



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power generation by renewables (B.W.) development and proportions



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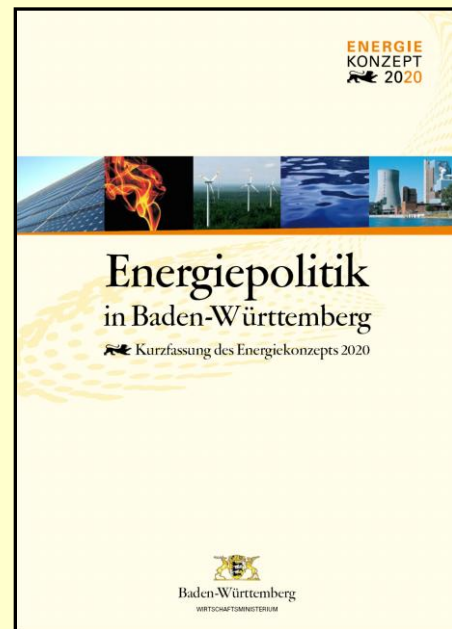
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energy concept Baden-Württemberg 2020

- Reducing consumption of primary energy -10%
- Improving energy productivity +2 % per year
- No more increase of electricity consumption
- Making double the contingent of cogeneration in the production of electricity up to 20%
- to source at least 20% of electricity from renewables
- to source at least 16% of heating from renewables
- contingent of renewable energy in primary energy consumption up to at least 13 %
- Maintaining and improving grid performance
- Promoting a consumer-focused energy-industry
- Informing energy consumers
- Promoting energy-related research
- Energy mix in 2020: renewable at least 20%
fossil 30%, nuclear approx. 50%
→ will probably change

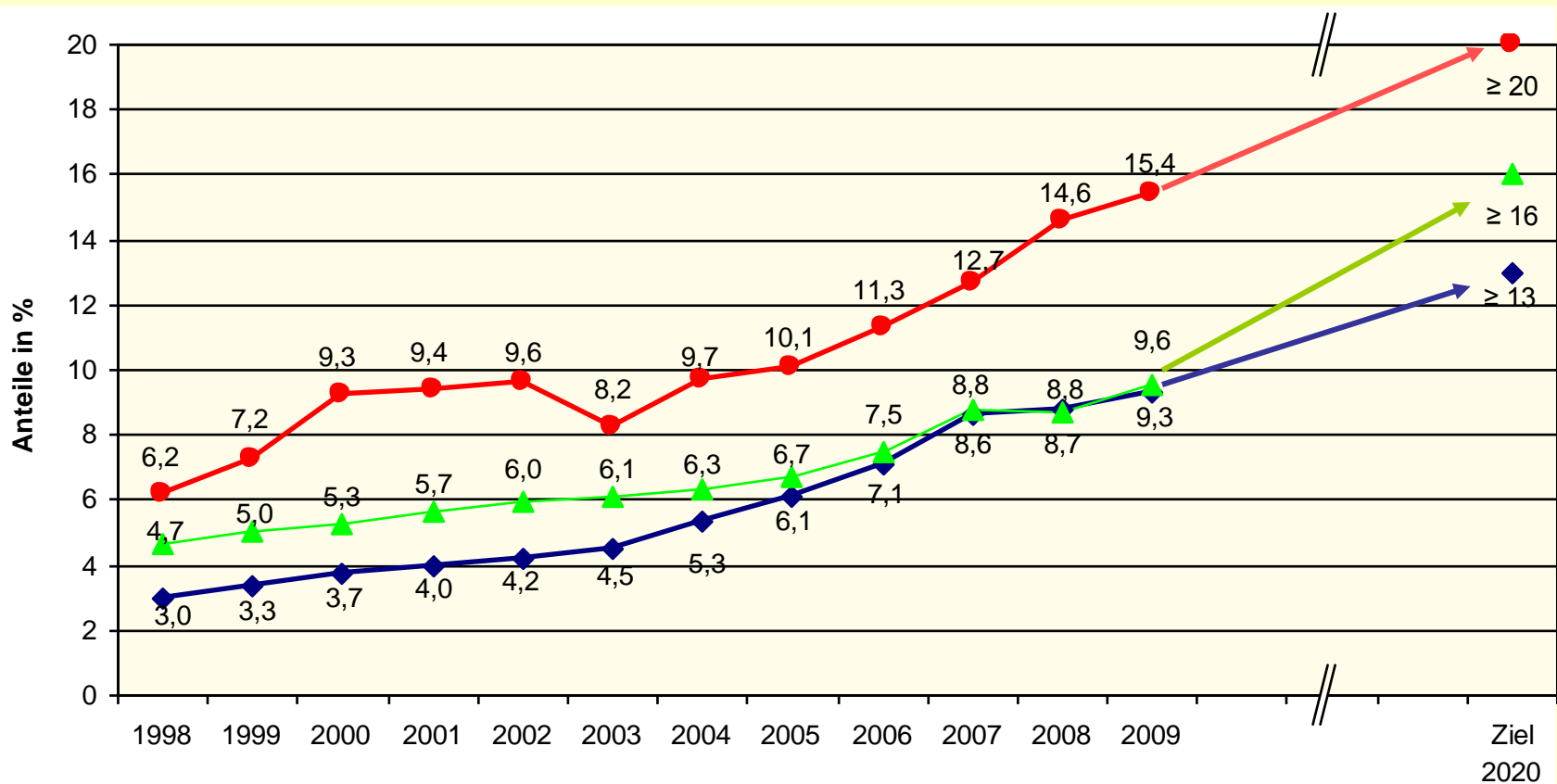


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Monitoring of the energy-concept BW 2020:

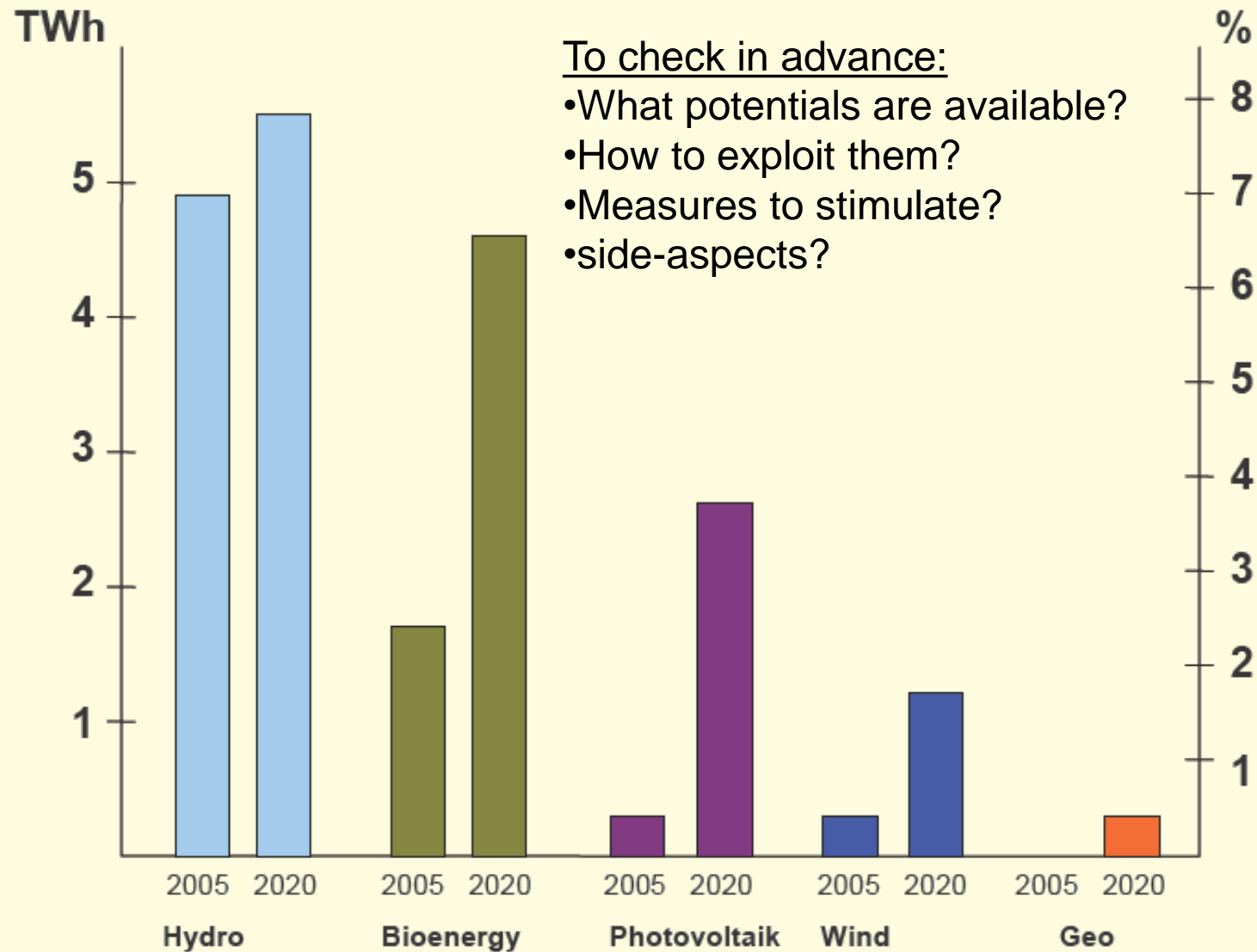
electricity, warmth, primary energy



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Aims for Baden-Wuerttemberg power generation in 2020



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monitoring, controlling, reporting

- Comparing regularly roadmap and reality
- Only possible, if you have determined adequate measures and not only proclaimed goals
- necessary to become aware of wheather you fullfill the path or wheather you have to intensify your efforts

Biomass: produced amount of energy
->Already reached 44% of the goal

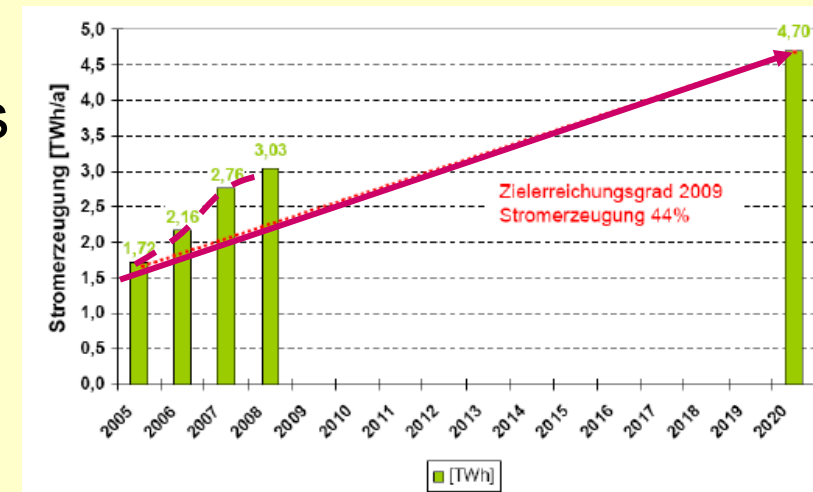


Abbildung B-3: Biomassennutzung in Baden-Württemberg (feste, flüssige und gasförmige Biomassen sowie biogener Anteil des Abfalls) von 2005 bis 2020 inklusive angestrebter Entwicklungspfad gemäß Energiekonzept 2020 [22, 1].

Example: biomass



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Monitoring: example photovoltaic

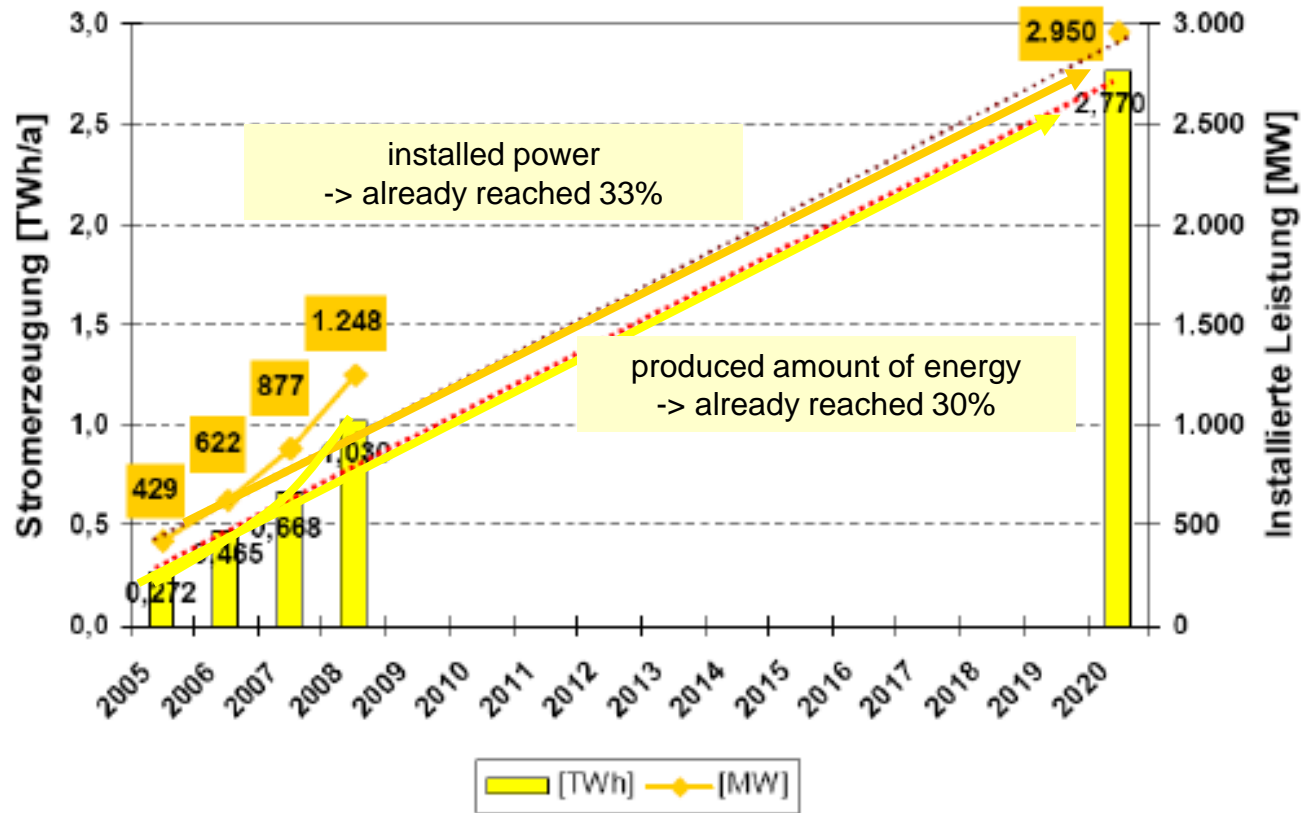


Abbildung B-4: Entwicklung der Photovoltaiknutzung in Baden-Württemberg von 1998 bis 2008 und angestrebter Ausbaupfad bis 2020 [22, 1].

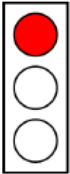



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Consequences of the monitoring report

- Evaluation about the current situation
- View backwards, estimation and forecast
- → Conclusions: (What`s going right, topical problems,...)
- You need measurable values (agreed in advance by all)
- easily provable indicators

Windenergie		
Ziel 2020: Steigerung der Stromproduktion bis 2020 auf 1,2 TWh/a	Stand 2008: Ausgehend von 0,3 TWh/a (2005) erfolgte eine Steigerung der produzierten Strommenge auf 0,595 TWh/a in 2008 bei einer installierten Gesamtleistung von 422 MW.	Ausbaugrad: Bezogen auf die Stromproduktion 32% Bezogen auf die installierte Leistung 31%
<p>Die Stagnation in den Bau-, vor allem aber auch in den Planungsaktivitäten zum Ausbau der Windenergienutzung in Baden-Württemberg verdeutlicht den dringenden Handlungsbedarf hinsichtlich der ausgewiesenen Vorrangflächen. Die vorhandenen Vorrangflächen sind dringend auf ihre Eignung zu überprüfen und ggf. neue, nachweislich geeignete Flächen auszuweisen. Um die Zielerreichung auch im Windbereich sicherzustellen, bedarf es einer zügigen Überarbeitung der Regionalpläne in Verbindung mit einer Anpassung des Kriterienkatalogs für Vorrangflächen. Dies ist zeitnah anzugehen, da die notwendigen Planungs- und Bauzeiträume für Windenergieanlagen berücksichtigt werden müssen.</p>		
Gesamtbewertung: <ul style="list-style-type: none"> ○ Ausbaugrad aufgrund der Entwicklung 2006 und 2007 noch oberhalb des linearen Ausbaupfads. ○ Stagnation des Ausbaus seit 2007, in 2008 und 2009 kaum Ausbau- und Planungsaktivitäten ○ Viele der ausgewiesenen Vorrangflächen ermöglichen keinen wirtschaftlichen Anlagenbetrieb, eine Überprüfung der vorhandenen und die Neuausweisung von geeigneten Vorrangflächen ist daher zwingend erforderlich. 		

Biomasse		
Ziel 2020: Steigerung der Stromproduktion bis 2020 auf 4,7 TWh/a (in KWK)	Stand 2008: Ausgehend von 1,8 TWh/a (2005) erfolgte eine Steigerung der Stromerzeugung in 2008 auf 3,03 TWh/a	Ausbaugrad: Bezogen auf die Stromproduktion 44%
<p>Im Bereich der Stromerzeugung aus Biomasse besteht aktuell kein Handlungsbedarf. Strategisch wird die Bedeutung von zukunftsweisenden Konzepten für die Erschließung vorhandener Reststofffraktionen und deren Einsatz in der energetischen Verwertung wichtig werden, so dass entsprechende Aktivitäten angestoßen werden sollten.</p>		
Gesamtbewertung: <ul style="list-style-type: none"> ○ Positive Entwicklung ○ Bislang Ausbaugrad oberhalb des linearen Ausbaupfads 		



energy concept Baden-Württemberg 2020

Tools to achieve the goals

- rising up the acceptance of mayors, public officers (opinion-leaders), the press and population, NGO`s
- more information and transparency – the sooner the better
- Try to find out in advance the main fears and prejudices of the people and take them seriously
- adaption of framework and regulations to avoid negative influence (of single persons with big influence)
- simplyfying approval of regulations and laws
- participation of the population
(in the process of decision and finacially)



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Why an Energy Information Center?

- to inform in all fields of energy consumption thus the investment obtains the most reasonable effects
- to induce people to change behaviour in regard of wasting / saving energy
- to explain that changing the energy-supply could cost more in the beginning but will bring return of invest later
- to care on quality when installing and replacing energy-systems (sustainable investment)
- rising up know-how of ingeneers and handcraft
- to help small factories handling their energy costs
- to inform about promoting programs
- cooperation, coordination and networking with all economic-organisations and employers associations



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Activities of the energy-information-center

- brochures, flyers,
- exhibitions, fairs, events
- seminars, congresses
- initiative „improvement of energy efficiency in economy“
- campaign „qualification for renewable energy“
- „energy day Baden-Württemberg“ – every year
- projects for kids at school



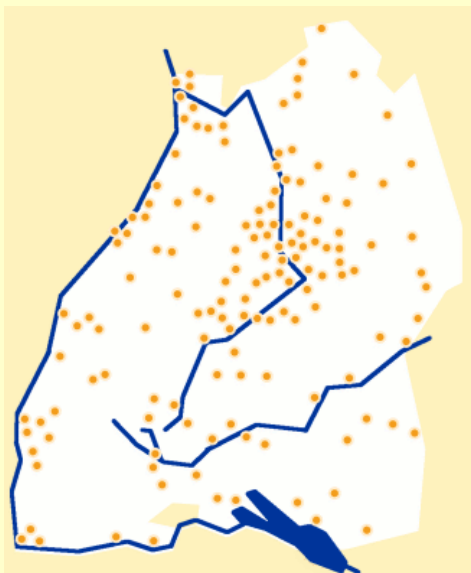
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Energietag Baden-Württemberg.
Zukunft erleben.

- **Energy-day**
- every year in september
- activity of the whole state of Baden-Württemberg
- 200 events at one weekend in 150 cities and villages
- all ministries and institutions are involved



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„info-tainment“

Betting, how much ice
will melt inside this
high-insulated house
during six weeks in summer




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Informationszentrum
Energie

 Zündende Ideen mit Energie

ANGEBOTE | LEISTUNGEN | PROJEKTE


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financial benefits promotion programs

- use of renewable energy in heating systems
- energy saving in residential buildings
- production of renewable electricity
- increasing energy efficiency (industry and public)
- avoiding co2-emissions (public buildings and industry)
- energy consulting (private und industrial)



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Programm for increasing the facilitation use of renewable energy

- Subsidies for all systems of renewable heating systems: solarthermal, wood, biomass, heatpump, geothermal
- huge projects: Loan with reduced rates of interest
Amount of 20 % of the credit will be released
- Up to 500.000.000 EUR / a

→ You find more information in the web
www.bafa.de or www.kfw-foerderbank.de



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„Klimaschutz-Plus“ Baden-Württemberg

Subsidies for non-residential buildings

energy consulting for non-residential buildings

- subsidy: 50 % of the consulting costs,

Reduction of CO2 emissions

- subsidy 50 €/ t CO2 on whole life-cycle (in comparison with the old technology)
- max. 75.000 €, max. 15%
- Subsidies for all investments, which reduce CO2 emissions: heating, insulation, air-conditioning, lights, ...
- www.klimaschutz-plus.baden-wuerttemberg.de



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Promotion programs for residential buildings

- Cheap loans for new or reconstructed buildings with a low energy-consumption
- The higher the achieved energetic standard, the better are the loan conditions.
- In small residential buildings there is a choice between a cheap credit (1,5-3 %) or subsidy 5-10%
- If you reach the quality level of new buildings, you get better conditions and higher subsidies
- Amount of loans and subsidies 1.500.000.000 EUR / a
- info: www.kfw-foerderbank.de



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summary

- In the next few years we will be facing major challenges. We must respond them by developing and implementing effective policies.
- Tackling climate change requires consistent action.
- Information and creating a adequate consciousness are helpful side aspects.
- Attractive promotion programs and suitable economic framework are necessary.
- To achieve the demanding goals, politicians, industry and population have to join forces actively and unreservedly.



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Ernst Pfister, Minister of economy, State of Baden-Wuerttemberg



- Quote:
„Only those, who *today* are acting with responsibility of resources and environment, will be successful managers *tomorrow*.“



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Thank you for your attention!
Do you have any questions?

Dipl.-Ing. Harald Höflich

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