Energy and climate policy for the building sector

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BFW
Bundesverband Freier Immobilien- und Wohnungsunternehmen

DDIV
Dachverband Deutscher Immobilienverwalter

GdW
Bundesverband deutscher Wohnungs- und Immobilienunternehmen

IVD
Immobilienverband Deutschland - Bundesverband der Immobilienberater, Makler, Verwalter und Sachverständigen

vdp
Verband deutscher Pfandbriefbanken

ZIA
Zentraler Immobilien Ausschuss

Energy Efficiency First - What Next?
Parliamentary Breakfast
September 26th, 2017

Nikolas Müller

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Agenda

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1. **Financial effects of future energy efficiency standards for residential buildings from the perspectives of owners and tenants.** (study 1)

2. **Energy and climate policy for the building sector – Alternative perspectives and their requirements on strategies to enhance energy efficiency.** (study 2)

3. **Conclusions and policy implications for future energy policy.**

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Aim and research question of study 1.

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Motivation

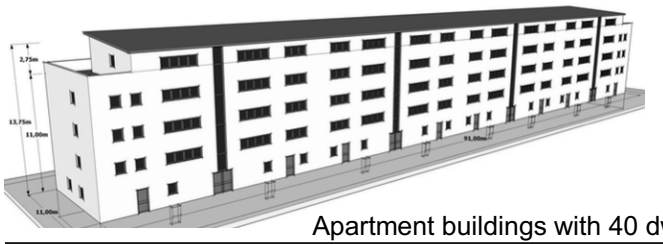
Higher requirements (-45% primary energy demand, -15% transmission-heat-loss) in the federal Energy Saving Ordinance (EnEV) are *cost-efficient,* seen by a technical perspective.

Aim

Provide transparency on the financial effects of tightened regulations of energy efficiency for new housing for owners and users (tenants).

Research question

What financial effects would have a potential tightening of energy efficiency regulations for new housing for investors and users?



Apartment buildings with 40 dwellings

Apartment buildings with 6 dwellings

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Financial effects for owners and users (tenants)

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The energetically higher standard requires additional investment costs - at least + 10 %.

„How much must the owner's income be in order to achieve his desired return? And what does this mean financially for the individual tenant?"

Target return is identical | Housing costs are variable outcome

Energetic Standard	EnEV 2014	nZEB standard discussed (Current EnEV 45 %)			
	Basis	V1	V2	V4	Unit
Investor perspective (owner)					
Equity capital	1.187.998	1.332.901	1.350.069	1.318.295	Euro
Ø internal rate of return (target) in t=10			**3,5%**		**p.a.**
User perspective (tenant)					
Net rent cold (variable) (t=1)	8,02	9,01	9,12	8,92	€/m² ls Month
Non-Energy-related operating cost (t=1)	1,43	1,50	1,43	1,44	€/m² ls Month
Energy-related operating cost (t=1)	0,44	0,23	0,37	0,33	€/m² ls Month
Total cost of housing (t=1)	**9,89**	**10,75**	**10,92**	**10,69**	€/m² ls Month
difference (t=1)		**0,86**	**1,03**	**0,80**	€/m² ls Month

Heat generation: V1 = Boiler + solar-thermal energy | V2 = Heat pump | V3 = Pellet

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CO_2 avoidance costs

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Energetic Standard	EnEV 2014	nZEB standard discussed (Current EnEV 45 %)			
	Basis	V1	V2	V4	Unit
Abatement cost CO_2-Emissions					
Abatement cost CO_2-Emissions (T=1)	-	34.400	36.800	14.400	€ / t CO_2
Abatement cost (40 year lifecycle of energy effective building components/technology)	-	**860**	**920**	**360**	€ / t CO_2 p.a.

Is overall economic efficiency at a cost of 360 to 920 € / t CO_2 for nZEB given, if carbon certificates are traded at a price of less than 10 € / t CO_2 ?

Heat generation: V1 = Boiler + solar-thermal energy | V2 = Heat pump | V3 = Pellet

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Lessons learned

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If we increase energy efficiency standards, then

- building houses will become more expensive / investment costs rise.
- higher net rents and higher costs of housing are the results (alternatively, declining returns on the owner side will occur).
- the overall economic efficiency of avoiding GHG is doubtful (GHG can be avoided with lower costs in other sectors).

Take away

1. Object-related calculation (valuation) is just one option to measure efficiency. “Efficiency" is a specific scale of a selected valuation approach, which is not transferable to other perspectives.
2. Real estate actors decide over investments in energy efficiency on site. Currently, their perspectives are lacking in the legal valuation approach evaluating the energy efficiency of buildings.

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Aim and research question of study 2.

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Purpose

Systematic assessment of alternative implementation strategies for the energy sector in the building sector, related control indicators and their legal implementation

Aim

Provide transparency on the strengths and weaknesses of the respective strategies in the control and implementation of the energy demand in the building sector

Research question

Is the current control system (primary energy demand, transmission heat loss) still effective to enforce energy and climate policy goals in the building sector, or does it require a reform and, if so, in what respect?

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Object-related valuation is just one option to measure efficiency of climate/energy policies

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Alternatively valuation principles in energy and climate politics for real estate

Object referenced valuation (technical approach)	**Subject referenced valuation** (perspective of actors on-side)	**Overall economical/ environmental economical valuation**
Objective is **efficiency of primary energy** of the technical solutions on a Construction-/district level (DIN 18599 or rather DIN 4108/4701)	**Objective** is **economic benefits** from a real-estate-economical point of view, cost-efficient housing (**owner**, **user/tenant** and producer); Plus from a user point of view: living comfort	**Objective** is **cost-efficient abatement of green house gases** (– in case of a bottleneck in financing the climate protection)
Valuation result: technical optimized result in case of primary energy demand (under standard test conditions).	**Valuation result**: economical optimized result on-site	**Valuation result: (across sectors)**: GHG abatement cost possible measures of principles of efficient controlling.

The current steering system conflicts to other political goals (i.e. affordable housing) – currently, it is not able to picture or forecast possible conflicts.

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The single evaluation approaches (and therefore also the results) are connected

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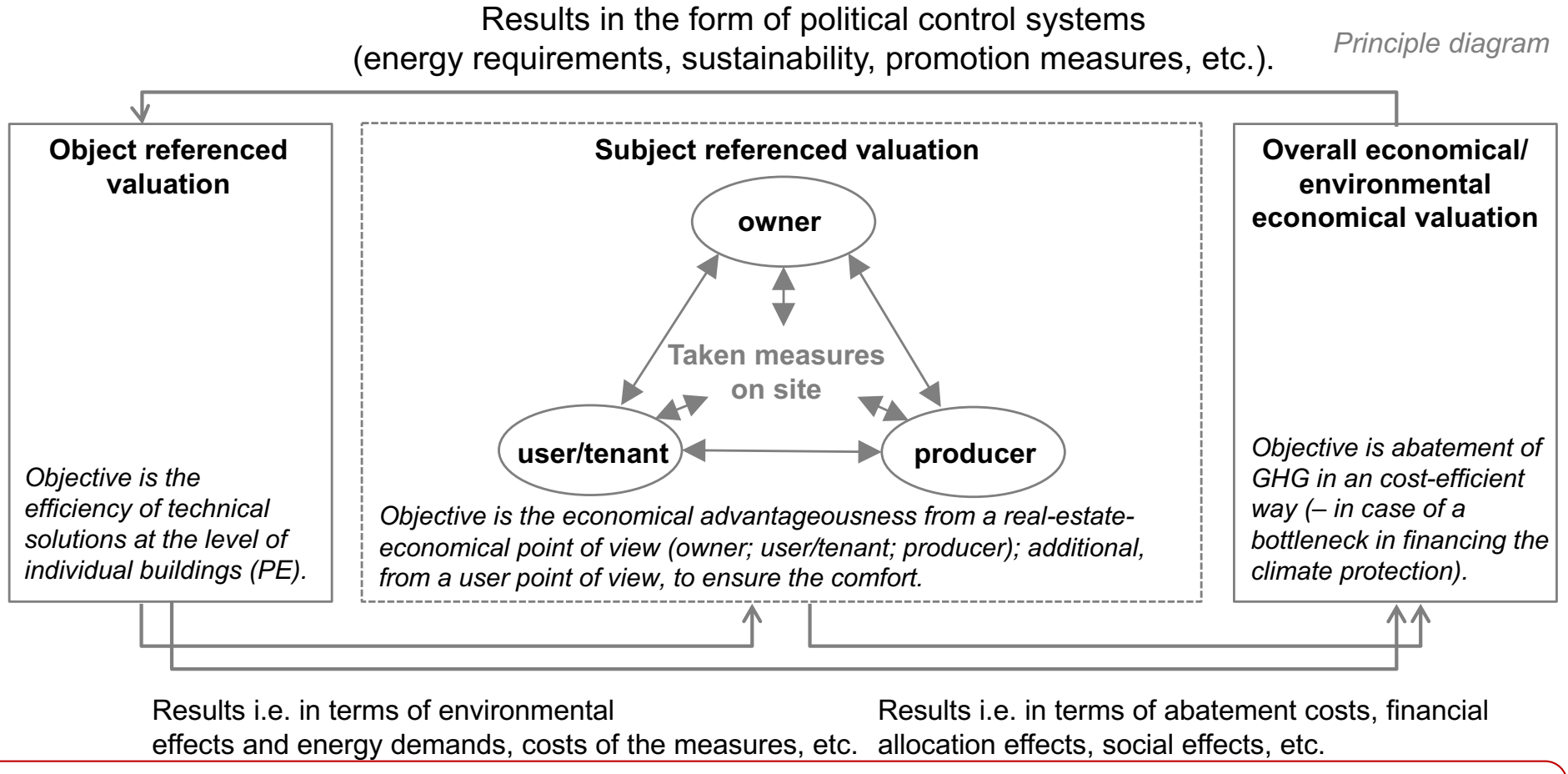
Principle diagram



The systematical dependencies are more complexes than the current implementation strategy might suggest. The bottleneck of the energy and climate policy in the building sector are owners and ustenants, not the technology or buildings!

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Economically efficient vs. economically efficient Possible misunderstanding in politics?

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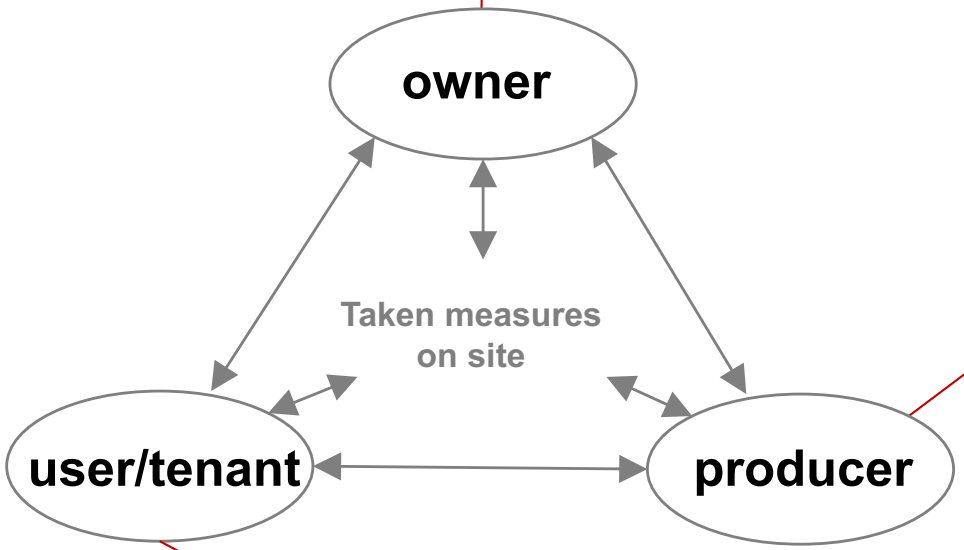
Economical objectives and issues of real estate stakeholder in energy policy

Objective: Maximize the capital invested in the building
Questions: What is the investment for the energy efficiency measure and is (still) affordable? How economically profitable is the investment?



Objective: Making profit by planning, constructing, operating & marketing
Questions: How can we optimize real estate energetically during planning, construction and the operating phase?

Objective: Maximize the cost-benefit-ratio
Questions: How does an investment in energetic measures effect the total cost of housing/living?

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Not all control indicators are equally suitable for the efficient enforcement of policy objectives in real estate

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Key-requirements of the alternative perspectives [excerpt]	**GHG-emissions**	**Primary energy demand**	**Final energy demand**	**Heat demand**	**Trans-mission heat loss**
Connectivity to pol. overall goals (decarbonization, cost-efficient abatement of GHG) – ***Overall economical/environmental economical valuation***	yes	limited	no	no	no
Allows standardized statements about the efficiency of the building – *Object referenced valuation*	no	yes	yes	yes	yes
Enables the technology-open optimization of the building – *Object referenced valuation*	yes	yes	yes	yes	no
Focus on minimizing energy-saving costs – owner perspective	no	limited	yes	yes	yes
Allows to identify and picture true operating cost – user/tenant perspective	no	no	yes	no	no
Allows scope for technological innovation – producer perspective	yes	yes (in principal)	yes	yes	no
Space for inter-sector solutions – system limit / enforcement energy transition	yes	yes	yes	no	no

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Lessons learned

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1. **Not all control indicators are equally suitable for the efficient enforcement of policy objectives in real estate!**
2. **If we keep the current approach** (trying to 'optimize' the energy efficiency of buildings by reducing *primarily energy* and *transmission heat loss* to the max. in an object based calculation) **running, we have a high risk of failure**
   - economic inefficiency for real estate actors (owners & tenants) cannot be evaluated
   - economic inefficiency for reducing GHG Emissions cannot be evaluated

Take away

A successful strategy to enhance energy efficiency in the building sector must make it possible to measure 'efficiency' from different perspectives.

The (additional) indicators **GHG** and **final energy** would fulfill the key requirements of real estate actors and of the overall economy.

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Conclusions for a successful strategy for enhancing energy efficiency in the real estate sector

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1. Competitive target systems of stakeholders (i.e., GHG reduction vs. affordable housing) should be prioritized in a political process before the current control system of steering energy efficiency can be further developed “effectively”.
2. A control system that aims towards efficiency and effectiveness needs carefully selected targeted-indicators to intensify the stakeholders adequately and to secure their contributions.
3. The financial effects of alternative options (measures on site) for energy and climate policy in the building sector have to be finally evaluated in a systemic context to achieve an efficient and socially balanced burden distribution.
4. Purpose-based valuation methods still need to be developed (depicting the decision situation of the stakeholders, GHG-Emissions of buildings).
5. Due to the high complexity, accuracy should be taken seriously (more important than a speedy process) if misallocations, failure, and social imbalances are to be avoided.

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Thank you for your attention

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Link to download the working papers

Study 1: www.real-estate.bwl.tu-darmstadt.de/media/bwl9/dateien/arbeitspapiere/Arbeitspapier_32.pdf
Study 2: www.real-estate.bwl.tu-darmstadt.de/media/bwl9/dateien/arbeitspapiere/Arbeitspapier_34.pdf

Link to the project website

Study 1: www.real-estate.bwl.tu-darmstadt.de/praxistransfer/praxisorientierte_forschungsergebnisse/wirtschaftlichkeitsberechnung_bei_verschaerften_energetischen_standards.de.jsp
Study 2: www.real-estate.bwl.tu-darmstadt.de/praxistransfer/praxisorientierte_forschungsergebnisse/konzeptionelle_ansaetze_zur_umsetzung_der_energiewende_im_gebaeudesektor.de.jsp

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Apendix

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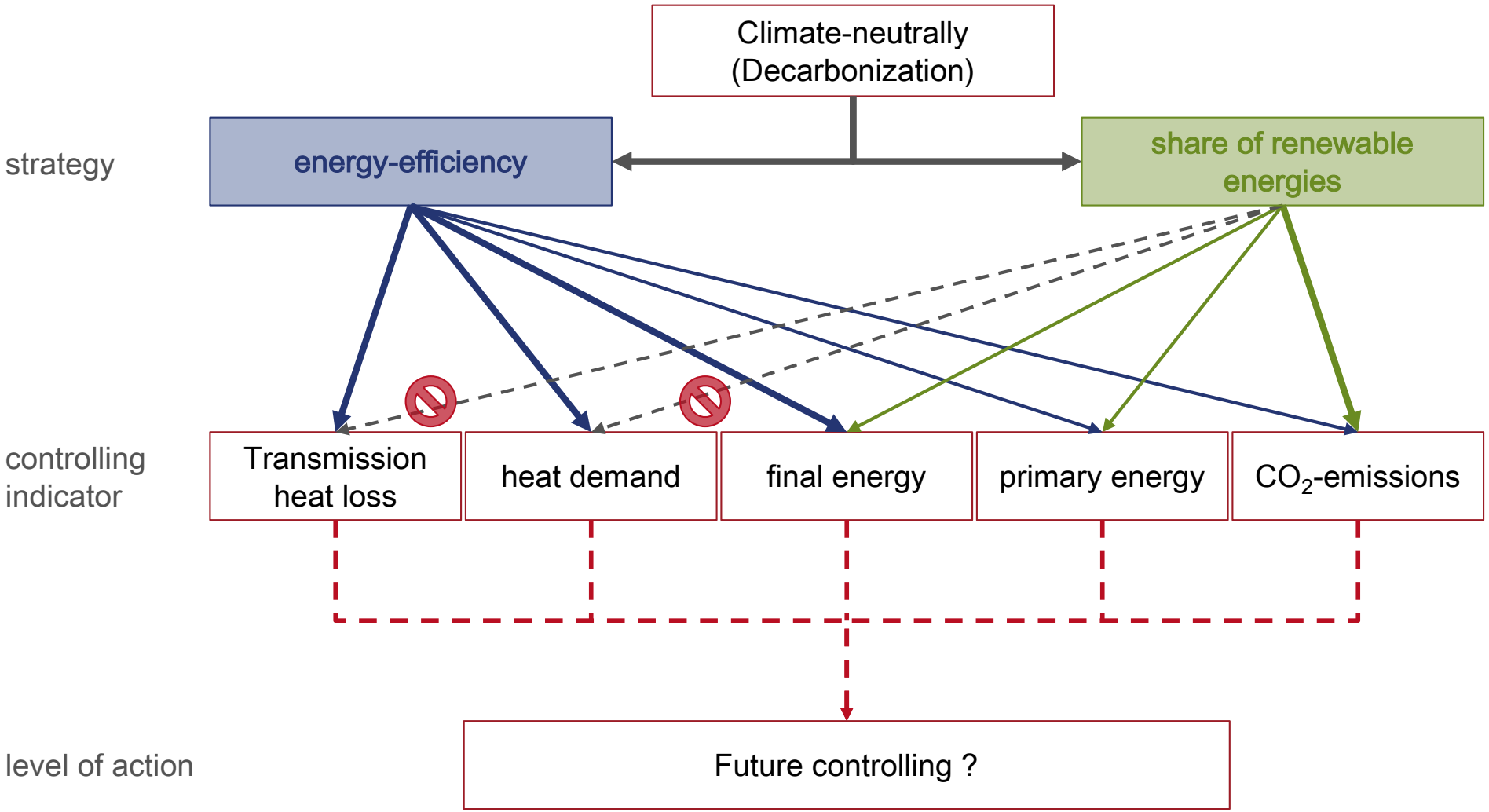
Background: control mechanisms in energy and climate policy for the building sector are complex



The efficiency of energy and climate policy for the building sector depends on the valuation approach

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	Object	Owner	User/tenant	Producer	Overall economy	Energy transition
Problem of evaluation						
purpose	Ecological - proof of keep the limits of EnEV/EEWärmeG	Economical – evaluation of effects of alternative measures	Economical – evaluation of living costs	Economical – evaluation of financial impacts on the company	Abatement of negative emission (GHG)	Implement energy transition
objective	**Identify efficient solutions related to primary energy**	**Identify Economical efficient solutions**	**Identify Economical efficient solutions**	**Minimise costs related to the company and maximise the earning**	**Identify cost efficient solutions**	**Identify economical efficient solution within the political process**
Valuation rules						
approach	Energetic balancing according to DIN 18599 focus primary energy	Profitability analysis (complete finance plan as the optimum manner)	Finance plan	Shareholder-value	Efficiency of Abatement costs	Profitability analysis (complete finance plan as the optimum manner)
System boundary horizontal	construction	Conatruction (+transport, energy production)	Rental unit (+tenant electricity building)	Depends on the companies' performance. Normally just a share of the building	Federal Republic of Germany (all sectors)	Federal Republic of Germany (connection of all sectors)
System boundary vertical	Utilisation phase	Construction and phase of use. If applicable across buildings	Individual phase of usage		Whole Life cycle	Phase of construction and usage
Valuation background	Generalise input data for validating the energy balance and determinate political factors for primary energy	Construction and debt costs, legal requirements, absorption capacity of the markets for necessary levies	Cost of living (Net rent, "cold", "warm" additional costs	Real cost structures including coaching, risk of liabilities, legal requirements, market demand	Real abatement costs and effect on stakeholder on project level on-site	Construction and debt costs, legal requirements, absorption capacity of the markets for necessary levies
Valuation result	**Technical optimised result in case of primary energy demand**	**Economical optimised – on-site**	**Economical optimised solution at the residence**	**Economical optimised solution for companies**	**Across sectors: abatement costs of possible measures**	**Economical optimised solution within the political process**

The different perspectives follow different valuation approaches in efficiency measurement. "Efficiency" of climate protection or energy saving measures in the building sector is a specific, non-transferable size of the selected valuation approach.

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Remember

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To avoid a substantial loss of political efficiency on a broad scale

- the financial effects from the various perspectives have to be carefully evaluated before further regulations for enhancing energy efficiency in the building sector are set.

Therefore, the current challenge is

to identify indicators and valuation methods for steering energy efficiency in the building sector, that can be optimized due to the financial effects for real estate actors and the general economy (GHG avoidance costs) in the different EU member states, too.

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