What drives the impact of future support policies for energy efficiency in buildings?

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Key research questions

➢ What impact on energy demand, CO_2-emissions and public costs do various nZEB support policies trigger in scenarios for EU MSs and the EU-28?

➢ What drives the differences between the scenarios in various countries and policy settings?

➢ How do the policies compare in terms of their consistency with long-term targets of energy savings and CO_2-reduction?
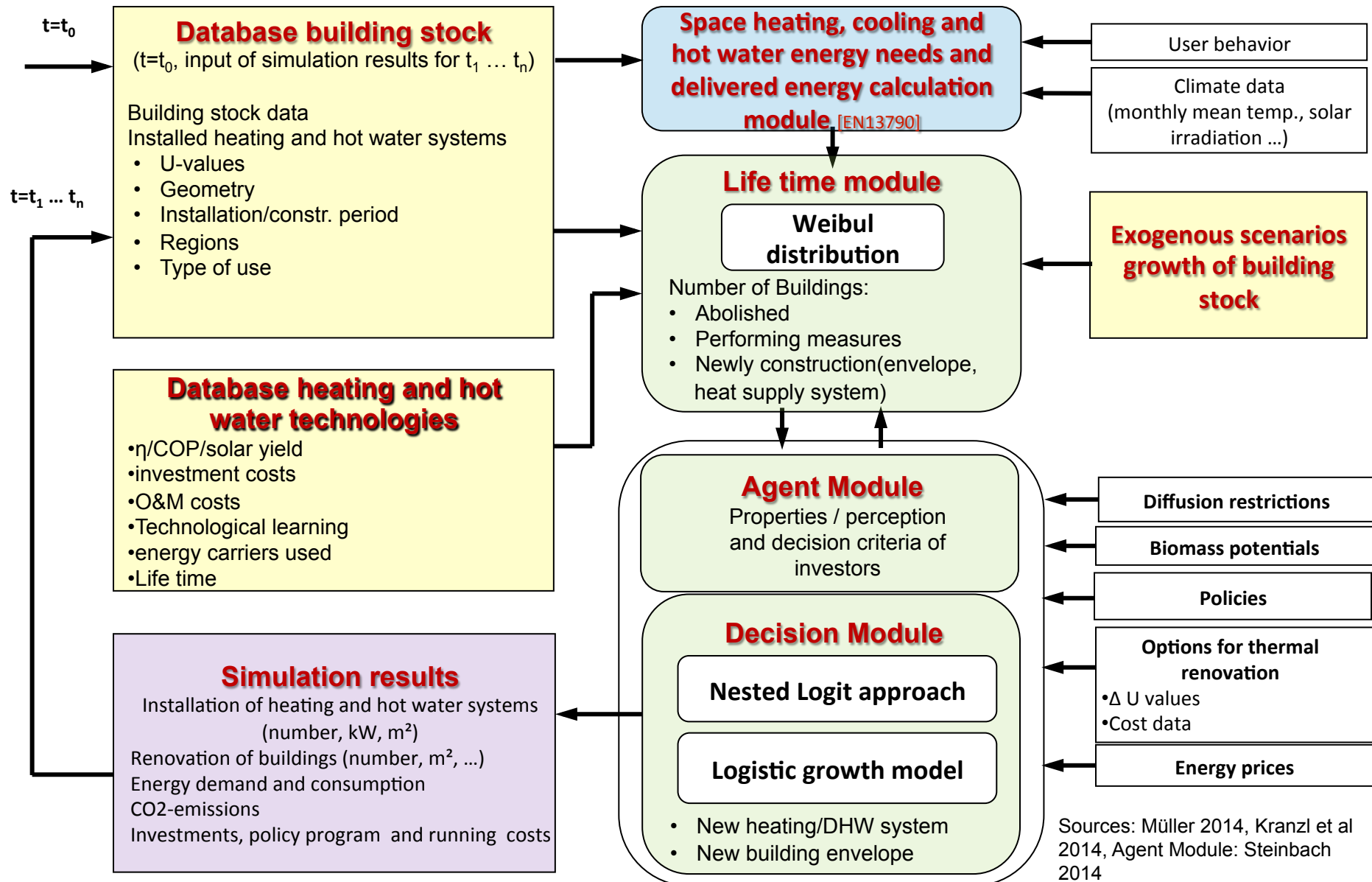
Project background and framework

✓ Policies to ENforce the TRAnsition to Nearly Zero-Energy buildings in Europe (IEE-Project)

✓ Study evaluating the current energy efficiency policy framework in the EU and providing orientation on policy options for realising the cost-effective energy-efficiency/saving potential until 2020 and beyond

➢ Nearly Zero-Energy Building Strategy 2020

➢ Mapping and analyses of the current and future (2020-2030) heating/cooling fuel deployment

Approach in the project ENTRANZE

✓ **Assessment of current policy status:** existing policies and regulations, implementation of cost-optimality and nZEB, support economic programs, cross-countries analysis

✓ **Database of the building stock in the EU-28:** no. of buildings by type and age, energy consumption by dwelling type and by energy carriers, occupancy etc.

✓ **Assessment of market costs** for technology, materials, workforce, taxes and fees

✓ **Development of policy sets for moving towards nZEB** in close cooperation with policy makers in AT, BG, CZ, DE, ES, FI, FR, IT, RO

✓ **Modelling of scenarios regarding the impact of policies. Policy recommendations for moving to nZEB**

General approach for design of policy scenario

➢ Policy scenario 1: oriented on current policies remaining constant until 2030 or planned policies

➢ Policy scenario 2: Innovative policy sets with moderat ambition

➢ Policy scenario 3: Innovative policy sets with higher ambition

➢ *Country specific design and selection of policies according to discussion with policy makers!*

➢ Each policy scenario modelled under high and low energy price scenarios => six scenarios

Modell Invert/EE-Lab

t=t_0

Database building stock

(t=t_0, input of simulation results for t_1 … t_n)
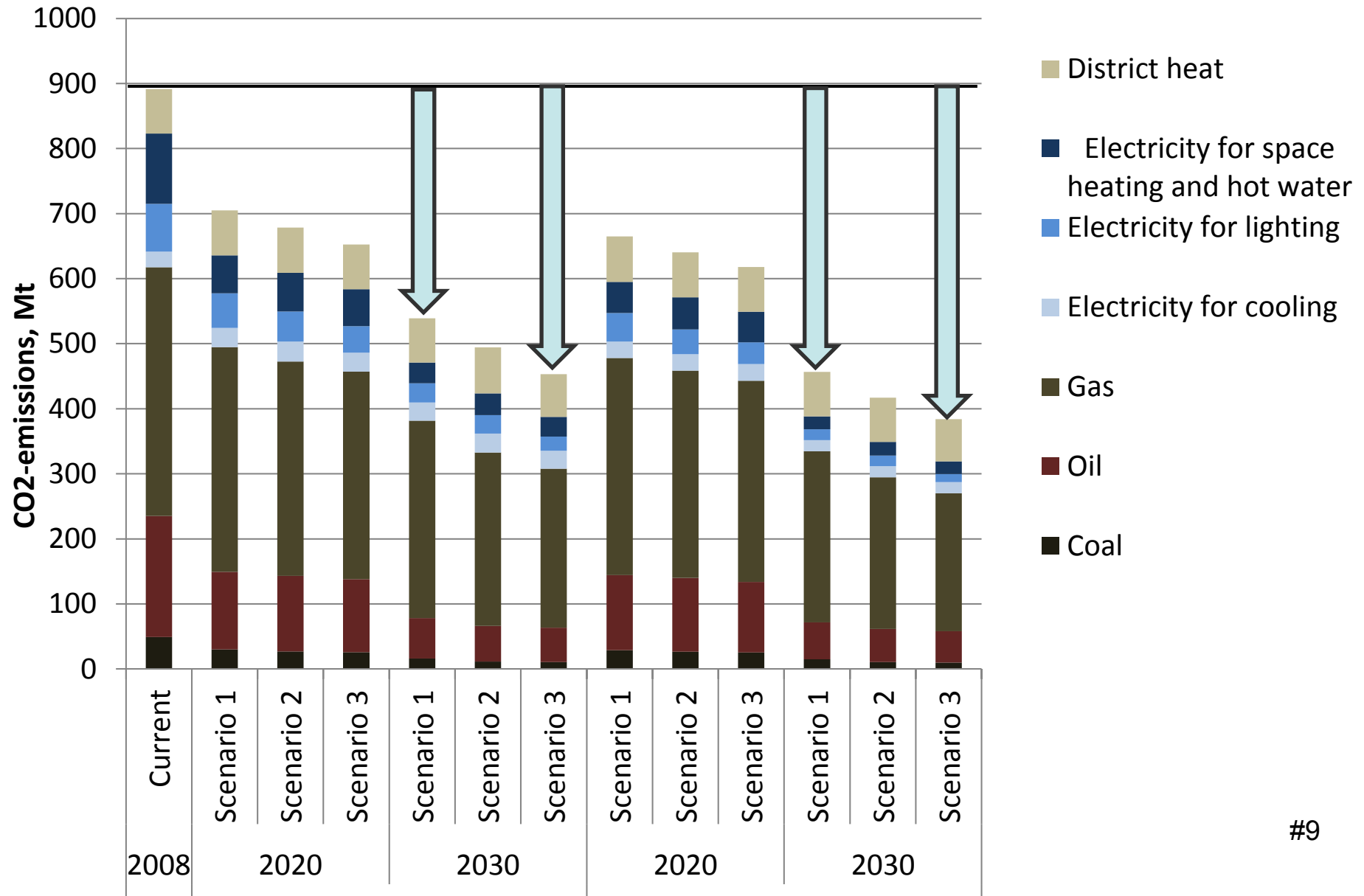
Building stock data
Installed heating and hot water systems
- U-values
- Geometry
- Installation/constr. period
- Regions
- Type of use

t=t_1 … t_n

Database heating and hot water technologies
- η/COP/solar yield
- investment costs
- O&M costs
- Technological learning
- energy carriers used
- Life time

Space heating, cooling and hot water energy needs and delivered energy calculation module [EN13790]

User behavior

Climate data
(monthly mean temp., solar irradiation …)

Life time module

Weibul distribution

Number of Buildings:
- Abolished
- Performing measures
- Newly construction(envelope, heat supply system)

Exogenous scenarios growth of building stock

Agent Module
Properties / perception and decision criteria of investors

Diffusion restrictions

Biomass potentials

Policies

Decision Module

Nested Logit approach

Logistic growth model

- New heating/DHW system
- New building envelope

Options for thermal renovation
- Δ U values
- Cost data

Energy prices

Simulation results
Installation of heating and hot water systems (number, kW, m²)
Renovation of buildings (number, m², …)
Energy demand and consumption
CO_2-emissions
Investments, policy program and running costs

Sources: Müller 2014, Kranzl et al 2014, Agent Module: Steinbach 2014

High reductions in energy demand and CO_2-emissions are achievable in the building stock

Final energy demand in policy scenarios, EU-28
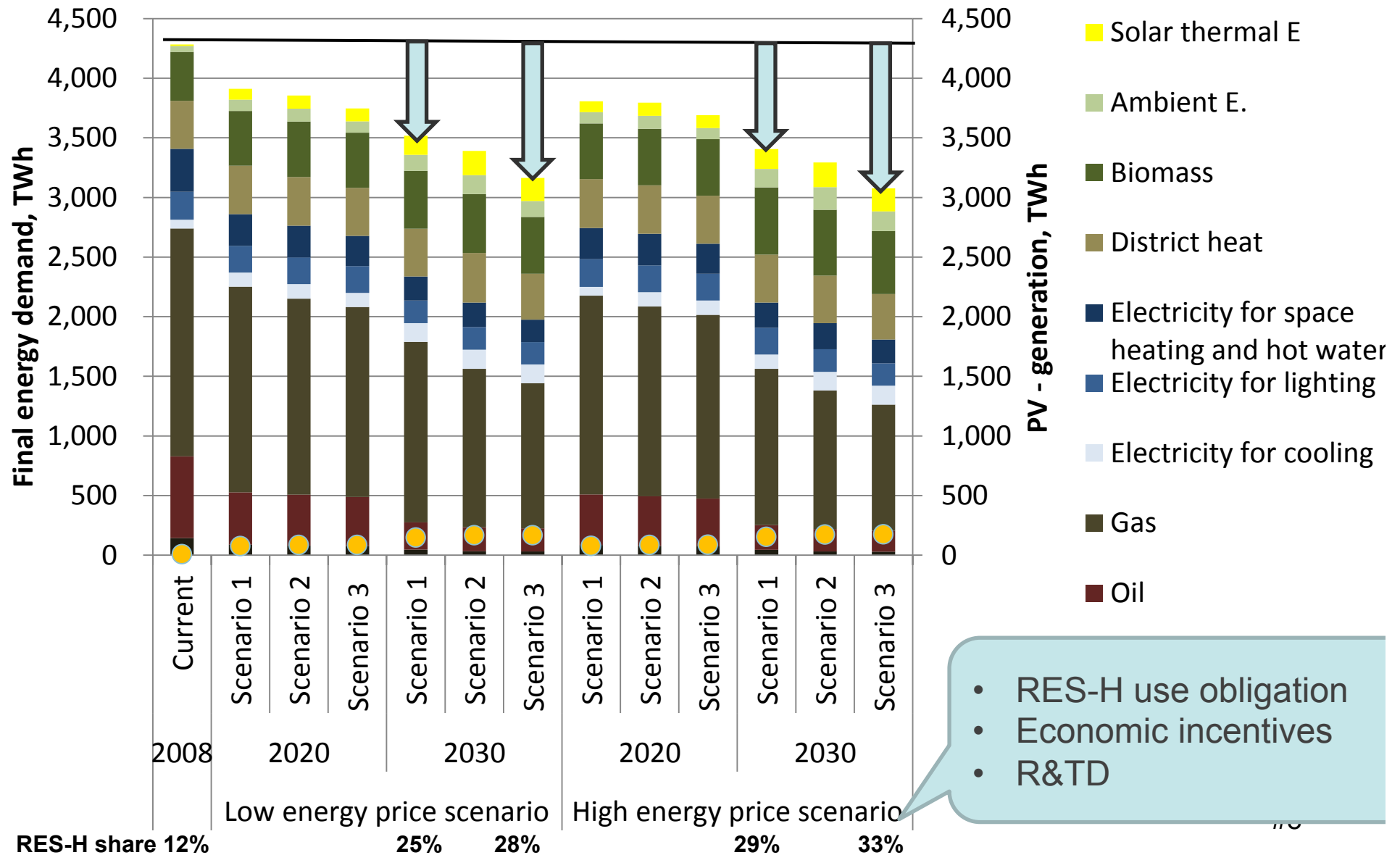
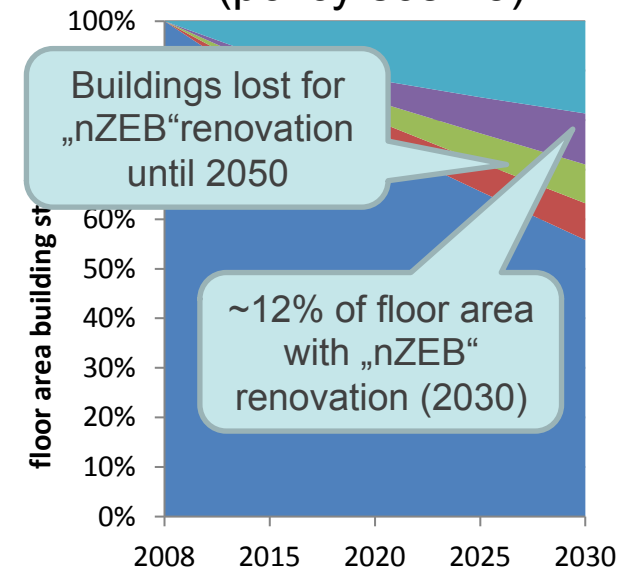- RES-H use obligation
- Economic incentives
- R&TD

CO_2-emissions in policy scenarios, EU-28

#9

Relevance of deep renovation

Low policy intensity (policy scen 1)
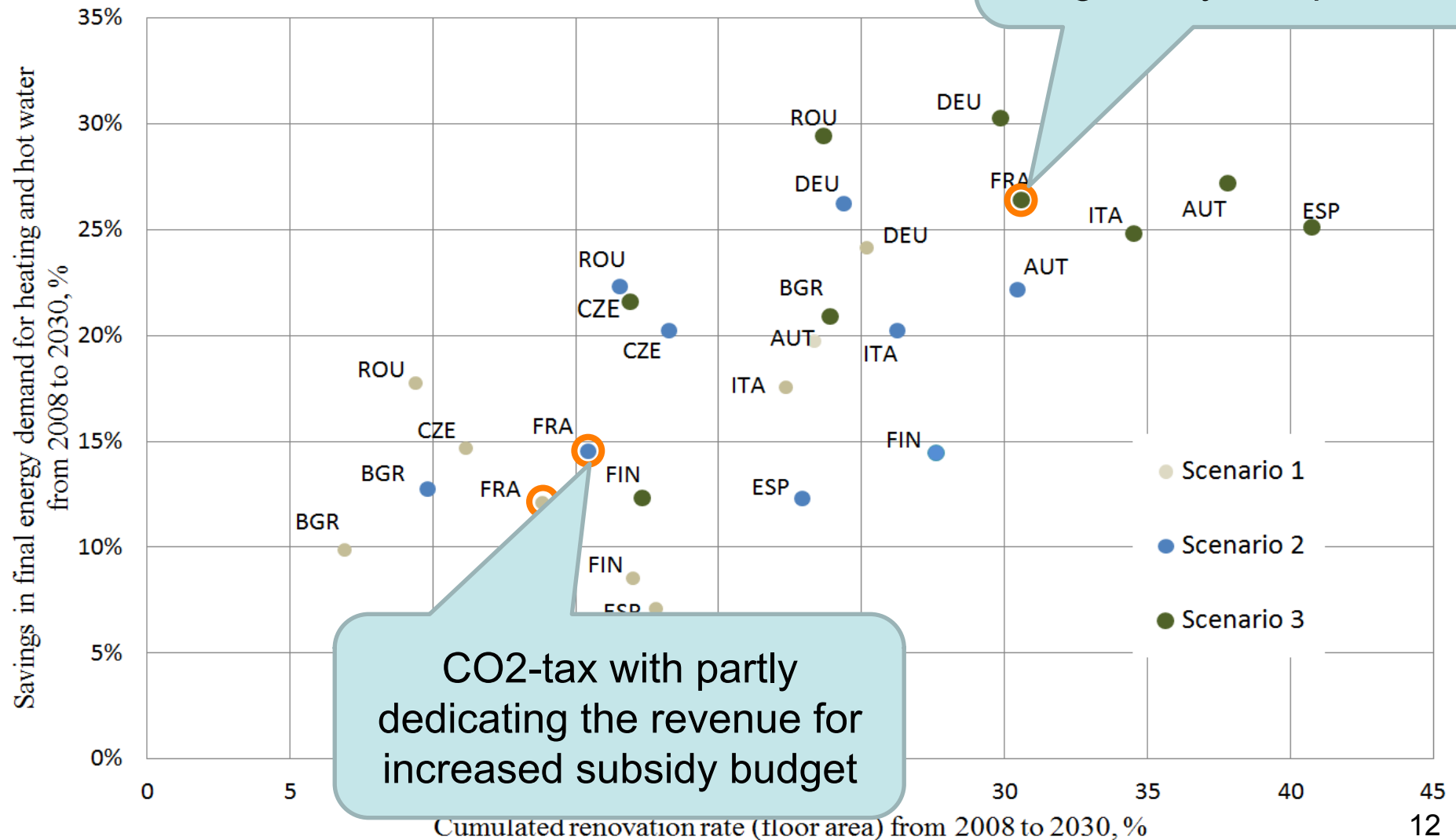
High policy intensity (policy scen 3)

Floor area

- new buildings (after 2008)
- "nZEB renovation"
- Good renovation
- Standard renovation
- building stock withou thermal improvemen

~5% of floor area with „nZEB" renovation (2030)

Buildings lost for „nZEB"renovation until 2050

~12% of floor area with „nZEB" renovation (2030)

Energy demand

Energy demand reduction 2008-2030: 20%

Energy demand reduction 2008-2030: 32%
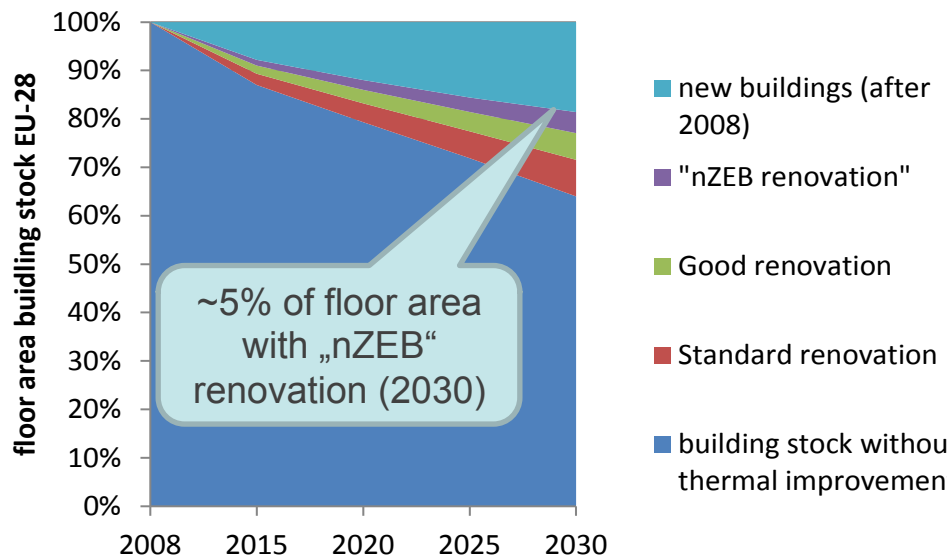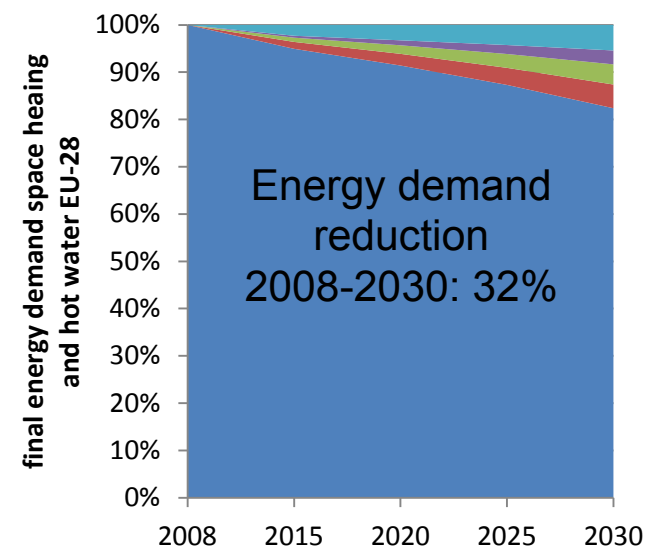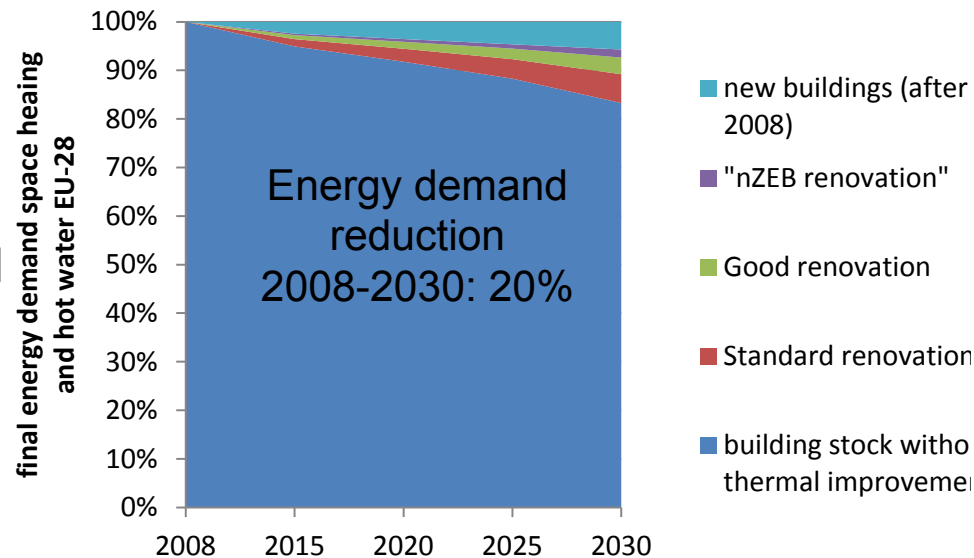
Public expenses and savings:
Selected country results

Public ex... — Ambitious ...packag... regulat... / Increasing compliance with building codes for renovation / CO2-tax with partly dedicating the revenue for increased subsidy budget

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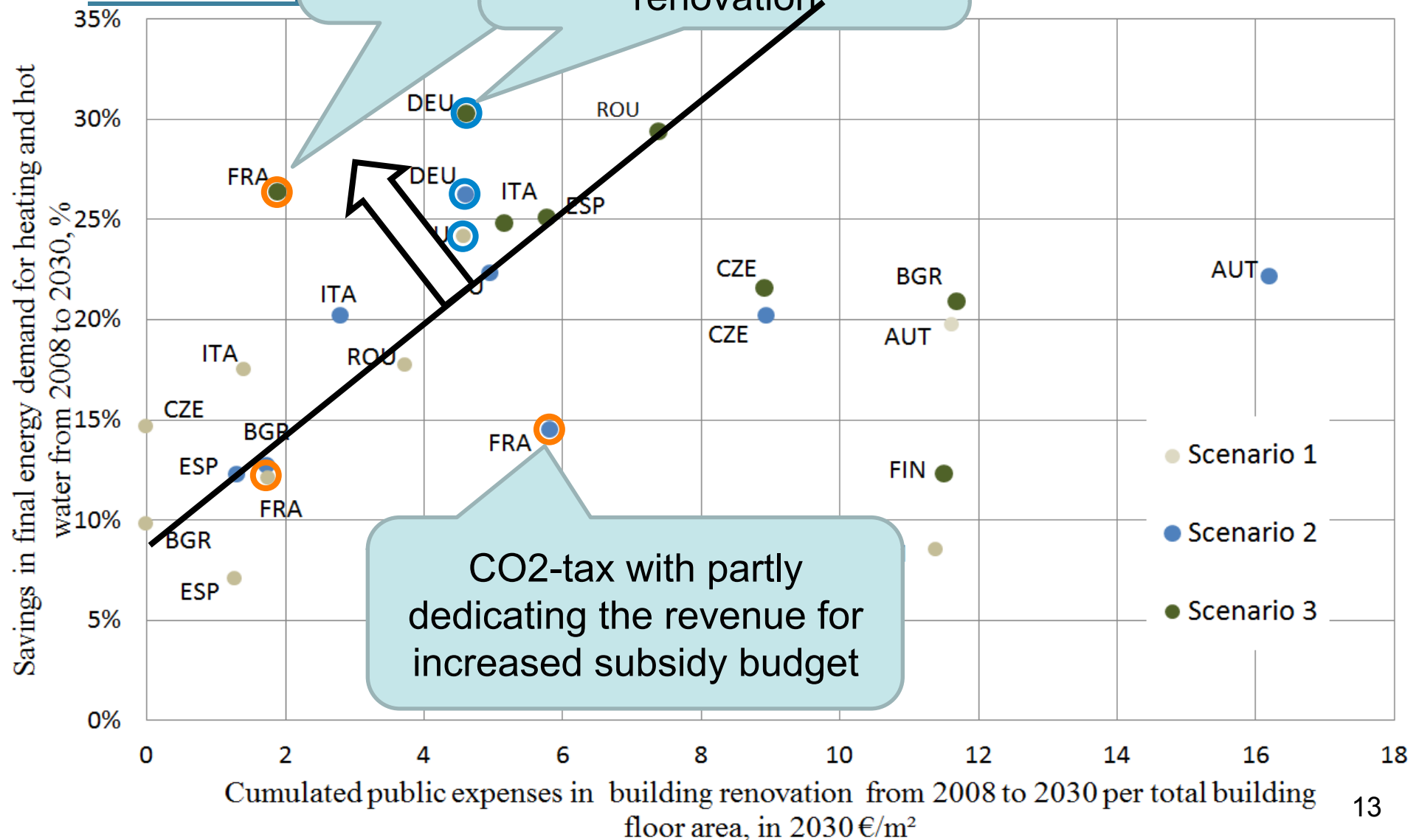
Conclusions

1. Policy packages are required

Conclusions (1)

Regulatory instruments (incl. compliance)

Economic incentives alone are not able to achieve high policy ambition levels. At least a minimum of regulatory instruments is also required.

Economic incentives

R&TD, training, qualification

➢ *Open question: where is an „optimum" mix of regulatory and economic instruments? How to address public acceptance of regulatory measures?*

# 2. Behaviour, rebound effects and comfort gains are crucial.

Conclusions (2)

➢ Rebound effects partly offset efficiency gains (this is what we already know for quite some time …)

➢ Differences regarding current comfort levels (and thus the potential rebound effect) is very different in different countries across Europe.

➢ *Open question: How will comfort gains, associated benefits and expected rebound effects will influence future development of energy demand under different climatic, economic and cultural conditions?*

**2. Avoid lock-in effects due to current policy framework.
Create an ambitious, effective policy culture for deep renovation.**

Conclusions (2)

- Even „high policy intensity" scenarios in ENTRANZE show high lock-in effects (since they are the result of in depth discussion processes).

- Yet, we do not even know the risk of lock-in effects. We need to know more about the current market status of nZEB (and „deep/ major/nZEB" renovation).

- *How to monitor nZEB market activities (in a harmonised way across Europe)?*
  (www.zebra2020.eu)

- *How to define nZEB and nZEB/deep renovation for such monitoring?*

- *How to close the gap between scientifically based requirements for deep renovation and real life barriers in policy making processes?*
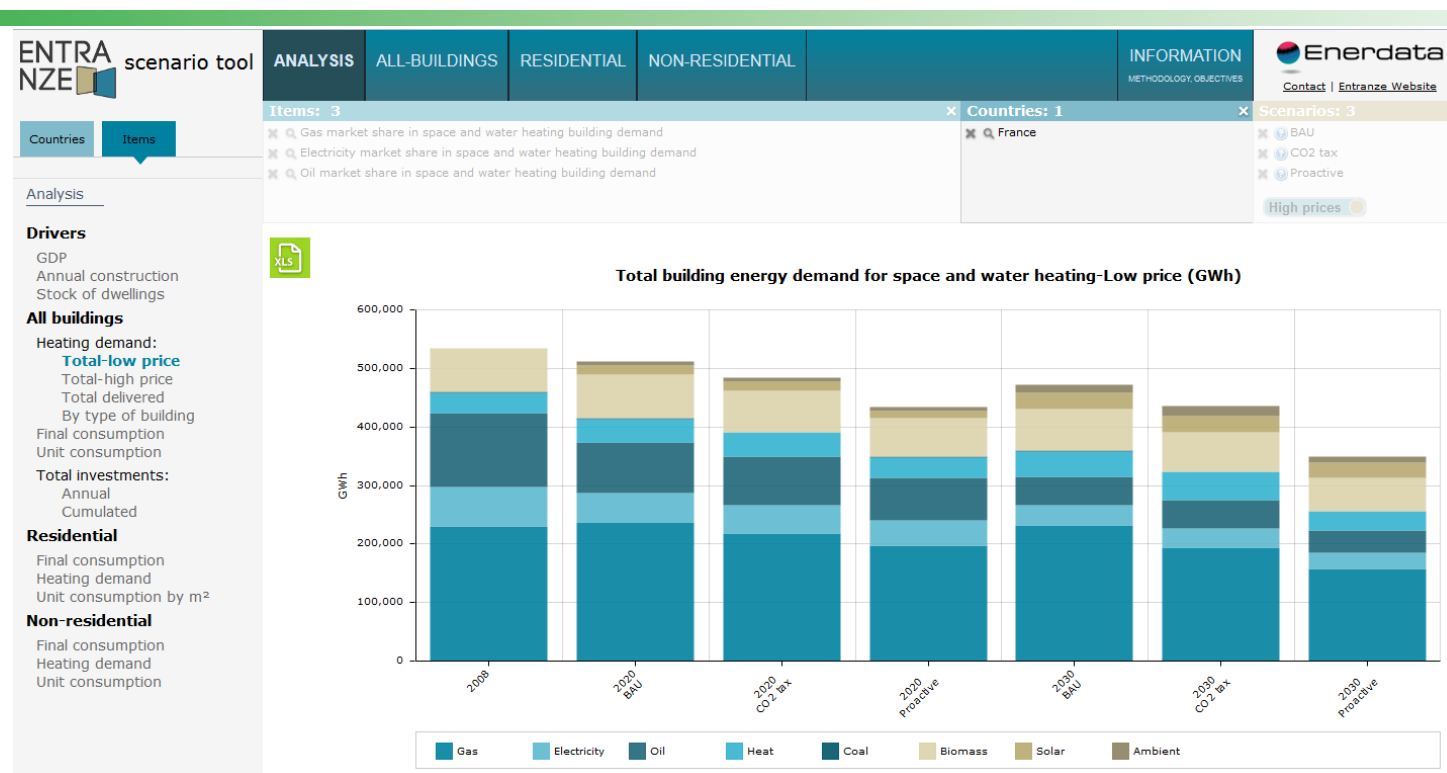
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