Implementing Energy Efficiency First:
Lessons learnt from pilot cases – session 2

5 November 2026 | Online

Joint workshop with the Energy Community Secretariat

Co-funded by the European Union under project n°101120880. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Commission or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

Today's agenda

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National energy planning through the EE1st lens: findings from a review of five countries	Diana Süsser (IEECP)
Embedding EE1st in SECAPs, from planning to action: findings of the Italian pilot case	Patrizia Pistochini (ENEA)
Implementing EE1st in Transport Planning: findings from the Greek pilot case	Christos Tourkolias (CRES)
Plugging Energy Efficiency First into Building Renovation Subsidies: finding from the Polish pilot case	Hanna Pilzak (KAPE)
Quick tour of ENEFIRST Plus' resources	Şirin Alibaş (Fraunhofer ISI)
Take away's from the lessons learnt in ENEFIRST+	Jean-Sébastien Broc (IEECP)

Implementing EE1st in 3 points:

1) **How the discussion is framed**
   ✓ broadening the range of options considered + interactions

2) **How options are assessed / compared**
   ✓ broadening the scope of impacts considered + viewpoint and time perspective

3) **How the decision is made & justified**
   ✓ transparency + prioritizing what is most beneficial to society

ENEFIRST+ approach = building on stakeholders' practices and existing processes → **plug EE1st in**

Project Objectives

1

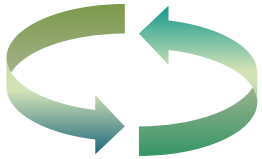
Provide public authorities and other stakeholders with **hands-on resources to implement EE1st**



2

Demonstrate how EE1st can be implemented with **pilot cases in 4 countries**





3

Provide **learning cycles** for knowledge and resources on EE1st



4

Grow a **community of practice**, increase stakeholders' **knowledge and capacities**, and maintain an open forum for practical discussions about EE1st



Pillar 1: Resources

Plug-ins | ENEFIRST+ supports policymakers and stakeholders with key resources for cost-benefit analysis, energy planning and policy incentives

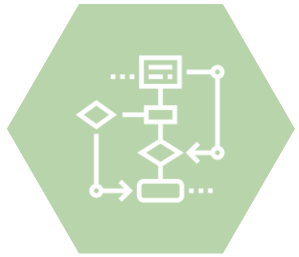
Fraunhofer ISI

RAP REGULATORY ASSISTANCE PROJECT

IEECP INSTITUTE FOR EUROPEAN ENERGY AND CLIMATE POLICY

Cost-benefit analysis

- CBA Guidebook
- CBA Excel Tool



Energy planning

- EE1st Solutions Catalogue
- EE1st Energy Planning Infographics



Policy incentives

- Bill Explainer
- Map of Electricity Tariffs

Pillar 2: 8 Pilot cases in 4 countries

TODAY

	1st round	2nd round
 **Croatia** EIHP ENERGY INSTITUTE HRVOJE POŽAR	EE1st in **transmission grid** planning	EE1st in **NECP / national energy planning**
 **Greece** ΚΑΠΕ CRES	EE1st in **heating & cooling plan**	EE1st in **transport measures**
 **Italy** ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development	EE1st in **SECAPs**	EE1st in **SECAPs** (extended case)
 **Poland** KAPE	EE1st through **demand-response** among **small end-users**	EE1st in **financial incentives**

https://ee1st.eu/resources/first-set-of-four-enefirst-plus-pilot-cases-now-available/

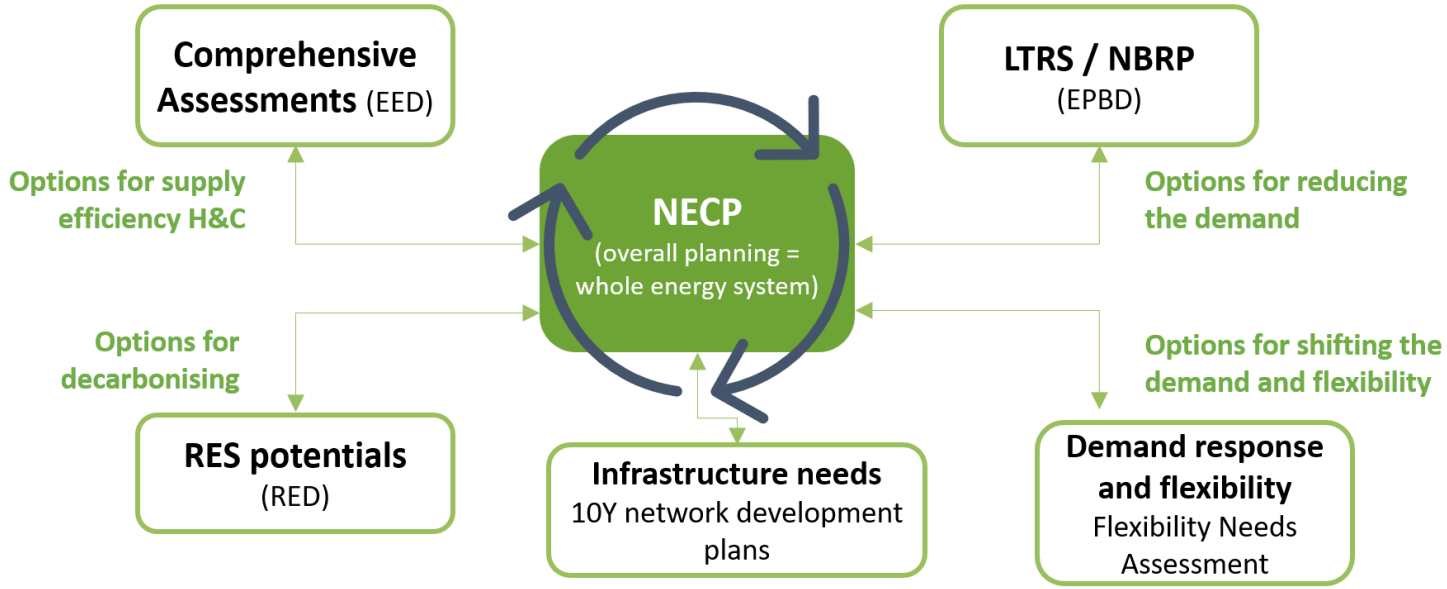
https://ee1st.eu/resources/the-8-enefirst-pilot-cases-at-a-glance/

Embedding EE1st in **national energy planning:** findings from the Croatian pilot case

Vesna Bukarica



Embedding EE1st in National Energy Planning



- How is EE1st embedded in the NECP modelling?
- How do sectoral plans inherit NECP assumptions?
- Do their results feed back into the NECP?

Embedding EE1st in National Energy Planning

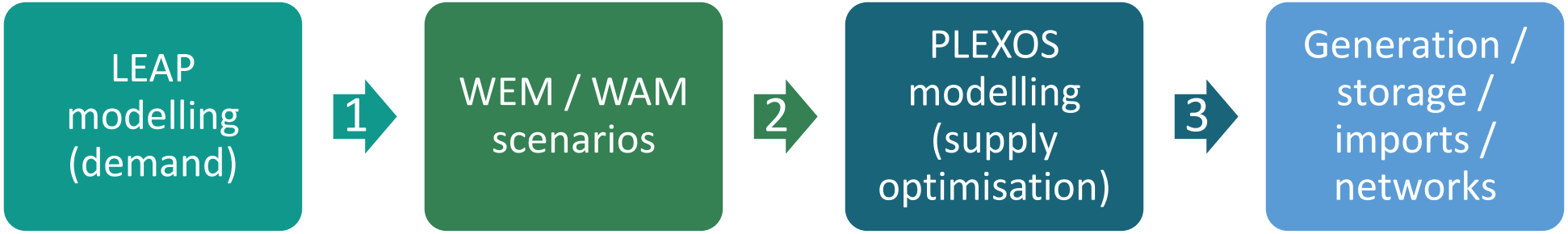
Croatian NECP: EE explicitly embedded in demand modelling



- EE1st is applied in modelling energy needs in each consumption sector
  - E.g. in buildings, efficiency is considered before new heating/cooling technologies and fuel switching
- LEAP modelling tool used
  - bottom-up/end-use modelling
  - allows interactions between policies and measures to be represented

Embedding EE1st in National Energy Planning

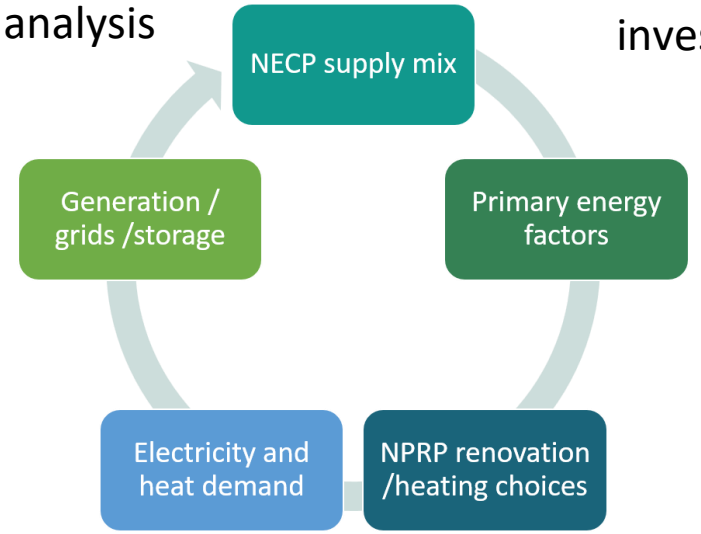
Croatian NECP: Modelling chain is sequential



- Networked energy systems are optimised according to minimum system cost once energy needs have been determined
- WEM/WAM demand trajectories are inputs to the subsequent system optimisation rather than endogenous demand-side resources competing directly with generation/network options
- **EE1st is present in scenario construction — but full integrated demand – supply optimisation is not demonstrated**

Moving downwards in planning hierarchy

- **Comprehensive H&C Assessment**
- Explicitly takes NECP projections as its baseline
- But then it:
  - identifies technical potential
  - compares alternatives
  - performs financial and economic CBA
  - distinguishes investor and societal perspectives
  - performs sensitivity analysis

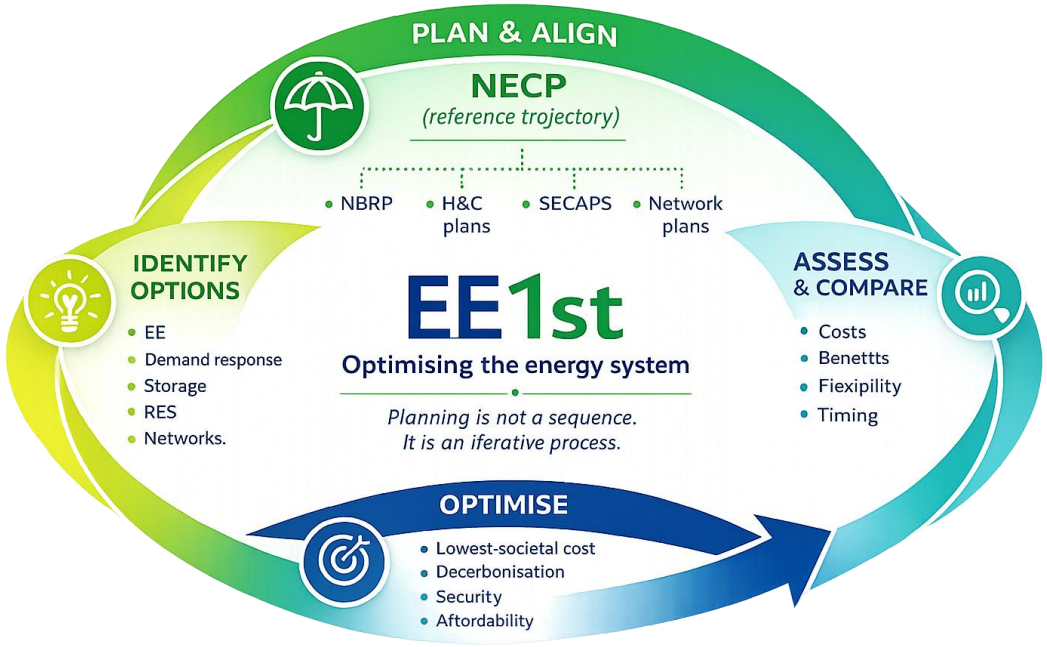


- **NBRP**
- Explicitly builds on the NECP and the H&C Assessment
- Its future final-energy projections come from the NECP, while primary energy is calculated using primary-energy factors
- For residential buildings it develops an optimal scenario, favouring the best ratio between investment cost and primary-energy reduction

The subordinate plans perform more detailed optimisation than the umbrella plan

Embedding EE1st in National Energy Planning

Main conclusions: connect the dots!



Sectoral optimisation to be used for refining NECP assumptions:

- NBRP may change electricity demand
- H&C CBA may change heating technology choices
- TYNDP may reveal network costs or constraints
- those results should feed back into the next national optimisation cycle

- Each process answers a different part of the EE1st question
- The issue is not lack of modelling capacity or clarity
- The missing element: **feedback and iteration**

National energy planning through the EE1st lens: findings from a review of five countries

Diana Süsser

MOTIVATION

Does efficiency enter the plan while choices are still open?

National energy planning sets the frame for every other planning instrument that follows. Our question: does EE1st shape that frame during the modelling and scenario-building itself — not only in the surrounding policy text?

WHAT WE DID

Reviewed NECPs (and supporting technical annexes) across five countries — Croatia, Greece, Italy, Poland, Germany — as a comparison case. France still to come.

WHY IT MATTERS FOR THE ENERGY COMMUNITY

Contracting Parties are developing their own national energy and climate plans, drawing on the EU's planning and governance framework.

The comparative findings that follow are a mirror for that process — not a ranking of countries.

CONCEPTS

What do models and scenarios actually do?

MODEL

A simplified mathematical representation of an (energy) system, run on a computer — deliberately less detailed than reality so it stays usable.

SCENARIO

A structured set of assumptions describing one possible future — a tool for exploring options, not a prediction.

Models and scenarios can inform decisions — or justify ones already made.
In practice, often both.

OUR LENS

Four questions guiding the analysis

1 Demand modelling

How is the evolution of energy demand assessed and modelled?

2 Supply–demand links

How are interactions between supply- and demand-side options considered within that modelling?

3 Multiple impacts

Whether and how multiple impacts are considered in the scenarios?

4 Stakeholder exchange

Whether and how experts and stakeholders from different sectors are organised around it?

How demand is modelled — and whether EE1st shapes it

MODELLING APPROACH

All five countries link demand to supply through some form of staged architecture — but who computes demand, and how, differs.

Poland

STEAM-PL uses market-share/logit substitution — demand shifts as relative prices change.

Greece & Italy

Demand is computed inside the same optimisation as supply — technology choice and generation mix are selected jointly.

EE1ST IN THE MODELLING LOGIC

Countries differ in whether EE1st shapes the scenario-construction process itself — or appears mainly in the surrounding legal text.

Example · Greece

Embeds EE1st as an explicit priority order inside its cost-optimisation model: savings first, then renewables, before other supply options.

Clearest case found of EE1st as a modelling rule rather than a narrative.

A staged architecture links demand and supply — with one exception

All five countries link demand and supply through some form of staged model architecture. Complexity differs, as does how visibly this is documented in the NECP itself.

Example · Poland

Poland's five-model chain includes an independent capacity check by the grid operator (PSE) that caught a shortfall the core model had missed — the only case of one national model verifying another.

Macroeconomic impacts are standard — health and environment rarely are

All five NECPs include a macroeconomic/social impact assessment, typically via input–output analysis — but scope varies. Most focus on GDP and employment; health and environmental effects are rarely quantified.

Example · Germany

Quantifies air-pollutant health co-benefits alongside GDP and employment effects, and flags land-use trade-offs from renewables deployment.

What is your experience assessing multiple benefits — and what role do they actually play in the scenarios?

Five countries, five different models of exchange

Croatia

Multilevel Climate & Energy Dialogue platform — broad, but its link to the scenario work is unclear.

Greece

Statutory Interministerial Committee with explicit authority over methodology — the most formalised link found.

Italy

A standing Technical Working Group acts as a shared cost/technology database feeding the model.

Poland

Most consultation-heavy by volume (128 stakeholders, 4,000+ comments) — organised ad hoc, not as a standing body.

Germany

Dense but fragmented: several parallel platforms, no single body with NECP-wide scenario authority.

WHY IT MATTERS

Stakeholders shape the modelling, not just receive it

Research on the model–policy relationship finds influence runs both ways: policymakers do not only receive scenario results — they can steer assumptions and set the question a study is asked to answer.

WHY THIS MATTERS FOR THE ENERGY COMMUNITY

Where TSOs, regulators and ministries sit in the scenario-building process — commissioning studies, agreeing assumptions, or only reviewing results afterwards — shapes whether EE1st has real room to compete with supply-side options, not just whether it's mentioned in the plan.

Do you participate in modelling processes? (How) do you use the modelling results?

TAKEAWAY

Integration — not just mention — decides how much room efficiency gets

Countries that compute demand inside the same optimisation as supply (Greece, Italy) let efficiency compete with supply options on equal footing. Countries that treat demand as a fixed input to a separate supply model (Croatia) don't show that competition happening at all.

And whether experts and stakeholders are brought in while assumptions are still open — or only once results are ready — decides whether that competition is actually negotiated, or just presented as a fait accompli.

Embedding EE1st in **SECAPs**, from planning to action: findings of the Italian pilot case

Patrizia Pistochini and Fabio Cignini

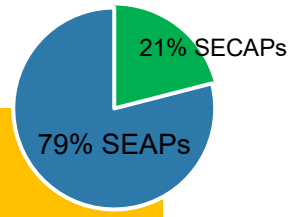


Italian National Agency for New Technologies, Energy and Sustainable Economic Development

The Italian Pilot Case on SECAPs

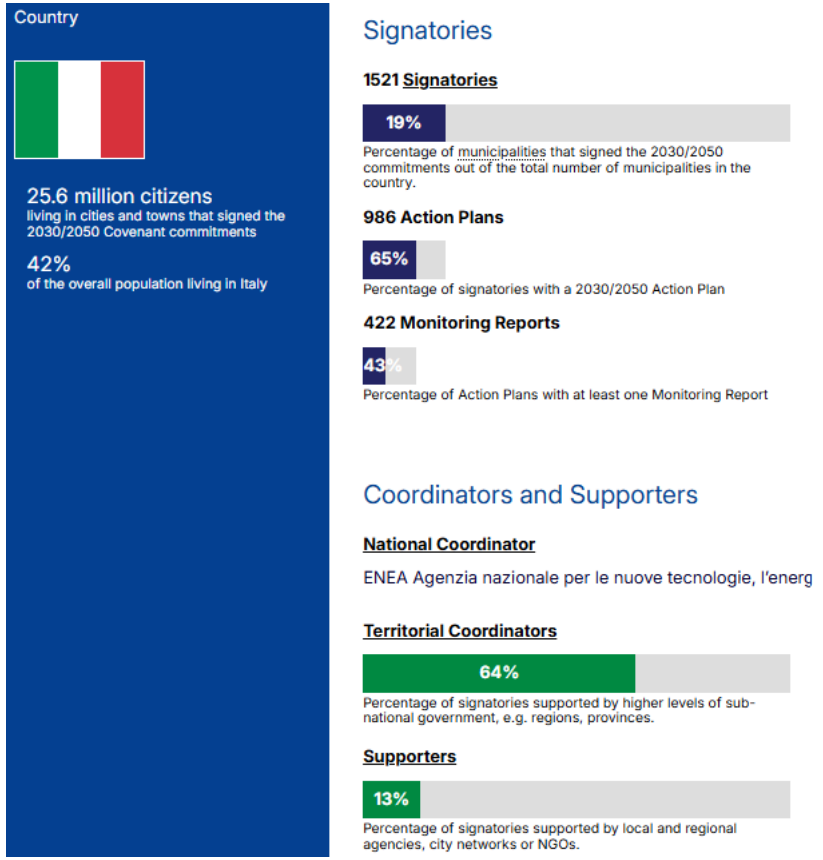
The EU CoM at the heart of multilevel governance in Italy" by the Covenant National Coordination Board

Covenant of Mayors
Committed to local sustainable energy



- **11,227** Total Covenant Signatories
- **46%** Italian Signatories within the EU-27
- **8,246** EU-27 Signatories with a SEAP/SECAP
- **42%** Italian Signatories with a SEAP/SECAP within the EU-27

90% individual | **6%** Signatories committing individually (joint SEAP - option 1) **4%** committing collectively (joint SEAP - option 2)
MyCovenant reporting platform, Joint Research Centre (JRC) [Dataset ID 7th Release - January 2026] – issued Oct '26



The Italian CoM-munity

ENEA, National Coordinator since 2013

ISPRA, Partner since 2011

RENAEL, Supporter since 2021

Area covered: National

Key figures

- Climate and energy ambition and objectives (2030 and 2050): **1500 Signatories signed the 2030/2050 Covenant commitments**, representing 19% of all Italian municipalities and covering 42% of Italy's population (25.4 million citizens)
- **955 Action Plans submitted** with 2030/2050 commitments
- 64% signatories supported by CTCs
- 13% signatories supported by Supporters
- Several regions/provinces (Piemonte, Veneto, Sicily, Friuli Venezia Giulia, Marche, Abruzzo and Sardinia, Apulia, Emilia Romagna) have established technical support and financing schemes to support municipalities to develop their Sustainable Energy and Climate Action Plans (SECAP)

Italy - Phase 1: Embedding EE1st into SECAPs

Objectives

- Assess whether and how far the Energy Efficiency First (EE1st) principle is already embedded in Sustainable Energy and Climate Action Plans (SECAPs)
- Examine the weight given to energy efficiency and demand-side resources, and the criteria used to select and prioritise actions
- Develop a transparent, replicable methodology to assess SECAPs' alignment with EE1st
- Identify practical ways to strengthen EE1st in SECAP preparation, implementation, revision and monitoring

Methodology

- Representative Italian SECAPs reviewed; selected actions assessed through a multidimensional approach (MDA)
- Five MDA dimensions: Energy, Financial, Regulatory, Awareness, Energy poverty
- Keywords and indicators identify the prevailing EE1st dimension and test completeness and balance
- The municipality of Naples is the main application case

COMUNE DI NAPOLI

Italy - Phase 2: From Plans to Good Practices

Objectives

- Translate EE1st into operational terms for selecting and describing SECAP actions, and define what makes a good practice detectable
- Identify the organisational, informational and managerial conditions needed to move from planning to implementation

A good practice is defined by 4 elements

Specificity

Objectives, target groups, activities and responsibilities clearly defined, not generic

Feasibility

Resources, governance, costs, financing and timelines compatible with implementation

Measurability

Indicators quantify savings, avoided CO_2, beneficiaries, progress, barriers and risks

Consistency with EE1st

Demand reduction and efficiency take priority over new generation or infrastructure

Lessons Learnt from the Italian Pilot Case

The Italian pilot cases show that the Energy Efficiency First (EE1st) principle becomes effective when it moves from a policy concept to a practical governance and decision-making approach.

Sustainable Energy and Climate Action Plans (SECAPs) under the Covenant of Mayors are voluntary planning instruments. **Their value therefore depends not only on the quality of the plans themselves, but also on the ability of municipalities to implement, monitor and continuously improve the actions they contain.**

The Italian experience highlights three main lessons:

1 EE1st should be embedded throughout the SECAP cycle.

Energy efficiency is already a significant component of many Italian SECAPs, even when the EE1st principle is not explicitly mentioned. The pilot demonstrates that the principle can provide a common framework for decision-making across the different stages of the SECAP—from planning and action selection to implementation, monitoring and revision. This is consistent with the JRC Guidelines, which recognise the application of EE1st across the different phases of SECAP implementation.

2 Good implementation starts with good data and organisation.

Fragmented energy data, unclear responsibilities and limited technical capacity can undermine the effectiveness of local energy actions. A key lesson from the peer-learning process is therefore that "the first form of energy efficiency is organisational efficiency." Reliable data, stable technical capacity and clear responsibilities are essential for turning planned measures into measurable energy savings.

3 Monitoring is essential to give value to voluntary climate action.

In the Italian context, monitoring is particularly important because it provides evidence of whether voluntary commitments are translating into actual results. Actions should therefore be designed from the outset to be specific, feasible, and measurable, with clear indicators, responsibilities, timelines and monitoring arrangements and consistent with EE1st.

This makes progress verifiable and allows municipalities to learn, adjust their actions and strengthen the next planning cycle.

Implementing EE1st in **Transport Planning**: findings from the Greek pilot case

Christos Tourkolias

Integrating EE1st in the transport sector Overview

16	5	8	1
transportation measures assessed	cost-effectiveness indicators	methodological steps	national-level assessment

Objective

- Identify the most effective strategies and policies for promoting sustainable and energy efficient transport to combat transport poverty and transport vulnerability across all administrative levels (national, regional, municipal) through the systematic application of the Energy Efficiency First (EE1st) principle.

Contribution of EE1st on transport decisions

- Comparing different transport options (e.g. electromobility vs. conventional fuels) with a medium- term or long-term perspective towards decarbonization.
- Avoiding stranded assets by evaluating whether conventional fuel infrastructure is cost-effective.
- Applying a transparent methodology based on the evaluation of different cost-effective indicators to ensure that the most energy-efficient transport solutions are prioritized.
- Integrating positive and negative externalities into the analysis.

Integrating EE1st in the transport sector
Methodological approach

Step I: Specification of the **geographical and system boundaries** and other parameters of the analysis

Step II: Identification of **different transport alternatives** to be assessed through the application of the EE1st principle

Step III: Selection of the **conventional / baseline option** for each transport alternative separately

Step IV: **Quantification and monetization of private costs and benefits**

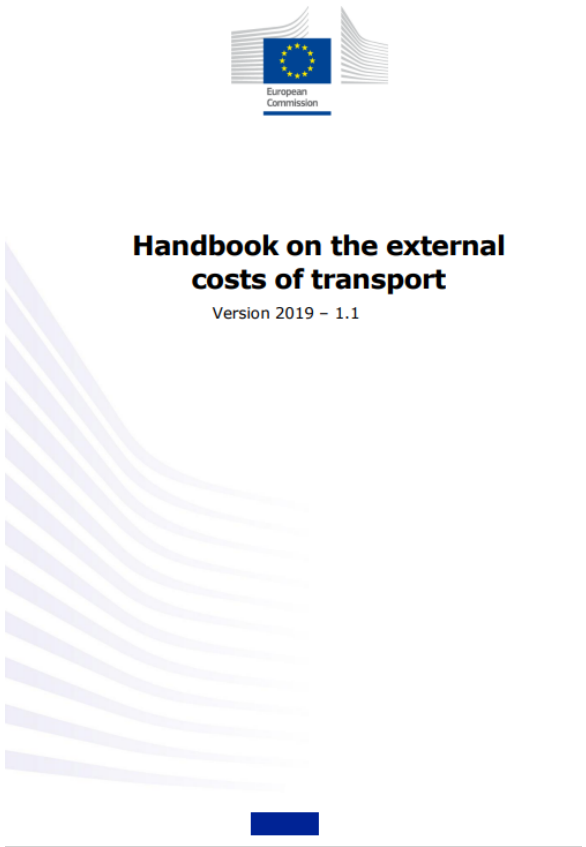
Step V: **Quantification and monetization of external costs and benefits**

Step VI: Calculation of different **cost effectiveness indicators**

Step VII: Conduction of a **sensitivity analysis**

Step VIII: **Ranking of the examined transport alternatives** based on the cost-effectiveness indicators

Integrating EE1st in the transport sector
Utilized external costs and benefits



https://op.europa.eu/en/publication-detail/-/publication/9781f65f-8448-11ea-bf12-01aa75ed71a1/language-en

- Habitat damage
- Well-to-tank emissions
- Noise
- Accidents
- Climate change
- Air pollution
- Congestion

Integrating EE1st in the transport sector
Examined cost effectiveness indicators

Final energy savings	kWh per € of public aid
GHG emission savings	kg CO_2 per € of public aid
Net external benefits	€ per € of public aid
Cost savings	€ per € of public aid
Net total benefits	€ of external benefits + cost savings per € of public aid

Main objective: Maximize each indicator

Integrating EE1st in the transport sector
Calculated cost-effectiveness indicators

Transportation measures	Final energy savings / Public aid (kWh/€)	GHG emission savings / Public aid (kg CO2/€)	Net external benefits / Public aid (€/€)	Cost savings / Public aid (€/€)	Net total benefits / Public aid (€/€)
• Financial incentives to vulnerable microenterprises for buying zero or low emission vehicles (LCVs - N1)	0.938	0.218	0.027	0.021	0.048
• Financial incentives to vulnerable microenterprises for buying zero or low emission vehicles (Cars - M1)	0.568	0.130	-0.009	0.011	0.002
• Financial incentives to vulnerable microenterprises for buying zero or low emission vehicles (Motorcycles)	0.407	0.100	0.015	0.022	0.037
• Financial incentives to vulnerable microenterprises for buying zero or low emission vehicles (Passenger Vehicles - M2)	0.553	0.127	-0.008	0.010	0.002
• Financial incentives to vulnerable microenterprises for buying zero or low emission vehicles (Medium-duty Trucks - N2)	0.391	0.072	0.021	-0.016	0.005
• Financial incentives to vulnerable microenterprises for buying zero or low emission vehicles (Passenger Vehicles - M3)	0.387	0.089	0.000	0.014	0.014
• Financial incentives to vulnerable microenterprises for buying zero or low emission vehicles (Heavy-duty Trucks - N3)	0.516	0.083	0.253	-0.037	0.216
• Financial incentives for purchasing/leasing zero emission taxis (M1 category EV & M1 category EV 6-9 seat Minivans)	1.804	0.408	-0.001	0.026	0.025
• Social Leasing	0.618	0.142	0.000	0.022	0.022
• Modernization of public transport in urban areas with zero-emission buses	0.997	0.247	0.224	0.058	0.282
• ATHENS MOVE+: Municipal Electric Urban Transport Network	0.846	0.217	0.181	0.058	0.239
• School mobility for students with special needs	0.055	0.013	0.012	0.002	0.014
• Athens Metro Rolling Stock	0.944	0.249	0.254	0.073	0.327
• Railway & Metro stations	0.114	0.030	0.031	0.009	0.039
• DRT Regional	0.084	0.022	0.056	0.001	0.057
• Vehicle occupancy (1 passenger) - Car use by potential future DRT users scenario	0.713	0.188	0.274	0.009	0.283

Integrating EE1st in the transport sector
Main results and challenges

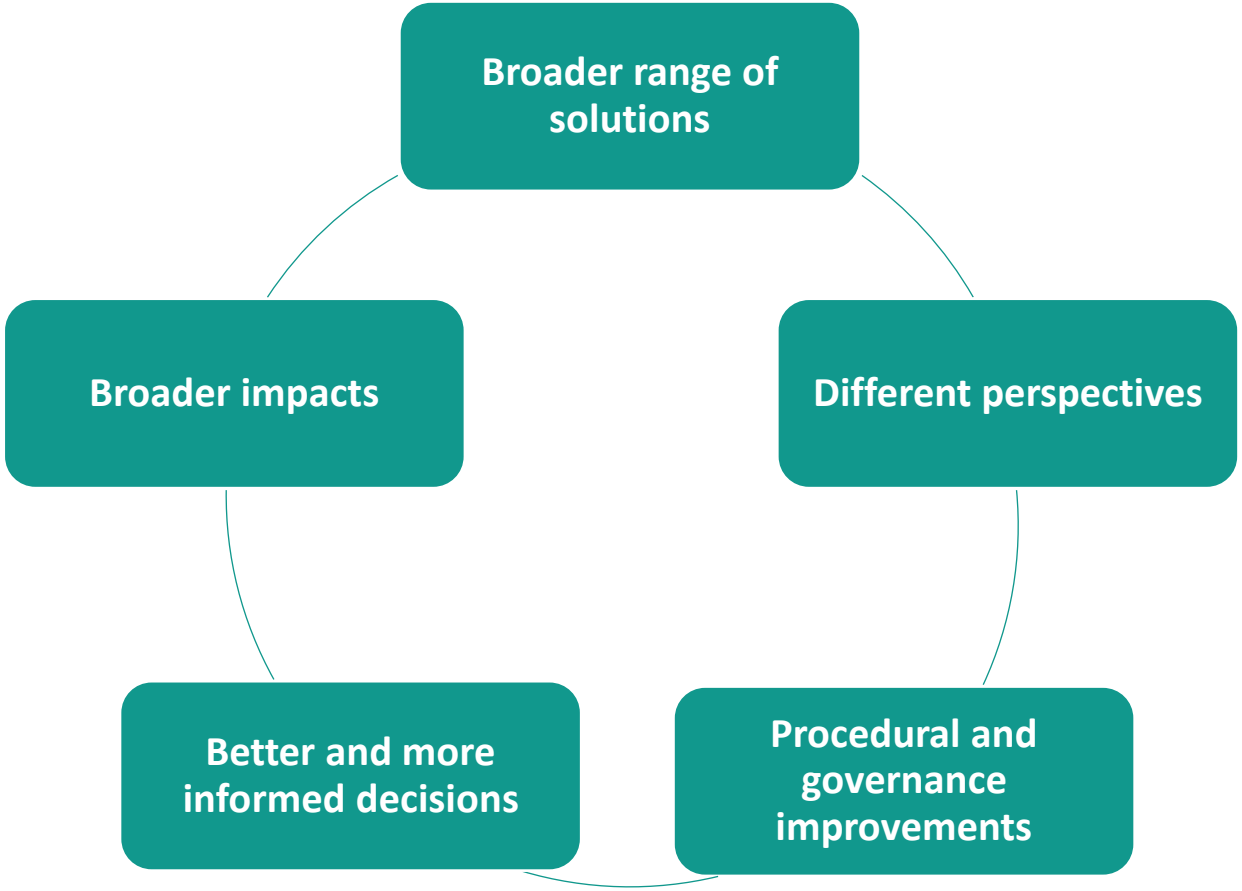
Main results

- All the examined energy-efficiency options in the transport sector **generated positive overall benefits**
- The **ranking** of the examined energy-efficiency options **varies depending on the cost-effectiveness indicator applied**
- The **promotion of public transport generates higher societal benefits** than the promotion of energy-efficient vehicles
- The **promotion of energy-efficient vehicles among microenterprises** appears to be more beneficial than the promotion of energy-efficient vehicles among households
- **No single measure is consistently optimal across all indicators**

Challenges

- Limited availability and quality of transport data
- Quantification of the actual energy savings
- Identification of the baseline options
- Specification of the wider societal impacts at national level
- Addressing behavioural uncertainty considering the implementation of the examined measures

Integrating EE1st in the transport sector
Main conclusions from the application of the EE1st principle



Plugging EE1st into **Building Renovation Subsidies**: finding from the Polish pilot case

Hanna Pilzak and Pawel Gilewski



Plugging EE1st into Building Renovation Subsidies

MAIN OBJECTIVE: Develop and validate a project-quality scoring methodology that complements existing subsidy eligibility rules.

01 Identify gaps

Assess where existing programmes fail to distinguish renovation quality.

02 Build and validate

Design a practical scoring tool and consult financing, consumer and programme experts.

03 Test and recommend

Compare modelled renovation options and propose improvements to funding decisions.

Pilot vehicle: Clean Air (single-family) | Transferability test: FTiR (multi-family)

Methodology: score quality, keep risks visible

Formal eligibility → **Project-quality score** → **Operational recommendation**

TOTAL SCORE (0–100)



40% EE1st	35% Financial accessibility	25% System impact
Useful-energy reduction + life-cycle costs	Energy bills + loan payments relative to income	PV, HRV, EMS / DSR readiness

INDEPENDENT WARNINGS

AUDIT-QUALITY CHECK • ENERGY-POVERTY RISK • FINANCIAL-FEASIBILITY RISK

Results and findings: what the pilot demonstrated

1 Quality differentiation

A quality score adds information beyond formal eligibility.

V. A ~20 | V. B ~72 | V. C ~82

2 Affordability can conflict with quality

The highest-scoring option had the weakest affordability score.

V. C: 82 total / 43 affordability; +PLN 40,000 vs V. B

3 FTiR reveals a policy inconsistency

The weakest energy outcome received the highest effective support.

10% savings / 81% support / ~33 quality score

4 Energy poverty needs a separate warning

For multi-family buildings, assess the share of dwellings above the 10% burden threshold.

Warning based on the distribution, not the median

TAKEAWAY · Reward better performance, keep eligibility and financial safeguards.

Quick tour of **ENEFIRST Plus' resources**

Şirin Alibaş and Tim Mandel

Plug-ins | ENEFIRST+ supports policymakers and stakeholders with key resources for cost-benefit analysis, energy planning and policy incentives

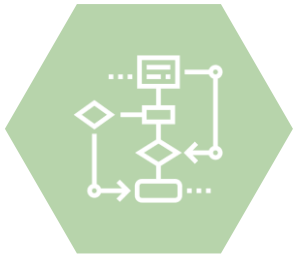
Fraunhofer ISI

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Cost-benefit analysis

- CBA Guidebook
- CBA Excel Tool



Energy planning

- EE1st Solutions Catalogue
- EE1st Energy Planning Infographics



Policy incentives

- Bill Explainer
- Map of Electricity Tariffs

Resources 1/3 | Cost-benefit analysis

Existing resources

- Commission Recommendation (EU) 2026/839
- OECD, ENTSO-E, ENTSOG, Cohesion Policy CBA guidelines

Key gaps

- How exactly should the societal perspective be operationalized?
- How can the multiple benefits of energy efficiency be properly accounted for in a CBA?

1A: **CBA Guidebook**

- Audience: CBA practitioners who want to complement their existing practices with an EE1st lens
- ≈ 60 pages, structured around nine topics that can act as an EE1st-CBA-checklists
- Making it reader-friendly: checklists, key takeaways & summary points, calculation examples

1B: **CBA Excel Tool**

- Calculation example of EE1st-compliant CBA in selected context of local heating and cooling planning
- Benchmark values for technology costs, energy prices, multiple impacts
- (**!**) No modelling tool, but practical illustration of CBA principles that can be transferred to other contexts

https://ee1st.eu/resources/new-ee1st-cost-benefit-guidance-and-excel-tool-now-available/

CBA Guidance | Nine issues that can act as an EE1st-CBA-checklist



1 Consider the full range of energy efficiency solutions

Identify and evaluate all potential efficiency measures across supply, distribution, and end-use, including demand-side flexibility, to fully leverage the EE1st principle.

2 Take into account all relevant costs and benefits

Include all direct, indirect, and external costs and benefits – environmental, social, and economic – to accurately capture the full societal value of efficiency measures.

3 Be clear what you are comparing and use consistent performance metrics

Apply transparent solution sets, such as EE1st options vs. NoEff options, and use consistent performance metrics and scenarios to systematically highlight the added value of efficiency solutions.

4 Apply appropriate discount rates

Select discount rates reflecting long-term societal interests, preventing undervaluation of future energy savings and benefits in comprehensive cost-benefit analyses.

5 Correct for transfer payments

From a societal perspective, ensure that transfer payments are systematically excluded, i.e. monetary flows that shift money between parties (e.g. taxes), as these do not affect overall societal cost.

6 Measure effects on the entire energy system

Consider how efficiency measures influence the broader energy system, reducing peak demand, enhancing grid stability, and deferring costly network upgrades.

7 Assess distributional impacts

Examine how costs and benefits are distributed among different groups, ensuring fairness, mitigating inequalities, and supporting just and inclusive energy transitions.

8 Incorporate risk and uncertainty analysis

Address uncertainties in future conditions, technology performance, and price trends through sensitivity analyses and scenarios, ensuring robust, reliable results under changing circumstances.

9 Understand the limits of CBA and complement with other approaches

View CBA as a decision-support tool, not the sole determinant; integrate multi-criteria analysis and public deliberation to address qualitative and intangible factors.

CBA tool | compares “EE1st” and “NoEff” options to demonstrate the added value of energy efficiency in local heating planning

EE1st requires testing demand-side options as full alternatives to supply-side status quo. Comparing least-cost **EE1st** vs least-cost **NoEff** per segment (age class × building type) reveals the value of efficiency, plus the efficiency gap to private choices.

1. Define your building stock

- Select % share by building type (e.g., SFH, MFH, apartment block).
- Select % share by age class (e.g., pre-1945 … 2010+).
- Check totals = 100%; confirm default envelope parameters or override.

2. Set scenario framework conditions

- Choose price year, currency, analysis horizon (real terms).
- Enter energy prices & fuel blends (retail/wholesale, network tariffs).
- Review technology CAPEX/O&M and externality values (CO_2, air pollutants).

3. Select / deselect solution sets

- Tick EE1st options: standard retrofit, deep retrofit, air-water HP, ground-water HP.
- Tick NoEff options: maintenance (no EE gain), gas/oil/biomass boilers.
- Optional toggles: comfort valuation, transfers handling, perspectives (societal/private).

4. Run model & read results

I. Societal added value of energy efficiency

II. The energy-efficiency gap (societal vs private)

III. Closing the gap with policy levers

IV. Non-monetary dashboards

Workflow of the CBA tool

CBA tool | The output storyline involves four steps

1 Societal added value of energy efficiency

- **Why**: Show that retrofit + heat pumps can deliver lower total societal cost and impacts.
- **How**: For each building segment, compare the least-cost EE1st option vs least-cost NoEff option under the societal perspective (externalities in, transfers out).
- **Result**: Lifetime net benefit (NPV), levelised heat cost (LCOH), cost-effective useful/final energy savings (%; GWh) - plus a chart of which segments deliver the most value.

2 The energy-efficiency gap (societal vs private)

- **Why**: Private choices (owner-occupiers) often diverge from the social optimum due to taxes, tariffs, financing, and unpriced externalities.
- **How**: Pick each segment's *private* least-cost option and compare to the *socially* optimal option
- **Result**: Unrealised cost-effective savings (GWh) and Gap % showing where socially cost-effective savings are not realised privately.

3 Closing the gap with policy levers

- **Why**: Align private incentives with societal value while keeping public budgets under control.
- **How**: Use sliders for grants, carbon price, energy surcharges, soft-loan rate buy-downs, network-tariff rebates; compute levels that flip choices and track fiscal impact.
- **Result**: Gap closed (%), required instrument level (€)

4 Non-monetary dashboards

- **Why**: Some factors matter but are hard to monetise—security of supply and affordability.
- **How**: Display energy security (import exposure, price-volatility indicators) and energy poverty metrics alongside core CBA results.
- **Result**: A balanced view that pairs CBA with practical policy considerations for local heating plans.

CBA tool | complements guidance with realistic exemplary data, not a full model

Residential only

- 4 building types × 8 age classes.
- Non-residential stock excluded.

No district heating (yet)

- No pipe / capex / loss / dispatch / tariff modelling.
- Current results are building-level only.

No smart-building modules

- No automation/advanced controls or thermal storage shifting.
- Flex benefits not captured.

No secondary market effects

- No fuel-price feedbacks, GDP/jobs multipliers, or rebound.
- Partial-equilibrium CBA only.

No dynamic pricing for heat pumps

- Uses flat/average tariffs.
- No time-of-use, demand response, or flexibility valuation.

No on-site solar

- PV/solar thermal excluded.
- No self-consumption/export effects.



The CBA tool is an illustrative sandbox that complements the guidance with realistic data. It compares EE1st vs NoEff options and lets users test perspectives, discount rates, multiple benefits and policy levers ▶ decision support, not full-fledged modelling.

Resources 2/3 | Energy planning

Existing resources

- Technology data: e.g. DEA Technology Catalogues
- Decision trees: e.g. COM Recommendation (EU) 2021/1749

Key gaps

- What energy efficiency solutions should be considered?
- How to properly integrate these in energy planning?

2A: **EE1st Solutions Catalogue**

- A practical guide to energy efficiency solutions across the energy system
- Structured overview of relevant solutions across **demand** (buildings, industry, transport) and **supply** (electricity, heat and gas)
- Technical characteristics, wider impacts, implementation considerations and limitations

https://ee1st.eu/resources/enefirst-catalogue-of-energy-efficiency-solutions/

2B: **EE1st Energy Planning Infographics**

- Set of infographics on how to integrate EE1st principle in existing energy planning practices
- **Infographic 1**: Heating and Cooling Plans under Art. 25(3) EED
- **Infographic 2**: Sustainable Energy and Climate Action Plan (SECAPs)

https://ee1st.eu/resources/set-of-infographics-from-plugging-energy-efficiency-first-in-heating-and-cooling-plans-why-and-how-enefirst-webinar/

enefirst

enefirst Solutions Catalogue ID: D-BUI-001

BUILDING WALL INSULATION

Reduce heat losses through external walls and lower energy demand energy demand energy demand energy

DEMAND / SUPPLY: Demand-side
SECTOR: Buildings
TYPE OF EE: Energy service efficiency



HOW IT WORKS

Wall insulation reduces heat transfer through external walls by adding an insulating layer to the building envelope. It helps maintain a stable indoor temperature with less heating in winter and less cooling in summer.

Common materials: mineral wool (rock or glass wool), expanded polystyrene (EPS), extruded polystyrene (XPS), wood fiber, cellulose, polyurethane (PUR/PIR), and aerogel-based products for space-constrained applications.

Installation options: external wall insulation (ETICS / external insulation finishing systems), internal wall insulation, or cavity wall insulation (where a suitable cavity exists).

Key technical points: choice depends on wall type, building age, moisture management, fire safety, façade constraints, available space and whether the measure is combined with broader renovation works.

CORE PROFILE

characterizing the solution

Investment intensity Relative upfront investment compared to alternatives	High
Direct energy-demand reduction Direct reduction in annual energy use for the service	High
Flexibility / load-shaping potential Ability to shift or modulate demand over time	Low
Maturity Market readiness and proven deployment	High

MULTIPLE-BENEFIT PROFILE

indicative impact channels

ENVIRONMENTAL	SOCIAL	ECONOMIC
Energy savings Lower space-heating demand; possible cooling-demand reduction in summer.	**Affordability** Lower heating bills; strongest relevance for households exposed to high energy prices.	**Grid investments** Lower peak heating or cooling demand may reduce pressure on heat and electricity systems.
Greenhouse gas emissions Lower CO_2 emissions from reduced fossil heating and electricity demand.	**Health** More stable indoor temperatures; fewer drafts; potential reduction of cold-related health risks.	**Energy security** Reduced demand for imported fossil fuels or electricity during peak periods.
Air pollution Less NO_x, SO_2 and particulate matter where combustion falls.	**Asset values** Potential property-value or rental premium; should be interpreted carefully to avoid double counting.	**Competitiveness** Lower operating costs for commercial buildings; improved working conditions.
Resource & material footprint Material production creates impacts; low-carbon or bio-based options can reduce them.		**Jobs** Energy audits, design, installation, façade works, materials production and renovation services.
		Economic growth Renovation activity can stimulate local value chains; macro effects require separate analysis.

IMPLEMENTATION CONSIDERATIONS

- **Planning & heritage:** External insulation may alter façade appearance and require planning approval or heritage consent.
- **Moisture & building physics:** Correct design and installation are critical to avoid condensation, moisture accumulation and mold risks.
- **Installation quality:** High workmanship standards are essential to minimize thermal bridges, gaps and air leakage.
- **Disruption & access:** External insulation involves works to the building exterior; internal insulation can reduce usable floor area and may affect indoor spaces.

TYPICAL APPLICABILITY AND LIMITATIONS

3 Most relevant for buildings with poor or moderate existing wall thermal performance.
3 Particularly suitable during major renovation, façade refurbishment or building envelope upgrade projects.
3 Effective across residential and tertiary buildings in all climate zones.
7 Less suitable for very well-insulated new buildings where additional gains are limited.
7 May be challenging for heritage buildings, façade and architectural constraints, or where fire-safety or moisture constraints are strict.
7 Performance depends on climate, wall construction, orientation, occupancy patterns and heating/cooling system.

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enefirst Solutions Catalogue ID: D-TRA-001

SMART ELECTRIC VEHICLE CHARGING

Shift EV charging to reduce peaks and support renewable electricity use

DEMAND / SUPPLY: Demand-side
SECTOR: Transport
TYPE OF EE: Demand-side flexibility



HOW IT WORKS

Smart EV charging controls when and how fast electric vehicles charge, using user preferences, grid signals or electricity prices. It shifts charging away from peaks while keeping vehicles ready when needed.

Common components: Typical components include smart chargers, control software, smart meters, communication interfaces, mobile apps, local energy management systems and aggregator platforms.

Installation options: Used at homes, workplaces, public hubs and depots; mainly unidirectional controlled charging, with vehicle-to-grid as an advanced option.

Key technical points: Benefits depend on charger power, connection capacity, smart-meter access, interoperability, cybersecurity, tariff design, data exchange and user acceptance.

CORE PROFILE

characterizing the solution

Investment intensity Relative upfront investment compared to alternatives	Medium
Direct energy-demand reduction Direct reduction in annual energy use for the service	Low
Flexibility / load-shaping potential Ability to shift or modulate demand over time	High
Maturity Market readiness and proven deployment	Medium

MULTIPLE-BENEFIT PROFILE

indicative impact channels

ENVIRONMENTAL	SOCIAL	ECONOMIC
Energy savings No direct final-energy saving; smoother charging can slightly reduce grid losses.	**Affordability** Lower charging costs where users can access flexible tariffs or smart charging offers.	**Grid investments** Lower simultaneous charging peaks can defer local grid reinforcement.
Greenhouse gas emissions Lower CO_2 when charging shifts to renewable or low-carbon hours.	**Health** Indirect health gains if charging avoids high-pollution generation periods.	**Energy security** Supports use of domestic renewables and reduces fossil-fuel exposure.
Air pollution Can reduce NO_x, SO_2 and PM caused by fossil-based electricity generation for serving peak load.	**Asset values** Charging-ready homes, offices or depots may become more attractive to EV users.	**Competitiveness** Can cut fleet charging costs and support reliable electrified logistics.
		Jobs Creates roles in charger installation, software, aggregation and maintenance.
		Economic growth Supports growth of charging services, software platforms and EV fleet operations.

IMPLEMENTATION CONSIDERATIONS

- **Connection & safety:** Check connection capacity, protection settings and local electrical safety requirements.
- **Control & communication:** Reliable communication is needed between charger, vehicle, meter, platform and grid or price signals.
- **User acceptance:** Automation should respect mobility needs, departure times and minimum battery levels.
- **Interoperability & markets:** Open standards, dynamic tariffs and aggregator access strongly affect realised benefits.

TYPICAL APPLICABILITY AND LIMITATIONS

3 Most relevant where EV uptake is growing and unmanaged charging creates local peak loads.
3 Suitable for homes, workplaces, public charging hubs and fleet depots.
3 Especially useful with smart meters, dynamic tariffs, high renewable shares or constrained grid capacity.
7 Limited direct energy savings; value comes mainly from timing, load shaping and peak reduction.
7 Benefits are lower without smart meters, flexible tariffs or grid communication.
7 V2G adds battery-warranty, interoperability and user-acceptance questions.

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enefirst Solutions Catalogue ID: S-HEAT-001

DISTRICT HEATING HEAT PUMPS

Produce district heat from ambient or waste heat using electricity

DEMAND / SUPPLY: Supply-side
SECTOR: Heat
TYPE OF EE: Production energy efficiency



HOW IT WORKS

Large-scale heat pumps raise low-temperature heat from water, air, ground, sewage, industry or data centers to district-heating temperatures using electricity and a refrigerant cycle.

Common components: Typical components include evaporator, compressor, condenser, expansion valve, heat exchangers, pumps, controls and connections to the heat source, power supply and district-heating network.

Installation options: Installed at heat plants, energy centers, wastewater facilities, industrial sites or data centers; can operate alone, with boilers or CHP, or with thermal storage.

Key technical points: Performance depends on source temperature, supply-temperature needs, refrigerant choice, grid connection, operating hours, backup heat, permits and integration with storage.

CORE PROFILE

characterizing the solution

Investment intensity Relative upfront investment compared to alternatives	High
Direct energy-demand reduction Direct reduction in annual energy use for the service	Medium
Flexibility / load-shaping potential Ability to shift or modulate demand over time	Medium
Maturity Market readiness and proven deployment	Medium

MULTIPLE-BENEFIT PROFILE

indicative impact channels

ENVIRONMENTAL	SOCIAL	ECONOMIC
Energy savings Uses ambient or waste heat, reducing fuel input for each unit of district heat.	**Affordability** Can stabilize heat prices where electricity and heat-source costs are favorable.	**Grid investments** May reduce peak boiler needs but require electricity-grid connection capacity.
Greenhouse gas emissions Lower CO_2 when displacing fossil boilers and using low-carbon electricity.	**Health** Cleaner heat generation can reduce local pollution-related health impacts.	**Energy security** Uses local ambient or waste heat, reducing exposure to imported fuels.
Air pollution Cuts NO_x, SO_2 and PM from local heat combustion where boilers run less.		**Competitiveness** Efficient heat production can lower operating costs for heat suppliers.
		Jobs Creates work in design, installation, grid connection and heat-source integration.
		Economic growth Supports local heat-source use, clean-tech services and district-heating upgrades.

IMPLEMENTATION CONSIDERATIONS

- **Heat source access:** Secure reliable low-temperature heat sources such as water, sewage, industry, data centers or ambient heat.
- **Network temperature:** Lower district-heating supply temperatures improve performance and reduce electricity use.
- **Electric connection:** Assess grid capacity, connection costs, demand charges and potential flexible operation.
- **Permits & integration:** Check permits, noise, refrigerant safety, backup heat and integration with storage or existing boilers.

TYPICAL APPLICABILITY AND LIMITATIONS

3 Suitable for district-heating systems with accessible ambient, sewage, surface-water, geothermal or waste-heat sources.
3 Works best with lower network temperatures and high annual heat demand.
3 Useful where low-carbon electricity, thermal storage or flexible electricity prices are available.
7 High supply temperatures, weak heat sources or limited operating hours reduce efficiency.
7 Large electrical connections, permits, noise limits and refrigerant rules can constrain projects.
7 Economics depend on electricity prices, backup heat needs and integration with existing heat plants.

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EE1st Solutions Catalogue is a screening and orientation resource to use when applying the EE1st principle in planning and investment decisions

Not an exhaustive inventory of all solutions.

- 33 solutions in total.
- Addresses buildings, industry, and transport on the demand side as well as the supply-side sectors of electricity, heat, and gas.

Not every solution is suitable everywhere

- Includes a maximum of 7 solutions per sector.
- One or two exemplary solutions per type of energy efficiency in each sector.

No universal cost or performance values

- These depend strongly on local conditions, technology design, energy prices and the specific decision context.

The Catalogue brings together a selected set of energy efficiency solutions that may be relevant to decision-makers across the energy system, to help them identify relevant alternatives before moving on to detailed technical assessment and cost-benefit analysis.

Resources 3/3 | Incentives for EE1st

Existing resources

- ENEFIRST project and related academic publications
- Best practices – particularly from UK and US

Key gaps

- Fragmented overviews of consumer tariffs and network remuneration schemes (e.g. CEER, ACER, smartEn)
- Lack of framing within EE1st

Bill Explainer + Map of Electricity Tariffs

- The **BILL EXPLAINER** is a briefing to explain the electricity bill for consumer organizations, transport and building stakeholders. It explains the elements of the electricity bill and how they are defined, illustrates the variety of tariff designs by visualizing some key design options.
- The **MAP OF ELECTRICITY TARIFFS** showcases the multitude of smart tariffs used in Europe by collecting data from public sources on availability and uptake.

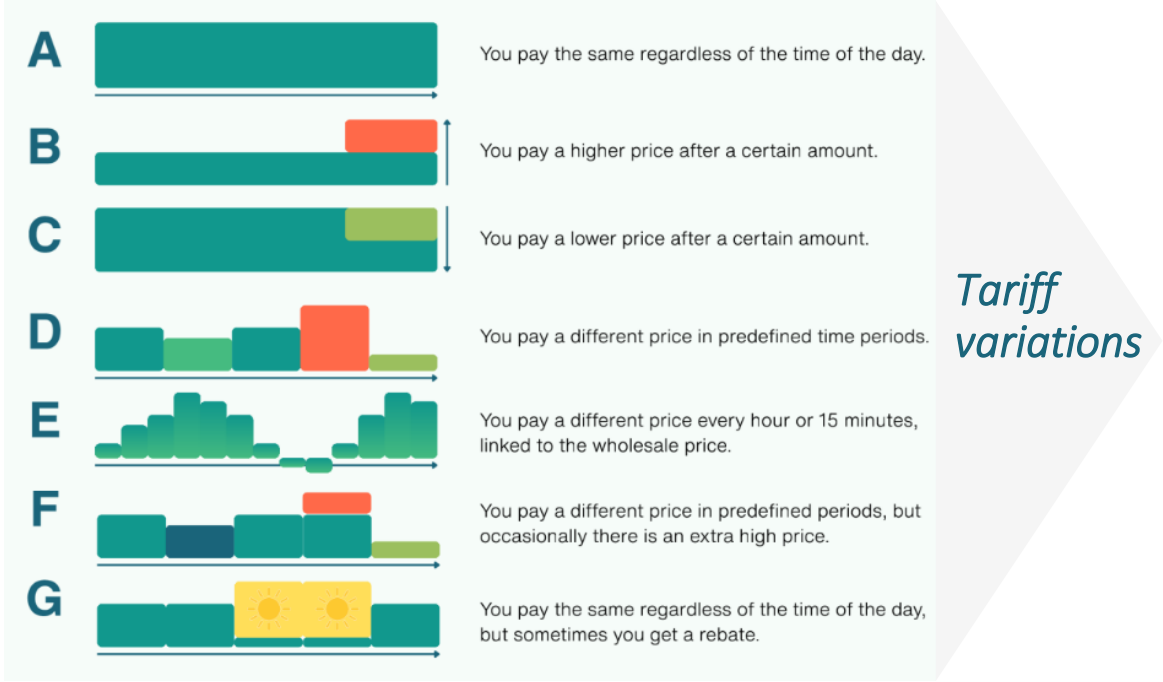
https://ee1st.eu/resources/bill-explainer-map-of-electricity-tariffs/

Bill Explainer | a briefing to explain the electricity bill for consumer organizations, transport and building stakeholders

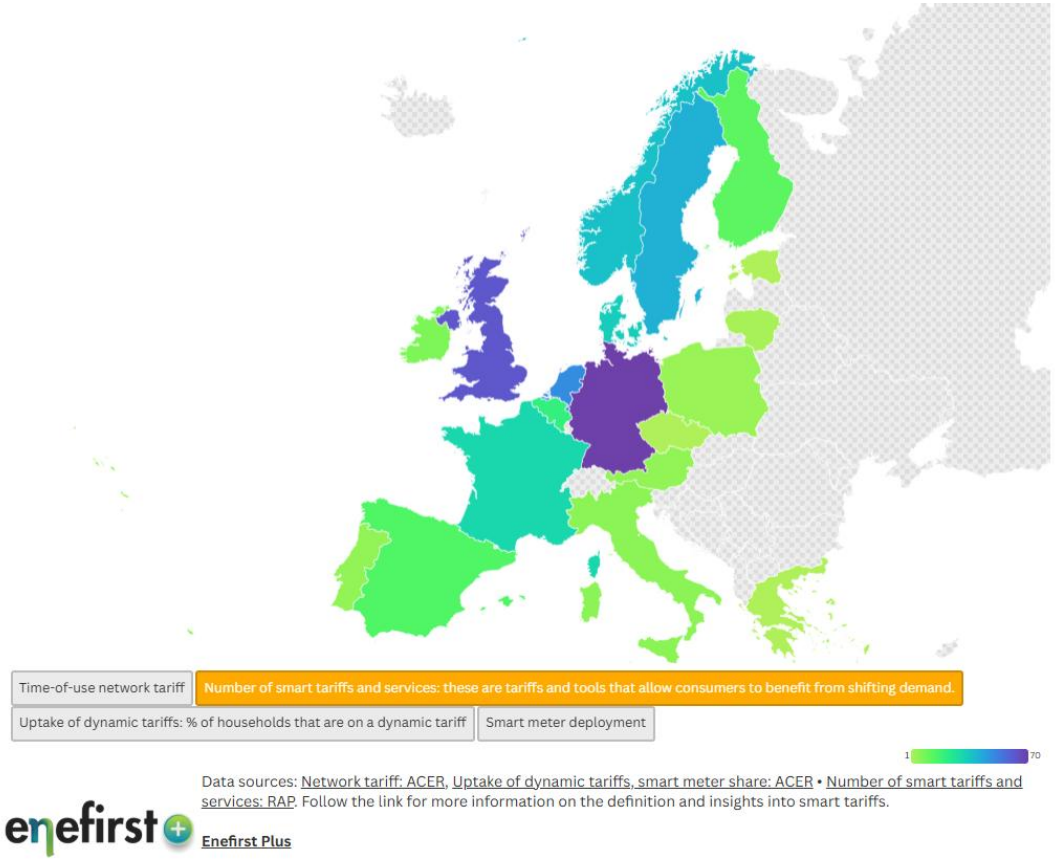
A bill consists of several elements that are designed and governed differently.

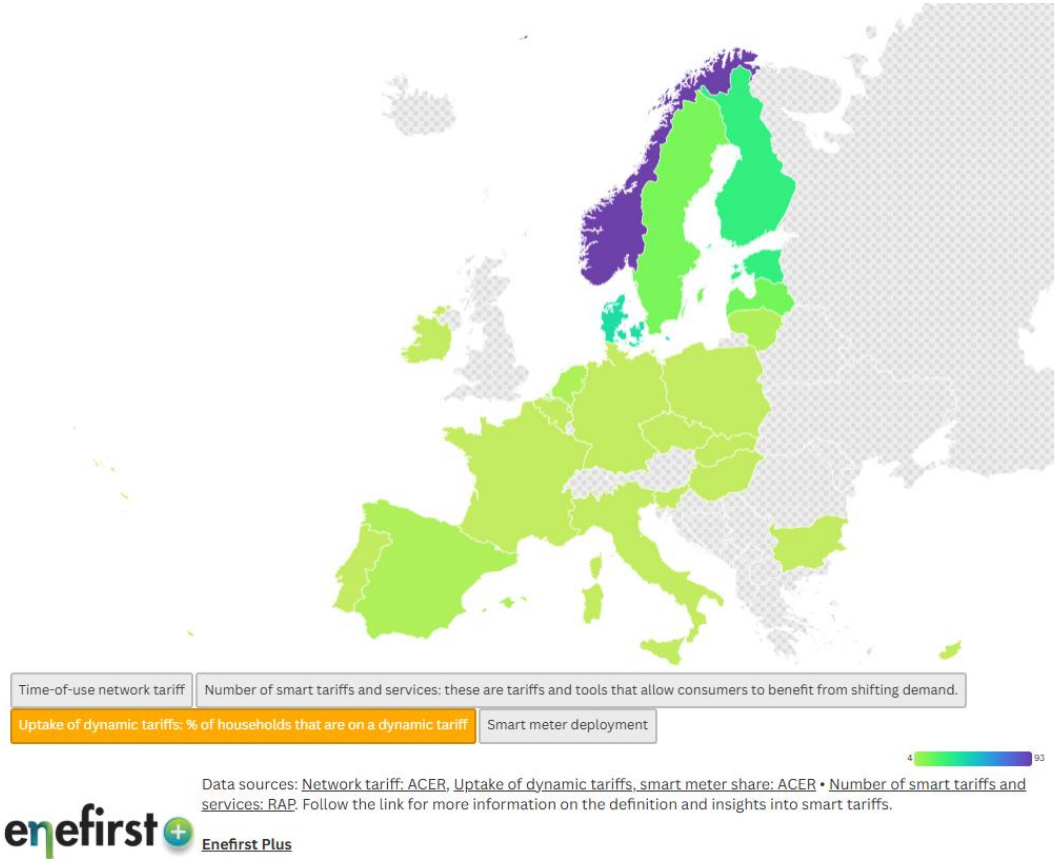
- **Electricity**: market-based wholesale price
- **Network**: regulated by NRA
- **Taxes and levies**: vary by country
  - Public TV subscription (Portugal)
  - Offshore grids and municipality concession fee (Germany)
  - RES support (many countries)
  - Rail costs (Italy)
  - Municipal taxes and the public TV cost, the excise duty, a 5‰ special levy for the customs officials and the real estate tax (Greece)
- **Value added tax (VAT)**

Tariff design has an impact on how you consume and how you can save on your bill



Map of Electricity Tariffs | showcases the multitude of smart tariffs used in Europe

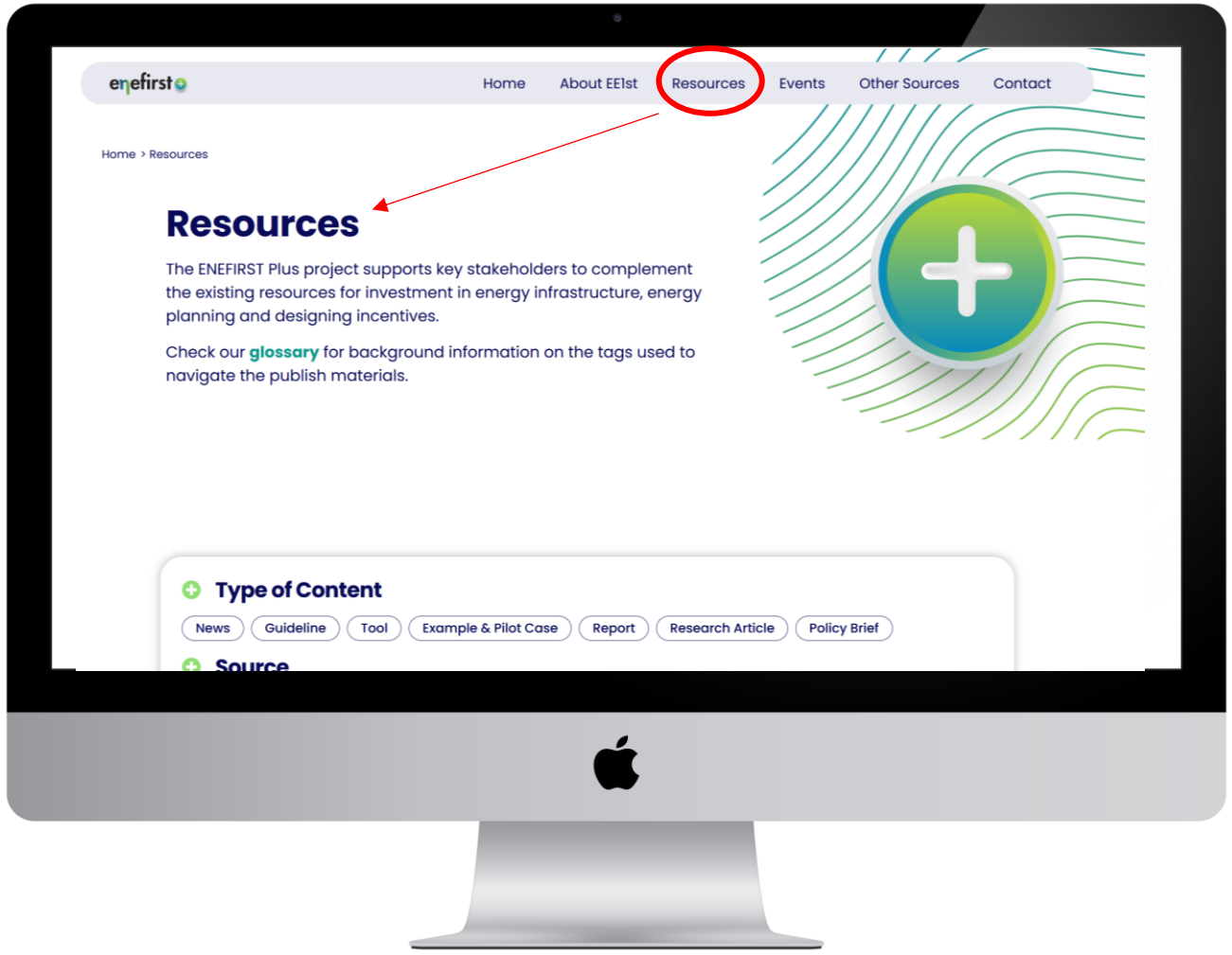




Take aways | EE1st Plug-Ins

1. EE1st is a test, not a verdict. It does not say efficiency always wins. It says efficiency must be genuinely assessed.
2. Passing that test requires a societal perspective that is applied consistently: being disciplined about transfer payments, about system-level effects, and about wider benefits.
3. The societal optimum will not materialize on its own. It needs incentives and tariffs that point in the same direction.
4. The practical point: no need to start from scratch. These plug-ins exist, they are free, and they are designed to fit into the work that is going to be done.

Check out the full set of Enefirst+ plug-ins



https://ee1st.eu/resources/

Take away's from the **lessons learnt in ENEFIRST+**

Jean-Sébastien Broc

Methodologies and data matter, but should not be a reason for inaction or delaying

- ✓ Starting point for EE1st can be **revising assessment methodologies**
  - to broaden the scope of options and impacts considered, and
  - to make the viewpoints adopted more explicit.

- ✓ **Data availability** remains a prerequisite but **does not impede to go forward**
  - Overall, data availability is improving
  - Assessments and discussions can anyway start with data currently available, overcoming data gaps with data available at EU level, from other countries or the literature

From assessment to decision

✓ **Assessment does <u>not</u> replace decision-making**: it is meant to inform it

- **EE1st** = broadening the scope → **enriching decision-making**:

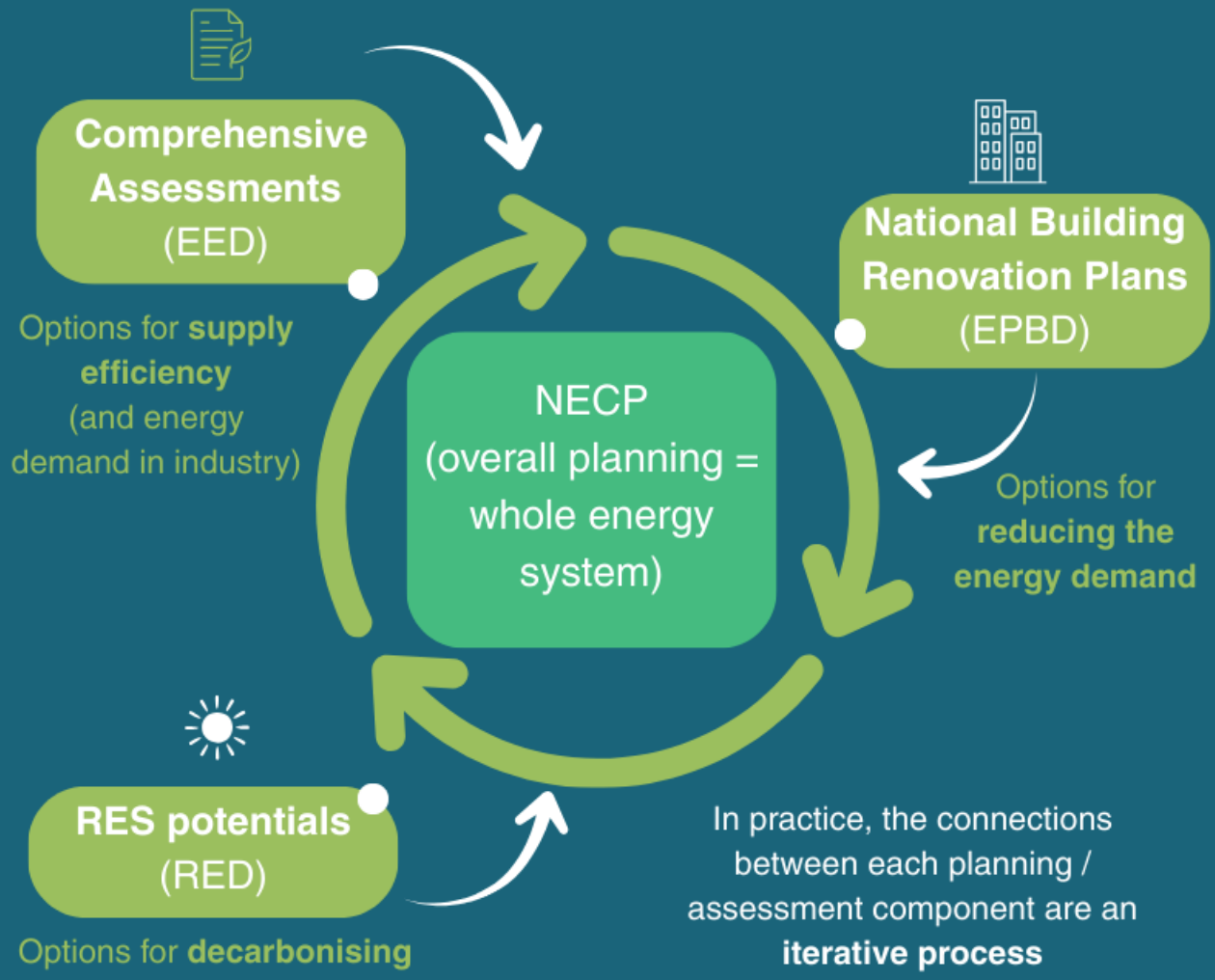
  → thinking beyond immediate KPIs

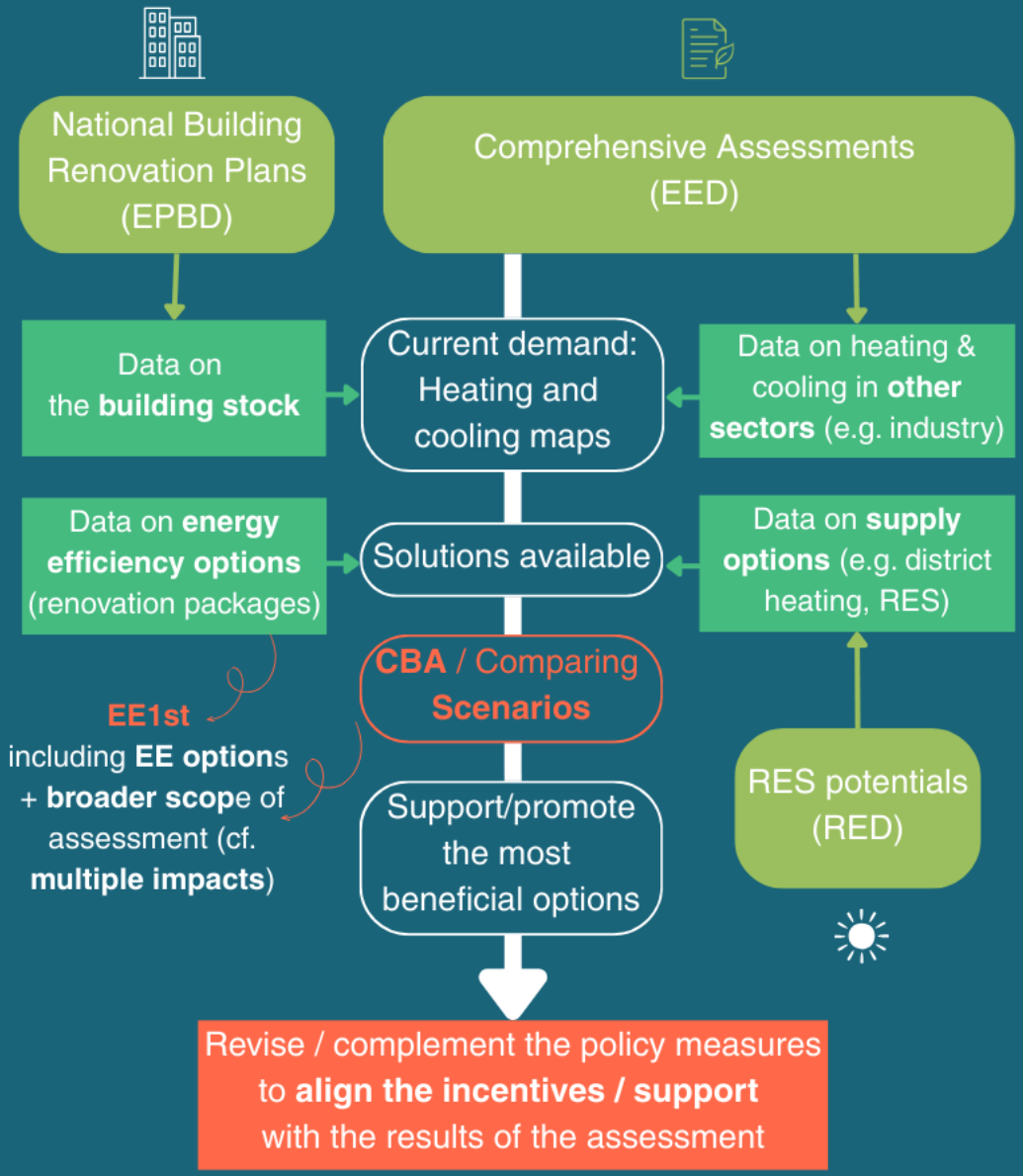
  → keeping in mind the implications on the whole energy system

  → keeping in mind that energy is a means to multiple ends (hence considering multiple impacts)

In other words,
decisions on energy-related investments have impacts on other policy objectives.

Connecting the dots for an integrated planning





CBA: Cost-Benefit Analysis
EED: Energy Efficiency Directive
EE1st: Energy Efficiency First
EPBD: Energy Performance of Buildings Directive
NECP: National Energy and Climate Plan
RED: Renewable Energy Directive
RES: Renewable Energy Sources

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Essential role of the national energy planning

NECP = common reference for sector-specific planning processes

→ NECPs may either drive or restrict the way demand-side resources are considered in sector-specific planning

Then planning should guide policy design



Take aways

Key added values of EE1st:

(1) assessments that provide a broader picture

(2) discussing these results with a broader range of stakeholders

→ yes, energy systems are complex. But not because of EE1st!

→ not adding another layer of red tape, but connecting people

→ not about choosing efficiency over infrastructure, but about choosing the best pathway for society

→ promoting evidence-based and transparent policymaking for sound and legitimate policies

Upcoming

Tue. **17 Nov.** — **Plugging Energy Efficiency First in national energy planning**

All details and registration links at:
https://ee1st.eu/events/

All proceedings and resources at:
https://ee1st.eu/resources/

+ follow **#ENEFIRSTplus** on LinkedIn

And more: new reports coming soon!

Look at sister projects!

SEED MICAT — Support Energy Efficiency Deployment with the Multiple Impacts CAlculation Tool

ODYSSEE-MURE

Tue. **10 Nov.** 11.00 CET

stream SAVE **Dialogue meeting**

Assessment of Energy Savings in Public Bodies: the Croatian experience

Partners

IEECP INSTITUTE FOR EUROPEAN ENERGY AND CLIMATE POLICY

RAP REGULATORY ASSISTANCE PROJECT

Fraunhofer ISI

ΚΑΠΕ CRES

EIHP ENERGY INSTITUTE HRVOJE POŽAR

KAPE

ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development

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Thank you!

Website https://ieecp.org/projects/enefirst-2/

Platform https://ee1st.eu

LinkedIn #EnefirstPlus

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