



The Interlinked Triad: Energy Efficiency, HE Cogeneration H&P & Energy Poverty

Costas Gr. Theofylaktos

Dipl. Mechanical Engineer, MSc

Vice President of IENE

Head of Energy Efficiency, IENE

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The South-East Europe: Regional Context

- High dependency on energy imports in many countries (e.g., >40% in parts of Western Balkans).
- Aging infrastructure and a significant portion of the population facing the consequences of Energy Poverty.
- A diverse energy landscape with common goals: Security, Competitiveness, and Decarbonization.

The IENE SEE Energy Outlook 25/26 integrates specific data from Albania, Bosnia & Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Moldova, Montenegro, North Macedonia, Romania, Serbia, Slovenia, and Türkiye.



The Data: Three Defining interlinked Challenges

The Efficiency Gap: High Energy Intensity

The SEE Region remains **~30-40% more energy-intensive** than the EU average (Eurostat 2025).

Implication: Far more energy to produce the same economic output—a massive, persistent "**Efficiency Gap**" that drains competitiveness.

The Security Gap: High Import Dependency

The Region imports over **50-60% of its energy** (e.g., Serbia's gas import reliance is ~80-90%).

Implication: This makes the "**Efficiency as a Resource**" argument critical. Every MWh saved is a MWh not imported, directly boosting energy security.

The Social Gap: High Energy Poverty Risk

Aging infrastructure (grids, power plants, District Heating networks) combines with the **highest Energy Poverty risk in Europe** (outside of the Baltic states).

Implication: A significant portion of the population faces the collision of high costs, low incomes, and inefficient homes. (e.g., more than 3.4 bn the debt of households & SME in electricity for 2024-25, 1 bn more than 2022-23.)

Pillar 1: Energy Efficiency-The Unseen infrastructure

The Core Principle:

"**Energy Efficiency First**" remains the “refrain” of the EU—the “**first fuel**” and the most cost-effective source of Energy Security.

In Southeast Europe, this means treating **every unit of saved energy as a strategic national resource.**

Why? For every **1 MWh saved** , the Region:

- ⌚ Avoids importing expensive fuel (reducing dependency, e.g., Croatia imports roughly 54%–60% of its total primary energy needs).
- ⌚ Reduces strain on aging, inefficient generation plants.
- ⌚ Lowers the need for consumption subsidies.

IENE Outlook '25 - The Persistent Gap:

Despite progress, a massive efficiency gap persists. Average final energy consumption in households across SEE remains **~20-30% higher** than the EU average, primarily due to poor insulation and outdated HVAC systems.

IENE Estimate: Over **40%** of the economic energy efficiency potential in the building sector remains untapped.



Pillar 1: Energy Efficiency-The Unseen infrastructure

The Building Stock Crisis

	Key Data Point	The Challenge
Bulgaria	~65% of residential buildings built before 1970	The most energy-intensive economy in the EU. No thermal regulations in older stock.
Romania	Renovation rate <1% per year (EU target: 3%)	High reliance on solid fuels in rural areas. Consumption per m ² is 2-3x higher than Western Europe.
Greece	>40% of final energy use is in buildings	"Exoikonomo" programs have upgraded ~200,000 homes since 2019, but potential remains for millions more.
Regionally	Consumption per m ² is 2-3x higher than Western Europe	Primarily due to pre-1980 construction lacking basic insulation.



The Industrial & Infrastructure Waste

Industrial Intensity: Energy intensity in **Serbia and N. Macedonia** is among the highest in Europe. This presents a direct opportunity for efficiency gains to boost competitiveness against global markets.

The "Unseen" Waste: District Heating Systems in **Serbia and N. Macedonia** suffer massive distribution losses—often **15-20%** —compared to the EU average (~5-10%). This is energy paid for but never delivered.

Pillar 2: High-Efficiency Cogeneration Heat & Power, HECHP

While Energy Efficiency reduces *demand*, **High Efficiency Combined Heat and Power (HECHP)** optimizes *supply*.

The Core Principle:

Traditional power generation in SEE is incredibly wasteful, losing **~60-70% of input energy** as discarded heat into the atmosphere. HECHP captures this heat for productive use.

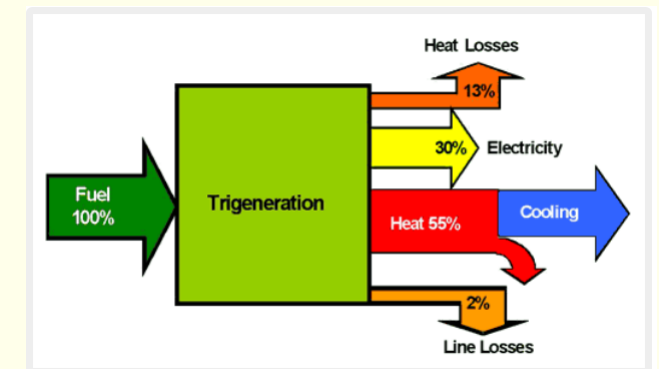
The Efficiency Leap:

- ⌚ **Separate Production:** ~50% efficiency
- ⌚ **HECHP:** 80-90% total efficiency

IENE Outlook '25 Impact: This leap can save **20-30% of primary energy** for the same final output—a massive boost to regional resource independence.

Current HECHP Penetration in SEE - Share of national power generation:

- ⌚ **Romania:** ~10-12% (Strong potential in industrial cities like Ploiesti)
- ⌚ **Bulgaria:** ~8-10% (Key for modernizing Sofia & Plovdiv DH)
- ⌚ **Greece:** ~5-6% (Major potential in post-lignite Western Macedonia)
- ⌚ **Croatia:** CHP is already central to Zagreb's district heating



Pillar 2: The SEE Opportunity: Where HECHP Delivers

Opportunity 1: Modernizing District Heating **Required by new EED**

- ⌚ **The Asset:** District Heating (DH) is critical in major SEE cities—**Sofia (BG), Bucharest (RO), Belgrade (RS), and Zagreb (HR), Kozani/Megalopoli/Amyntaio/Ptolemaida (GR)** —serving millions.
- ⌚ **The Challenge:** Many networks, built in the 1960s-80s, suffer from distribution losses exceeding **20-25%** .
- ⌚ **The Solution:** Repowering these grids with HECHP (Natural Gas, Biomass, Geothermal) provides baseload, low-carbon heat and drastically cuts losses.
 - **Example:** Croatia and Slovenia are already expanding **Biomass CHP** , leveraging high forestry cover.

Opportunity 2: Boosting Industrial Competitiveness

- ⌚ **The Context:** Energy-intensive industries (refineries, food processing, chemicals) in **Türkiye, Romania, Bulgaria, and Greece** are major consumers and face global competition.
- ⌚ **The Data:** HECHP provides reliable, low-cost steam and power directly to industrial sites.
- ⌚ **The Impact:** Lower operating costs translate directly into stronger competitiveness.
 - **Example:** In **North Macedonia & Bulgaria** , industry accounts for **>30%** of final energy use. HECHP is a tool for economic survival and growth.

Pillar 3: The Vicious Cycle of Energy Poverty

The ultimate goal of our energy policy is not just efficient systems, but **affordable comfort for all citizens**.

When a household spends **over 10-15% of its income on energy**, they are forced to make impossible choices between heating, food, and healthcare. This creates a **social and political risk** that can derail the entire Energy Transition.

The Vicious Cycle of Energy Poverty in SEE :

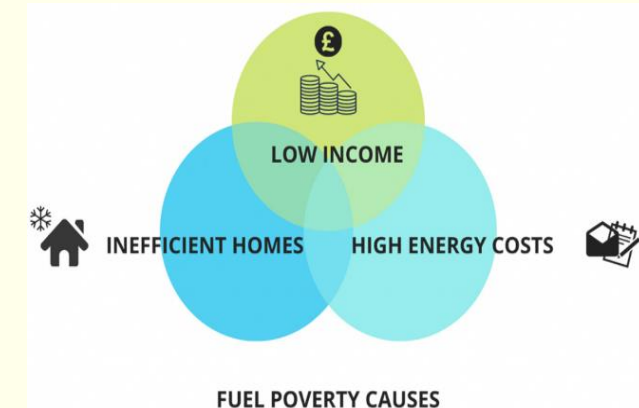
High Energy Bills: Volatile markets, import dependency -Citizens struggle to pay for essential energy.

Low Incomes (Below EU average in many member states)

Public Reaction: Voters reject Carbon taxes, infrastructure projects as costly and w/o benefits to them, due to bureaucracy and lack of communication of benefits.

Policy Stagnation: Governments delay or water down necessary efficiency and decarbonization measures.

Inefficient Building Persists: Aging building stock, often Energy Class F or G - unrenovated, energy waste continues, and bills stay high trapping people in poverty.



Pillar 3: IENE Outlook 2025 Data: The "Inability to Keep Home Warm"

(Source: Eurostat 2024 data, reflected in IENE Outlook 2025)

Country	Population Affected	Key Insight
Bulgaria	~22-24%	Highest in the EU. The intersection of low incomes and the region's poorest housing stock.
Greece	~17-19%	Spiked post-energy crisis, driven by high electricity costs and low-quality urban buildings.
Romania	~11-13%	Significant urban/rural divide; rural areas rely on inefficient and expensive solid fuels.
Cyprus	~9-11%	Rising "cooling poverty" (need for A/C) is often underreported in traditional heating metrics.
Western Balkans	25% - 40%	Widespread reliance on inefficient and polluting wood/biomass stoves in informal settlements.

Energy Poverty matters for the Entire Energy Transition, as it is not just a statistic; it is a human reality!

Pillars 1 to 3: The Virtuous Cycle - Connecting the Triad in SEE

Step 1: Deep Renovation (Energy Efficiency)	Step 2: High-Efficiency Supply (HECHP)	Step 3: Alleviate Energy Poverty (Social Outcome)
<p>Action: Deep renovation of a multi-family building (e.g., panel blocks in Sofia, old buildings in Greek cities).</p> <p>Data Impact: Reduces heating demand by 50-60% .</p> <p>Result: A drastically lower, stable energy need is created. The building is now ready for a modern, efficient supply.</p>	<p>Action: Repower the local district heating grid with a modern High-Efficiency CHP plant (NG or Biomass) to meet the new, lower demand.</p> <p>Start actions needed for District Cooling Systems, DCS.</p> <p>Data Impact: Achieves >80% total system efficiency, compared to ~50% for separate heat and power generation. Minimizes waste and system costs.</p>	<p>Direct Result: The household connected to this renovated building and modern grid sees its heating bills drop by 30-50% .</p> <p>Macro Outcome:</p> <p>Social: Energy expenditure falls (e.g., from 15% of income to <10%), lifting families out of poverty.</p> <p>Economic: Bill savings and freed-up energy resources (e.g., NG) can be redirected to industry, boosting competitiveness.</p>

Policy Recommendations

To link “Efficiency, HECHP, and Social Equity”, a more systemic approach should be adopted by all stakeholders:

➔ Policy Synergy: The "One Project" Approach

- ⌚ **Action:** Legally and financially link building renovation subsidies with the modernization of local district heating/cooling grids. Treat the building *and* its energy supply as a single project.

SEE Example: Utilize EU Cohesion and Modernisation Funds for integrated tenders, e.g., "Renovate the 'Studentski Komplex' district in Sofia AND upgrade its CHP plant simultaneously."

➔ Targeted Financing: The "Poverty Map" Approach

- ⌚ **Action:** Use national energy poverty maps to prioritize public investments (e.g., identifying the **22%** of Bulgarian households unable to keep warm).

SEE Focus: Direct public funds first to the neighbourhoods with the highest energy burden and least efficient networks—maximizing both social impact and system efficiency.

➔ Modern Market Signals: The "Value" Approach

- ⌚ **Action:** Design capacity mechanisms and support schemes for HE cogeneration to value its *system* benefits: grid stability, primary energy savings, and affordable district heat.

SEE Focus: Recognize that a HECHP plant in Novi Sad or Ploiesti provides more value than a simple gas plant; its remuneration must reflect its contribution to security, efficiency, and social affordability.

Conclusion: Charting a Resilient Pathway for SEE

By strategically linking

- ➔ **Efficiency** (reducing demand by up to 60%),
- ➔ **HECHP** (increasing supply efficiency to 80%+), and the fight against
- ➔ **Energy Poverty** (affecting up to **22%** of households),

The Region can transform its energy system from a source of economic strain into a driver of sustainable and inclusive growth.

The result is a system that is demonstrably less wasteful, more competitive, and more equitable.

ENERGY SECURITY IN SOUTH EAST EUROPE

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Thank you for your attention!
Any Q?

Don't forget: ENERGY EFFICIENCY FIRST!