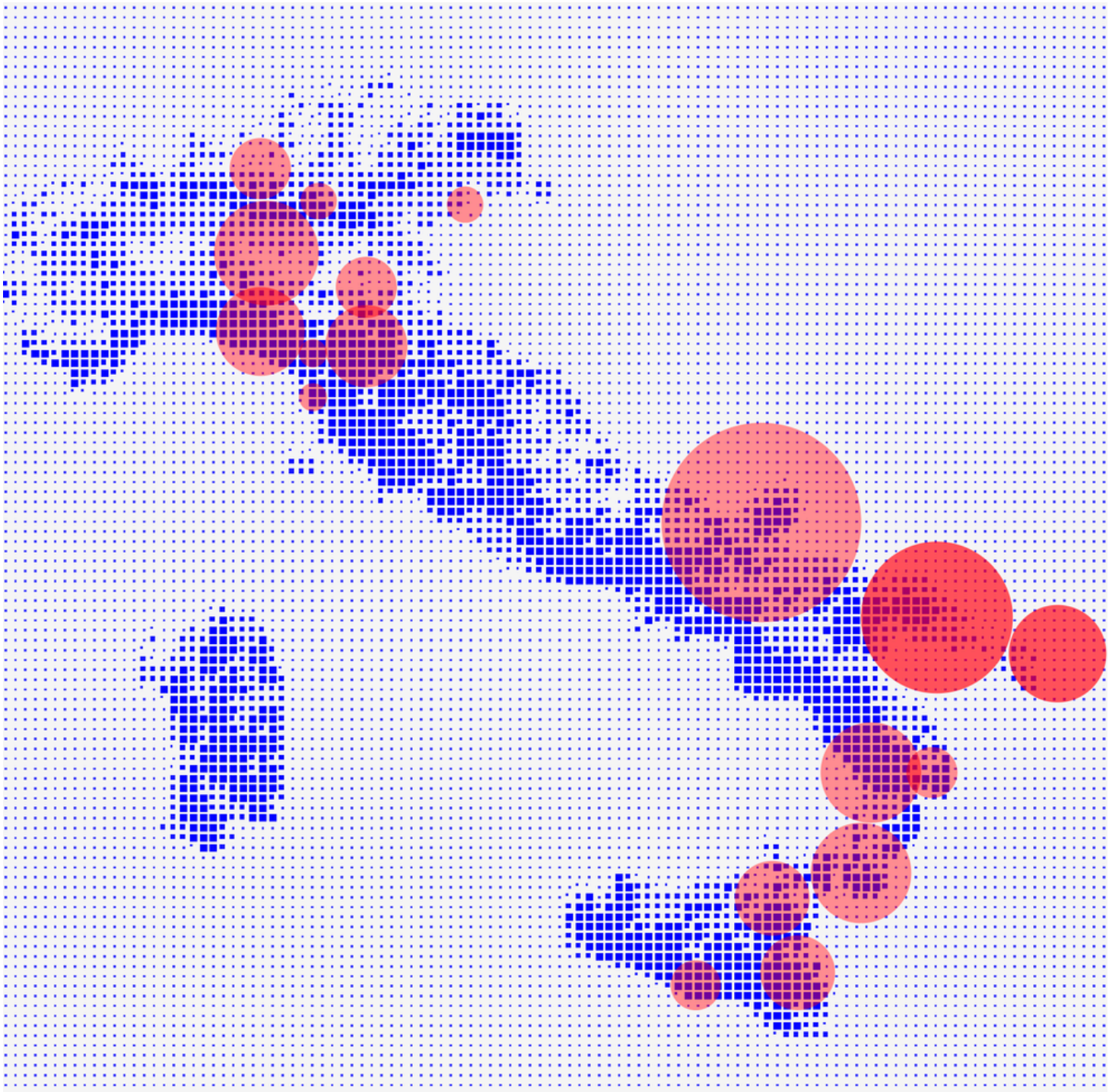
Civiqa

CIVIQA SCENARIOS | MAY 2026

The impact of the energy shock on Italy's territories

Who will foot the steepest bill?

A territorial reading of energy risk



Preface

Hormuz, 28 February 2026.

LThe closure of the Strait of Hormuz triggered what the International Energy Agency has called the largest disruption in the history of the global oil market. Brent — the world's benchmark oil price — climbed to 120 dollars a barrel. European gas rose by 40–50% above previous levels.

This is not the first time. In 2022, Russia's invasion of Ukraine had already produced a similar shock, and Italy paid one of the heaviest prices in Europe. Exceptional events are becoming structural.

And yet, every time a shock hits, the response is the same: surprise, emergency, after-the-fact management. As if we did not already know which territories will be hit hardest, which local economies are most fragile, where soaring energy costs risk turning into an employment crisis.

The data needed to manage an energy crisis more knowingly already exist. They are public data — Istat, Eurostat, Banca d'Italia, OECD, TERNA — accessible to anyone, but rarely organised in a form that is useful to those who govern. We have done exactly that in this report, in keeping with the mission of Civiqa, the platform supporting the governance of public bodies.

We asked ourselves precise questions: which territories are structurally most exposed to an energy shock? Why? How can a policy maker or a public administrator address the specific energy risks of their own territory?

The answer is a map that can be used by those who administer a territory, who plan investments, who intend to apply for public funding, and who want to come to the institutional table with solid arguments.

Enjoy the read.

Gianluca Calvosa — President, OpenEconomics

IN BRIEF

6 things the report highlights

01 **Italy's industrial geography is a first snapshot of energy risk.**

Cement, steel, chemicals and ceramics show energy-intensity values 3 to 7 times higher than mechanics and electronics. The very specialisation that generated prosperity is today the main source of vulnerability.

02 **Energy exposure does not follow the map of wealth.**

Emilia-Romagna leads. Sicily and Puglia rank ahead of Lombardy — not because of their factories, but because of their large coastal petrochemical hubs. Two very different risk equations, a similar result.

03 **Energy risk and employment risk compound each other.**

In territories where high exposure and high unemployment coincide, a shock to energy costs produces not just an industrial crisis but potentially a social one.

04 **The ranking of the ten most exposed territories is surprising.**

They are not the places best known for their industrialisation, but those with a particular productive and demographic fabric. This is the value of the EEI: it surfaces vulnerabilities that aggregate data cannot see.

05 **Renewables offer protection, but only under certain conditions.**

The effectiveness threshold is high, and today only Trentino, Basilicata and some parts of Calabria reach it.

06 **Anticipating risk helps to govern it.**

Those who govern can act ahead of a shock through several levers. Planning — before risk scenarios become emergencies. Holding a seat at the institutional table — where resources such as structural funds, programme agreements and development contracts are decided. Diversifying upstream supply chains — reducing dependence on energy-intensive suppliers. Accelerating the transition to renewables — not merely an environmental choice but a tool for reducing exposure to energy shocks.

INTRODUCTION

Energy shock on territories: do you know how exposed you are?

THE PROBLEM

A rise in energy prices does not affect everyone equally

When energy prices rise, the cost is not distributed uniformly. Sassuolo pays it, with its ceramics kilns. Taranto pays it, with its steelworks. The manufacturing provinces of the North-East and the coastal petrochemical hubs of the South pay it. Those who produce software or offer financial services do not pay it in the same way. This asymmetry is well known to those who study the industrial economy. But it has rarely been translated into a tool for assessing exposure to an energy shock.

THE TOOL

An original index for reading risk, territory by territory

To answer these questions, we built the Energy Exposure Index (EEI): an original, composite index that measures energy exposure starting from data on Italian municipalities, relative to an energy shock that has already occurred and whose effects on territories are now measurable. The EEI offers a structural reading of risk, built on information that public data already contain but which is rarely organised in a way that is useful for decision-making.

THE ANSWERS

Where you stand on the risk map. And what you can do

01

View energy-risk maps for regions, provinces and municipalities

02

Explore the exposure profiles of Italy's main territories

03

Examine the relationship between energy risk and the productive structure / labour market

Knowing your own position on the risk map is the first condition for choosing, where possible, the best courses of action — **knowingly**.

CHAPTER 1

The price of energy is not the same for everyone

It is one thing to read on a statistics table that ceramics, steel, paper and glass are energy-intensive sectors; it is quite another to be at the helm of a territory when an energy shock arrives.

Italy is a country of industrial districts. This geographic concentration of manufacturing is the root of Italian industrial prosperity. But it is also its main weakness when energy prices rise.

When soaring energy costs arrive, the bill is not distributed uniformly across the country. A territory specialised in energy-intensive production is structurally more exposed to the shock and follows a precise trajectory, from slowing production to the declaration of a state of crisis, all the way to employment fallout. The impacts arrive later, and in a more muted form, where the dominant sectors are low energy-intensity ones, such as financial services, software production or tourism.

How can a territory's exposure to energy risk be measured

To measure this phenomenon systematically across all Italian territories, we built the **Energy Exposure Index** (EEI): a composite index calculated for 7,890 municipalities.

HOW THE EEI IS BUILT

The index combines three variables in a multiplicative structure.

#	Variable	What it measures
E1	Energy intensity of the employment structure	How exposed local productive sectors are to direct energy costs
E2	Upstream exposure	How dependent local sectors are on energy-exposed supplies
S	Social scale	The demographic weight of the municipality — how many people live in that exposed territory

The multiplicative structure is not a technical detail: it means the index measures joint exposure. For example, a municipality with high energy intensity but few inhabitants will carry a lower systemic risk than one with a similar productive structure and ten times the population.

An index built this way does not measure a territory's wealth or fragility in absolute terms; it expresses a level of risk assessed in its entirety — productive, systemic and social.

Full methodology in the Appendix.

Resilient regions and vulnerable regions

Let's start with an initial overview, a snapshot of the situation across the regions, which play an important role alongside central government on energy matters. Energy exposure does not follow the map of wealth. At the top are neither the most fragile regions nor the strongest. They are the ones that produce the most — or that depend the most on oil and gas.

Table 1 | Average overall exposure of the regions

Rank	Region	Macro-area	EEI
1	Emilia-Romagna	North-East	0.615
2	Veneto	North-East	0.561
3	Sicilia	Islands	0.526
4	Toscana	Centre	0.526
5	Umbria	Centre	0.517
6	Puglia	South	0.511
7	Marche	Centre	0.488
8	Lombardia	North-West	0.481
9	Campania	South	0.468
10	Calabria	South	0.451
11	Prov.Aut. Bolzano/Bozen	North-East	0.449
12	Friuli-Venezia Giulia	North.East	0.429
13	Lazio	Centre	0.417
14	Basilicata	South	0.412
15	Sardegna	Islands	0.401
16	Abruzzo	South	0.365
17	Liguria	North-West	0.359
18	Prov.Aut. Trento	North-East	0.356
19	Molise	South	0.349
20	Piemonte	North-West	0.347
21	Valle d'Aosta/ Vallée d'Aoste	North_West	0.274

Looking at the EEI (Energy Exposure Index) values, the regions most exposed to energy-shock risk are those that produce the most or that depend most heavily on oil and gas. Emilia-Romagna (0.615) and Veneto (0.561) lead on manufacturing density: these are territories where energy is not a marginal cost item but the physical precondition of production.

Sicilia (0.526) and Puglia (0.511) rank ahead of Lombardia (0.481) because of their coastal petrochemical hubs, where exposure is concentrated in a few large plants that weigh on the entire provincial economy.

The same risk, opposite origins: two distinct geometries of risk.

This view is only a starting point: as we will see in the maps that follow, territories with very similar EEI scores can in fact reflect profoundly different vulnerabilities.

Civiqa/OpenEconomics analysis based on Istat and Eurostat data. Reference year: 2022. Updated: May 2026.

CHAPTER 2

Energy risk: where exposure concentrates, and why

The table introduced in the previous chapter shows how exposed a territory is to energy risk. The maps that follow show why. Two regions can have the same EEI score for completely different reasons: any intervention policies change accordingly.

Regions: one risk, two geometries

Energy cost tied to what is produced — direct exposure

The first map isolates the E1 component: how much territories consume energy directly in the production cycle. The map darkens above all in the manufacturing districts of the North-East and the Centre — ceramics in Emilia, paper in Tuscany and Lucca, glass in Veneto, steelmaking in Brescia and Terni. These are processes that are hard to electrify in the short term: every percentage point of energy-price increase passes straight through to margins.

At the other extreme are the regions dominated by services or tourism: Piemonte, Liguria, the Autonomous Provinces of Trento and Bolzano, Valle d'Aosta. Their low exposure reflects a productive structure less dependent on energy, or a higher use of renewables.

The vulnerability you can't see: the "upstream" factor

The second map tells something more subtle. The E2 component measures how much local sectors depend on supplies exposed to energy costs — refineries, road, maritime and air transport. A territory can be low energy-consuming in its direct production yet highly vulnerable through its supply chain.

This is where the most surprising discontinuity emerges.

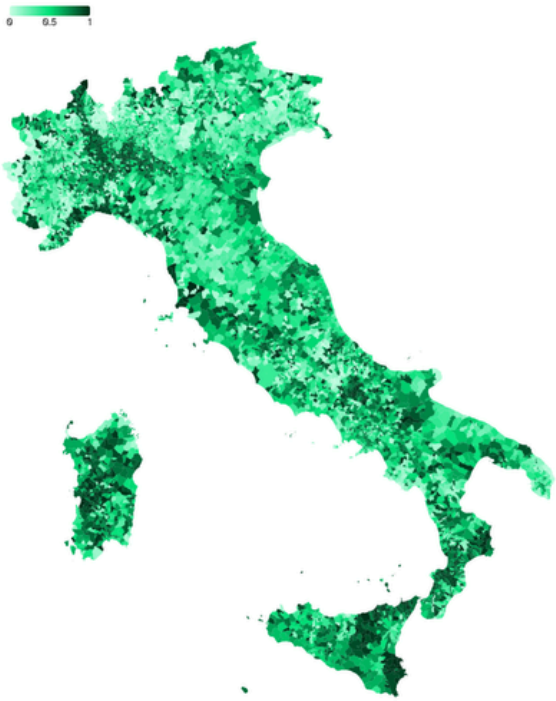
Sicilia and Puglia rank ahead of Lombardia. It is not the factory that burns energy: it is the supply chain. Priolo, Augusta, Taranto and Brindisi are coastal petrochemical hubs where every shift in the price of crude is passed on indirectly.

Map 1 | Direct energy-intensity index (E1)

Darker colour = more energy-intensive production

Map 2 | Upstream exposure index (E2)

Darker colour = greater dependence on energy supply chain



Civiqa/OpenEconomics analysis based on Istat and Eurostat data. Updated: May 2026.

It must be said clearly: no territory is immune to an energy shock.
In every Italian region there are supply chains that expose local businesses to swings in energy prices, upstream of direct production. The difference is not between those who are exposed and those who are not, but between those who are more exposed and, above all, through which mechanisms.

Some sectors and some supply chains — particularly those linked to extraction, refining and heavy logistics — amplify the energy shock far more directly than others. This is what Map 2 makes visible.

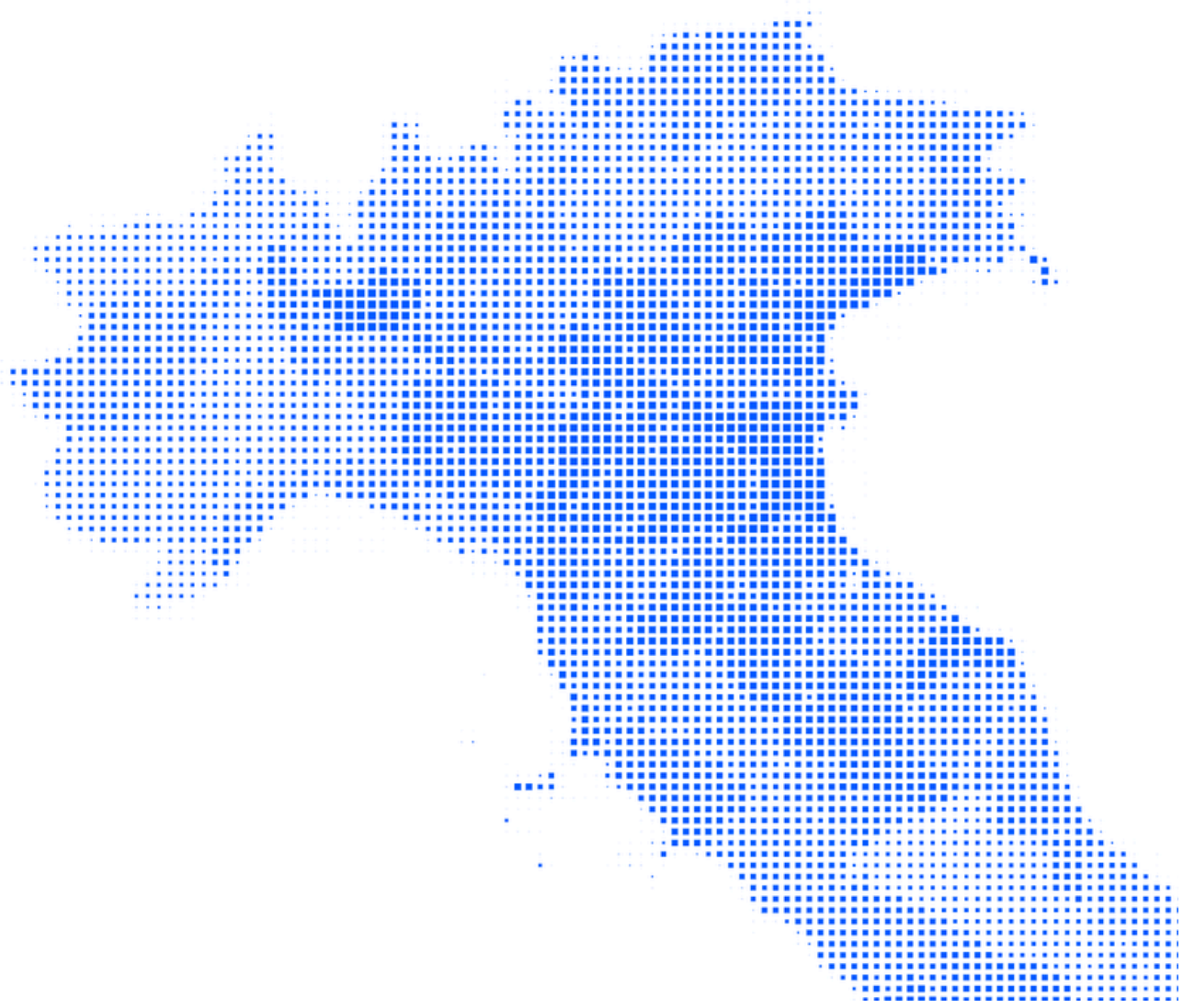
North and South have the same scores, but for opposite reasons.
Read together, the two maps deliver a clear message: in Italy there are at least two geometries of energy risk, separated by a border that is not geographic but productive.

MANUFACTURING NORTH-EAST

Exposed because it produces a great deal, in energy-intensive sectors — high E1, contained E2. The risk comes from direct production: energy communities and process efficiency.

INDUSTRIAL-PORT SOUTH

Exposed because **its supply chains depend structurally on oil and gas** — high E2, E1 often more contained. The risk comes from the supply chain: diversification and employment protection.

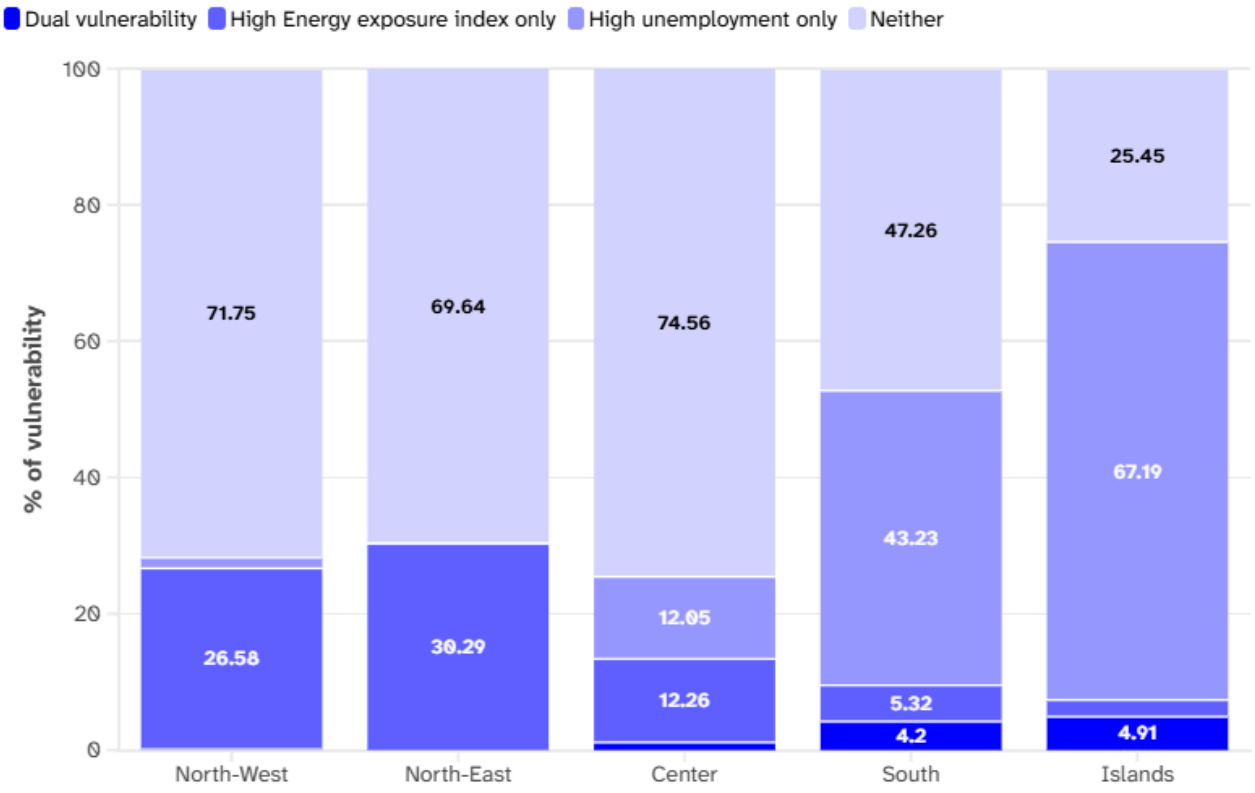


Energy exposure and the labour market: the paradox of underdevelopment

There is a reading that the EEI index alone cannot capture: when an energy shock hits a territory, the impact depends not only on how exposed it is, but on how capable it is of reacting. And the capacity to react is largely measured by the local labour market.

Across much of the Mezzogiorno, low energy exposure does not reflect the presence of a diversified productive fabric. It reflects the structural absence of industrial development. The North-East has high exposure but dynamic labour markets. When a plant shuts down in Pomigliano d'Arco or Brindisi, that alternative fabric is rare.

Chart 1 | Energy vulnerability and employment vulnerability by macro-area



Civiqa/OpenEconomics analysis based on Istat and Eurostat data. Updated: May 2026.

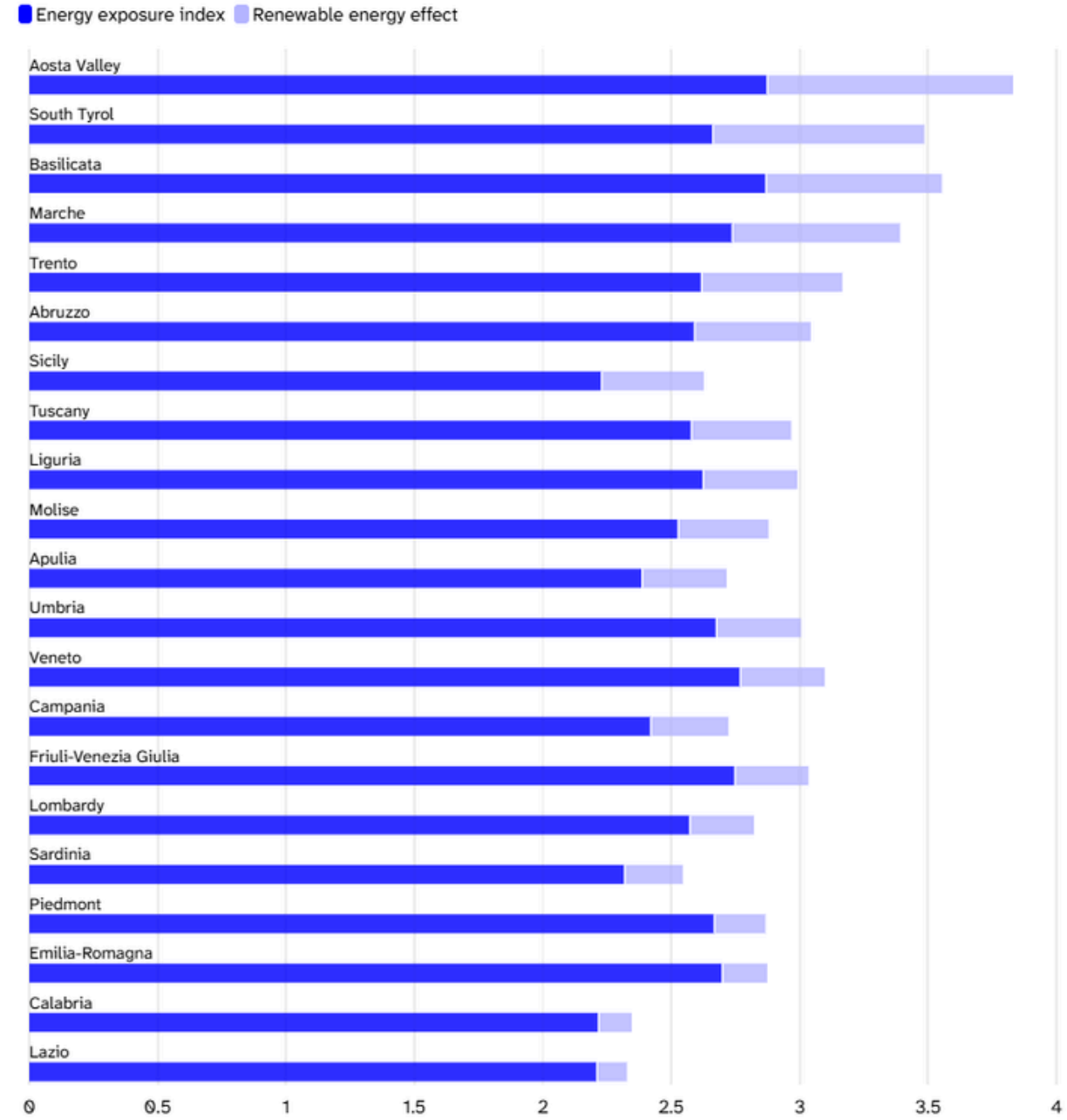
The real fault line does not run between exposed territories and protected ones. It runs between exposed territories **with the capacity to respond and territories with low exposure due to a lack of development**. For the latter, an energy shock is not the main problem: the main problem is the structural fragility that precedes it.

Renewables offer protection — but only where they are genuinely present

What happens if we factor in the use of renewable energy? The Energy Exposure Index can be adjusted downwards in territories that have a share of renewable energy. This "shield" does not apply to every territory: it depends on the share of renewable energy a territory has available.

Chart 2 | Reduction of the Energy Exposure Index from the contribution of renewables

The chart shows energy per worker used in each Italian region. The blue bar indicates energy per worker adjusted for the share of renewables, while the light-blue portion indicates the reduction achieved thanks to local renewable-energy production.



Civiqa/OpenEconomics analysis based on Istat and Eurostat data. Updated: May 2026.

In other words, renewable energy reduces energy exposure only where it has high penetration. Its effects follow a curve of increasing marginal benefits: at the lowest levels of renewable share in the provincial mix, the impact is limited; it offers far more substantial protection in high-penetration contexts.

CHAPTER 3

Provinces: three Italys, three different risks

The provincial map refines the regional picture, revealing more precisely where energy risk concentrates and, above all, where it overlaps with other structural fragilities.

AREA 1 – EASTERN PO VALLEY

Modena, Reggio Emilia, Vicenza, Verona. Decades of district-based manufacturing specialisation with high energy intensity. The risk is real, but balanced by dynamic labour markets and a business fabric with the capacity to adapt.

AREA 2 – CENTRAL-SOUTHERN ADRIATIC COAST

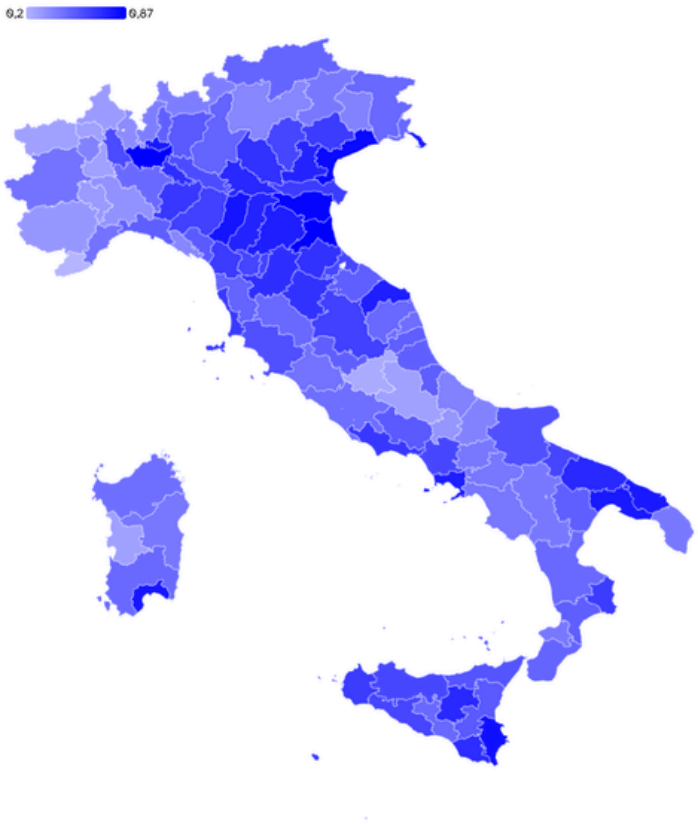
Brindisi, Taranto, Chieti, Andria. Petrochemicals, steelmaking, port logistics: exposure is high and the capacity for institutional response is structurally weaker. Crotone and Reggio Calabria present the same problem in two variants: the first with a chemical hub being decommissioned, the second with structural unemployment above 19%. In Sicily, Messina and Agrigento complete the picture: the third and fourth provinces by unemployment rate in 2024.

AREA 3 – THE TYRRHENIAN PORTS

Livorno, La Spezia, Genova, Salerno. Exposure does not depend on the direct energy intensity of local businesses, but on the vulnerability of supply chains: maritime transport and refining push the upstream component of the index upwards.

Map 3 | Energy intensity of Italian provinces

Lighter colour = lower index value / Darker colour = higher index value



Civiqa / OpenEconomics analysis based on Istat and Eurostat data. Updated: May 2026.

This map is not a snapshot of a territory's poverty or wealth. **It is a snapshot of systemic risk**. The lower-value provinces of the Centre-North are therefore not immune to shocks: they are more resilient, because they have productive structures more oriented towards services and tourism.

cHAPTER 4

Municipalities: an even more granular perspective

The EEI tool allows us to go one level deeper, down to the municipal scale: an analytically significant step. At the regional or provincial level, averages conceal extreme concentrations that can emerge at the local level. A province with average exposure may contain a single-specialisation municipality with an index close to the national maximum, and a service-based municipality with almost no exposure.

Italy's most exposed municipality does not have a refinery. It has an airport.

The most exposed municipality is Fiumicino, because of Leonardo da Vinci Airport: cargo logistics and total dependence on aviation fuel and diesel. It is not alone. Among Italy's 10 most vulnerable municipalities, airports, logistics hubs, refineries and automotive clusters coexist: different risk profiles, but all at the critical limit of the index. San Donato Milanese ranks second, owing to the weight of its industrial hub. Pomigliano d'Arco is fourth, where high exposure overlaps with the highest provincial unemployment rate in Italy. This is the value of the Energy Exposure Index: it surfaces vulnerabilities that aggregate data fail to see.

Table 2 | Top 10 municipalities by overall exposure index

#	Municipality	Prov	Region	Population	E1	E2	EEI
1	Fiumicino	RM	Lazio	82,481	0.94	0.92	0.96
2	San Donato Milanese	MI	Lombardia	32,221	0.99	0.91	0.96
3	Brindisi	BR	Puglia	82,298	0.93	0.89	0.95
4	Pomigliano d'Arco	NA	Campania	39,803	0.96	0.87	0.94
5	Augusta	SR	Sicilia	34,703	0.84	0.99	0.94
6	Peschiera Borromeo	MI	Lombardia	24,393	0.93	0.93	0.94
7	Collesalvetti	LI	Toscana	16,410	0.94	0.99	0.94
8	Castel San Giovanni	PC	Emilia-R.	14,139	0.98	0.97	0.94
9	Somma Lombardo	VA	Lombardia	17,794	0.97	0.92	0.94
10	Ortona	CH	Abruzzo	22,099	0.95	0.88	0.93

Civiqa/OpenEconomics analysis based on Istat and Eurostat data. NOTE: only municipalities with more than 500 employees are included. Updated: May 2026.

Four profiles, four different stories

The score-based ranking is useful for identifying priority municipalities, but it does not capture the diversity of risk profiles. The matrix distinguishes those at high direct risk (high E1) from those who are vulnerable through the supply chain (high E2). This segmentation matters because, where possible, it points towards different mitigation measures.

Map 4 | Matrix of municipal energy exposure (E1 × E2)

The blue quadrant (High E1 / High E2) identifies the municipalities most exposed to risk.
The green quadrant (Low E1 / Low E2) gathers the most resilient municipalities.

Civiqa/OpenEconomics analysis based on Istat and Eurostat data. Updated: May 2026.

How does your territory rank?

The maps and charts in this report will be made available on the Civiqa.it site in a navigable, interactive version, through periodic in-depth articles.

civiqa.it/scenarios

Hub, belt or periphery? The risk changes

Risk also depends on the DNA of territories. Italy's 7,890 municipalities can be further reclassified into categories, each corresponding to very different exposure profiles.

Table 3 | Average exposure by territorial class

Class	Economic exposure	Total exposure
Hub	0.49	0.68
Inter-municipal hub	0.44	0.61
Belt	0.52	0.51
Peripheral	0.42	0.36
Ultra-peripheral	0.37	0.30

Civiqa/OpenEconomics analysis based on Istat and Eurostat data. Updated: May 2026.

URBAN HUBS | MORE PEOPLE, GREATER SOCIAL IMPACT

Urban hubs reach the highest total exposure (0.681): large cities are where many people live and work, and this amplifies the social reach of any energy shock, even when the productive structure itself is relatively unexposed. Milan, Rome and Naples are not cities of foundries or refineries — but a shock affecting public transport, heating or urban logistics is transmitted to millions of people at once.

BELT TERRITORIES | THE HIDDEN RISK OF THE PRODUCTIVE PERIPHERY

Here the picture is reversed: in 3,712 municipalities the economic component prevails over the demographic one. These are the satellite municipalities of the industrial hubs — the productive peripheries of Emilia, Veneto and Puglia: manufacturing accounts for a high share of the workforce relative to the resident population. The vulnerability is more concentrated, less visible in aggregate statistics, but just as real.

PERIPHERAL AND ULTRA-PERIPHERAL AREAS | THE INVISIBLE VULNERABILITY

This is the most delicate reading. Low values on both components do not mean safety, but often isolation. In these municipalities, low exposure coexists with extreme local peaks — a small town with a single manufacturing plant or a quarry, where the closure of just one facility is equivalent to the end of the local labour market.

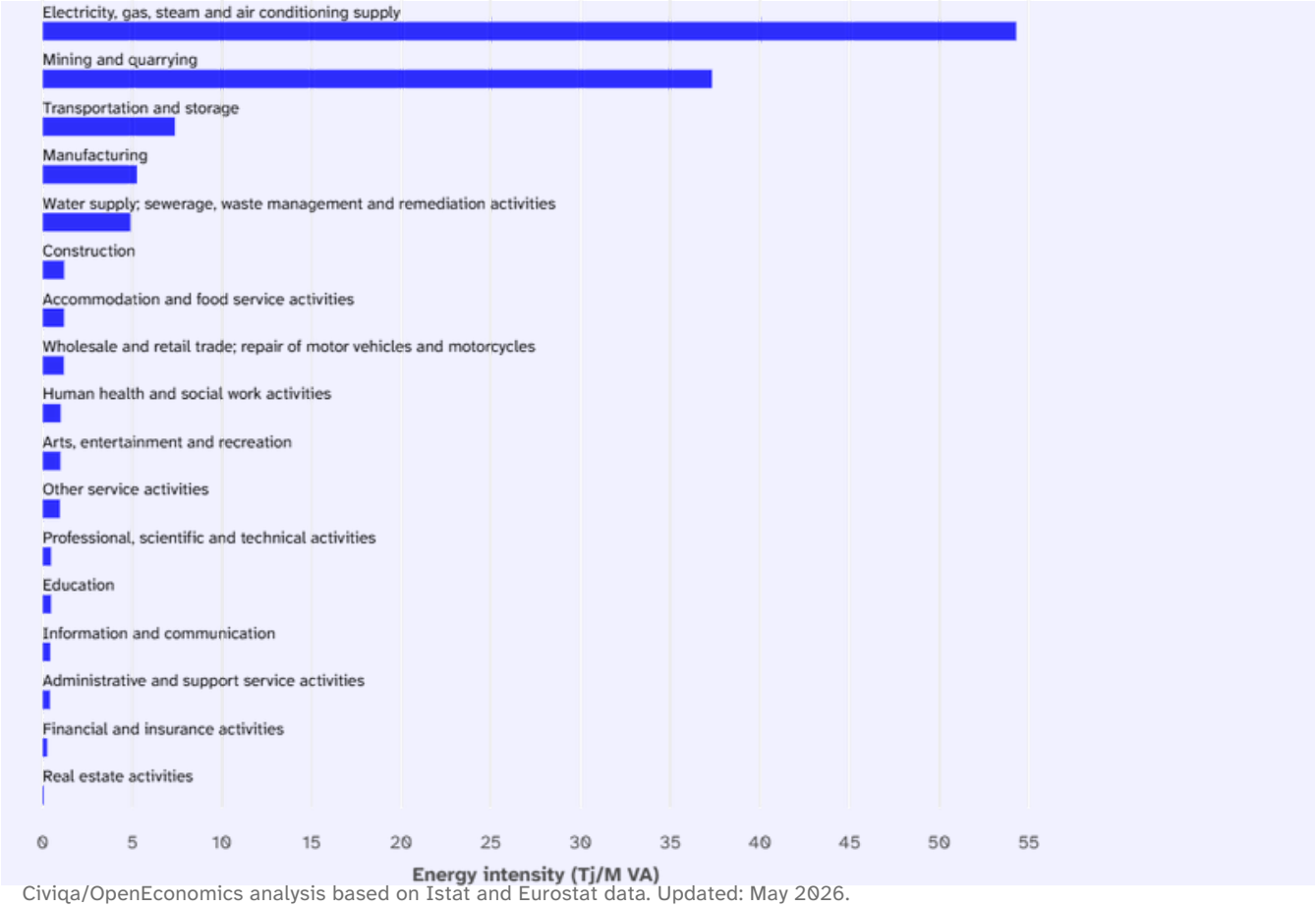
Italy's 176 urban hubs concentrate the social reach of energy risk. Its 3,712 productive belts hide it within aggregate statistics.

CHAPTER 5

Industrial districts: where the risk has a name

Going down to the district level enriches the reading and shapes the nature of the measures needed.

Chart 3 | Energy intensity by sector (TJ / million € of value added)



Civiqa/OpenEconomics analysis based on Istat and Eurostat data. Updated: May 2026.

DUAL-EXPOSURE DISTRICTS

These are the ones where both energy intensity and dependence on oil & gas are high. Taranto and Brindisi are the clearest example: the energy shock spreads simultaneously to direct production costs and to raw-material costs, with no room to offset. Porto Marghera, already partly decommissioned for over a decade, remains among the most exposed industrial concentrations in the North-East.

AREAS OF EMERGING RISK

Brescia and Valcamonica for their foundries, and the Calabrian municipalities specialised in cement and bricks, have less diversified productive structures that amplify the impact of any contraction in activity. Brescia is Italy's largest steel district by volumes produced with the electric arc furnace: technically less exposed than Taranto's integrated cycle, but equally vulnerable to swings in the price of electricity.

HIGH ENERGY-INTENSITY ZONES

Sassuolo (ceramics), Lucca and Pistoia (paper), Murano (glass): they depend on gas for thermal processes above 1,000°C. Not electrifiable in the short term. Every increase in the price of gas passes straight through to margins, with no possibility of technical substitution within the 2026 horizon.

> From the petrochemical hubs of the South to the glass, paper and ceramics districts, vulnerability grows where energy alternatives and productive diversification are missing.

NOTE

How the Energy Exposure Index is built

A.1 — THE LOGIC OF THE INDEX

The EEI is a composite index with a multiplicative structure that combines three channels: direct energy intensity (E1), upstream dependence (E2) and demographic weight (S). A municipality turns out to be highly exposed only when all three channels converge.

$$EconomicExposure(c) = \sqrt{(E1(c) \cdot E2(c))}$$

$$OverallExposure(c) = \sqrt{(EconomicExp. \cdot S(c))}$$

All factors are expressed as a percentile rank (0–1) over the national distribution of the 7,890 municipalities. The raw distribution is strongly skewed (skewness ≈ 5.5): the percentile rank preserves the ordering while removing sensitivity to extreme values.

A.2 — ENERGY INTENSITY (E1)

A weighted average of sectoral energy intensity, using employment shares by NACE section as weights:

$$E1raw(c) = \sum_s w(c,s) \cdot EI(s)$$

EI(s) is the intensity in toe per million euros of VA. Calculated across 17 sectors and 7,890 municipalities, year 2022.

A.3 — RENEWABLES CORRECTION

The provincial renewable share attenuates exposure to fossil costs before the percentile is calculated:

$$E1adj(c) = E1raw(c) \cdot (1 - 0.33 \cdot R^2)$$

The R^2 term produces a contained attenuation at low shares and a marked one only at high penetration. Median raw E1: 2.469 — adjusted: 2.129 (Δ −0.289 toe/€mn VA).

A.4 — UPSTREAM EXPOSURE (E2)

Measures indirect exposure to energy-critical sectors: refining (H49), land transport (H49), maritime (H50), air (H51).

$$upstream\_exp.(c) = \sum_s w(c,s) \cdot upstream\_intensity(nuts3,s)$$

E2 is moderately correlated with E1 (Pearson ≈ 0.74; Spearman: 0.56 percentiles): the two dimensions are analytically distinct and justify a separate representation.

A.5 — DEMOGRAPHIC SCALE (S)

Percentile rank of the resident municipal population. It introduces the social reach of risk: for a given productive structure, a more populous municipality concentrates more workers and families in a vulnerable context.

A.6 — HOW TO READ THE SCORE

Value (0–1)	Interpretation
~0.50	Median - in line with the norm
~0.75	Third quartile — above average
~0.90	Top 10% — high exposure
~0.96	Top ~1% - maximum exposure

A.7 — SOURCES AND INPUT DATA

Data	Source
Municipal employment by NACE sector	Istat (2022)
Sectoral energy intensity	Istat (17 sectors)
Input-output tables	Eurostat / OpenEconomics
Provincial renewable share	TERNA

Where to find the data for your territory?

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Civiqa

CCiviqa is a cloud platform developed by OpenEconomics and powered by Artificial Intelligence, enabling policy makers, officials and technical staff to manage the acquisition of resources and the spending of municipalities simply, effectively and securely, while reducing risks.

Civiqa's first module — free of charge — is the **Data Room**, the starting point for planning: a diagnostic tool for understanding citizens' priorities, comparing socioeconomic indicators and shaping a territory's development strategy on the basis of robust, up-to-date information.

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OpenEconomics

OOpenEconomics offers integrated solutions for socioeconomic impact analysis and a public-funding factory, supporting businesses and public administrations in mitigating financial, social and climate risks.

Drawing on many years of experience, deep legal and economic expertise and a factory of SaaS platforms and agentic AI, OpenEconomics introduces a paradigm shift in socioeconomic impact analysis: it enables clients to carry out advanced analyses independently and offers results-oriented advisory support on the most strategic and complex matters.

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