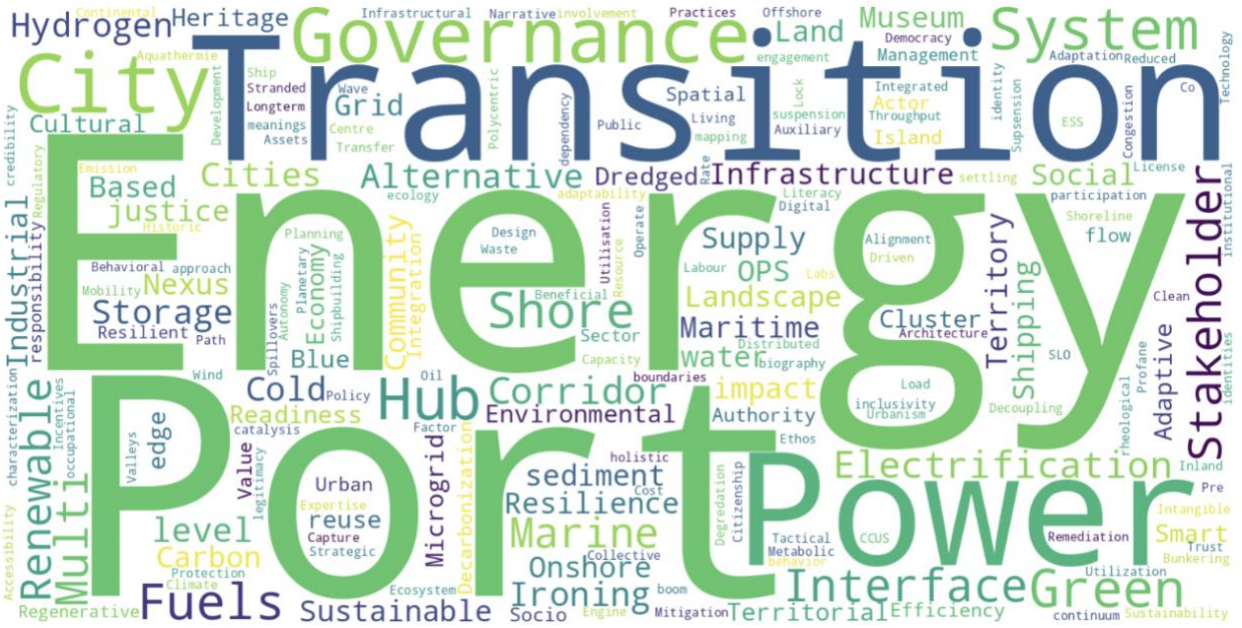
COST Action CA23138

Port City Territories in Action: A Collaborative Laboratory for Inclusive Energy Transition (PACT)

WG3 – Theoretical Knowledge

Database and report on taxonomy and glossary of different disciplines and stakeholders on port city territories and energy transition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1. Introduction

COST Action CA23138, *Port City Territories in Action: A Collaborative Laboratory for Inclusive Energy Transition (PACT)*, addresses the complex transformations that port city territories are undergoing in response to the transition from fossil-fuel-based to renewable and low-carbon energy systems. The Action recognises port city territories as particularly significant spaces for understanding energy transition because they concentrate infrastructures, industries, logistics, energy systems, urban populations, environmental resources and multiple forms of governance within the same territorial setting. At the same time, these territories are characterised by longstanding social, spatial, economic and ecological tensions. Energy transition in port city territories therefore cannot be understood exclusively as a technological process. It is also a question of territorial transformation, governance, social justice, environmental sustainability, cultural identity and the redistribution of costs, benefits and responsibilities.

The Action is structured around five Working Groups, with WG3 dedicated to Theoretical Knowledge. According to the official PACT structure, WG3 is responsible for creating a shared glossary and taxonomy capable of bringing together diverse perspectives on energy transitions in port city territories and of bridging academic, professional and civic knowledge. The work presented in this deliverable responds to this objective. It documents the first phase of the collective process undertaken by WG3 to identify, organise and critically examine the terminology through which energy transition in port city territories is currently understood. The deliverable presents the initial database of terms collected from members of the WG3, describes the methodology through which these terms were gathered and organised, and explains the subsequent phase of collective discussion that is currently being developed.

The purpose of the work is not to produce a conventional dictionary in which every concept is reduced to a single, universally accepted definition. Rather, WG3 approaches glossary-making as a form of knowledge production. The diversity of definitions collected through the process is considered an important source of knowledge because differences in terminology often reveal differences in disciplinary assumptions, professional practices, institutional responsibilities, cultural contexts and values. The work therefore proceeds from the premise that establishing a common vocabulary does not necessarily mean eliminating conceptual differences. On the contrary, an inclusive common vocabulary should make differences intelligible and provide participants with the capacity to understand where meanings converge, where they diverge and why.

2. The role of WG3 in PACT

WG3 – Theoretical Knowledge occupies a specific position within the broader PACT methodology. While the Action addresses the practical and territorial dimensions of energy transition through its collaborative framework and pilot activities, the work of WG3 addresses the conceptual conditions that make communication and collaboration across these different fields possible.

Port city territories are characterised by a particularly high degree of conceptual complexity. The same phenomenon can be described through very different vocabularies depending on the actor observing it. For an energy engineer, for example, electrification may primarily refer to electricity infrastructure, grid capacity and power demand. For a port authority, it may involve investment, operational continuity and regulatory compliance. For a municipality, it may concern urban emissions, public health and territorial planning. For workers, it may be associated with

changing skills and employment conditions, while for residents it may be experienced through changes in air quality, noise, mobility or changes in land use driven by the transition. These interpretations are not simply different ways of expressing the same idea – they can represent substantially different understandings of what the energy transition is, what its objectives should be and who should benefit from it.

WG3 therefore addresses a fundamental challenge for PACT: how can participants from different disciplines, sectors, cultures and scales develop a sufficiently shared conceptual language to work together without suppressing the plurality of knowledge and experience that makes such collaboration valuable? The work on the taxonomy and glossary is intended to respond to this challenge. The glossary is conceived as a common conceptual infrastructure for the PACT network: a resource that can facilitate communication while also making visible the assumptions, tensions and values embedded in the terminology used by different communities.

3. Objectives of the work

The work undertaken by WG3 has two closely connected objectives. The first concerns the establishment of a taxonomy and glossary of concepts relevant to energy transitions in port city territories. This first task involves identifying the terms that different participants consider important, collecting their definitions and descriptions, recognising overlaps and repetitions, and organising the resulting conceptual material into meaningful thematic domains.

The second objective concerns the development of a future framework for the operationalisation of these concepts. Once the initial terminology has been collected, the challenge is to understand how concepts can be applied across different contexts and how their meanings change when they move between disciplines, professional environments and stakeholder groups. This second objective is particularly important for concepts such as just transition, resilience, sustainability, stakeholder, energy justice or port-city territory. These terms are frequently used across different fields, but their meanings cannot automatically be assumed to be identical. Their operationalisation therefore requires an understanding of the different conceptual and normative positions from which they are used.

The work is consequently conceived as an iterative process. The initial glossary provides the material through which conceptual differences can be explored, while the subsequent discussions contribute to the refinement of the taxonomy and to the development of a framework capable of accommodating plural understandings.

4. Methodological approach: collective knowledge production

The methodology developed by WG3 combines collective discussion, survey-based knowledge collection, thematic organisation, World Café discussions and co-production. This methodological choice reflects the composition and purpose of the WG. Rather than relying exclusively on a literature review or on definitions established by a limited number of disciplinary experts, WG3 sought to mobilise the knowledge distributed across its membership.

The first stage consisted of collective consultations conducted online and complemented by in-person exchanges associated with PACT meetings and pilot activities. These exchanges provided an initial opportunity to set objectives, identify the concepts that participants considered particularly relevant to understanding energy transition in port city territories. The discussions demonstrated the breadth of terminology used across the network and highlighted

the importance of capturing concepts from different areas of expertise. The work consequently moved towards a more systematic collection of terms through a survey.

The survey involved the 113 members of WG3 and asked the participants to identify concepts that they considered relevant to the glossary and to provide associated descriptions. This process was intentionally open to different disciplinary and sectorial backgrounds. It enabled participants to contribute not only established technical terminology but also concepts emerging from governance, social sciences, planning, environmental studies, logistics, labour, justice and territorial research. Thirty-three participants contributed terms through this process. The survey generated approximately 200 raw terms and associated descriptions. The responses demonstrated significant diversity, with some concepts appearing repeatedly and with several terms being accompanied by substantially different descriptions.

Rather than treating these differences exclusively as duplication, WG3 considered whether variations in descriptions represented meaningful conceptual differences. This distinction is central to the methodology. Where several participants provided essentially the same meaning, repetitions could be consolidated. Where different descriptions revealed different disciplinary or sectorial understandings, the plurality of definitions was retained. Following this screening process, the initial material was reduced to a working list of approximately 165 terms. The resulting list constitutes the current database and the basis for the next phase of the work.

5. Organisation of the initial glossary

The collected terms were subsequently organised into nine thematic groups. This organisation was undertaken as a pragmatic way of structuring the large amount of material generated through the survey and of facilitating the next phase of collective discussion.The nine groups cover port energy systems and electrification; renewable and alternative energy sources; governance, policy and stakeholder engagement; urban, port-city and territorial integration; energy justice and social equity; infrastructure, ports and logistics; environmental sustainability and circularity; risk, resilience and adaptation; and monitoring, metrics and planning.

The thematic organisation should not be understood as a final taxonomy. The boundaries between the groups are intentionally porous. Many concepts operate simultaneously across several domains. Energy justice, for example, relates to governance, infrastructure, environmental health, social participation and territorial inequality. Similarly, port electrification is simultaneously an engineering question, an infrastructure question, an investment question, an environmental question and a social question. The thematic groups therefore provide an initial structure rather than a rigid classification system. One of the objectives of the next phase is to examine these relationships and determine whether the current taxonomy adequately captures the connections between concepts.

6. What the first phase has produced

The first phase has produced three principal outcomes. The first is a substantial collective database of terminology. The approximately 165 terms currently retained in the working list provide a broad representation of the concepts that members of WG3 consider relevant to energy transition in port city territories. The second outcome is the identification of considerable conceptual plurality. Several terms were associated with multiple descriptions, demonstrating that participants do not necessarily share a single understanding of key concepts. This is particularly evident in terms related to governance, justice, resilience, territorial integration and

sustainability. The third outcome is methodological. The process has demonstrated that the glossary itself can become a site of knowledge exchange. Participants have not simply contributed definitions; they have also revealed different ways of framing the problems associated with energy transition.

This is particularly relevant to the PACT objective of bridging academic, professional and civic knowledge. A glossary that only reproduces disciplinary definitions would risk reproducing the divisions that the Action seeks to overcome. The WG3 process instead aims to use the glossary as a mechanism for making those divisions visible and opening them to dialogue.

7. From a glossary of terms to an inclusive glossary-making process

The completion of the first collection phase marked the beginning of a second stage of WG3 work. The central question of this stage is no longer simply which terms should be included in the glossary; instead, the focus has shifted towards understanding how different participants interpret those terms and what these interpretations reveal about energy transition in port city territories.

Nine thematic subgroups have therefore been established, each coordinated by a subgroup leader and moderator. The groups are currently undertaking a series of parallel online discussions based on the terms collected during the first phase. The methodology used for these discussions is based on a World Café approach. However, the objective differs from a conventional consensus-oriented workshop. Participants are explicitly encouraged to explore plurality rather than to produce a single agreed definition. The purpose of the discussions is to identify how the same term can carry different meanings across disciplines and sectors, to explore tensions and contradictions between these interpretations, and to identify the values that underpin them.

This approach responds directly to the question of inclusivity. If the glossary is intended to provide a common framework for PACT, it is important to ask not only whether participants can agree on a definition but also whether the process through which the definition is produced adequately represents the diversity of knowledge within the Action. The second phase therefore treats disagreement as valuable information. A disagreement over a term may reveal a difference in disciplinary perspective, a difference in professional responsibility, a difference in political or ethical priorities, or a more fundamental difference in how a phenomenon is understood.

8. The World Café discussions

The subgroup discussions follow common guidelines distributed by the WG3 leadership. The guidelines establish a shared methodological approach while allowing each group to adapt the discussion to its own thematic material. The discussions begin with the raw definitions collected during the survey. Participants are invited to consider whether they agree with the definitions, whether they consider them complete and whether they understand the terms differently.

The discussion then moves towards semantic differences. The objective is to make visible how the same word may represent different conceptual worlds. This is particularly important in port city territories because the same term may be used simultaneously by port authorities, municipalities, shipping companies, logistics firms, workers, residents, environmental

organisations, regulators and researchers. These actors may use identical terminology while attaching different technical, economic, political, social or ethical meanings to it.

The discussions therefore examine three types of semantic difference. The first concerns scope: one interpretation may encompass more elements than another. The second concerns values: participants may describe a similar phenomenon but attach different normative priorities to it. The third concerns ontology: participants may have fundamentally different understandings of what the phenomenon itself is. The discussions subsequently explore tensions and controversies. Participants are asked where conflicts arise, what is at stake in different interpretations and what might be lost if one interpretation becomes dominant. Terms are also examined for their political or strategic dimensions and for the extent to which they generate controversy. The next stage concerns values. Participants are encouraged to identify what each interpretation seeks to protect, what it seeks to transform and what it considers to constitute success. This step is important because apparently technical definitions can contain strong normative assumptions.

Finally, the group seeks to formulate a definition or set of definitions that reflects the discussion. Consensus may emerge, but consensus is not the objective. Where a single definition would artificially conceal important differences, the subgroup may retain multiple definitions or construct a layered definition that makes tensions explicit.

9. The analytical principle: clarity without artificial consensus

A key principle guiding the second phase is that a successful glossary does not necessarily produce uniformity. The desired outcome is rather clarity combined with complexity. In practical terms, this means that a final glossary entry may include a broad conceptual core while also identifying important tensions. Alternatively, it may explicitly distinguish between different interpretations of the same concept. For example, port resilience may simultaneously refer to the technical robustness of infrastructure, the economic continuity of port operations, ecological recovery or the capacity of local communities to adapt. A conventional glossary might select one definition. The WG3 approach instead asks what is gained and lost through each interpretation.

The same principle applies to concepts such as just transition. The term may be understood primarily in relation to employment and workers, or more broadly in relation to environmental burdens, public health, participation, territorial inequalities and the distribution of benefits. These meanings should not necessarily be collapsed into one formulation before their differences have been examined. The objective is therefore to create a glossary that enables participants to understand one another better precisely because it documents the conceptual differences between them.

10. Standardisation of the subgroup process

Although the discussions are exploratory, WG3 has introduced a standardised reporting structure to ensure that the material generated by the nine groups can subsequently be compared and synthesised. Each subgroup records information about the participants and the terms discussed and provides a short narrative describing the context and overall character of the discussion. For each term, the subgroup records the principal differences in framing, semantic differences, tensions and controversies, values and resulting definition or definitions.

The groups are also asked to identify broader contradictions and paradoxes that emerged across several terms. This is particularly important because some tensions may not belong to individual concepts but may instead reveal structural dilemmas affecting energy transitions in port city territories as a whole. Finally, each group considers the implications of its discussion for policy, technology development, social change and governance and identifies the key messages that should contribute to the subsequent WG3 publication. This common reporting framework allows the richness of the individual discussions to be retained while providing sufficient consistency for cross-group analysis.

11. The emerging contribution of WG3

The work undertaken to date suggests that the WG3 glossary will have a function beyond terminological clarification. First, it will provide a common conceptual resource for the PACT network; participants working across different disciplines and sectors will be able to identify how key terms are used and where different meanings exist. Second, it will contribute to the development of a shared framework for understanding energy transition in port city territories; by bringing technical, spatial, environmental, social and governance concepts into the same conceptual space, the glossary can support the interdisciplinary work of the Action. Third, and most importantly, the process will contribute to PACT's objective of developing genuinely inclusive approaches to energy transition. Inclusivity is not only an outcome to be measured after a transition has been designed. It can also be embedded in the production of knowledge through which the transition is conceptualised.

This is why the second phase of WG3 focuses explicitly on the making of the glossary itself. The process asks whose knowledge is represented, which meanings are privileged, what assumptions are embedded in apparently neutral concepts and whether alternative perspectives are made visible.

12. Towards the next WG3 publication

The current World Café discussions constitute the beginning of the next phase of WG3 work, which will lead to a publication addressing the question of inclusivity in defining energy transition in port city territories. The publication will build on the database presented in this deliverable but will move beyond the simple presentation of terminology. It will analyse the semantic differences, tensions and values identified through the subgroup discussions and consider what these reveal about the possibility of developing a common conceptual framework for PCT energy transitions. In this respect, the current deliverable provides both a substantive and methodological foundation for the next output. The database provides the empirical material, while the World Café methodology provides the means through which that material can be critically interpreted. The next stage will therefore examine not only which terms belong in the glossary, but also how their meanings are shaped by the positions from which they are used.

13. Conclusion

The work undertaken by WG3 has established the first collective basis for a taxonomy and glossary of concepts related to energy transition in port city territories. The process began with collective discussions and exchanges within the PACT network and was subsequently developed through a survey involving participants from different disciplinary and sectorial backgrounds. The survey generated approximately 200 raw terms and associated descriptions.

Following the removal of repetitions and initial consolidation, approximately 165 terms were retained as a working database.

The terms were organised into nine thematic groups to provide an initial structure for the material. This organisation has made visible the breadth of concepts required to understand energy transition in PCTs, extending from energy infrastructure and alternative fuels to governance, territorial integration, justice, labour, resilience, environmental sustainability and monitoring. The first phase has also demonstrated that the challenge is not simply to establish a common vocabulary. Different participants frequently use the same terms with different meanings, reflecting different disciplinary traditions, professional responsibilities, institutional positions and values.

For this reason, WG3 has initiated a second phase based on nine parallel subgroup discussions using a World Café methodology. The objective of these discussions is not to eliminate disagreement or to force consensus. Rather, they seek to explore plurality, identify semantic differences, make tensions visible and understand the values underlying different interpretations.This approach allows the glossary to become more than a technical reference document. It becomes a record of the diversity of knowledge within PACT and a tool for building a common framework without suppressing conceptual plurality.

The work is therefore moving from the collection of terminology towards the collective examination of meaning. The initial database provides the foundation for this process, while the ongoing World Café discussions will contribute to the development of an inclusive glossary and to the subsequent WG3 publication on the role of inclusivity in defining energy transition in port city territories.

WORKING GLOSSARY

Group 1 – Port Energy Systems and Electrification

- **Cold Ironing / Shore Power / Onshore Power Supply (OPS)**

***Definition 1*:** The supply of electricity from the onshore grid to ships at berth, allowing onboard generators to be switched off. It reduces local air pollution (NO_x, SO_x, PM) and CO_2 emissions, but requires significant grid upgrades and standardisation.

Definition 2: OPS (on-shore power supply) or Cold Iron: providing electric energy from the shore to berthing ships in order to avoid their use of fossil-fuel-based onboard generators, which produce CO_2 emissions closer to the city territory.

Definition 3: A technology allowing ships at berth to connect to onshore electricity instead of running auxiliary engines, significantly reducing local air pollution and greenhouse-gas emissions in port cities.

***Definition 4*:** A technology allowing ships to connect to the local electricity grid while at berth, enabling engines to be switched off and significantly reducing greenhouse-gas emissions, air pollution and noise in port cities.

Definition 5: The provision of electrical power from the onshore grid to vessels at berth, enabling ships to switch off auxiliary engines. OPS contributes to the reduction of greenhouse-gas emissions and local air pollution in port cities and requires dedicated grid infrastructure, power-conversion systems and compliance with international technical standards.

Definition 6: The deployment of electricity-based infrastructure that allows vessels to switch off auxiliary engines at berth and use onshore electricity, reducing local air pollution, noise and greenhouse-gas emissions.

- **Cold Ironing Utilisation Rate**

The proportion of time or number of port calls during which ships actively use shore power instead of onboard auxiliary engines.

- **Port Electrification**

The replacement of fossil-fuel-based port equipment and vehicles with electric alternatives, supported by upgraded power infrastructure.

- **Electrification of Port and Port-City Systems**

***Definition 1*:** Electrification refers to the replacement of fossil-fuel-based energy uses with electricity across port and urban activities, such as cargo-handling equipment, terminal operations, hinterland transport, ferries and urban mobility.

***Definition 2*:** The replacement of fossil-fuel-based equipment with electrically powered alternatives in port handling, logistics and transport activities. Electrification is a key pathway for decarbonisation but requires adequate grid capacity, charging infrastructure and power-quality management.

- **Port Energy System / Port-Integrated Energy System (PIES)**

A coordinated energy system that integrates electricity supply, renewable generation, energy storage and demand from port operations, industrial areas and adjacent urban zones. PIES aims to enhance energy efficiency, decarbonisation and grid reliability in port city territories through integrated planning and system operation.

- **Multi-Energy System**

An integrated system that combines multiple energy carriers, such as electricity, gas, hydrogen and heat, and conversion technologies such as electrolysers, fuel cells and heat pumps, enabling higher efficiency and flexibility in port energy systems.

- **Energy Storage Systems (ESS)**

***Definition 1*:** Technologies such as batteries, hydrogen storage, thermal storage or pumped hydro that provide flexibility, peak shaving and resilience in port energy networks with high renewable penetration.

***Definition 2*:** Technologies that store electrical energy for later use, including battery-based and hybrid systems. ESS provides grid flexibility by balancing renewable generation, managing peak demand and supporting frequency and voltage stability in port and urban distribution networks.

- **Shore Power System Capacity**

The maximum electrical power that an onshore supply system can deliver to berthed vessels, determined by ship demand profiles, berth configuration and grid constraints.

- **Power Quality and Grid Stability**

The maintenance of acceptable voltage, frequency and waveform characteristics within electrical networks supplying port and industrial loads. Power quality and stability are critical enabling conditions for the reliable operation of electrified port infrastructure and renewable-energy systems.

- **Renewable Energy Curtailment**

The reduction of renewable electricity output due to network constraints, system-security requirements or limited demand. Curtailment indicates structural challenges in grid integration and highlights the need for network reinforcement, storage solutions and advanced control strategies.

Group 2 – Renewable and Alternative Energy Sources

- **Alternative Marine Fuels**

***Definition 1*:** Low- or zero-carbon fuels such as hydrogen, ammonia, methanol or biofuels used to reduce greenhouse-gas emissions from shipping and port operations.

***Definition 2*:** Low-carbon and zero-carbon fuels such as green hydrogen, ammonia, methanol and biofuels that are increasingly central to port energy infrastructure and planning.

***Definition 3*:** Marine fuels whose full lifecycle greenhouse-gas emissions and wider environmental impacts are demonstrably compatible with planetary boundaries, including strict avoidance of high indirect land-use-change feedstocks, verified sustainability certification and full traceability from feedstock origin to bunkering.

- **Hydrogen Readiness / Hydrogen Hub / Hydrogen Valleys**

***Definition 1*:** The capacity of infrastructure and institutions to adopt hydrogen-based energy systems.

***Definition 2*:** A coordinated system for producing, importing, storing and distributing hydrogen and derivatives such as ammonia and methanol.

***Definition 3*:** Geographically concentrated ecosystems, often anchored in port cities, where hydrogen is produced, stored, distributed and used across multiple sectors such as shipping, industry, mobility and power generation.

- **Renewable Maritime Corridors / Green Shipping Corridors**

***Definition 1*:** Strategic maritime routes where ports, shipping companies and regulators coordinate to implement low- or zero-emission fuels and technologies, supported by harmonised standards, infrastructure and investment.

***Definition 2*:** Maritime routes between one or more ports that enable the testing and uptake of zero-emission lifecycle fuels and technologies, with the ambition of achieving zero greenhouse-gas emissions across the value chain of the corridor in support of equitable sector-wide decarbonisation.

- **Offshore Wind Energy**

Electricity generation from wind turbines installed near or within port areas, using strong and consistent coastal winds to supply clean energy for port operations.

- **Wave Energy**

Electricity generated from the motion of ocean waves using energy converters installed near port infrastructures, providing a predictable renewable energy source for port facilities and coastal operations.

- **Aquathermie**

The extraction and use of thermal energy from surface water, wastewater or groundwater for heating and cooling.

- **Port-Based Renewable Energy Hubs**

The development of ports as production, storage and distribution centres for renewable energy, such as offshore wind, solar PV and green hydrogen, leveraging ports' spatial, logistical and industrial advantages.

- **Clean Fuels**

Energy sources that produce zero greenhouse-gas emissions along their whole supply chain, reducing air pollutants during production and use and supporting decarbonisation and improved environmental and public-health outcomes.

Group 3 – Governance, Policy and Stakeholder Engagement

- **Stakeholder**

An actor—individual, organisational or institutional—who holds an interest, a form of influence or a degree of responsibility within a collaborative process. Stakeholders contribute knowledge, resources and perspectives that shape decisions and collective outcomes.

- **Stakeholder Governance**

Governance arrangements addressing the coordination of port authorities, operators, shipping lines and communities through models such as public-private partnerships in order to align interests and investments for energy transitions.

- **Multi-Level Governance**

***Definition 1*:** Decision-making distributed across local, metropolitan, national and international levels, including maritime bodies and trade regimes. Port energy transitions depend on this layering because many key levers, such as fuel standards, shipping regulation, grid investment and industrial permitting, operate at different scales.

***Definition 2*:** Coordinated decision-making across scales, including municipal, port-authority, regional, national, EU and IMO levels, and across sectors such as energy, transport and industry.

- **Adaptive Governance**

Flexible, learning-based governance approaches that can respond to uncertainties, technological change and social feedback, supporting resilient energy transitions in port city territories.

- **Just Transition / Just Energy Transition in Port Cities**

***Definition 1*:** A policy and governance approach ensuring that the shift to low-carbon port operations is socially fair, protecting workers, communities and vulnerable groups from disproportionate economic and employment losses.

***Definition 2*:** A framework ensuring that energy transition in port territories is socially inclusive, addressing employment impacts, skills transformation, health benefits and equitable distribution of costs and benefits among workers and local communities.

- **Trust, Legitimacy and Institutional Credibility**

The role of social trust and institutional legitimacy in shaping public acceptance of energy-transition policies and projects, with particular attention to transparency, accountability and governance relations between institutions, communities and stakeholders.

- **Regulatory Alignment**

The harmonisation of local, national and international regulations to support clean-energy deployment in ports.

- **Public Participation and Social Consultation**

The involvement of local communities and social actors in decision-making processes related to energy transition in port city territories, including mechanisms of participation, co-creation and dialogue that shape the social legitimacy and acceptance of transition policies and infrastructures.

- **Energy Citizenship**

The active role of residents, workers and local communities in shaping energy transitions through participation, collective action, governance and everyday practices rather than as passive consumers.

- **Co-Design**

Collaborative processes through which multiple stakeholders jointly develop solutions, ensuring that technical, social and environmental perspectives are integrated into energy-transition initiatives.

Group 4 – Urban, Port-City and Territorial Integration

- **Port-City Energy Nexus / Urban-Port Energy Interface**

***Definition 1*:** The interdependent relationship between port activities, urban energy demand, logistics, industry and surrounding communities, highlighting how energy-transition decisions affect both port operations and city systems.

***Definition 2*:** The interaction zone between urban and port energy systems.

- **Port-City Interface / Port-City Edge**

***Definition 1*:** The physical, institutional and socio-economic interaction zone between port infrastructure and the urban fabric, where energy-transition measures must balance industrial efficiency, environmental protection and urban quality of life.

***Definition 2*:** A spatially and functionally articulated threshold situated between port territories and the urban fabric, where maritime and urban systems converge, overlap and interact.

***Definition 3*:** The physically and institutionally delineated interface between urban territory and port operations. Rather than constituting a singular or static boundary, it operates as a spatially heterogeneous threshold that both separates and connects urban and maritime domains.

- **Territorial Ecology**

The study of socio-ecological interactions within a geographical space and, more specifically, the circulation of material and energy flows within human societies and in interaction with the biosphere, including the political dimension and the community of actors involved in the emergence of territorial systems based on socio-ecological dynamics.

- **Blue Territory / Blue Economy**

Definition 1: A Blue Territory refers to the portion of the hydrosphere—comprising water on, under and above the Earth's surface—shaped by the influence, use and governance of a community, city or nation.

***Definition 2*:** The sustainable, equitable and efficient use of ocean and coastal resources to generate economic value while preserving marine ecosystems and supporting social wellbeing.

- **Land-Water Continuum / Land-Water Interface / Land-Water Edge**

Definition 1: The land-water continuum refers to a conceptual framework that understands terrestrial and aquatic environments as interdependent and continuously connected systems rather than as discrete or oppositional domains.

***Definition 2*:** The land-water interface denotes a dynamic and complex transitional zone in which terrestrial and aquatic systems converge and interact through intertwined biophysical, socio-economic and governance processes.

***Definition 3*:** The land-water edge refers to the physical and functional boundary at which terrestrial and aquatic environments meet, constituting the spatial manifestation of land-water interactions within urban and port contexts.

- **Port City Territory**

A territorial concept encompassing the various spaces affected by maritime traffic and activities along coastlines or river-sea corridors, providing the foundations for analysing these territories from a maritime perspective.

- **Historic Urban Landscape (HUL)**

An understanding of port cities as layered systems shaped over time by water, infrastructure, built form and societal changes rather than as isolated heritage objects.

- **Cultural and Industrial Heritage / Heritage**

The cultural, historical, technological and social legacies passed down through generations.

- **Adaptive Reuse**

The process of repurposing existing, often historical or derelict, buildings or infrastructure for a new function rather than demolishing them.

- **Tactical Urbanism / Narrative / Landscape Biography**
- **Tactical Urbanism:** Temporary, low-cost interventions in urban spaces to test solutions and engage communities.
- **Narrative:** Value-carrying structures that translate complex and often tacit cultural meanings into communicable and actionable forms that can inform design.
- **Landscape Biography:** An approach that tells the layered life story of a landscape and how it has developed through the continuous interaction between humans and nature.

Group 5 – Energy Justice and Social Equity

- **Energy Justice**

***Definition 1*:** The fair distribution of energy benefits and burdens, including who gains from port decarbonisation projects and who bears the social, environmental and economic costs, including local and marginalised communities.

***Definition 2*:** A framework focusing on fair distribution of energy benefits and burdens, including access, affordability, health outcomes and environmental impacts, especially for communities living near port-industrial zones.

- **Social Inclusivity and Energy Justice**

A concept describing how energy-transition processes in port city territories distribute costs, benefits and risks unevenly across social groups. It highlights inequalities in access to clean energy, exposure to environmental burdens and participation in decision-making.

- **Community Resilience and Social Adaptability**

***Definition 1*:** A community consists of participants who share representations, practices and values and forms around social ties, trust, shared objectives and a sense of belonging rather than solely through geographic proximity.

***Definition 2*:** The capacity of local communities to respond to, adapt to and cope with social, economic and environmental changes generated by energy-transition processes, emphasising social networks, collective resources and adaptive strategies that enable communities to manage uncertainty and structural transformation.

- **Social License to Operate (SLO)**

The informal acceptance granted by communities and stakeholders to major port and energy projects such as fuel terminals, grid upgrades and dredging. Even with legal permits, projects may face resistance or delays without trust, transparency and credible benefit-sharing, particularly in historically burdened neighbourhoods.

- **Labour Transitions and Occupational Identities**

The social consequences of energy transition for work, employment structures and professional identities in port city territories. It addresses job transformation, reskilling, occupational displacement and the reconfiguration of work cultures linked to maritime and port economies.

- **Energy Democracy**

The principle of participatory and decentralised governance, allowing local communities and stakeholders to influence energy systems and transition decisions.

- **Territorial Identity and Socio-Cultural Meanings of Energy**

The ways in which energy infrastructures and transition processes reshape local identities, cultural narratives and symbolic meanings attached to place, including changes to collective imaginaries, landscapes and cultural interpretations of port cities.

Group 6 – Infrastructure, Ports and Logistics

- **Inland Port / Dry Port**

***Definition 1*:** A port located on land away from the terminals of seaports, serving as a point of connection for different transport modes involved in the distribution of goods from seaports.

***Definition 2*:** An inland terminal connected by road or rail to seaports whose function is to tranship ocean cargo to inland destinations.

- **Bunkering Transition**

The shift from fossil-fuel supply chains, such as heavy fuel oil, to new fuels and associated storage and handling systems.

- **Industrial Decarbonisation Clusters**

Groups of energy-intensive industries located around ports that work together to reduce emissions by sharing clean-energy infrastructure and technologies.

- **Multi-Energy Hubs / Energy Hub / Port Energy Hub**

***Definition 1*:** Port areas that bring together different energy sources, such as electricity, hydrogen and alternative fuels, and distribute them to ships, industries and urban users.

***Definition 2*:** A conceptual and technical framework in which the port operates as a multi-vector energy node, integrating electricity, hydrogen, heat, fuels and storage to optimise production, conversion and consumption across maritime and urban users.

- **Port Authority as Energy Actor / Port Authority as Energy Transition Actor**

***Definition 1*:** The role of port authorities in guiding energy transition through planning, investment choices and coordination with public and private stakeholders.

***Definition 2*:** Recognition of the port authority as a central actor in energy planning and infrastructure deployment, influencing the adoption of clean energy and low-carbon operations.

- **Infrastructure Power / Grid Congestion / Port-Level Energy Autonomy**
- **Infrastructure Power:** Ways in which energy transition and the reconfiguration of transport infrastructures shape power relationships, economic power and spatial inequality, particularly through control of port terminals, grids, pipelines and renewable-energy hubs.
- **Grid Congestion:** A condition where electricity-network capacity is insufficient to meet demand, often exacerbated in ports by shore power, electrified cranes and electric vehicles, making grid reinforcement or flexibility solutions essential.
- **Port-Level Energy Autonomy:** The capability of a port to meet its electricity demand independently from the national grid through local generation and storage.

- **Onshore Power Supply (OPS)**

Standardised electrical systems enabling ships to draw electricity from port grids, with plugs and transformers sized for the high-voltage requirements of large vessels.

- **Port-City Interface**

A spatially and functionally articulated threshold situated between port territories and the urban fabric, where maritime and urban systems converge, overlap and interact.

Group 7 – Environmental Sustainability and Circularity

- **Remediation / Beneficial Reuse of Dredged Sediment**
- **Remediation:** The process of improving environmental quality in degraded areas.
- **Beneficial reuse of dredged sediment:** Application of dredged material within a circular-economy approach, such as for construction, coastal protection or habitat creation.
- **Resource Efficiency and Reduced Waste:** Improving the use of materials and energy to minimise waste and emissions.

- **Circularity / Circular and Regenerative Economy Zones**

***Definition 1*:** The design and management of material flows to minimise waste and retain materials at their highest possible value through reuse, repair, recycling and recovery.

***Definition 2*:** Areas designated and prioritised for circular and regenerative industry clusters, focused on reducing reliance on primary resources and lowering land and emissions pressures.

- **Decoupling (Relative vs Absolute)**

The separation of economic activity from environmental pressure, which may be relative, when impacts grow more slowly than activity, or absolute, when impacts decline in total terms.

- **Carbon Lock-In**

A situation where long-lived assets, such as terminals, pipelines, refineries or port-access roads, commit a territory to high-emission pathways because they are costly to replace and create political and economic dependence.

- **Carbon Capture, Utilisation and Storage (CCUS)**

The capture of CO_2 from industrial sources, followed by its use in products or processes and/or transport for geological storage.

- **Nature-Based Solutions**

Approaches that protect, restore or enhance natural processes and ecosystems to address environmental challenges, delivering benefits for climate resilience, water management, biodiversity and human wellbeing while operating within ecological rates and capacities.

- **Regenerative Systems**

Systems designed to restore and enhance ecological and social capacity rather than merely reducing harm or slowing degradation.

Group 8 – Risk, Resilience and Adaptation

- **Long-Term Resilience and Adaptation / Island Resilience**

***Definition 1*:** The capacity of island territories and communities to anticipate, absorb, adapt and transform in response to environmental, climate, economic and social tensions and disruptions.

***Definition 2*:** Port energy and transport infrastructure designed or retrofitted to withstand climate-change impacts such as sea-level rise, extreme weather events and flooding while supporting long-term decarbonisation goals.

- **Transition Risk and Uncertainty**

Regulatory, technological and market uncertainties that discourage investment in low-carbon solutions in ports, particularly given long asset lifetimes and global competition pressures.

- **Path Dependency**

The tendency for past decisions and investments to constrain future options, shaping long-term system trajectories even when alternative pathways become preferable.

- **Resilient Energy Systems**

Energy systems capable of withstanding and adapting to disruptions.

- **Suspension Flow and Settling / Rheological Behaviour of Sediment Suspension**

Physical behaviours of sediment and suspended materials in port waters affecting dredging, transport and environmental management.

Group 9 – Monitoring, Metrics and Planning

- **Throughput Impacts / Value Chain Responsibility / Upstream-Downstream Impacts**

***Definition 1*:** Assessing the full planetary-boundary pressures embodied in the materials and products moving through a port across their full lifecycle, from resource extraction and production to transport, use and end-of-life.

***Definition 2*:** Expanding responsibility beyond the port's direct footprint to include throughput emissions and associated upstream and downstream impacts.

- **Demand-Side Management (DSM)**

Strategies to influence when, how and how much energy is consumed in port-city systems, including flexible electricity demand, peak reduction and smart scheduling, improving efficiency and grid stability.

- **Energy System Integration / Digital Energy Management / Smart Ports**

The coordinated planning and operation of electricity, heat, gas, hydrogen and transport systems within port cities to increase efficiency, flexibility and the uptake of renewable energy sources.

- **Holistic Approach Methodology**

A methodology that takes into account all stakeholders, situations, agents and results, including social, technical and economic factors and short- and long-term effects.

- **Monitoring and Metrics (Planetary Boundaries, Absolute Reduction, Sustainability Indicators)**

Frameworks and tools for measuring environmental and social impacts, including decoupling, absolute reduction, systemic responsibility and alignment with planetary boundaries.

- **Nudging for Decarbonisation / Behavioural Spillovers**

***Definition 1*:** Behaviourally informed interventions that shape choices through non-coercive design features such as defaults, feedback, labelling and social norms to encourage lower-emission decisions among port users and firms.

***Definition 2*:** The phenomenon whereby one pro-environmental action, such as adopting clean port practices, leads to additional sustainable behaviours, or conversely triggers negative spillovers such as moral licensing.

Transition to Annexes

The glossary presented above constitutes the working database generated through the first phase of WG3 collective knowledge production. The definitions remain deliberately close to the formulations provided by participants, as preserving the plurality of descriptions is important for the next analytical phase.

The following annexes provide the detailed methodological material supporting the ongoing second phase of the work, including the guidelines provided to subgroup leaders for the World Café discussions and the standardised template used to document the results of those discussions.

ANNEX 1

Glossary-making. World Café phase

Supporting documents

Guidelines for Subgroup Leaders

Energy Transition Glossary – World Café Discussions

Purpose of the session

Your role is to **stimulate dialogue, not to find consensus**. The goal is to:

- Surface plurality through making evident **different interpretations**
- Explore **tensions and contradictions**
- Find **values** behind the interpretations

Good discussions produce **clarity + complexity**, not just neat definitions.

SUGGESTED DISCUSSION FLOW (20–30 minutes per term set)

Step 1 — Individual framing (3–5 min)

Read the raw definition(s) of the term.

Ask each person:

Prompts: “Do you agree with this definition? Is it complete? Do you understand it in a different way?”

Capture **key differences** visibly (post-its / board).

Step 2 — Collective unpacking of semantic differences (5–8 min)

Exploring semantic differences is about making visible how the same word carries different worlds. In energy transition debates in port city territories, this is especially important because actors (port authorities, municipalities, logistics firms, unions, residents, environmental NGOs) often use identical terms with different assumptions.

Same word, different actor = different semantic field.

Prompts: How would port-city territories stakeholders define this? I.e.: How a shipping company define this? How would a dockworker define it? How would the Port Authority define this? How would a coastal resident define it? How would the municipality define this? How would an environmental regulator define it? Etc. Then compare the definitions side-by-side. You’ll like to make evident technical meanings, political meanings, economical meanings, and ethical meanings. You can make a matrix with actors and meanings.

Distinguish three types of semantic differences: 1) scope difference (One interpretation includes more elements than another); 2) Value difference (same scope, different normative orientation)); 3) ontological difference (fundamentally different understanding of what the term is).

For example: “port resilience” –> Technical robustness of infrastructure / Economic competitiveness / Ecological regeneration / Social cohesion

These are not small variations, they reflect different worldviews.

Step 3 — Tensions & controversies (5–8 min)

If a term generates disagreement, that means it matters.

Identify the type of tension across the different interpretation, explore what is at stake, identify red flags.

Prompts: “Where do conflicts arise?” “What is sacrificed if this interpretation dominates?” Which words in this discussion create discomfort? Which terms feel strategic or political?

Identify if the term has a low, medium of high controversy.

Step 4 — Chart the values behind the interpretation (5–8 min)

Search with participants the values behind the different interpretations, and name them.

Prompts to explore:“What does this interpretation care about most?”, “What does it want to protect?”, “What does it want to change?”, “What would count as ‘success’?”

Prompts to name: “If this value were a headline, how would we call it?”, “What word would represent all these ideas?”, “Does existing vocabulary work, or do we need a new term?”

Step 5 — Co-create a common/differing definition(s) (5–7 min)

Instead of forcing agreement, aim for a definition that reflects complexity and plural perspectives. If this is not possible, include different definitions.

You can say: “We are not looking for one ‘correct’ definition. We are trying to write something that fairly represents the different perspectives in this room.”

Identify What Must Appear. Point to the interpretations and values previously charted.

Ask: What elements are essential and cannot disappear? Which values must be visible in the definition? Each participant proposes 1 key element only.

Now attempt to weave the elements together using a layered structure:

OPTION 1: “Broad Core + Tensions”

Example:

[Term] refers to… It involves… It raises tensions between…

OPTION 2: If consensus feels artificial, write:

While participants agree that X involves…, they differ on whether it primarily means A (value…) or B (value…).

OPTION 3: If the room is clearly divided:

Write: Definition 1 (… perspective). Definition 2 (… perspective)

TIPS:

Core facilitation principles

1. Invite multiple perspectives

Encourage participants to speak from their:

- Professional background
- Personal and practical experience
- Disciplinary field

2. Make disagreement productive

Disagreement is **valuable data**, not a problem.

When views differ, say: “Great — let’s explore why we see this differently.”

3. Slow down assumptions

Many energy terms sound obvious but hide **strong assumptions**.

Ask:“What does this term *implicitly assume* about technology, society, or the future?”

4. Keep the conversation concrete

Move between:

- Abstract ideas ↔ real-world examples
- Theory ↔ lived experience

Ask:

“Where do we actually see this playing out in practice?”

ANNEX 2

Glossary-making. World Café phase
Supporting documents

Subgroup discussion summary template

Energy Transition Glossary – Book chapter input

Purpose of this template
This template is designed as an output of the World café discussion; it helps subgroup leaders capture, structure, and synthesise the richness of discussions in a consistent way, so that outputs can be a valuable contribution for a book chapter dedicated to the making of the glossary.

Please focus on clarity, depth, and nuance, rather than completeness.

1. Subgroup information

- **Table nr:**
- **Facilitator:**
- **Participants (names + disciplines/sectors):**
- **Date and session (s):**

2. Terms discussed

List the terms discussed by your subgroup:

3. Context and framing (short narrative)

Briefly describe: a) How participants approached the discussion; b) The overall tone (e.g. exploratory, critical, conflicted, constructive); c) Any contextual elements that strongly shaped the debate;

(Max 120–150 words)

4. Term-by-term synthesis

Repeat the following structure for each term.

Term: _____

A. Key differences in framing

B. Semantic differences

C. Tensions and controverses

Main points of disagreement, controversy, or friction.

D. Values

Values that stand behind different interpretations

E. Definition(s)

5. Major contradictions and paradoxes

Highlight tensions that remained unresolved or revealed structural dilemmas

6. Implications for the energy transition in PCTs

What does this discussion suggest for:

- Policy?
- Technology development?
- Social change?
- Governance?

7. Key messages for the book chapter

List 3–5 takeaways that should clearly appear in the final chapter:

8. Final reflection from the facilitator

What surprised you most? What shifted your own understanding?

(Optional – 50–100 words)

Thank you for capturing the process of co-production of your group. Your synthesis directly shapes the quality and depth of the final book chapter.