

# Luxembourg research capacities in the field of energy transition

MARKET INTELLIGENCE KEY INSIGHT

January 2024



**Luxembourg research capacities supporting the energy transition are distributed among the Luxembourg Institute of Science and Technology (LIST), the University of Luxembourg and the Luxembourg Institute of Socio-Economic Research (LISER). They include research groups, platforms, transversal topics and Chairs that either:**

- ▀ **focus directly on energy topics (renewable energies, energy efficiency, energy consumption, electrification, smart grids, energy communities, etc.); or**
  - ▀ **address research areas indirectly linked to energy, such as materials, process engineering, mobility, human behaviours, sustainable finance, justice and ethics.**
- The current research capacities in Luxembourg demonstrate six main areas of expertise, which highlight the strengths of the research ecosystem.**

▀ **Energy-related materials** are addressed by at least 24 research groups. The University of Luxembourg (Department of Physics & Materials Science) concentrates the expertise in advanced photovoltaics systems and sustainable energy, addressed via materials and physics research. Meanwhile, the Material Research and Technology (MRT) Department of LIST focuses on composite materials, clean technologies, energy system design and in operando instrumentations, which all can be used for different applications in the field of energy (conversion, sustainable fuel cells, batteries, safe H2 storage, energy harvesting, etc).

▀ **Intelligent energy systems** is another strong specialisation in Luxembourg. 17 research groups focus on topics such as data-driven energy management, digital twins, smart grids and energy distribution. The Department of Engineering and the Interdisciplinary Centre for Security, Reliability and Trust (SnT) of the University of Luxembourg, as well as the Environmental Research and Innovation (ERIN) and the IT for Innovative Services (ITIS) Departments of LIST have specific expertise in applying new technologies (e.g. blockchain, artificial intelligence, automation, power electronics, storage, smart mobility systems) to intelligent energy systems. The ERIN department also carries out sustainability assessments of energy systems.

▀ **Energy efficiency** topics are mainly addressed for applications in the construction sector, notably by the ERIN department of LIST and the Arcelor Mittal Chair at the University of Luxembourg. Research on energy-efficient digital infrastructures is notably conducted by the university's Department of Engineering and the SnT. Energy efficiency in space is also an emerging field of research.

▀ **Biomass**, used as a renewable source of energy based on circular economy principles, is a strong area of expertise within the LIST's ERIN department.

▀ **Research on hydrogen** also emerges as a new area of expertise with the Paul Wurth Chair in Energy Process Engineering at the University of Luxembourg and in the LIST's MRT department.

▀ **Human behaviour and social sciences** related to the energy transition is addressed by 27 research groups in Luxembourg, through different prisms and applied to different sectors. Urban and non-urban development, transport services and disruptive events and their consequences on the energy transition are analysed in the Urban Development and Mobility (UDM) department of LISER. Research on skills and knowledge required to address the green transition as well as on consumption behaviour are conducted by the Living Conditions and Labour Market departments of LISER. These departments also study labour market risks and challenges for welfare states. Research on energy transition policies and on the environmental impacts of human behaviours and activities are topics studied both at the LISER (Labour Market and Living Conditions departments) and at the University of Luxembourg (Department of Law and Department of Economics and Management). The role of the financial sector and its impacts on the energy transition is analysed by both LISER (UDM) and the University of Luxembourg (Department of Finance).

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Special credits to the persons working at the University of Luxembourg, the Luxembourg Institute of Science and Technology (LIST) and the Luxembourg Institute of Socio-Economic Research (LISER) who contributed to this work.

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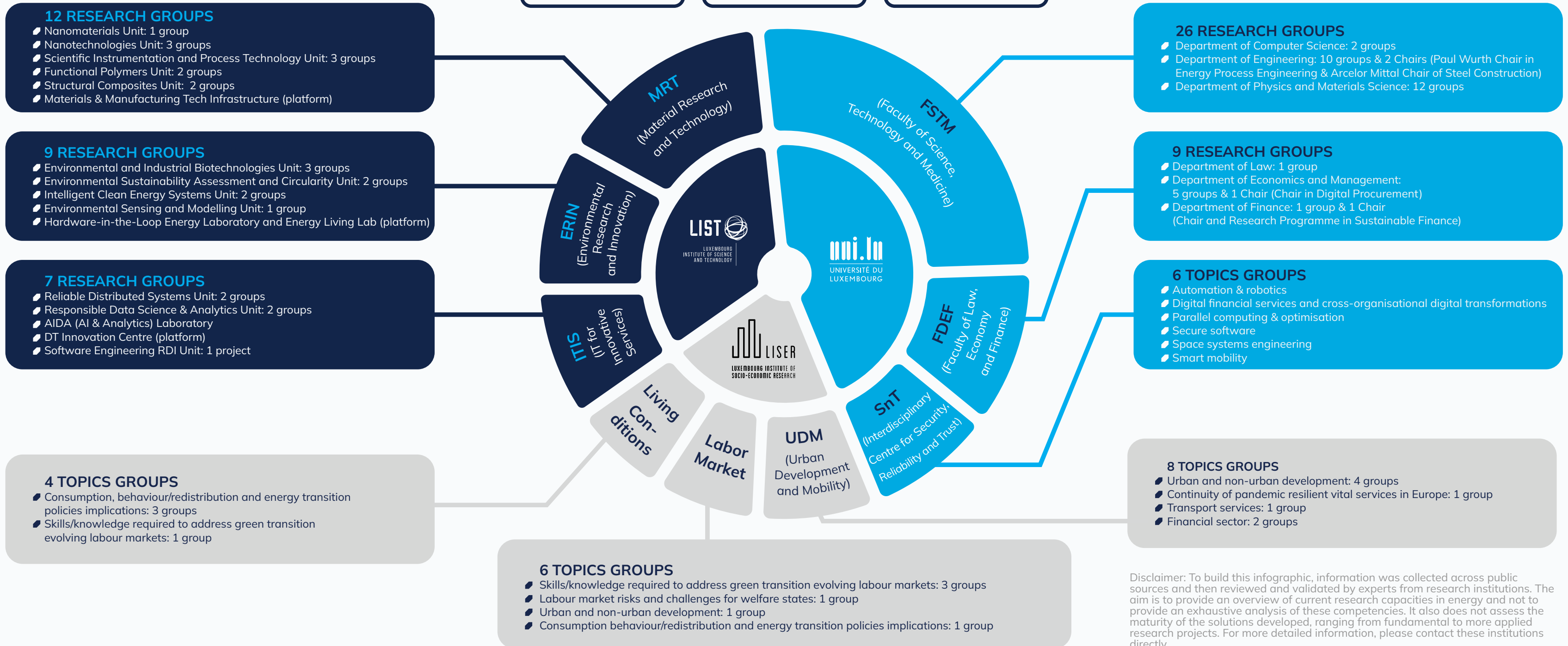
Research institutions

## 87

Research groups

## 6

Main areas of energy expertise



Disclaimer: To build this infographic, information was collected across public sources and then reviewed and validated by experts from research institutions. The aim is to provide an overview of current research capacities in energy and not to provide an exhaustive analysis of these competencies. It also does not assess the maturity of the solutions developed, ranging from fundamental to more applied research projects. For more detailed information, please contact these institutions directly.