EXPOSOME ALLIANCE

IHEN

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POLICY BRIEF
Interim roadmap focused on exposome research in Europe

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KEY MESSAGE

Environmental exposures account for over 80% of non-communicable disease burden, yet they remain systematically under addressed in health policy. The exposome approach offers a science-based framework to change this: by mapping the full range of environmental factors that drive chronic disease, Europe can shift from managing illness to preventing it, before the costs – human and economic – become irreversible.

Europe is uniquely positioned to lead this transition. Its research infrastructure, regulatory frameworks and industrial base provide the foundation for a new generation of precision health technologies and data-driven prevention tools — creating economic opportunity alongside health gains. Acting now means not only reducing the unsustainable costs of chronic disease, but securing Europe's role as a global reference point in one of the most consequential fields of 21st century science and innovation.

WHY THIS MATTERS NOW

Europe is at a strategic inflection point. Climate change, pollution, biodiversity loss, and social inequalities are reshaping exposure patterns across the continent. At the same time, major transitions — in energy, mobility, food systems, and the circular economy — create both health benefits and new risks that current frameworks are ill-equipped to capture.

The economic stakes are high. Health systems face rising costs from chronic diseases linked to environmental exposures. Regulatory frameworks that fail to account for cumulative, life-course exposures leave society and industry exposed to future risks and liability. And as the US, China, and other competitors scale up investment in precision environmental health, Europe risks ceding ground in a technology race it is currently at the forefront.

The exposome represents Europe's opportunity to lead — scientifically, industrially, and in global regulatory standard-setting. Europe is well placed to shape how the exposome field develops, in research, in policy, and in the industries, it will give rise to.

WHAT THE EXPOSOME ADDS

- Captures combined, cumulative exposures (chemical, physical, social)
- Links environment, biology, and health across the life course
- Enables earlier, more targeted prevention
- Supports more realistic risk assessment and regulation
- Bridges public health, environmental policy, and clinical care
- Generates economic returns through new exposome-derived technologies and markets — including sensors, biomarkers, AI-based diagnostics, and precision health services estimated to represent a multibillion-euro market opportunity for European industry.

SIX STRATEGIC PRIORITIES FOR EUROPE

1

Anticipate global change impacts

- Understand how climate change, biodiversity loss, and pollution reshape exposures
- Integrate health into climate adaptation and mitigation policies

2

Ensure transitions are health-positive

- Assess unintended risks of energy, mobility, and circular economy transitions
- Apply Safe and Sustainable by Design and exposome-based risk assessment

3

Embed exposome in policy and regulation

- Update burden of disease and economic models
- Integrate cumulative exposures into:
  - chemicals regulation (e.g. REACH)
  - urban planning and workplace policies
- Strengthen equity-focused policymaking

4

Transform prevention and healthcare

- Enable precision prevention combining environmental and genetic data
- Improve treatment outcomes through pharmaco-exposomics
- Integrate exposome into clinical practice and training

5 Build data and infrastructure capacity

- Develop FAIR, interoperable data systems
- Link environmental, health, and socio-economic data (EHDS, EOSC)

6 Scale-up scientific leadership for EU competitiveness

- Translate world class EU exposome research into economic value
- Develop structured partnerships with the private sector — pharma, MedTech, environmental monitoring, digital health — to integrate exposome insights into products and services
- Invest in tools (sensors, AI, biomarkers) and human capital

CROSS-CUTTING PRIORITIES

- Move from fragmented to integrated health approaches
- Ensure transitions are equitable and just
- Strengthen science–policy interfaces
- Support citizen engagement and trust
- Invest in skills, training, and transdisciplinary research
- Collaborate with private sectors to anchor EU competitiveness in this emerging field

POLICY IMPLICATIONS FOR THE EU

The exposome agenda directly supports:

- European Green Deal & Zero Pollution Action Plan
- Chemicals Strategy for Sustainability & REACH
- EU Climate Law & Adaptation Strategy
- EU4Health & Mission on Cancer
- European Health Data Space (EHDS)
- Child Guarantee Program
- New European Bauhaus
- Life science strategy & Biotech Act

It also contributes to:

- SDG 3 (Health), SDG 10 (Inequalities), SDG 13 (Climate), SDG 12 (Sustainable consumption)

KEY RECOMMENDATIONS

1. **Establish a European Human Exposome Initiative**
    a. Coordinate research, policy, infrastructure, and innovation
2. **Integrate exposome into EU legislation**
    a. Move toward cumulative and life-course risk assessment
3. **Invest in data infrastructure**
    a. Fully implement FAIR data systems linked to EHDS and EOSC
4. **Support large-scale exposome cohorts**
    a. Enable long-term, population-level evidence
5. **Embed exposome in policy design**
    a. Urban planning, energy transition, chemicals, and health strategies
6. **Strengthen capacity and training**
    a. Build expertise across science, healthcare, and policy
7. **Deploy Exposome-derived services and products**
    a. Establish public-private partnership frameworks to commercialise European exposome science — scaling biological and digital biomarkers, sensor platforms, and AI health tools for global markets.

CONCLUSION

The exposome represents a paradigm shift in how Europe understands and manages health risks — and a strategic opportunity it cannot afford to miss. Europe has already invested substantially in building the scientific foundation: the human resources, expertise, infrastructure, and cohort data that underpin world-leading research.

The task now is translation: from scientific authority into policy impact, and from research investment into industrial leadership. A coordinated European approach, backed by political commitment and private sector partnership, will determine whether Europe shapes the global standard for environmental health — or watches others do so.

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