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Title of your paper/presentation or poster: **HEALTH IMPACT ASSESSMENT FIT FOR ENERGY TRANSITION**

1. Introduction

The energy transition paradigm requires the Oil & Gas Industry to transform and reshape embracing sustainable energy resources. This process of decarbonization takes place in the context of two challenges of global significance: the negative effects contributing to climate change and the post pandemic global recovery.

Health gained increasing centrality during G20, COP26 and in general in the UN Climate conversation:

- The UN Human Rights Council recognized access to a clean, healthy and sustainable Environment as a Universal Right;
- UN Global Compact is calling on companies to take actions to sustain resilience to Climate Change prioritizing strategies that have Nature and Health co-benefits;
- WHO is calling for transformational action in every sector, including the energy one, in order to create energy systems that protect and improve Climate and Health.

The Energy Transition it's not only a matter of new technologies but it requires a paradigm shift that must consider the impacts on the health of workers and their families and of communities to avoid or minimize negative impacts. It is a moral imperative but also an opportunity for the business to mitigate risks and costs.

Health and well-being are prerequisites as well as results of sustainable development, and therefore it is increasingly important to investigate the new Health-related risks and opportunities in the Oil & Gas Industry in the evolving context of the energy transition.

Eni wants to play a decisive role in the energy transition process towards a low carbon future and embraces, as underlined by the company's mission, the United Nations Sustainable Development Goals (SDGs) are structurally integrated into Eni strategies. In such process of decarbonization, Eni's proprietary technologies, conceived and rapidly developed and implemented, represent an important strategic lever, both for increasing the efficiency of traditional business and for developing new ones. The great challenges of the energy sector require a strong collective commitment, which Eni also realizes by making use of public-private partnerships for the sharing of experiences, professionalism, and skills.

Human health became one of the major focus in this particular context of energy transition and the COVID-19 pandemic.

With the support of SOS international and ERM, an initial analysis of the emerging trend has been integrated within the first assessment and scoping of the research work. The emerging trends analysis covers :

- Increasing attention for and requests for disclosure by stakeholders and shareholders;
- Evolution of the Health System;
- Regulatory anticipation and risk of lack of consistency on positioning on emerging health issues.

In addition of the various activities and actions undertaken, Eni is working to seize the opportunities of a transformation driven by technological innovation and oriented towards a new paradigm of development that allows us to create value for stakeholders. Eni has created a scientific research program under the leadership of the Fondazione Eni Enrico Mattei (FEEM) with the aims of:

- promoting independent research activities in the field of public and community health;
- producing and disseminating scientific works; and
- promoting training and information campaigns for the benefit of professionals from various health disciplines.

Moreover, priority areas of research have been identified:

- Epidemiological studies on the interaction between environment and health and health impacts of industrial activities
- Industrial hygiene and toxicology
- Infectious diseases, emerging diseases and regional/global health emergencies
- Health and Social Health Models and Systems

FEEM has established a scientific health committee to investigate and express views on these identified prioritie. This scientific research on health issues aims at inspiring reflection within Eni with respect on how its health

management model needs to evolve to deal with the future evolution of its industrial activities and the potential consequences for the health of workers, their families, and communities.

2. Health Impact Assessment in Company Management System

The Health Impact Assessment (HIA) is an integral part of Eni's Health Management System. It provides vital support in decision-making, is in line with international best practices. It follows those operating steps that are preliminary to the forecast, quantification, mitigation, monitoring, and evaluation of the possible direct effects on populations or mediated through the individual, environmental, socio-economic and institutional determinants of community health. The HIA, directly and particularly when integrated in the procedures of environmental (and social) impact assessment, carries out the knowledge improvement starting from the analysis of the elements that characterize the industrial project and provides key recommendations for the sustainable development of the area of interest. Company set two kind of health impact assessments (HIA) that are :

- Strategic Health Impact Assessment which presents the proactive assessment process useful to strengthen the role of Health in the decision-making process ;
- Project Health Impact Assessment which presents the assessment process useful for the analysis of potential positive and negative impacts of a specific industrial project on the health status of a population in the project area of influence.

Analogously to the health risk management, Eni has adopted a proactive approach by integrating the HIA in almost all its industrial projects and from the early stage, even when it's not requested by local/national legislation.

3. Methodology

The research has been conducted through desktop analysis with large literature review. Extensive consultation among the authors themselves, as well as with Eni's functions, such as Health and R&D, has taken place.

Areas on attention for future steps have been identified (see recommendations below).

4. Priorities for Research

4.1. Epidemiological Studies on the Interaction between Environment, Health and Health Impacts

Focus and objectives

1. Assessment of health benefits and costs associated to energy transition including the associated potential changes on biodiversity ;
2. Improve the process of assessment of health risks and opportunities in relation to the SDGs, in particular SDG3 and all the determinants of health;
3. Investigate community attitudes to current and proposed transformation of sources of energy;

1st Research Year Focus

To perform a systematic review on health effects of novel energy production technologies based on Eni Energy Transition Strategy
Technologies covered :

- Biofuel,
- Green Hydrogen,
- Carbon Capture and Storage (CCS),
- Concentrated Solar Power (CSP),
- Magnetic Fusion,
- Wind Power,
- Sea Wave
- Energy Converter (SWEC)

Preliminary Results

- Pubmed, Embase, Cochrane Library, Web of Science, Scopus, Reaxys - *42 in total* ;
- Research queries formulated with the support of librarians - *221 queries in total* ;
- Identification and selection of scientific articles: title and abstract; full-text – *134 relevant articles in total* ;
- Inclusion of reports outside peer-reviewed literature

Recommendations

- With the exception of wind power, studies on health effects are very limited or absent. For wind power, most studies are of low quality and evidence is inconclusive
- LCA studies are available for most technologies
    - They tend to support the hypothesis of a contribution to health effects
    - Studies likely overestimate the risk because of uncertainties in exposure scenarios
- Data on use of biofuel for energy production are poor

4.2. Industrial hygiene and toxicology

Focus and objectives

1. Digitalization to improve the health impacts and risks prevention and control ;
2. Exposure and toxicity in relation to human health ;
3. The production processes of biorefineries might generate new materials, both as a final product and as a by-product of the reaction;
4. Sex and gender are increasingly recognized as major influencing factors in diseases, as well as vulnerable populations.

1st Research Year Focus

The main objective is to develop a roadmap to assess and quantify potential health effects of biorefineries

Preliminary Results

Due to the limited available data, the assessment has been postponed for second-year with below recommendations.

Recommendations

- LCA study comparing biorefineries with traditional ones (biofuel/with traditional fuels);
- Comprehensive assessment of exposure levels (residential and occupational) from operating plant based on real data;
- Ad-Hoc model-based studies of potential health effects based on exposure estimates.

4.3. Infectious diseases, emerging diseases and regional/global health emergencies

1. Based on COVID19, the prevention of infectious diseases (air borne and droplets borne) in the workplace ;
2. Increase the control and preventive measures for infectious diseases ;
3. The digital health revolution will also play a pivotal role in this area ;
4. Emergency crisis response is a critical component of the Eni health management system and might benefit from a reassessment post COVID-19;
5. Develop a research program that focuses on emergencies, including scenarios associated with the development of new forms of energy.

1st Research Year Focus

- Collect and review the data available on the current literature regarding pandemic emergency response models, in order to size and detail companies' contribution, taking into account the scientific evidence and the major trends at the level international and multidisciplinary approaches such as one health
- Review of current scientific literature and gray literature
- Propose recommendations for actions

Preliminary Results and Recommendations

- Unify management models to unify commissioning and delivery models
- Assistance is the service with the greatest extent of content and model due to prevention activities and extension of coverage to families of employees
- Need to activate user verification and feedback processes
- Enhancement of interdependencies with the public entity
- Multiplier of NHS prevention
- Access to services extra NHS
- Sharing of information
- Integration or support on social health services

4.4. Health and Social Health Models and Systems

1. Address the evolving trends and changes within the health system, as well as outside of it with key focus on the changing relationship between private and public health actors;
2. Digital health and telemedicine ;
3. Mental health is the health priority of the next decade.
4. Identify a standardized set of indicators agreed across different departments which serve as basis for a global tracking and reporting system considering that health and wellbeing are now a C-suite concern and have become more central in the ESG/sustainability discussion.

1st Research Year Focus

- Define a new conceptual and operational model of synergy between the corporate health system and the NHS that considers the following elements:
    - The integration between General Practitioner (GP) and company competent physician
    - Occupational medicine and company's health welfare programs
    - The contribution of digital and information technologies
- Review of the literature on welfare models
- Analysis of the weight of private consumption in the healthcare sector in Italy

Preliminary Results

- Definition of the key transformational drivers (aging population, new available services thanks to scientific progress, prevention centrality, community focus)
- Proposal for framing of Eni's corporate health-welfare model with respect to existing configurations

Recommendations

- Unify management models to unify commissioning and delivery models
- Assistance is the service with the greatest extent of content and model due to prevention activities and extension of coverage to families of employees
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5. Future Research and Associated Work

1. Definition of the following years scope for the research based on the first-year committee's recommendations Eni will assess further how to interact with the relevant stakeholders in this regard and integrate above recommendations within its own management system.
2. Continue assessing the global and international trends in terms of global health and wellbeing
3. Continue the dialogue and common efforts with the various stakeholders and international organizations such as WHO and WBCSD
4. Set a foundation for common work with IOGP – IPIECA by launching specific task force
5. Continue improving the control of risks and impacts on health and maximize opportunities using the outcome of the research as well as reinforce it through HIA-ESHIA as fundamental tool to prevent the business impact on human health