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Sono passati trent'anni dalla nascita della Fondazione Eni Enrico Mattei (FEEM), centro di ricerca internazionale e *think tank* di frontiera, intitolata a Enrico Mattei, fondatore dell'Eni e imprenditore visionario.

La Fondazione nasce il 7 giugno 1989 con il riconoscimento del Presidente della Repubblica con l'obiettivo, tuttora prioritario, di contribuire con la sua ricerca a dare delle risposte e proporre delle soluzioni concrete alle sfide poste dal cambiamento globale.

Oggi la Fondazione Eni Enrico Mattei rinnova il suo impegno come leader riconosciuto nella ricerca sullo sviluppo sostenibile, tema che FEEM ha intercettato e declinato fin dalla sua fondazione e che «Equilibri - Rivista per lo Sviluppo Sostenibile» ha contribuito a definire, approfondendo le complesse interazioni tra le sfere dell'economia, dell'energia e dell'ambiente.

In questi anni, con passione e orgoglio, la Fondazione ha mantenuto sempre viva l'eredità più preziosa del pensiero matteiano: lo spirito innovatore, la visione allargata, l'abilità di immaginare il futuro.

Ed è proprio guardando al futuro che la Fondazione dedica questo primo numero del 2019 all'economia circolare, argomento centrale per la sostenibilità da qui al 2050 e tema trasversale delle nuove frontiere della ricerca FEEM.

Il numero segue un percorso ampio e articolato. Dal contributo di Giulio Sapelli, storico ed economista, che sottolinea come l'economia circolare non possa che «sorgere dall'associazione, ossia da una sfera condivisa da più persone», a quelli di William McDonough, rivoluzionario architetto del *cradle to cradle*, e di Ellen MacArthur, fondatrice della Ellen MacArthur Foundation per l'economia circolare e velista in solitaria.

Interroga studiosi ed economisti sull'economia di domani che, come sottolinea il contributo di Veronica Ronchi, dovrà «rispondere anche alle sfide poste dai sistemi di capitale, valorizzando l'economia comunitaria, il

riciclo, il riutilizzo, il baratto e tutti quegli elementi che non meritano di essere relegati a povertà, marginalità o arretratezza, ma che fanno parte delle prospettive dello sviluppo sostenibile».

Dialoga con il mondo dell'impresa, da sempre motore dell'innovazione, e descrive la transizione verso la sostenibilità delle città circolari. Parla di lavoro, competenze e professioni nell'economia circolare, si sofferma sullo scarto come modello educativo e azione sociale.

E poi racconta due storie, la prima sui Sassi di Matera, dove già nell'antichità si raccoglievano e si riciclavano le acque piovane, e la seconda ambientata in Ghana, dove gli scarti del cocco si trasformano in carbonella.

All'Africa, cuore del mondo che avanza e cambia, sono dedicati tre articoli scritti da alcuni giovani ricercatori della Fondazione. Quali lezioni possiamo apprendere dalle economie extra-occidentali? Come migliorare l'accesso all'energia in Africa nel rispetto di uno sviluppo sostenibile del continente? E come creare un quadro legislativo adeguato per aiutare i Paesi africani a implementare politiche di economia circolare?

Il numero è ampio ma non certo esaustivo, non è che l'inizio di un viaggio che anche la Fondazione Eni Enrico Mattei si appresta a intraprendere nello spirito che l'ha contraddistinta negli anni, ponendosi domande, cercando risposte e guardando sempre e comunque avanti.

Buona lettura,

Paolo Carnevale

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PAOLO CARNEVALE è direttore esecutivo della Fondazione Eni Enrico Mattei dal 2018. Questo è il suo primo numero come direttore della rivista.

THE CIRCULAR ECONOMY. CLOSING THE CIRCLE TO OPEN NEW PERSPECTIVES

OPENING

A Change of Direction. Notes on the Circular Economy, by Giulio Sapelli

Technology, the classics remind us, is the true mediation between man and nature, between the vital world of humans and the artificial world of digital devices. Safeguarding everyday knowledge, the knowledge related to crafts, from the simplest to the most complex, allows us to interact with the technical systems that surround us without being overwhelmed. The circular economy is not just a technical fact, a productive activity without «wastes», but shared knowledge that becomes an ethic.

Keywords: Circular Economy, Technology, Craft, Ethic

Equity, Ecology, Elegance. A Conversation with William McDonough, by Riccardo Luna

Well-designed materials do not produce waste. Everything is a resource for something else. From cradle to cradle is now part of our culture. It is time to take action, and technologies such as the blockchain and inspiring young people like Greta Thunberg can help us.

Keywords: Circular Economy, Cradle to Cradle

The Vision of a World without Wastes. Interview with Ellen MacArthur, by Francesca Venturi

Once a successful solo long-distance yachtswoman, Ellen MacArthur now leads the Ellen MacArthur Foundation. The aim is to accelerate the

transition to a circular economy by designing out waste and pollution, keeping products and materials in use and regenerating the natural systems. The ultimate goal is to redesign the economy all over again.

Keywords: Circular Economy, Waste, Pollution

Foundations of the Economy of Tomorrow, by Tim Jackson

Is prosperity possible without growth? In his presentation at the meeting «Circular. L'economia che fa sistema» (Milan, December 3, 2018), Tim Jackson challenges the pursuit of exponential economic growth and argues that it is time to think of a different kind of economy, a circular economy of care, craft and creativity that protects employment, fosters social investment, reduces inequality and delivers both ecological and financial stability.

Keywords: Circular Economy, Growth, Prosperity, Equity

From the Pyramid to the Circle, by Paolo Perulli

The dominance of pyramid-like economies has driven the world to the current crisis due to a debt economy and the predominance of finance over creative production. The opposite emerging circular model of the economy is based on five key principles: responsibility, tenacity, localizing, synergy, and quality. A paradigm shift is expected.

Keywords: Circular Economy, Creative Production

Why Talk about the Circular Economy? by Laura Gherardi

The circular economy is one of the many pathways to shared value creation that spread in Western democracies after the 2008 crisis. Shared val-

ue creation is the symptom of a new model of development parallel to that of pre-crisis capitalism. It responds to the emerging social demand for an economy that is embedded in society after decades of separation.

Keywords: Circular Economy, Shared Value Creation

The Circular Economy: A Challenge that Starts from Cities, by *Laura Cavalli, Giulia Lizzi, Sergio Vergalli*

Circularity is an enabling factor for sustainability. This is why the objectives of the circular economy and many of the goals of the 2030 Agenda that explicitly refer to the cities are closely linked. Circularity and sustainability are essential for a city's resilience and competitiveness.

Keywords: Circular Economy, Resilient Cities

Why is the Circular Economy Convenient for Italy? Comment on the AGI-CENSIS Report, by *Francesca Diluiso, Gianni Guastella, Stefano Pareglio*

The good news is that over fifty percent of Italians know what the circular economy is, but only 11% are willing to make an effort in this direction. Entrepreneurs and professionals are the most confident of its feasibility. Institutions play an important role.

Keywords: Circular Economy, Italy, Feasibility

A STORY

Collecting Rainwater in the Stones of Matera: An Ancient Recycling Practice, by Annalisa Percoco

The management of water resources has strongly influenced the development and the overall structure of the Sassi of Matera. The ancient city is endowed with a number of storage systems that allowed a significant urban development in which rainwater was collected and stored in a system of tanks with different purposes and connections.

Keywords: Circular Economy, Water, Tanks, Reuse

CIRCULAR ECONOMY IN BUSINESS

The Circular Economy in Italy, by Eleonora Rizzuto

Are Italian companies becoming circular? How much do businesses know of the advantages and need to shift to this new model? What are the challenges that firms need to face? Preliminary answers can be found in a survey carried out by the Italian Association for the Development of the Circular Economy.

Keywords: Circular Economy, Challenges for Italian Firms

A Matter of Indicators, by Nicolò Golinucci, Matteo Vincenzo Rocco, Federica Inzoli e Emanuela Colombo

The Circular Economy paradigm has recently emerged as a way to attain sustainable development. The quantitative assessment of circularity interventions is a largely debated and increasingly relevant topic in the lit-

erature. This article reviews the indicators useful to perform quantitative measures of circular economy initiatives.

Keywords: Circular Economy, Indicators

Public Policies to Stimulate the Circular Economy, by Marco Frey

Less than 10% of the raw materials extracted are recycled within the economic system. There are still many problems to be solved at the European level. Experiences in China, Japan and the United States show the importance of public policies.

Keywords: Circular Economy, Public Policies

What is ENEA Doing for Circular Firms? by Roberto Morabito

For years, the Italian Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) has been providing technical and scientific support to businesses and the public administration for the efficient use of resources. ENEA is also active in the development and implementation of technologies and methodologies for closing cycles at various levels locally, within companies, in the transfer of resources between different types of companies and over the entire life cycle of products and services, including the development of new business models and the promotion of more sustainable consumption models.

Keywords: Circular Economy, ENEA, Circular Firms

Firms and the Circular Economy: Eni Policies, by Monica Spada

Talking about the circular economy has become a very topical theme. To evaluate Eni's commitment in this field we have to consider the company's position regarding the epochal changes we are going through and the challenges in the long term. Through a strategic program, Eni shares the

objectives of the Paris agreement to keep global warming within 2°C while recognizing the need for full energy access, and in this path the circular economy plays a key role. Eni is looking for a distinctive way to contribute to the transition from the linear economy to the circular economy.

Keywords: Circular Economy, Eni Policies

Chemistry Leads the Circular Transition, by Daniele Ferrari

«Closing the circle»: reusing, recycling and repairing are the watchwords for combating the dispersion of plastic in the environment, but also the lines of a business strategy that aims to maximize resource efficiency through eco-design, recycling and the diversification of raw materials.

Keywords: Circular Economy, Chemistry, Recycling

Wastewater: Re-evaluation of a Resource between New Business Models and Their Acceptance, by Tiziana Perri, Dario Colucci, Francesca Scannone

Clean and safe water shortage represents a global concern due to climate change effects and to a variety of factors, such as poor services/supply. Wastewater, thanks to innovative treatment technologies, can be changed from infrastructure and poor management of water waste into a resource and become one of the most important sources of water supply for civil uses and in agriculture, according to circular economy principles. In fact, the use of purified wastewater represents an economic opportunity when innovative forms of public-private partnerships are established between similar economic and industrial sectors. However, some economic variables should be better studied to assess the actual economic convenience. Finally, the success of water reuse practices depends on public involvement and acceptance, which require a careful communication strategy.

Keywords: Climate Change, Water Reuse, Wastewater Regulation, Circular Economy, Public Acceptance

A Close-up of the Circular Firm, by Pasquale Alferj, Alessandra Favazzo

Practicing circularity means not just building a company that pitches a «zero waste» objective, involving the territory and the shareholders, but also rethinking sustainability as a profitable business and economic model. The experiences of Hera, Bio-On Ecolamp and Green Idea Technologies.

Keywords: Circular Economy; Sustainability, Hera, Bio-On Ecolamp, Green Idea Technologies

Work, Skills and Professions for the Circular Economy, by Francesco Seghezzi

The circular economy will change the structure of production processes and the roles, tasks and skills of the workers employed in most economic sectors. The article analyzes the quantitative impacts on the various fields, both in terms of growth and the decline in employment, based on available forecasts. It then focuses on the skills needed to manage a sustainable transition from the current economic paradigm to the circular economy by putting forth some possible strategies.

Keywords: Circular Economy, New Skills

From Business to Society: The Circular Economy as a Social Action, by Cecilia Mezzano

What if the concept of circularity applies not just to the use of raw materials and natural resources, but also to the skills of human beings? The article offers some ideas that go beyond predicting the jobs of the future and postulates the risk that (also) human resources may run out.

Keywords: Circular Economy, Social Action

Waste as an Educational Resource, by Arturo Bertoldi, Azio Sezzi

Transforming the concept of waste into beauty through a creative approach: this is the philosophy of REMIDA, the creative recycling center born in Reggio Emilia in 1996 on the initiative of the Schools and Nursery Institutions of the Municipality of Reggio Emilia and of the Iren multiutility. The Center is directed by the Reggio Children Foundation – Loris Malaguzzi Center, named after the pedagogist from Reggio who created the educational model of world renown. The main activity consists in gathering – with the collaboration of over two hundred local industrial, commercial and artisan businesses – materials obtained from the leftovers and from production waste, making them available to teachers and operators of primary and nursery schools, secondary and higher education institutions, as well as educational, social and cultural centers and associations.

Keywords: Circular Economy, Wastes, Recycling

THE TRANSITION TO THE CIRCULAR ECONOMY IN AFRICA

Africa and the Circular Economy. Lessons to be Learned, by Veronica Ronchi

The endogenous development of sub-Saharan Africa will depend on the ability of its ruling classes to succeed in connecting with the many symbolic worlds that populate that land, emerging from the purely Western conception of progress. The circular economy, whose foundation is the re-use of assets and the sustainability of production processes, can be the starting point of this new development, since it gives an answer close to the ancient African cultures that see the economy as supporting the entire collectivity, where man is part of the cosmos and not its ruler.

Keywords: Circular Economy, Africa, Tradition, Innovation

Energy and Africa: An Overview, by Pier Paolo Raimondi, Simone Tagliapietra

This article seeks to highlight the main circular economy policies and strategies in Africa. Firstly, it reviews the activities currently undertaken by African regional institutions in the field, illustrating the lack of a clear policy agenda in the field in comparison to other regional institutions, such as the European Union. Secondly, it reviews the activities currently undertaken at national level in the field, illustrating that only few countries (notably South Africa, Nigeria and Rwanda) are currently committed to strengthening their legislations in the field. Finally, the article explains the important role that other international organizations, such as multilateral financial institutions, can play in supporting the development of an African circular economy strategy.

Keywords: Energy, Africa, Circular Economy

Access to Energy: Prospects and Projects, by Davide Mazzoni

With 600 million people without access to energy in Sub-Saharan Africa, the nascent off-grid solar industry is facing an exponential growth driven by digitalization. While the socioeconomic impact is positive, on the other hand there is the problem of repairing and recovering components such as batteries and photovoltaic modules in remote villages. It could be the perfect breeding ground to put into practice a self-regenerating economy in a Sub-Saharan market, where the principles of the circular economy and the need to reduce waste are already inherent in the local cultural matrices.

Keywords: Africa, Access to Energy, Sustainability

Africa is our Home: A Circular Business in Ghana. Interview with Amin Sulley, by Veronica Ronchi

The starting point: the observation of coconut wastes accumulating around the kiosks with freshly displayed coconuts. The entrepreneurial

idea: how can wastes be transformed into resources? This is how the social enterprise Zaacoal that produces charcoal from scraps was born.

Keywords: Circular Economy, Recycling Wastes