



11, 12 e 13 de maio de 2017

Marina da Glória - Rio de Janeiro

Horário: das 10h às 18h

Organização



Patrocínio



Apoio



11, 12 e 13 de maio de 2017
Marina da Glória - Rio de Janeiro

The bioeconomy in Latin America and the Caribbean from a WEF Nexus perspective

Adrián G. Rodríguez

Agricultural Development Unit/DPPM



NACIONES UNIDAS

C E P A L

Cascada de valor Fibras
Enzimas industriales Biomateriales Forrajes Biocomercio
Inteligencia biológica Bioconstrucción Bioplásticos Biofungicidas
Energía biosolar Servicios ambientales Enzimas
Uso productivo de los desechos De-carbonización Biocidas Biogas Biodiversidad
Biofinanzas Biorefinerias Biotecnología Agro-biodiversidad
Bioturismo Maximizar uso de la biomasa Bionematicidas Biodiseño Reducción GEI
Biocosméticos Bioenergía Biofármacos

Alimentos Seguridad alimentaria

Bioeconomía

Biomasa

Content



- The bioeconomy concept
- The Nexus approach
- The bioeconomy as a policy framework
- Institutions and policies for the bioeconomy in Latin America and the Caribbean (10 countries)
- *The bioeconomy in Latin American Exports*
- Challenges

A description of the bioeconomy

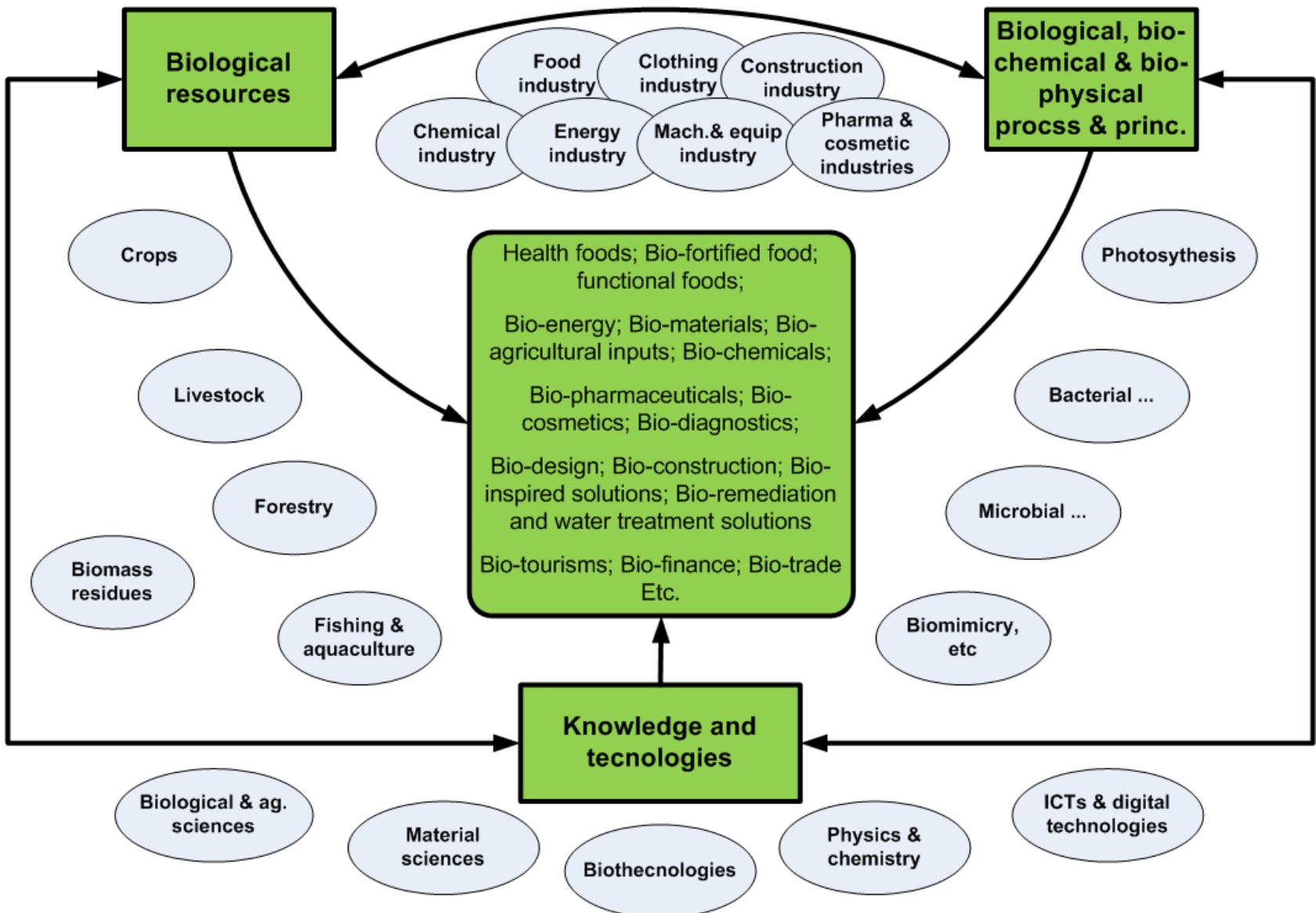
THE CONCEPT

What is a bioeconomy?



- (a) *an economy based on the consumption and production of goods and services derived from (1) the sustainable direct use and transformation of biological resources and (2) biomass residues generated in the processes of transformation, production and consumption ,*
- (b) *taking advantage of the knowledge of biological processes and principles and ("biological intelligence, biomimicry), and*
- (c) *technologies applicable to the knowledge and transformation of biological resources and the emulation of biological processes and principles.*

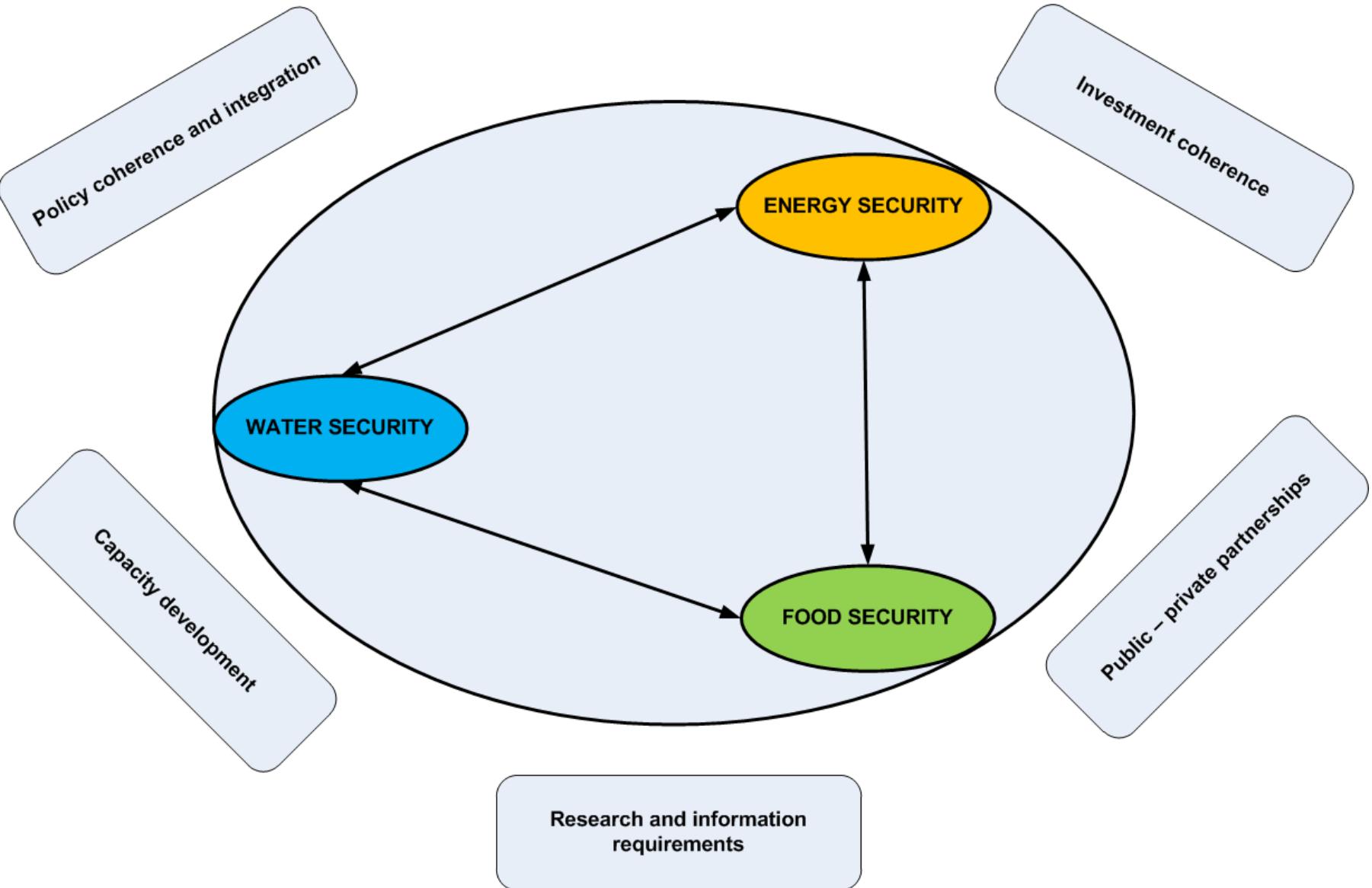
A bioeconomy is ... a non-carbon based economy



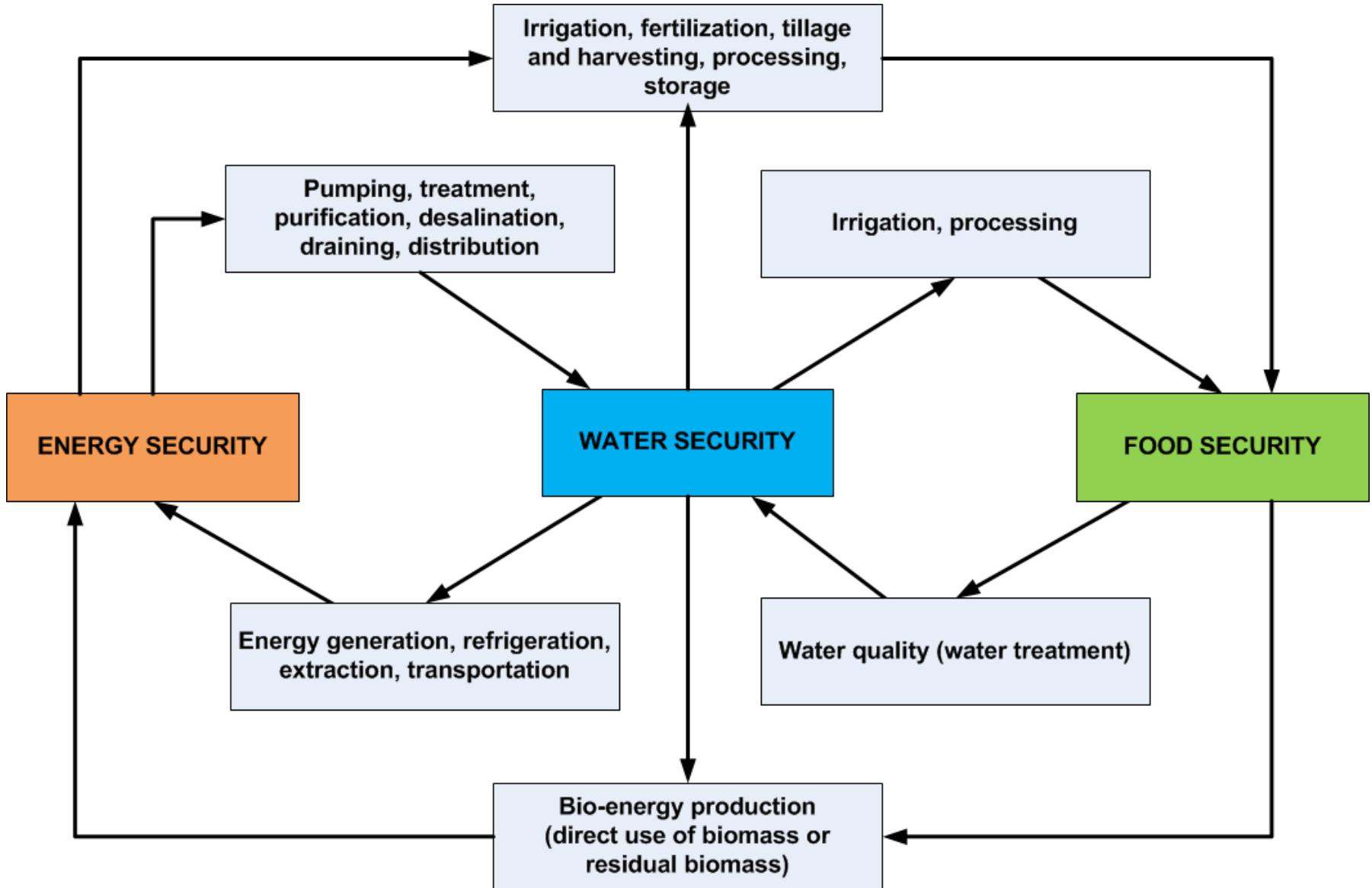
Water, Energy and Food Security

THE WEF NEXUS APPROACH

The WEF Nexus approach



WEF interactions (Embid & Martin, 2017)



WEF Nexus in Latin America



Embíd, Antonio & Martín, Liber (2017). *El Nexo entre el agua, la energía y la alimentación en América Latina y el Caribe: planificación, marco normativo e identificación de interconexiones prioritarias.*
Serie Recursos Naturales e Infraestructura No.179 (LC/TS.2017/16). CEPAL-Cooperacion Alemana-Unión Europea. Santiago, Chile

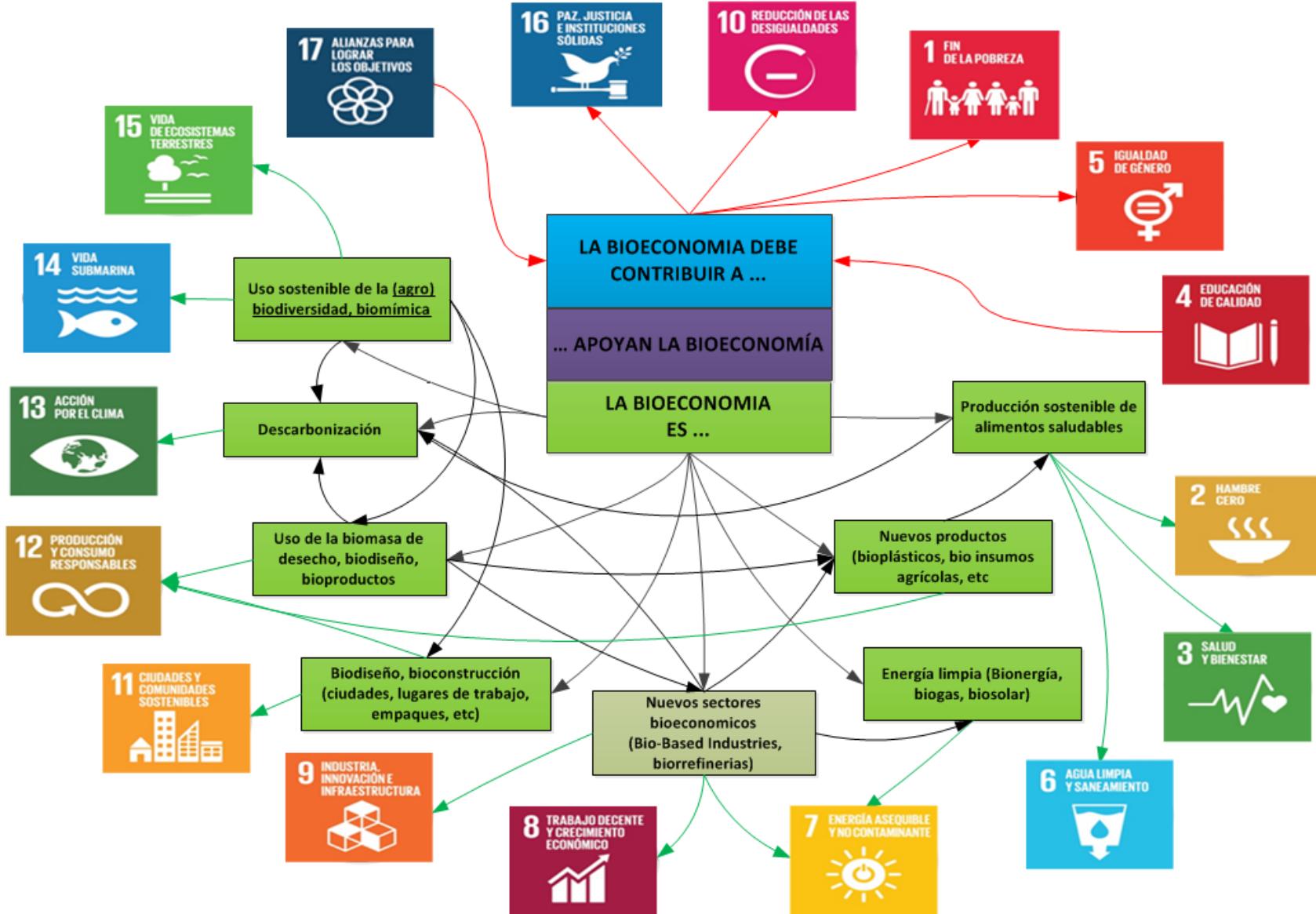
Bioeconomy, Agenda 2030 and WEF Nexus

THE BIOECONOMY AS A POLICY FRAMEWORK

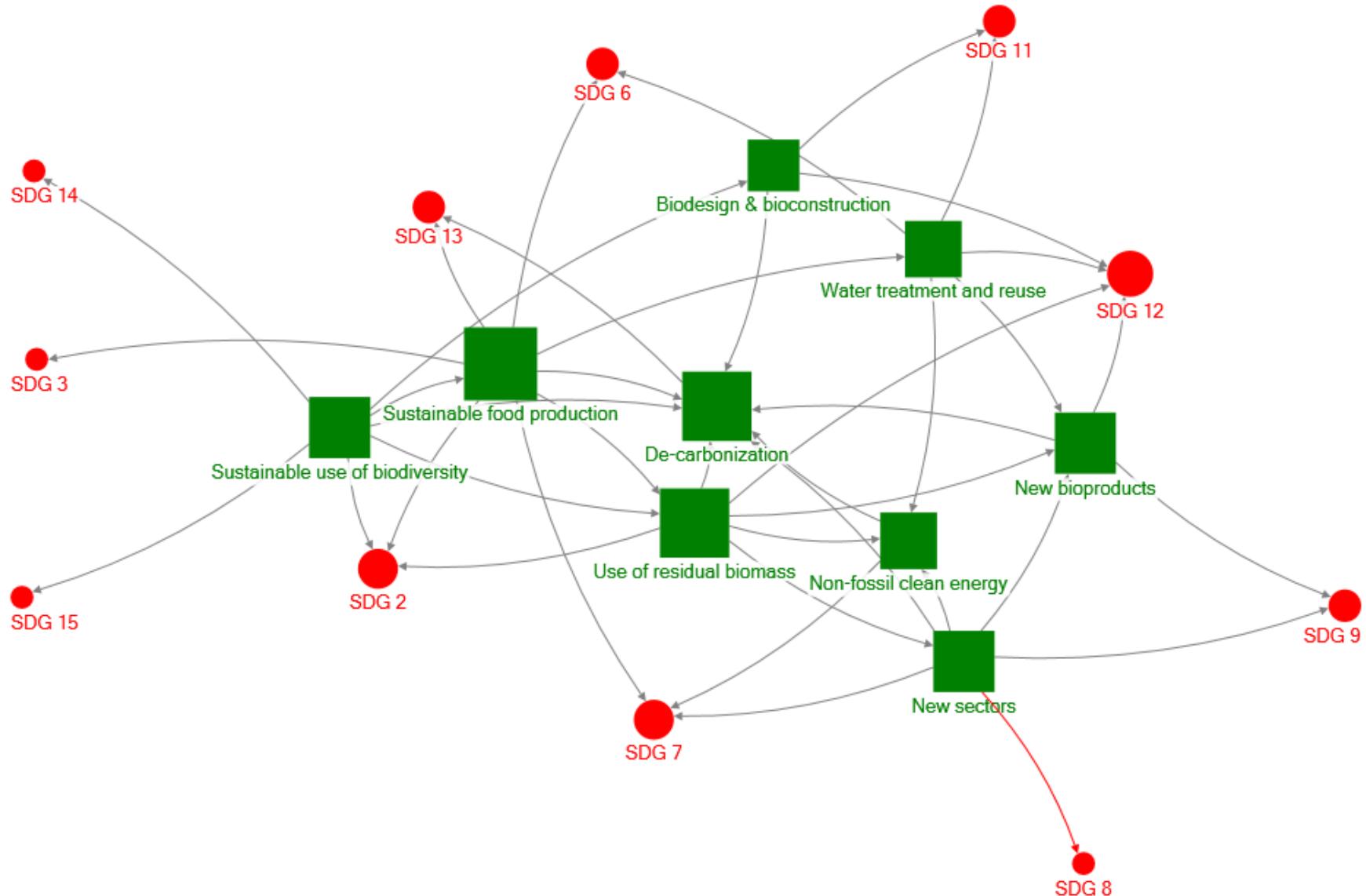
Policies for the bioeconomy around the world



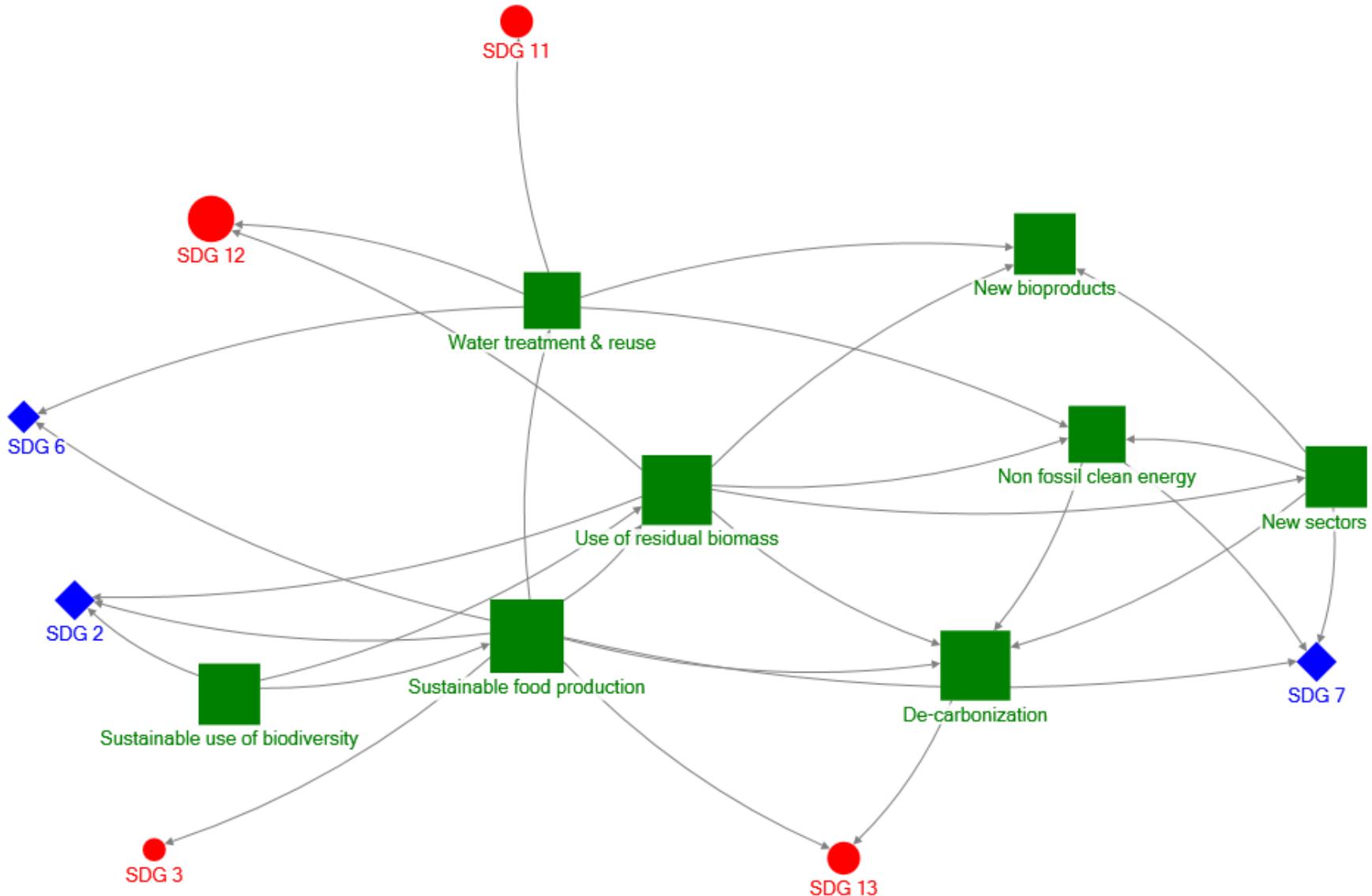
The bioeconomy and the Agenda 2030



A Paradigm change toward de-carbonization



The WEF Nexus approach ... an entry point to the bioeconomy



Bioeconomy and the firms of the future

WEF related examples from young entrepreneurs



Activity	Innovator	Innovation	Company	Web
Bio-remediation	Carla Lausevicius, 36, Brazil	Reduction of grease and oils accumulated in waste water through a cocktail of bacteria.	Toth Research & Lab	http://www.laboratoriototh.com
Bioenergy	Esteban Bermúdez, 32, Costa Rica	Bioenergy from pineapple residues.	Escoia	http://escoia.com
	Joaquín Víquez, 32, Costa Rica.	Production of small and medium scale biodigesters	Viogaz	http://www.viogaz.com/
New products	Enrique González, 29, mexicano	Extraction of fiber, protein and antioxidants from fruit and vegetable waste for reuse in food processing.	GeniusFoods	http://www.geniusfoods.co/
	Daniel Méndez, 27, Costa Rica.	Extraction of products of interest to the food and pharmaceutical (bromelain) and construction industries. (fibers, biomaterials) from pineapple residues	Reuti-piña	http://reutipiacr.com/
	Dariana Rodríguez, 34, mexicana	Generation of natural antibacterial additives from avocado waste	Avosafe	nd

Bioeconomy related R&D + innovation, Chile



- **Universidad de Concepción (Concepción, Chile)**
 - Extraction of fatty oils from pine seeds
 - Bark residues from pine tress to produce thermic isolation panels
- **Universidad de la Frontera (Temuco, Chile) - Biorefineries**
 - Dry biomass (residues from forestry industry)
 - Gas, bio-oil
 - Biochar, eco-fertilizer (controlled release fertilizer)
 - Wet biomass (bio-refining of micro-algae; joint venture with a thermoelectric company to use CO₂ releases)
 - Carbohydrates for alcohol production
 - Protein concentrate and aminoacids
 - Biomaterials
 - Used biomass for biogas generation

The bioeconomy in Latin America and the Caribbean

POLICIES AND INSTITUTIONS FOR THE BIOECONOMY IN LAC

Strategic resources – processes – products



Biomass production

Biodiversity
resources

Agricultural, agro-
industrial and
domestic biomass
residues

Biotechnologies

Biorefineries

Biodesign

Bioprospection

Bioinnovation

....

Foods

Bioenergy

Bioplastics

Agricultural bioinputs

Biocosmetics

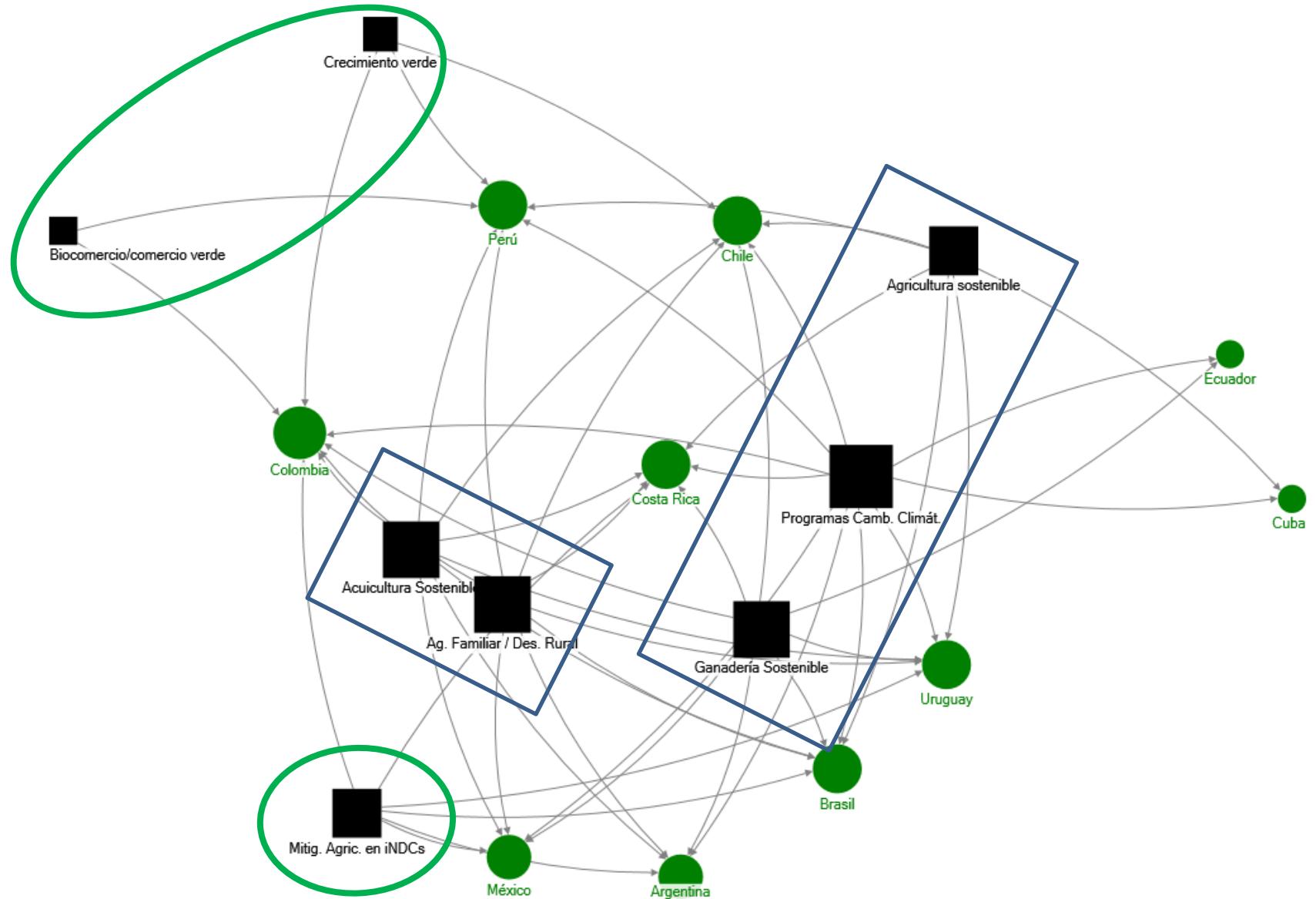
Bioproducts in
general

Institutional and policy domains

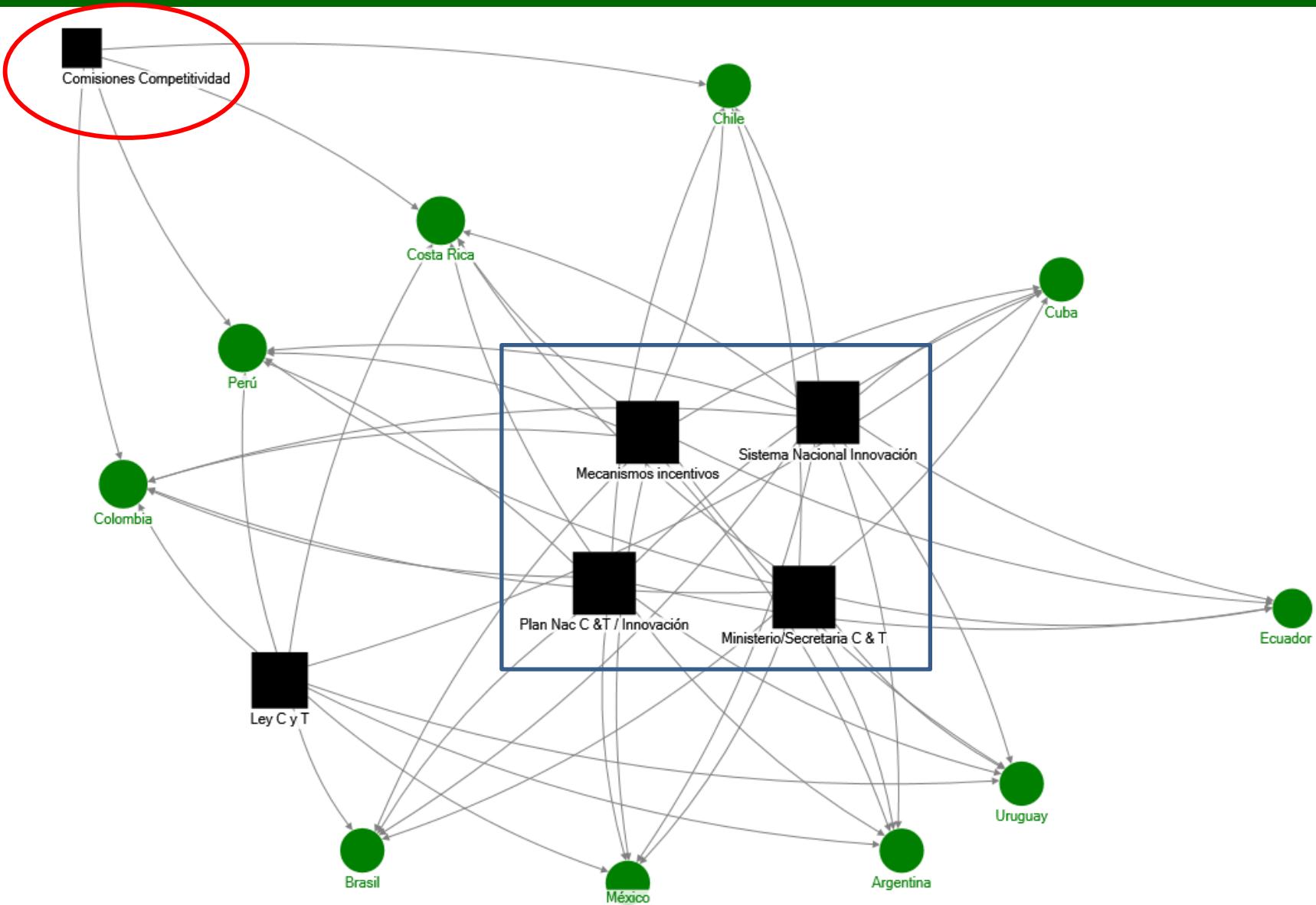


Related policies	Innovation	Biotechnology	Biodiversity, forestry	Bioenergy, residues
Sustainable agriculture	Ministries, Secretariats	Promotion mechanisms	Environmental Laws	Biofuels
Sustainable livestock	C-T-I Laws	Advisory Commissions Biotech/Biosafety	Biodiversity / Wild life laws	Renewable energies
Sustainable aquaculture	National Innovation Systems	Leyes de Obtenciones Vegetales / GMOs	National Biodiversity Strategies	Management of residues
Family Agriculture	National R&D+I Plans	Biosafety laws	Forestry Laws	Use of ag. residues
Green Growth	Incentive mechanisms		Forestry incentives	
Green /Bio trade	Competitiveness Commissions		Forestry Commissions	
Climate Change			Payment Env. Services	

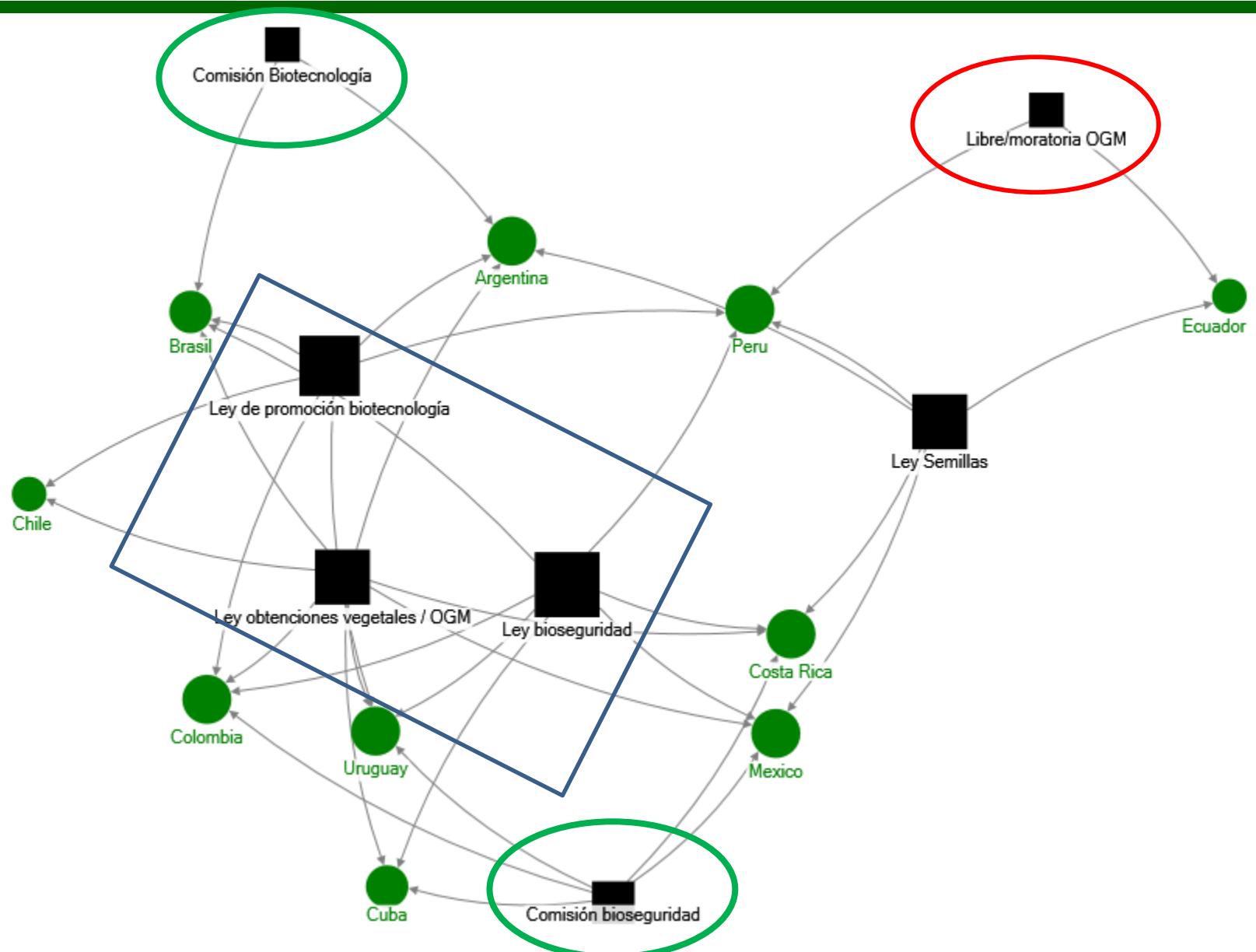
Related policies



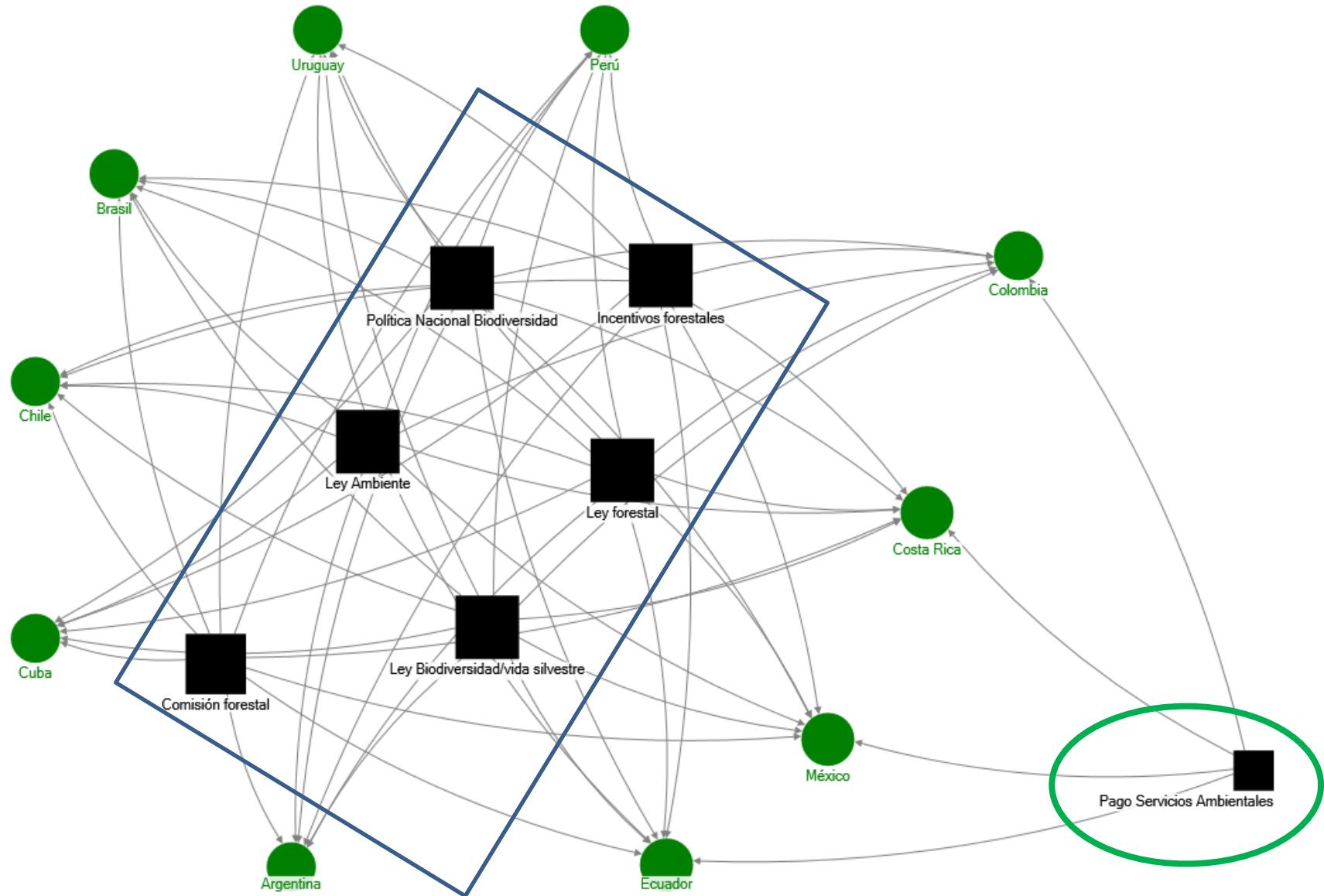
Innovation



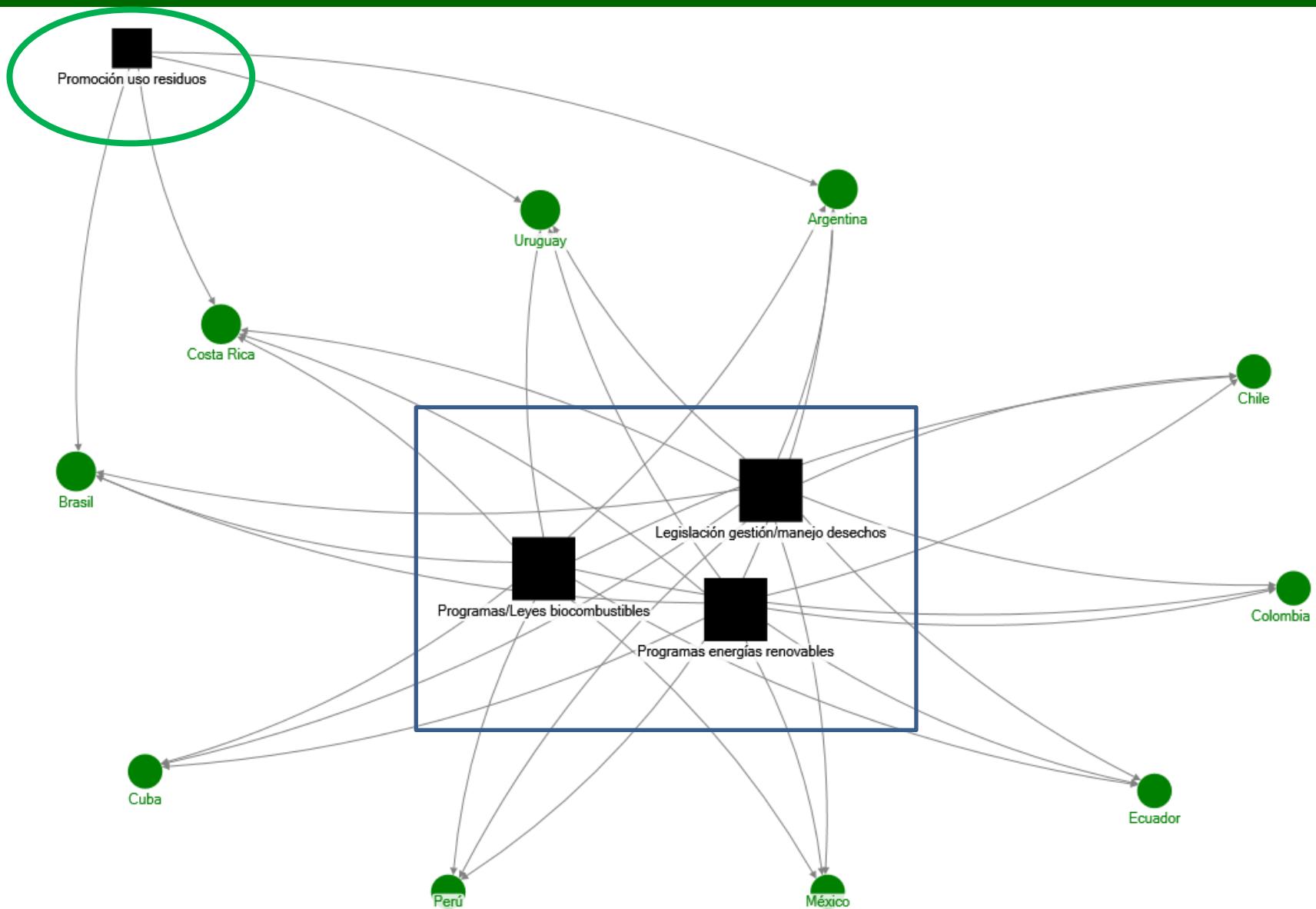
Biotechnology



Biodiversity and forestry



Bioenergy and use of residues



Incentives (1)



Country	Instruments
Argentina	Fondo para la Investigación Científica y Tecnológica Fondo Tecnológico Argentino Fondo Argentino Sectorial
Brasil	Fondo Nacional de Desarrollo Científico y Tecnológico Fondo Brasileño para la Biodiversidad Fondo Amazonas
Chile	Fondo Nacional de Desarrollo Científico, Tecnología e Innovación Fondo de Fomento al Desarrollo Científico y Tecnológico Fondo de Financiamiento de Centros de Investigación en Areas Prioritarias Fondo de Innovación para la Competitividad Fondo de Investigación Pequera y de Acuicultura
Colombia	Fondo Nacional de Financiamiento de la Ciencia y la Tecnología Francisco José de Caldas
Costa Rica	Fondo de Incentivos al Desarrollo Científico y Tecnológico Fondo Propyme Programa Nacional de Innovación y Capital Humano para la Innovación Fondo Nacional de Financiamiento Forestal
Cuba	Fondo Financiero para la Ciencia y la Innovación.
Ecuador	Fideicomiso para el Emprendimiento y la Innovación Proyecto Prometeo Fondo Capital de Riesgo

Incentives (2)



País	Incentivo
México	Fondo Institucional Fondo de Cooperación Internacional en Ciencia y Tecnología Fondo Institucional de Fomento Regional para el Desarrollo Científico y Tecnológico y la Innovación Fondo Sectorial CONACYT- Secretaría de Energía-Sustentabilidad Energética Fondo Sectorial de Investigación CONACYT-INEGI Fondo Sectorial de Innovación
Perú	Fondo Nacional de Desarrollo de la Ciencia, Tecnología e Innovación Tecnológica Fondo para la Innovación, la Ciencia y la Tecnología Fondo de Investigación y Desarrollo de la Competitividad Fondo Marco para la Investigación en Ciencia y Tecnología Fondo Nacional para el Desarrollo de la Investigación Peruana
Uruguay	Fondos Agencia Nacional de Innovación (innovación, emprendimiento, investigación y formación).

In general:

- SMEs
- Innovation
- Competitiveness
- Sectoral funds
- Human capital
- Technological development

Institutional context – private sector (1)



Country	Biotechnology	Bioenergy	Other
Argentina	<ul style="list-style-type: none">• Instituto de Agrobiotecnología Rosario• Asociación de Semilleros Argentinos• Consejo Argentino para la Información y Desarrollo de la Biotecnología• Cámara Argentina de Biotecnología	<ul style="list-style-type: none">• Cámara Argentina de Energías Renovables• Cámara de Empresas Pyme Regionales Elaboradoras de Biocombustibles• Cámara Argentina de Biocombustibles	<ul style="list-style-type: none">• Bolsa de Cereales de Buenos Aires• Consejo Argentino para el Desarrollo Sostenible• Fundación Argentina de Nanotecnología
Brazil	<ul style="list-style-type: none">• Consejo de Información sobre Biotecnología• Asociación Brasileña de Biotecnología Industrial	<ul style="list-style-type: none">• Unión de la Industria de la Caña de Azúcar• Alianza Brasileña para Biocombustibles de Aviación• Unión Brasileña de Biodiesel o Bioquerosene• Instituto Brasileño de Petróleo, Gas y Biocombustibles• Asociación de Productores de Biodiesel de Brasil	<ul style="list-style-type: none">• Centro de Gestión de Estudios Estratégicos (CGEE)• Asociación Brasileña de Reciclaje Animal• Articulación Nacional de Agroecología.

Spaces for policy dialogue and convergence

Institutional context – private sector (2)



Country	Biotechnology	Bioenergy	Other
Chile	<ul style="list-style-type: none">• Instituto de Dinámica Celular y Biotecnología• Asociación Nacional de Productores de Semillas• Asociación Gremial Chile Bio Crop Life	<ul style="list-style-type: none">• Asociación Chilena de Energías Renovables	<ul style="list-style-type: none">• Instituto de Fomento Pequero.
Colombia	<ul style="list-style-type: none">• Asociación Colombiana de Ciencia y Tecnología de Alimentos• Biointropic	<ul style="list-style-type: none">• Federación Nacional de Cultivadores de Palma de Aceite• Federación Nacional de Biocombustibles de Colombia	<ul style="list-style-type: none">• Consejo Privado de Competitividad• Corporación Biocomercio de Colombia.• Cenicaña• Cenicafé
Costa Rica	<ul style="list-style-type: none">• Centro Nacional de Innovaciones Biotecnológicas• Red de Ingeniería Genética Aplicada al Mejoramiento de Cultivos Tropicales• Consorcio de Empresas de Biotecnología de Costa Rica	<ul style="list-style-type: none">• Asociación Costarricense de Productores de Energía	<ul style="list-style-type: none">• Instituto Nacional de Biodiversidad• Centro Nacional de Alta Tecnología

Institutional context – private sector (3)



Country	Biotechnology	Bioenergy	Other
Cuba	<ul style="list-style-type: none"> BioCubaFarma 	<ul style="list-style-type: none"> Cuba Solar 	<ul style="list-style-type: none"> Asociación Cubana para la Ciencia y la Tecnología de los Alimentos
Ecuador	<ul style="list-style-type: none"> Cámara Ecuatoriana de la Industria de la Innovación y Tecnología Agrícola 	<ul style="list-style-type: none"> Fundación de Fomento de Exportaciones de Aceite de Palma y sus derivados de origen nacional Corporación para la Investigación Energética Centro de Investigaciones de la Caña de Azúcar. 	<ul style="list-style-type: none"> Alianza para el Emprendimiento y la Innovación.
México	<ul style="list-style-type: none"> Genómica y Bioeconomía A.C Agro Bio México 	<ul style="list-style-type: none"> Asociación Nacional de Energía Solar Asociación Mexicana de Energía Eólica 	<ul style="list-style-type: none"> Consejo Mexiquense de Ciencia y Tecnología
Perú	<ul style="list-style-type: none"> Asociación Peruana para el Desarrollo de la Biotecnología 	<ul style="list-style-type: none"> Cámara Peruana de Energías Renovables 	<ul style="list-style-type: none"> Cámara Peruana de Medio Ambiente y Desarrollo Sostenible
Uruguay	<ul style="list-style-type: none"> Asociación Uruguaya de Biotecnología Cámara Uruguaya de Semillas. 	<ul style="list-style-type: none"> Cámara Solar del Uruguay 	<ul style="list-style-type: none"> Centro Uruguayo de Tecnologías Apropriadas

Fuente: Elaboración propia.



The economic importance of the bioeconomy

ECONOMY IN THE EXPORTS OF LATIN AMERICA AND CARIBBEAN COUNTRIES

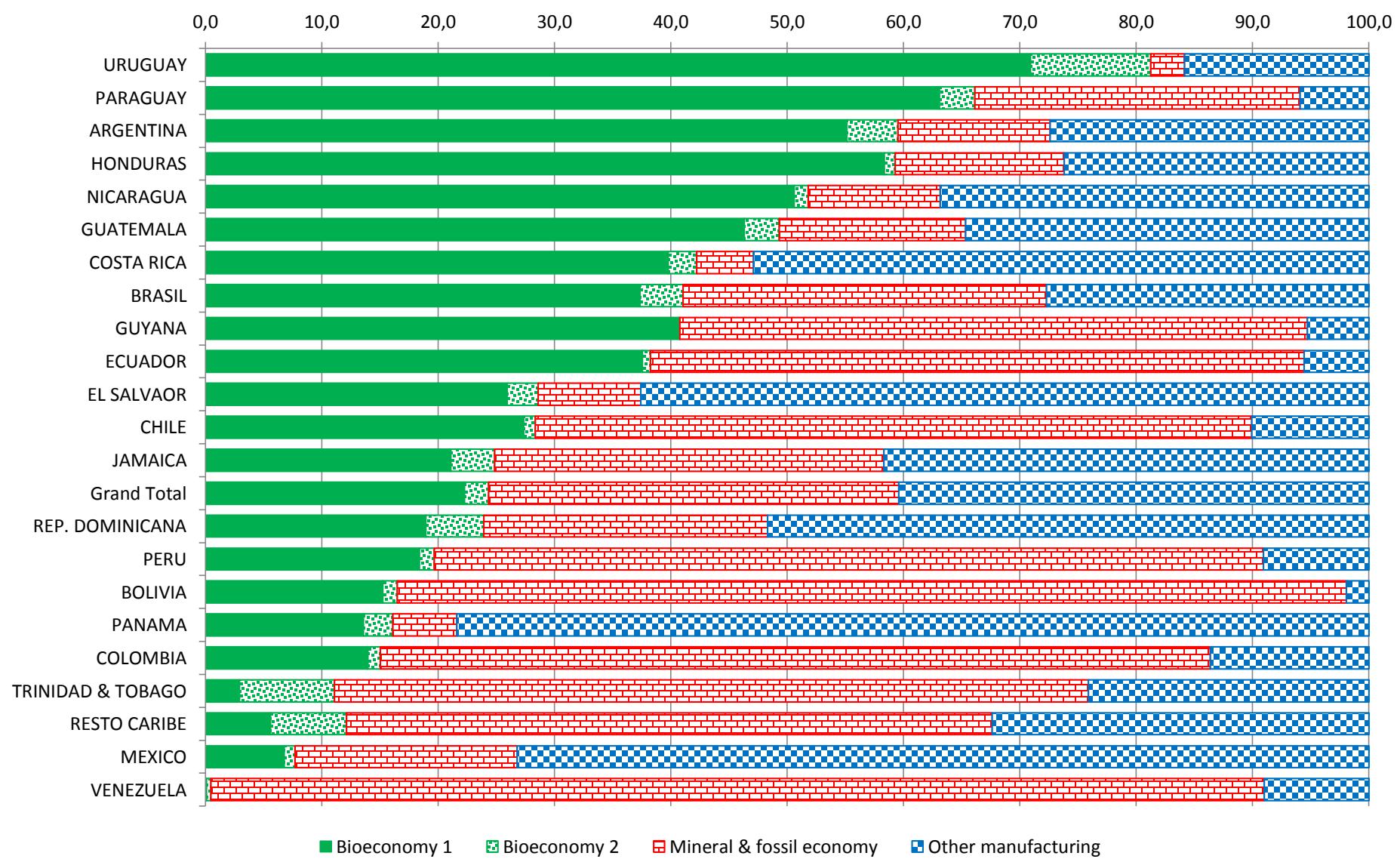
Exports classification

(COMTRADE, 4 digits, harmonized system)



Bioeconomy 1	Bioeconomy 2	Mineral and fossil economy	Manufacturing
Agriculture and agroindustry	Bio-based chemicals	Non-fuel minerals and derives	Metalworking industry
Food industry	Textile and leather manufacturing	Fossil fuels	Machinery and equipment
Fisheries, aquaculture & der	Biodiesel		Chemical industry
Forestry and wood industry	Bioethanol		Plastics and rubber
Pulp and paper industry	Caloric solid bioenergy		Textiles, clothing and footwear
	Bio pharmaceutical industry		Pharmaceutical and cosmetics
	Bio plastics & rubber		Other manufactures
	Bio cosmetics		

Composition of total exports (2010-2015, percentages)



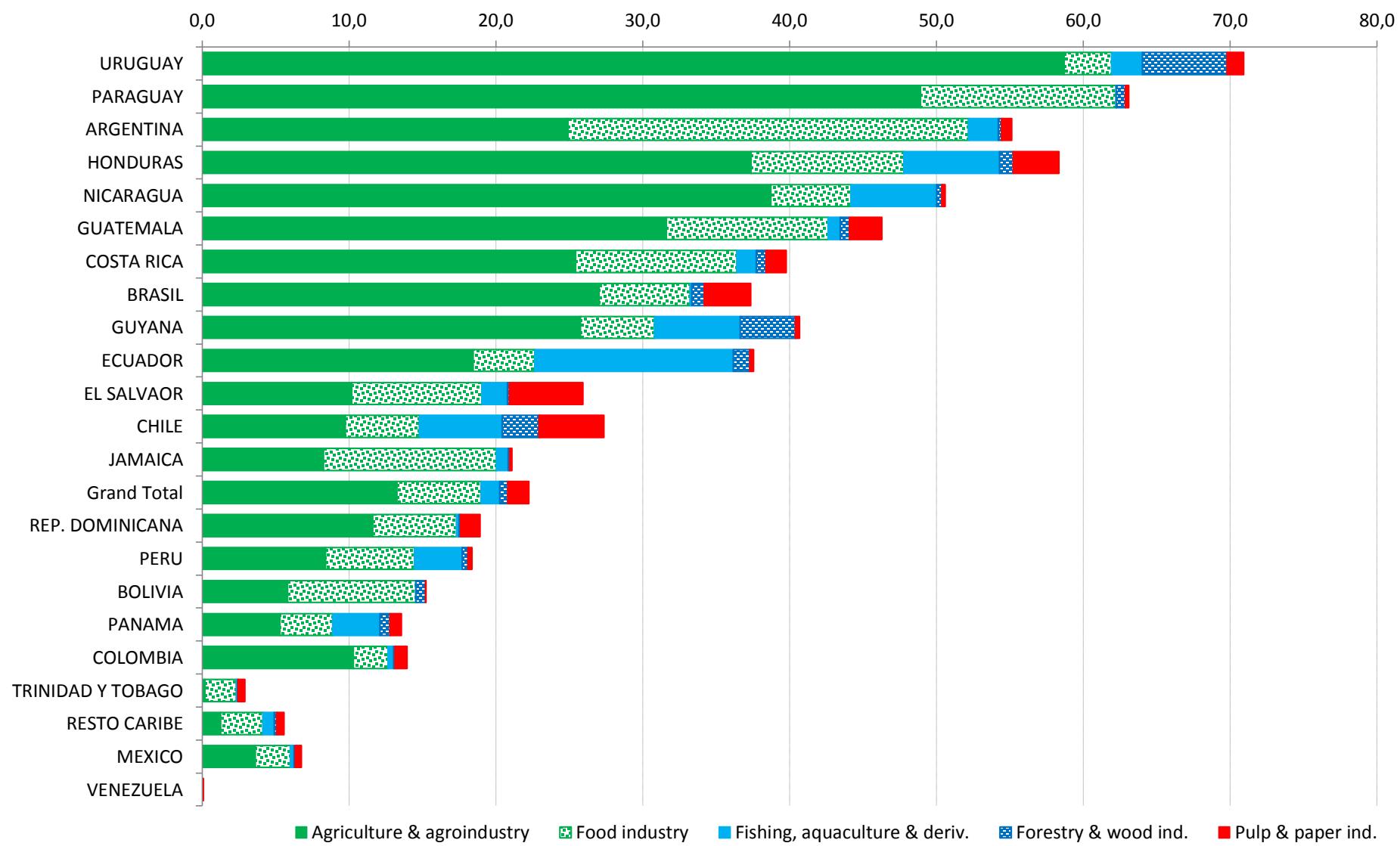


Groups of countries

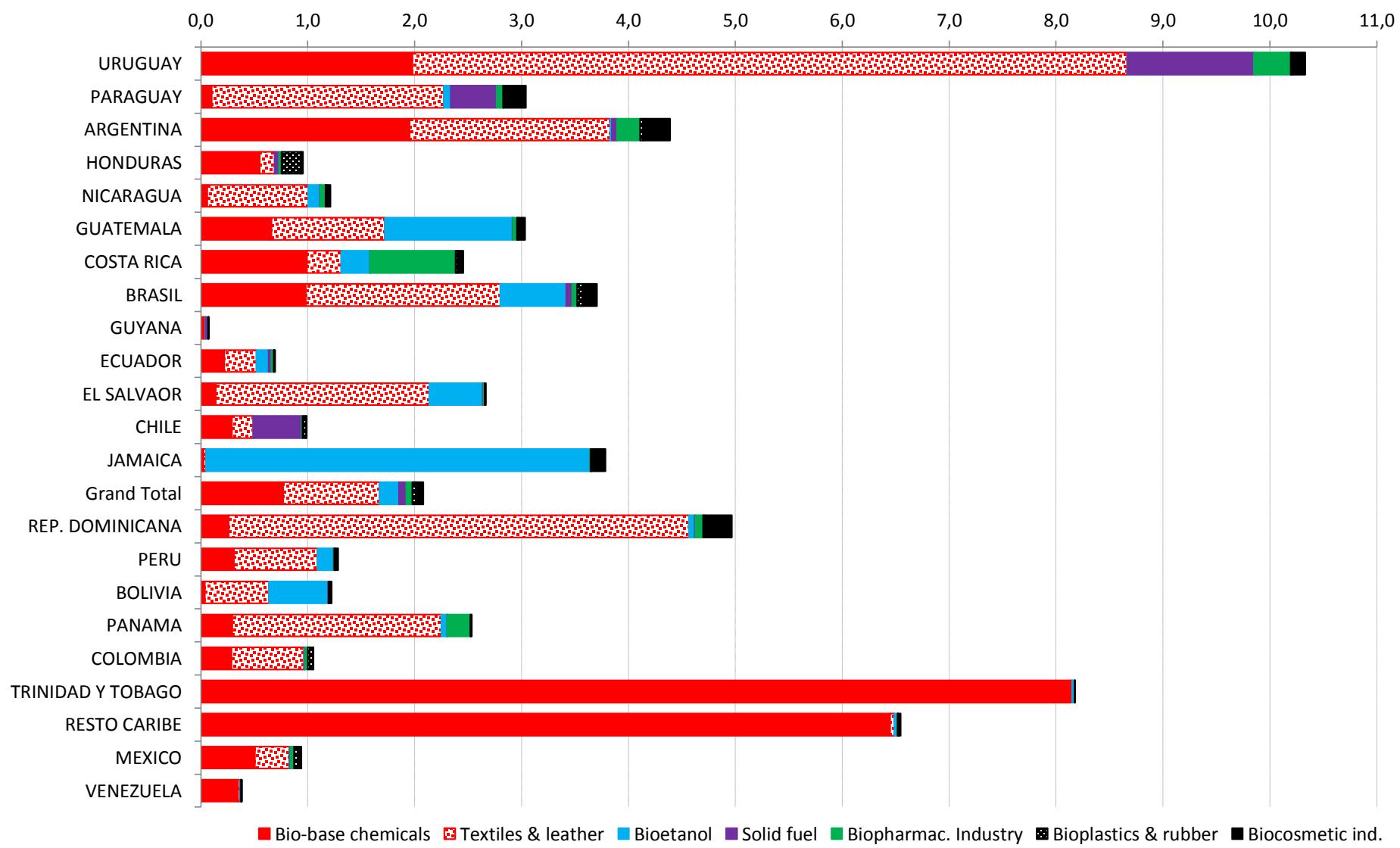
- *High share of bioeconomy exports (over 40% of total) and higher proportion of manufactures than mineral and fossil resources.*
 - Uruguay, Argentina and Costa Rica.
- *High share of bioeconomy exports (over 40% of total) and higher proportion of mineral and fossil resources than manufactures.*
 - Brazil, Guyana and Paraguay; Brazil stands-out due to the higher proportion of manufacturing exports (28% vs. 6% in Guyana y Paraguay).
- *Low proportion of bioeconomy exports (less than 40% of total) and higher proportion of manufacturing exports than mineral and fossil resources.*
 - Jamaica and México; México has a higher proportion of manufacturing exports (72,2%)
- *Low proportion of bioeconomy exports (less than 40% of total) and higher proportion of mineral and fossil resources exports than manufactures.*
 - (a) less diversified exports (Peru, Bolivia, Colombia and Venezuela);
 - (b) a higher share of bio-based exports (Chile y Ecuador)

Composition of exports, Bioeconomy 1

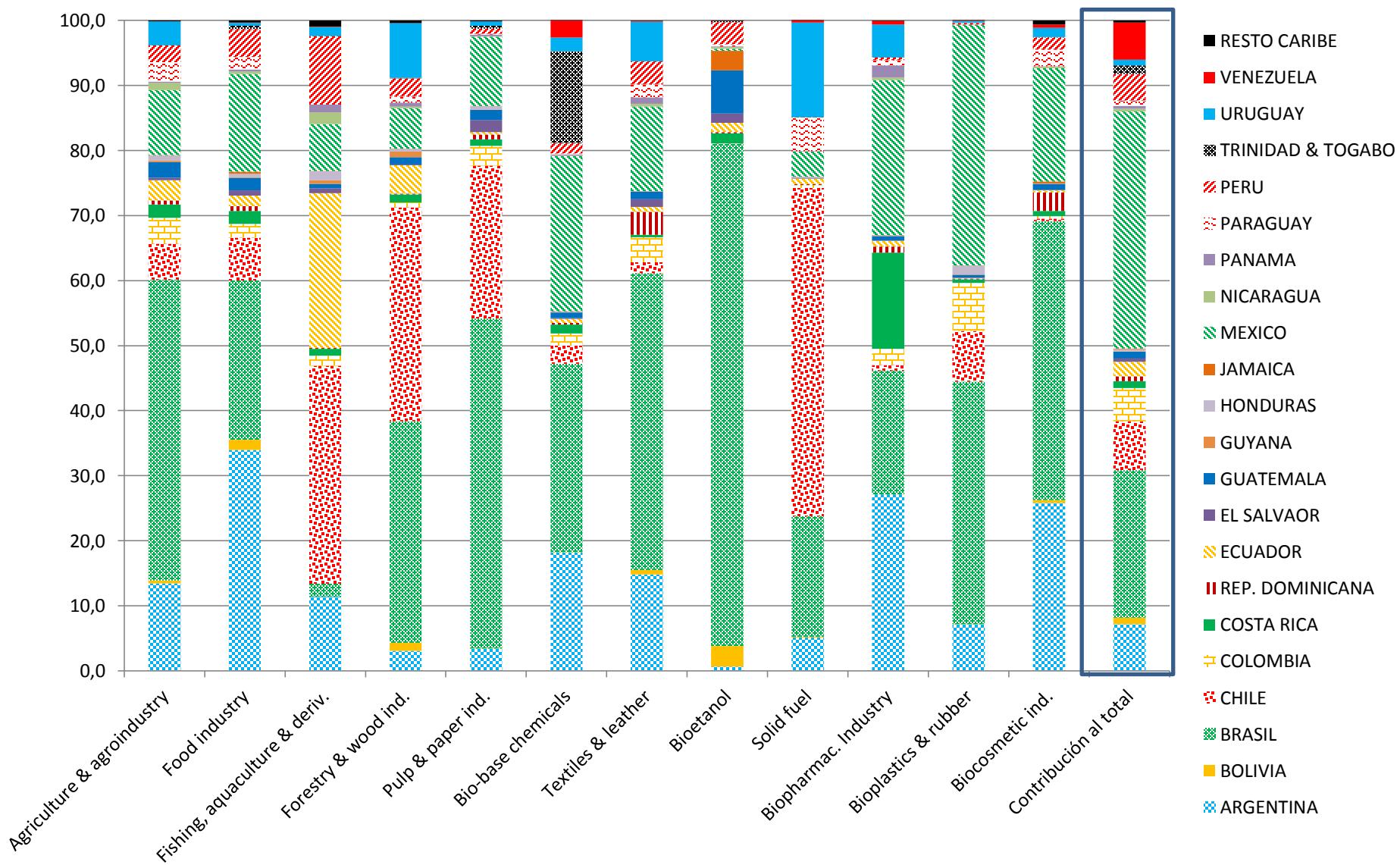
(2010-2015, percentages, Comtrade)



Composition of exports, Bioeconomy 2 (2010-2015, percentages, Comtrade)



Contribution to bioeconomy exports (2010-2015, percentages, Comtrade)



Typologies of bioeconomies

(based on exports, 2010-2015, Comtrade)



Area	Countries
Agriculture & agroindustry	Argentina, Brasil, Costa Rica, Ecuador, Guatemala, Paraguay, & Uruguay;
Food industry	Argentina, Brasil, y en menor medida Costa Rica and Paraguay
Fishing & aquaculture	Ecuador, Chile, Peru, Argentina and to a lesser degree Uruguay , Guyana, Honduras, Nicaragua, Panama.
Forestry & related	Chile, Brasil, Uruguay, and Ecuador
Bioenergy	Argentina (biodiesel); Brasil, Guatemala, Jamaica (bioethanol;) and Chile, Uruguay (solid bio-energy);
Bio-chemic & bio-plastics	Brasil (both), Argentina, Costa Rica (bio-chemicals), México y Uruguay (bioplastics);
Biopharma & biocosmetics	Argentina, Uruguay (both); Costa Rica, Panama (biopharma); Brasil, Paraguay, Dominican Republic (biocosmetics).

Looking into the future

CHALLENGES

Policy challenges



- **Adequate regulatory frameworks**
 - Bio-risk, bio-security, biodiversity protection, access to genetic resources, GMO regulation, intellectual property and patenting issues,
- **Articulation of current policy initiatives**
 - R&D + Innovation, non-fossil clean energy; biotechnology development; low carbon agriculture; payment for environmental services; sustainability and efficiency improvements in the food system.
- **Coordination of existing capacities (public and private)**
- **Policies for bio-based SMEs**
 - *Adequate financing* for innovative start-ups.
 - *Entry into concentrated markets* (e.g. regulatory issues)
 - Capacity development,

Enabling factors



- Better comprehension of the bioeconomy concept.
- Policy dialogue, exchange y mutual understanding among public and private bioeconomy stakeholders.
- Understanding of the potential of the bioeconomy for inclusive, competitive and sustainable development.
- Systematization of successful experiences (e.g. market and business development; public-private collaboration; private sector-academia collaboration).
- Exchange of successful experiences.
- Explore pathways for the development of the bioeconomy of national and sub-national interest (the “bioeconomies”).
- Bring the bioeconomy to the highest political level.

“El fin del conflicto implica la posibilidad de consolidar una nueva economía con mayor provecho de nuestros recursos y reivindicar nuestro medio ambiente (...). Queremos llegar al año 2025 convertidos en una bioeconomía basada en la ciencia, la tecnología y la innovación, y que saque el mayor provecho de su inmensa riqueza natural”

Juan Manuel Santos, Presidente de Colombia, en el Gran Foro de la Biodiversidad, 14 de septiembre 2016.

The bioeconomy:

“It feed people.

It clothes them.

I warms them.

It moves them.

It gives them a roof over their heads.

It cares for and heals them.

It connects them with nature.

***And it develops solutions for a better,
more sustainable future.***

German Bioeconomy Council. (2017). *Recommendations of the German Bioeconomy Council: Further Development of the National Research Strategy Bioeconomy 2030*, p. 4.



Muito obrigado

adrian.rodriguez@cepal.org

<https://www.facebook.com/BioeconomiaAmericaLatina/>