Potential impact of developing the lithium value chain in Argentina: an Input-Output analysis

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Introduction

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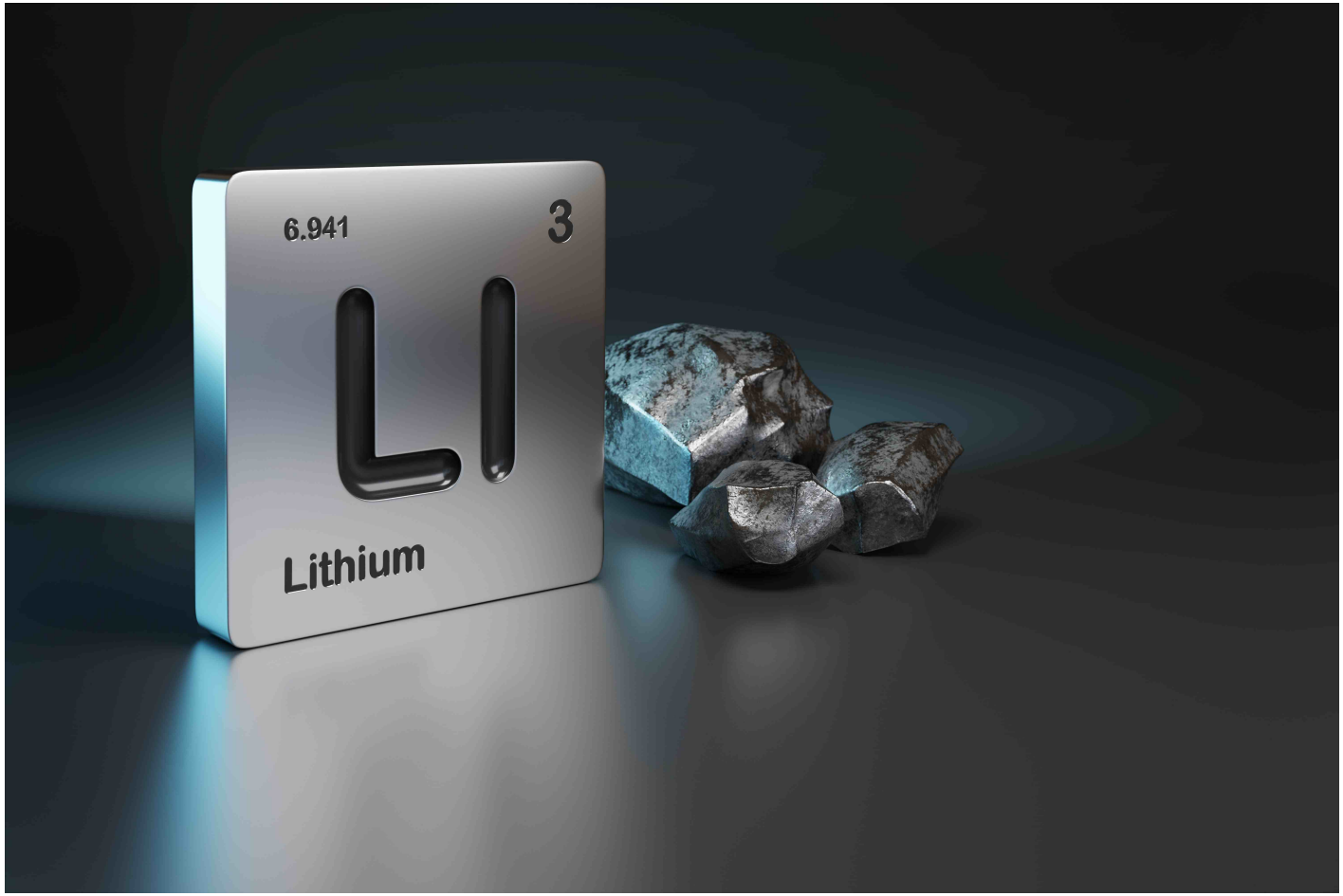
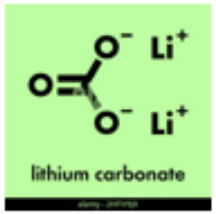


Introduction

58%
Of world identified lithium resources are in Argentina, Bolivia & Chile **(USGS,2021).**



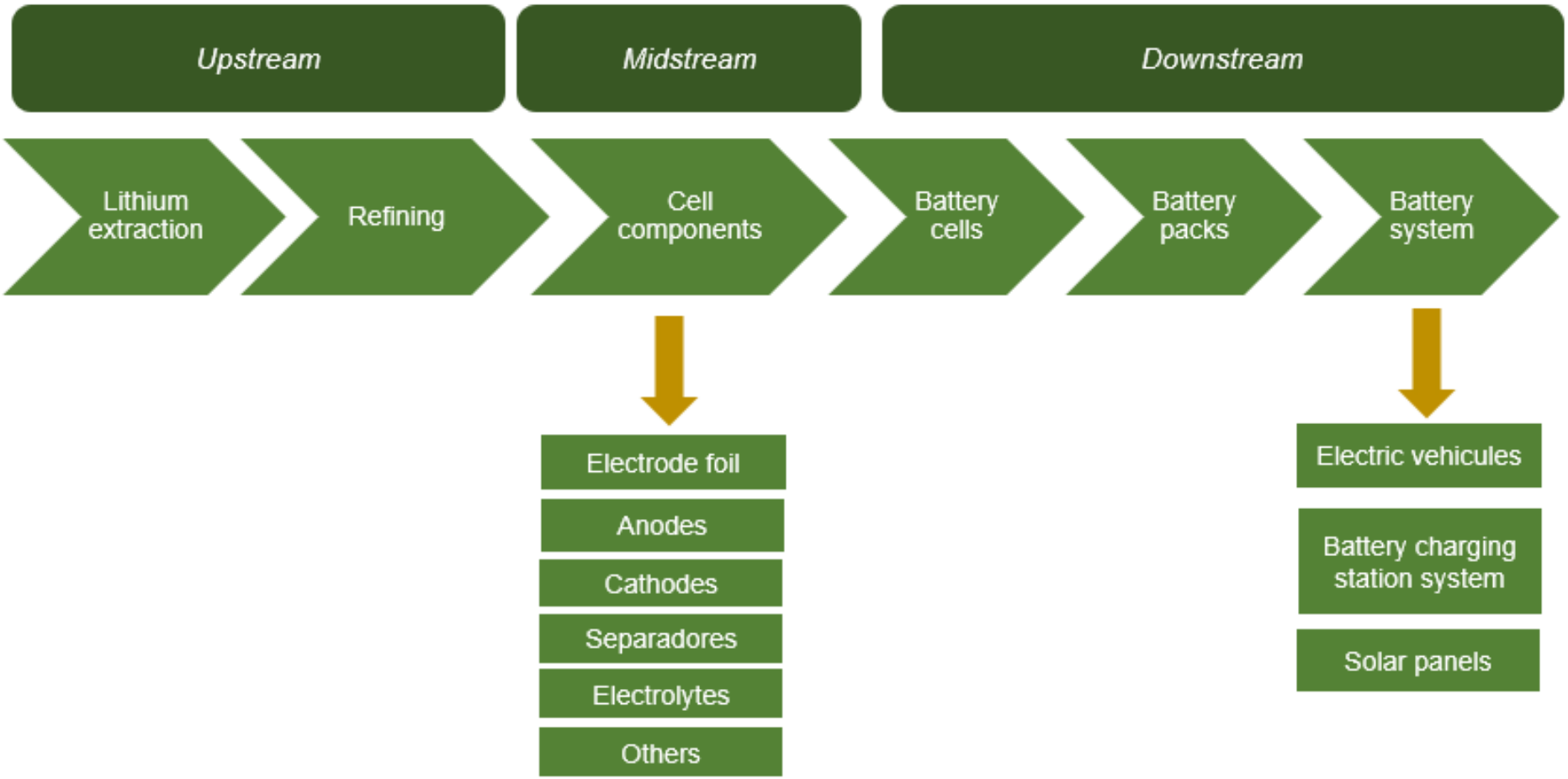
29%
Of worldwide production of lithium (carbonate) is from Argentina, Bolivia & Chile **(USGS,2021).**

22%
Of world identified lithium resources are in Argentina **(USGS,2021).**

8%
Of worldwide production of lithium (carbonate) is from Argentina **(USGS,2021).**

Development of lithium value chain

Value Added in Lithium value chain

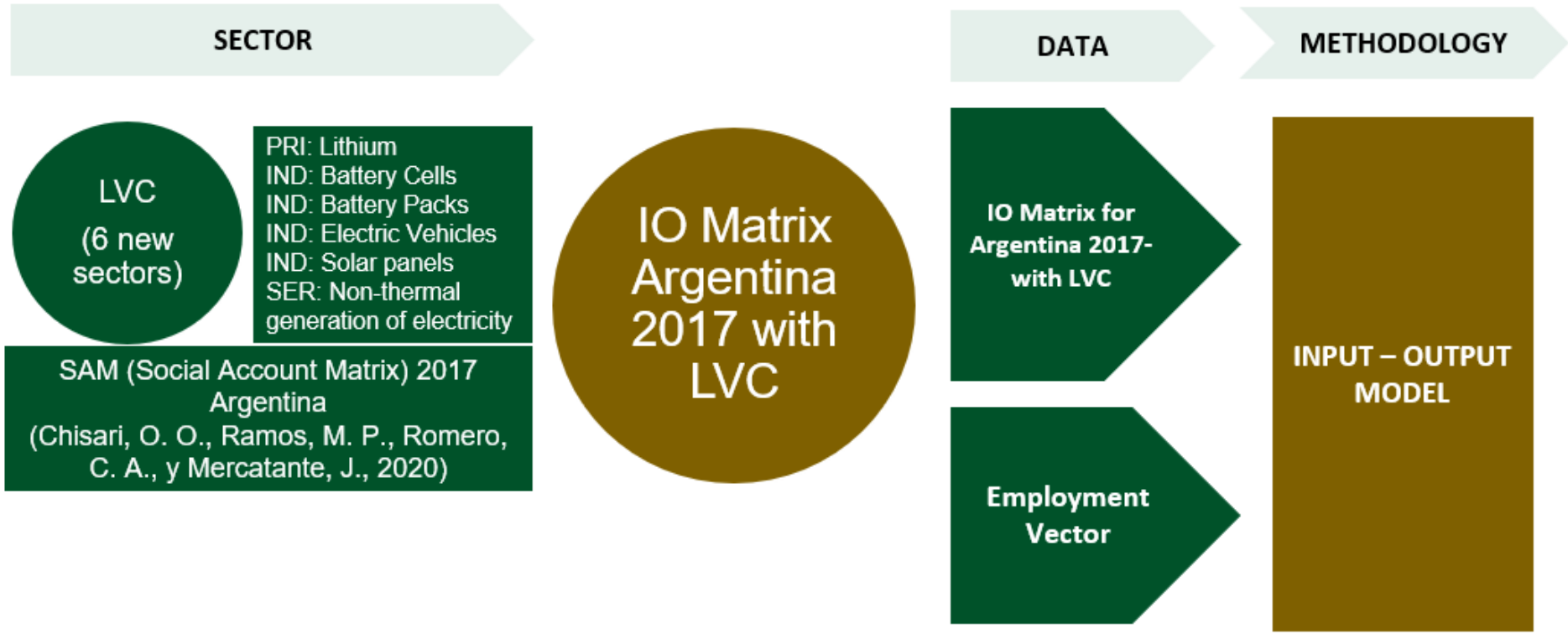


Development of input output matrix

IO Matrix

Sector	Characteristic	Description	Source
Lithium extraction	Operative	Total production	Argentinian Ministry of Treasury: Value Chain Report (2018) - Lopez et al. (2019)
		Operative cost structure	Balance sheet information of firms in 2017
Cells	Latent sector: minimun amount of lithium sales as productive function	Operative cost structure	Y-TEC project
		Sales structure	Input requirement observed in the cost structure in Battery packs
Battery Pack	Latent sector: minimun amount of cells sales as productive function	Operative cost structure	BIS (2021)
		Sales structure	Input requirement observed in the cost structure to electric vehicules and solar technology
Electric Vehicles	Latent sector: minimun amount of battery packs sales as productive function	Operative cost structure	Konig et al. (2021) y Leurent (2015)
		Sales structure	Part of the market vehicles
Solar panels	Latent sector: minimun amount of battery packs sales as productive function	Operative cost structure	World Bank (2021)
		Sales structure	Capital goods direct to distributed power generation network
Non-thermic generation of electricity	Latent sector: minimun amount of battery packs sales as productive function	Operative cost structure	
		Sales structure	
Other sectors	Operative	Operative cost structure	(Chisari et al., 2020)
		Sales structure	

IOM Structure



Employment vector

Data employment	Description	Source
National Work Force (17 economic activities)	Three occupational categories: - Wage earners registered (formal jobs) - Non-registered (informal jobs) - Non-wage earners on their own in an independent way	Generation Input Account (INDEC, 2017)
Integrated Retirement and Pension System (ISIC - 4 digits)	Expand from 17 economic activities to 35 sectors of IOM (formal jobs)	Ex National Ministry of Labor
Permanent Household Survey (EPH)	National survey that allows us to expand informal jobs and "independent" jobs	INDEC

Design of Lithium Value Chain scenarios

Design of Lithium Value Chain scenarios

Conservative Lithium	Optimistic Lithium	Conservative Lithium-ion batteries	Optimistic Lithium-ion batteries
Production: **303,000 tons LCE in 2030**	Production: **463,000 tons LCE in 2030**	Y-TEC-La Plata: Cells production: **13,5 MWh/year** **Cell price:** 190 USD/KWh	Y-TEC-La Plata: Cells production: **13,5 MWh/year** **Cell price:** 190 USD/KWh
Price: **USD 18,000 per ton**	Price: **USD 20,000 per ton**	**No local production**	Battery packs production: **5,000 MWh** per year Domestic demand: **3,587 MWh** Exports: **1,412 MWh.** Battery price: **14,95/kWh**
Investment: **14.8 MM USD** / '000 tons LCE	Investment: **14.8 MM USD** / '000 tons LCE	Production of batteries by **Y-TEC and INIFTA-CONICET** with **local production of LFP active material.**	Production of batteries by **Y-TEC and INIFTA-CONICET** with **local production of LFP active material.**
7 projects under development between 2025 and 2030.	**7 projects** under development between 2025 and 2030.	**No local production**	A battery pack assembly plant serves the domestic demand for electromobility and exports the surplus

Design of Lithium Value Chain scenarios

Conservative Electromobility	Optimistic Electromobility	Conservative Renewable energies	Optimistic Renewable energies
No local production	Electric vehicles production: **119,576 units** /year ; Price: **USD 12,000**		
Penetration rate of electromobility in Argentina is estimated at **2%**	**Penetration rate of electromobility** in Argentina is estimated at **20%** (passenger and light utility vehicles)	**27%** of power generation based on renewable sources **(solar and wind)**	**30%** of power generation based on renewable sources **(solar and wind)**
The domestic demand of electric vehicles is met with **imports.**	The domestic demand of electric vehicles is met with local production: battery cells and packs are manufactured locally.		

Results to 2030

Investment and production

	LVC impacts by 2030			
	Investment shocks		Production shocks	
	Value	Percentage (%)	Value	Percentage (%)
Conservative				
Gross Domestic Product (MM AR$)	23,700	0.31	43,874	0.56
Tax revenue (MM AR$)	7,940	0.29	12,513	0.45
Employment (#)	66,113	0.32	52,377	0.26
Exports (MM AR$)			51,687	4.28
Optimistic				
Gross Domestic Product (MM AR$)	41,947	0.54	73,451	0.95
Tax revenue (MM AR$)	13,977	0.50	20,943	0.76
Employment (#)	117,412	0.58	87,455	0.43
Exports (MM AR$)			87,010	7.21

	LVC impacts by 2030					
	Investment shocks			Production shocks		
	Direct & Indirect	Induced	Total	Direct & Indirect	Induced	Total
CONSERVATIVE						
Value of production (MM AR$)	0.850	0.150	62,514	0.791	0.209	103,776
Employment (#)	**0.814**	**0.186**	66,113	**0.466**	**0.534**	52,377
Tax revenue (MM AR$)	0.857	0.143	7,940	0.792	0.208	12,513
Output multiplier			**2.06**	1.59		**2.01**
Employment multiplier			**1.89**	3.56		**7.62**
OPTIMISTIC						
Value of production (MM AR$)	0.849	0.151	110,212	0.792	0.208	173,940
Employment (#)	**0.816**	**0.184**	117,412	**0.470**	**0.530**	87,455
Tax revenue (MM AR$)	0.858	0.142	13,977	0.795	0.205	20,943
Output multiplier			**2.06**	1.58		**2.00**
Employment multiplier			**1.86**	3.51		**7.47**

Optimist scenario

Sector	Production		Employment	
	Value (MM AR$)	Share (%)	Jobs (Miles)	Share (%)
Agriculture, cattle, silviculture & fishing	311	0.2%	388	0.9%
Rest of mining, oil & gas	4,116	3.0%	769	1.9%
Lithium	76,593	**55.6%**	9,290	**22.6%**
Rest of industries	2,850	**2.1%**	1,588	**3.9%**
Fuels	2,061	1.5%	35	0.1%
Chemicals	15,487	**11.2%**	3,146	**7.7%**
Batteries, cell production	2,883	**2.1%**	586	**1.4%**
Batteries, packs production	12,461	**9.0%**	2,531	**6.2%**
Electricity generation & distribution	327	**0.2%**	161	**0.4%**
Water & gas distribution	545	0.4%	194	0.5%
Construction	132	0.1%	106	0.3%
Commerce	176	0.1%	333	0.8%
Host Services, Bars & Restaurants	2,984	**2.2%**	4,683	**11.4%**
Transport & Communications	6,353	**4.6%**	8,069	**19.6%**
Financial, real state & business services	2,640	1.9%	1,033	2.5%
Rest of services	7,904	**5.7%**	8,191	**19.9%**
Total	137,824		41,104	

Conclusions

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- Two scenarios have been designed with increasing levels of ambition regarding activities related to the lithium-ion battery value chain: lithium compounds, lithium-ion batteries, electromobility and renewable energies by 2030.
- The development of disaggregation impacts in investment and production phases of the lithium development highlight differences in order to multipliers.
- Sectoral impacts are driven by direct impacts of the LVC sectors but also through spill over effects observed particularly on those sectors that provide inputs and services to the LVC.

Thanks