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Economic Incentives and Energy Production from Forest Biomass in Argentina

Demián Olemberg, Patricia Egolf, Constantino Zaderenko, Ana María Lupi, Roberto Fernandez, Karina Casellas

Instituto Nacional de Tecnología Agropecuaria, Universidad Nacional de Misiones
Argentina

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Economic Incentives and Energy Production from Forest Biomass in Argentina

Presentation contents:

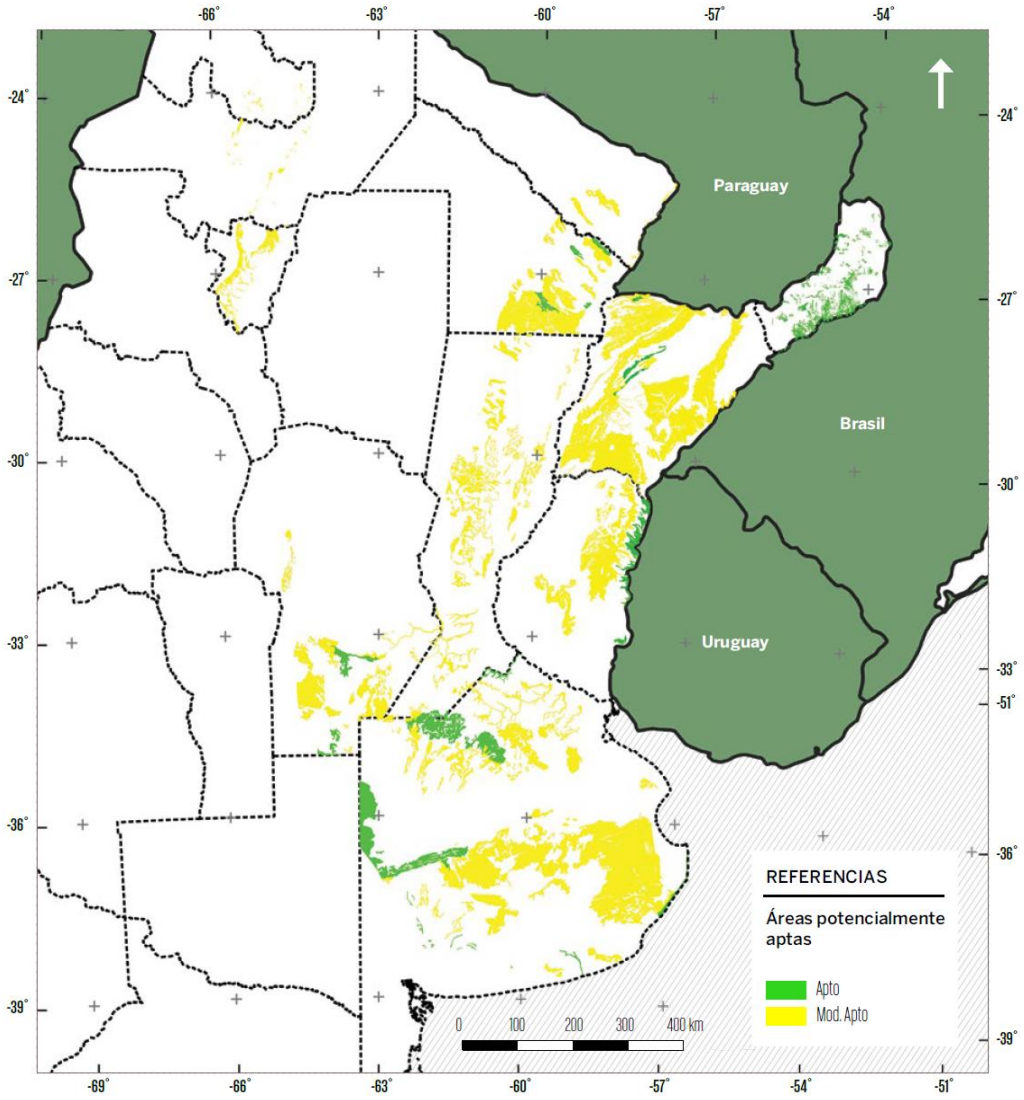
- Dendroenergy Potential
- Political and Regulatory Framework
- Current Economic Conditions of the Energy Sector: Towards a Standard Model
- Final Comments

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Dendroenergy Potential (1/3)

Dendroenergy is the energetic use of wood. It is a particularly interesting option to improve a highly fossil energy matrix in terms of sustainability and as a way of contributing to the bioeconomic development, because:

- Possibilty of using waste and byproducts combined with *ad hoc* plantations and other biomass sources
- No pressure on the food system
- Distributing geolocalized energy generation in a supplementary manner to other territorial coverages, such as wind, solar and small scale hydroelectric energy
- Possibility of cogeneration and trigeneration
- Reduction of several types of pollutant emissions
- Reduction of the risks of wildfires, as well as plagues and diseases, and land degradation reversion
- Untying energy costs from imported fuel price fluctuations
- Creation of new economic opportunities for rural areas

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Dendroenergy Potential (2/3)



FAO (2020)

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Region	Mod. Suit. Area (ha)	Full Suit. Area (ha)	Total Area (ha)
Pampas	6.398.524	1.383.322	7.008.254
Mesopotamia	4.744.444	631.019	5.375.463
Central	2.437.900	106.157	2.544.057
Northwestern	325.104	-	325.104
Total	13.905.972	2.120.498	15.252.878

Table 1: Suitable areas for forest biomass cultivation by macroregions. Adapted from: FAO (2020a).

How much power is that in terms of installed capacity potential?

Within a rather conservative set of assumptions:

> 10,000 MW (one fourth of the current total installed power generation capacity at the national level)

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Regulatory Framework (1/5)

- Argentina has endorsed the multilateral political initiatives for carbon reduction and energy transition, in the context of the G20, by means of the 2015 Paris Agreement, as well as other framework instruments
- NCRE sources are those that are not used up or exhausted during useful energy transformation and use processes, and, at the same time, have a significantly lower environmental impact than the rest of the renewable energy sources
- Law No. 27,191 + Decree No. 531/16 constitute the basis of the framework, with the goal to set NCRE share in the entire national power supply system to 20% by the year 2025, and all large users of electrical power (those demanding over 300 kW) will need to meet that target on an individual basis
- Fiscal and financial benefits that are intended to encourage investment, as well as a dollarized energy trade contract system

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Regulatory Framework (2/5)

RENEWABLE [GWh]	jan/dic-19	jul-20
Renewable HYDRO	1.462	59
EOLIC	4.996	766
SOLAR	800	67
BIOMASS	299	44
BIOGAS	256	28
TOTAL RENEWABLE	**7.812**	**964**
TOTAL DEMAND	128.905	12.178
% Share REN/DEM	**6,1%**	**7,9%**

Table 3: Current renewable sources share in the national energetic demand. Adapted from: CAMMESA (2020a) y CAMMESA (2020b).

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Regulatory Framework (3/5)

- RenovAR (Argentine Program for Electricity Supply Using Renewable Sources)
  - To date, eighteen biomass energy generation projects have been awarded in calls for bids (rounds 1, 1.5, and 2), ten of which are based on forest biomass.
  - Most forest biomass projects are either under construction or, in a few cases, they have been called off for the time being.
  - Hired capacities range from 2 MW to 37 MW.
  - Agreed prices vary from USD 108 per MWh to USD 143.10 per MWh.

- FODER (Fiduciary Fund for the Development of Renewable Energy Sources)
  - FODER has been playing a prominent role as a guarantee fund, rather than a direct financing entity.

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Regulatory Framework (4/5)

Adjudicaciones del Programa **RenovAr**

Ronda 1 Ronda 1.5 Ronda 2

Ministerio de Energía y Minería
Presidencia de la Nación

Adjudicados	Potencia	Precio Promedio Ponderado
147	4,466.5	54.72
Proyectos	MW	USD/MWh

Tecnología

Región	Provincia	Eólica	Solar	Peq. Hidro	Biomasa	Biogás	Biogás RS
BSAS	Buenos Aires						
Centro	Córdoba						
	San Luis						
Comahue	La Pampa						
	Neuquén						
	Río Negro						
Cuyo	Mendoza						
	San Juan						
Litoral	Santa Fe						
NEA	Chaco						
	Corrientes						
	Formosa						
	Misiones						
NOA	Catamarca						
	Jujuy						
	La Rioja						
	Salta						
	Santiago D..						
	Tucumán						
Patagonia	Chubut						
	Santa Cruz						

Seleccionar ronda:
All

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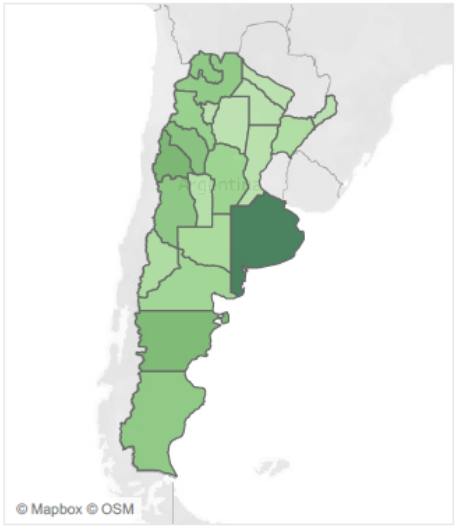

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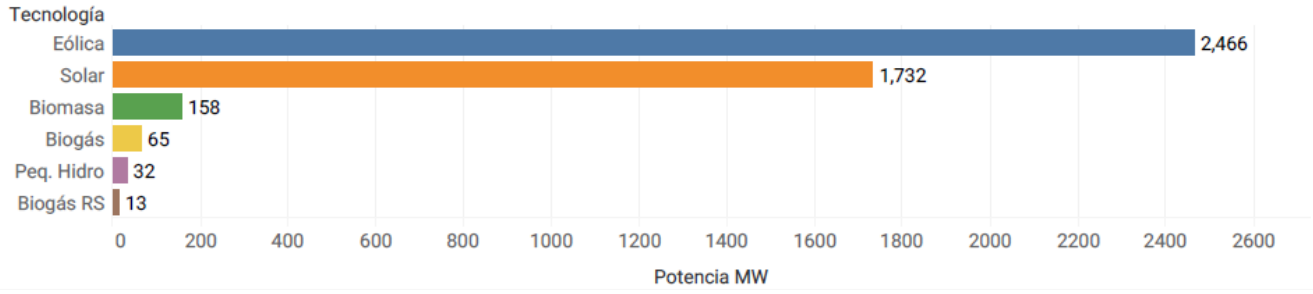

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Regulatory Framework (5/5)

Summing-up, even though Argentina has been building a modern system in line with the pursued objectives based on the multilateral political insertion profile, which is surviving the changes in the domestic political cycle, the development level of such system is still insufficient to take a qualitative leap towards a fully functional and operational scheme regarding its differential attributes.

Generated Distribution is still an open chapter in the dendroenergetic potential.

Deeper planning policies might help to achieve a logistic profile that geographically matches supply and demand (industrial and household) for energy, increasing the stability and raising the efficiency of the system.

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Towards a Standard Economic Model (1/9)

- *Eucalyptus grandis* high density plantation (technical details in FAO, 2020)
- Located in the Province of Misiones
- Cycle: Three harvests with a 5-year rotation period
- The forest production model is an option for alternative land use, land value is not included in costs

- Energy conversion carried out in a thermal power plant that will consume the forest biomass produced, (FAO, 2020; Zaderenko, 2012) with a delivery capacity of 2 MW in cogeneration (electrical-thermal power).

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Towards a Standard Economic Model (2/9)

Input factors (economic expenses):

JO_t	Hiring employees, transformed into amount of wages aligned to a benchmark hierarchical category and market valued
GO_t	Use of fuels and lubricants transformed into equivalent liters of diesel fuel
PL_t	Use of plantation material (seedlings, in the case of *eucalyptus* and pines)
AQ_t	Cost of agrochemicals and other supplies
TR_t	Cost-in-use of specific machinery (including regular maintenance, mainly for tractors and tillage implements, excluding depreciation)
AM_t	Equipment depreciation, including tractor, chainsaws, shed, etc.
IM_t	Specific local taxes (mainly property tax and road maintenance fees), plus other minor overhead costs
AD_t	Administrative expenses, calculated as a fixed percentage ad of subtotal expenses and evenly distributed on an annual basis in the entire cycle

Output factors (economic income):

$P\ R_j$	Valuation of forest harvests (R_j) at the single current price (P)

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Towards a Standard Economic Model (3/9)

Our methodology consists in taking the minimum price of 1 $Mg_{dry\ basis}$ of wood produced as a choice variable that offsets the costs incurred, setting the NPV of the entire cycle equal to zero, for a given discount rate.

The first step is to calculate the NPV, including the initial year (t=0) as the investment required for the first plantation:

$$NPV = \sum_{t=0}^{T} \frac{1}{(1+i)^t} (II_t - EE_t)$$

Where:

t represents the successive project years, up to *T*=15 in our case,

II_t represents income for the year *t,*

EE_t represents expenses for the year *t,*

i is the discount rate selected for the simulation.

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Towards a Standard Economic Model (4/9)

Then, we break down as follows:

$$II_t = \begin{cases} \boldsymbol{P}\, R_j, & t = 5, j = 1\,; \quad t = 10, j = 2\,; \quad t = 15, j = 3 \\ 0, & t \neq \{5; 10; 15\} \end{cases}$$

$$ST_t = JO_t + GO_t + PL_t + AQ_t + TR_t + AM_t + IM_t$$

$$AD = \frac{ad}{T+1} \sum_{t=0}^{T} ST_t$$

$$EE_t = ST_t + AD$$

The exercise is solved by computationally calculating the value of $\boldsymbol{P}$, so that the following equality may be obtained, integrating the previously developed terms:

$$\sum_{t=0}^{4} \frac{-1}{(1+i)^t} (JO_t + GO_t + PL_t + AQ_t + TR_t + AM_t + IM_t + AD) +$$

$$+ \frac{\boldsymbol{P}\, R_1}{(1+i)^5} - \frac{1}{(1+i)^5} (JO_5 + GO_5 + PL_5 + AQ_5 + TR_5 + AM_5 + IM_5 + AD) + \cdots = 0$$

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Towards a Standard Economic Model (5/9)

We proceeded with simulations of the relative price set for the years 2010-2020, using two reference discount rates: 5% and 15%.

For 2020, the model provides a simulation resulting in a minimum price of USD **32.15** per Mg_{db} for a 5% discount rate and USD **41.88** per Mg_{db} for a 15% discount rate.

Cost composition		
	5%	15%
Wages	37.17	39.13
Fuel and lubricants	19.37	16.60
Equipamient depreciation	15.04	14.59
Equipamient cost-in-use	11.72	9.50
Specific taxes and overheads	5.01	4.86
Plantation material	4.83	7.79
Administration	4.74	4.60
Other	2.11	2.93
Total	100.00	100.00

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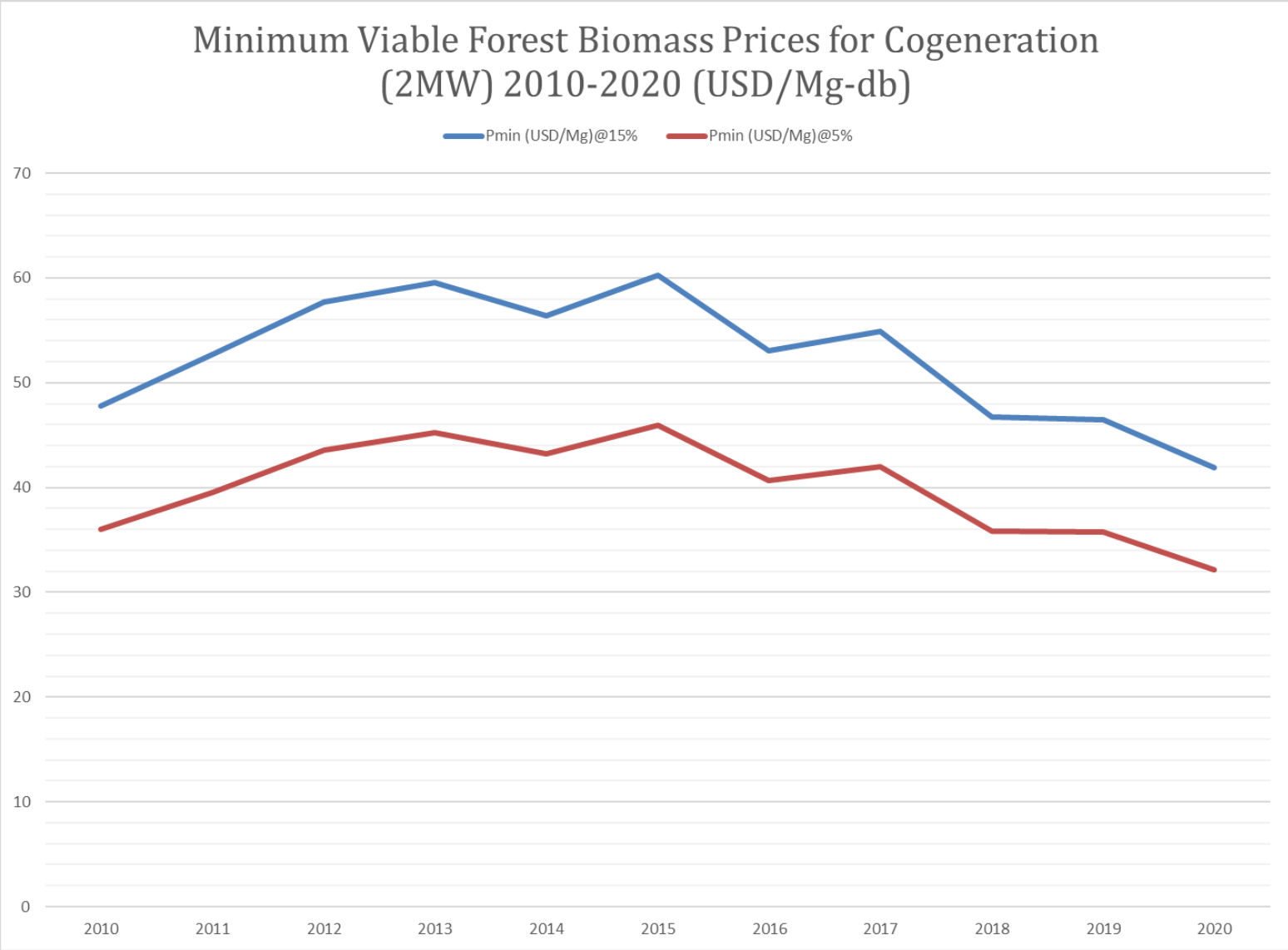
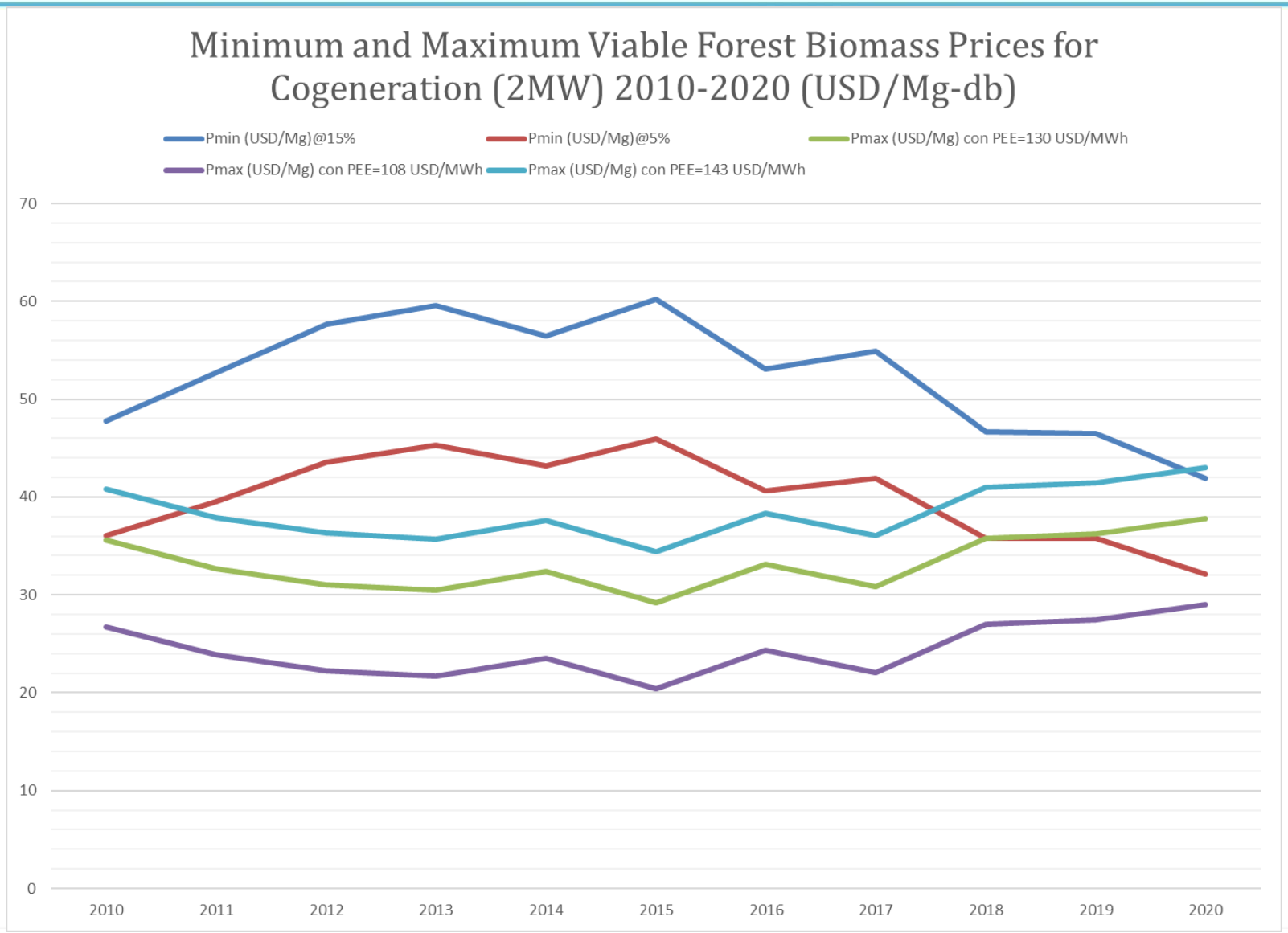
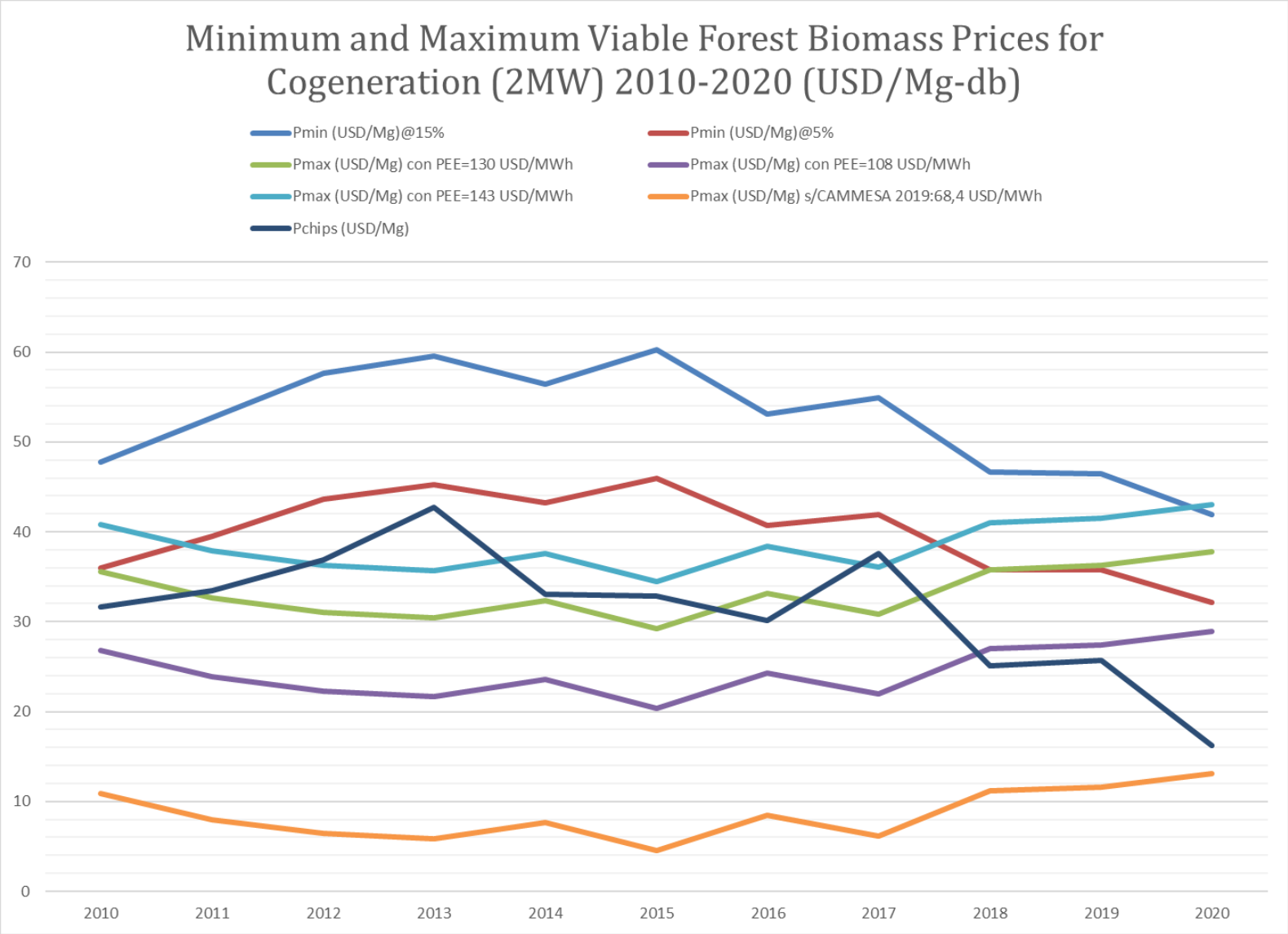


Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Towards a Standard Economic Model (7/9)



Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Towards a Standard Economic Model (8/9)



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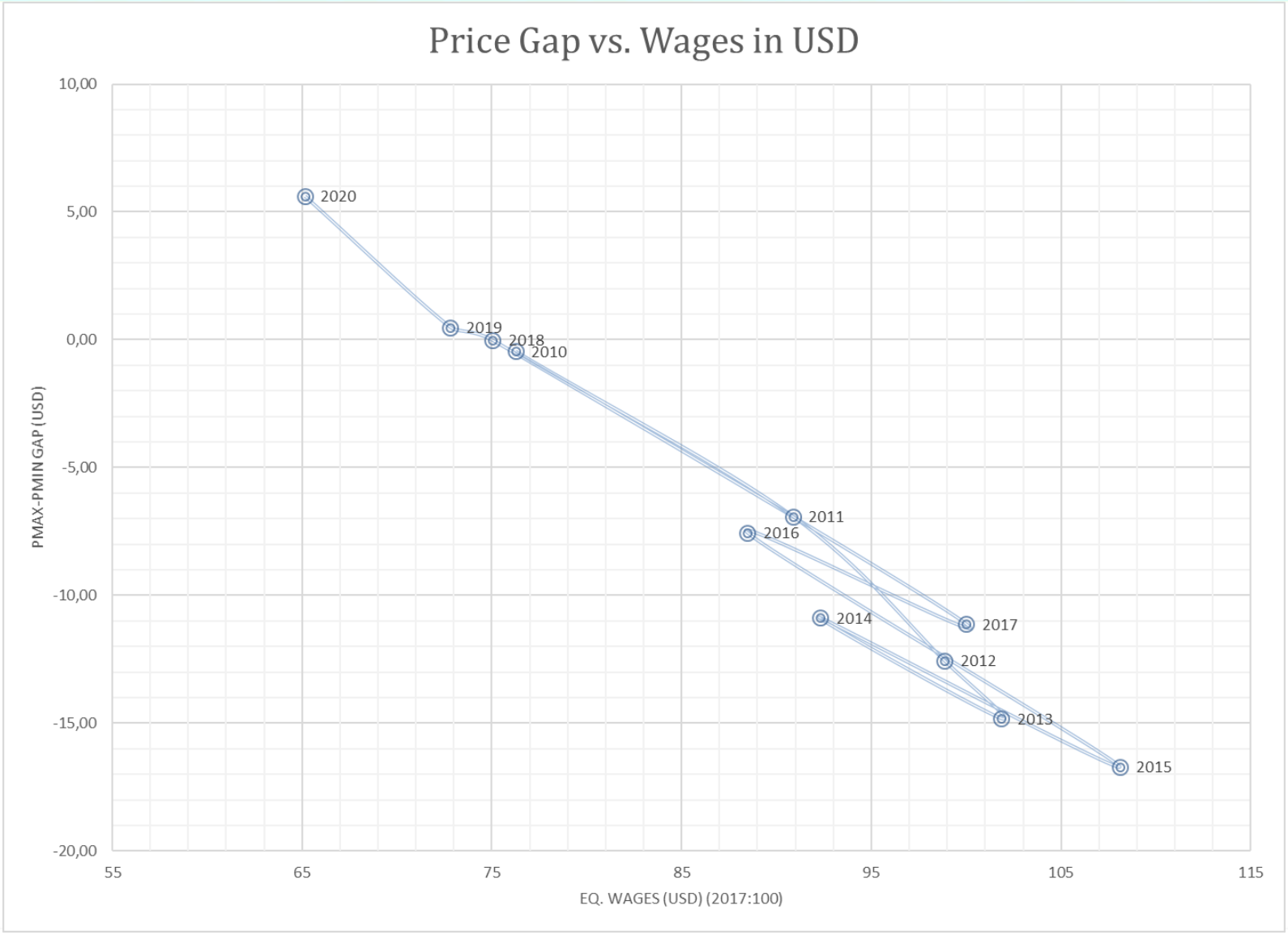

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Final Comments (1/3)

- Some of the incentive tools discussed in this paper have gradually come to fruition in the past few years, specially featuring RenovAR.
- September 13, 2020: the share of renewable energy sources hit a record high, peaking to 22.6% of the total (CAMMESA). At present biomass energy supply is steady at around 8%.
- In contrast, we can also see that at least some of the projects awarded under such program, particularly those related to forest biomass, are on hold until business conditions look better.
- With respect to the regulatory criterion, it is striking that precisely those instruments that seek to encourage investment with a set of special rules are perceived in a negative way by companies' representatives.

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Final Comments (2/3)

- The regulatory framework to promote this sector precisely forms a block which is intended to somehow safeguard a number of special preferred conditions which are essentially separated from the general path followed by the rest of the economic policy.
- Maybe it was not enough?
- However, it has become increasingly difficult to justify greater subsidy levels for the activity, due to the difference observed in economic efficiency regarding other types of renewable energy.
- The problem of a great level of dependence on imported technology and equipment, which is in opposition to the promotion of locally centered technological development.
- While advancing towards the production of dendroenergy, it is strategically advisable to further a better use of materials and their respective specific potential.

Econ. Incentives and Energy Prod. from Forest Biomass in Argentina: Final Comments (3/3)

- With specific exceptions, the use of materials for energetic purposes implies always building on residual value, and any alternative use is often valued on a priority basis.
- The importance not to lose focus on forestry in order to solve a unilateral energy problem, and of seeking general efficiency by using the materials that can be produced, especially in Argentina, in industries that range from solid wood uses to different types of biorefineries or bioreactors.
- There will always be waste and byproducts from all the processes, and they may be used for energy purposes.
- The importance of geographic distribution for dendroenergy projects. All efforts to atomize energy supply and distribution will result in a more robust and more cost-effective system, leading to a more balanced territorial development.

Thank you very much for your attention

olemberg.demian@inta.gob.ar

Feel free to write! All comments are welcome.

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