

SELECTING OPTIMAL SITES FOR GREEN HYDROGEN PRODUCTION PLANTS IN ARICA REGION: A COMPOSITE INDICATOR APPROACH

DAIANA SUÁREZ ORDAZ, VÍCTOR PÉREZ LEÓN, ALEJANDRO FERNÁNDEZ GIL, YUNESKY MASIP MACÍA, IGNACIO CONTRERAS RUBIO



INTRODUCTION

Global sustainability demands energy decarbonization, with green hydrogen emerging as a key solution.

Given its abundant renewable resources and strategic location, Chile holds significant potential for a green hydrogen industry.

This study aims to identify the optimal locations for green hydrogen production plants in the Arica and Parinacota Region, Chile.

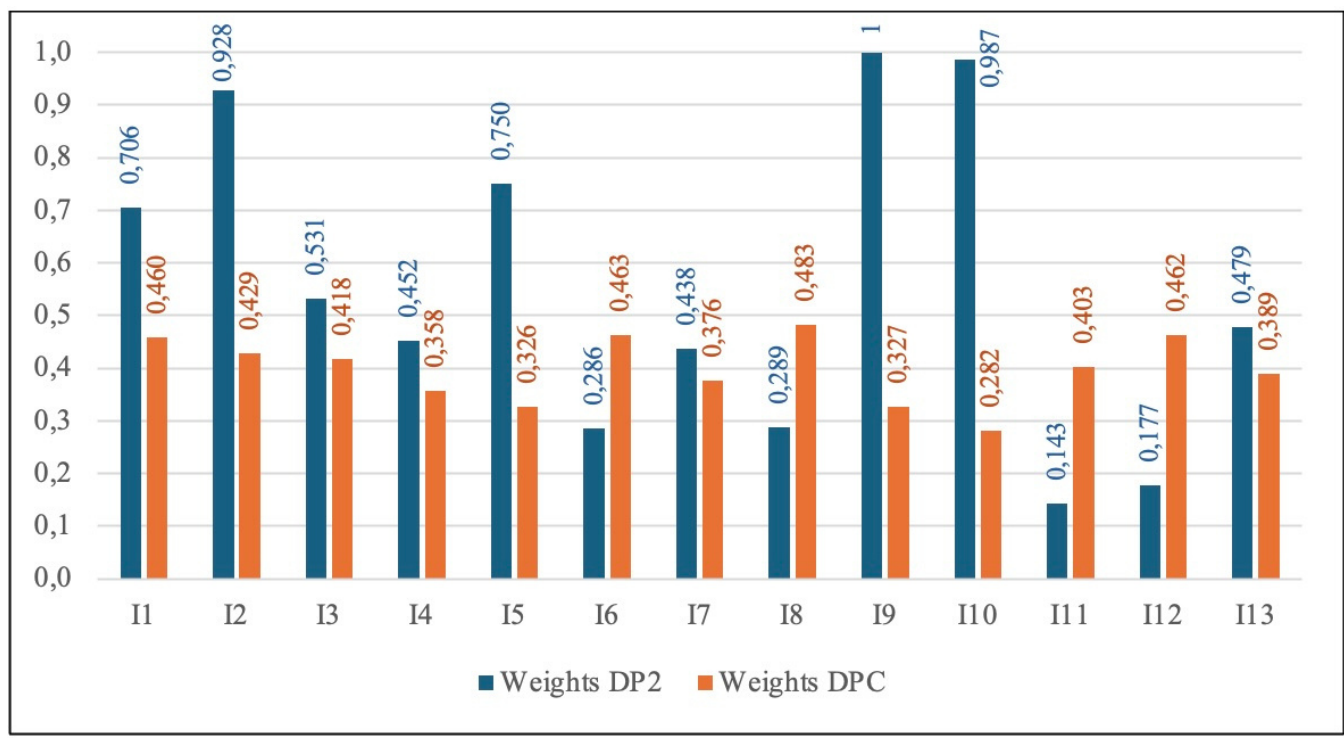
The objective is to provide decision-making tools and support public policies for the sustainable development of this industry in accordance with Chilean laws.

Composite indicators and solar energy as an alternative production source are considered.

METHODOLOGY

Goal Programming and Multi-Criteria Decision Methods (MCDM) are employed to analyze various factors and overcome subjectivity in decision-making.

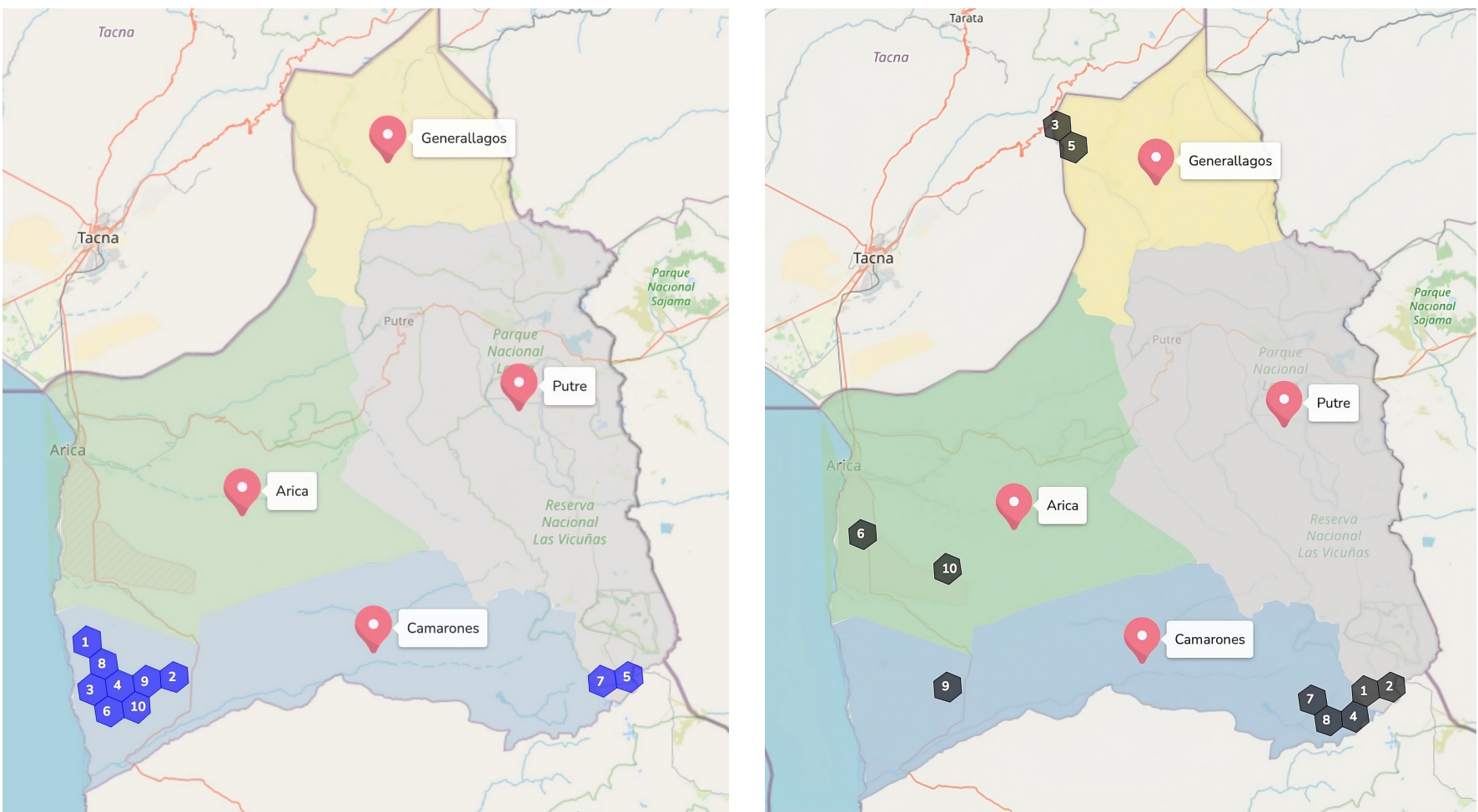
The methodology also includes the DP2-distance approach and the Distance Principal Component procedure for robust analysis and ease of interpretation.



$$DPC_i = \sum_{j=1}^q \left[VE_j \left(\sum_{k=1}^p IN_{ik} |Corr_{jk}| \right) \right]$$
$$DP_2 = \sum_{i=1}^n \frac{d_i}{\sigma_i} (1 - R_{i,i-1,i-2,\dots,1}^2) \text{ with } R_1^2 = 0$$

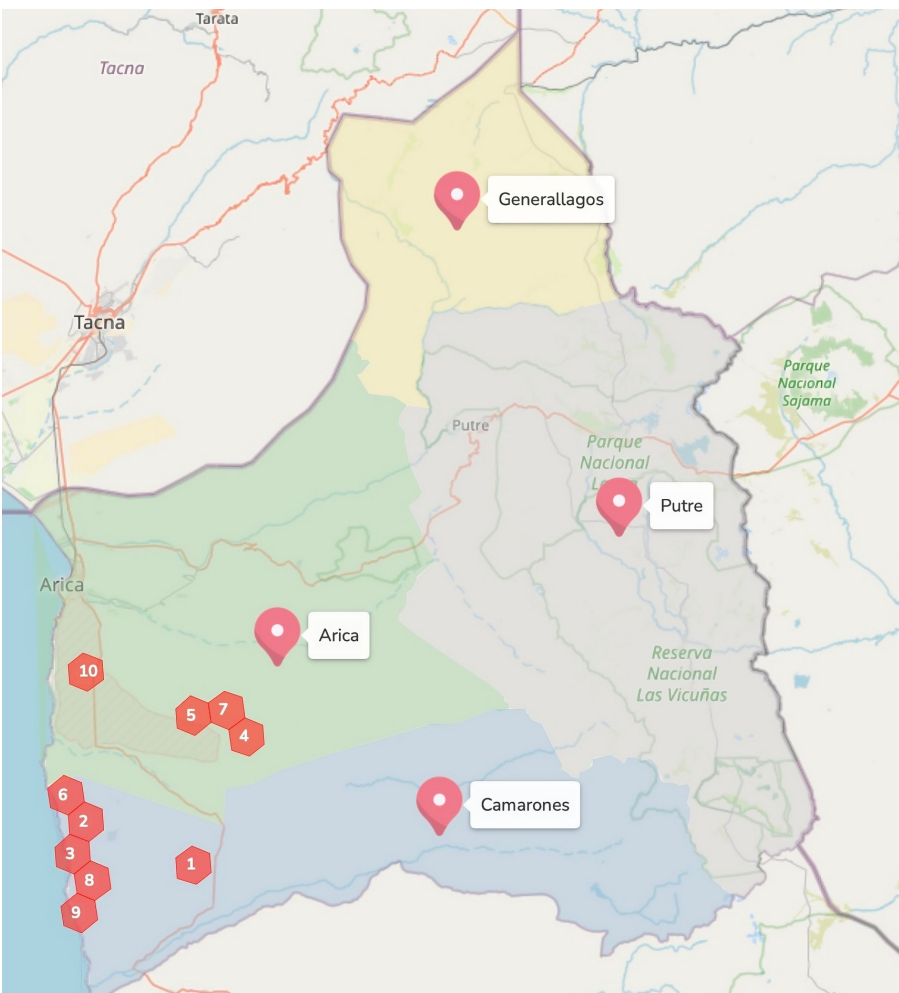
$$GPSI_i^N = \sum_{j \in J} \frac{w_j^+(p_{ij}^+ - n_{ij}^+)}{u_j^+} + \sum_{k \in K} \frac{w_k^-(n_{ik}^- - p_{ik}^-)}{u_k^-}, \forall i \in \{1, 2, \dots, n\}$$

TOP TEN GEOGRAPHICAL LOCATIONS



DPC RANKING

DP2 RANKING



GPSI RANKING

CONCLUSIONS

- Three alternatives of composite indicators for constructing composite indexes are proposed.
- These methods highlight the Arica and Parinacota region is strong wind energy potential indicating a concentration of the top locations, mainly near the coast.
- Socio-environmental factors gain significance, supporting the suitability of the selected areas for green hydrogen industry development.

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