

Systemic Approach to Develop Mature Fields*

**Mario Grinberg¹, Henk Chin A. Lien², Mario Vicente³, Javier Arizola⁴,
Jenny Vallejos⁴, Luis Soto⁵, Javier Almeida⁴, and Miguel Moyano⁶**

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¹YPF SA, Buenos Aires, Argentina

²Staatsolie Maatschappij Suriname N.V., Paramaribo, Republic of Suriname

³Schlumberger, Buenos Aires, Argentina

⁴Petroperu, Lima, Peru

⁵Equion Energia, Bogota, Colombia

⁶ARPEL, Montevideo, Uruguay (mmoyano@arpel.org.uy)

Abstract

Modern societies require increasing amounts of energy to meet their growth needs. In absolute terms, energy demand increases daily, regardless of improvements in energy efficiency. The share of oil and gas is estimated to account for 50% of the world energy matrix by 2040. The global energy demand is expected to grow approximately 28% between 2015 and 2040. This means that by 2040 the world will require approximately 4.5 billion cubic meters per day of natural gas and 16 million barrels of oil per day more than what was consumed in 2015. In addition, the existing oil and gas fields are being depleted by 6% per year. Depending on the permeability and the flow regime of the reservoir, a field can reach the stage of maturation in just 3 to 6 months or up to several years. In 2017, mature fields accounted for approximately 70% of the global oil production, so there is a huge potential to increase the recovery from existing producing fields.

At the global level, it is estimated that for every 1% increase in oil recovery from currently operating mature fields, two years could be added to the global supply of oil and gas, and help meet future energy demands. However, the percentage of global oil production through enhanced oil recovery has remained stable at 2-3%. Thus, the industry and states, owners of the hydrocarbon resources, have the challenge and the opportunity to work together to make the necessary investments and meet this growing energy demand in a manner consistent with sustainable development. The average recovery factor in oil reservoirs is approximately 30%; this percentage can be increased up to 40-60%. To achieve this in an economically viable way, there must be a combination of factors, such as the use of modern technology, regulations that favor the improvement of recovery factors and optimization of corporate performance through the improvement of operational aspects and business strategies. This article addresses these key factors and provides some innovative recommendations for consideration by governments and industry.

Systemic Approach to Develop Mature Fields

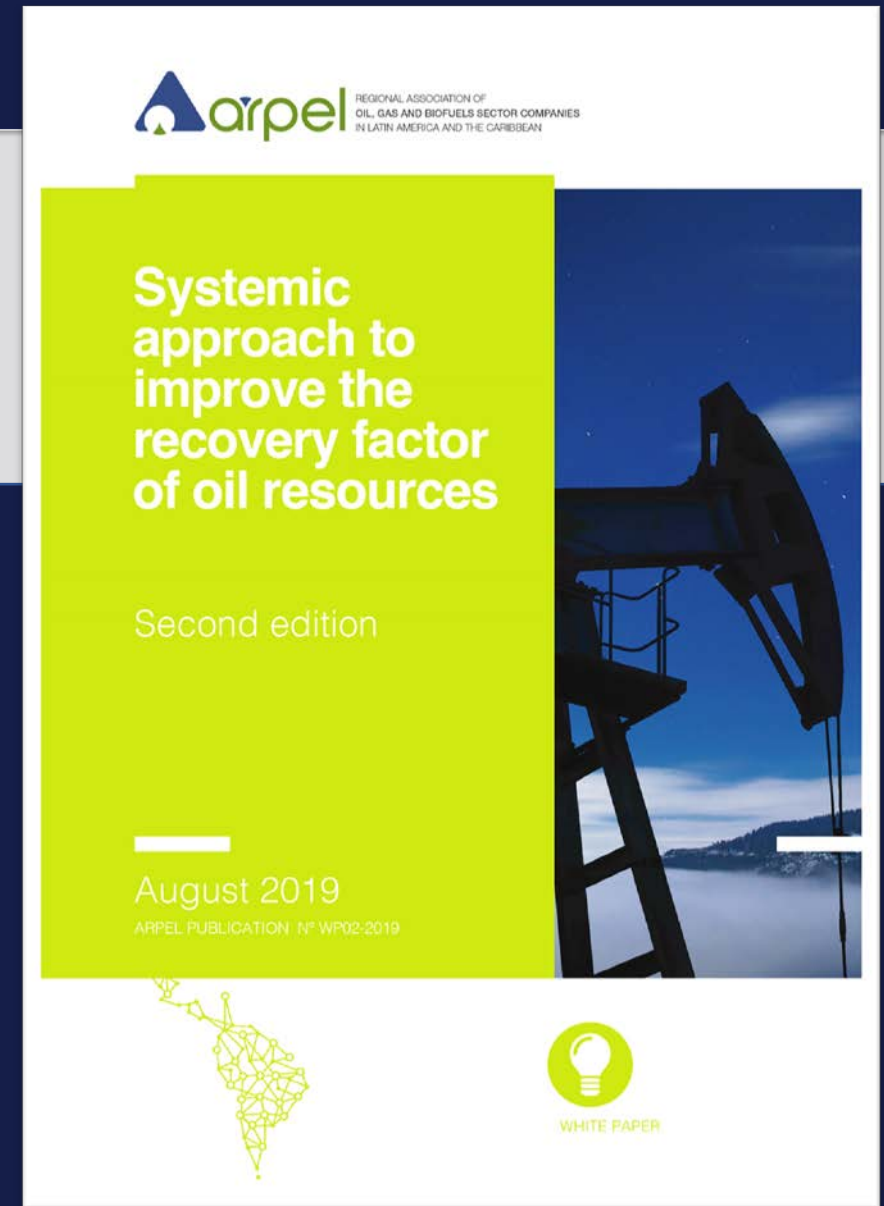
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ARPEL White Paper

Objective:

share -with different stakeholders-
options to improve the recovery
factors of mature oil reservoirs in a
systemic way

<https://arpel.org/library/publication/516/>



Increase in Energy Demand

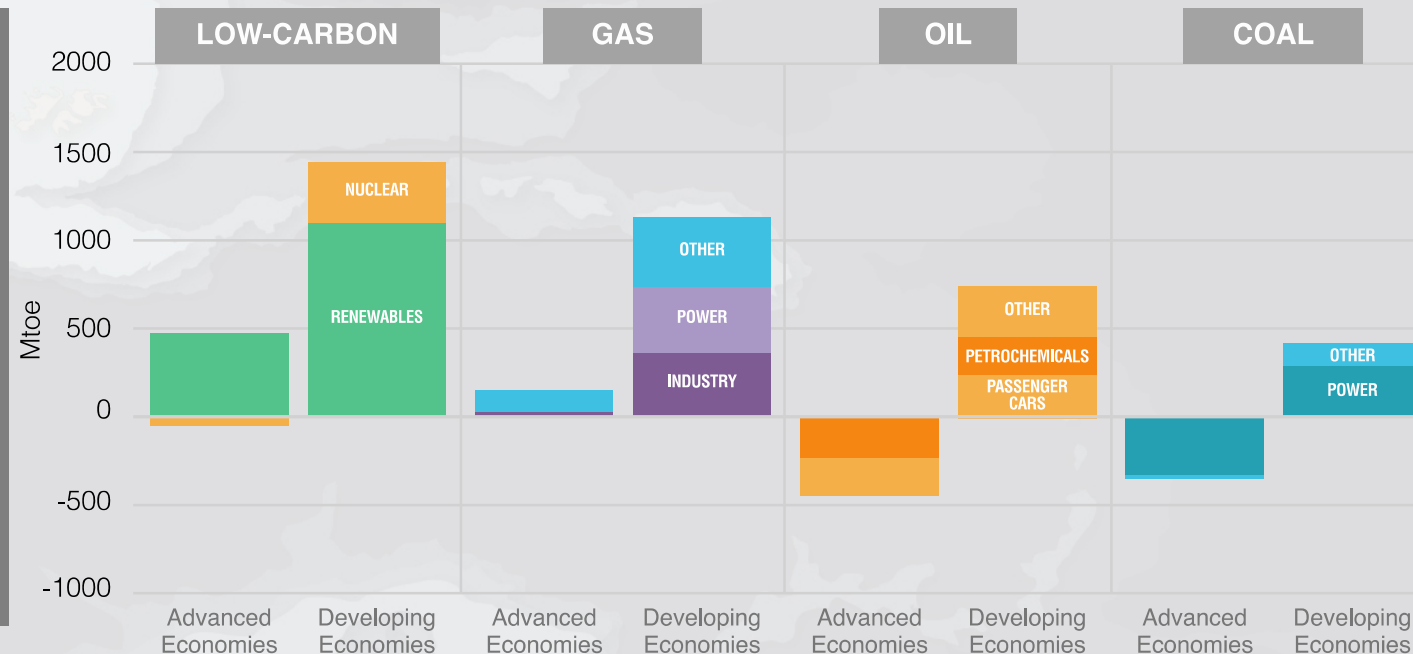
In **2040** the world will require approximately

16 million barrels of oil per day

4,5 billion cubic meters per day of natural gas

MORE than what was consumed in **2015**

Change in total primary energy demand, 2017-2040 in the New Policies Scenario



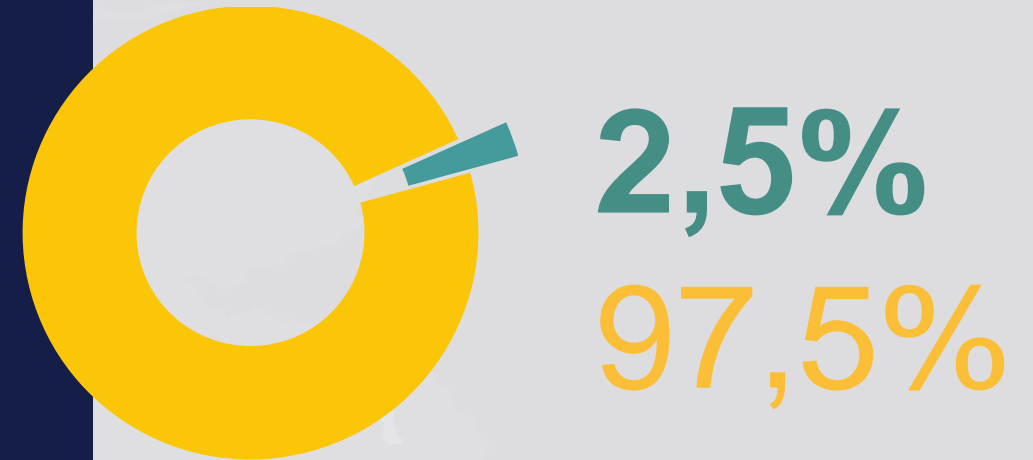
The Importance of Mature Fields

- **Existing** oil and gas fields are being **depleted** at a rate of **6 % per year**
- In 2017, **mature fields** represented approximately **70 % of global oil production.**
- For every **1 % increase in oil recovery** from operating mature fields, **two years** could be **added** to the **global supply of oil**

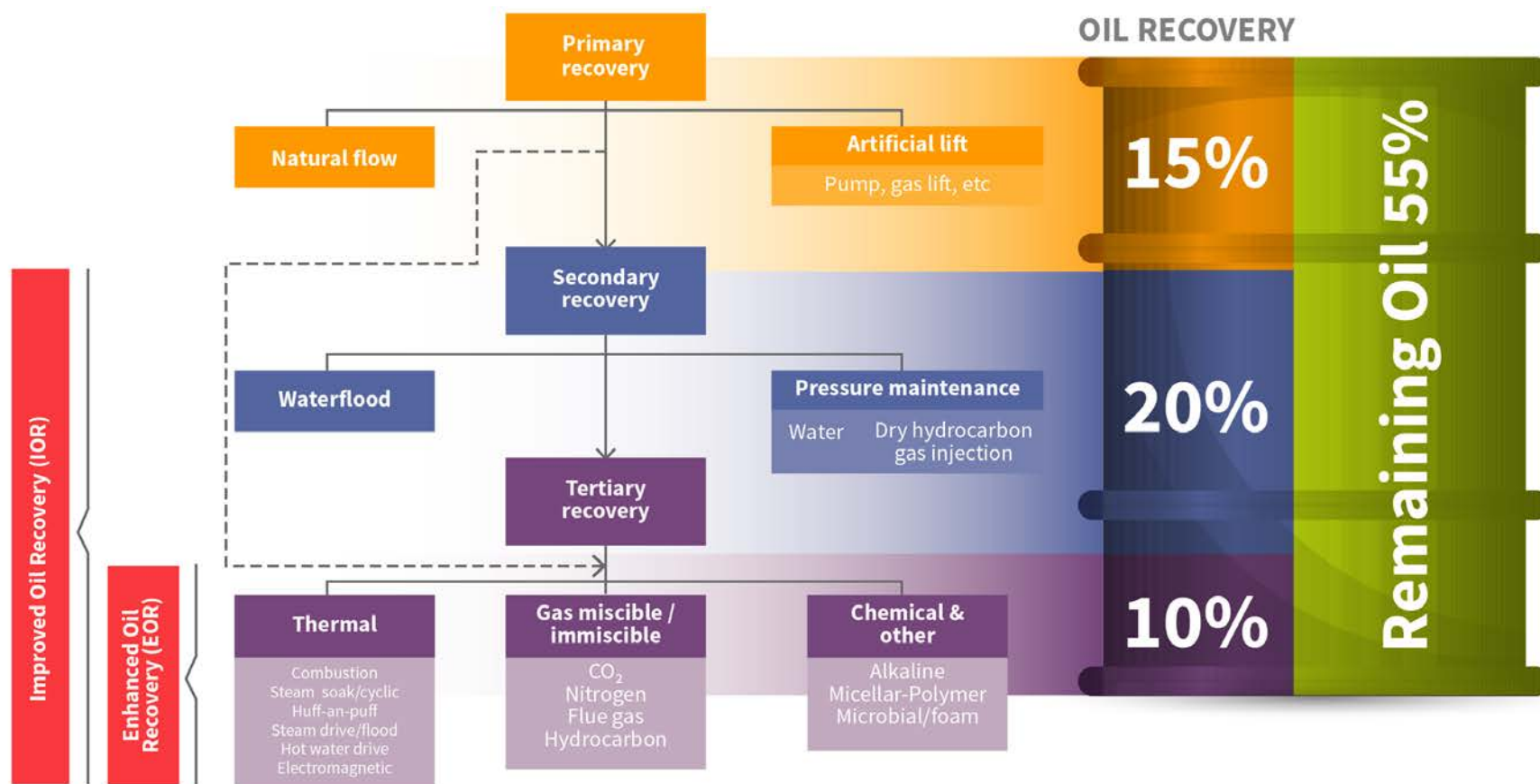
**OPPORTUNITY FOR
GOVERNMENTS
AND INDUSTRY!**

BUT...

**THE PERCENTAGE OF
GLOBAL PRODUCTION
THROUGH ENHANCED
OIL RECOVERY (EOR)
HAS REMAINED STABLE
BETWEEN 2 - 3 %**

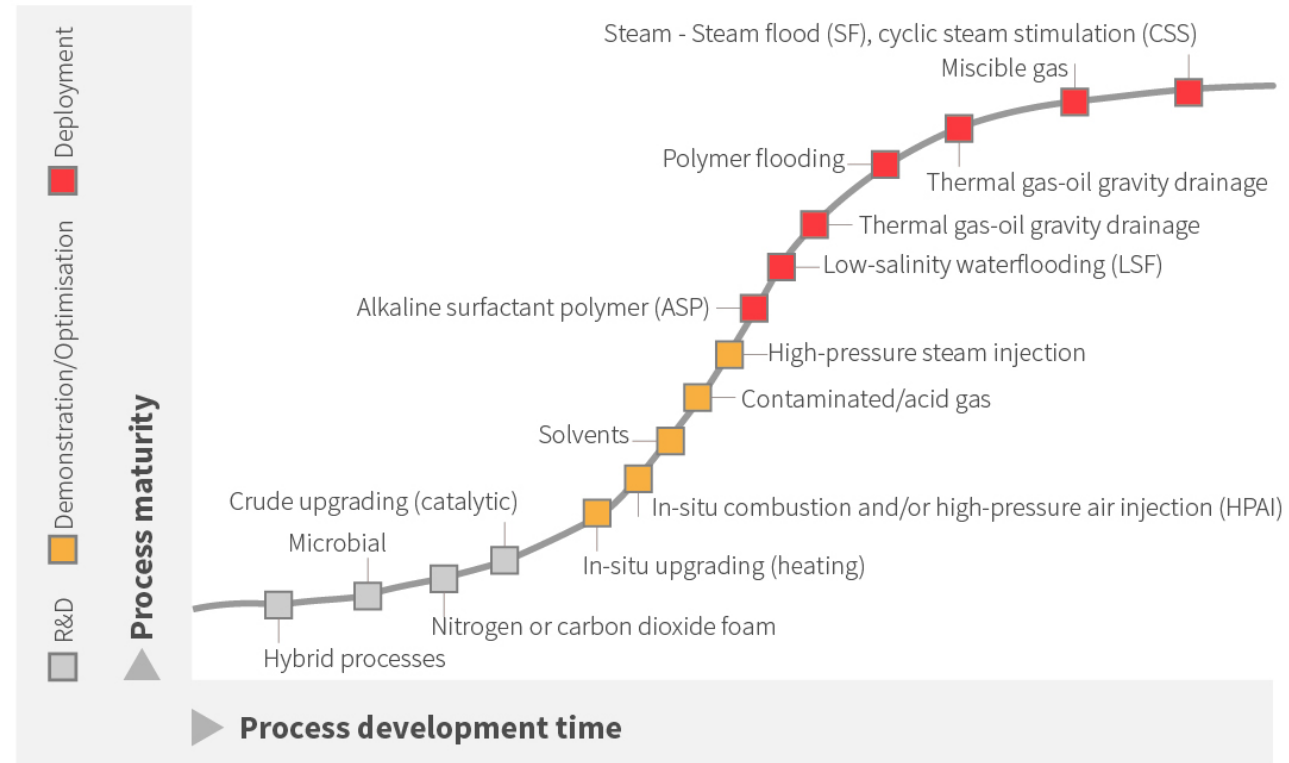


Technological Alternatives



EOR Technology

Our industry has
not achieved yet
 the **technological**
limit in terms of
Recovery Factor



EOR Technologies and Processes

- New technologies should require less equipment and specialized personnel for field operations.
- The gap between deployment and increased production requires CAPEX/OPEX
- CO₂ injection for EOR and geological sequestration of CO₂ → reduced company environmental footprint



The Importance of Regulations



“Today over 80% of global EOR production benefits from some sort of government incentive or is prioritized by national oil companies as part of their efforts to maximize the return from national resources.”

Source: “Whatever happened to enhanced oil recovery?” IEA. (November, 2018).

Strategic Industry Evaluation

- **Incentives associated to resource scarcity** → Price of oil and gas + Expected offer/demand market
- **Preference for fast returns?**
- **Technology deployment** → Business niche for oilfield service providers
- **Competition with other investment opportunities** → Shale, offshore



Synergy between Operators and OFS providers

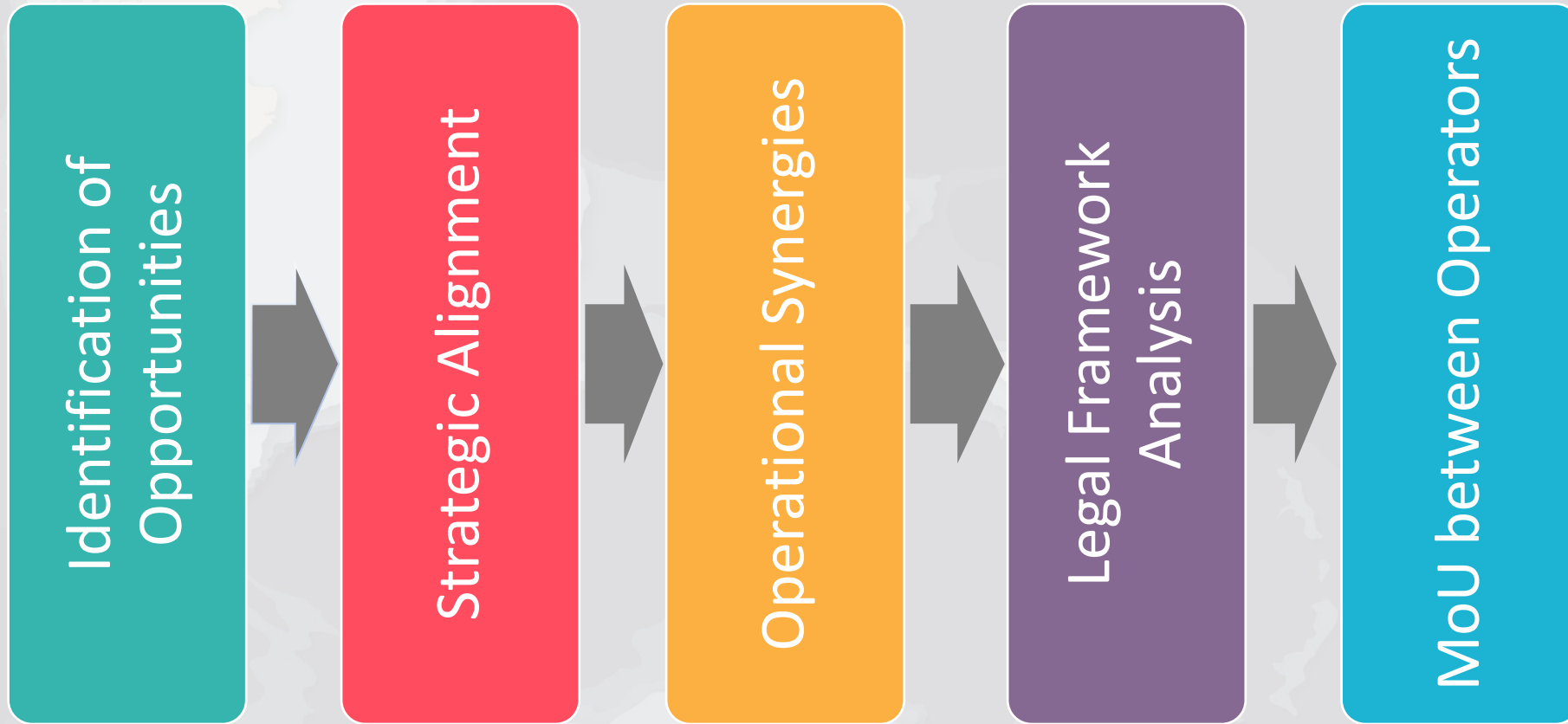
Implement robust business models through service contracts integrated to the operation

Contribution of service providers:

- *Business mechanisms for implementation and development of applicable innovative solutions,*
- *Optimization and management of existing resources, and*
- *Design of integration between blocks*



Synergy among Blocks



Conclusions

**Between 2025 and 2040,
EOR total production
will grow over 60% and
will represent
approximately 4% of
global production in
2040**

**Companies and
governments** should start
thinking of the alternatives
ahead ... now!

- *Test EOR projects in countries where it has not been used before*
- *Be creative*
- *Collaboration is key - Innov@arapel (www.innovarapel.org)*

Access to the Mature Fields forums in Innov@arpel

ARPEL members

Sign-up as a user on the platform:

<https://www.innovarapel.org/signup/>

Other users (non-ARPEL members)

1) Register in Innov@arpel for FREE. Fill the subscription form:

<http://media.arpel2011.clk.com.uy/innova/altadeempresa.pdf>

2) Sign-up as a user on the platform with your professional email:

<https://www.innovarapel.org/signup/>



POST



Technologies for Mature Fields

GO!



**Regulations to foster
the development of mature fields**

GO!