Drag reducers testing and economics

Cristina Álvarez
CLH
Spain

AGENDA

- Introduction:

  Use of DRA with CLH and efficiency improvements.
- DRA as another economic variable in the new situation of the Spanish energy industry.
- Fine Tuning: Energy vs. DRA to optimize transportation cost.
- Case Study
- Questions.

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Use of DRA in CLH

- Started in 1993
- Supplier: ConocoPhillips SPI
- Average consumption over the last 3 years: 124.378 gallons
- Efficiency up to 70%DR

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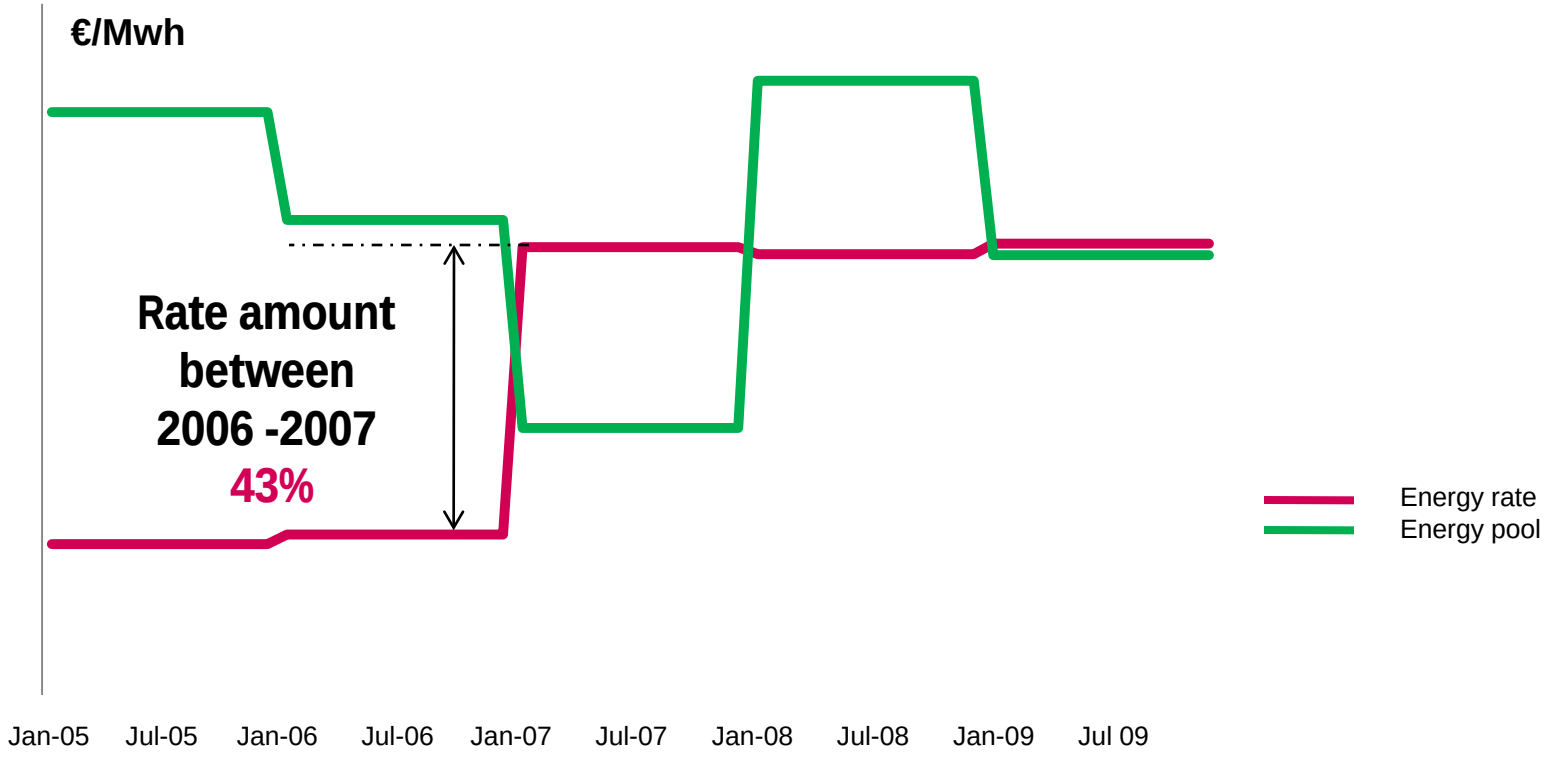
Comparative Energy cost vs. Energy pool in CLH



Why to use DRA as an economic parameter of transportation cost in pipelines

- CLH has suffered a big energy cost increase in the last decade
- This situation makes the company seek new alternatives.
- Drag reducer agents could be a good choice.
- Use of DRA at the expense of electrical energy greatly reduces the transportation cost in certain pipelines.
- The key is to know the optimal balance between use of electricity and percentage of injection of DRA's in order to achieve the best economic performance.

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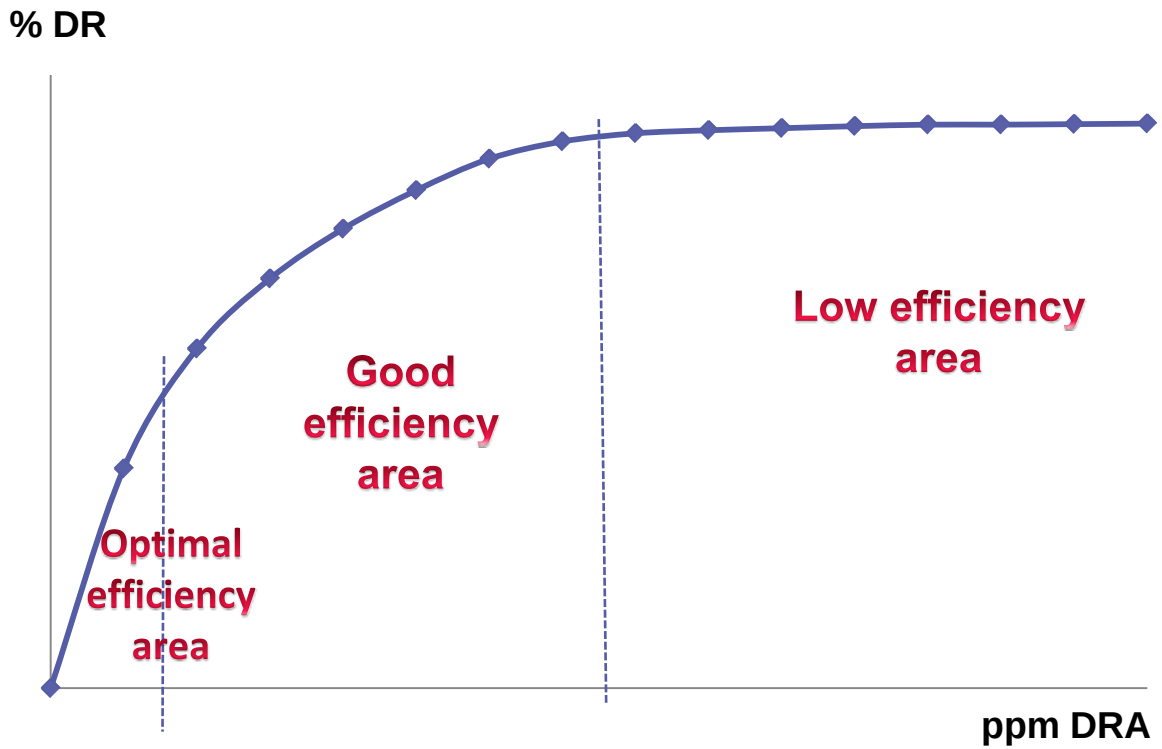
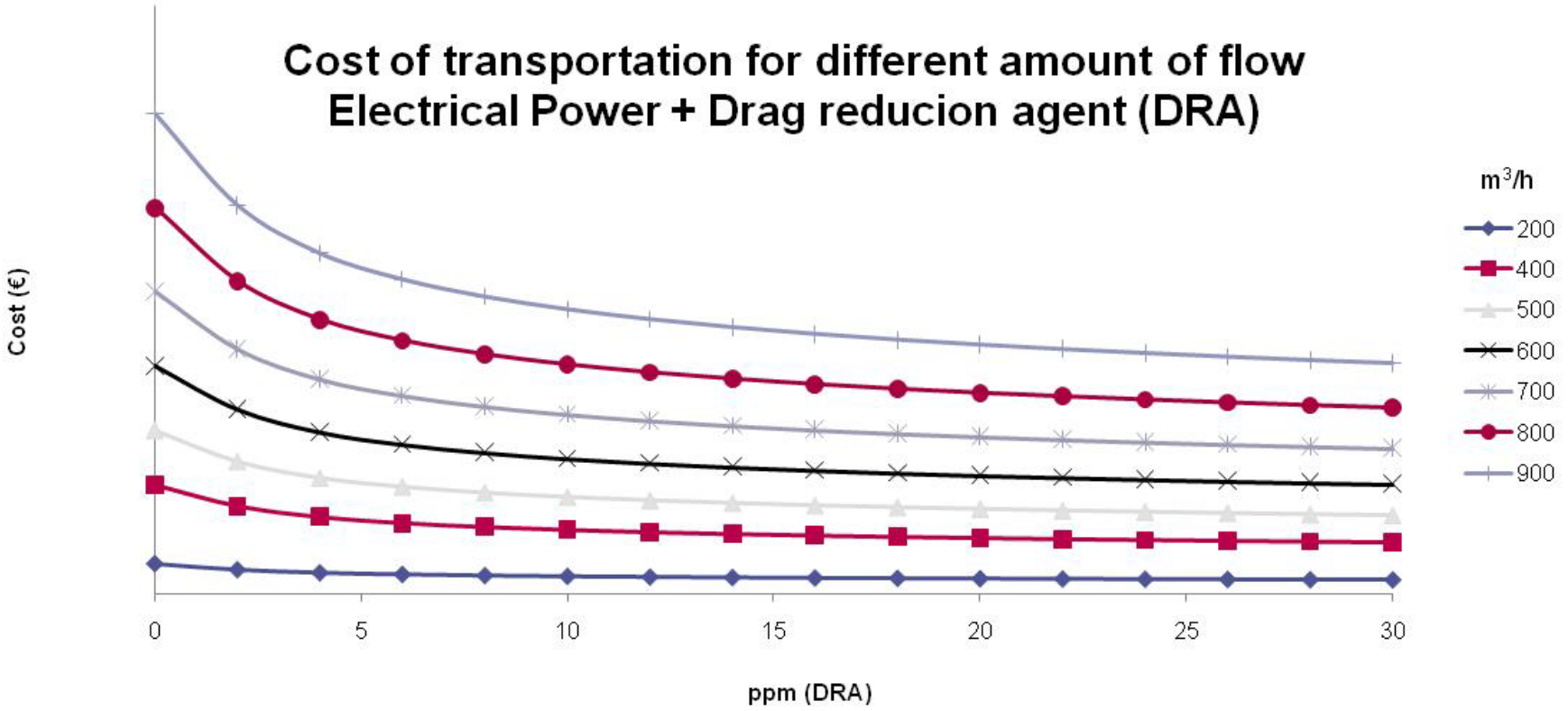
DRA efficiency curve



How evaluate whether the use of DRA will be interesting

6” Diameter

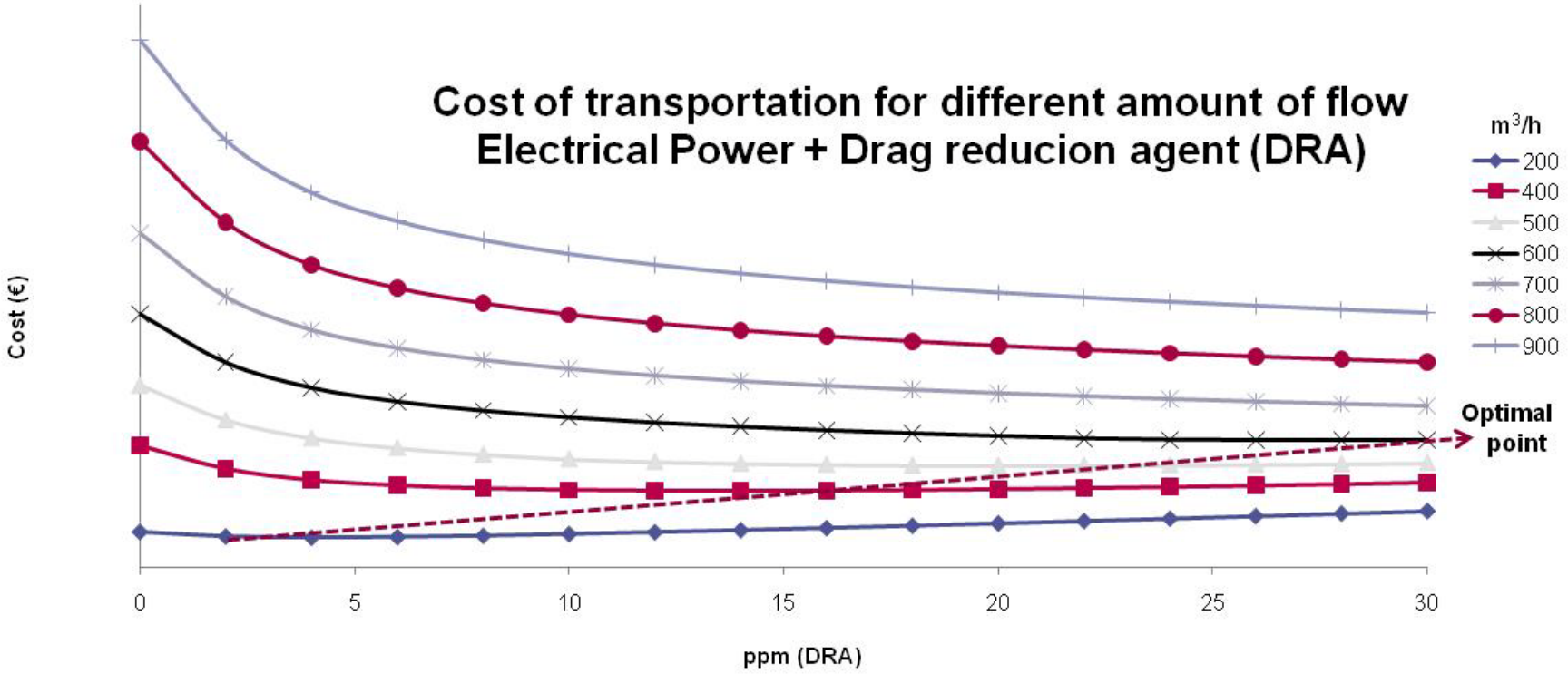
- Length: 100 km
- Flat elevation
- MAOP: 100 kg/cm2
- Volume transported: 1 M m3
- Product: Diesel



How evaluate whether the use of DRA will be interesting

10” Diameter

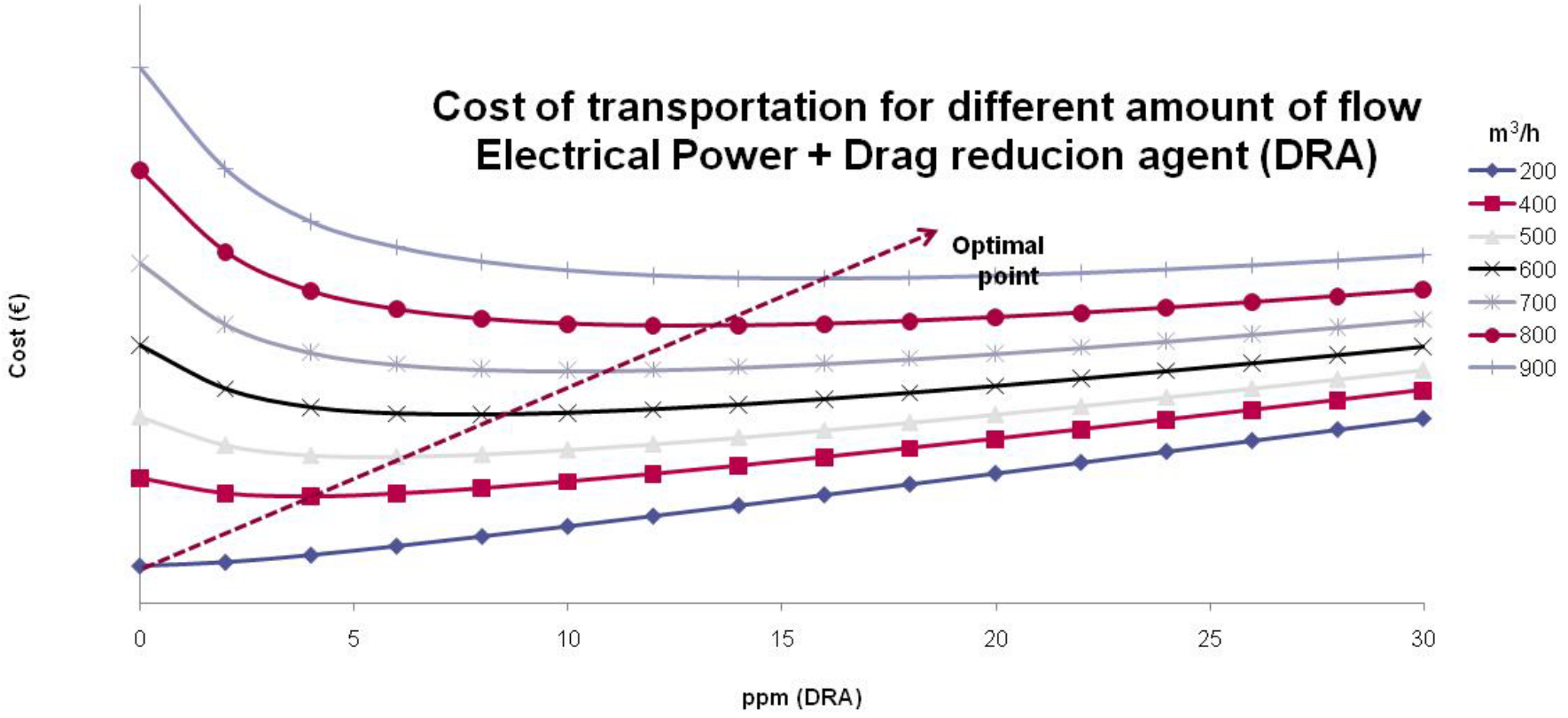
- Length: 100 km
- Flat elevation
- MAOP: 100 kg/cm2
- Volume transported: 1 M m3
- Product: Diesel



How evaluate whether the use of DRA will be interesting

14” Diameter

- Length: 100 km
- Flat elevation
- MAOP: 100 kg/cm2
- Volume transported: 1 M m3
- Product: Diesel



When is it possible to achieve savings

- Non saturated pipelines (Capacity below the maximum)
- Saturated pipelines where DRA is not being used.

Each pipeline should be studied in detail to find the optimal point of performance.

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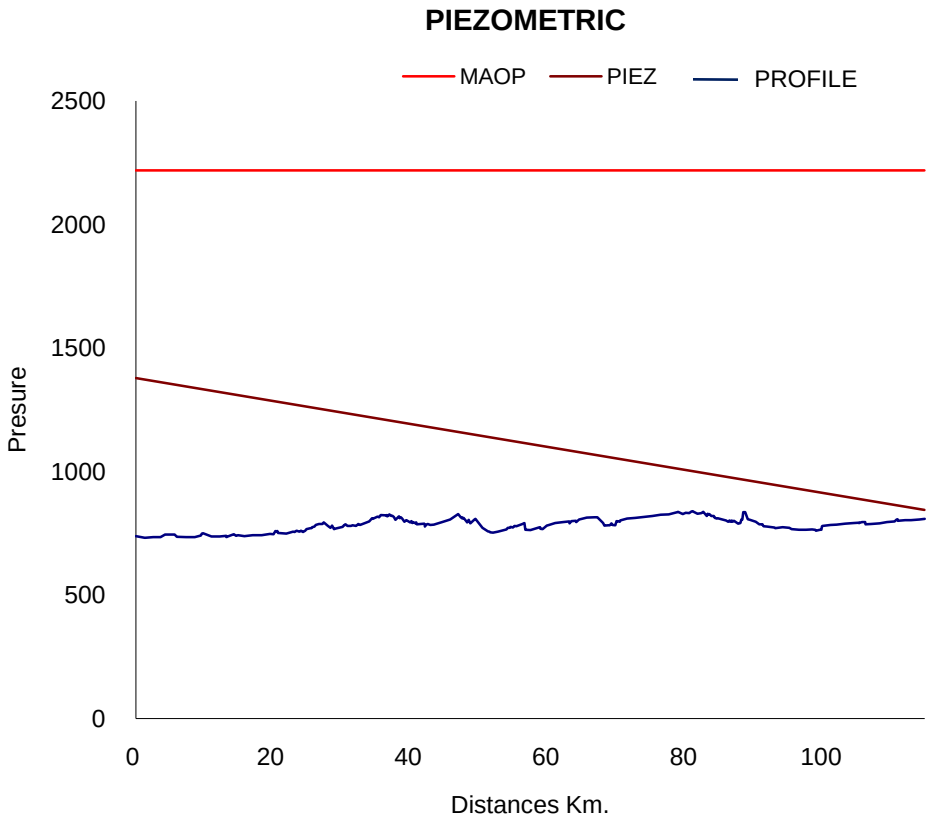
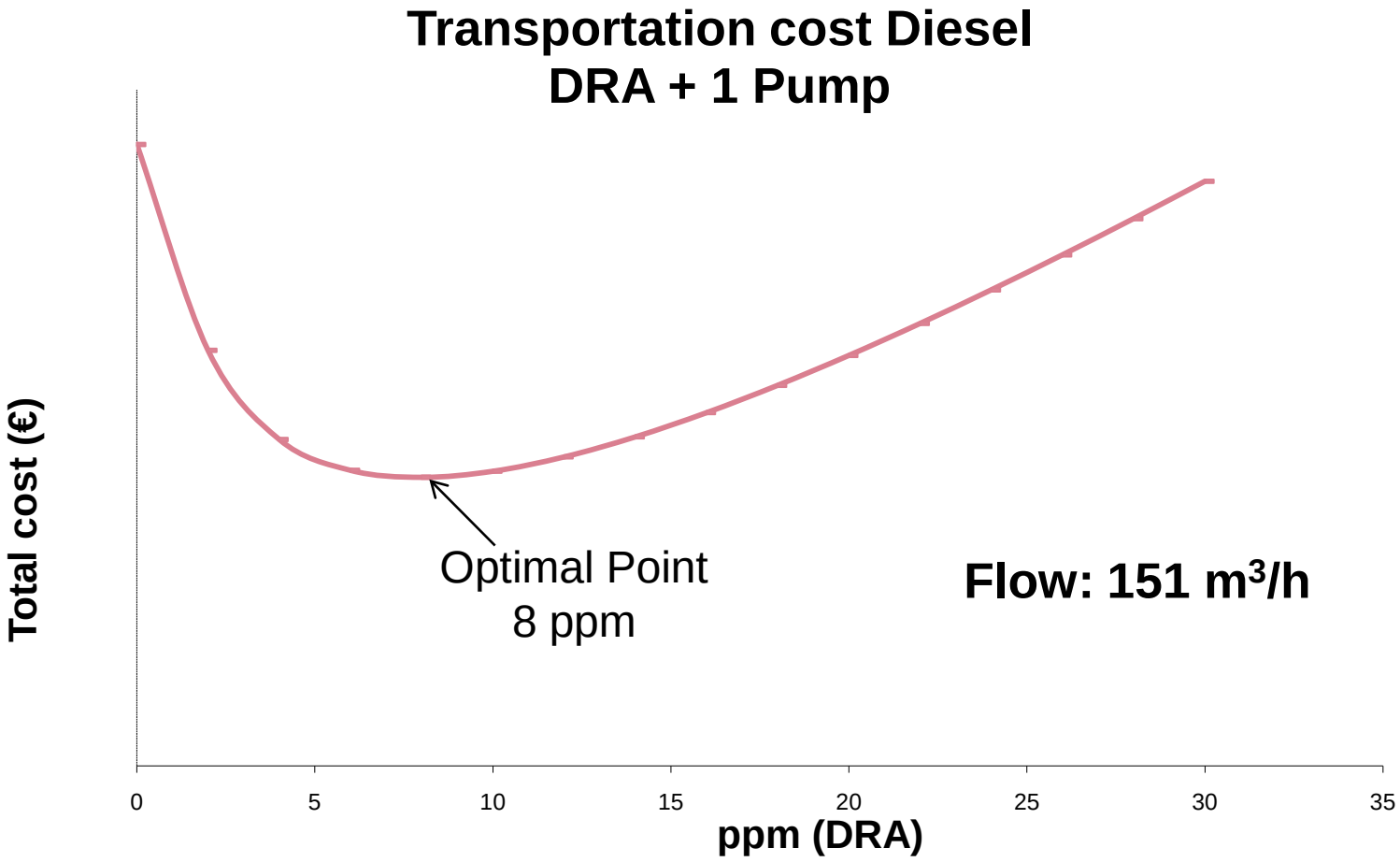
Case Study

Pipelines parameters

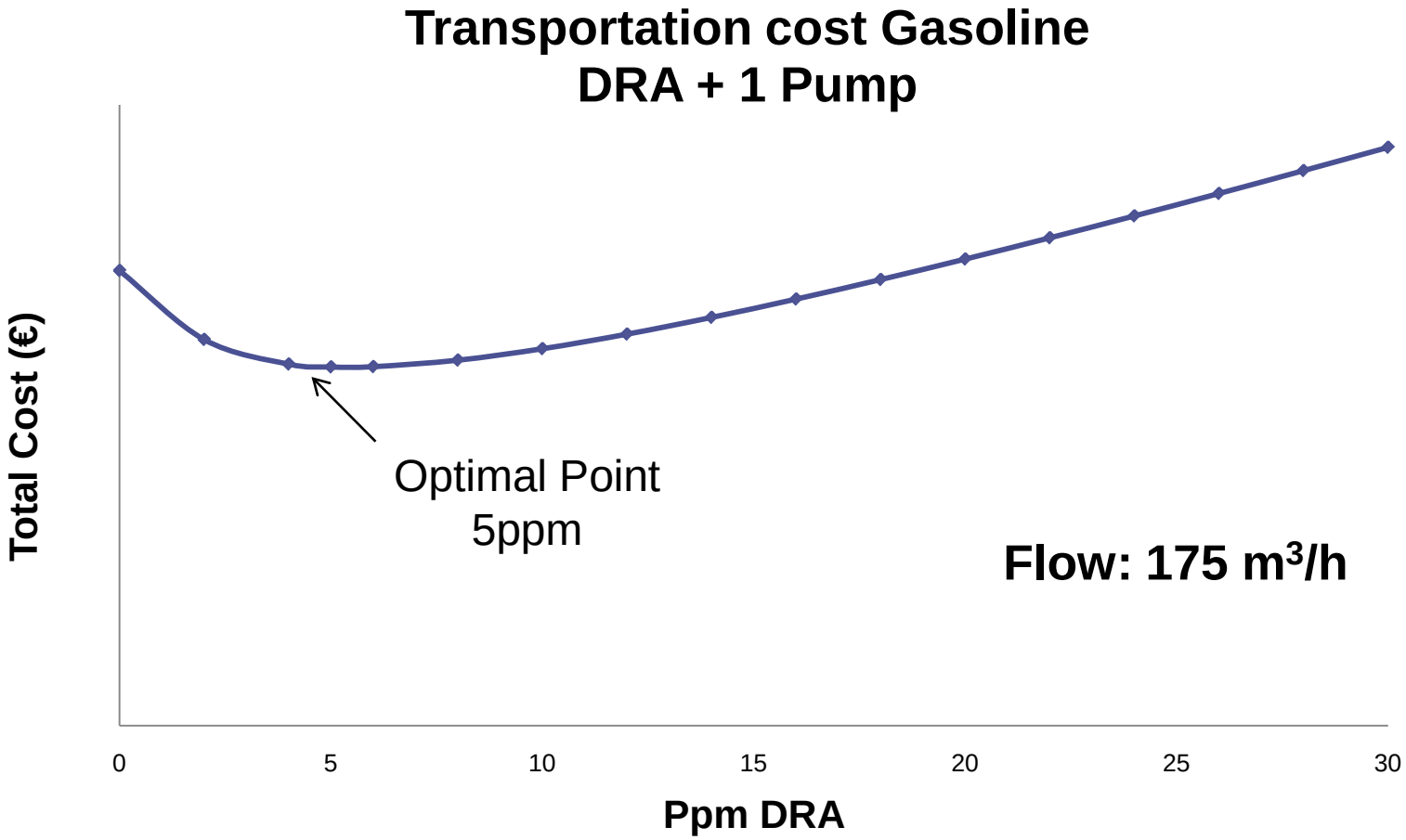
- Length 114.5 km
- 8” diameter
- thickness 5,56 mm
- Elevation
  - Origin 740m
  - end 809,2m
- Piezometric
  - Origin 1346 mcl
  - end 844 mcl
- MAOP 125 kg/cm2
- 2 Pumps.
- Diesel volume(86.5%)
- Gasoline volume (13.5%)



Diesel transportation Cost



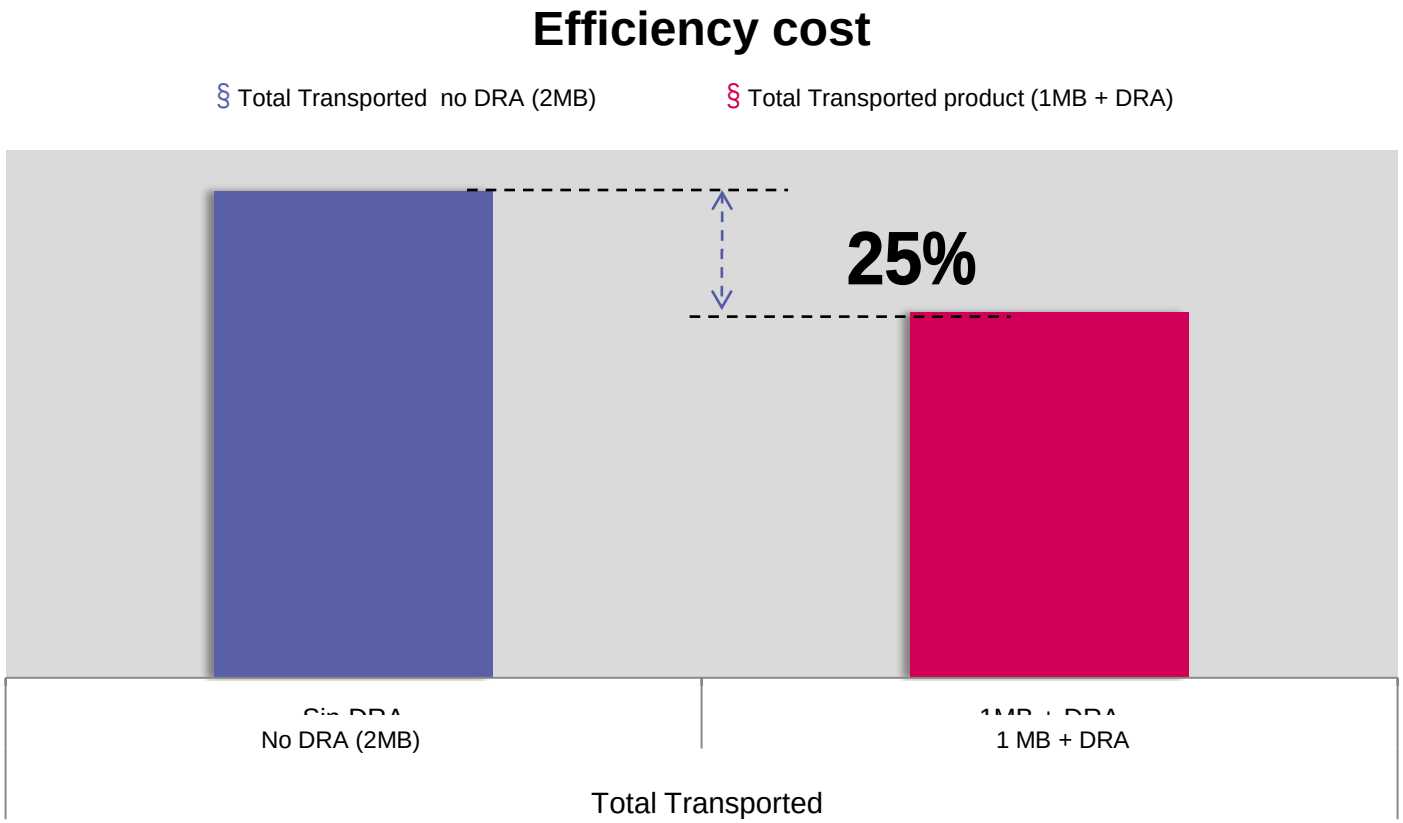
Gasoline transportation Cost



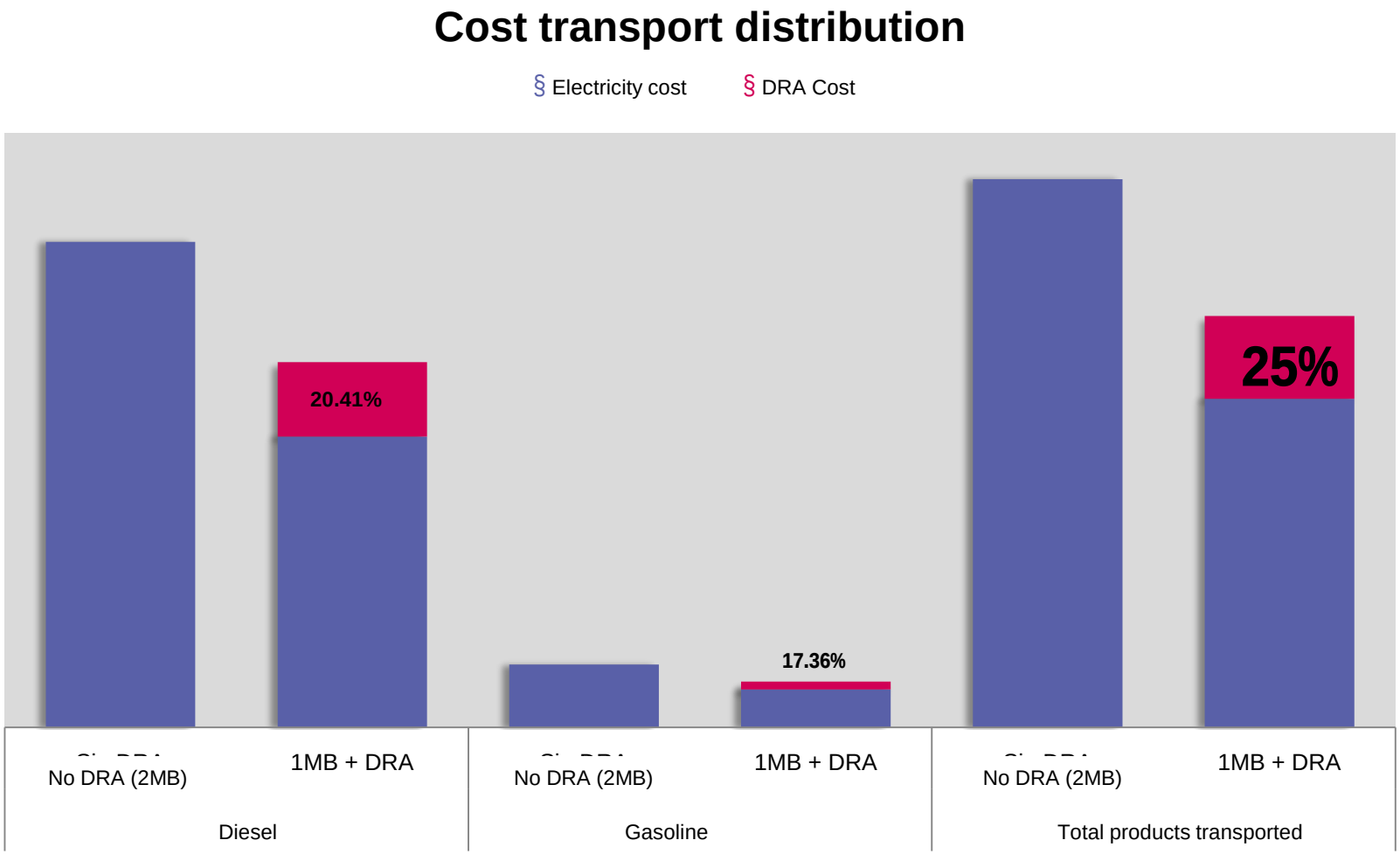
Rate of Operation

	Flow (m3/h)		DRA (ppm)	
Cases studied	Diesel	Gasolines	Diesel	Gasolines
2 Pumps	151	175	0	0
1 Pump	113	134	0	0
1 Pump + DRA	151	175	8	5

Cost Reduction



Cost efficiency by product



CONCLUSION

- Use of DRA could help to reduce the costs of transportation
- It is necessary to performe an indept analysis of each pipeline.
- Benefits are worth it.

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