

Summary of the cost - benefit analysis for the roll out of a smart metering systems in electricity and gas, for the mass market in France

CRE, French regulatory authority – Workshop on smart metering
Brussels – December 14th, 2009

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- Introduction
 - Definitions
 - Framework of the studies

- Electricity
 - Scenarii analysed compared to the « business as usual »
 - Business case
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Definitions

- **Mass market in France**

- Electricity : all households and small companies whose connected load is 36 KVA or lower
 - 35 millions meters in place
- Gas : all households and small companies whose consumption is 300 MWh per year or less
 - 11 millions meters in place

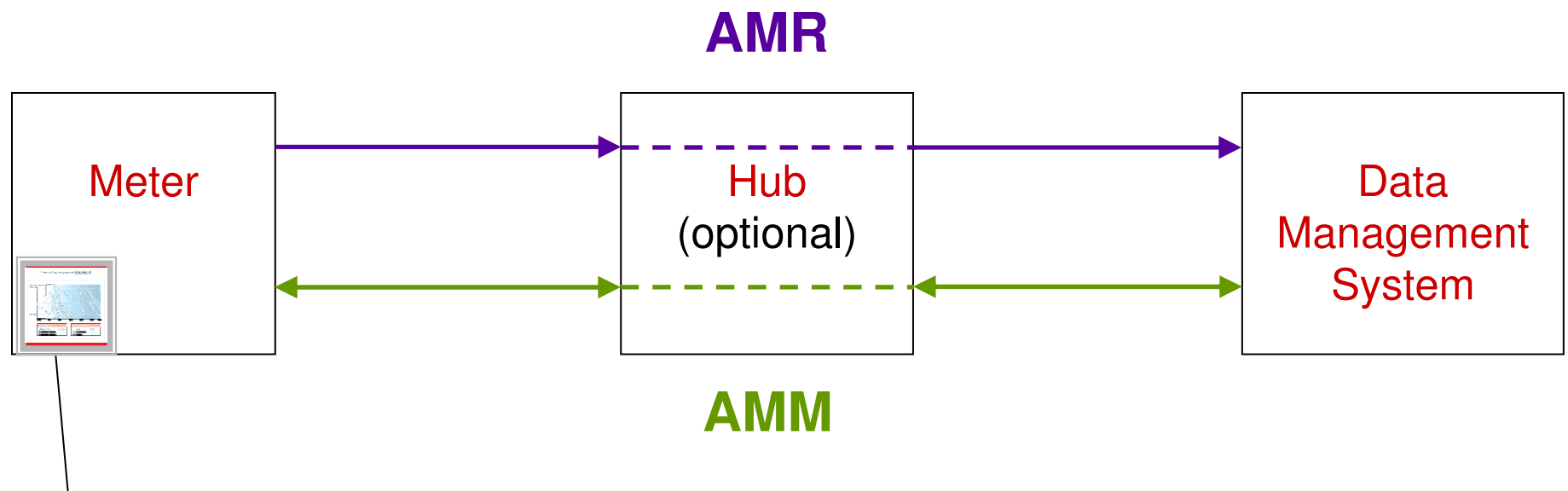
- **AMR in France : Automated Meter Reading**

- Is a one way communication system which transfers the meter information up to the data management system

- **AMM in France : Automated Meter Management**

- Is a 2 ways communication system between the meter and the data management system
- It corresponds to an AMR with additional services such as remote meter operations (connection, disconnection, change in power...)

General structure for a smart metering system



Local interface of communication for customer (optional)

Framework of the study

- For both electricity and gas market :
 - The DSO has the legal responsibility for all operations related to metering (installation, maintenance, meter reading...)
 - Current meters are read manually twice a year
- In electricity the cost - benefit analysis (CBA) was conducted by the regulator in 2007
- In gas the CBA was conducted by the main DSO (GrDF) in 2008
 - GrDF covers about 90% of the mass market

Main objectives for the smart meter model in France

- Improve electricity or gas market functioning, especially for the benefit of customers
 - More frequent meter reads
 - Better quality of billing
 - Billing based on real data consumption
 - Better fluidity and rapidity of the market process
 - Real index for supplier switching, connection...
 - Remote meter operations for connection, disconnection, change in subscribed power (only in electricity)
- Minimise the DSO costs, while upholding quality of supply and level of service
- Energy efficiency
 - Peak load management (only in electricity)
 - For customers, easy access to their consumption data as often as possible

Inventory of the main costs by actor

		Generation	DSO	Energy supplier	Customers
Costs	Investments	—	<ul style="list-style-type: none"> • Metering equipment • Meter installation • Hubs equipment • Meter information system 	—	—
	Stranded costs	—	<ul style="list-style-type: none"> • Replacement of the meter by anticipation 	—	—
	Operating costs	—	<ul style="list-style-type: none"> • Maintenance, repair and operations for <ul style="list-style-type: none"> - meters - hubs • Operations information system 	—	—

- As the DSO has the legal responsibility for all the operations related to metering, he is the only one to bear costs...

Inventory of the main benefits by actor

		Generation	DSO	Energy suppliers	Customers
Benefits	Avoided investments	<ul style="list-style-type: none"> • peak load management 	<ul style="list-style-type: none"> • Grid optimisation 		
	Operating benefits	<ul style="list-style-type: none"> • Less CO2 emissions 	<ul style="list-style-type: none"> • Remote reading 	<ul style="list-style-type: none"> • Customer services • Prepayment : less unpaid bills 	<ul style="list-style-type: none"> • Easier supplier switching • presence not required for DSO's operations • Consumption control

- ...but the smart metering system benefits all the actors, including the customers

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Methodology of the cost - benefit analysis



- Three scenarii have been analysed against the « business as usual » model
 - The BAU consists in the installation of meters which are read manually and include one relay for controlling an electronic device such as water heater
 - Each of the three scenarii has been based on two hypothesis of roll out duration
 - 5 years
 - 10 years
 - The 3 scenarii have the following common functionalities :
 - Allow remote meter operations : meter reading, connection, disconnection, change in power
 - Manage any type of pricing and timetable chosen by the energy supplier

Differences between the scenarii A, B & C

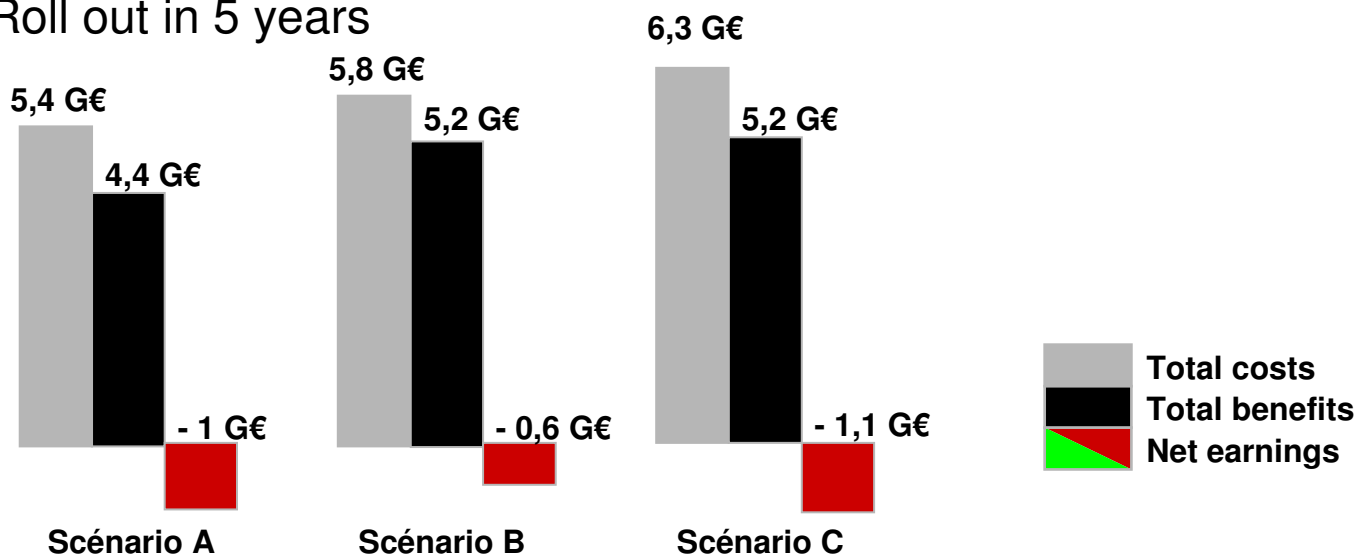


	Scenario A	Scenario B	Scenario C
Frequency of reading	Monthly	Monthly	Weekly or daily upon request
Kind of data transfered up to the DSO	Index of consumption	Load curves in hourly steps read	More precise load curves
Quantity of relays to control electronic devices	1	2	3
Pre payment	No	Yes	Yes
Ability to read gas and water index	No	No	Yes

CBA is negative from a DSO's centric perspective...(1/2)



- Roll out in 5 years



Source : Capgemini consulting

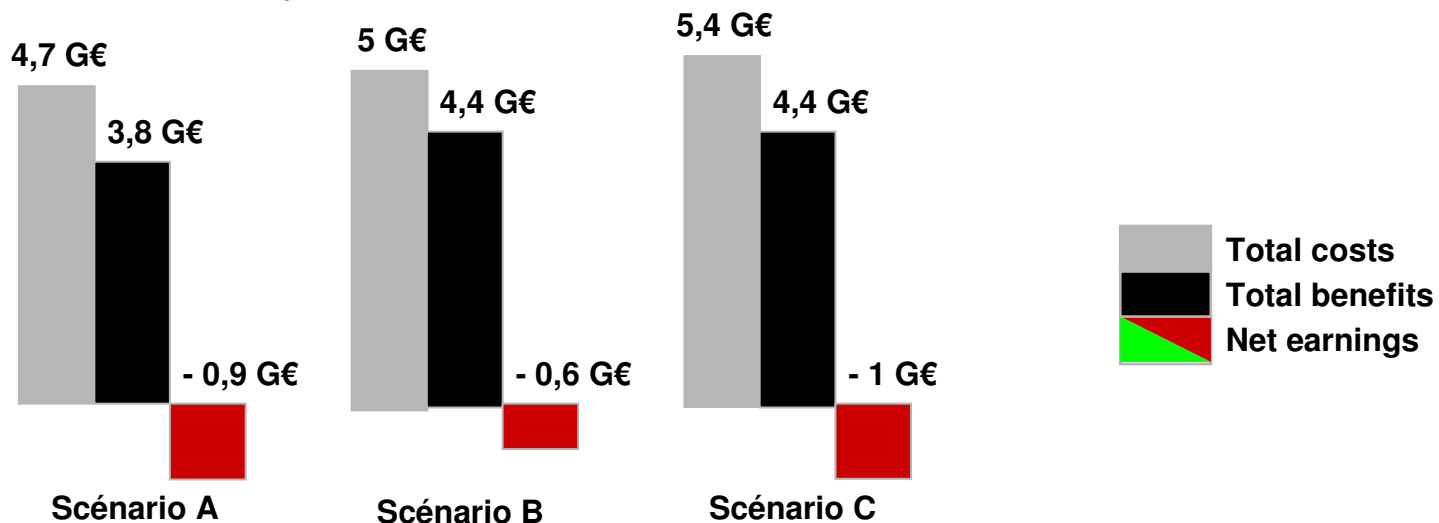
- There is not much difference between the scenarii in terms of costs.
 - About 7% between scenario A and scenario B and between scenario B and scenario C
- Benefits are the same for scenarii B and C

The meter project generates negative net earnings in every case

CBA is negative from a DSO's centric perspective ...(2/2)



- Roll out in 10 years



Source : Capgemini consulting

- A roll out in 10 years reduces costs by around 15%
 - These lower costs are not enough to generate positive scenario
- The best scenario, regarding the DSO's centric perspective, is scenario B carried out in 10 years

...but positive in a broader context (1/3)

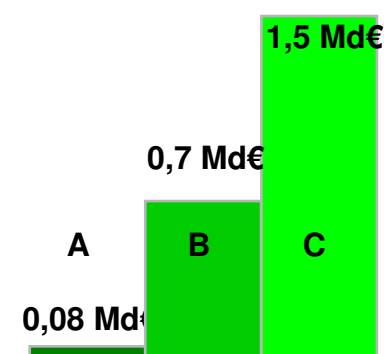
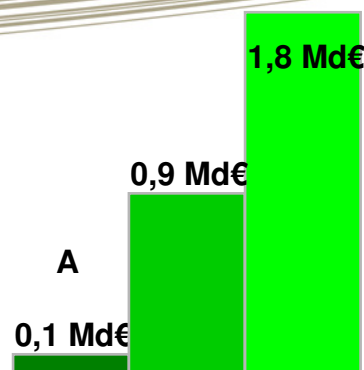


- The previous conclusions are reversed if the analysis considers the electricity value chain as a whole :
 - generation + distribution + supply
- Indeed if producers and suppliers' perspectives were taken into account, benefits would be :
 - electricity demand control which has a direct effect on the means of generation (avoided investments to handle peakloads and CO2 emission)
 - functionalities included in the meters will enable the supplier to reduce costs (fewer phone calls, development of prepayment...)

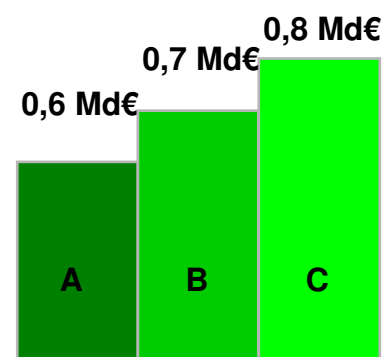
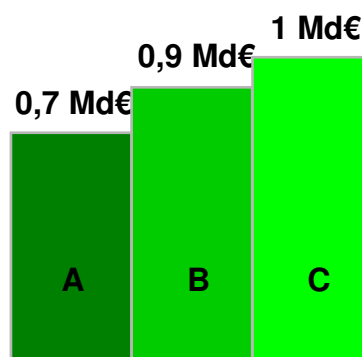
...but positive in a broader context (2/3)



Focus on the generation side :



Focus on the supply side :



Roll out in 5 years

Roll out in 10 years

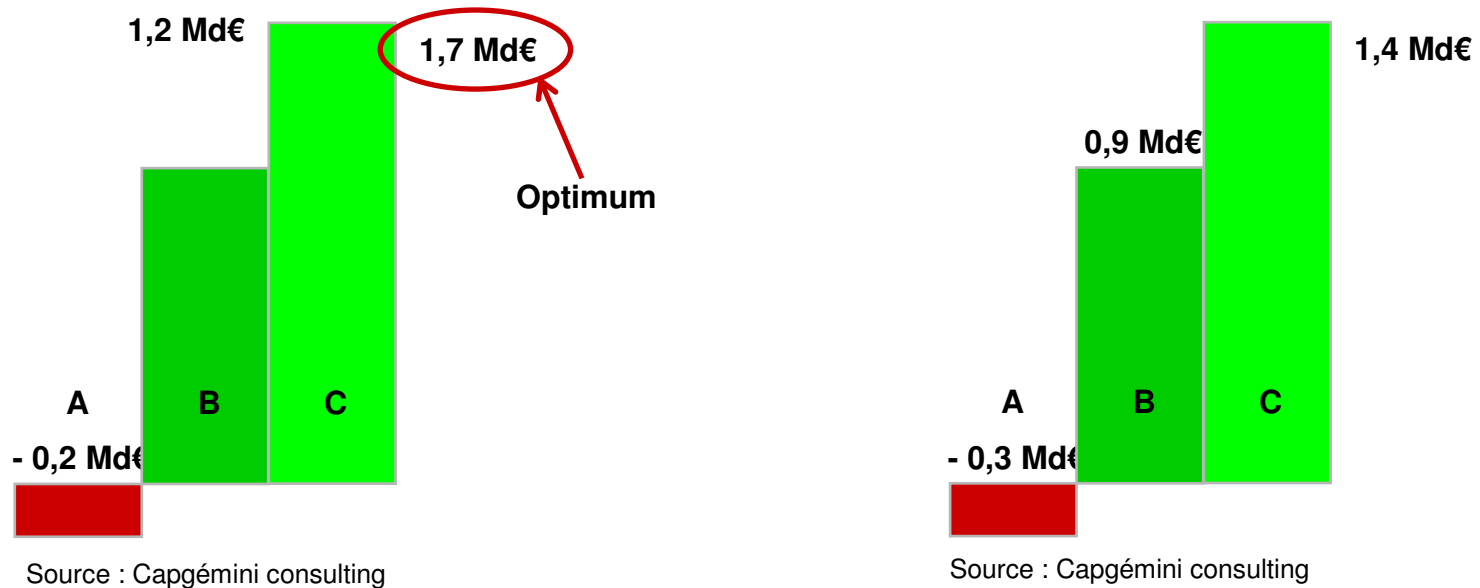
Source : Capgemini consulting

- For both generation and supply sector the study shows better results for the scenario C rolled out in 5 years

...but positive in a broader context (3/3)



- Summary of the business case considering the value chain as a whole :



- Scenario C (precise load curve, advanced services) conducted in 5 years is the best

Analysis of the scenarii from the customer point of view



- Compared to a situation where customers do not know their consumption, the advanced metering infrastructure shows a significant difference from the customer point of view in terms of economy

Scenario A: Remotely read index	3,8 M€
Scenario B: Load curve	8,3 M€
Scenario C: Precise load curve & services	13,7 M€

Source : Capg mini consulting

- The more functionalities there are, the greater benefit is expected for customers in terms of energy savings

Summary



- The three scenarii show higher differences in benefits than differences in costs
- The conclusions vary according to the considered scope (distribution only v.s. electricity value chain as a whole)
 - Regarding the DSO point of view, the optimum scenario is scenario B with hourly load curve implemented in 10 years
 - Regarding electricity value chain, the optimum scenario is scenario C rolled out in 5 years
 - Regarding customers benefits, the optimum scenario is scenario C rolled out either in 5 or 10 years
- Network tariff issue
 - All scenarii show an increase of around 20% during 2 to 4 years (i.e. an increase of 4 to 5 euros per meter per year) on the current tariff for public grid use

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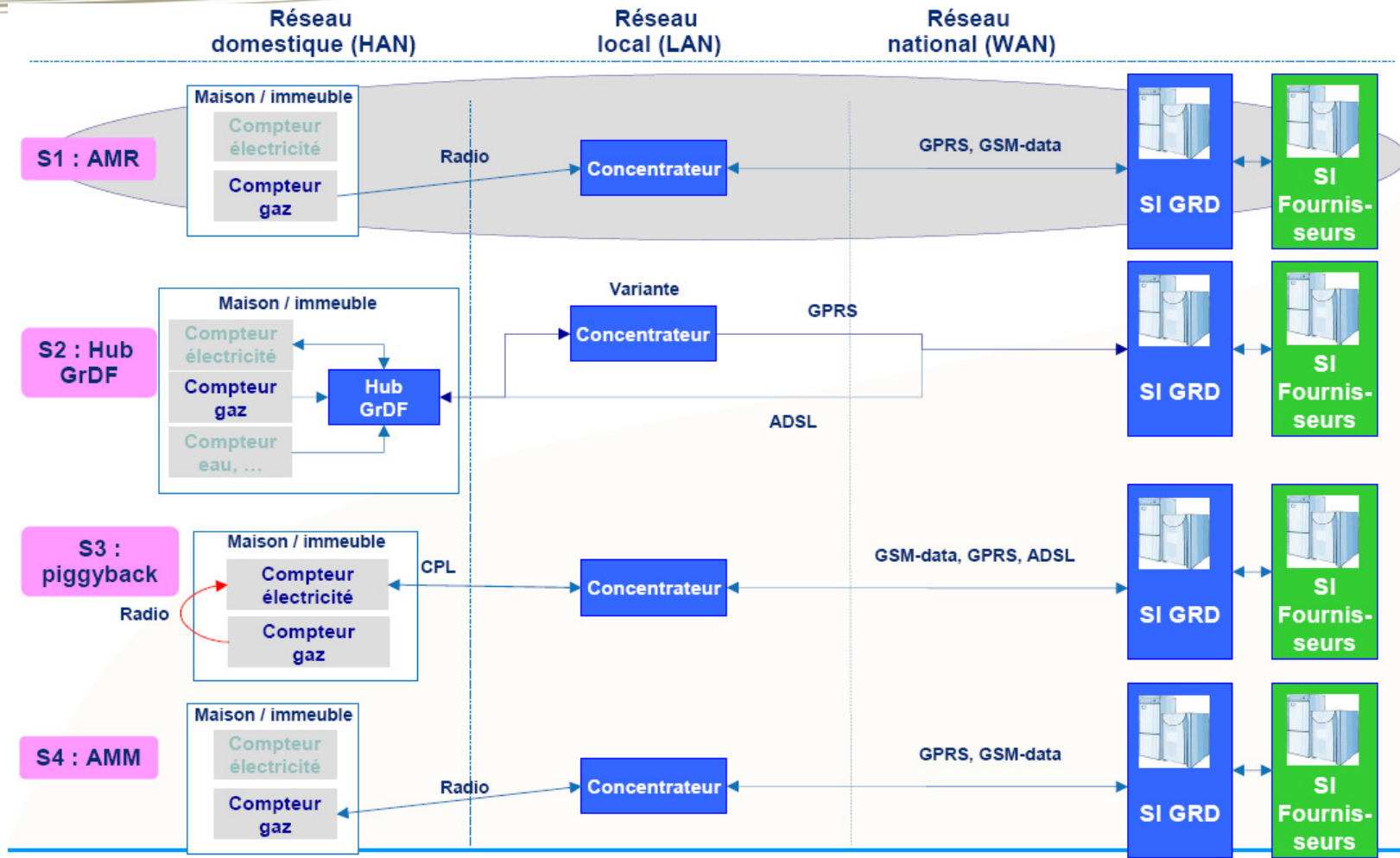
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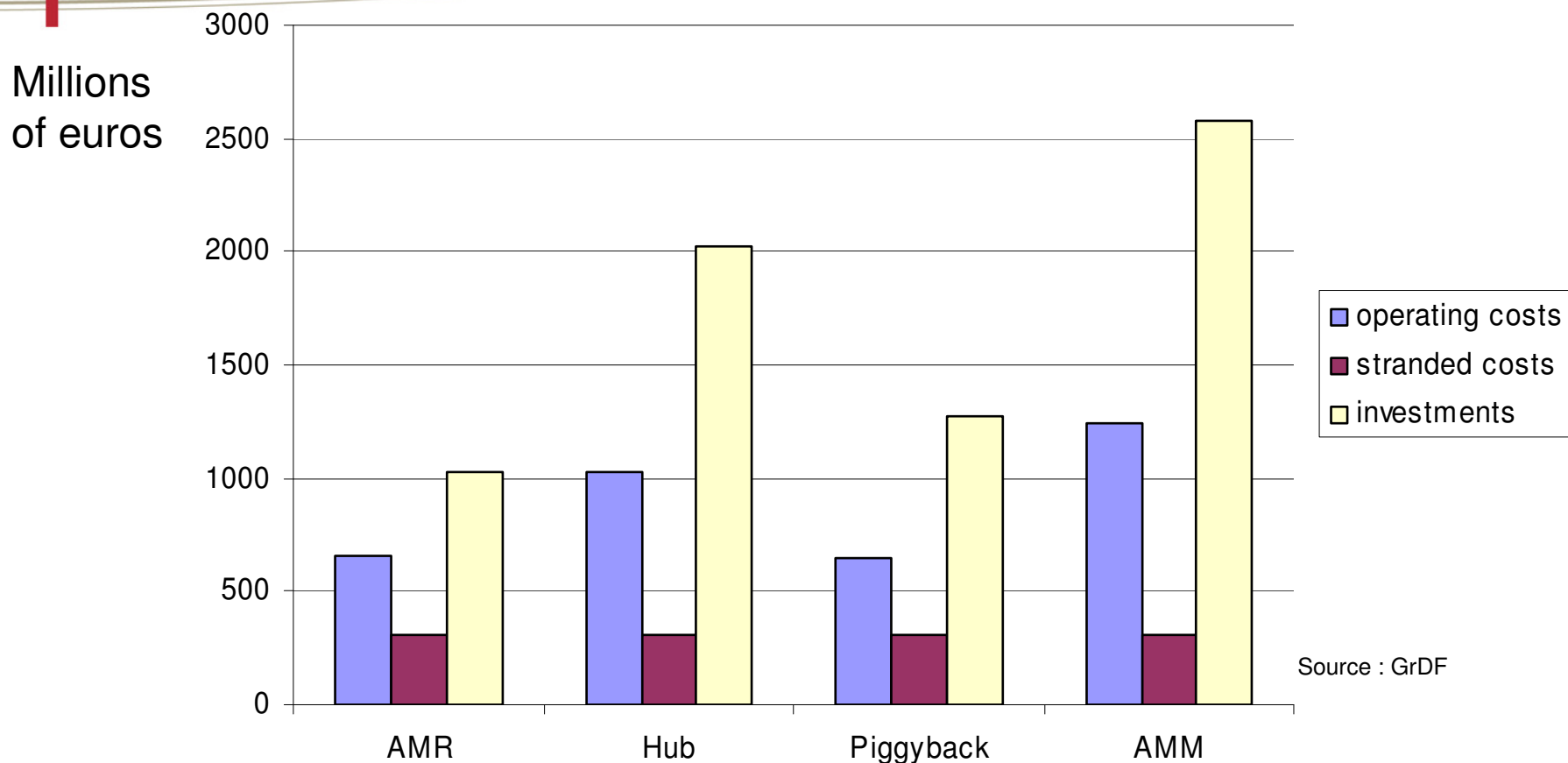
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Methodology : four scenarii analysed against the « business as usual » model



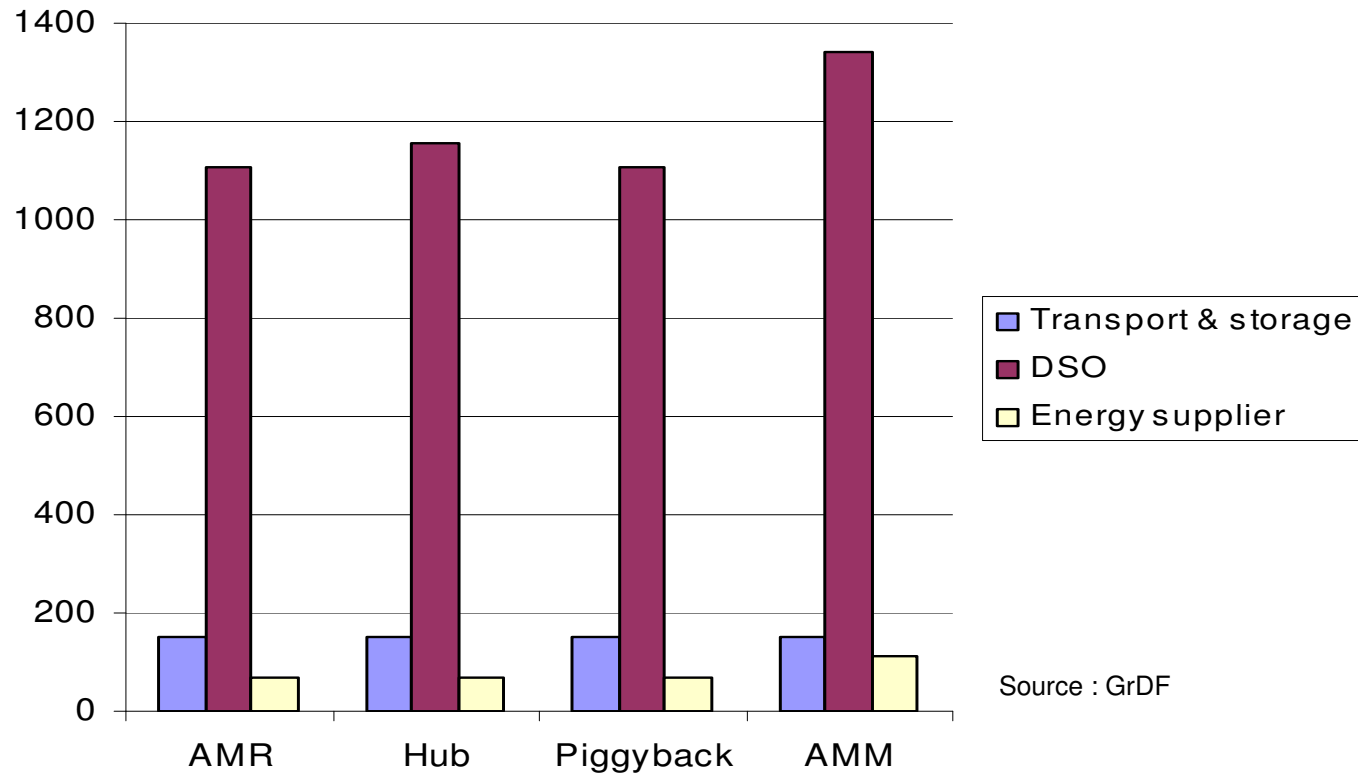
Costs analysis from the DSO's point of view



- The « AMR » scenario requires the lowest investment
 - About 1 billion euros

Focus on the benefits according to the market operator

Millions of euros

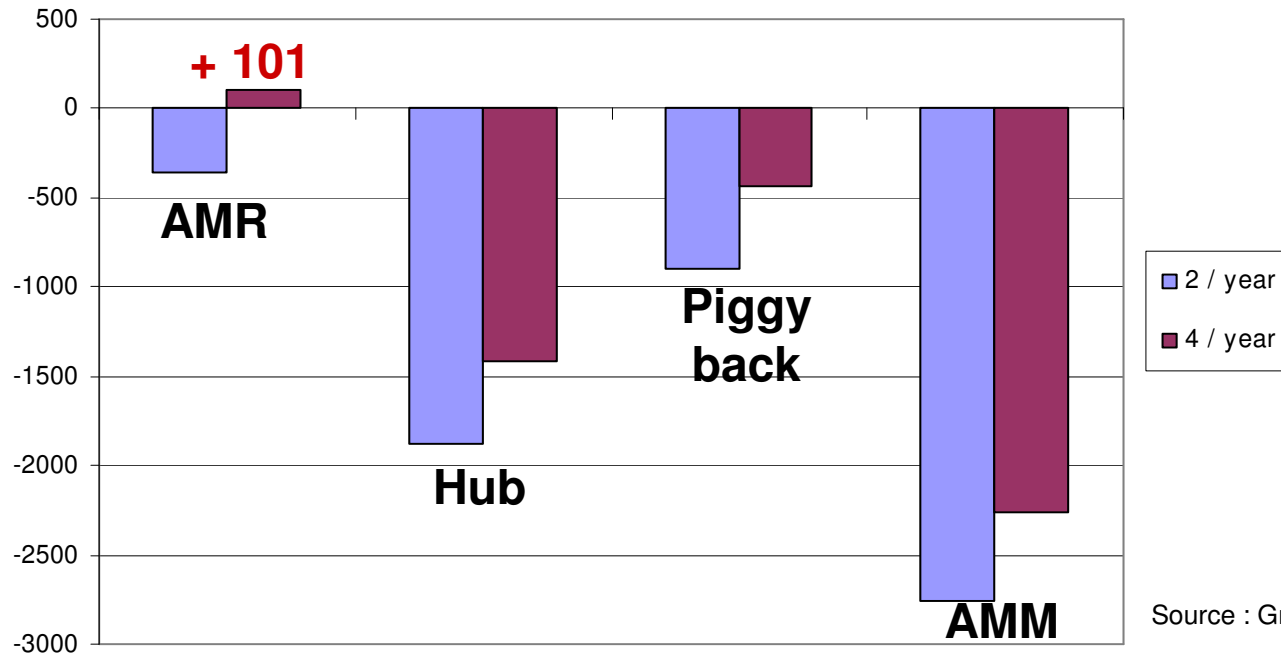


Source : GrDF

- There is not much differences in terms of benefits between all the scenarii
- The main benefit for the DSO is related to remote reading
 - As a result the benefits really depends on the frequency of reading

Hypothesis on the frequency of reading

Net earnings
in millions of €

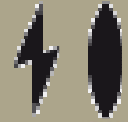


- Regarding the previous results, none of the scenario is positive compared to a BAU that includes a frequency of reading of twice a year...
- ...but the « AMR » scenario shows a positive net earnings as early as the legal reading frequency is over 4 times a year

Summary

- For security aspects, functionalities in gas are more restrictive than in the electricity field :
 - Connection necessarily requires the presence of the DSO, i.e. remote control is not allowed
 - It is not allowed to connect gas meters on electric network, as a result the use of a battery is necessary, inducing autonomy matters
- The AMR scenario seems to be the best compromise from a technical and economic point of view in order to reach the expected aims

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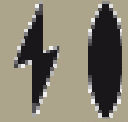
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Conclusions



- Compared to the business as usual, a smart metering system is not economically valid if the analysis focuses only on the DSO's centric perspective
- To justify the roll out of a smart metering system it is necessary to take into account the electricity or the gas value chain as a whole (generation, distribution, supply)
- Even though the tariff for public grid use will increase during the first years, the smart metering system will actually benefit the customers :
 - Energy savings
 - Better knowledge of their consumption thanks to more frequent reading
 - Simplification of the market process
 - The presence of the customer is not required anymore for technical operations such as meter reading



● Thank you for your attention