



Commission for Energy Regulation

An Coimisiún um Rialáil Fuinnimh

Smart Metering Programme



National Smart Meter Plan

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Programme Office
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Introduction

- What is Smart Metering?
- Why the interest in Smart Metering?
- CER Smart Metering Programme Overview
 - Customer Behaviour Trials (CBTs)
 - Technology Trials
 - Cost-Benefit Analyses (CBAs)
 - Next Steps (Consultation & Decision)

What is a Smart Meter??

- ‘Not so Smart’ Meter
 - Electromechanical
 - No communications
 - Manual Reading (4 actuals / 2 estimates)
- ‘Smart’ Meter(ing System)
 - Electronic
 - 2-way Communications
 - Remote Reading (interval data e.g. half-hourly)



Smarter! →



Facilitates new consumer services:

- Better Information
- New Pricing
- In-home data (Display unit is separate to meter!)

Drivers for Smart Metering



Potential Benefits

- Encourage energy efficiency
- Improve peak load management
- Support renewables generation
- Enhance competition
- Improve consumer experience
- Improve network operations & services
(including facilitating Smart Grid & EVs)

Legislation & Policy

- EU Legislation:
 - Third Legislative Package for Electricity (2009/72/EC) and Gas (2009/73/EC) – installation by 2020
 - Energy End-use Efficiency and Energy Services Directive (2006/32/EC) – costs reflective tariffs
 - Security of Supply Directive (2005/32/EC) – advanced metering systems
- Programme for Government
- National Energy Efficiency Action Plan (NEEAP 1 in 2009 & NEEAP 2 due in 2011)
- CER Consultation Paper 2007

CER Smart Metering Programme

Phase 1
(Discovery, Exploration and
Business Case Development)



Phase 1 Overview – Participants & Key Deliverables



National Smart Meter Plan



Department of Communications, Energy and Natural Resources
Roinn Cumarsáide, Fuinnimh agus Acmhainní Nádurtha

**Customer Behaviour
Trials Findings Reports**
Electricity: CER/11/080a
Gas: CER/11/180a

**Technology Trials
Findings Reports**
Electricity: CER/11/080b
Dual Fuel : CER/11/180b

**Cost-Benefit Analyses
Reports**
Electricity:
CER/11/080c
Gas : CER/11/180c

Overview of the Customer Behaviour Trials (CBTs)

Separate Electricity & Gas Trials
(Mainly Residential but some SMEs)



Objective of the CBTs

*“to ascertain the potential for smart metering technology to effect **measurable change in consumer behaviour**, which will result in the **reduction of peak demand and overall energy use**, when operated with appropriate DSM initiatives.”*

DSM (demand side management) initiatives trialled:

- Better **price** signals - Time of use (ToU) tariffs
combined with
- Better **information** – in-home displays (IHDs) & energy usage statements with billing (mthly/bi-mthly)

Electricity Customer Behaviour Trial (CBT)

Design, Stimuli & Results



Experimental Design

(6mth Benchmark Period / 12mth Active Test Period)

Tariff	Bi-monthly detailed bill and energy use statement	Monthly detailed bill and energy use statement	Bi-monthly detailed bill and Electricity Monitor	Bi-monthly detailed bill, energy use statement plus Overall Load Reduction	
Tariff A	342	342	342	342	1,368
Tariff B	127	129	127	128	511
Tariff C	342	342	343	343	1,370
Tariff D	127	129	126	127	509
Weekend					100
Control Group					1,170
	938	942	938	940	5,028

Time of Use (ToU) Tariffs

Electric Ireland Residential Trial Time of Use Tariffs (cents per kWh, excluding VAT)**

Tariff	Night	Day	Peak
T1	12	14	20
T2	11	13.5	26
T3	10	13	32
T4	9	12.5	38
T5 (W'end)*	10	14	38

* Night rate applies all day Saturday & Sunday for T5

** Current standard 24hr tariff rate is 14.1c per kWh excl. VAT

Electric Ireland SME Trial Time of Use Tariffs (cents per kWh, excluding VAT) ***

Tariff	Night	Day	Peak
T6	14	15	22
T7	7.5	16	22.5

*** Bord Gáis Energy & ESBIE calculated the SME trial ToU tariffs for their participating customers based on the agreed methodology.



Different times, different prices

DAY 8am - 5pm	PEAK* 5pm - 7pm	DAY 7pm - 11pm	NIGHT 11pm - 8am
14c	20c	14c	12c

* Peak rate applies Monday to Friday only excluding Public Holidays.
Time of Use pricing will apply from 1st January - 31st December 2010.
Rates may be subject to change in line with ESB Customer Supply tariff changes.
Prices exclude VAT.

Detailed Bill (Residential)

Appliance ToU Cost Table

Graph of average usage
costs (by ToU)

Text based messages:

- Personalised
- Motivational
- Historic & peer comparisons
- Hints & Tips

OLR Incentive (stimulus
for subset of customers)

Energy awareness



Typical cost of running various appliances over a full year*

Main household appliances (excl. Electric Oven)	NIGHT RATE	DAY RATE	PEAK RATE
Washing machine	€55	€64	€91
Tumble dryer	€183	€213	€305
Dishwasher	€73	€85	€122
Immersion - 6 months only	€203	€236	€338

* Average usage 1 cycle per day, 5 days a week for a full year. Immersion: 1 tank per day 6 months only.

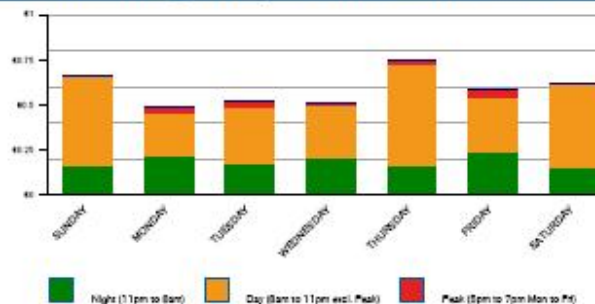
Hints and Tips

- Money Down the Drain - During the peak period (5pm to 7pm) an instantaneous electric shower running for 15 minutes costs you €14.30 per year. At day rates it would cost you €80.01 per year.
- Beat the Peak. If using a dishwasher washing your dishes at peak rate will cost you €121.92 per year; on the day rate it would cost you €85.34 per year.
- Remember! To make the greatest savings always try to be energy efficient when you use your appliances even when you shift to an Off-Peak time.

Has your electricity usage changed?

- 2.8% of your electricity for last month was used in the peak period. By using some of your appliances at day rate rather than at peak rate you could save money.
- Last month 572 customers on your tariff have reduced the amount of electricity they use. You are one of them. Congratulations!

Your average day of the week costs



Learn More

2010 Electricity Reduction Target

Your Target

Use less than **330** Units By 31 Dec

Used so far **330** Units

Reduce your usage Goals

Goal THIS bill - Use less than **330** Units

Goal NEXT bill - Use less than **330** Units

You are outside your goal for this period, can you reduce your usage more? See the energy tips above.

Your goals help to meet your annual target. Reach your target in December and earn €20 AS WELL as any savings you make on your bill.

Further information

Values given above may be slightly different to Page 1 due to rounding impacts. The correct final values are those displayed on Page 1 of the Bill.

In Home Display (IHD)

Shows how you are doing against your daily budget

Indicates the current cost of electricity per hour (does not include standing charge and VAT)



Indicates price at peak (red), day (orange) and night (green) rates

Indicates how much your electricity has cost this month (does not include standing charge and VAT)



CER Residential CBT Findings

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- The deployment of Time of Use tariffs and informational stimuli are found to reduce overall electricity usage by **2.5%** and peak usage by **8.8%**

	Overall	Peak Usage	Day Usage	Night Usage
Overall Change	-2.5% *	-8.8% *	-2.6% *	0.1%
* denotes results which are statistically significantly different from control group using a 90% confidence level.				

Informational Stimuli

Usage	All Tariff Groups and DSM Stimuli	Tariff Groups A-D by DSM Stimulus			
		Bi-monthly Bill and energy use statement (Stimulus 1) %	Monthly Bill and energy use statement (Stimulus 2) %	Bi-monthly Bill, energy use statement and electricity monitor (Stimulus 3) %	Bi-monthly Bill, energy use statement and OLR incentive (Stimulus 4) %
Overall	-2.5*	-1.1	-2.7*	-3.2*	-2.9*
Peak	-8.8*	-6.9*	-8.4*	-11.3*	-8.3*
* denotes results statistically significantly different from control group using a 90% confidence level					

Survey Findings

- 82% of Participants made some change to the way the used electricity.
- Fridge magnets and ToU stickers had a 80% recall.
- 91% felt the electricity monitor was effective in helping them reduce peak load.
- Barriers to moving more load to night included safety and convenience.
- Participants on FEA and the fuel poor exhibited the same level of change as other households.

Gas Customer Behaviour Trial (CBT)

Design, Stimuli & Results



Experimental Design

(6mth Benchmark Period / 12mth Active Test Period)

	Bi-monthly Detailed Bill	Monthly Detailed Bill	Bi-monthly Detailed Bill plus IHD	Bi-monthly Detailed Bill plus IHD plus Tariff	Total
Stimulus	200	200	200	200	800
Control Group					450
					Total 1,250
					Total (including 35% fallout) 1,925

- Energy statements – similar to electricity CBT
- Monthly & Bi-monthly billing frequency
- In-home displays - similar to electricity CBT
- *Price Signal:*
 - No Time of Use Tariffs
 - ‘Variable’ (seasonal) tariff trialled

Variable Gas Tariff

- Based on future and historical patterns of gas commodity prices
- A two-monthly change in tariffs
- All rates are applicable for the period 1st June 2010 to the 30th May 2011, subject to regulatory approved price changes in the standard tariff

Billing Period	Rate (cent per kWh, VAT exclusive)
June 2010 – July 2010	3.3
August 2010 – September 2010	3.3
October 2010 – November 2010	3.8
December 2010 – January 2011	4.6
February 2011 – March 2011	3.9
April 2011 – May 2011	3.4

Residential CBT Findings

- The deployment of stimuli and varying tariff are found to reduce overall gas consumption by a statistically significant **2.9%**;
- Each of the four stimuli combination tested were found to reduce usage as follows;

		Bi-monthly bill and energy usage statement %	Monthly bill and energy usage statement %	Bi-monthly bill , energy usage statement and IHD device %	Bi-monthly bill, energy usage statement, IHD device and Variable tariff %
Overall	-2.9*	-2.2%*	-2.8%*	-2.9%*	-3.6%*
* denotes results statistically significantly different from control group using a 90% confidence level.					

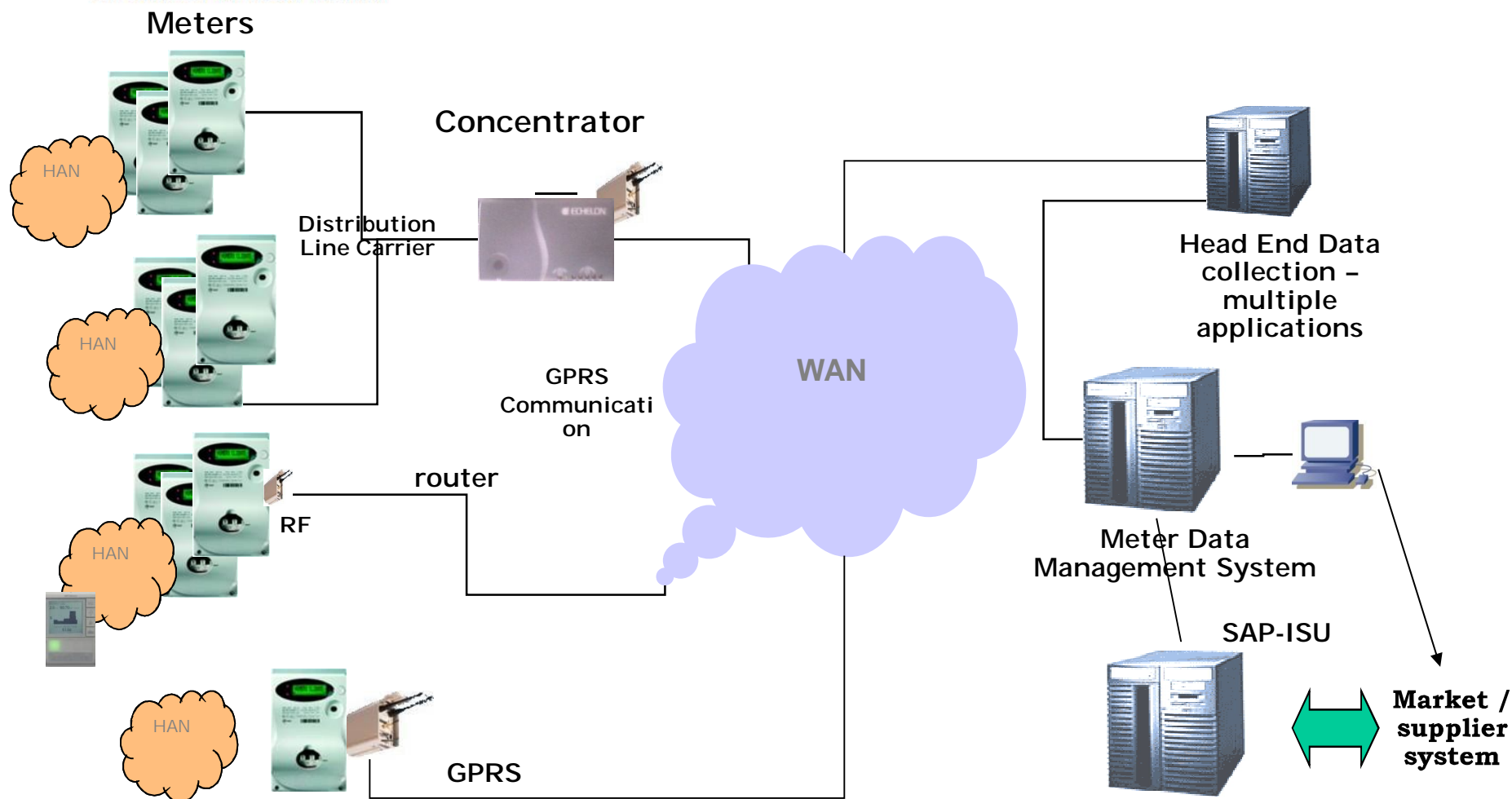
Survey Findings

- Participants' assessment of the statement was good with 82% stating it was straightforward to understand and 57% stating that it helped them reduce the amount of gas they used;
- Most IHD participants perceived it was easy to use (84%) with a majority believing that it helped them to reduce the amount of gas used (62%) and made them more aware of the gas they used (74%)
- There is evidence that the value declined over time with 38% of participants stating that the IHD became less effective over time
- Text messages sent to the IHD were effective for those who recall receiving the message – however only 15% did recall the messages;

Technology Trials Overview

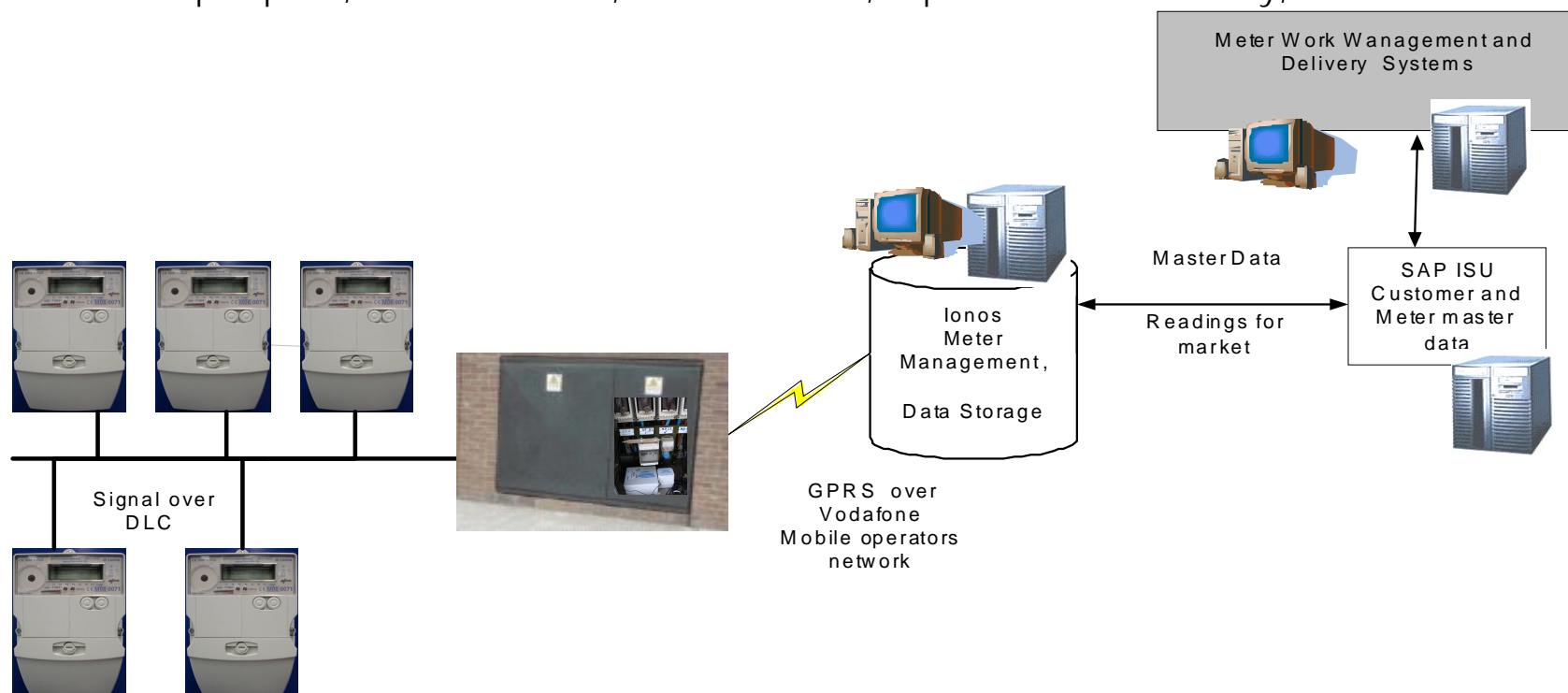


Smart Metering Infrastructure



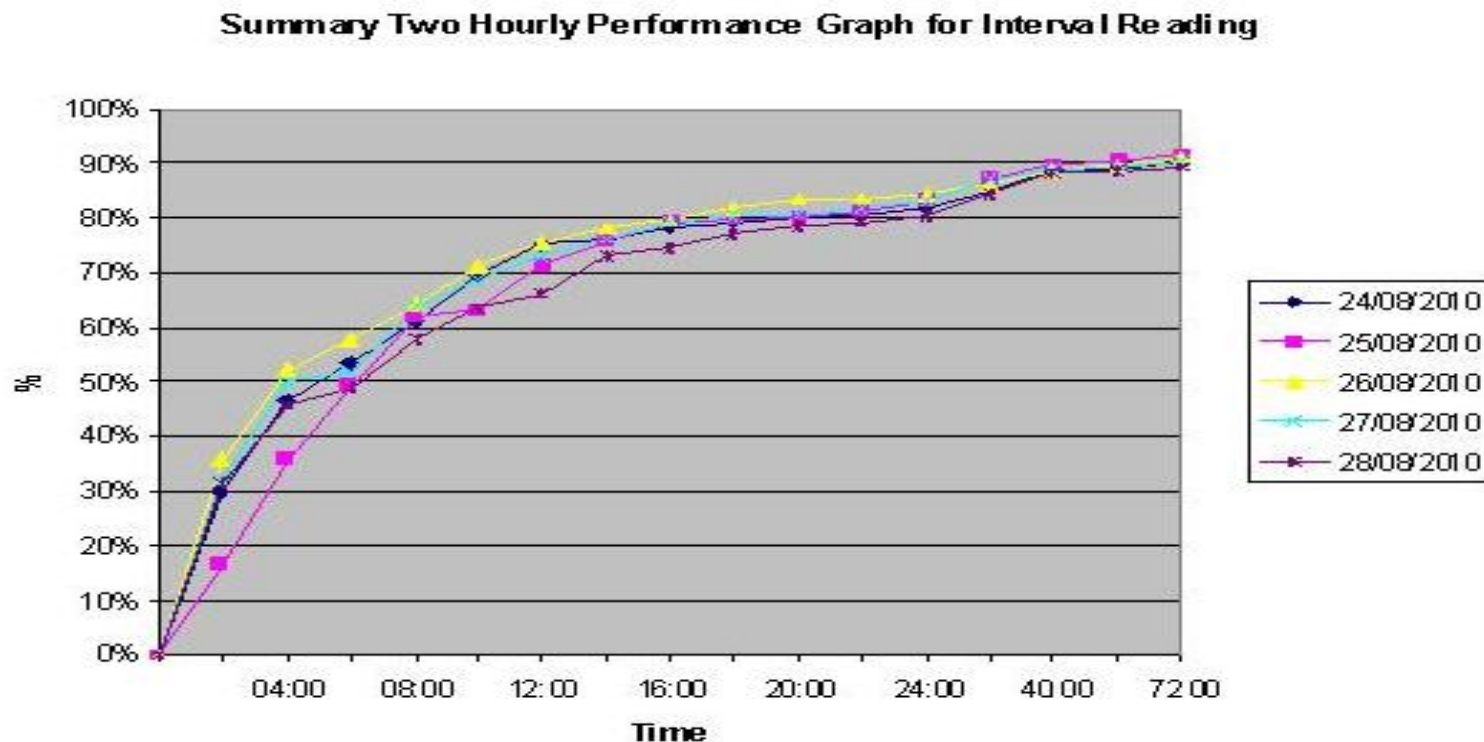
DLC Trial

- Standards based solution
- Favoured technology for most European smart metering projects to date
- Concentrator at MV substation manages and communicates with meters over low voltage
- 1.2Kbps speed, IEC standards, Two channels, repetition functionality, Cenelec A band

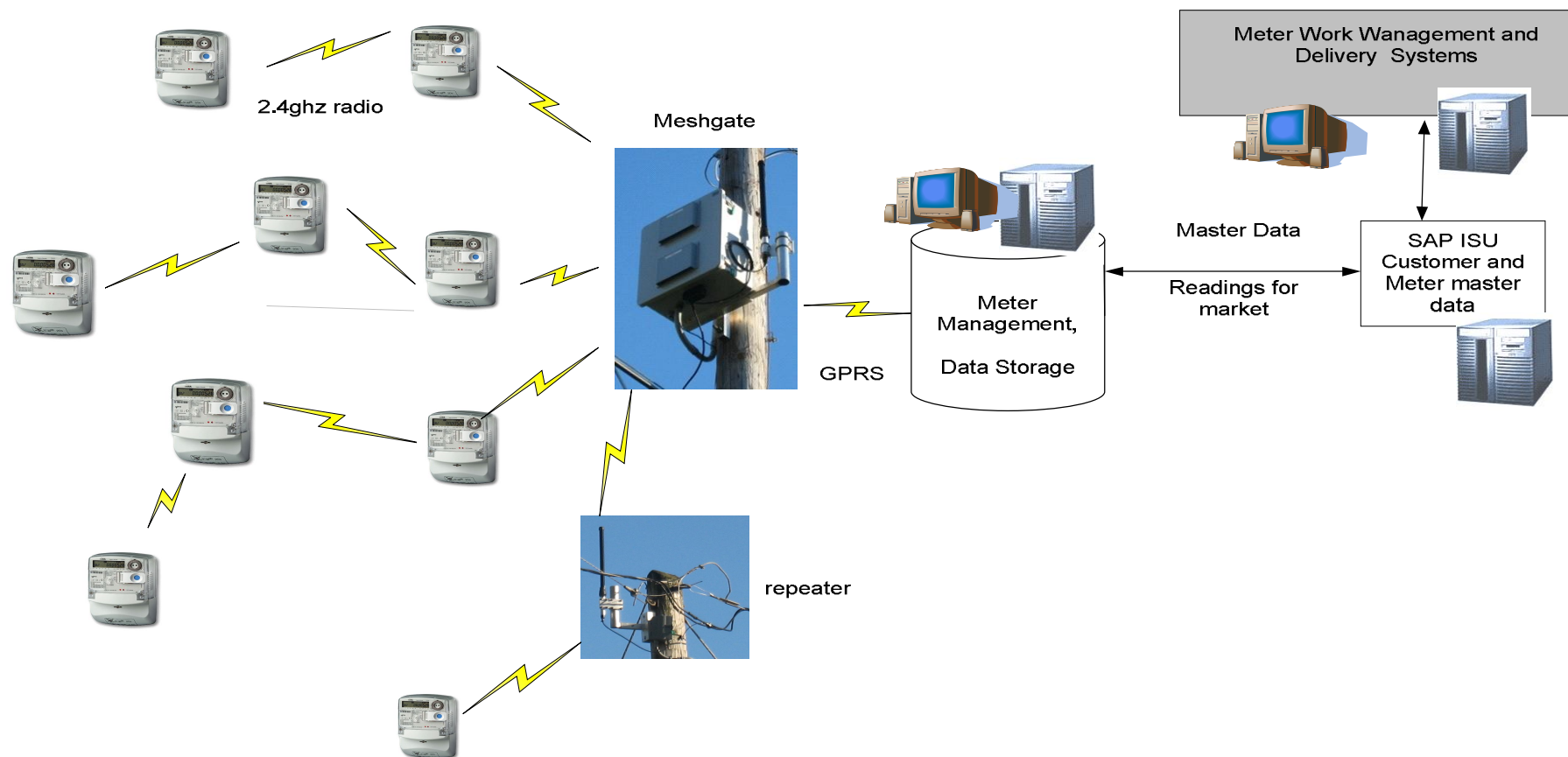


DLC Trial Results – Performance of Cyclical Functionalities

- Daily collection of interval data
 - 60% at opening of business, rising to 75% by end of day and over 90% within 2 working days
 - Big variation on performance depending on network with newer underground network performing best

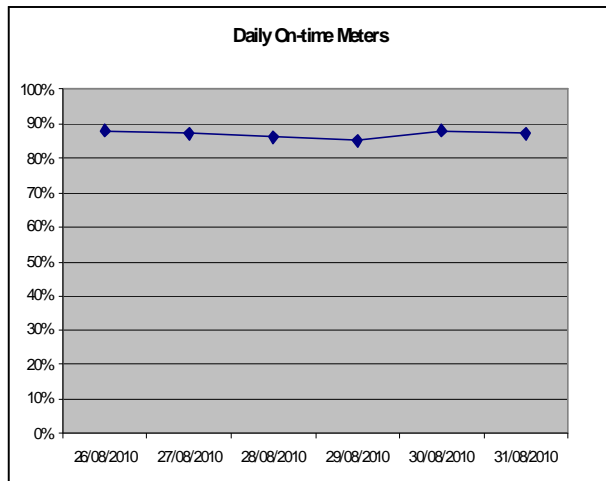


RF Mesh Overview

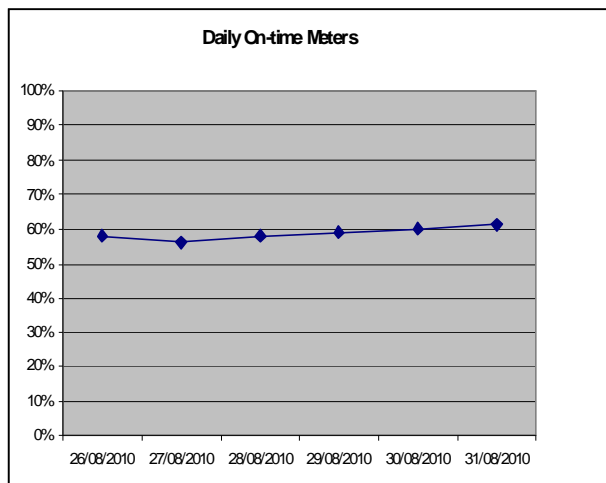


Overall Performance for Automated Functions.

Urban



Rural



Daily collection of interval data and register data;

- Overall performance on currently tuned network of 87% urban and 60% rural interval data next day 8.00am.
- Further work including additional repeaters, mesh gates and enhanced antennae may bring performance up to 95% overall

Gas Technology Trial

- Scoped & planned between ESBN & BGN
- 150 meters - 75 gas & 75 electricity
- Electricity meter acts as the hub for communications to and from the gas meter
- Learn lessons:
 - from coordinated deployment process between two separate DSO's
 - on the ongoing provisioning of data from the gas meter from ESBN to BGN
 - technology lessons of gas & electricity MBUS wireless deployment

Cost Benefit Analyses (CBAs) Overview

Electricity & Gas
(using CBT & info' from industry)





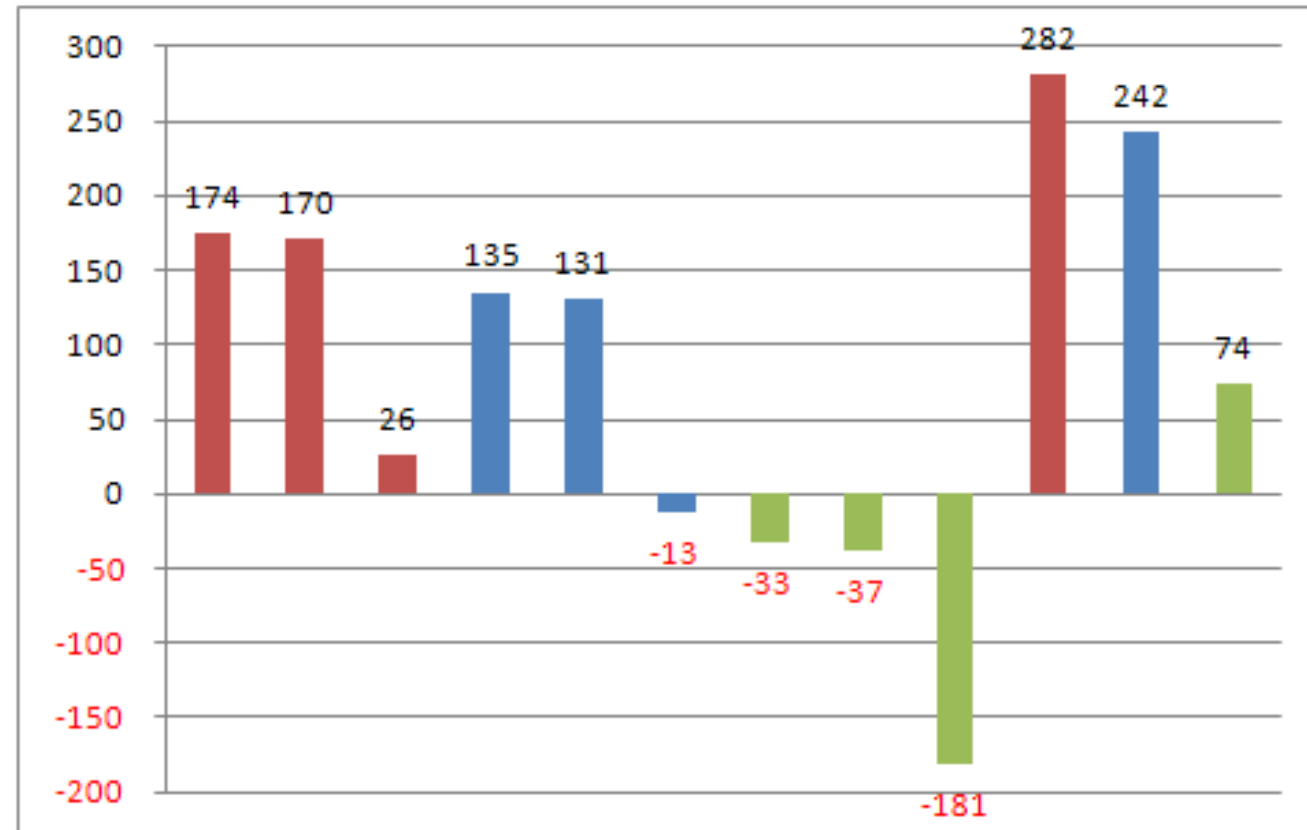
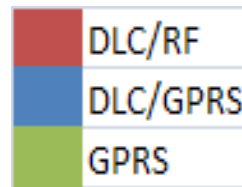
National Rollout Options Electricity

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- 12 Options - vary by WAN technology & informational stimuli.

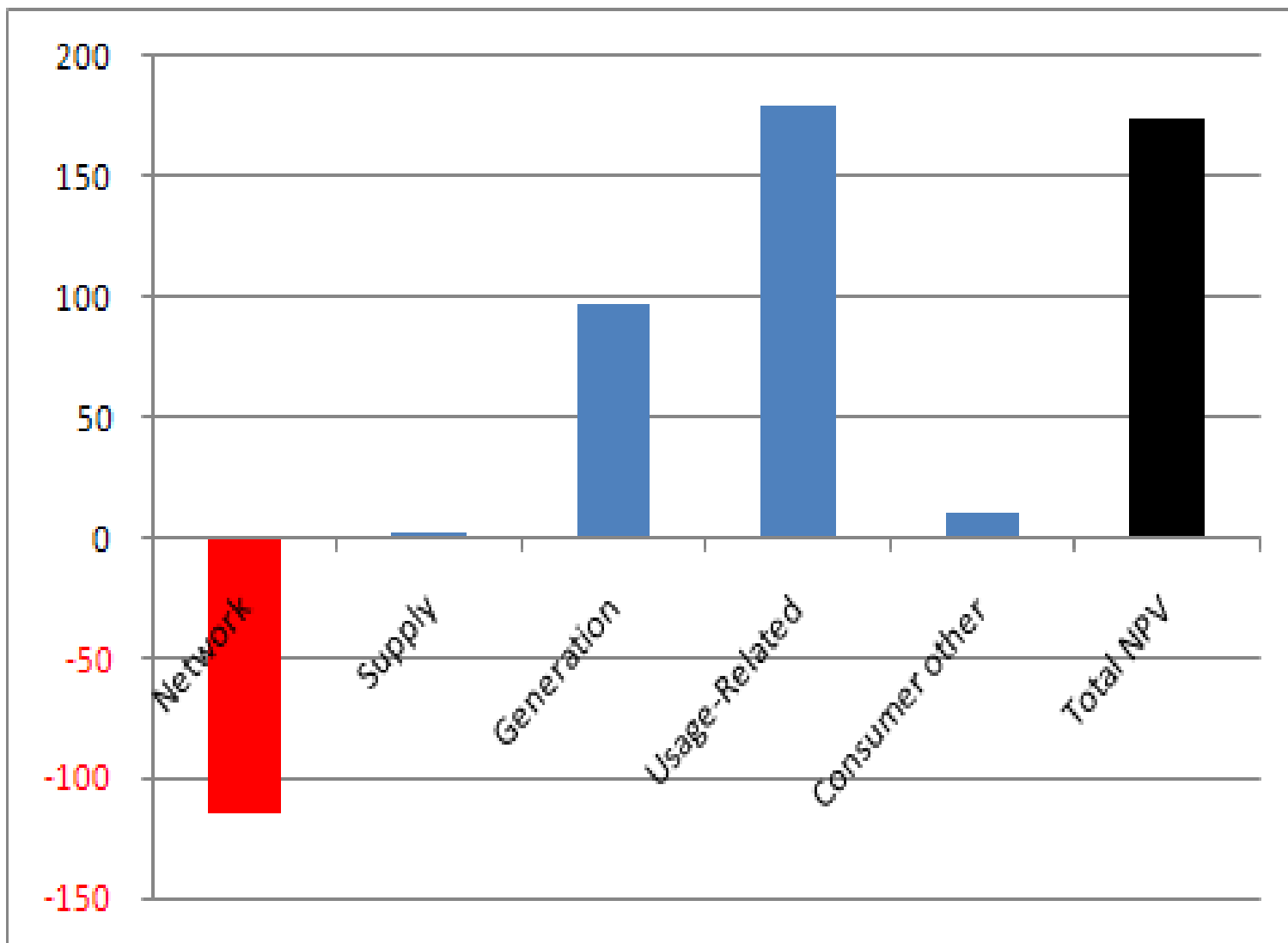
Option	Billing baseline	Billing scenario	Comm's	IHD
Option 1	Bi-monthly	Bi-monthly	PLC-RF	N
Option 2	Bi-monthly	Bi-monthly	PLC-RF	Y
Option 3	Bi-monthly	Monthly	PLC-RF	N
Option 4	Bi-monthly	Bi-monthly	PLC-GPRS	N
Option 5	Bi-monthly	Bi-monthly	PLC-GPRS	Y
Option 6	Bi-monthly	Monthly	PLC-GPRS	N
Option 7	Bi-monthly	Bi-monthly	GPRS	N
Option 8	Bi-monthly	Bi-monthly	GPRS	Y
Option 9	Bi-monthly	Monthly	GPRS	N
Option 10	Monthly	Monthly	PLC-RF	N
Option 11	Monthly	Monthly	PLC-GPRS	N
Option 12	Monthly	Monthly	GPRS	N

Total Electricity NPV (€m) by Option



- The estimated total NPVs for the 12 main national electricity smart metering rollout options analysed are generally positive, and often substantially so

Electricity NPV (€m) Breakdown by Component (Option 1)



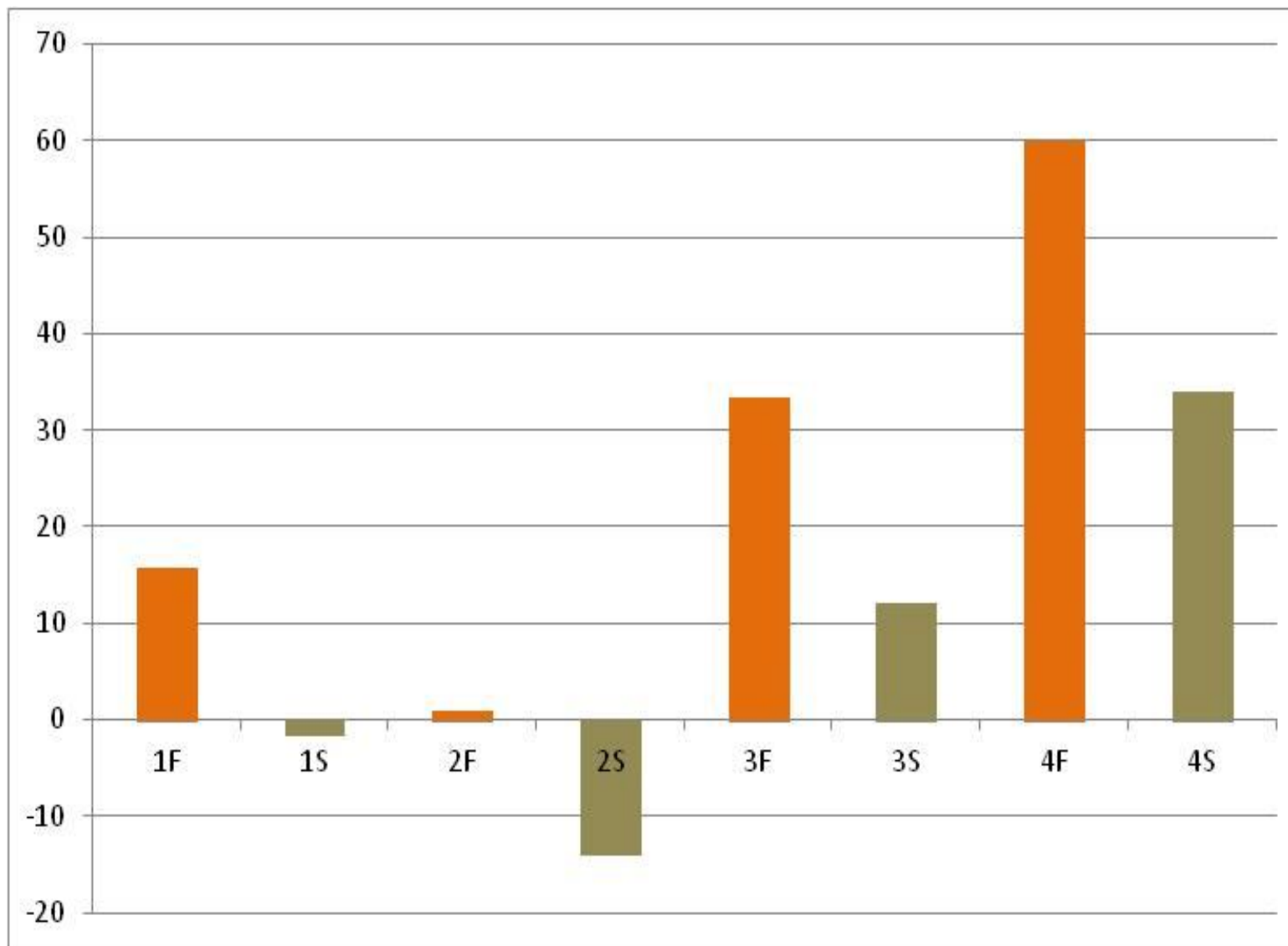
Qualitative Benefits

- Smart Grid
- Micro Generation
- Electric Vehicles
- Smart Home
- Synergies with other Metering Requirements
(Gas / Water)

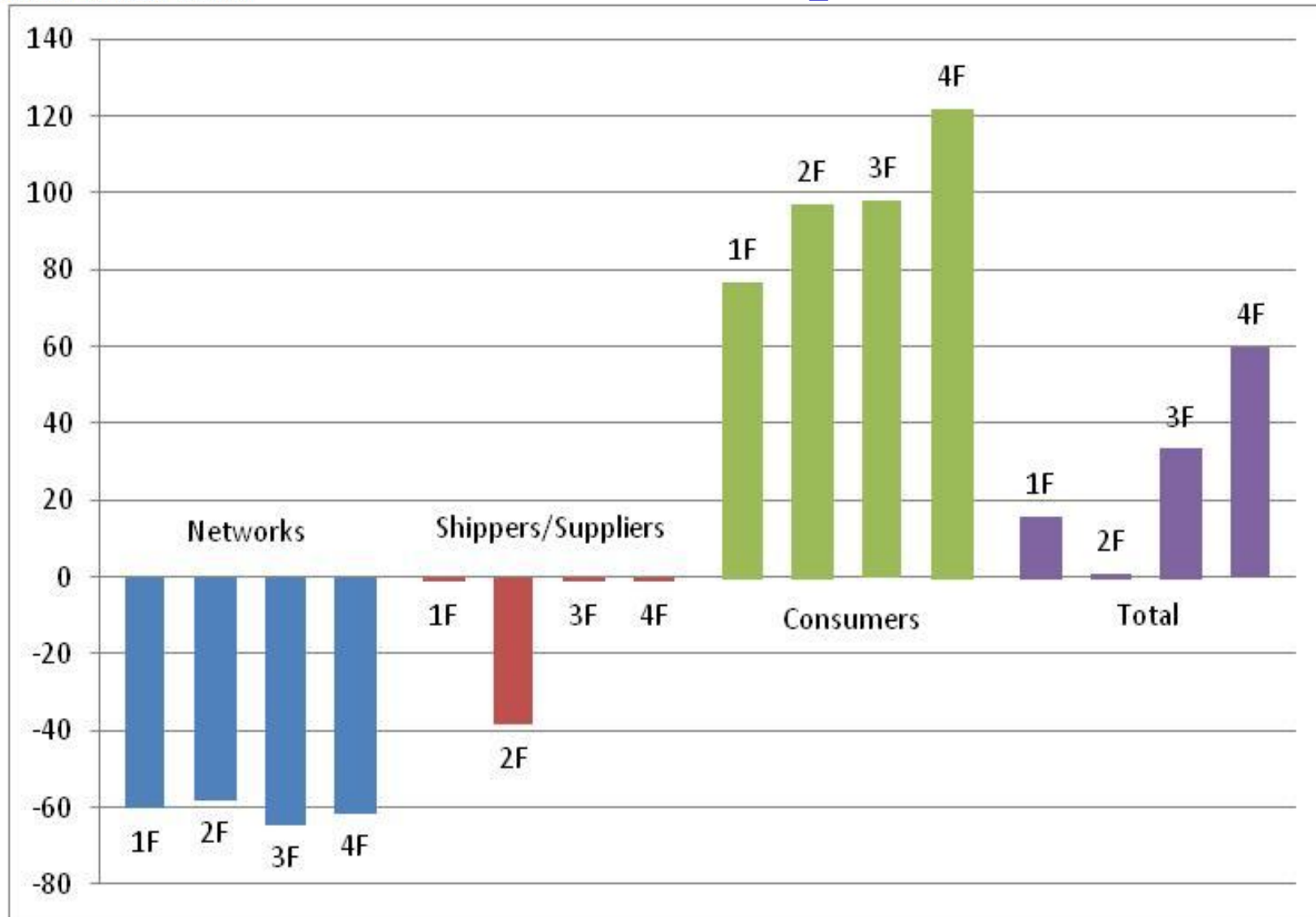
Total Gas NPV (€m) by Option

Energy saving scenario	Meter roll-out scenario	Scenario code	Total incremental NPV (EUR)
Bimonthly ES	Fast	1F	15,663,848
Bimonthly ES	Phased	1S	-1,612,759
Monthly ES	Fast	2F	938,003
Monthly ES	Phased	2S	-13,870,616
Bimonthly ES + IHD	Fast	3F	33,323,837
Bimonthly ES + IHD	Phased	3S	12,101,010
Bimonthly ES + IHD + VT	Fast	4F	59,879,967
Bimonthly ES + IHD + VT	Phased	4S	33,991,380

Total Gas NPV (€m) by Option



Gas NPV (€m) Breakdown by Component



Next Steps

Consultation & Decision



Consultation Overview

- Consultation published 15th November (closes 13th December) - CER is proposing to rollout electricity & gas smart metering nationally in a manner which:
 - Includes an **In-home Display** screen to give consumers more real-time information on both the cost and usage of electricity and gas.
 - Provides customers with **Smart Bills**, containing detailed consumption and cost information.
 - Involves suppliers offering **Time-of-Use Pricing** for all electricity consumers, facilitating a shift in electricity consumption to cheaper times of the day and giving more choice to customers.
 - Provides **prepayment** services as standard with smart metering, i.e. energy consumers will be able to automatically switch between prepay and bill pay
- Also includes proposals for the design and functionality requirements of the national Smart Meter roll-out, as well as the procurement model and high-level timelines involved.

Next Steps

- Consultation closes 13th December 2011
- CER Decision Paper by 31 January 2012
- National Rollout (electricity & gas) high-level timeframe:
 - detailed work plan to be developed.

PHASE 2
Design & Procurement
2012 & 2013

PHASE 3
Detailed Design & Testing
2013 & 2014

PHASE 4
Deployment
2014 - 2018