11th Symposium on EnInnov

The Economics of implementing Smart Metering in Europe

MMag. Alexander Gabl, Dipl.-Ing. Erwin Smole

PRICEWATERHOUSECOOPERS

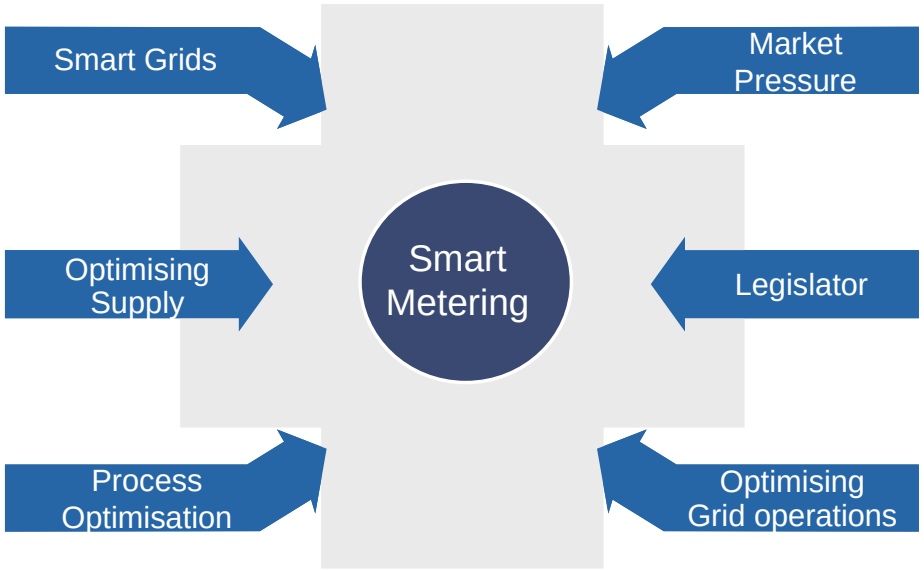
Graz, February 2010

Table of Contents

		Page
1	European perspective	1
2	Cost-benefit analysis and Smart Metering	6
2.1	CAPEX, OPEX	11
2.2	Communication	13
2.3	Economy	17
3	Credentials and contact	19

Section 1
European perspective

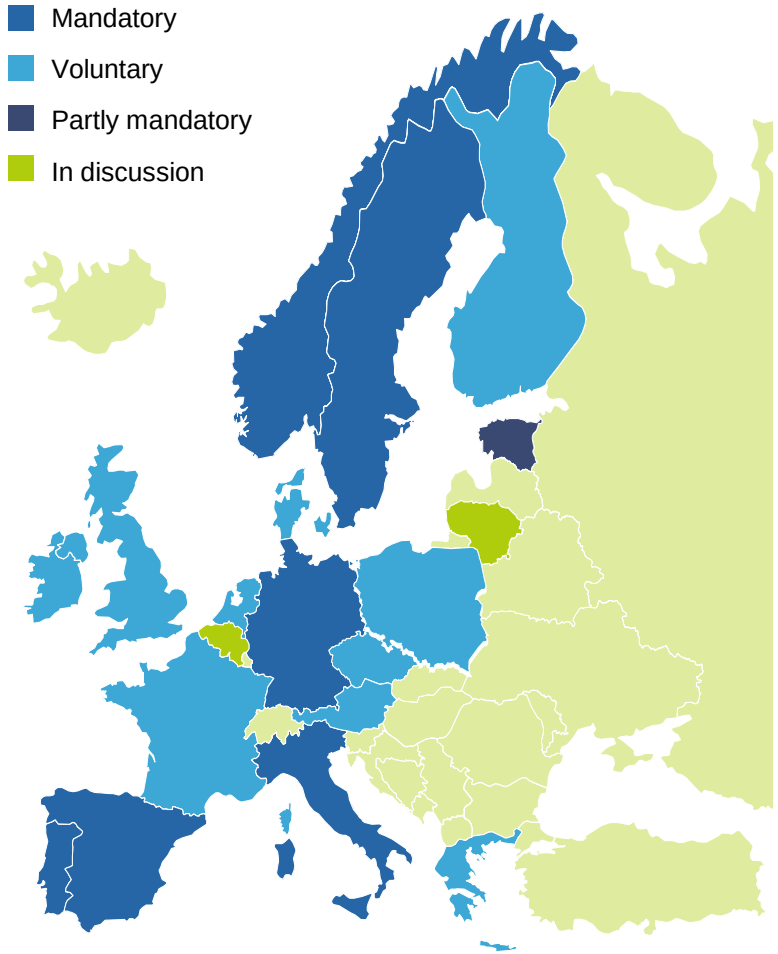
Drivers for the implementation



Source: PwC Analysis

- Energy Services Directive 2006/32/EC
- Third Energy Package Directive 2009/72/EC, 80% until 2020
- EUR 30 billion market until 2014
- E-mobility, decentralised production
- Supply assurance, aging infrastructure and capacity management
- Reducing process costs

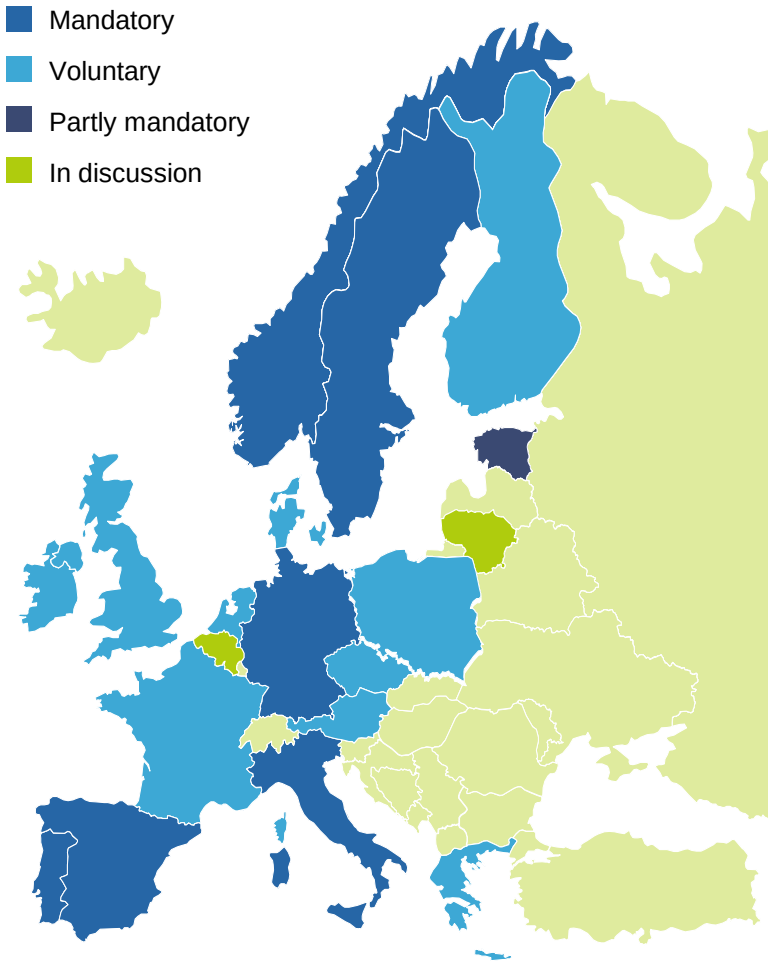
Countries implementation mandatory (1/2)



Source: PwC Analysis

- Italy (95% by 2011)
- Germany (starting in 2010 for new buildings)
- Sweden (100% by 2009)
- Spain (by 2018)
- Portugal (by 2015)
- Norway (by 2013)

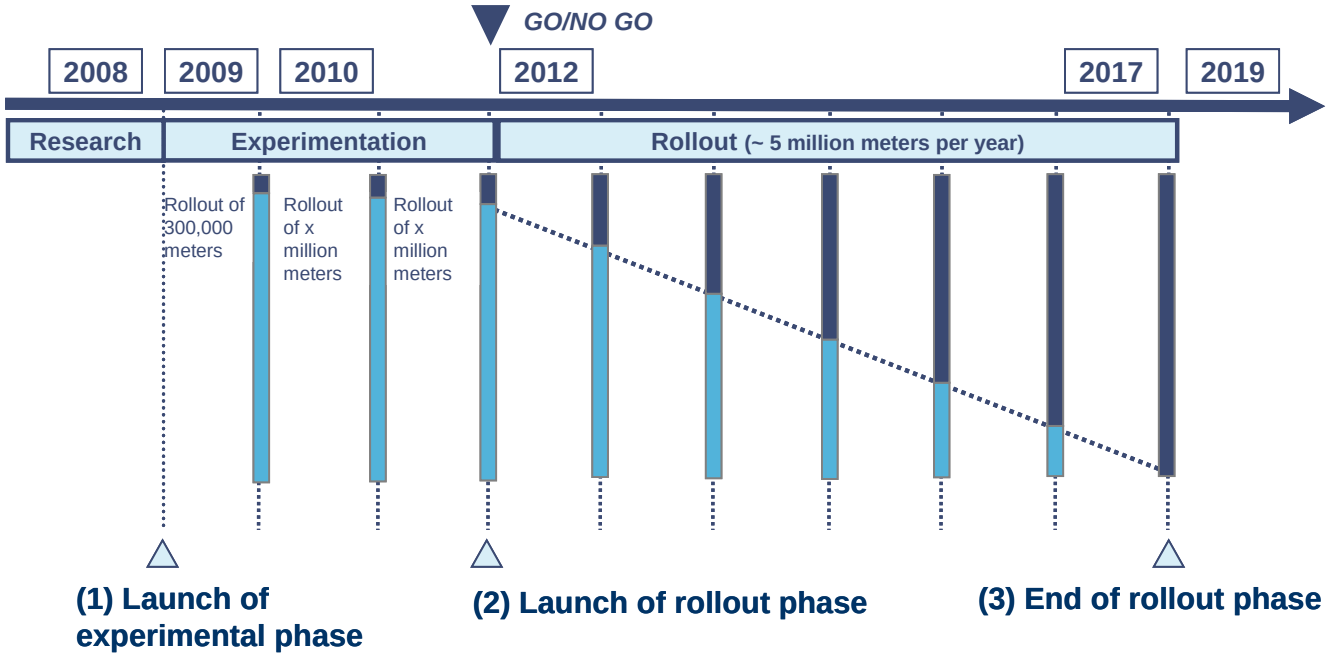
Countries implementation voluntary (2/2)



Source: PwC Analysis

- Austria
- Czech Republic
- Cyprus
- Denmark
- Finland
- France
- Greece
- Ireland
- Netherlands
- Poland
- UK

Largest European rollout in France



Source: PwC France, Exemplary illustration of the implementation process in France

- ERDF presented in 2008 the AMM rollout of 35 Mio. Meters and 7 Mio. concentrators until end of 2017.
- Estimated costs EUR 4 to 5 billion, 50% of which are planned to be installation costs.
- Largest project Europe-wide.

Section 2
Cost-benefit analysis and Smart Metering

Connecting Smart Metering and CBA

Six important steps to do, when conducting cost-benefit analysis

- Defining alternatives
  - Scenarios for implementation
- Model timing
  - Lifetime, roll out, operation
- Stakeholders
  - Benefits
  - Costs
- Net-Present-Value
  - Discount rate
- Sensitivity analysis
- Recommendation

Stakeholder in Austria (1/2)

Grid Operator

- Purchase, installation, IT, OPEX
- Meter reading
- Load profile management
- Back office
- Peak/off-peak demand

Supplier

- New tariff models
- Balancing energy, peak/off-peak
- Back office – invoicing
- Postpone investments

Stakeholder in Austria (2/2)

Customer

- Timely information on usage
- Reduced consumption
- Saved time
- Lower invoices
- Supplier switching
- Efficient competition

Energy efficiency and CO_2 emissions

Change in consumption behaviour

- Timely information on consumed usage through monthly invoicing, SMS, email, mail.
- 1% - 20%
- i.e. Norway -4% (space heating)
- High grade of penetration

Energy efficiency effect depends on

- Change in consumer behaviour
- Penetration grade
- Level of energy efficiency in a country
- CO_2 savings depend on the energy efficiency effect

Section 2.1
CAPEX, OPEX

Key numbers and their implication

Device	Unit	Range	Comment
Smart Meter Power (AMI)	EUR	34 – 60	Without communication module
Smart Meter Gas (AMI)	EUR	50 – 80	Without communication module
Installation Costs per Power Smart Meter	EUR	15 – 60	Installation, licensing, project costs, rollout method
Server + implementation	EUR	30,000 – 48,000	
Meters per server	Number	10,000 – 50,000	
Concentrator	EUR	1,000 – 2,000	
Meters per concentrator	Number	100 – 300	

Source: PwC Analysis

European Case – implementing 250 Mio power Smart Meters

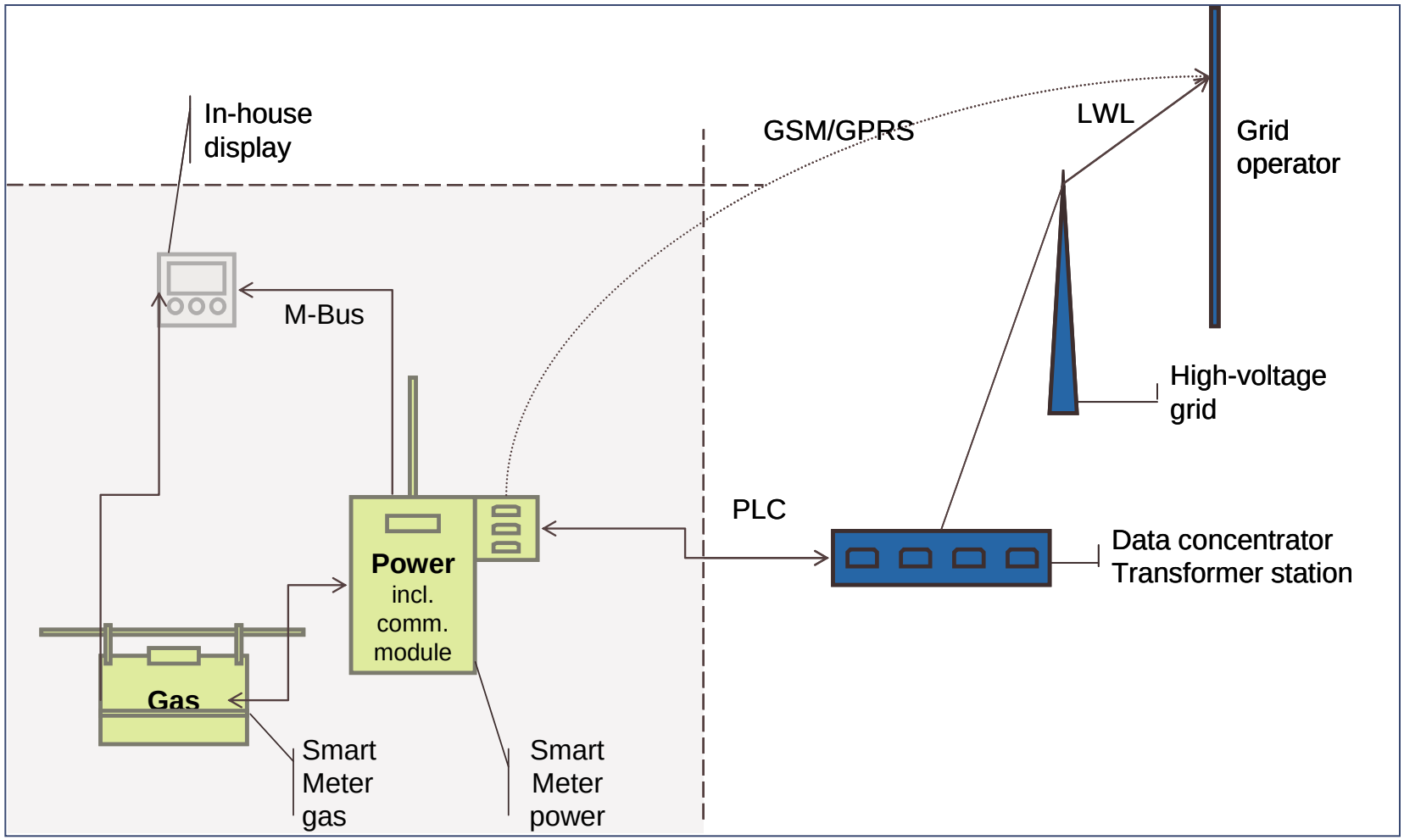
- Investment: EUR 8.5 – 15 bn
- Installation: EUR 4 – 15 bn
- Overall: EUR 12.5 – 30 bn

Section 2.2
Communication

Communication technologies

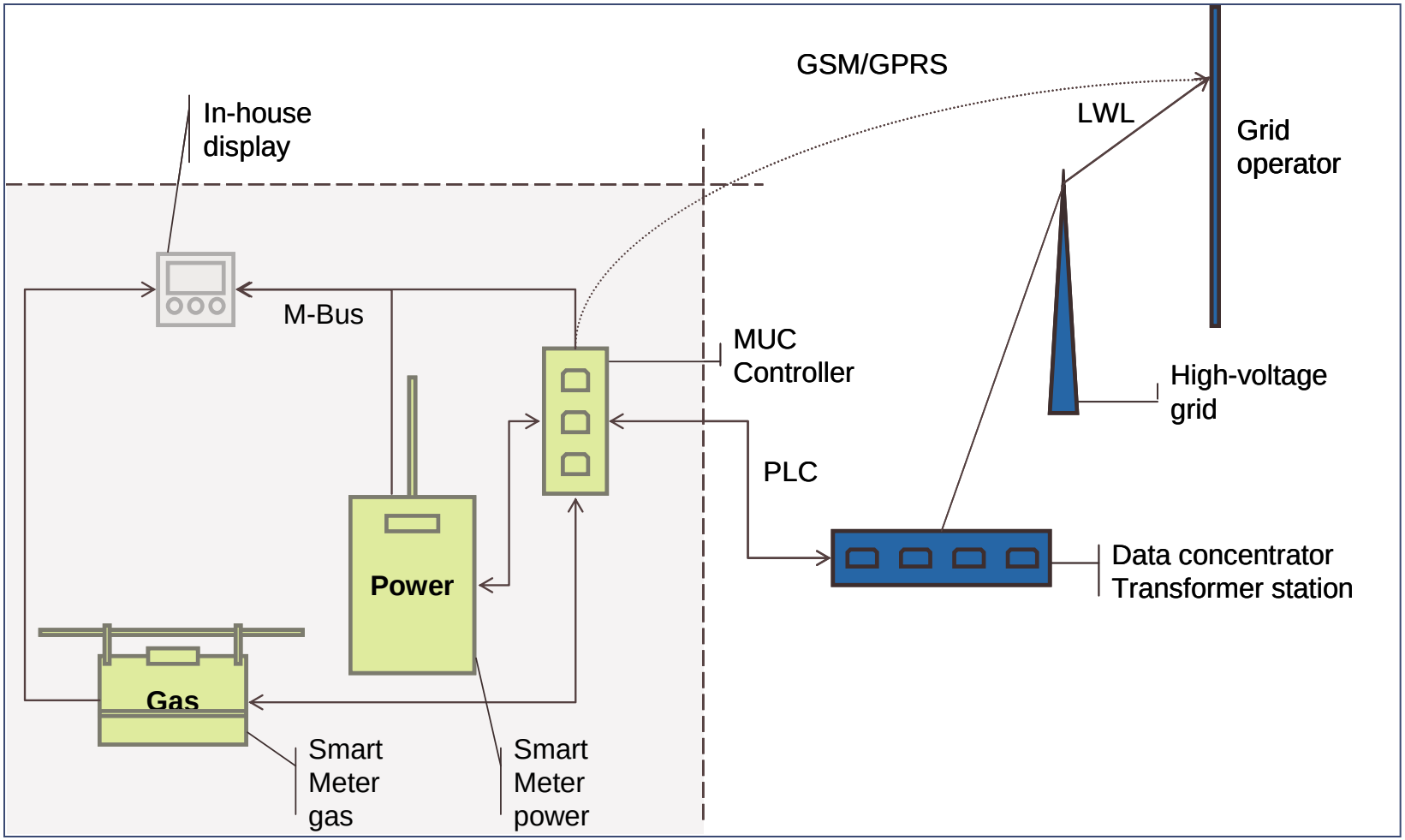
	Strengths	Weaknesses
Power line (PLC)	➢ Widely tested in trial projects ➢ Existing infrastructure	➢ 500 meters range ➢ Slow data read-out ➢ Signal may interrupt other devices
GSM/GPRS/ UMTS	➢ Direct transmission ➢ Reliable, secure ➢ Non susceptible to interference	➢ Running costs based on data volume
DSL	➢ Long ranges possible ➢ Hardly susceptible to interference	➢ Running costs based on data volume ➢ Modem switched on (vacation, work,…)
IP, Fibre optic	➢ Nationwide penetration (IP) ➢ Reliable, secure, non susceptible to interferences ➢ FO: high transfer rate	➢ FO: not available ➢ FO: high investment costs ➢ Service provider -> capacity ➢ Running costs based on data volume
WLAN, ZigBee	➢ Open standard ➢ Low energy consumption ➢ No connection costs	➢ Line of sight ➢ Bandwidth decreases with number users ➢ No licensed radio range
Satellite	➢ Penetration	➢ Installation and connection costs ➢ Data transfer low ➢ Available capacity, time lag signal

Topology of technology model (1/2)



Source: PwC Analysis

Topology of technology model (2/2)



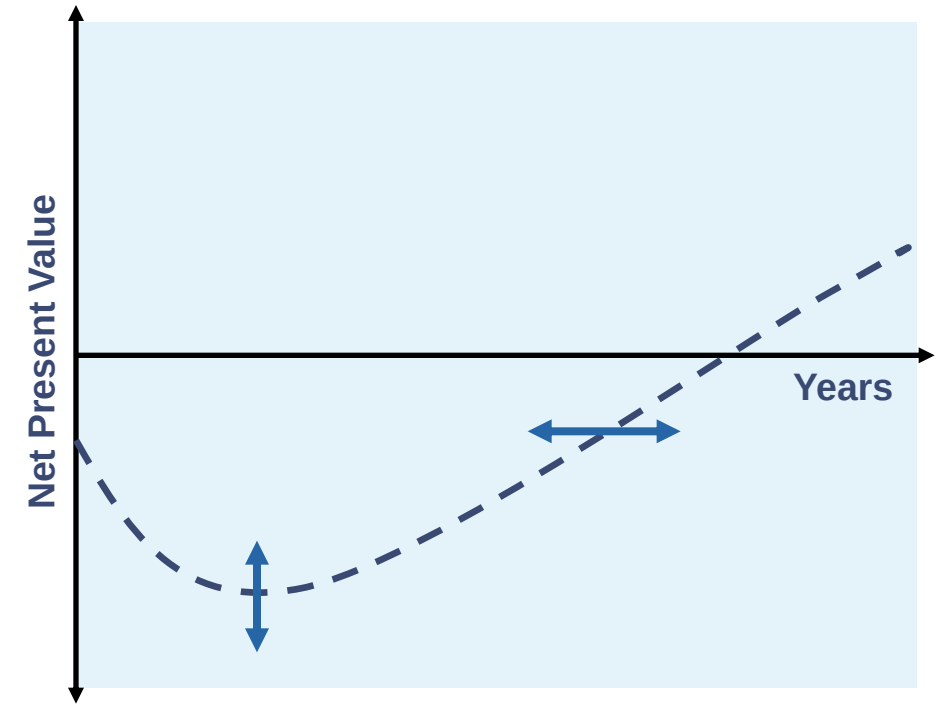
Source: PwC Analysis

Section 2.3
Economy

Key drivers of CBA

7 Main drivers for CBA result

- Consumption behaviour
  - > 1% up to 20%
- Load shifting
  - > 1.9% to 4.7%
- Investment Costs
- Potential energy price reductions
- Discount rate
- Roll out
- Penetration grade



Source: PwC Analysis

Section 3
Credentials and contact

A selection of our global capability in Smart Metering

Canada

- SMI strategy and business case, grid modernization vision, procurement and negotiations, and financial modelling for a major utility

UK

- Mergers and acquisitions experience within the metering landscape

Netherlands

- Smart metering programme business case analysis and development

Norway

- Outsourcing of metering, settlement, billing and debt collection

U.S.A

- Smart metering implementation programme and transformation management including regulatory support, risk management, scheduling support and process design

India

- Implementation of advanced metering in distribution companies

France

- Smart metering deployment analysis in order to secure internal and legal reporting production and publication

Italy

- Smart metering implementation planning support

Germany

- Advising on implementation of smart metering
- Implementation of IT solutions for smart metering
- Issued sector survey - “State of realisation and strategic implications for the German utility market”

Australia

- Currently assisting development of a consistent national framework for the rollout of smart metering infrastructure across the Australian electricity market to small customers.

Smart Metering study 2008

- “State of realisation and strategic implications for the German utility market”
- Goal: Evaluation of the expectations and perceptions of the utilities and strategic considerations.
- Publication in November 2008

Thank you for your attention

MMag. Alexander Gabl

Tel: +43 01 50188 2944

E-Mail: alexander.gabl@at.pwc.com

Dipl.-Ing. Erwin Smole

Tel: +43 01 50188 2928

E-Mail: erwin.smole@at.pwc.com

Internet: www.pwc.com/energy