

telenor

Broadband demand and the role of new technologies

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Agenda

- Relevant broadband technologies
- Broadband evolution
- The Norwegian broadband case
- Impact of new technologies
- Long-Term broadband forecasts
- Conclusions



Western Europe

The countries:

- EU15 + Iceland, Norway and Switzerland

EU15:

- Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Luxembourg, Portugal, Spain, Sweden and UK
- Population: ca. 400 million
- No of households: ca. 170 million
- Persons per household: 2,5



Broadband technologies

- DSL
 - ADSL, ADSL2+, VDSL2
 - S(H)DSL
- Cable modem/HFC
- FTTH/FTTB
- WiMAX
- Other (Satellite, PLC,)

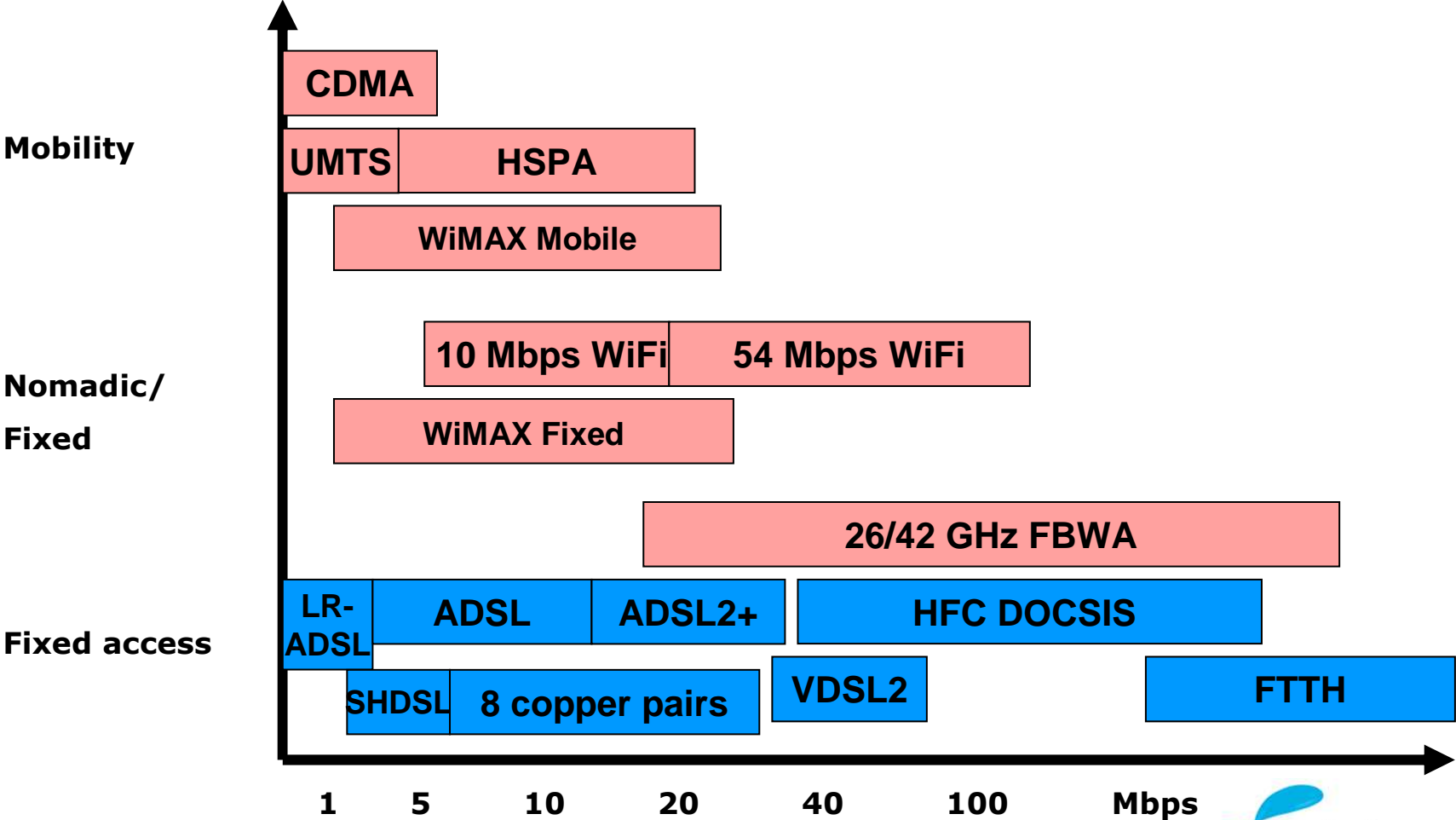
- CDMA 2000
- HSPA
- LTE

- WLAN/WiFi

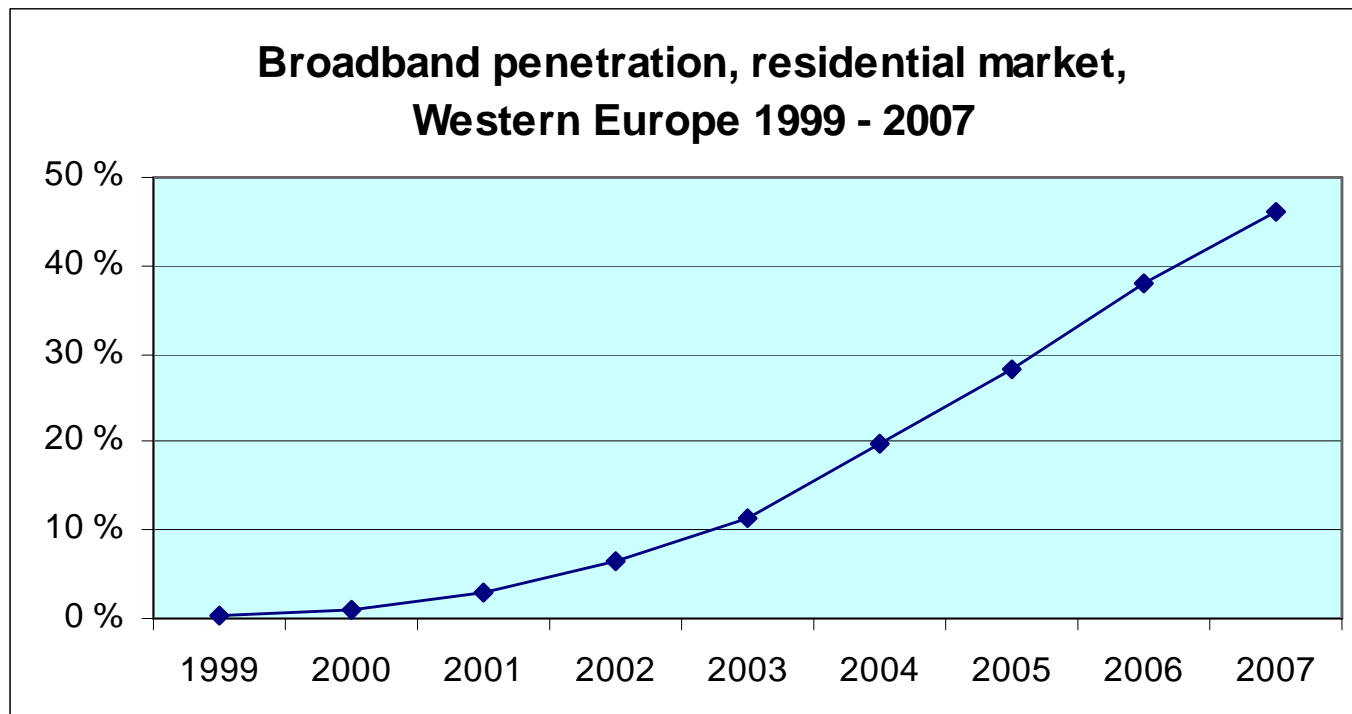
Fixed broadband

Mobile Broadband

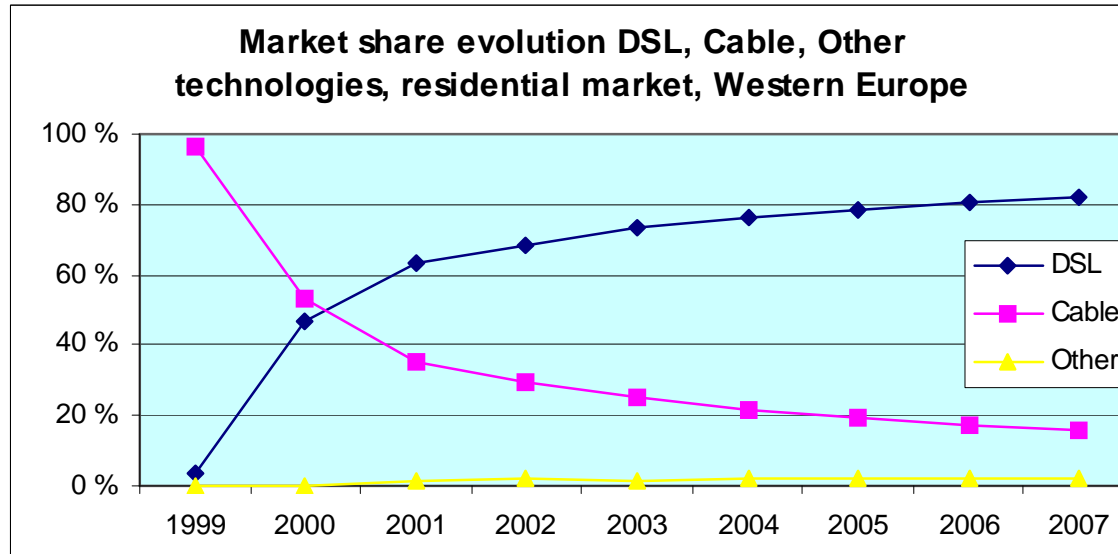
Different technologies: Downstream capacity and mobility



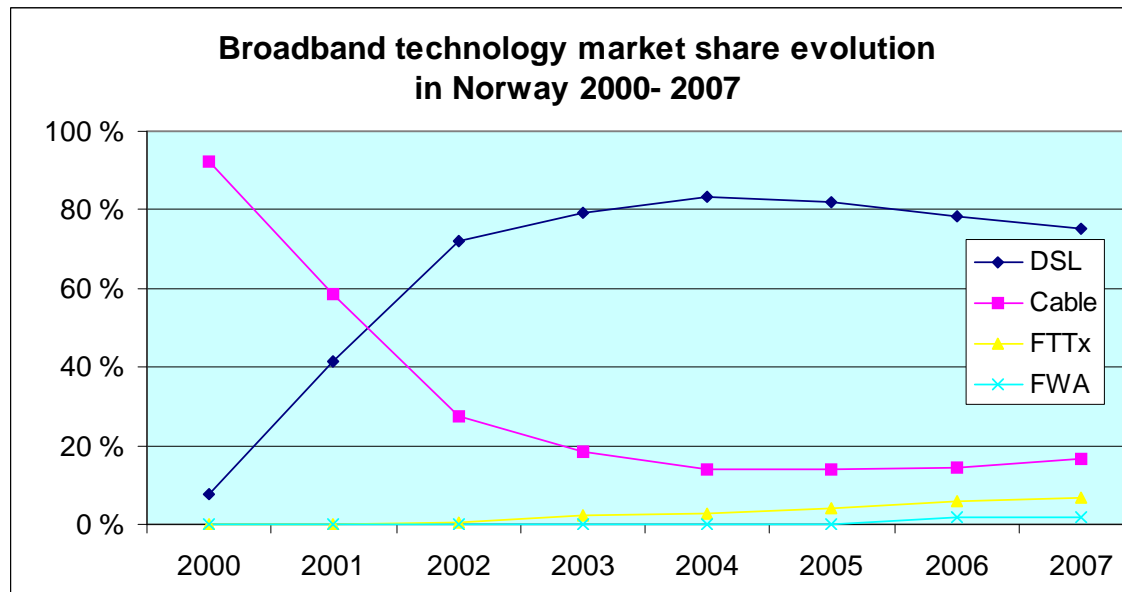
Broadband penetration, residential market, Western Europe, 1999 - 2007



Market share different technologies, residential market, Western Europe and Norway, 1999 -2007



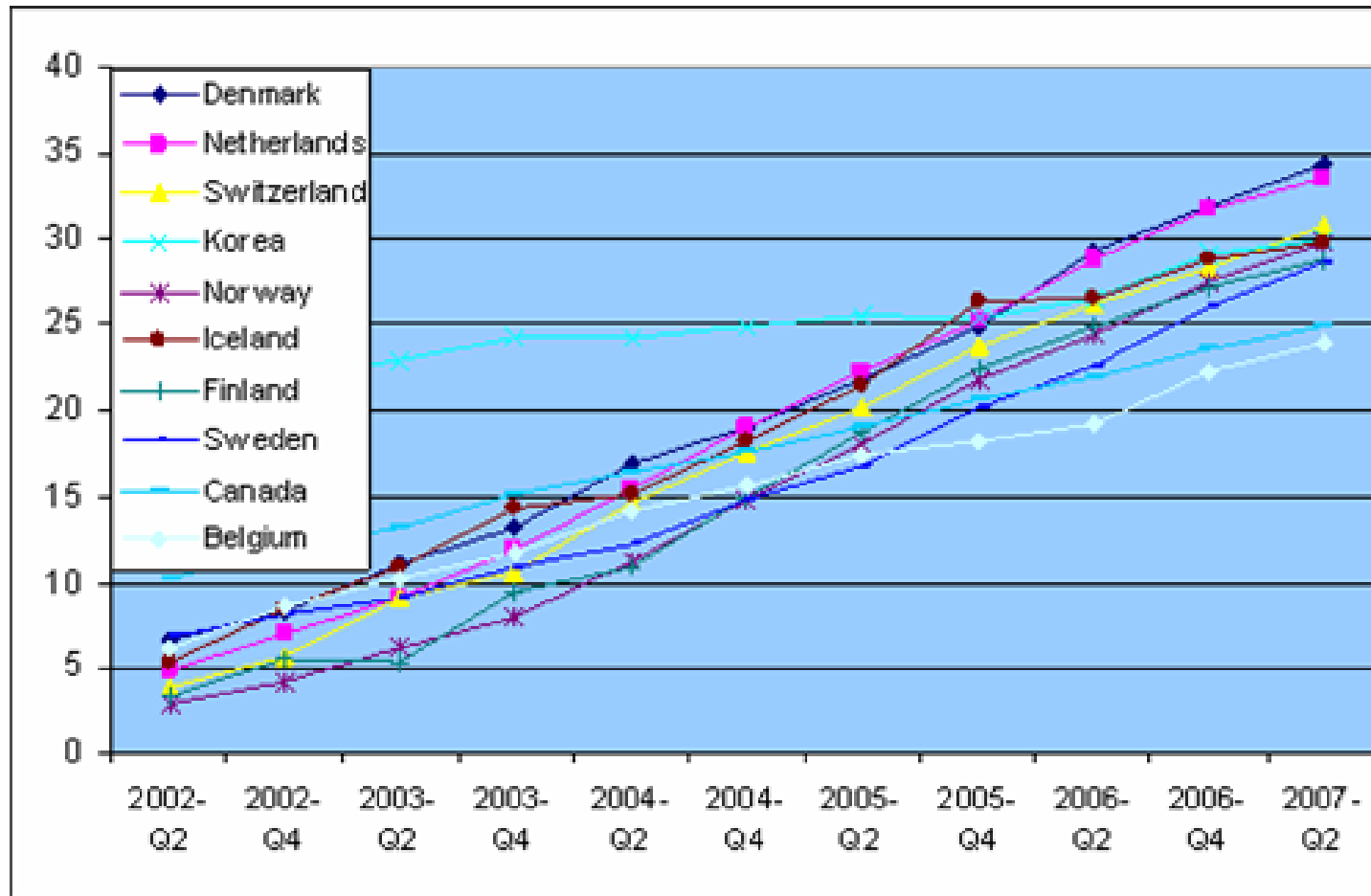
Western Europe



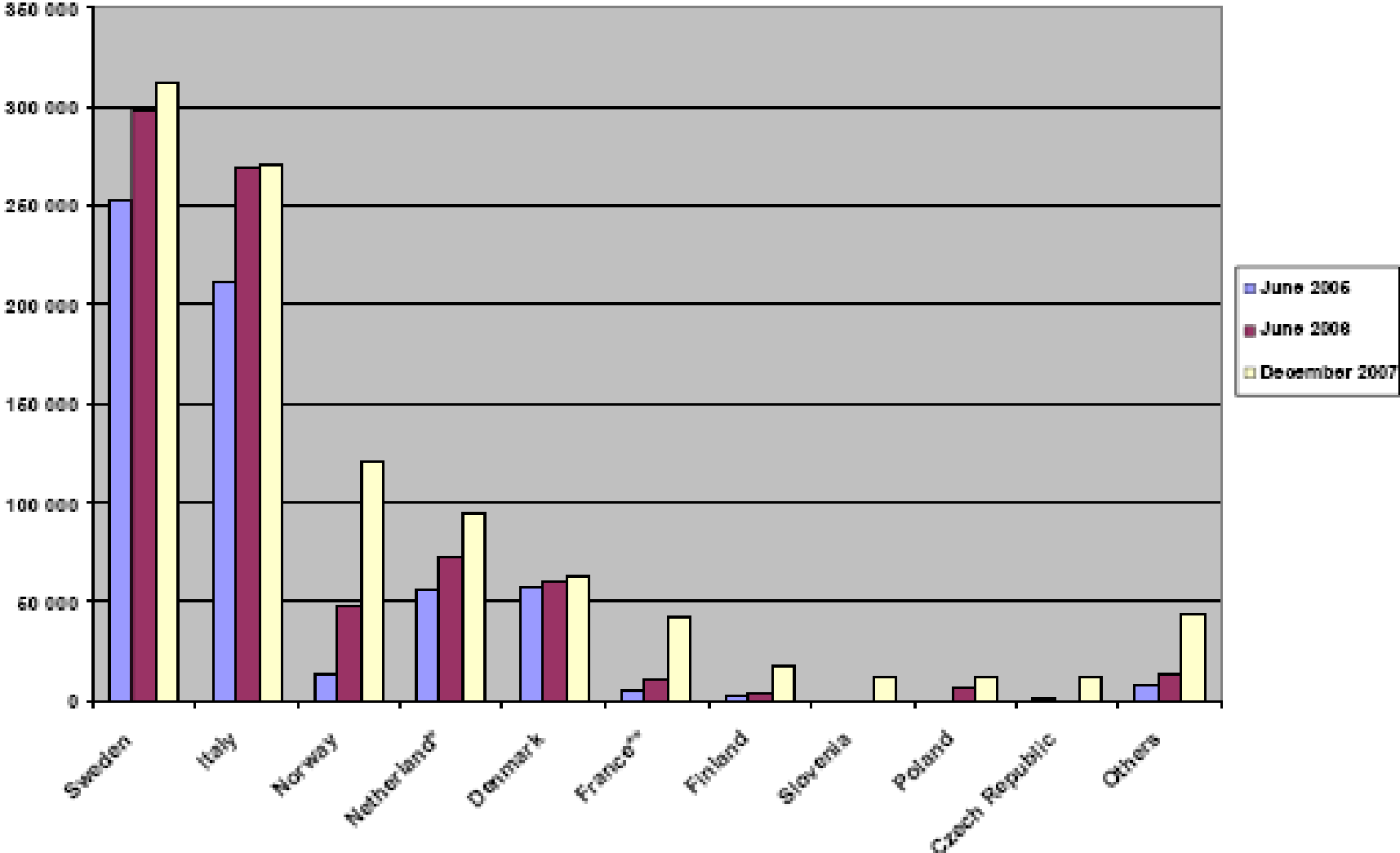
Norway



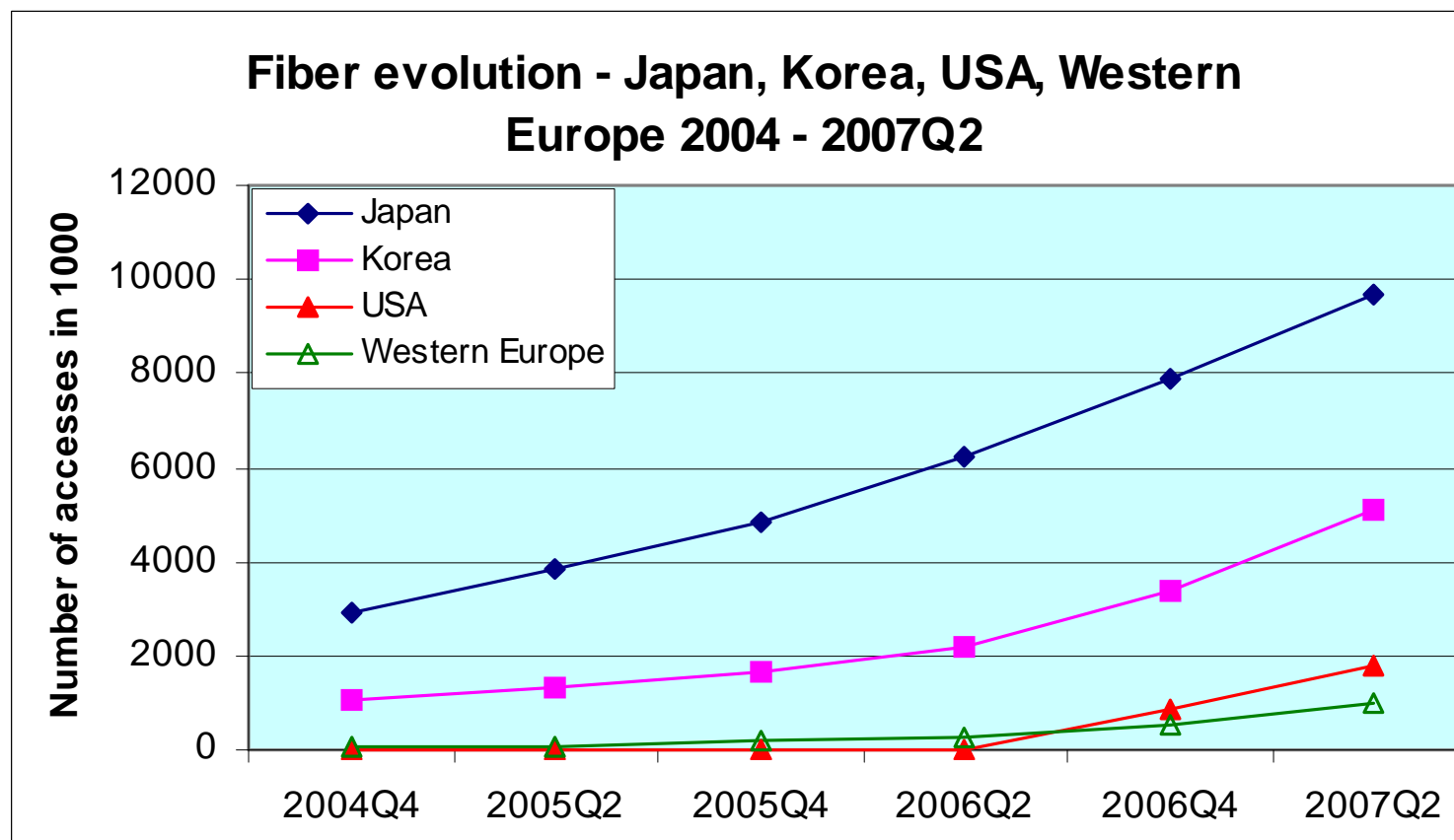
Evolution of number of accesses per 100 inhabitants (Business and residential). Top 10 OECD countries 2007Q2



Europe: FTTx evolution (Idate Feb. 2008)



Fiber access evolution – Japan, Korea, USA and Western Europe 2004 – 2007Q2



Broadband access fiber deployment

- Greenfield
- Renewal and replacement in areas with much failures and low performance
- Fiber deployment deeper in the access network
- Fiber deployment utilizing established ducts
- FTTx rollout with IPTV
- Fiber deployment for catching market shares in established areas



Status: Regulation of Next Generation Access network (NGA)

The EU commission has developed a Recommendation on NGA

- The draft Recommendation is on hearing to November and will be adopted and finalized soon afterwards
- The guidelines will be recommendations for the national regulators
- Will make heavier competition in the access network
- Mandating the regulators to open the ducks to dominant operators for other competitors
- Mandating the regulators to give other competitors access to the dominating operators fiber access network
- Like LLU on copper, a compensation for the leasing will be given



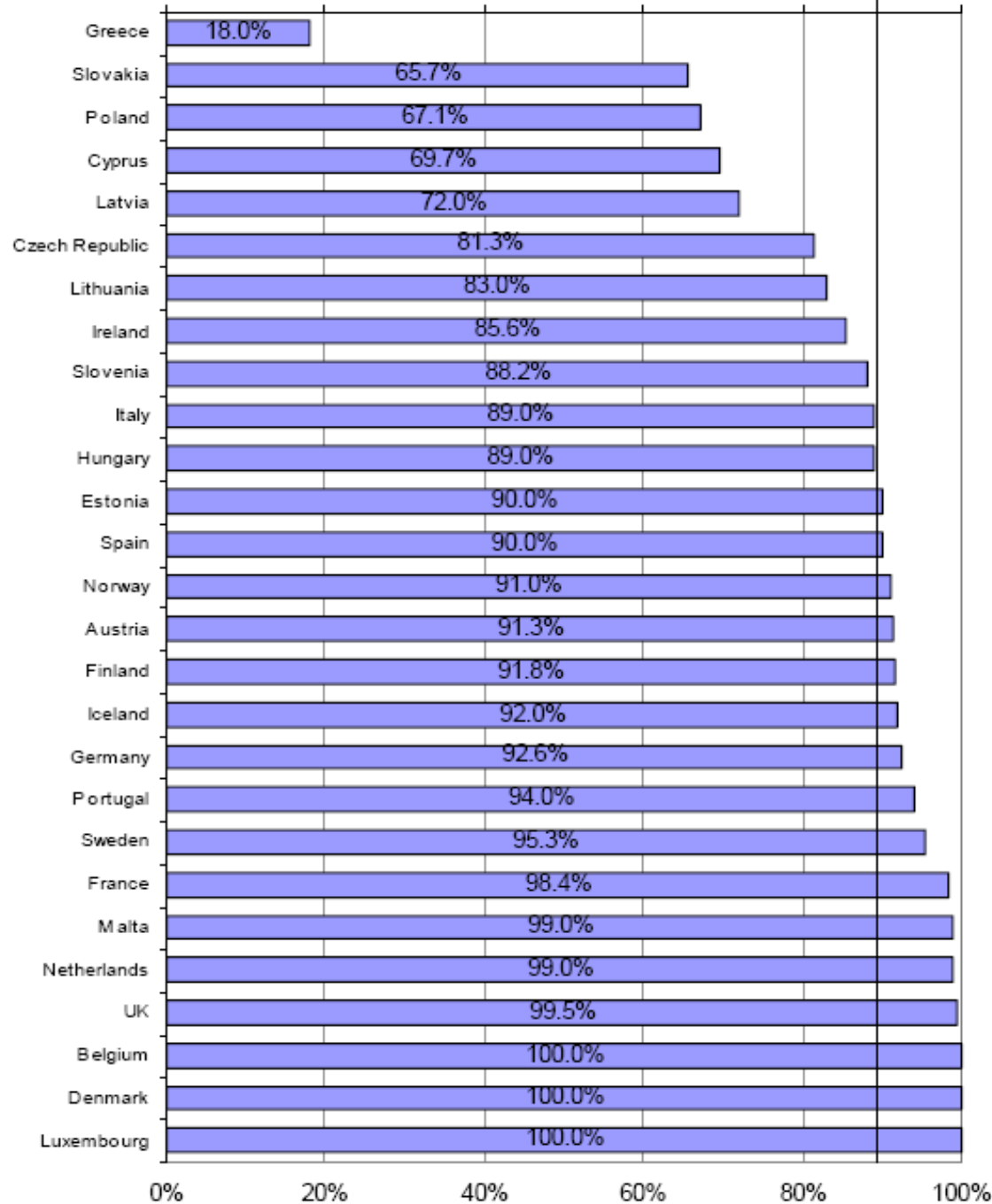
Press release 18. September ETNO

ETNO (European Telecommunications Network Operators):

- Europa is lagging behind other regions in fiber deployment
- The investment efforts is slowing down
- New access network require investments up to 300 billions Euro
- Key focus should be to make a recommendation on how to boost risky investments by all operators and accelerate network deployment
- In its current form it may generate further delay of deployment of the New Generation Access network (NGA)
- EU should primary focus on how the operators should be encouraged to invest in new networks



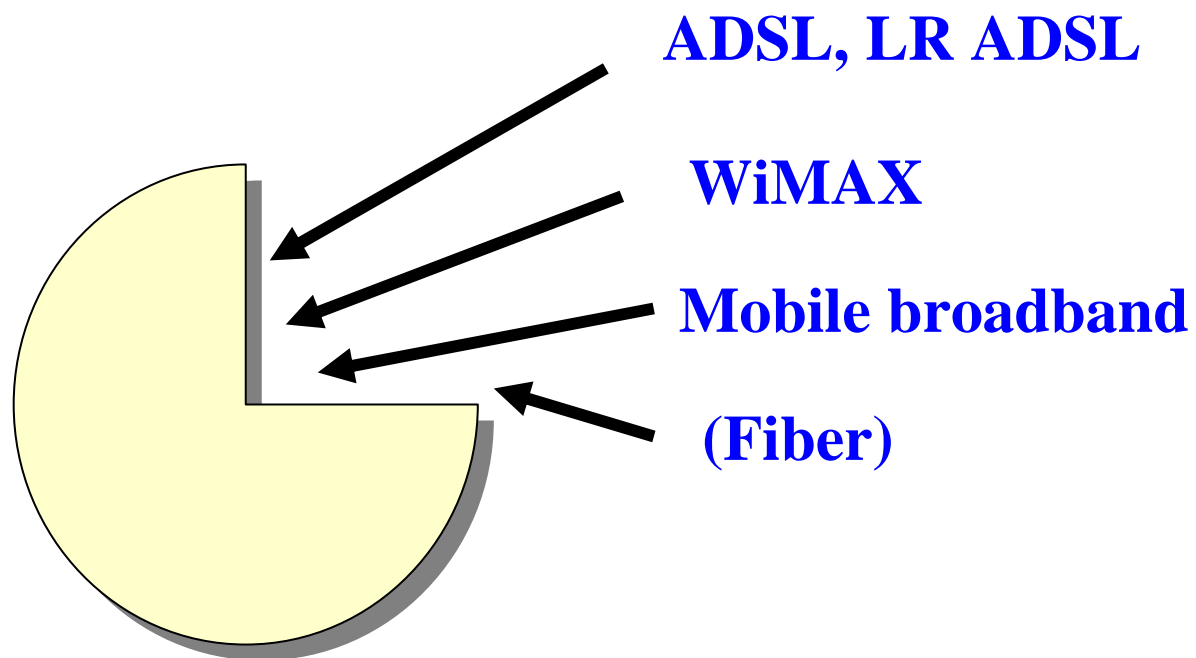
average 27
89.3%



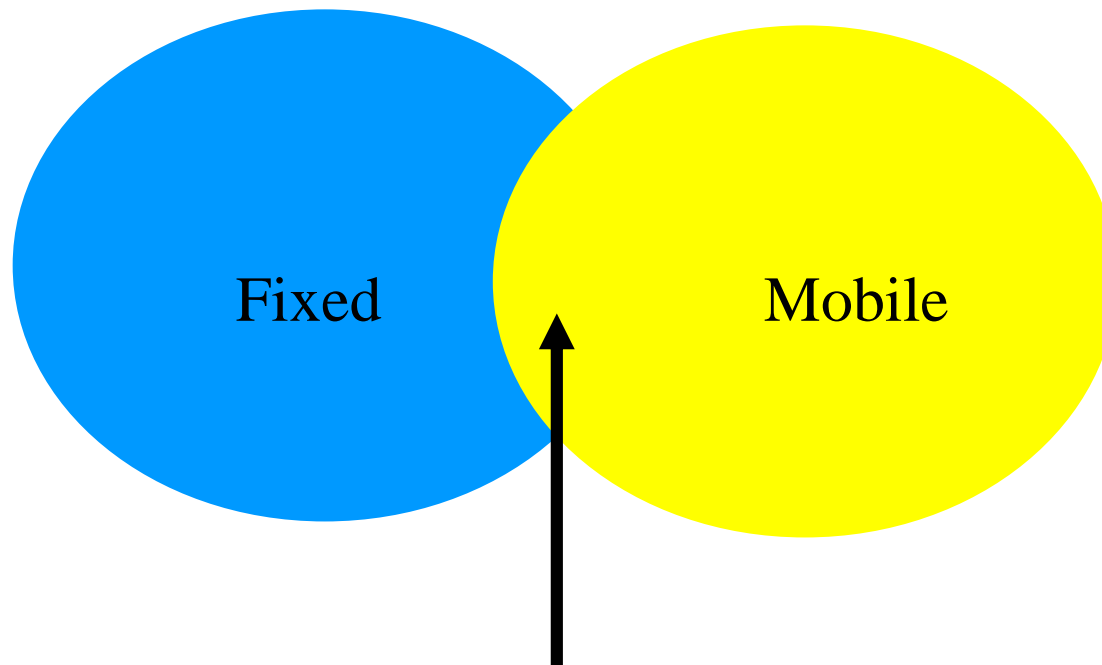
DSL coverage
EoY 2006
Idate October 2007



Broadband residual market



Fixed broadband and mobile broadband. Market and market segments



Specific residential segments: students, flexible home locations, newly established families, etc

Specific business segments: Nomadic offices, etc



Diffusion models for long-term broadband access forecasts

Logistic four parameters model:

$$Y_t = M / (1 + e^{\alpha + \beta t})^\gamma$$

Y_t is the accumulated demand at time t

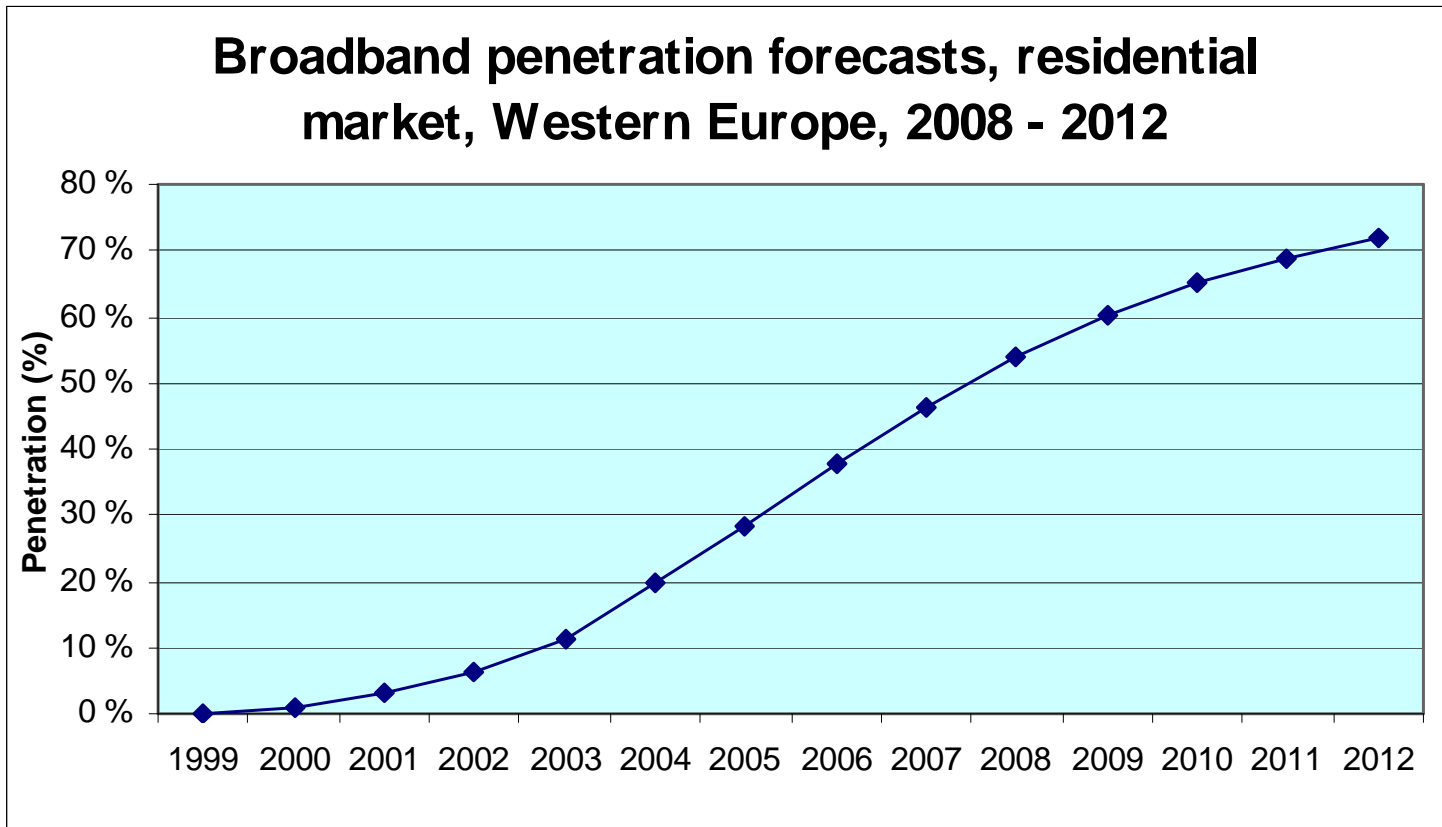
M the saturation level

α level parameter

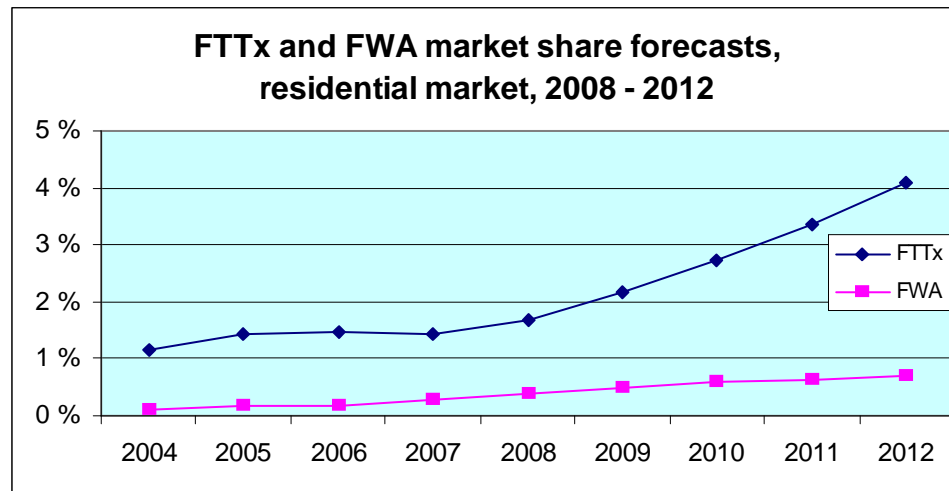
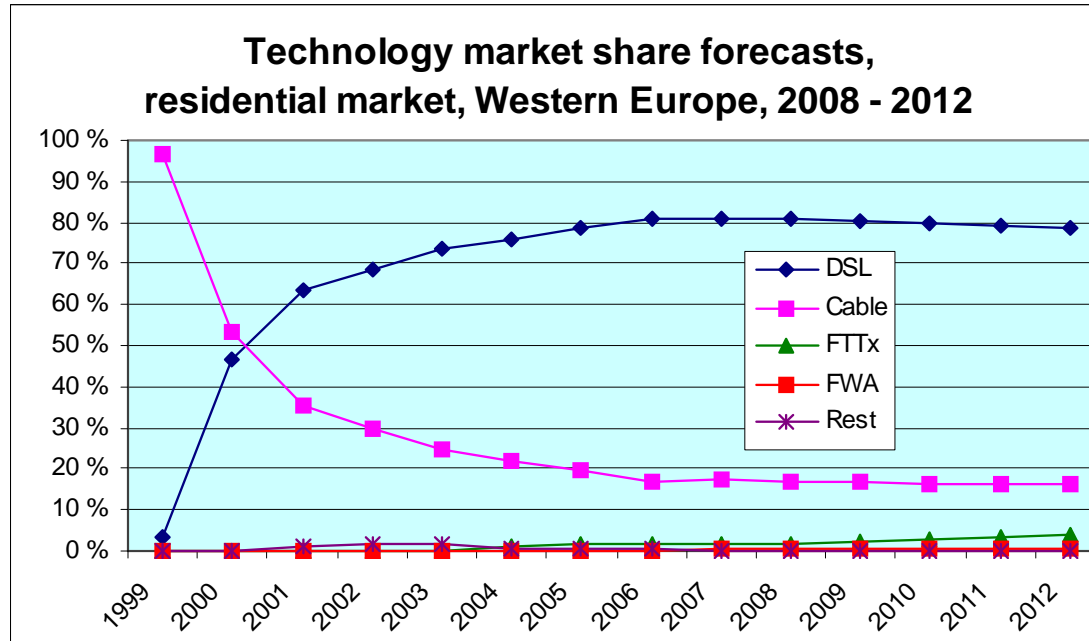
β, γ growth parameters.



Broadband residential penetration forecasts 2008 -2012



Technology market share forecasts, residential market, 2008 - 2012



Conclusions Western European BB market

- DSL market share reaches maximum
- N-play affects the broadband market
- HFC market share reduction stops
- Fiber access catches significant market share
- Regulation of fiber access in NGA creates significant uncertainties
- FWA catches market share in the residual market
- Mobile broadband compete with fixed broadband and takes significant market share in specific user groups
- FTTH/FTTB/VDSL2/DOCSIS 3.0 will in the long run be the most attractive broadband solutions





FTTx regulation issues

- A regulatory FTTx framework is missing
- The technology makes it difficult for wholesale
- Connection point for LLU operators must be identified
- Opening of ducts near the customers for other operators?
- Sharing of fiber near the customer?
- Predictability will speed up the fiber deployment
- Predictability will serve the customer faster with high capacity services



Broadband technologies

Year	Total subscr. penetration	Market share forecasts				
		DSL	Cable	FTTx	FWA	Rest
1999	0,2 %	3,5 %	96,5 %	0,0 %	0,0 %	0,0 %
2000	0,9 %	46,7 %	53,3 %	0,0 %	0,0 %	0,0 %
2001	3,0 %	63,6 %	35,2 %	0,0 %	0,0 %	1,2 %
2002	6,4 %	68,7 %	29,5 %	0,0 %	0,0 %	1,8 %
2003	11,4 %	73,4 %	25,0 %	0,0 %	0,0 %	1,6 %
2004	19,7 %	76,10 %	21,81 %	1,14 %	0,11 %	0,83 %
2005	28,4 %	78,47 %	19,51 %	1,43 %	0,17 %	0,43 %
2006	38,0 %	80,92 %	16,95 %	1,58 %	0,19 %	0,35 %
2007	47,1 %	81,85 %	15,87 %	1,85 %	0,27 %	0,25 %
2008	55,2 %	81,39 %	15,51 %	2,28 %	0,62 %	0,2 %
2009	62,0 %	80,94 %	15,27 %	2,71 %	0,88 %	0,2 %
2010	67,5 %	80,35 %	15,15 %	3,18 %	1,12 %	0,2 %
2011	71,9 %	79,69 %	15,08 %	3,71 %	1,32 %	0,2 %
2012	75,3 %	79,00 %	15,04 %	4,29 %	1,47 %	0,2 %

HFC evolution different countries

