

Creating a brighter future

Webinar: Reaching the EU-2020 Broadband Targets –
Applying the FTTH Council Europe Cost Model to Germany

FTTH Council Europe

Our Vision: A sustainable future enabled by Fibre to the Home

Our Mission

- To accelerate FTTH adoption through information and promotion in order to enhance the quality of life, contribute to a better environment and increased competitiveness

Organisation

- Founded in 2004, non-profit industry organisation
- More than 150 member companies



Presenter



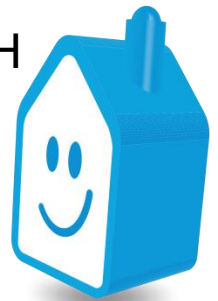
Raf Meersman, CEO Comsof



Patrick Jung, Partner, Greenwich Consulting

Webinar

- 20-25 minutes presentation
- 15-20 minutes Q&A
- Please write your questions in the questions box of the webinar system
- Relevant questions that are not answered during the webinar will be answered by email
- The slides will be available for download after the webinar
- The webinar is recorded and can be viewed as video-stream afterwards. The video will be available on the website of the FTTH Council Europe within one week
- Slides and information about the availability will be sent to registered attendees by email





Costs for Obtaining the EU-2020 Broadband Target in Germany

*Applying the FTTH Council Europe
Cost Model on a Specific Country*

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FttH Council Europe's Cost Model Team



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- Raf Meersman
- Luc De Heyn

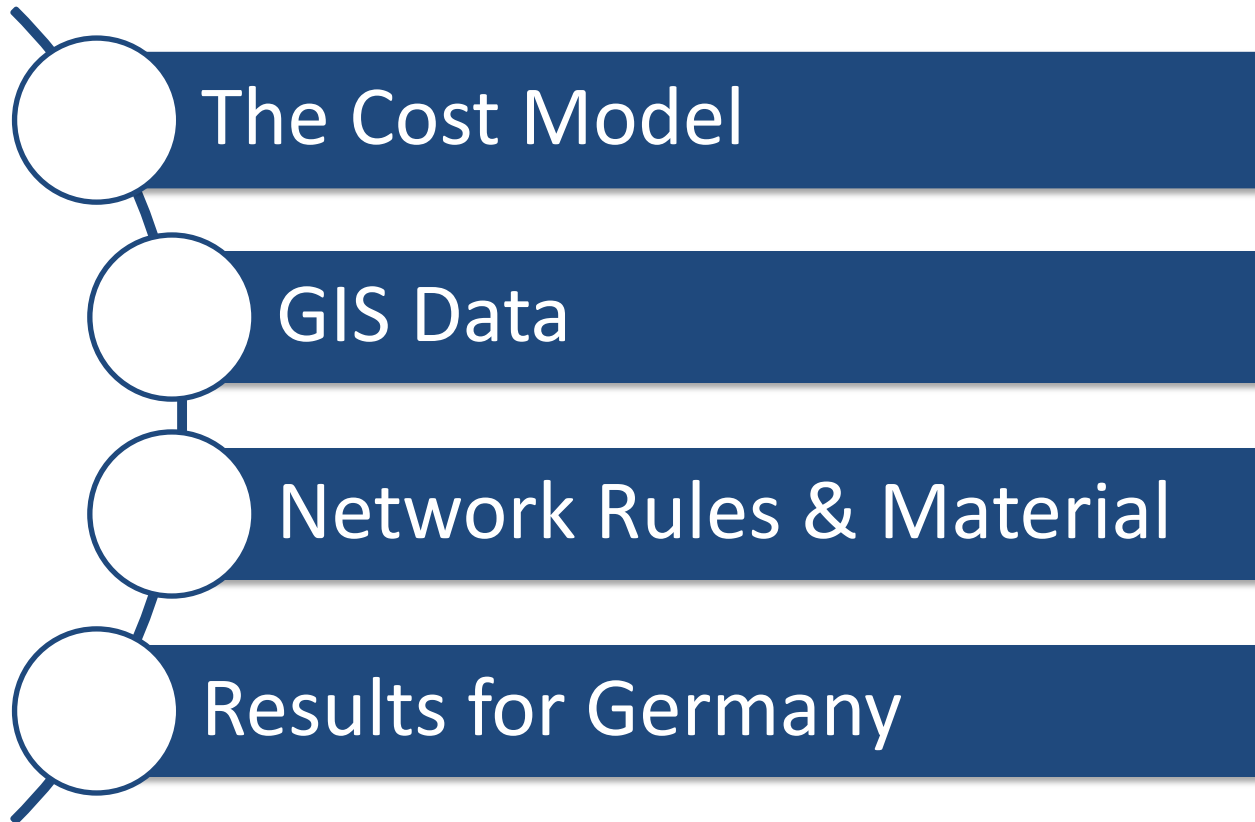


Greenwich Consulting

- Patrick Jung



Agenda





The Cost Model - Objective

What investment is needed to reach DAE broadband objective?

1. **50%** of European households should be **subscribed** to a bandwidth of at least **100Mbps**



FTTH
FTTB

Assuming you need 100% Homes Passed to obtain 50% Homes Connected,
the same network fulfills both objectives

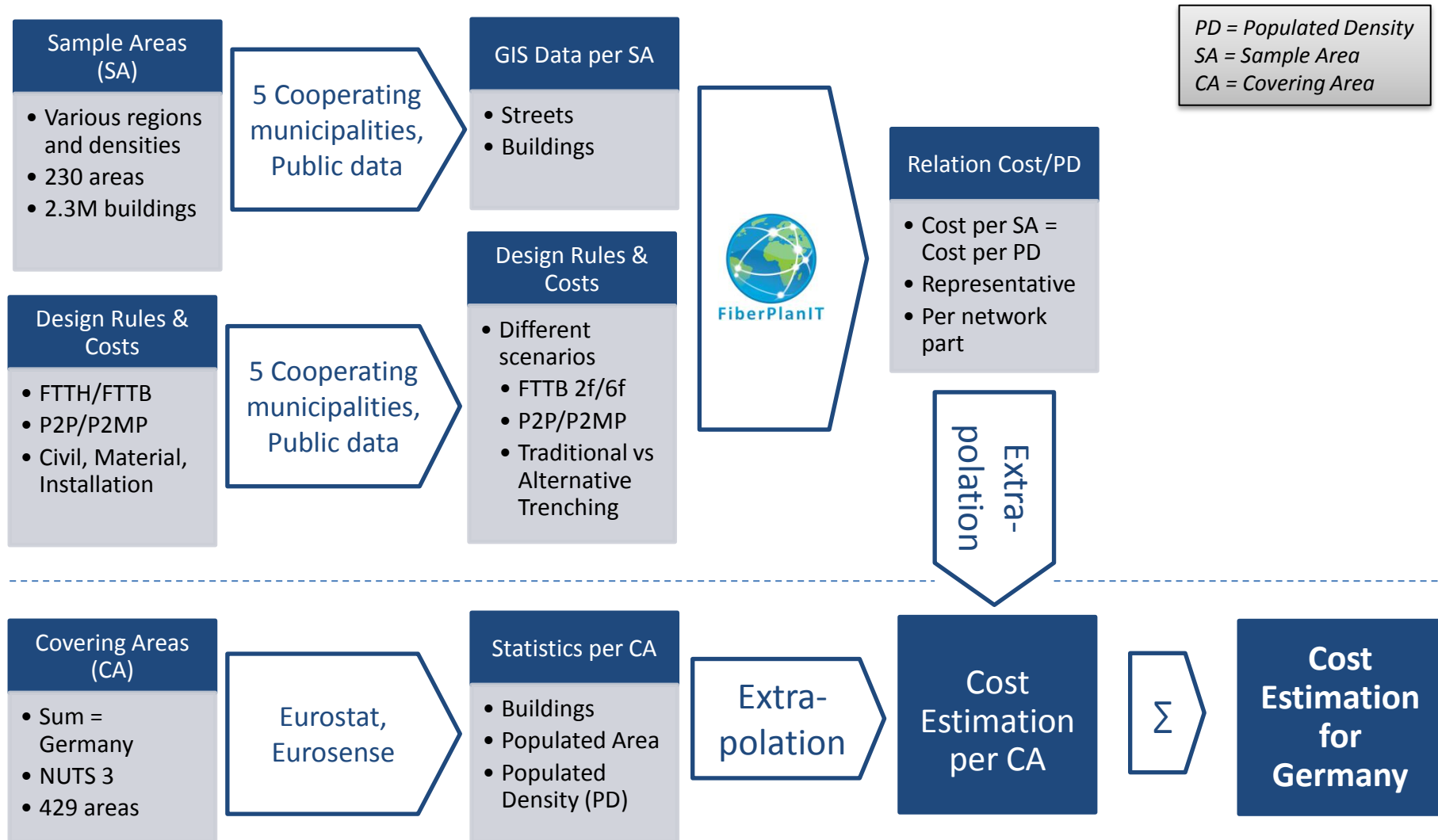
2. **100%** of European households should **be able to subscribe** to a bandwidth of **30Mbps**



FTTH
FTTB

EU Targets by 2020

Cost Model Approach





Cost Model Approach – Key Features

1. Cost/density derived from GIS based network optimisation
 - ✓ Real network topologies
 - ✓ Based on real GIS data
 - ✓ Accurate bill of material
 - ✓ Large set of sample data
2. Extrapolation based on 'Populated Density' instead of 'Total Density' of an area
3. 'Populated Density' derived from detailed GIS data sources
 - ✓ Population statistics on NUTS3 level for whole Germany from Eurostat
 - ✓ Populated area derived from accurate GIS data covering whole Germany

GIS based Network Planning

Distribution Cable

Deployment Technology: **Conventional Ducts**

Number of microducts in duct bundle: **24** of which **4** are spare

Blow cable through microduct: **Immediately install all distribution cables**

Splitter settings

Default splitter scheme: **no splitter** **no splitter** **1:32** **no splitter** **1:32**

☒ use separate splitter scheme for buildings with **4** living units or more

Costs

	Material cost	Labour cost	Unit
Street sidewalk trench	0.0	68.0	€/m
Street crossing trench	0.0	219.62	€/m
Splicing closure	0.0	0.0	€
Splice cost per fiber	0.0	0.0	€
Manhole	1800.0	500.0	€

INPUT: GIS and DESIGN RULES



Simulation information

	Unit Costs	Calculated Cost	HP/HA
	Material Cost	Labour Cost	Volume
General			
Manhole	€ 1,000.00	€ 1,125.00	14
Streetside Trench Cost: Buried-Repairing	€ 0.00	€ 45.00	16105
Crossing Trench Cost: Buried-Repairing	€ 0.00	€ 50.00	612
Feeder			
Central Office	€ 15,000.00	€ 5,000.00	1
OLT PON Card	€ 2,250.00	€ 200.00	4
Blown Fiber Duct (size=4)	€ 2.00	€ 1.50	2837
Cable 12F	€ 0.75	€ 1.00	777
Cable 48F	€ 1.20	€ 1.10	1763
Cable 96F	€ 1.50	€ 1.20	296
Distribution			
Distribution Point	€ 2,000.00	€ 1,000.00	8
Distribution Point Internal Components	€ 350.00	€ 5,000.00	8
Splitter 1:4	€ 120.00	€ 40.00	5
Splitter 1:32	€ 220.00	€ 40.00	23
Blown Fiber Duct (size=24)	€ 2.40	€ 1.50	15846
Cable **			
Cable			
Drop			
Blown			
Cable			
Drop t			
Home			
Cost p			
Cost p			
Cost p			
CPE pe			
Splitter			

Results

	Expected Adoption Rate	100% Homes Passed Cost	Homes Activated Cost	Total Cost	%
Total Cost of Project	€ 1,588,656.57	€ 155,955.00	€ 156,966.76	€ 156,966.76	10%
Total Cost of Deployment	€ 1,382,684.57	€ 567,955.97	€ 567,955.97	€ 567,955.97	20%
Total Cost of Activation	€ 401,366.49	€ 73,900.00	€ 188,522.50	€ 262,422.50	17%
		€ 356,565.99	€ 356,565.99	€ 356,565.99	36%
		€ 850,623.84	€ 850,623.84	€ 850,623.84	45%
		€ 1,582,684.57	€ 401,366.49	€ 1,984,051.07	200%

Generated by FiberPlanIT

Total Cost Breakdown

OUTPUT: NETWORK, BOM and COSTS

Trendlines for each network layer

Considered Layers

Building

Drop Layer

Distribution Layer

Feeder Layer

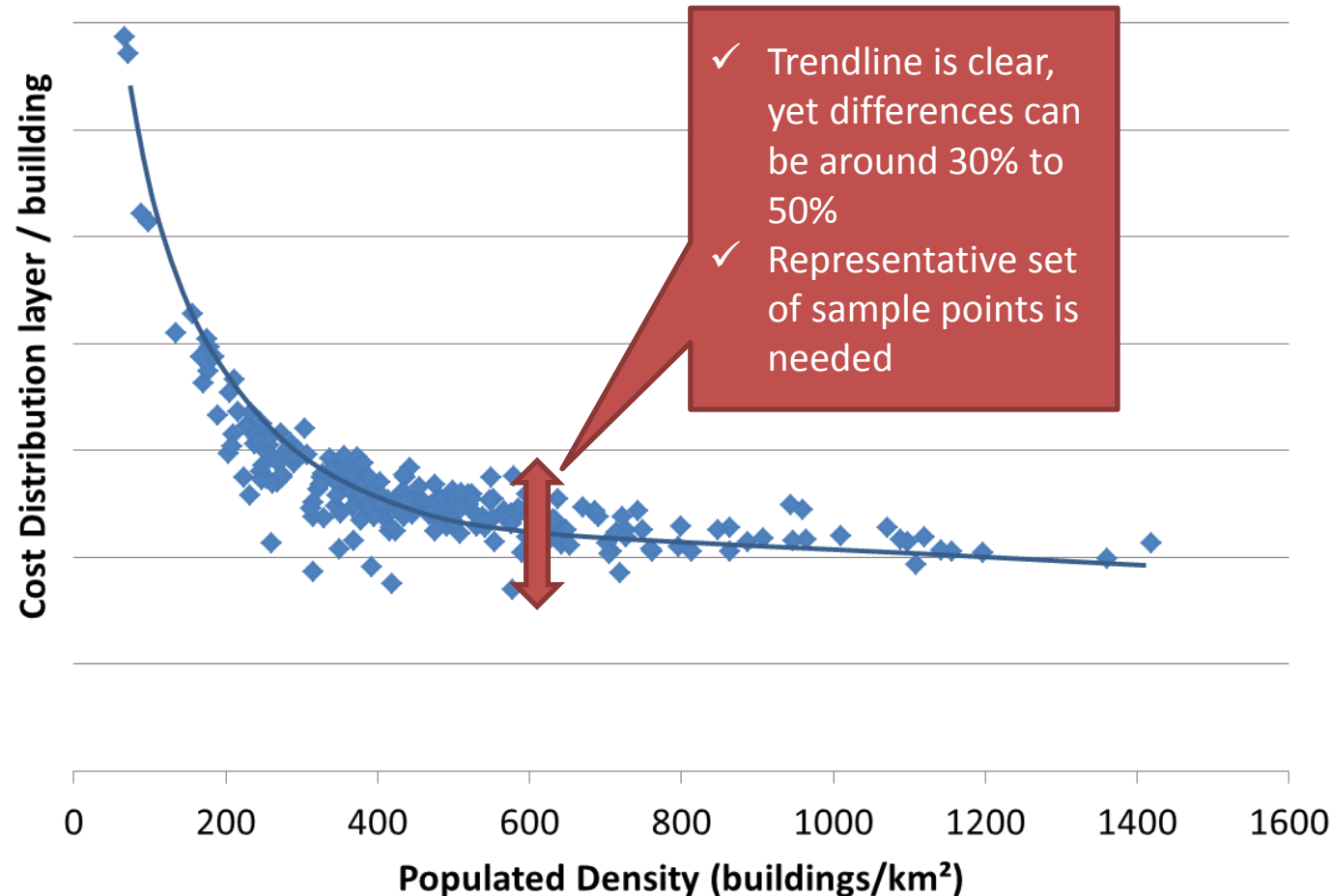
Area-POP

Metro loop

City-POP*

Backbone*

* Not considered



Density as basis for extrapolation

To determine the density of an area, various methods can be used.
Which density is the best parameter for extrapolation?



Cost Area 1

Total Density (A1)
 $= 6X / 6Y$

Populated Density (A1)
 $= 6X / 6Y$

\approx

Cost Area 2

Total Density (A2)
 $= 6X / 12Y$

Populated Density (A2)
 $= 6X / 6Y$

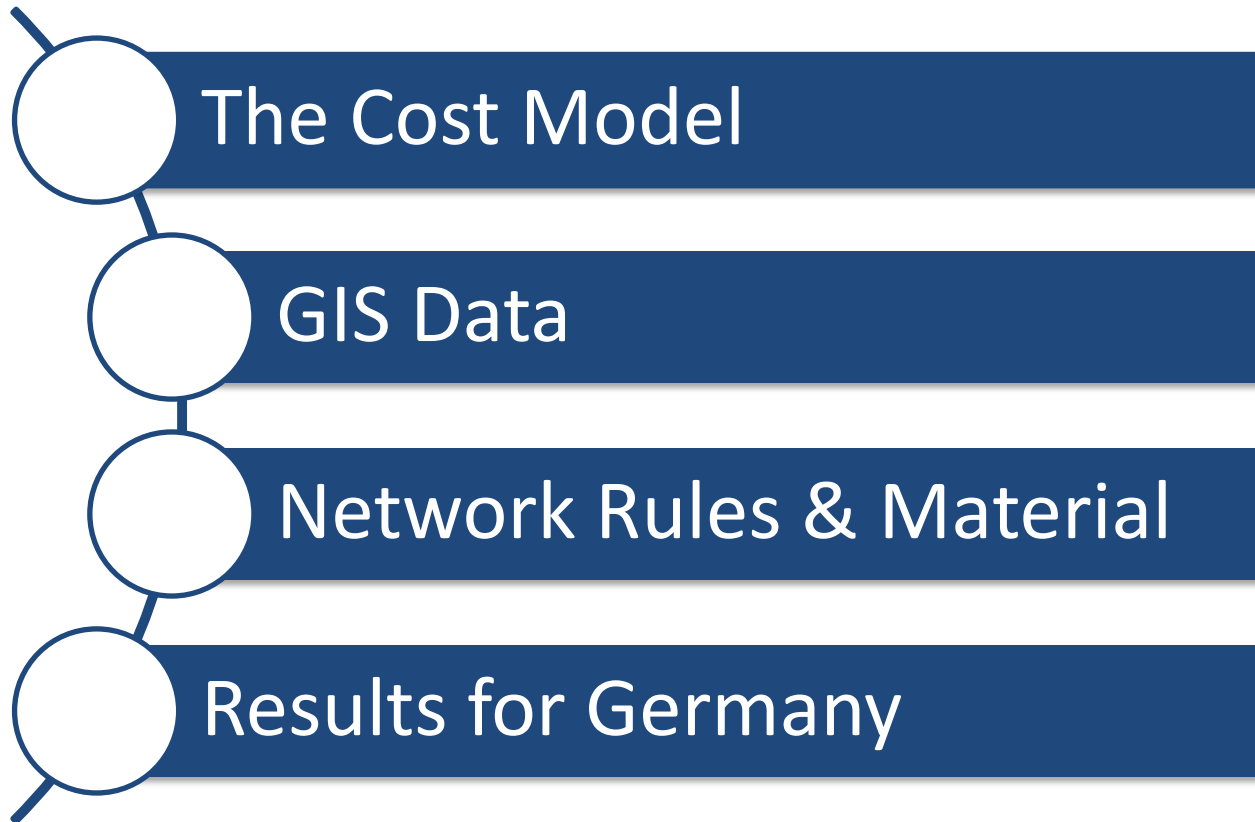
$>$

\approx

Populated Density
(Population / "Populated
Area Surface")
is best measure for
extrapolation based on
density



Agenda



Sample Areas



Gathered GIS data of streets and buildings for

- More than **230 sample areas**
- More than **2.3 million buildings**

Sources:

- 5 cooperating municipalities
- public data (openstreetmap.de)

Accurate information on populated area

‘Populated Area’ per NUTS3* derived from detailed GIS data covering all of Germany

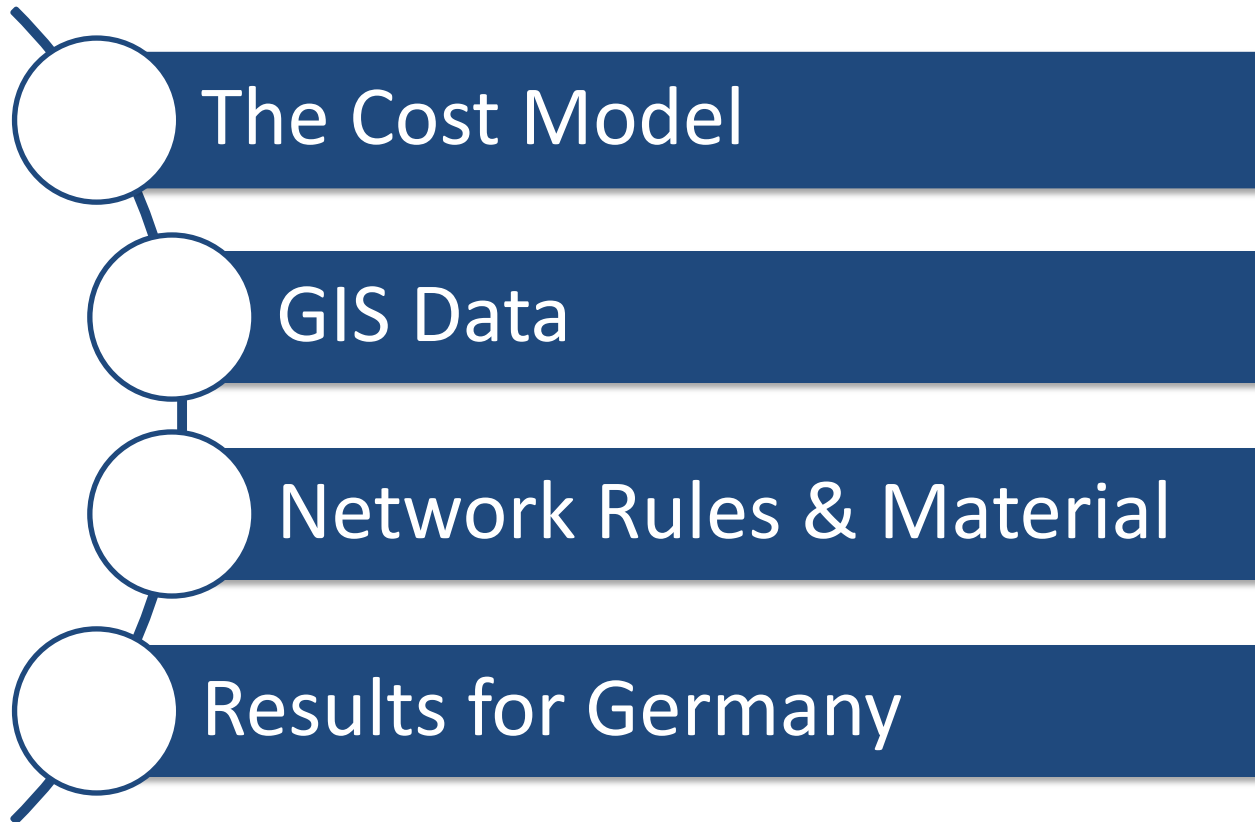


Green areas = visualisation of purchased GIS data (grid data from Eurosense) indicating part of area covered with Residential Buildings

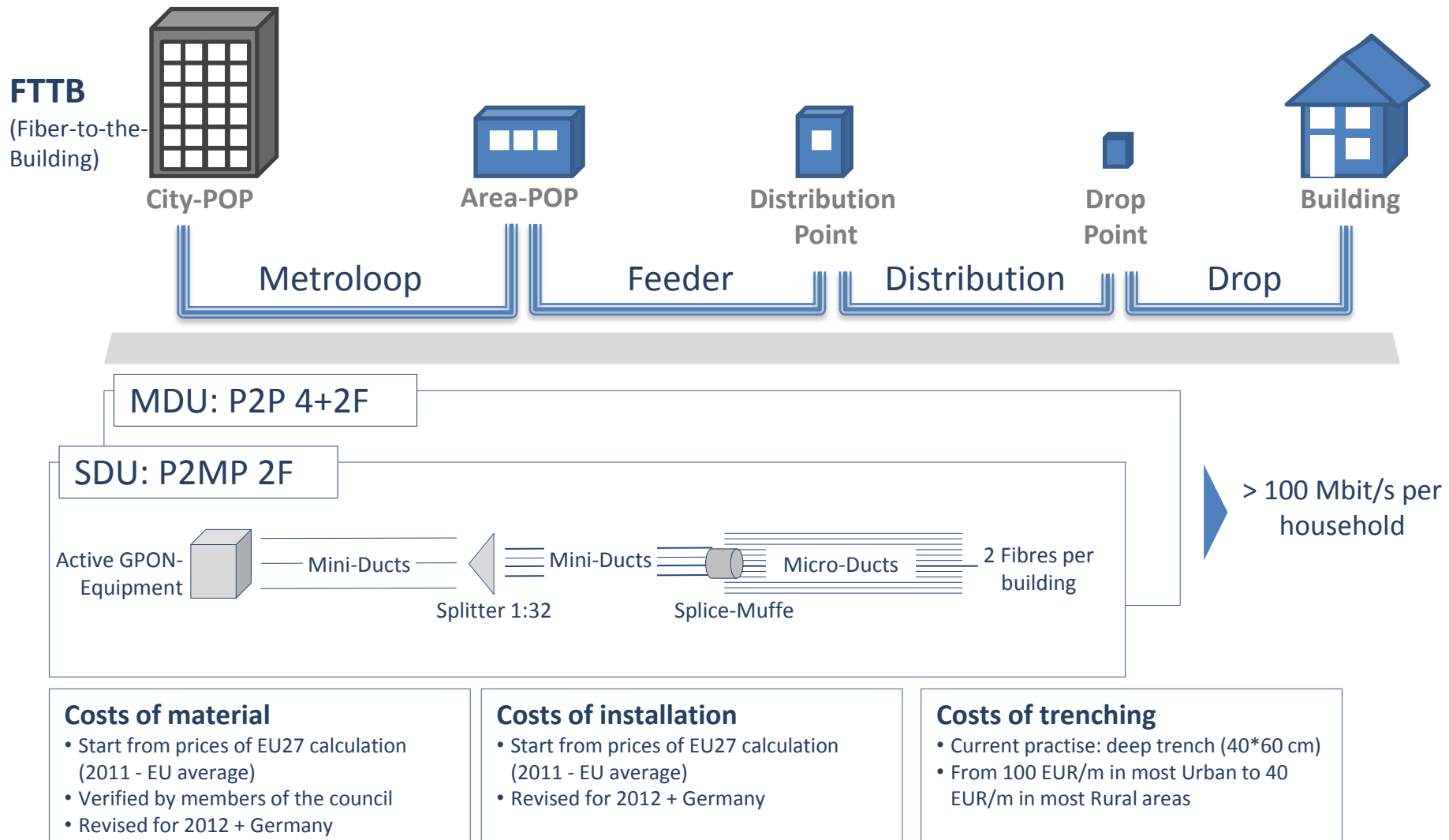
* 429 NUTS3 areas covering Germany



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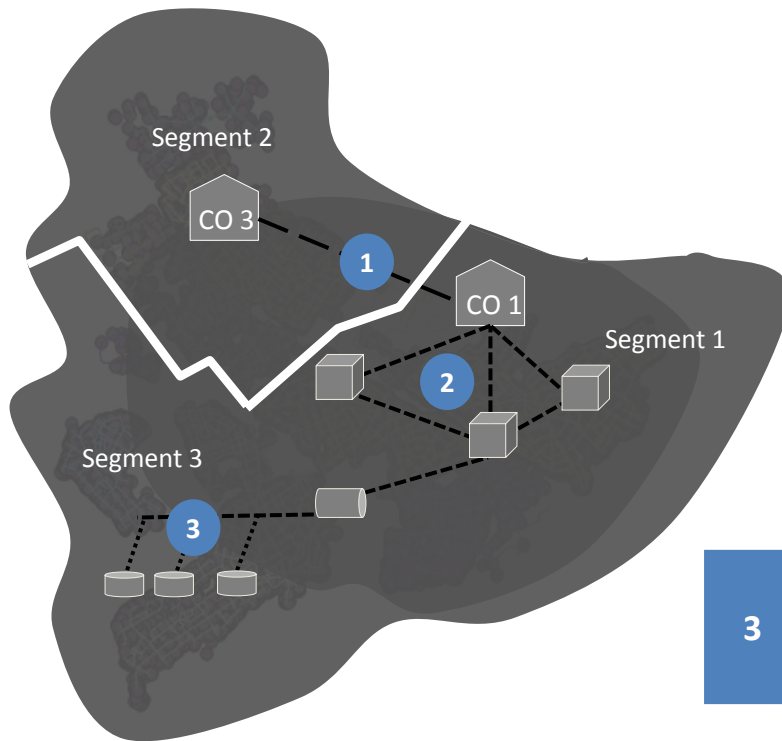


Hybrid network design for FTTB

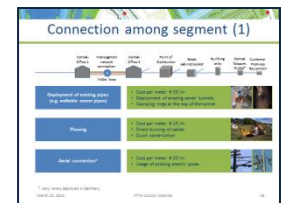


Lowering trenching costs on 3 levels

Different levels to improve trenching cost in FttH access networks



1 Network connectivity among segments



2 Methods for distribution to provide network coverage on distribution to drop layer



3 Methods to connect buildings to distribution layer



Alternative methods for distribution

2

Central-Office 1

Central-Office 2

Distribution point

Splice-Muffe

Building entry point

Optical Telecom. Outlet*

Customer Premises Equipment

Regular trenching

- Cost per meter: € 75-125 /m (Urban)
- Consideration of top soil requirements („Mutterboden“) based on German environmental protection



Mini-trenching

- Cost per meter: € 25-55 /m
- 30cm in width, 30cm in depth



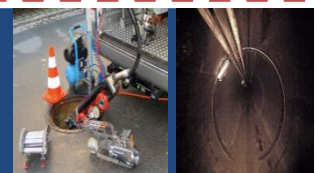
Micro-trenching

- Cost per meter: € 15-40 /m
- 2–10 cm in width, 10-20cm in depth
- Not feasible on cobbles



Deployment of existing pipes (non-walkable sewer pipes)

- Cost per meter: € 5-10 /m
- Deployment in existing sewer pipe by robots
- Clamping rings at the top of the tunnel



Deployment of existing pipes/ducts (non-walkable)

- Cost per meter: € 1-3 /m (refurbishing)
- Limited by maximum blow distance, i.e. 1,500 meter



Alternatives to connect buildings

3

Central-Office 1

Central-Office 2

Distribution point

Splice-Muffe

Building entry point

Optical Telecom. Outlet*

Customer Premises Equipment

Drop

Trenching

- Cost per meter: € 25-35 /m
- Plowing-technique on customer premise
- Connection of multiple buildings possible



Drop

Drilling

- Cost per meter: € 15-25 /m; ~€500
- Horizontal directional drilling (HDD)
- Causes minimal surface damage



Drop & Entry

Gas pipes

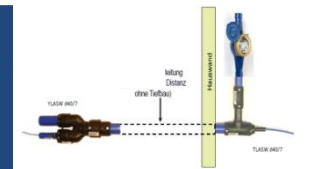
- For drop trench & building entry: € 600
- Deployment of a 'pipe-in-pipe' concept
- Consideration of high security standards



Drop & Entry

(Drinking-) Water pipes

- Per drop trench & entry: € 450-600 depending on deployment concept
- Good level of availability of existing pipes



Entry

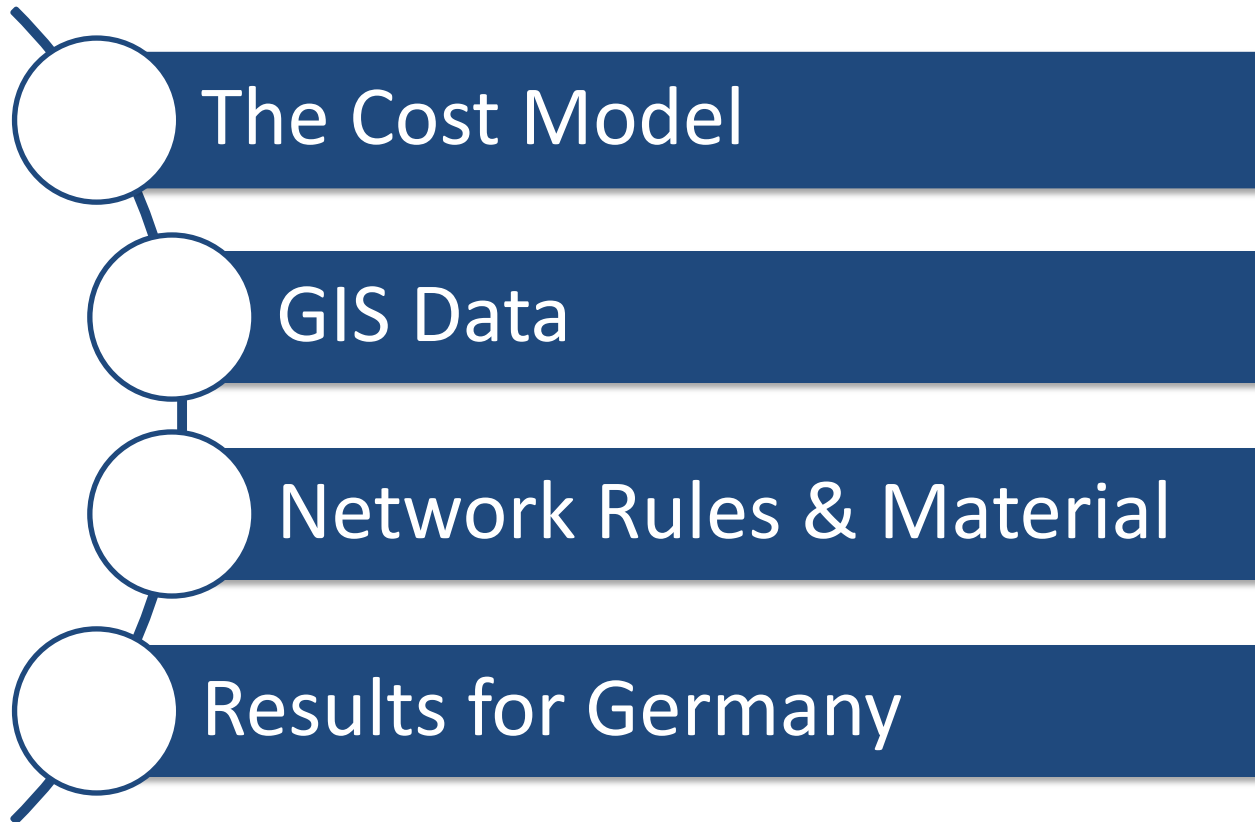
Multi-entry unit

- Per building entry: € 100
- Access for gas, water, electricity & broadband
- Unit needs to be already in place





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Results for Germany

67,1 B€

Typical German network built today

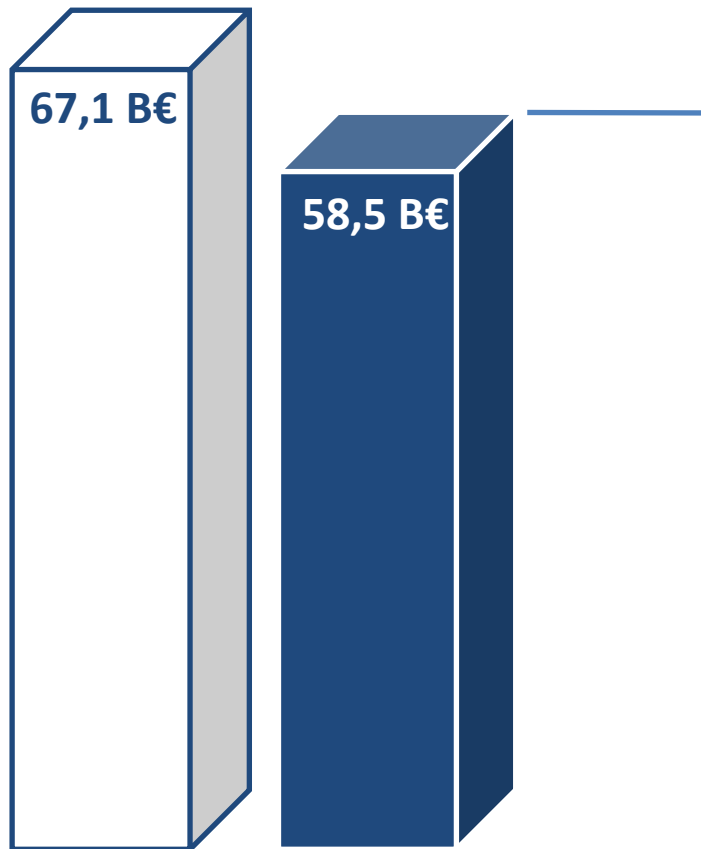
- P2P FTTB with 4f+2f per building **> 100Mbps**
- All underground (deep trenches)

Including cost for 100% homes connected

> 50% conn

> DAE

Results for Germany



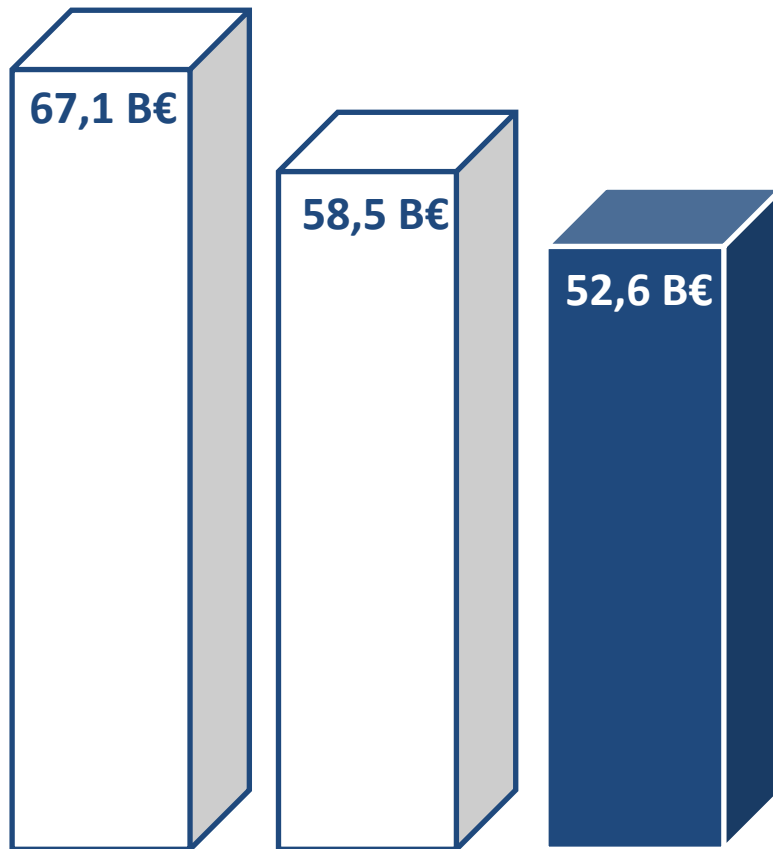
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Including cost for **50%** homes connected

DAE

Results for Germany



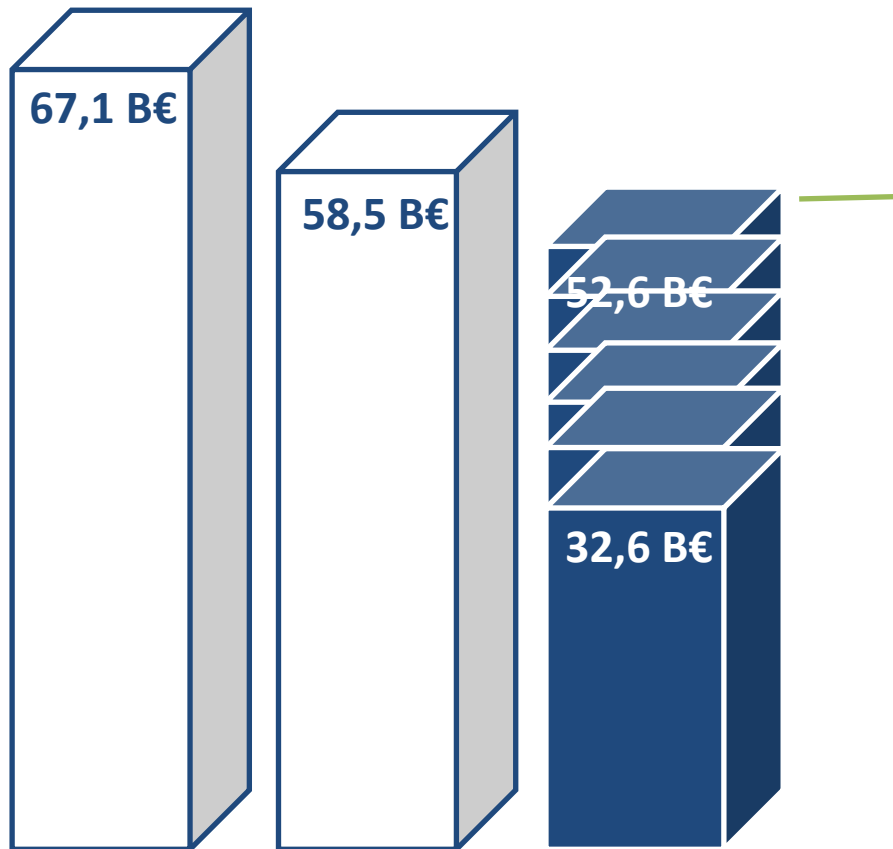
DAE

Optimal hybrid network

- P2MP FTTB with 2f for SDU
- P2P FTTB with 4f+2f for MDU
- All underground (deep trenches)

Including cost for **50%** homes connected

Results for Germany

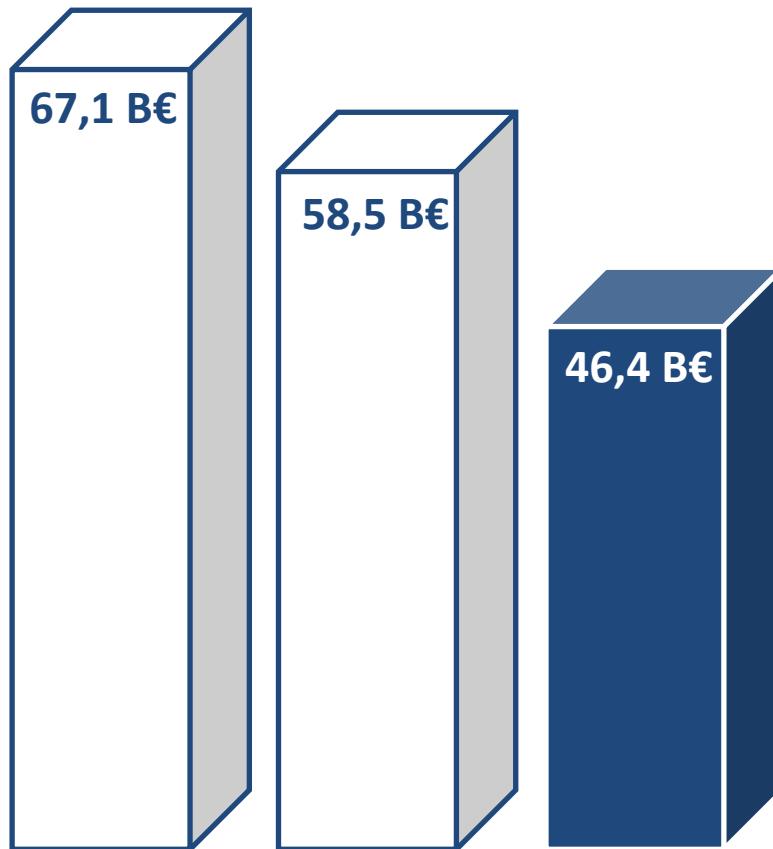


Optimal hybrid network

- P2MP FTTB with 2f for SDU
- P2P FTTB with 4f+2f for MDU
- All underground
 - **Use alternative trenching methods**

Including cost for **50%** homes connected

Results for Germany



DAE

Optimal hybrid network

- PON FTTB with 2f for SDU
- P2P FTTB with 4f+2f for MDU
- All underground
 - **70% 'deep trenches'**
 - **30% 'mini-trenches'**

Including cost for **50%** homes connected



Conclusions

52BEUR > [DAE's objectives for Germany]

Potential to decrease towards 32BEUR (theoretical cost limit):

Importance of

- Network design rules, i.e. hybrid design
- Alternative trenching methods hold significant cost reduction potential

Refined model confirms EU27 model results (202BEUR) from 2012



More details on the results plus market update for Germany in the upcoming **white paper** of the FttH Council Europe: May 2013



**Thanks for your
attention**

Questions?

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Invitation: Upcoming Webinars

- **European FTTH Forecast, 2012-2017: Behind The Numbers**

21 May 2013 11-12 CEST

Presenter: Graham Finnie



- **The Role of FTTH in the Mobile Backhaul**

6 June 2013 11-12 CEST

Presenter: Roland Montagne

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An aerial photograph of a residential neighborhood with a green circular highlight over a specific area. A large blue rounded rectangle is overlaid on the right side of the image, containing the title. Below it, a white rounded rectangle contains the subtitle.

Your questions

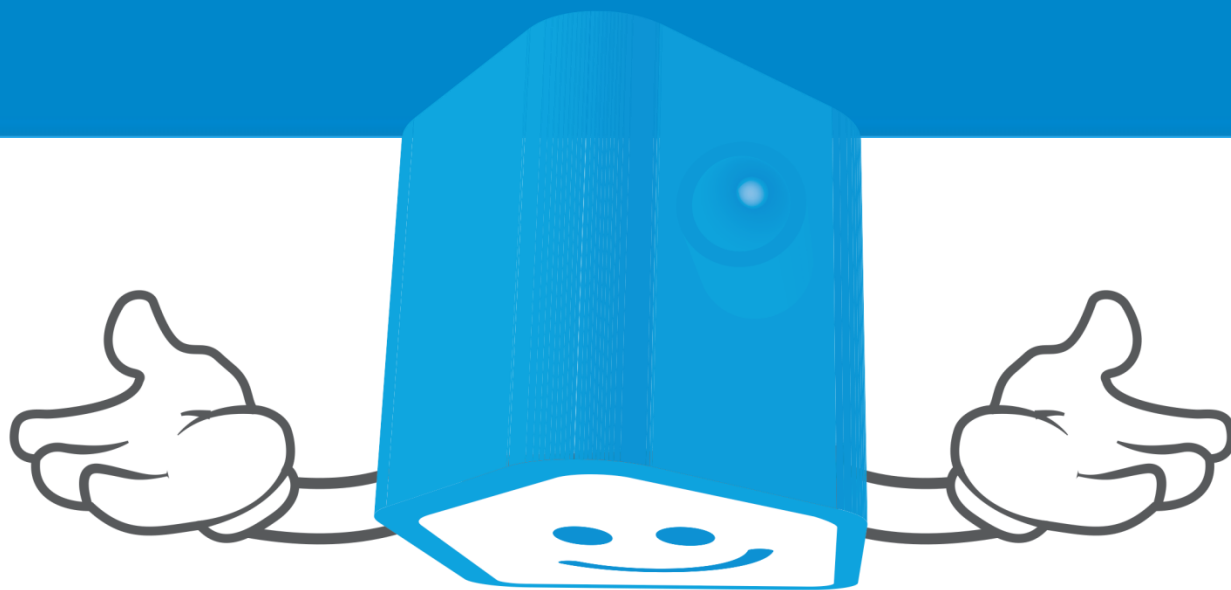
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