



## Upwards Drilling

Herrenknecht AG, 2010



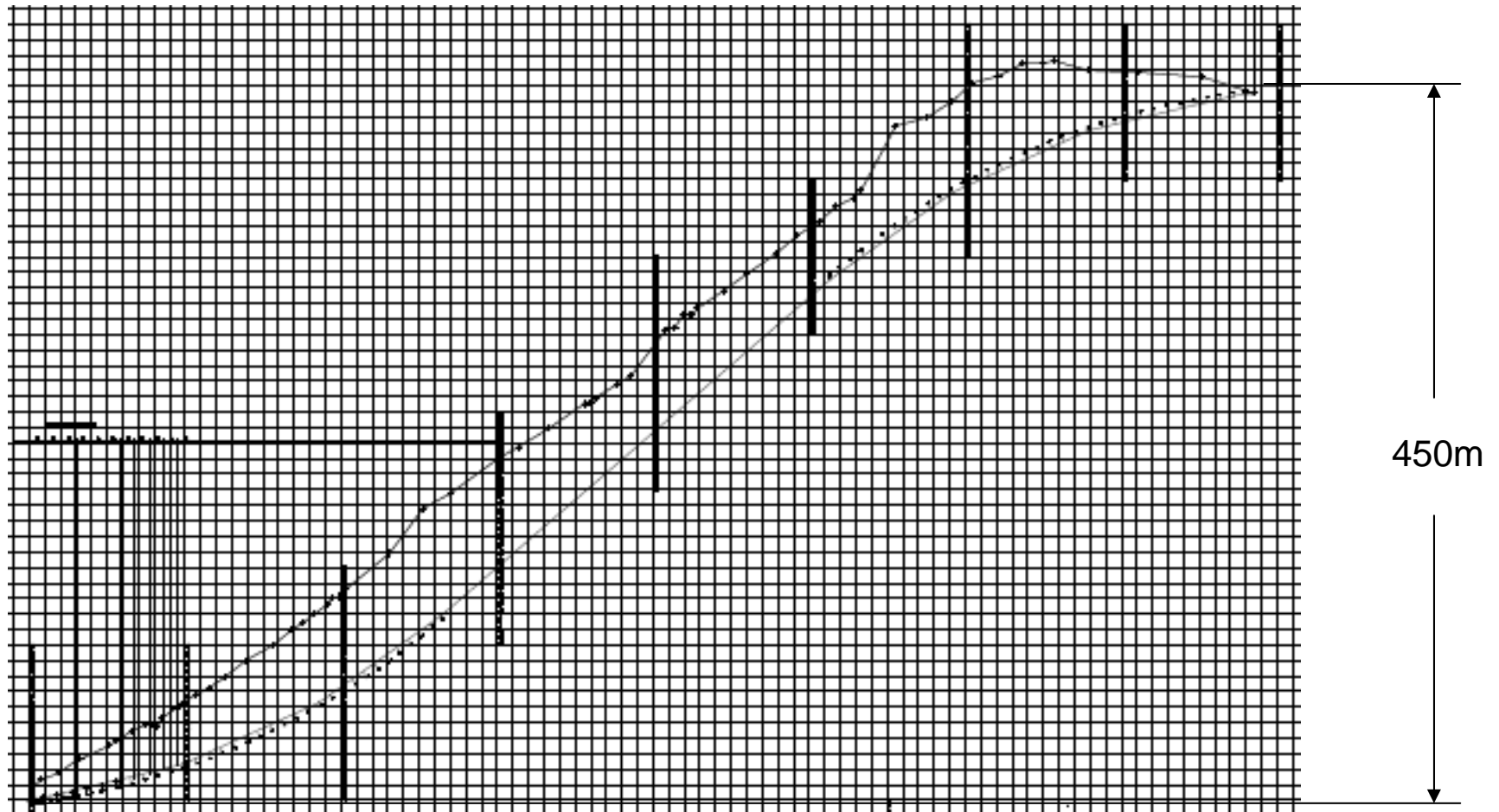
## New field of application for HDD/SDD → Small Hydro Power Plants (SHPP)



### Example Austria:

- 2400 SHPP installations generating 8% of the complete electrical energy requirement of Austria.
- 50% of the private households could be provided with electricity.
- Until 2020, 2TWh extra provided by SHPP installations.
- Planed Investment up to 2020: 8,4 Billions Euro
- Especially are SHPP installations planed in protect areas (no surface infrastructure allowed)

## New field of application for HDD/SDD → Small Hydro Power Plants (SHPP) Valdastico Project (Val d'Aoste)



Hight difference of 450 m



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**View from the top into the Astico valley**



**Asiago Plateau**

## New field of application for HDD/SDD → Small Hydro Power Plants (SHPP) Valdastico Project (Val d'Aoste)



**Rig site is at the bottom of the mountain, with less space**



## New field of application for HDD/SDD → Small Hydro Power Plants (SHPP) Valdastico Project (Val d'Aoste)



**Geology: Hard Rock with up to 160 MPa**



## New field of application for HDD/SDD → Small Hydro Power Plants (SHPP) Valdastico Project (Val d'Aoste)



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Upwards drilling with 8°



## New field of application for HDD/SDD → Small Hydro Power Plants (SHPP) Valdastico Project (Val d'Aoste)



**Drill pipe device (drill pipe slip) for save drill pipe change**



## New field of application for HDD/SDD → Small Hydro Power Plants (SHPP) Valdastico Project (Val d'Aoste)



**Pipe site after break through of the pilot**



**9 7/8" Tri-Cone bit after Pilot**

## New field of application for HDD/SDD → Small Hydro Power Plants (SHPP) Valdastico Project (Val d'Aoste)



**Downwards reaming 14" (with hole-opener)**



## **New field of application for HDD/SDD → Small Hydro Power Plants (SHPP)** **Valdastico Project (Val d'Aoste)**



**Possibility to go with a camera into the borehole**



**Mud draining at the beginning of changing a drill pipe**

## New field of application for HDD/SDD → Small Hydro Power Plants (SHPP) Valdastico Project (Val d'Aoste)



**Pullback-Assembly with product pipe, arrived at Rig side:**

- **Product pipe: 8" stainless steel**
- **L= 950 m**



**Thank you for your attention.**

