



37TH INTERNATIONAL
NO - DIG
FLORENCE 2019

Fortezza da Basso • FLORENCE (Italy)

30th September • 2nd October 2019



INNOVATION FOR THE
ENVIRONMENT: THE
EXPERIENCE OF
MARCHE MULTISERVIZI
S.P.A.



Eng. Niko Bruni

INNOVATION FOR THE ENVIRONMENT: THE EXPERIENCE OF MARCHE MULTISERVIZI S.P.A.

.....It all began in 2014



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Montecchio (Vallefoglia Council)
Crossing the Foglia River
2 HDPE OD 250mm drainage pipes
Length 150 m

Montesoffio (Urbino Council)
Crossing S.S 73bis road
HDPE OD 160mm water pipe
Length 50 m

Pontedoccia (Piandimeleto
Council)
Crossing Mutino Stream
HDPE OD 125mm water pipe
Length 70 m

Canavaccio (Urbino Council)
Crossing Metauro River
Steel OD 150mm water pipe
Length 90 m

Sant'Antonio (Fossombrone Council)
Crossing Metauro River
HDPE OD 180mm water pipe
Length 145 m

Rogaccia (Urbania Council)
Crossing Metauro River
2 HDPE OD 180mm water pipes
Length 90 m

Isola del Piano (Fossombrone Council)
Crossing Tarugo Stream
Steel gas pipe OD 100mm
Steel casing OD 200mm
Length 140 m

INNOVATION FOR THE ENVIRONMENT: THE EXPERIENCE OF MARCHE MULTISERVIZI S.P.A.





CAGLI-ACQUALAGNA WATER PIPE REPLACEMENT WITH HDD

July-September 2019

HDPE Pipes OD 280/225

Length: 800 m



PROFILO	ALTEZZA	PROFONDITÀ	PROFONDITÀ TOTALE	PROFONDITÀ TOTALE
1	1.50	1.50	1.50	1.50
2	1.50	1.50	1.50	1.50
3	1.50	1.50	1.50	1.50
4	1.50	1.50	1.50	1.50
5	1.50	1.50	1.50	1.50
6	1.50	1.50	1.50	1.50
7	1.50	1.50	1.50	1.50
8	1.50	1.50	1.50	1.50
9	1.50	1.50	1.50	1.50
10	1.50	1.50	1.50	1.50
11	1.50	1.50	1.50	1.50
12	1.50	1.50	1.50	1.50
13	1.50	1.50	1.50	1.50
14	1.50	1.50	1.50	1.50
15	1.50	1.50	1.50	1.50
16	1.50	1.50	1.50	1.50
17	1.50	1.50	1.50	1.50
18	1.50	1.50	1.50	1.50
19	1.50	1.50	1.50	1.50
20	1.50	1.50	1.50	1.50
21	1.50	1.50	1.50	1.50
22	1.50	1.50	1.50	1.50
23	1.50	1.50	1.50	1.50
24	1.50	1.50	1.50	1.50
25	1.50	1.50	1.50	1.50
26	1.50	1.50	1.50	1.50
27	1.50	1.50	1.50	1.50
28	1.50	1.50	1.50	1.50
29	1.50	1.50	1.50	1.50
30	1.50	1.50	1.50	1.50
31	1.50	1.50	1.50	1.50
32	1.50	1.50	1.50	1.50
33	1.50	1.50	1.50	1.50
34	1.50	1.50	1.50	1.50
35	1.50	1.50	1.50	1.50
36	1.50	1.50	1.50	1.50
37	1.50	1.50	1.50	1.50
38	1.50	1.50	1.50	1.50
39	1.50	1.50	1.50	1.50
40	1.50	1.50	1.50	1.50
41	1.50	1.50	1.50	1.50
42	1.50	1.50	1.50	1.50
43	1.50	1.50	1.50	1.50
44	1.50	1.50	1.50	1.50
45	1.50	1.50	1.50	1.50
46	1.50	1.50	1.50	1.50
47	1.50	1.50	1.50	1.50
48	1.50	1.50	1.50	1.50
49	1.50	1.50	1.50	1.50
50	1.50	1.50	1.50	1.50
51	1.50	1.50	1.50	1.50
52	1.50	1.50	1.50	1.50
53	1.50	1.50	1.50	1.50
54	1.50	1.50	1.50	1.50
55	1.50	1.50	1.50	1.50
56	1.50	1.50	1.50	1.50
57	1.50	1.50	1.50	1.50
58	1.50	1.50	1.50	1.50
59	1.50	1.50	1.50	1.50
60	1.50	1.50	1.50	1.50
61	1.50	1.50	1.50	1.50
62	1.50	1.50	1.50	1.50
63	1.50	1.50	1.50	1.50
64	1.50	1.50	1.50	1.50
65	1.50	1.50	1.50	1.50
66	1.50	1.50	1.50	1.50
67	1.50	1.50	1.50	1.50
68	1.50	1.50	1.50	1.50
69	1.50	1.50	1.50	1.50
70	1.50	1.50	1.50	1.50
71	1.50	1.50	1.50	1.50
72	1.50	1.50	1.50	1.50
73	1.50	1.50	1.50	1.50
74	1.50	1.50	1.50	1.50
75	1.50	1.50	1.50	1.50
76	1.50	1.50	1.50	1.50
77	1.50	1.50	1.50	1.50
78	1.50	1.50	1.50	1.50
79	1.50	1.50	1.50	1.50
80	1.50	1.50	1.50	1.50
81	1.50	1.50	1.50	1.50
82	1.50	1.50	1.50	1.50
83	1.50	1.50	1.50	1.50
84	1.50	1.50	1.50	1.50
85	1.50	1.50	1.50	1.50
86	1.50	1.50	1.50	1.50
87	1.50	1.50	1.50	1.50
88	1.50	1.50	1.50	1.50
89	1.50	1.50	1.50	1.50
90	1.50	1.50	1.50	1.50
91	1.50	1.50	1.50	1.50
92	1.50	1.50	1.50	1.50
93	1.50	1.50	1.50	1.50
94	1.50	1.50	1.50	1.50
95	1.50	1.50	1.50	1.50
96	1.50	1.50	1.50	1.50
97	1.50	1.50	1.50	1.50
98	1.50	1.50	1.50	1.50
99	1.50	1.50	1.50	1.50
100	1.50	1.50	1.50	1.50

INNOVATION FOR THE ENVIRONMENT: THE EXPERIENCE OF MARCHE MULTISERVIZI S.P.A.

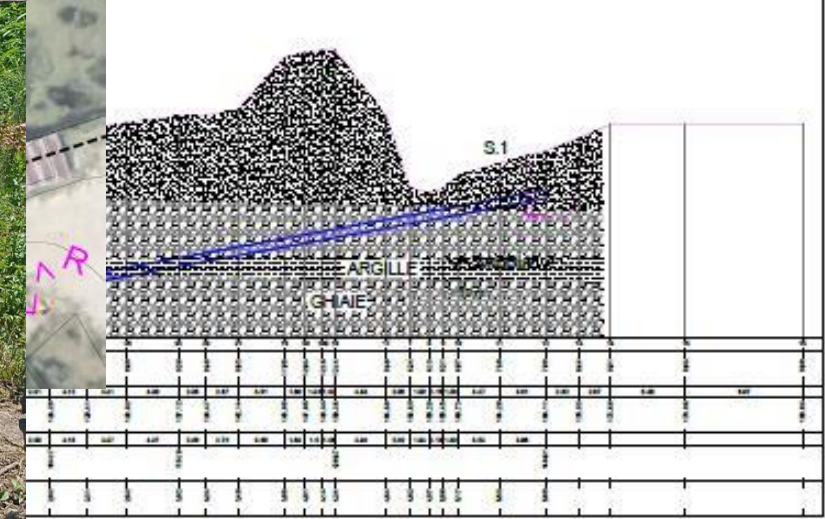


HYDROCO WATER PIPE REPLACEMENT WITH HDD ACROSS THE RIVER FOGLIA IN PESARO

JUNE-JULY 2019

HDPE Pipes OD 355

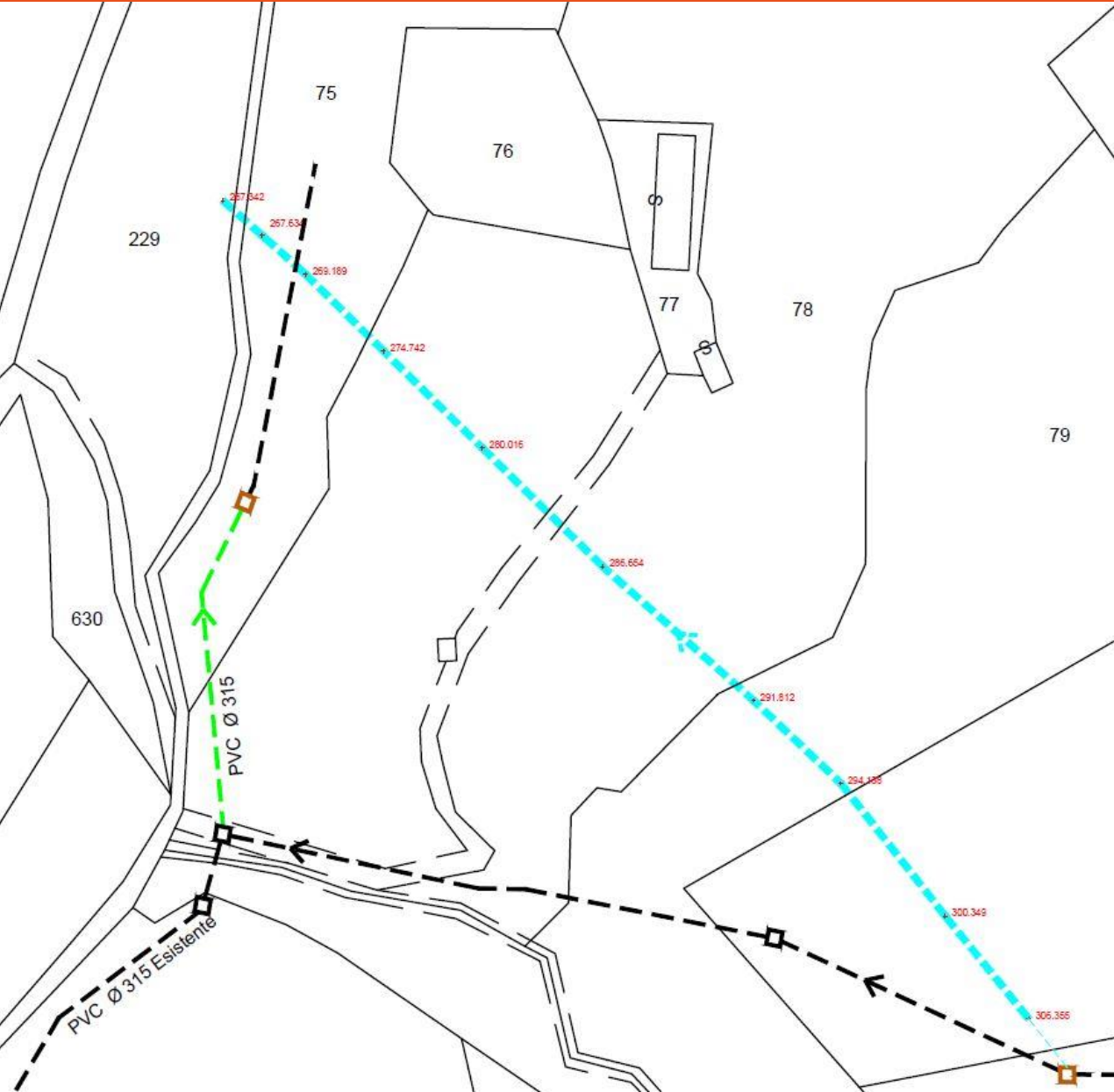
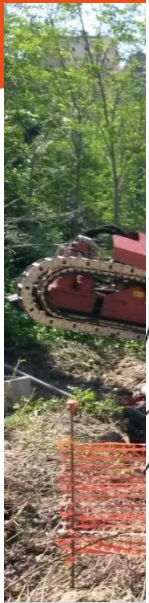
Length: 140 m



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**Cà Antonio SEWER PIPE
REPLACEMENT with HDD,
Sassocorvaro-Auditore**

May-June 2019

HDPE Pipes OD 450

Length: 175 m

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HDD : The planning approach of Marche Multiservizi S.p.A

Pre-feasibility study

- **MORFOLOGIC ANALYSIS** IN THE AREA OF OPERATION AND CHOICE OF ROUTE AND METHOD

Feasibility study

- **TOPOGRAPHIC SURVEY AND GEOGNOSTIC TEST** CONSISTING OF FIELD AND LABORATORY TESTING (CORE TESTING, CPT, SPT, GROUND CLASSIFICATION, COMPRESSION AND EXPANSION TESTING) TO UNDERSTAND THE TERRAIN THAT MUST BE CROSSED.

Detailed Design

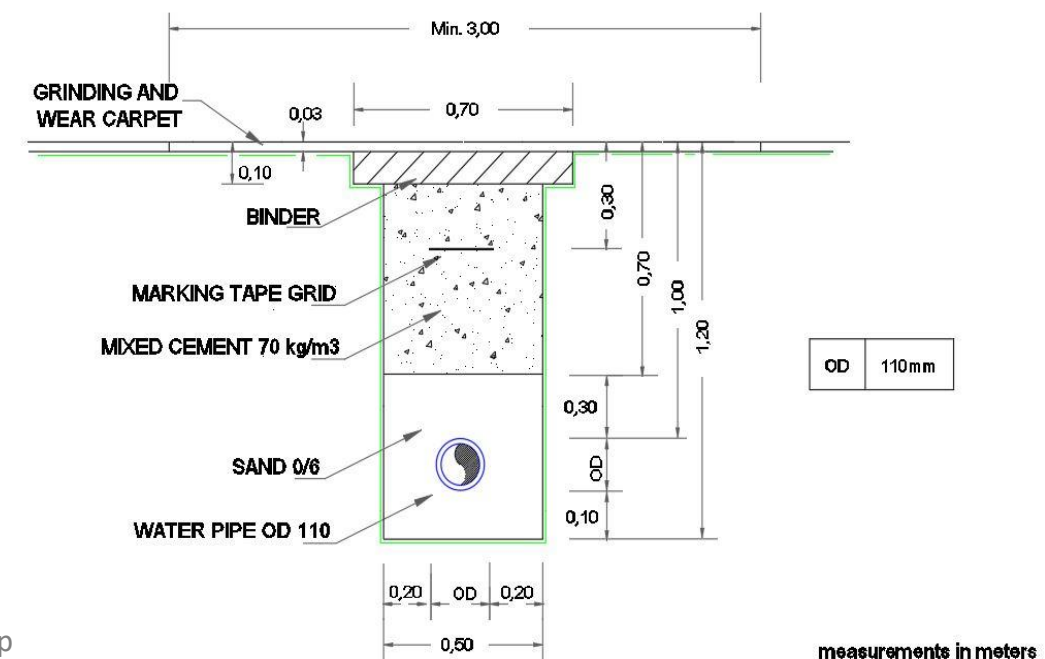
- **ROUTE DESIGN**, DEFINITION OF THE CURVATURE TO BE RESPECTED DURING THE LAY
- ALL THE DOCUMENTS NECESSARY TO THE BID PHASE, IN ACCORDANCE WITH THE LAW (**D.LGS. 50/2016**)

INNOVATION FOR THE ENVIRONMENT: THE EXPERIENCE OF MARCHE MULTISERVIZI S.P.A.

COST-BENEFIT ANALYSIS: Open-air excavation vs no-dig (HDD)

The study compare four fundamental variables in order to choose the best method to lay high-density polyethylene (HDPE) water pipes with an external diameter of 110mm:

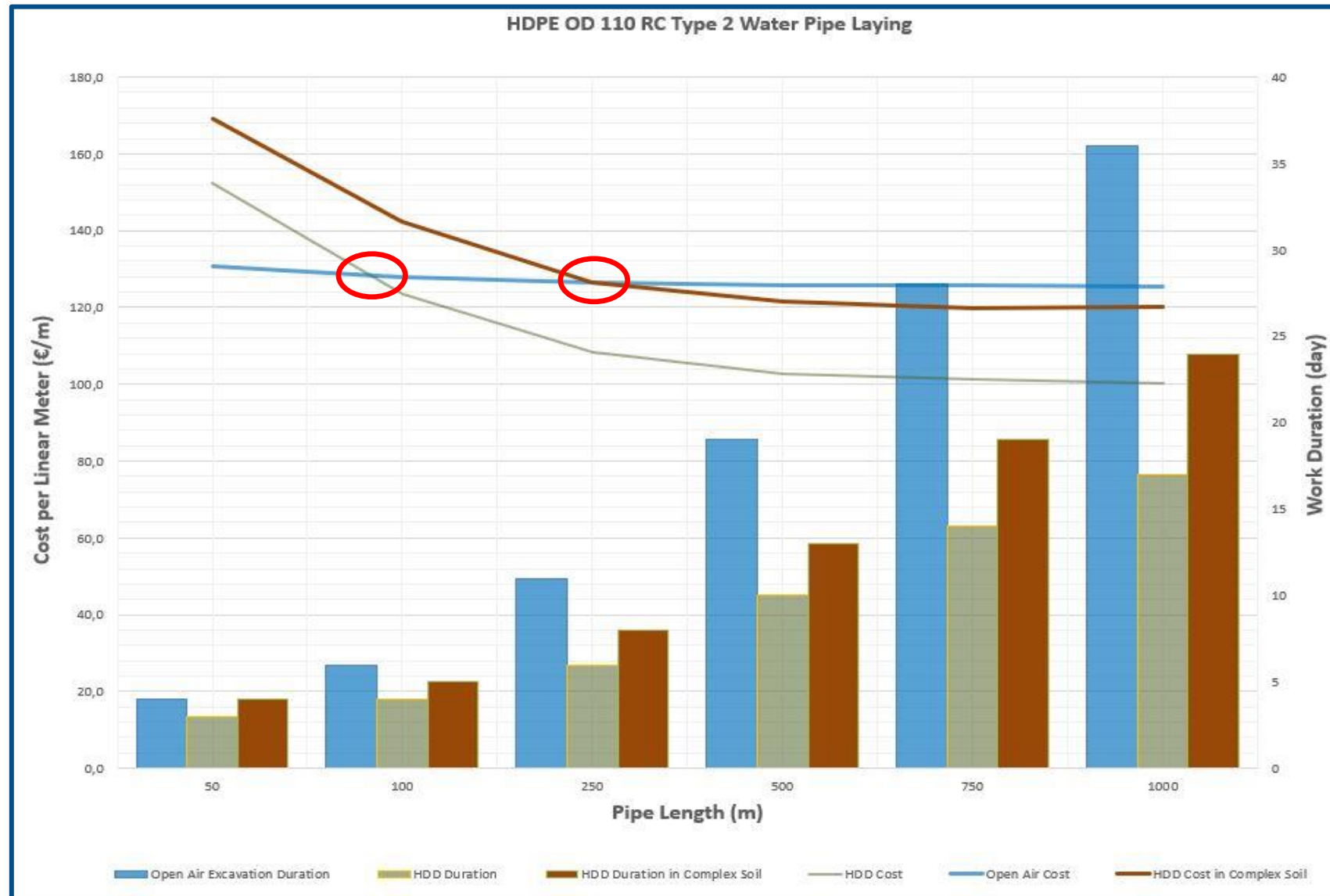
1. COST;
2. DURATION OF THE OPERATION,
3. CONSUMPTION OF MATERIALS;
4. CO2 EMISSIONS



**INNOVATION FOR THE ENVIRONMENT: THE EXPERIENCE OF
MARCHE MULTISERVIZI S.P.A.**
COST-BENEFIT ANALYSIS: Open-air excavation vs no-dig (HDD)



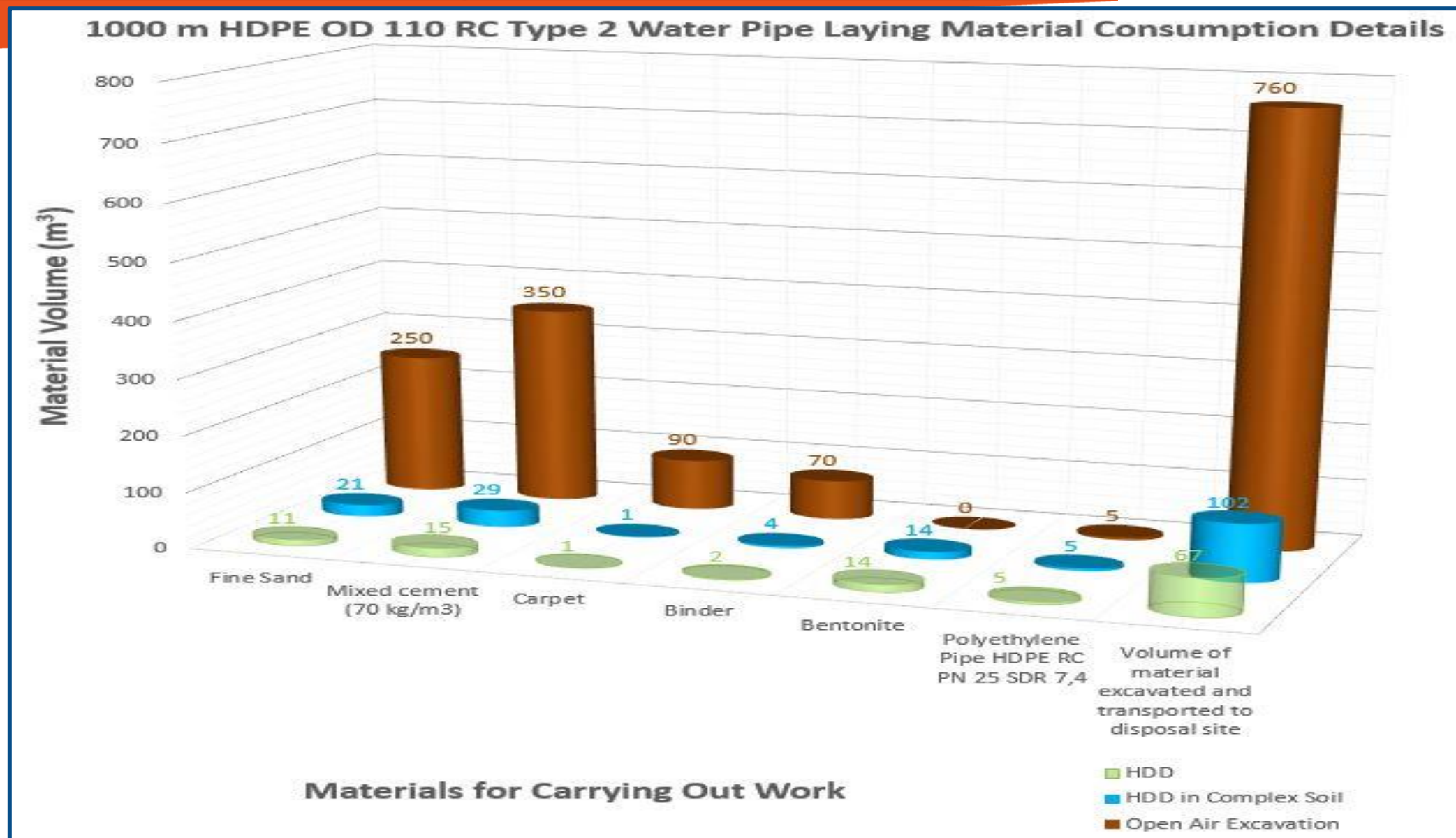
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**INNOVATION FOR THE ENVIRONMENT: THE EXPERIENCE OF
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MATERIAL CONSUMPTION: Open-air excavation vs no-dig (HDD)



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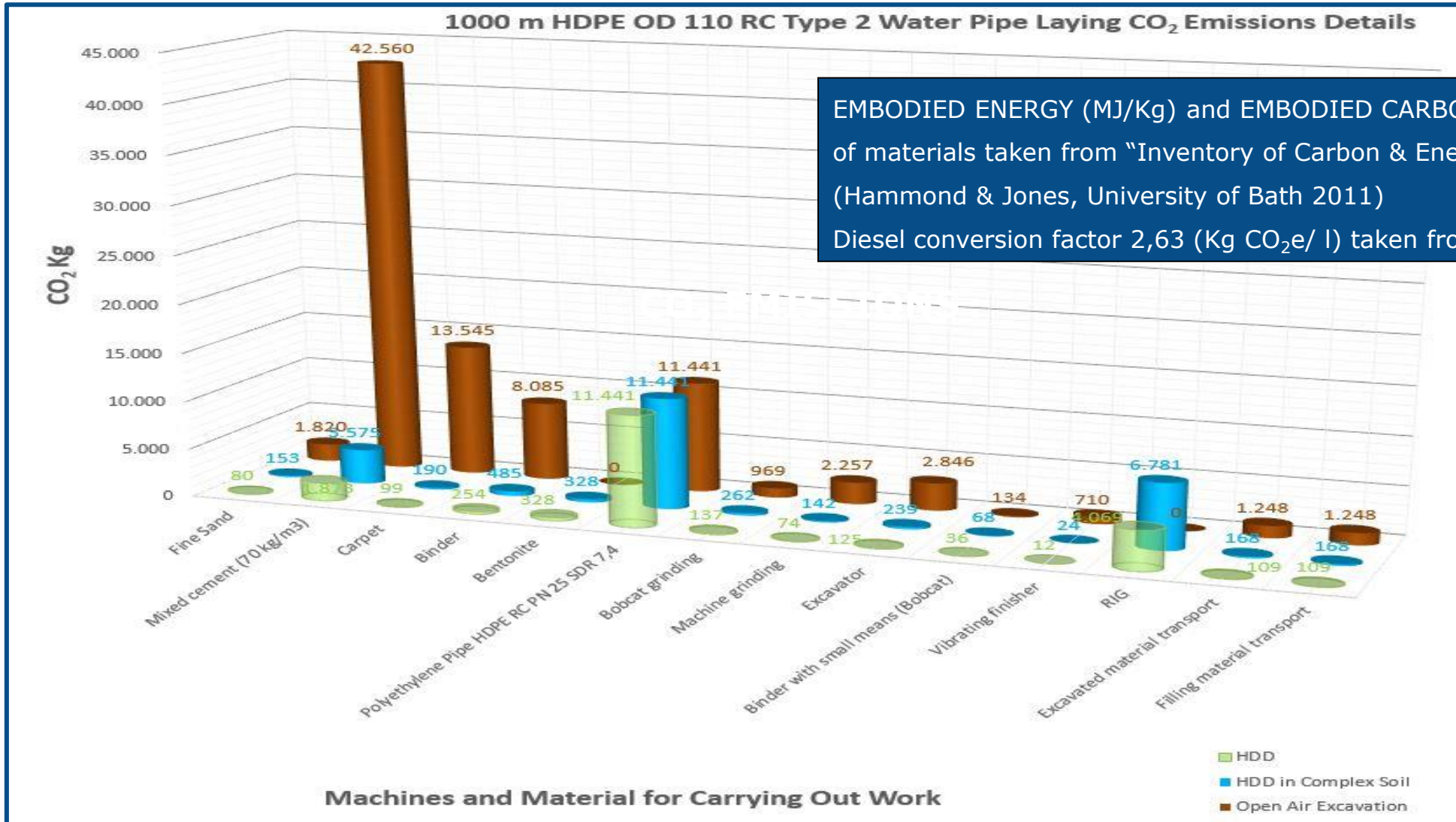


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CO₂ EMISSIONS : Open-air excavation vs no-dig (HDD)



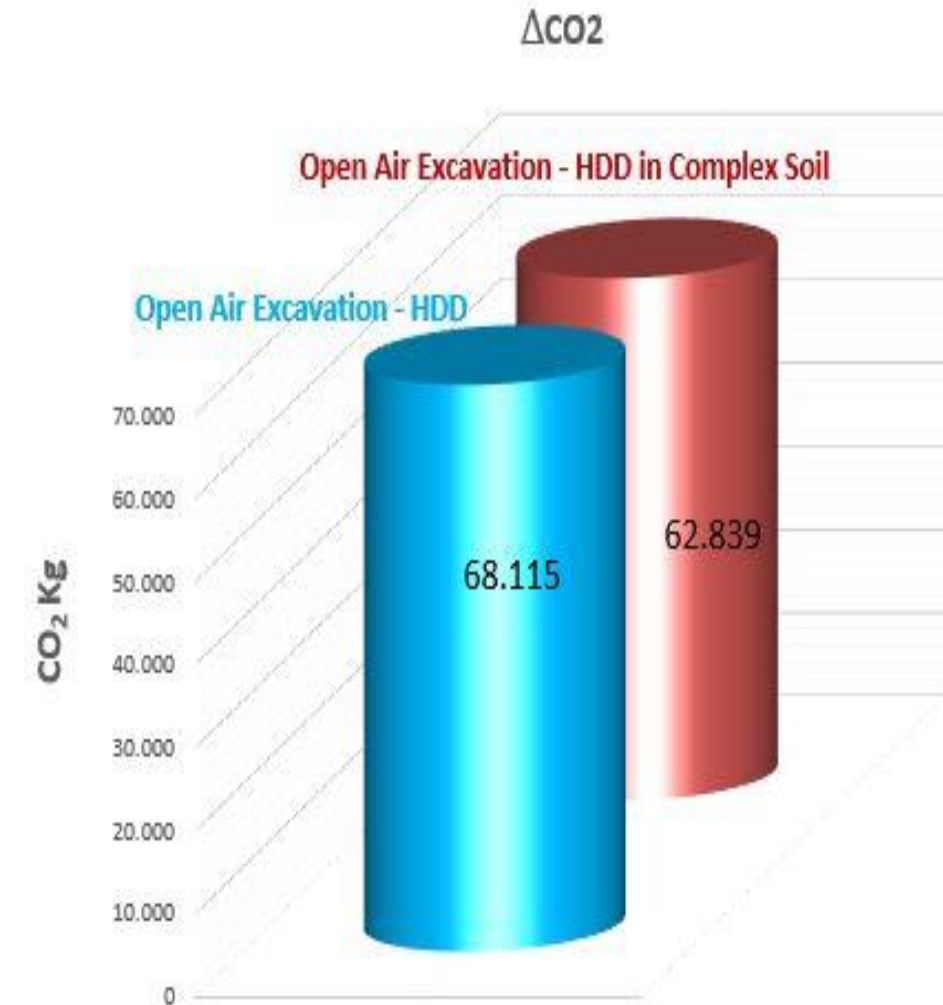
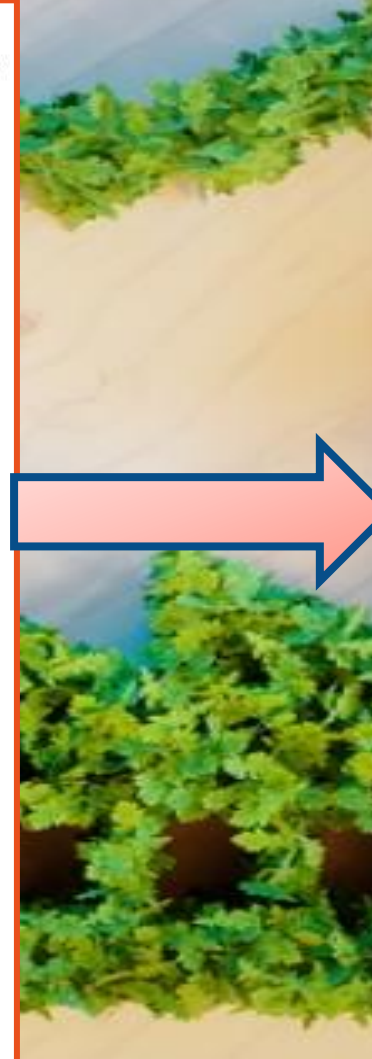
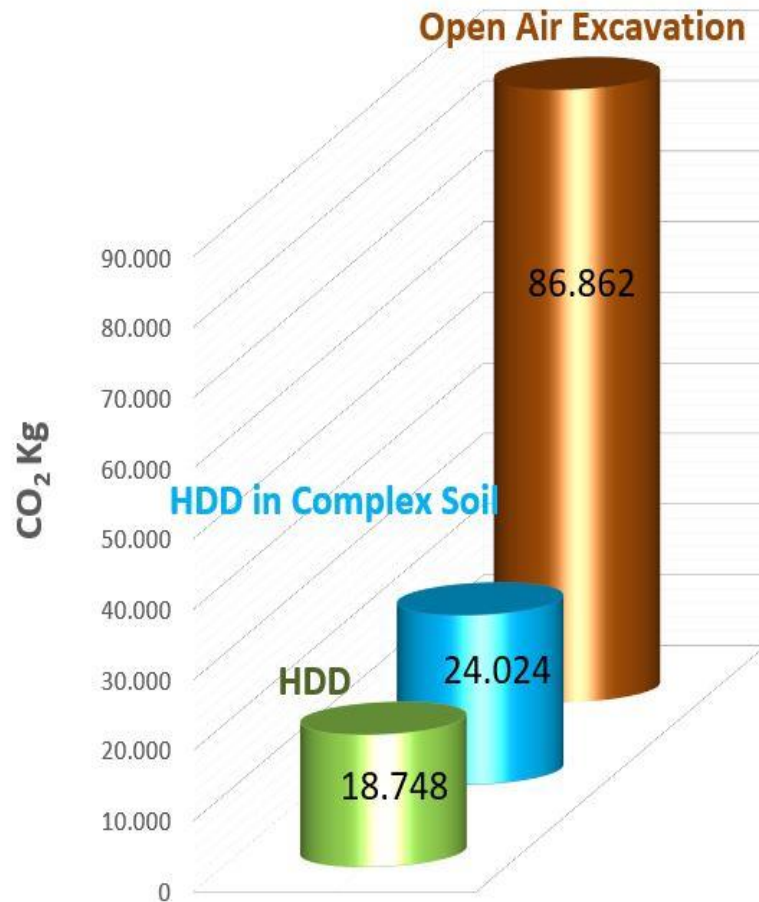
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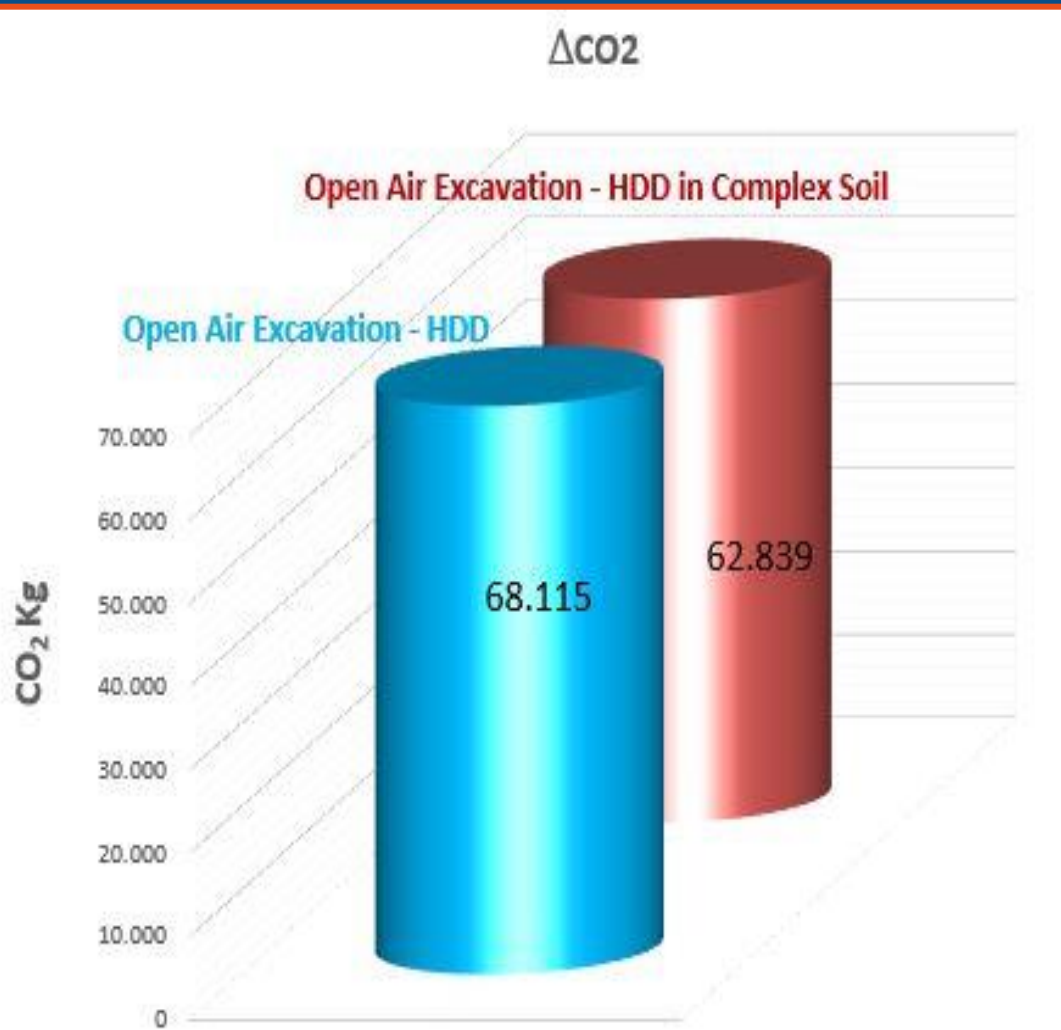
EMBODIED ENERGY (MJ/Kg) and EMBODIED CARBON (Kg CO₂e/Kg) of materials taken from "Inventory of Carbon & Energy (ICE)"⁴ (Hammond & Jones, University of Bath 2011)
Diesel conversion factor 2,63 (Kg CO₂e/ l) taken from Defra 2017

Balance of emissions for 1,000 m of Water Pipe Laying

HDPE OD 110 RC Type 2 CO₂ Emissions per 1000 m of Water Pipe Laying



Balance of emissions for 1,000 m of Water Pipe Laying



71 Families with an average electrical consumption of 2,700 KWh/y per family



28 petrol cars with an annual mileage of 10.000 km with emmissions of 230 g/km

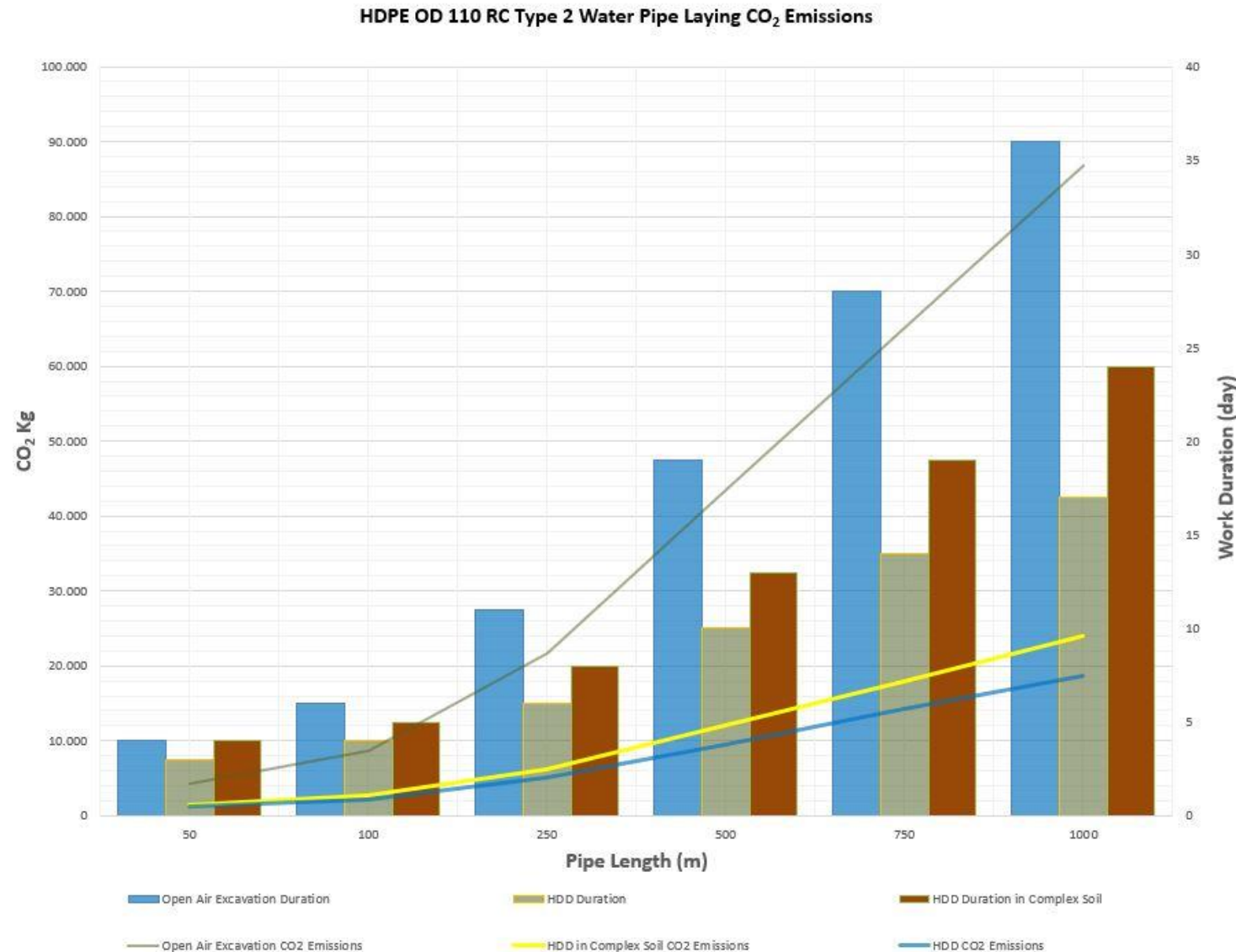


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CO₂ EMISSIONS : Open-air excavation vs no-dig (HDD)



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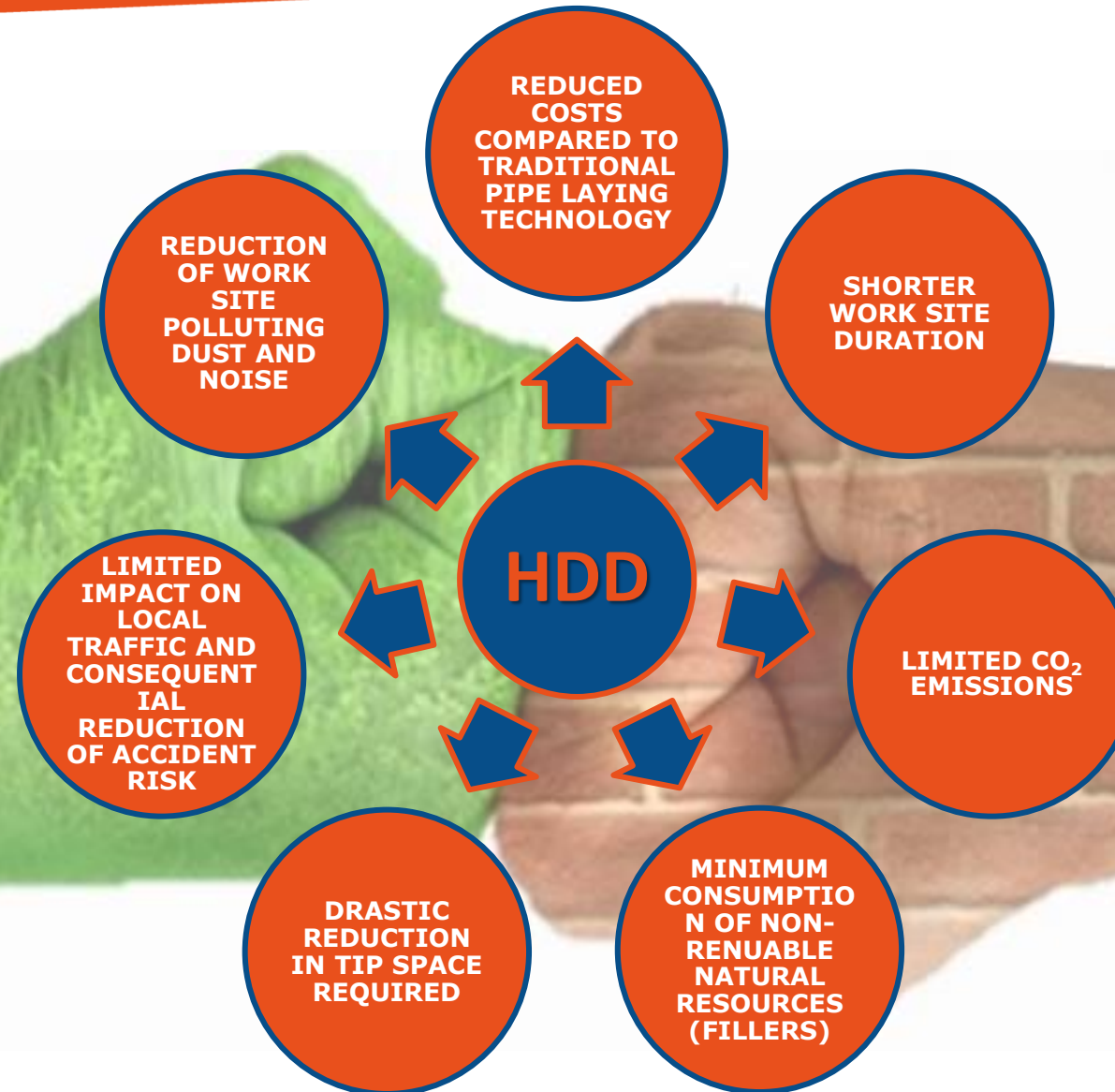


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DIRECT AND INDIRECT ADVANTAGES OF HDD



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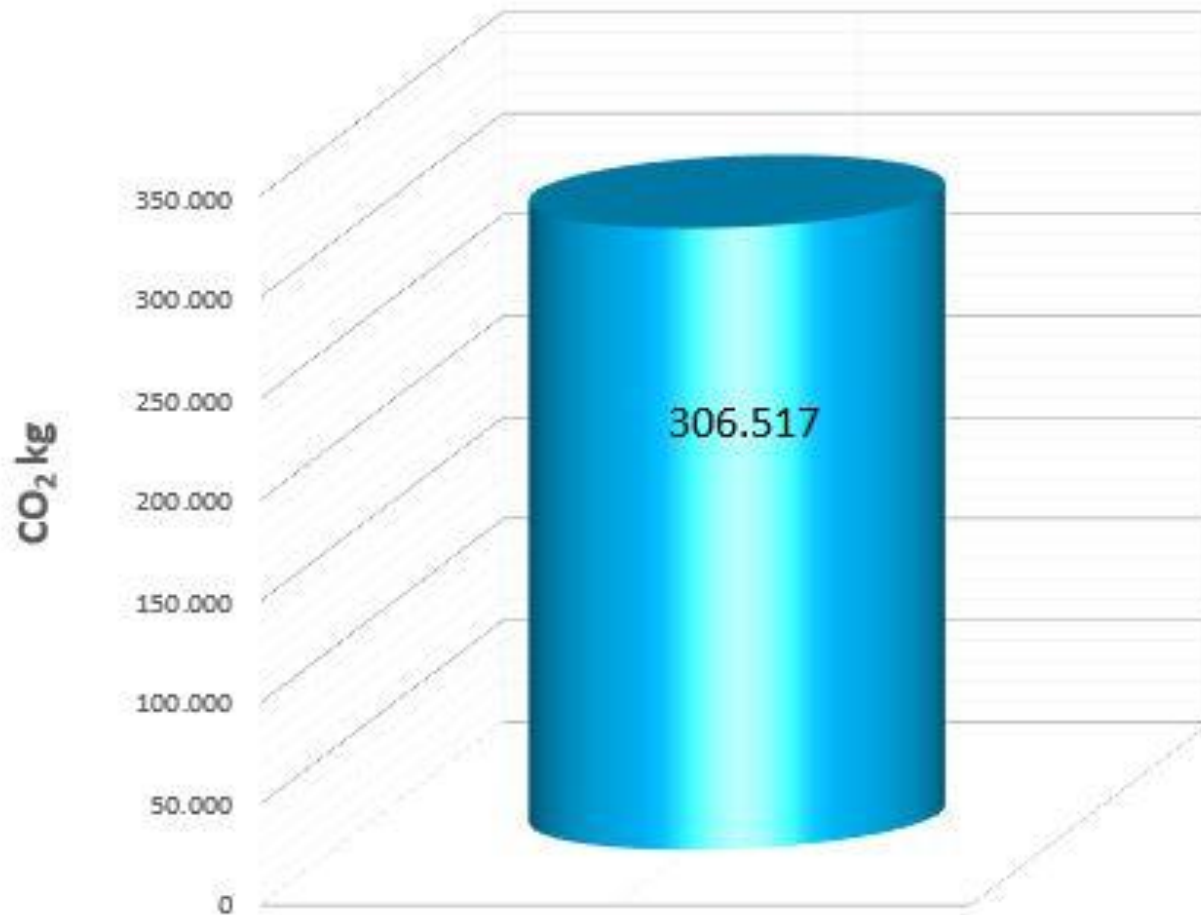
No-dig technology at MARCHE MULTISERVIZI 2019



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TARGET 2019 5,0 Km of pipes layed with HDD

HDD in YEAR 2019



356 Families with an average
elettrical consumption of 2,700
KWh/y per family



139 petrol cars with an annual
mileage of 10.000 km with
emmissions of 230 g/km





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Fortezza da Basso • FLORENCE (Italy)

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THANKS FOR YOUR
ATTENTION

marche
multiservizi



Eng. Niko Bruni