

## D14.5 Report on social acceptance and socioeconomic issues

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## EXECUTIVE SUMMARY

This deliverable describes an analysis of social and socioeconomic issues of the OPTIDRILL drilling advisory system. It also describes the strategy for gaining public acceptance and promoting the adoption of OPTIRILL technology. The OPTIDRILL project has developed a drilling advisory system utilising machine learning methods to predict ROP, lithology, and drilling problems, uniting those under one system for drilling process optimisation and intelligent decision-making. The drilling advisory system advises drillers on optimum parameters to improve drilling efficiency and reduce problems. Economic analysis of OPTIDRILL showed a 1.69% - 4.19% reduction in LCOE (levelised cost of energy). OPTIDRILL LCA (Life-cycle impact analysis) showed about 16.2 % carbon footprint (long-term climate change impact) savings. This report outlines the strategy for informing the public about OPTIDRILL technology, its benefits, and its role in creating a more sustainable energy future. This strategy addresses techno-economic benefits, builds trust among the population and stakeholders, addresses potential socioeconomic challenges, and manages public perception. It also discusses overcoming potential challenges, such as scepticism about its effectiveness, environmental protection and job concerns. The goal is to show how OPTIDRILL can contribute to economic growth and environmental protection.

## 1. INTRODUCTION

Fossil fuels account for the majority of energy consumption worldwide. Fossil fuel share of Europe's gross available energy has reduced from more than 82% in 1990 to about 70% in 2019.<sup>1</sup> Fossil fuel contribution to global energy demand is expected to be 60% in 2040 from the current value of about 85%.<sup>2</sup> Unlike other renewable sources, geothermal power can operate at its maximum capacity 24/7. Global average geothermal utilisation was over 75% in 2023, compared to wind (30%) and solar PV (15%).<sup>3</sup> Error! Bookmark not defined. Hence, geothermal power plants can contribute to the stability of electricity grids by supporting the integration of variable renewables such as wind and solar PV. Though geofluid (the source of geothermal energy) has different pollutants and greenhouse gases, the amount depends upon the geological conditions. It is typically re-injected into the reservoir and, therefore, not released into the environment. CO<sub>2</sub> emissions from geothermal power are much lower than those of fossil fuel plants.<sup>4</sup> This sets geothermal energy apart from other base-load conventional power sources, underscoring its exceptional environmental friendliness and sustainable nature.

Base-load is defined as the minimum level of electricity demand over 24 hours. Coal power plants are one of the most prominent examples of base-load power plants. Half of Europe's 324 coal power plants have been closed or announced retirement before 2030, emissions being the main reason.<sup>5</sup> Germany and Poland have 51% of the EU's installed coal capacity and 54% of coal-based emissions.<sup>6</sup> U.S. coal-fired electricity generation in 2019 was the lowest in 42 years.<sup>7</sup> Geothermal energy will be in high demand in the future because it is one of the few renewable sources that can handle base load.

The OPTIDRILL drilling advisory system was designed to make drilling faster, more affordable, and safer by offering real-time advice to drillers, helping them avoid costly mistakes. The drilling advisory system reduces drilling costs and environmental impact by recommending parameters to improve drilling efficiency, resulting in faster drilling and less tool wear. It also allows drillers to take preventive action to mitigate drilling problems such as unpredictable formation pressure, lost circulation, drill pipe sticking, etc. Economic analysis showed a 1.69% - 4.19% reduction in LCOE (levelised cost of energy).<sup>8</sup> LCA (Life-cycle impact analysis) showed about 16.2% carbon footprint (long-term climate change impact) savings<sup>8</sup> from OPTIDRILL technology. OPTIDRILL technology will reduce costs for all types of geothermal energy exploitation, deep drilling for power generation, or shallow drilling for district heating and industrial heat. To ensure that the OPTIDRILL technology is widely adopted, it is essential to address both the publics and stakeholders' technical benefits and concerns.

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<sup>1</sup> <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20210204-1>

<sup>2</sup> <https://copenhageneconomics.com/publication/the-future-of-fossil-fuels/>

<sup>3</sup> <https://www.geothermal-energy.org/pdf/IGAstandard/WGC/2010/0209.pdf>

<sup>4</sup> <https://www.euractiv.com/section/climate-environment/news/europe-halfway-towards-closing-all-coal-power-plants-by-2030/>

<sup>5</sup> <https://climateanalytics.org/briefings/eu-coal-phase-out/>

<sup>6</sup> U.S. Coal-Fired Electricity Generation in 2019 Falls to 42-Year Low, <https://www.eia.gov/todayinenergy/detail.php?id=43675>

<sup>7</sup> OPTIDRILL D14.2 Report on the impact of OPTIDRILL on LCOE

<sup>8</sup> OPTIDRILL D14.3 Report on the impact of OPTIDRILL on environmental footprint of geothermal power

## 2. SOCIAL AND SOCIOECONOMIC ACCEPTANCE STRATEGY

OPTIDRILL's social and socioeconomic acceptance strategy has a three-pronged approach:

- **Community acceptance:** Gaining the support of the local community, drill rig service providers, and drillers
- **Market acceptance** Gaining the support of geothermal energy investors, drilling service providers
- **Socio-political acceptance:** With government and public support, promoting geothermal energy as a safe and reliable energy source.

To gain public acceptance for OPTIDRILL technology, we will adopt a clean and open communication strategy that involves outreach through various media channels, including social media, conferences, informational materials, exhibitions, public forums, town halls, community meetings, etc providing clear and honest information about how OPTIDRILL technology works, its benefits, and potential risks. To enhance OPTIDRILL's credibility and foster public trust, endorsement from government bodies and industry associations will be sought. From real-world success stories, we will showcase demonstrable benefits in cost and emission reductions, and operational efficiency to build public trust. Tangible evidence of the success of the technology will make it easier to convince the public of its viability and importance. In addition to addressing the technical aspects of the technology, we will emphasize its broader community and environmental benefits. OPTIDRILL contributes to a more stable and sustainable energy supply by improving the cost-effectiveness of geothermal energy production and strengthening the role of geothermal energy in the global energy mix.

One of the main benefits of OPTIDRILL is that it helps reduce the environmental impact of geothermal drilling. By improving drilling operations efficiency, the technology reduces the energy and resources required to drill each wellbore, which reduces CO<sub>2</sub> emissions from the drilling activity and the overall CO<sub>2</sub> footprint of geothermal energy production. This aligns with global efforts to reduce greenhouse gas emissions and transition to renewable energy sources. In addition to reducing CO<sub>2</sub> emissions, OPTIDRILL enhances drilling safety by detecting potential problems, allowing drillers to take preventive measures reducing the likelihood of environmental damage from drilling accidents.

We will also highlight that the OPTIDRILL is designed as an advisory system that works alongside existing drilling methods. Since OPTIDRILL is designed as an advisory system rather than a replacement for human labour, there is no risk of displacement for workers in the geothermal drilling industry. The OPTIDRILL technology enhances the drillers by providing tools to detect drilling issues early, improving job security and safety in the sector.

Awareness campaigns targeting different audiences, including the geothermal industry, policymakers, and the general public will be conducted to ensure that the public understands the advantages of the OPTIDRILL system and its contribution to environmental protection. OPTIDRILL not only makes geothermal energy more accessible by reducing wellbore drilling costs but is also good for the environment. It helps to reduce CO<sub>2</sub> emissions from geothermal drilling, making the whole process greener. Safety is another impact of OPTIDRILL as the technology helps drillers detect issues like stuck or broken drill strings before they cause serious damage, preventing unnecessary costs and environmental harm. By showcasing these capabilities, we can assure the public that OPTIDRILL geothermal drilling is safe.

The OPTIDRILL technology is poised to enhance security in the geothermal industry by providing workers with advanced tools that increase efficiency and reduce the risk of accidents. OPTIDRILL is an add-on for existing drill rigs that won't replace jobs but makes the work safer and more cost-effective. By improving safety and efficiency, it directly benefits workers.

In addition to its direct benefits for workers, OPTIDRILL has the potential to foster broader socioeconomic development. As geothermal energy becomes more efficient and affordable, it can contribute to the growth of local economies, particularly in developing nations and small-scale operations. By cutting down the cost of energy production and reducing inefficiencies, OPTIDRILL makes geothermal energy more affordable for countries with fewer resources. This can boost economic growth, create jobs, and help develop important infrastructure like energy grids, roads, and other essential services.

OPTIDRILL was designed to be a flexible and affordable solution for all scales of drill rigs. By making geothermal drilling more cost-effective and reliable, OPTIDRILL can reduce the overall cost of geothermal energy. This makes it a more appealing option for investors and energy producers, encouraging more investment in the sector.

The following communication strategy would be used to maximize the OPTIDRILL technology's acceptance:

- **Tailored Campaigns:** Tailored campaigns for various stakeholders (e.g., policymakers, energy producers, local communities) should explain the benefits of the OPTIDRILL system in clear, accessible terms.
- **Early Engagement:** Involving stakeholders early through surveys, consultations, and advisory panels will increase buy-in and help mitigate resistance to the technology.
- **Community Consultations:** Regular consultations with local communities, drilling companies, and workers to gather feedback and address concerns early on will ensure the technology is tailored to all stakeholder needs and minimise resistance and build local project ownership.
- **Climate Change Messaging:** A concerted effort would be made to connect OPTIDRILL with global climate goals by promoting its role in reducing CO2 emissions during geothermal drilling operations.
- **Emphasizing Safety:** Public awareness campaigns highlighting the preventive capabilities of OPTIDRILL, including early detection of issues like stuck drill strings or operational failures that can mitigate environmental damage.
- **Cost-Effectiveness:** Demonstrate that the OPTIDRILL system requires a relatively small investment compared to the significant operational savings (reduced CO2 emissions, fewer drilling failures, lower cost per well). This will be done by providing cost-benefit analyses and case studies.
- **Interactive Platforms:** Online platforms providing in-depth content and enhance public engagement and understanding

This approach will help ensure the successful adoption and integration of OPTIDRILL technology in the geothermal drilling industry.

### 3. CONCLUSION

OPTIDRILL brings big benefits to the geothermal energy industry by making drilling more efficient, reducing costs and CO2 emissions. To make sure it gets the support it needs, we will run public awareness campaigns, engage stakeholders, and address any environmental or social concerns. The technology not only improves business results and helps the environment, but it also keeps jobs safe, making it a great solution for geothermal energy.

If OPTIDRILL is widely adopted, it will change the way geothermal drilling works and help create a more sustainable future. By increasing geothermal energy production, it can strengthen the global energy supply and support economic growth. To overcome any public doubts and ensure broad support, we need a clear plan that includes education, engagement, and open communication.