



Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 25-May-2023 | Report No: PIDC34819

BASIC INFORMATION

**A. Basic Project Data**

| | | | |
|------------------------------------|--|--|----------------------|
| Project Beneficiary(ies) | Operation ID | Operation Name | |
| Dominica | P179845 | Dominica Geothermal Risk Mitigation II Project | |
| Region | Estimated Appraisal Date | Estimated Approval Date | Practice Area (Lead) |
| LATIN AMERICA AND CARIBBEAN | 28-Aug-2023 | 08-Nov-2023 | Energy & Extractives |
| Financing Instrument | Borrower(s) | Implementing Agency | |
| Investment Project Financing (IPF) | The Government of the Commonwealth of Dominica - Ministry of Finance | Dominica Geothermal Development Company | |

Proposed Development Objective(s)

The Project Development Objective is to integrate geothermal electricity capacity and strengthen the resilience of the national grid in Dominica.

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

| | |
|-----------------------------|--------------|
| Total Operation Cost | 40.00 |
| Total Financing | 40.00 |
| of which IBRD/IDA | 38.00 |
| Financing Gap | 0.00 |

DETAILS**World Bank Group Financing**

| | |
|---|-------|
| International Development Association (IDA) | 38.00 |
| of which IDA Recommitted | 8.00 |
| IDA Credit | 38.00 |

Non-World Bank Group Financing

| | |
|---------------------|------|
| Counterpart Funding | 2.00 |
| National Government | 2.00 |



Environmental and Social Risk Classification

Substantial

Concept Review Decision

The review did authorize the preparation to continue

Other Decision (as needed)

B. Introduction and Context

Country Context

1. **The Commonwealth of Dominica (Dominica) is a small island developing state (SIDS) in the Eastern Caribbean Region.** It is an upper-middle income country, with, in 2021, a population of 72,421 and a GDP of US\$ 554.1 million giving a per capita GDP of \$7,653¹. It is a member of the Organization of Eastern Caribbean States (OECS). The economy is reliant on tourism, agriculture and to a lesser extent the financial sector. While tourism now accounts for 36.9 percent of GDP², the share of agriculture has declined, from 30 percent in the early 1990s to 15 percent in 2016. Dominica's poverty headcount reached 28.8 percent and its Gini coefficient was 0.44 in 2008³; both may have since risen due to subsequent economic shocks caused by hurricanes and the Covid-19 pandemic. Dominica, like other SIDS in the region, has suffered from low growth, high debt, and limited fiscal space.

2. **Dominica's economy is heavily influenced by natural disasters, topography and external events.** It is especially vulnerable to hurricanes. Most recently it experienced the category 5 hurricane Maria in September 2017, which killed 31 people, damaged 90 percent of the housing stock and caused the electricity system to fail completely⁴. Damage was estimated to have cost \$1.31 billion, equivalent to 226 percent of GDP⁵. The mountainous inland terrain means that 90 percent of the population and most of the infrastructure is located near the shore, rendering them susceptible to sea level rise and storm surges. Moreover, the few sandy beaches limit the opportunities for tourism development while the rugged terrain limits the potential for agriculture. External events can have severe impacts on the economy. Notable recent examples are the global financial crisis of 2008 and Covid-19, between 2020 and 2021, both of which halted tourist arrivals.

3. **Volatility in recent economic performance reflects regional and global shocks.** GDP growth over the past twenty years has averaged 2.1 percent per annum, lower than the 2.6 percent seen in other OECS countries⁶, which is itself lower than the growth recorded in Pacific Islands states and other upper middle-income countries⁷. GDP is unusually volatile, owing to the narrow economic base of just two or three main sectors. Reconstruction following hurricane Maria fueled

¹ Source: World Bank data: <https://data.worldbank.org/country/dominica>

² Estimate from the World Travel and Tourism Council data (2019). This estimate is considered high as it includes direct, indirect, and marginally related service sector contributions.

³ Estimated at the time of the last Country Poverty Assessment (CPA) conducted in 2009

⁴ Post-Disaster needs Assessment Hurricane Maria September 18, 2017. Government of the Commonwealth of Dominica: <https://www.gfdrr.org/en/dominica-hurricane-maria-post-disaster-assessment-and-support-recovery-planning>

⁵ National Resilience Development Strategy 2030. Government of the Commonwealth of Dominica : <https://finance.gov.dm/national-development-strategies/strategies/file/31-national-resilience-development-strategy-dominica-2030>

⁶ such as Antigua and Barbuda, Grenada, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines (World Bank Annual GDP Growth Data; 1996-2015).

⁷ Regional Partnership Framework for the Eastern Caribbean States April 19, 2022. Report No. 160349-LAC.



GDP growth which rose to 5.5 percent in 2019. A sharp contraction of 16.6 percent followed in 2020 during the Covid-19 pandemic⁸. Growth recovered to six percent in 2022, in large part stemming from a public investment program financed by Citizenship by Investment (CBI) revenues.

4. **Dominica's fiscal position has also fluctuated in recent years.** The country's fiscal deficit worsened significantly after hurricane Maria in 2017, driven by a decline in revenue, the result of lower output and tax exemptions, and an increase in expenditure on reconstruction and emergency transfers to households. The COVID-19 pandemic provided a further shock. In FY2020, the fiscal deficit reached 11.1 percent of GDP, the highest since Hurricane Maria. It has steadily reduced and is forecast to be 1.5 percent in 2023⁹. Gross general government debt peaked at 114.5 percent of GDP in 2020 but has since declined and is forecast to be 98.3 percent in 2023. The country is at high risk of debt distress.

5. **The government has adopted a National Resilience Development Strategy (NRDS) aimed at transitioning to a more diversified and greener economy.** The NRDS aims to build the economy based on five strategic growth poles, while maintaining a sound macroeconomic framework. The growth poles are: (i) renewable energy; (ii) productive enterprises; (iii) creative industries; (iv) infrastructure; and (v) human services¹⁰. Amongst others, it calls for development of higher added-value businesses, such as agro-processing and improving Dominica's competitiveness in the Caribbean tourism industry. In addition, building resilience across all sectors is crucial for the Country to embark on a sustainable and inclusive development pathway because vulnerability to natural disasters and climate change are at the center of the Dominica's development challenges

Sectoral and Institutional Context

6. **Dominica's small population and geography shape the electricity sector.** The power system is operated by a single, vertically integrated concessionaire, Dominica Electricity Services Limited (DOMLEC) which since 2022 has been majority publicly owned. It is overseen by the Independent Regulatory Commission (IRC). The Electricity Supply Act (ESA), passed in 2006, permits the licensing of independent power producer (IPPs) but leaves DOMLEC responsible for system performance and reliability. In 2021 DOMLEC served 35,702 customers, accounting for 98 percent of the island's population. About 47 percent of the 89 gigawatt hours (GWh) generated were sold to households and 43 percent to commercial customers, the balance of 10 percent was used by industry, hotels and street lighting. Losses on gross generation were 7.8 percent. In the same year, DOMLEC revenues were EC\$92.05 million and it made an operating income of EC\$7.02 million¹¹.

7. **The electricity system relies primarily on a fleet of aging diesel generators resulting in high electricity costs and unreliable supply which undermines Dominica's competitiveness.** In 2021, installed nameplate generation capacity owned by DOMLEC was 25.53 megawatts (MW), serving a system peak demand of 17 MW. 74 per cent of the generation capacity (18.89 MW) came from two diesel power plants located at Fond Cole in the southeast outside the capital Roseau, and Sugar Loaf in the northwest outside Portsmouth. The remaining 26 per cent or 6.6 MW derived from a cascade of three small run-of-the-river hydro plant in the Roseau Valley. There is also an estimated 15MW of diesel self-generation. Seventy five percent of demand is in the South around Roseau and 25 percent in the North around Portsmouth. The average retail price of electricity in Dominica was around US\$33 cents/kWh in 2022. Diesel import prices were particularly

⁸ Source: IMF Country Data: <https://www.imf.org/en/Countries/DMA#countrydata>

⁹ *ibid*

¹⁰ National Resilience Development Strategy 2030. Government of the Commonwealth of Dominica : <https://finance.gov.dm/national-development-strategies/strategies/file/31-national-resilience-development-strategy-dominica-2030>

¹¹ Source: DOMLEC Annual Report 2021 <https://www.domlec.dm/wp-content/uploads/AR2021.pdf>



unstable in 2022 and the recent increases have worsened the country's balance of trade. Moreover, seven out of 13 diesel generating units owned by DOMLEC with installed capacity of over 10 MW have exceeded their maximum operating hours. Continued operation of those units without replacement risks unexpected shutdowns and possible engine failures, which would lead to major electricity supply blackouts. Unsurprisingly, about 66 percent of firms in Dominica cite the cost and irregularity of electricity as a major or very severe constraint¹². Costly and unreliable electricity supply hinders the development of high value service businesses and inhibits inward investment, both of which are essential to the achievement of the NRDS.

8. **Dominica's electricity system is vulnerable to recurrent and devastating hurricanes.** DOMLEC's transmission and distribution (T&D) system comprises over 400 km of 11 kilovolt (kV) overhead lines and 900 km of 230/400 Volt overhead distribution lines. An 11 kV ring interconnects the hydro plants and diesel power plants in the South and in the North. The aging overhead T&D network was a principal factor in the failure of the electricity system following hurricane Maria. Then, more than 75 percent of the network and most of the generation assets were damaged to a greater or lesser extent. The cost of damage totaled US\$33 million, or 65 percent of the net book value of assets. Of the total, US\$30 million was attributable to the grid, the balance accruing to generation, mainly to rebuild the Padu hydropower plant. Lost gross revenues (including electricity sales and fuel surcharges) in one year were US\$26.9 million, 82 percent of total revenues. The financing required to repair or rebuild the power system following Hurricane Maria was estimated at US\$80.68 million¹³, nearly 2.5 times DOMLEC's total revenue in 2016. While it is not possible to forecast future hurricanes' timing or strength, climate change has increased their frequency and severity; it is thus prudent to plan in the expectation of devastating events in the future.

9. **The NRDS foresees a critical role for geothermal energy in supporting Dominica's transition to a green and resilient economy.** Dominica has a confirmed geothermal resource capable of supporting up to 100 MW of generation¹⁴, far exceeding current domestic needs and which could in the longer term provide an exportable surplus. Geothermal energy has an expected cost of around US\$ 12c/kWh¹⁵, which would significantly lower tariffs and their volatility, and thus improve the country's economic competitiveness. The timely commissioning of the geothermal power plant would also substantially improve Dominica's electricity supply reliability and resilience. Absent geothermal capacity, DOMLEC would have to invest in new diesel gensets to replace the aged fleet. In consequence, the government is working on building a 10 MW domestic geothermal power plant (DGPP), planned as a public-private partnership (PPP), supported by the on-going Dominica Geothermal Risk Mitigation Project (DGRMP – P162149) and implemented by the Dominica Geothermal Development Company Ltd (DGDC).

10. **The DGRMP aims to diversify Dominica's domestic power generation mix and demonstrate the potential of larger development of the geothermal resource.** It was approved in March 2019 and is scheduled to close in February 2026. Originally, the DGRMP was to finance design, supply and installation of a 7MW geothermal power plant. Insufficient and costly responses from the market led to the cancellation of the procurement in early 2020. A market survey and new technical data that emerged from further studies indicated the need to modify the project technical scope, design, and implementation approach. In May 2020, the government proposed to increase the capacity of the DGPP to 10MW and that it be developed by a private consortium. The government requested the restructuring of DGRMP to support the additional drilling of a new reinjection well for the DGPP and the construction of new transmission network and associated substations to integrate the proposed DGPP into the national grid.

11. **Following restructuring, DGRMP is making satisfactory progress.** The project was restructured in March 2022 to include financing a production well and a reinjection well and technical assistance for preparation of new transmission

¹² World Bank, 2010, evaluation of raw data from Enterprise Survey in Dominica.

¹³ Post Disaster Needs Assessment for Dominica after Hurricane Maria in 2017, GFDRR

¹⁴ Based various surface studies and well drillings, GoCD confirmed the existence of up to 100 MW in geothermal capacity in the Wotten Waven-Laudat field, located in the Roseau Valley.

¹⁵ Estimated based on the planned 10 MW geothermal power plant in Roseau Valley.



network investment to integrate the DGPP into the national grid. The new drilling is critical to enable an increase of the plant capacity from the original 7 MW to 10 MW. In April 2023, DGDC reported that the drilling of both additional wells had been completed successfully, substantially reducing upstream resource risks, increasing bankability of the downstream development of the DGPP, and reducing geothermal energy costs. The progress of the drilling will facilitate the government in finalizing negotiations with its private partner for the DGPP. The technical design and preparation for the environmental and social instruments for the transmission investment are advancing and will contribute to the preparation of the proposed project. Following the restructuring and the improved progress, the project was rated moderately satisfactory for achievement of its development objective and for implementation progress on the most recent supervision in [month/year].

Relationship to CPF

12. **The proposed project will buttress achieving the overarching aim of the Regional Partnership Framework which is to support green, resilient, and inclusive development¹⁶ (GRID) and competitiveness in Dominica.** The project addresses two of the high-level outcomes and associated objectives of the Regional Partnership Framework which underpin it. Under High-Level Outcome 1: “Strengthening resilience to climate change and other shocks,” the project will contribute to Objective 1: “Enhance Environmental Protection and Climate Change Response” by decarbonizing electricity supply and making the transmission and distribution system more resilient to future hurricanes. It will also contribute to Objective 2: “Improve Fiscal, Debt, and Public Financial Management” by reducing DOMLEC’s need to import diesel. Furthermore, by reducing the country’s dependence on diesel imports and monetizing domestic geothermal resources, the Project will support the government’s fiscal recovery from past natural disasters and continuing climate change challenges. Under High-level Outcome 3: “More and Better Jobs” it will contribute to Objective 5: “Enhance the Enabling Environment for Businesses” by lowering and stabilizing retail electricity tariffs.

13. **The proposed project is consistent with Dominica’s National Determined Contribution (NDC)¹⁷ in its mitigation and adaptation pillars and is aligned with the Paris Agreement.** Dominica’s updated NDC sets out an ambitious greenhouse gas (GHG) emission reduction target of 45 percent below 2014 levels by 2030. The mitigation pillar prioritizes development of geothermal energy to achieve 100 percent renewable energy generation by 2030 and 98.6 percent reduction of GHG emitted by the energy industries. The adaption pillar of the NDC aims at the integration of climate change considerations into the planning, development and implementation of all economic sectors, electricity. In proposing to finance transmission used to evacuate electricity from a geothermal power plant, the project is universally aligned with the Paris Agreement’s mitigation goals. By supporting long-term planning and modelling of grid modernization, which will include addressing increased severity and frequency of hurricanes and enhancement in emergency preparedness capacity of DOMLEC against extreme climate events, the project also supports the Paris Agreement’s adaptation and resilience goals. No specific risks with respect to the mitigation and adaptation aspects of the Paris Alignment Assessment are flagged at this stage.

C. Proposed Development Objective(s)

14. The Project Development Objective is to integrate geothermal electricity capacity and strengthen the resilience of the national grid in Dominica.

Key Results (From PCN)

¹⁶ ¹⁶ World Bank. 2021. Green, Resilient, and Inclusive Approach. <https://openknowledge.worldbank.org/entities/publication>

¹⁷ [The Commonwealth of Dominica, updated Nationally Determined Contribution \(NDC\), released July 4, 2022](#)



15. The primary results arising upon completion of the proposed Project are expected to be:

| Key Results | Indicators |
|--|---|
| Integration of geothermal electricity capacity into the national grid in Dominica. | Capacity of geothermal electricity connected to the national grid. Sales of renewable electricity to consumers. Lifetime GHG emissions reduced or avoided (kg of CO ₂ eq). |
| Strengthened resilience of the electricity network. | Reliability of electricity supply (SAIDI and SAIFI ¹⁸ measures) Share of load being served by system meeting n-1 criterion ¹⁹ |

D. Concept Description

16. The proposed project would finance the first of two phases of the transmission network expansion required to support the development of the DGPP. In the face of limited financial resources for investment in the electricity system, meeting the needs of Fond Cole is the higher priority, because it serves the greater part of national demand in the southern part of the island. Hence the first phase entails construction of new 33 kV and 69 kV transmission lines and associated substations to evacuate electricity generated at the DGPP to Fond Cole. The second phase would extend the 69 kV transmission line from Fond Cole substation to Sugar Loaf substation in the north of the island; it would be financed by a follow-up investment project.

17. The proposed project will achieve its development objective by expanding the transmission system's capacity and reach, building the capacity of DOMLEC to operate the expanded system, and supporting the Independent Regulatory Commission (IRC) to foster increased uptake of renewable energy. The project will finance goods, works, and consultant services in support of these goals.

18. The proposed project will run in parallel with DGRMP, the outcome of which is expected to be 10MW of geothermal generation capacity becoming available to the DOMLEC system. When both projects are completed, the share of renewable electricity used by the domestic power system is expected to increase significantly while the reliability of the electricity supply will be improved as the majority of the aged diesel generators which exceed their unit's maximum operational hours and life expectancy will be displaced by the new geothermal capacity. The average cost of electricity generated (and consequently the tariff paid by consumers) is expected to decrease proportionally. DGRMP and DGRMP II will, between them, enable significant greenhouse gas (GHG) emission reductions by displacing the diesel generating units that would continue to operate or be retired and replaced under the current 'business as usual' baseline.

19. The construction of two new transmission lines at 69 kV and 33 kV will create redundancy in the connection between the DGPP and Fond Cole substation. The 33 kV line will be routed underground along an existing road, which avoids areas at risks of landslide or flooding as well. Between them, these measures will increase the electricity system's resilience to hurricanes. During preparation, designs that would increase the resilience of all substations and the 69 kV overhead transmission line to future hurricanes and flooding will be explored further and incorporated into the final

¹⁸ System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI).

¹⁹ The amount of load the grid can continue to serve after experiencing an outage of a single transmission line or transformer.



design. Other resilience and adaptation measures such as additional system redundancy, rapid system restoration methods and optimum levels of spare parts holdings will also be considered.

20. The proposed project will have two components. Costs and financing are shown in Table 2.

(a) **Component 1: Transmission Network Development for Integration of DGPP.** This component will support the construction of new transmission lines and substations connecting the DGPP with Fond Cole. Network expansion will take place in four segments: (i) a 33 kV line of 0.5 km, connecting DGPP to Laudat substation where electricity will enter the DOMLEC grid; (ii) a 33 kV underground transmission line of 10.6 km, connecting Laudat substation with Fond Cole substation via New Trafalgar and Padu substations (iii) a 69 kV overhead transmission line of 7.6 km, between Laudat and Fond Cole substation; and (iv) construction of two new 69/33/11 kV substations at Laudat and at Fond Cole; and upgrading the New Trafalgar and Padu substations from 11kV to 33/11 kV. A stock of emergency spare parts will be financed and stored in DOMLEC existing warehouses to allow efficient and fast response to future extreme weather events.

(b) **Component 2: Technical Assistance and Project Implementation Support.** This component will finance technical assistance to: (i) improve the capacity of DOMLEC to operate and manage the 33kV and 69kV networks sustainably, including in management of environmental and social issues, a more complex task than managing the present 11kV system (ii) promote female participation in the electricity sector; (iii) technical assistance and capacity building in regulatory framework development, grid modernization and renewable energy resource assessment and (iii) support project implementation by DGDC.

Table 2. Cost Estimates and Financing, in US\$ million

| Component | Estimated Cost | Funding Source | | | |
|--|----------------|----------------|----------|-------------|-----------|
| | | IDA | GEF | Counterpart | Total |
| Component 1: Transmission Network Development for Integration of DGPP | 38 | 29 | 7 | 2 | 38 |
| Component 2: Technical Assistance and Project Implementation Support | 2 | 1 | 1 | | 2 |
| Total | 40 | 30 | 8 | 2 | 40 |

21. **Climate and disaster screening.** Overhead transmission networks are susceptible to hurricanes during construction and operation, as has been seen in the past. Climate and disaster risk will be mitigated by implementing resilience measures in the design and construction of the network and building capacity of DOMLEC for emergency preparedness. Physical investment measures include construction of new underground 33 kV line for system redundancy to the new overhead 69 kV line connecting the DGPP and the load centers and ensuring rapid repair and system restoration through design and holding of ample spare parts. Capacity building measures include training and provision of tools on climate data gathering, monitoring, information management system upgrading and knowledge exchange.

22. **Gender.** The project aims to improve gender equality in three areas: displacement and compensation, employment, and gender-based violence (GBV) as described below.

(a) Land-use changes associated with electricity infrastructure projects, such as the loss of agricultural land for small-scale cultivation, frequently disproportionately affect women. Men and women are affected differently by the induced



economic, social, and environmental risks when projects necessitate involuntary displacement and resettlement; however, women frequently suffer disproportionately. Even if environmental and social safeguard policies are systematically incorporated into international development projects, gender-inclusive public consultations may not take place, due in part to social and gender norms in affected communities. To ensure gender-equal project outcomes, gender analysis should be an integral part of social assessments and safeguards policies. Women's crucial role in agriculture and their property rights should be considered by the compensation decision process. Strategies should be gender-targeted, including joint registration of assets and spousal co-ownership rights titles. The project will ensure that affected women are included in any displacement and compensation process.

- (b) Labor force participation in Dominica is lower for women (59.5%) than men (70.6%) (2013 data) and the labor market is gender segregated. Women are heavily represented in junior and middle administrative positions, or in low-skilled jobs. Such positions often have lower status and financial value, along with poor working conditions and work-related benefits. Female employment in utilities, especially in technical and leadership positions, is inhibited by social norms and gender roles, adverse work environments (such as unsafe working environment – including discrimination, harassment, and gender-based violence, and lack of flexibility leading to poor work-life balance), along with lack of technical and professional skills. The project will expand opportunities for women to work in the electricity sector, especially the utility DOMLEC, by providing gender-sensitive training and skill development for technical and management positions and ensuring gender-sensitive HR practices.
- (c) Electricity infrastructure projects may have negative impacts involving health risks, especially for women. Local women may be adversely impacted by the inflow of migrant workers, linked to increased incidence of STDs, sex trafficking and GBV. Measures to mitigate GBV and sexual harassment should be put in place, by adopting specific policies and reporting procedures, providing appropriate training and conduct M&E. A GBV Action Plan including a risk assessment, and associated staff and budget is crucial. All staff involved in the project should adopt and sign a Code of Conduct, detailed obligations, and consequences for offenders.

Legal Operational Policies

Triggered?

Projects on International Waterways OP 7.50

No

Projects in Disputed Area OP 7.60

No

Summary of Screening of Environmental and Social Risks and Impacts

Environmental and social risks are *Substantial*. The environmental, health and safety risks related to the construction of the transmission lines and upgrade and construction of the substations are *Substantial* due to (i) the occupational health and safety risk during construction including working at heights and in difficult terrain; (ii) the traffic volumes needed to transport equipment and materials through residential areas and narrow winding roads; (iii) the potential impacts on biodiversity including the possibility of bird collisions; and (iv) the institutional capacity of DGDC to supervise and monitor the DGRMP (which has a Substantial E&S risk rating) and DGRMP II if both are implemented simultaneously. Although the project requires land acquisition for construction of the new 69 kV overhead line of about 7.6 km by expanding the existing easement of a non-operational 11 kV line owned by DOMLEC and the access road to it, the social risk rating is *Moderate* because the resettlement impacts are expected to be small and not involve the resettlement of people. These impacts relate to assets such as crop and tree damage and livelihoods impacts which are expected to occur during the construction



phase and for which the PIU has some experience in handling according to World Bank requirements. To date, the required social risk mitigation actions are being well implemented. A social consultant has been engaged and is developing the Resettlement Action Plan and household surveys are under way. Early consultations have been held with impacted communities with no significant issues being raised. Impacts are likely to be short-term and reversible and would be addressed through mitigation measures incorporated into the Environmental and Social Management Plan (ESMP) in line with good international industry practice (GIIP) delineated in the WB Group General Environmental, Health and Safety (EHS) Guidelines and Guideline for Electric Power Transmission and Distribution. Preparation of the project environmental and social instruments such as Environmental and Social Management Framework, Resettlement Action Plan, Labor Management Plan and Stakeholders Management Plan is under way and will be completed before project appraisal.

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APPROVAL

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|---------------------------|--------------------------|-------------|
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