PREPARED FOR:

Vredenburg Wind Farm (PTY) Ltd

SOCIO-ECONOMIC ASSESSMENT OF WAKE EFFECTS OF THE PROPOSED BOULDERS WIND FARM ON WEST COATS ONE

February 2020

PREPARED BY:

URBAN-ECON

Celebrate Development Diversity

Celebrate Development Diversity.

P.O. Box 13554, HATFIELD 0028
Tel: (012) 342-8686
E-mail: elena@urban-econ.com

SPECIALISTS DETAILS

ELENA BROUGHTON

Cell: 082 463 2325

E-mail: elena@urban-econ.com

Position: Manager/Senior Economist

Qualifications: MSc Technology Management, BSC (Hon) Technology Management, BCom (Hon) Economics

Experience: 16 years

Brief profile: Elena Broughton is a senior professional and the manager of the Innovation & Sustainable Development Unit at Urban-Econ. She has extensive knowledge in various fields of economic development that includes 14 years of experience in undertaking socio-economic impact assessment studies for a variety of private clients spanning the mining, manufacturing, energy, infrastructure, and retail sectors. She also acted as a peer reviewer in several socio-economic impact assessment studies and completed a few strategic socio-economic impact assessments. Her involvement in the field allowed her to develop a sound understanding of the South African environmental legislation and developmental policies and equipped her with a widespread knowledge of socio-economic implications and benefits of various new developments.

SPECIALISTS DECLARATION

I, Elena Broughton declare that--:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

Name of company: Urban-Econ Development Economists

Date: 28 February 2020

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1 INTRODUCTION

1.1 Study rationale

The Vredenburg Windfarm (Pty) Ltd company proposes to develop a wind farm – Boulders Wind Farm (BWF) - with a generating capacity of up to 140 MW. The project is located in the Saldanha Bay Local Municipality (LM) within the West Coast District Municipality (DM) in the Western Cape. The site is located on the West Coast Peninsula, as illustrated on map below.

Map 1-1: Location of the proposed Boulders Wind Farm

The proposed Boulders Wind Farm is to be located to the west and north-west of the exiting West Coast One (WC1) Wind Farm as illustrated on Map 1-2. West Coast One is a 94 MW wind farm that has been operating since 2015 (Tractebel, 2019).

During the appeal process for the proposed Boulders Wind Farm, a concern was raised by Interested and Affected Parties that the proposed development would generate wake losses, which in turn would have a direct implication on the socio-economic benefits that are derived form West Coast One.

In response to these concerns, Vredenburg Wind Farm (PTY) Ltd appointed Urban-Econ to undertake an assessment of socio-economic impacts that could be associated with the wake losses modelled by Tracetebel (2019).

Map 1-2: Location of West Coast One as per CDM Project Design Document (UNFCCC, 2006)

1.2 Study scope

The purpose of the socio-economic impact assessment presented in this document is twofold:

- To provide an independent review of the potential socio-economic impacts that could be associated with the possible wake effects to be exerted by the proposed Boulders Wind Farm (BWF) in relation to West Coast One (WC1)
- To consider two alternatives – the no go option and the BWF development option - and illustrate the net effect on these alternatives from a local community benefit perspective
- To identify the opportunity costs associated with the Boulders Wind Farm not being developed

1.3 Structure of the report

The report is structured as follows:

- Chapter 2 contains an overview of the socio-economic impacts predicted for the BWF is provided

- Chapter 3 contains an overview of WC1 current contribution towards the local economy given publicly available information and the estimation of potential socio-economic losses associated with the wake effect
- Chapter 4 provides the comparative analysis of the socio-economic impacts associated with possible future scenarios linked to BWF and WC1 operations
- Chapter 5 provides concluding remarks

2 OVERVIEW OF SOCIO-ECONOMIC IMPACT OF BWF

The proposed development of BWF will have a positive impact on the socio-economic environment during both construction and operation of the facility. The following paragraphs summarise the socio-economic contributions that the wind farm is envisaged to make towards the local and regional economies.

2.1 Impact ensued from construction expenditure

The following table provides a summary of GDP and employment contribution that is envisaged to be derived during the construction of BWF.

Table 2-1: BWF contribution towards economy during construction

Indicator	Value/contribution
Expenditure	
Total project CAPEX	R1 520 million
Domestic expenditure (equivalent of 33% of local content)	R494 million
Impact on GDP	
Contribution towards GDP – direct and multiplier effects	R342 million
Implications for the provincial economy	Growth by 0.04% sustained for two years
Impact on employment	
Employment – direct (on site)	813 FTE person-years
Employment – direct and multiplier effect	1 861 FTE person-years
Unemployment reduction	By 0.16% relative to 2016 figures for two years

(Ubban-Econ Development Economists , 2019)

The propose Boulder Wind Farm will require an investment to the tune of R1 520 million, of which 33% or R494 million will be spent in South Africa. This expenditure will be directed towards the construction and erection of turbine towers, and construction of the wind farm components such as access roads, turbine towers' foundations, cranes hire, insurances, and other activities and items required for the development of the wind farm.

The increase in production will lead to the growth of the GDP to the tune of R342 million. This equates to about R171 million per annum for two years in a row and 0.04% of the Western Cap GDP.

The increase in production during the construction period will also translate in creation of jobs, albeit for a temporary period of two years. It is estimated that a total of 813 direct full-time equivalent (FTE) person-years will be created during the construction of the proposed Boulder

Wind Farm. An additional 1 049 full-time equivalent person-years will be created through the multiplier effects, some of which will be localised in the nearby towns of Paternoster, Vredenburg and St Helena Bay. Thus, a total of 1 861 full-time equivalent person-years will be created during construction of BWF, which equates to about 931 jobs created and maintained for two years.

2.2 Impact ensued from direct operations

The following table provides a summary of GDP and employment contribution that is envisaged to be derived during the operations of BWF.

Table 2-2: BWF contribution towards economy during operations (minimum 20 years)

Indicator	Value/contribution
Annual operating expenditure	
Total project OPEX	R63.7 million
Impact on GDP	
Contribution towards GDP – direct and multiplier effects	R49.8 million
Impact on employment	
Employment – direct (on site)	17 jobs
Employment – direct and multiplier effect	50 FTE person-years

(Ubban-Econ Development Economists , 2019)

It is envisaged that the project, once operational, will contribute to the creation of R170.7 million of business sales throughout the Western Cape economy, which translates into an annual figure of R49.8 million of GDP.

BWF will create 17 new jobs on site, which will be supported for at least 20 years. An additional 33 full-time equivalent person-years will be supported through multiplier effects; thus, making a total contribution of the project towards employment in the province to the tune of 50 full-time equivalent person years.

2.3 Impact ensued from ED and SED contributions

In addition to the GDP and job creation benefits that will be derived as a result of construction and operational expenditure of the proposed BWF, the wind farm will also contribute to the upliftment of the local communities located within a 50 km radius from the project site.

Table 2-3: BWF contribution towards enterprise and socio-economic development

Indicator	Value/contribution
Annual revenue	
Tariff	R840/MWh
Average annual electricity generation	389 203 MWh

Indicator	Value/contribution
Total revenue	R326.9 million
Annual contributions – Socio-Economic Development (SED)	
% of project revenue	2.2%
Annual equivalent	R7.2 million
Annual contributions – Enterprise Development (ED)	
% of project revenue	0.59%
Annual equivalent	R1.9 million
Total contribution over 20 years of operations	
SED contributions	R143.8 million
ED contribution	R38.6 million
TOTAL	R182.4 million

BWF's commitments to SED and ED will equate to 2.2% or about R7.23 million per annum for SED contributions and 0.59% or about R1.9 million per annum for ED contributions. Overall, a total of R182.4 million is envisaged to be invested in the local communities located within a 50 km radius of Vredenburg over a 20-year period of the wind farm's operations.

To put the above figure in perspective, the annual R9.1 million to be spent by BWF on community initiatives equates to about 0.6% of the Saldanha Bay municipal budget and 2.9% of its capital component. The following potential initiatives and project were already identified for the support through SED and ED initiatives (Ubban-Econ Development Economists , 2019):

- Enterprise development:
    - Support and development of small-scale commercial businesses in the agricultural and fishery sectors
    - Establishment of a skills centre for aquaculture and promotion of related businesses
    - Skills development and commercial support facility to assist with upgrading of public spaces in Vredenburg
- Socio-economic development:
    - Early Childhood Development and Primary school support programmes
    - Vocational, artisan and technical education to build capacity of the local labour force
    - Provision of material support to foster parents of children removed from primary caregivers due to substance abuse or other social ills
    - Actions to address communicable diseases among children under 5 years of age and injuries among children under 15 caused by various social factors
    - Support community safety initiatives

3 ASSESSMENT OF THE SOCIO-ECONOMIC IMPLICATIONS OF THE WAKE EFFECT

3.1 Assumptions regarding west coast one socio-economic contributions

West Coast One was one of the numerous Bid Window 2 (BW2) projects that was selected as a Preferred Bidder on 21 May 2012. With a nameplate capacity of 94MW and contracted capacity of 90.8 MW, the wind energy facility started its commercial operation on 9 June 2015 (IPPP Partnership , 2017). West Coast One employs 25 people to maintain its operations (DBSA, 2018).

The project is owned by a joint venture comprising of ENGIE (formerly GDF SUEZ, France, a European utility in the energy sector) and two South African shareholders, Investec Bank Limited and Kagiso Tiso Holdings (KTH) (DBSA, 2018). Combined, these three shareholders own 97.5% of the project company (Micawber 862 (Pty) Ltd , 2012). The remaining 2.5% is owned by the local community through Micawber 860 (Pty) Ltd, a Broad-Based Black Economic Empowerment (BBBEE) Trust that represents the local community beneficiaries (DBSA, 2018).

During public hearing, the representatives of WC1 indicated that the Trust "has been established to benefit Black People as defined in the Codes. Cash flows from ED and SED will be directed through the Trust to meet the specific needs of the community" (Micawber 862 (Pty) Ltd , 2012). It was further stated that "a percentage of project revenues will be set aside for sustainable community projects with particular emphasis on education, skills development and enterprise development" (Micawber 862 (Pty) Ltd , 2012).

From the above, determining the exact amount that WC1 allocates towards SED and ED initiatives and channels these through the BBBEE Trust is challenging. The review of the information regarding SED and ED contributions highlights the following:

- The Department of Energy in its request for proposals of August 2011 stated the following thresholds and targets:
    - For SED: the minimum threshold of 1.0% and a target of 1.5%
    - For ED: a target of 0.6%
- The IPP projects procured through BW1 to BW4, SmallsBW1 and SmallsBW2, committed 2% of revenue towards SED and ED initiatives with 1.5% of revenue being actually invested (IPPP Partnership , 2017)

Considering the above, the maximum SED and ED contributions that could have been expected to ensure compliance is 2.1% of project's revenue. However, it is also known that in some instances project developers exceeded the targets to increase their competitiveness against other bids. Given that the BBBEE Trust created for WC1 with the purpose of channelling funds towards local community development owns 2.5% of the project company, it would be prudent to assume that WC1 commits 2.5% of its revenue towards SED and ED initiatives.

As indicated during public hearings (Micawber 862 (Pty) Ltd , 2012), and assuming that the allocations still stand, the split between SED and ED contributions by WC1 is as follows:

- SED: 77%
- ED: 20%
- Other/unknown: 3%

Considering that it is not possible to discern what initiatives an outstanding 3% is directed towards, for the [purpose of this study, the known SED and ED figures are normalised. Thus, it is assumed that the split between SED and ED initiatives for WC1 are as follows:

- SED: 79%
- ED: 21%

Following the above assumptions and information with respect to the tariff and electricity generation capacity of WC1, the following table summarises the key assumptions related to the projects SED and ED contributions in absolute values.

Table 3-1: WC1 contribution towards enterprise and socio-economic development

Indicator	Value/contribution	Source
Annual revenue		
Tariff	R1 310/MWh	Bid Window 2 average technology tariff - wind (IPPPP Partnership , 2019)
Average annual electricity generation	316 488 MWh	Tractebel, 2019
Total revenue	R414.6 million	Calculated based on above
Annual contributions – Socio-Economic Development (SED)		
% of project revenue	1.98%	As per assumptions - 79% of 2.5%
Annual equivalent	R8.2 million	Calculated based on above
Annual contributions – Enterprise Development (ED)		
% of project revenue	0.52%	As per assumptions - 21% of 2.5%
Annual equivalent	R2.1 million	Calculated based on above

3.2 Assessment of potential losses associated with the wake effect

Projects that are operating under the REIPPPP have made commitments to allocate a certain amount of their revenue towards community and enterprise development through their ED and SED contributions. Such commitments are calculated as a fixed percentage of a project revenue. The SED and ED percentages are fixed for the duration of the Power Purchase Agreement signed by the facility with the relevant parties. On the other hand, the annual revenue derived by the facility is a function of a tariff and the annual energy produced by the facility, where the former is fixed and the latter - varied. Thus, the amount of SED and ED contributions that REIPPPP projects spend on local community development would vary depending on the amount of energy that the facility produces.

As mentioned earlier in this document, concerns were raised by I&APs that BWF would generate additional wake effects that would negatively impact on the energy production of

WC1 leading to the socio-economic losses for the community. The study conducted by Tractebel (2019) quantified the potential wake effect of BWF on the existing WC1, which is summarised in the table below.

Table 3-2 shows the results of four scenarios that were assessed by Tractebel (2019) using two different wake models. It indicates that in the worst-case scenario, 2.5% of annual energy produced by WC1 would be lost as a result of BWF establishment. This translates into 7 897 MWh of electricity lost on an annual basis during the period when WC1 and BWF operate at the same time.

Table 3-2: Wake effect induced by BWF in relation to WC1 – annual losses

Scenario	Wake model 1		Wake model 2	
	% loss	MWh loss	% loss	MWh loss
Scenario 1: 47 x V90-2.0 MW @ 80 m + 45 x E-103 EP2 / 2.35 MW @ 108m	1.5%	4 894	2.5%	7 897
Scenario 2: 47 x V90-2.0 MW @ 80 m + 45 x E-92 / 2.35 MW @ 108m	1.5%	4 666	2.4%	7 613
Scenario 3: 47 x v90-2.0 MW @ 80 m + 45 x E-92 / 2.35 MW @ 138m	1.2%	3 989	2.2%	7 011
Scenario 4: 47 x v90-2.0 MW @ 80 m + 36 x E-103 EP2 / 2.35 MW @ 108m	0.9%	3 024	1.6%	4 959

(Tractebel, 2019)

As suggested by the developer, the earliest year when BWF would be able to come online if it were to be approved and to reach financial closure in 2021 is 2024. Given that WC1 signed a 20-year PPA, it is left with 14.5 years of operation (from 2020). Thus, both wind farms would be operating at the same time during the period between 2024 and 2035. Therefore, the wake effect induced by BWF will take place only during the ten-year period of 2024 to 2035.

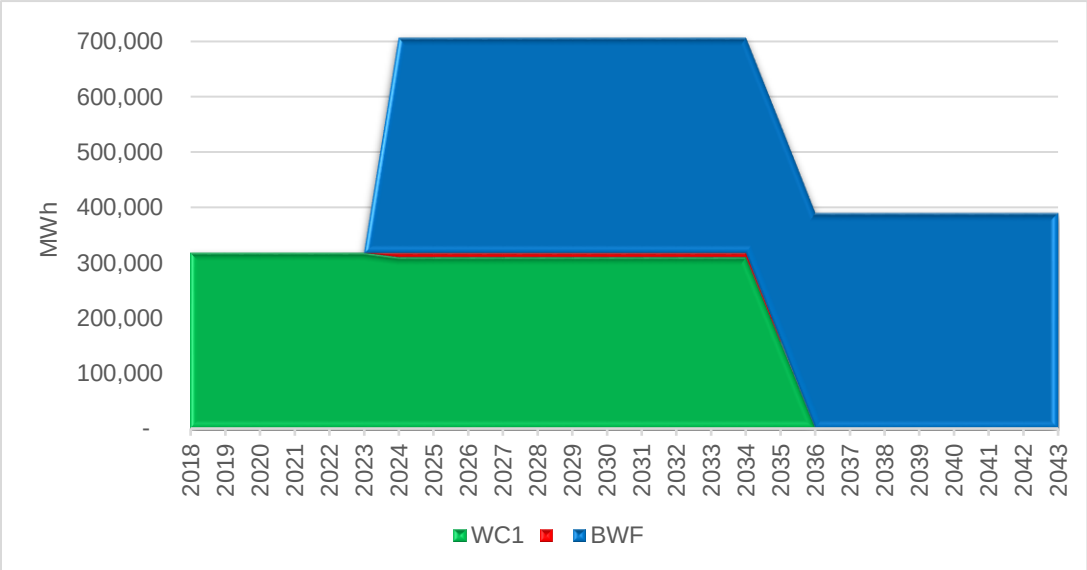

Figure 3-1: Overlap of operations of BWF and WC1 assuming a 20-year PPA

Given the above-mentioned assumptions associated with the reduced energy production by WC1, it is estimated that the annual revenue of the wind energy facility would drop by about R10.3 million – from R414.6 million to R404.3 million. If a 2.5% contribution towards SED and ED initiatives funded by WC1 remains until the end of its PPA, the drop in the annual revenue derived by the wind energy facility will result in the loss of R258 627 of SED and ED contribution per annum. Over the outstanding 14.5 years under the current PPA, this in turn translates into a loss of R2 974 208 that could be directed towards the local community development by WC1.

Table 3-3: Reduced SED and ED spending by WC1 as a result of the wake effect induced by BWF in relation to WC1 (per annum; constant 2019 prices)

	WC1 without BWF	WC1 induced losses	WC1 with BWF
Annual revenue			
Tariff	R1 310/MWh		
Annual energy production (MWh)	316 488	- 7 897	308 591
Annual revenue	R414.6 million	- R10.3 million	R404.3 million
Annual contributions – Socio-Economic Development (SED)			
% of project revenue	1.98%		
Annual equivalent	R8,227,872	- R205,302	R8,022,571
Annual contributions – Enterprise Development (ED)			
% of project revenue	0.52%		
Annual equivalent	R2,137,110	- R53,325	R2,083,785
Annual contributions – SED and ED combined			
% of project revenue	2.5%		
Annual equivalent	R10,364,982	- R258,627	R10,106,355
SED and ED over the outstanding WC1 PPA period of 14.5 years (2020-2035)			
Rand value	R160,657,221	- R2,974,208	R157,683,013

4 COMPARATIVE ANALYSIS

4.1 Brief overview of future alternatives

In order to understand the local socio-economic implications of the potential wake effect associated with the development of BWF in relation to WC1, two possible future alternatives are examined:

- **Alternative 1: No go option**, which implies the existing status of wind energy development in the peninsular with only WC1 being present
- **Alternative 2: Development of BWF**, which implies the approval of BWF and its subsequent creation of a wake effect in relation to WC1

When reviewing the above-mentioned alternatives, it is assumed that all aspects related to these projects remain constant except for the amount of energy that is being generated and subsequently the amount of funds directed toward community development through SED and ED contributions.

4.2 Socio-economic implications for local community development initiatives of future alternatives

The SED and ED contributions associated with each alternative are presented in the table below.

Table 4-1: Alternative comparison (R, constant 2019 prices)

Indicator	Alternative 1: WC1 only	Alternative 2: WC1 and BWF
WC1		
Annual SED and ED contributions	R10,364,982	R10,106,355
Outstanding PPA period	14.5 years	14.5 years
Contributions over the outstanding PPA period	R160,657,221	R157,683,013
BWF		
Annual SED and ED contributions	-	R9,121,362
Outstanding PPA period	-	20 years
Contributions over the outstanding PPA period	-	R182,427,230
Cumulative effect		
Annual SED and ED contributions (2024-2034)	R10,364,982	R19,227,717
Annual SED and ED contributions (2035, WC1 Operates only for half a year)	R5,182,491	R14,174,539
Contributions over the outstanding PPA period	R160,657,221	R340,110,244
Period over which benefits to be derived	2020-2035	2020-2043
Equivalent annual average over the period	R10,710,481	R14,171,260

SED and ED contributions represent a Rand-value of benefits that the local communities can derive from the operations of IPP projects. The following can be highlighted:

- Alternative 1, which implies the retention of the status quo and excludes the development of BWF, will result in R160.7 million worth of socio-economic development and enterprise development funding to be spent in the local community between 2020 and 2035. On average, this equates to about R10.7 million worth of funding to be allocated for various SED and ED initiatives implemented by WC1.
- Alternative 2, which is associated with the operation of both wind farms, will be associated with a total spend of R340.1 million in the local community between 2020 and 2043. During that period, the annual contributions towards SED and ED initiatives would vary between R9.1 million and R19.2 million per annum (constant 2019 prices). However, these contributions will take place for 23 years versus 14.5 years as is the case of Alternative 1 and will also be associated with a higher average annual figure of R14.2 million.

When looking at the total amount of funding that will be allocated towards SED and ED initiatives were both wind farms to operate in the area, the value of socio-economic benefits that the local community would be able to derive through SED and ED initiatives would be more than two times the value that could arise from Alternative 1. Thus, the significance of socio-economic benefits of Alternative 2 is in order of magnitude higher than that of alternative 2.

4.3 Opportunity cost from SED and ED funding perspective

The proposed development of BWF will result in the wake effect that will reduce the ability to WC1 funds its SED and ED initiatives by an average of R258 627 per annum over the next 14.5 years. However, establishment of BWF, as indicated previously, will create an opportunity to spend an additional R9.1 million per annum on SED and ED initiatives for a period of 20 years.

It can thus be deduced that, from the local community perspective, if BWF were to be developed for every R1 of funds that will be lost from WC1, the community would gain R61 from BWF. Therefore, the net effect on the socio-economic development of the local community from SED and ED initiatives perspective would be positive and would be significant.

Were BWF not developed due to the concerns over the potential wake effect exerted on WC1, it would create an opportunity cost to the tune of R179.5 million that could be derived over the next 23-year period. Thus, when considering the alternatives and associated opportunities costs, it can be concluded that, from a community perspective, a total loss of R2 974 208 of funding for SED and ED initiative from WC1 is justifiable given the potential gain of R179 453 023 worth of SED and ED initiatives from BWF.

5 CONCLUDING REMARKS

The purpose of this document was to examine the potential socio-economic implications of the wake effect induced by BWF in relation to WC1. The assessment only dealt with the implications on the funding for SED and ED initiatives that are used by IPPs to develop local communities and enterprises, as such funding is directly linked to the amount of energy produced by facilities.

The assumptions for the potential wake effect were derived from the study conducted by Tractebel (2019). The worst-case scenario was used that predicted a 2.5% loss in annual energy production by WC1 due to the established of BWF. This translated in a reduced generation of electricity of 7 897 MWh per annum. Considering a tariff of R1 310/MWh and a 2.5% contribution toward SED and ED initiatives, this amount translated into a potential annual loss of R258 627 of SED and ED funding. Considering that WC1 has 14.5 years left to operate under the current PPA, this implies a possible underfunding of SED and ED initiatives to the tune of R2 974 208.

While the ability of WC1 to spend on its SED and ED initiatives as a result of the wake effect induced by BWF would be reduced, it is expected to be offset by the injection of funds into the SED and ED initiatives from revenue derived by BWF. Considering the commitments of BWF with respect to SED and ED initiatives, it is expected that a total of R182.4 million will be invested in the local community over 20 years starting from 2024. Thus, the net effect for the local community will be positive and will equate to R179.5 million.

From the above and purely from a local community development opportunity perspective, the establishment of BWF would be highly beneficial. With the establishment of BWF, the local community gains through SED and ED initiatives will more than double over the operational life span of the two wind farms and will far outweigh the potential reduction in benefits that could ensure form induced wake effects.

Net effects on the broader tourism and property values will remain the same as that analysed in the report produced by Urban-Econ in 2019.

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