

NOV/22

Ensuring safety at water dams using predictive algorithms

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AVEVA

BRK at a Glance



Leading platform with a diversified footprint and multiple growth avenues

Company Overview



Leading water and wastewater platform in Brazil



Diversified portfolio with predictable cash flows



Contracted growth to more than double the Company's EBITDA organically

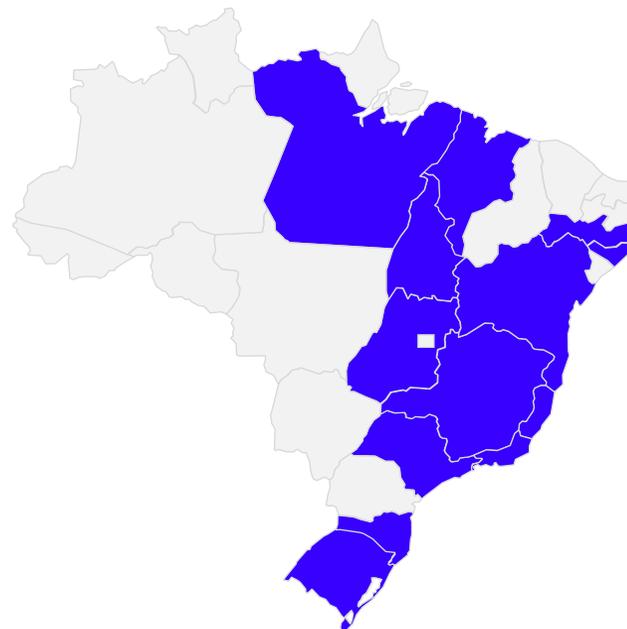


Platform value arising from **seasoned** management team & **world-class** sponsors (Brookfield and FI-FGTS) ready to tap **inorganic growth opportunities**



ESG-oriented purpose and decision-making

Largest National Footprint^{/1}



Positive Momentum



+R\$ 700 bn in investments to reach universalization



Private companies with only **42mm inhabitants** (~17% market share^{/2})



Pipeline of new concessions to achieve **+93mm inhabitants^{/3}** (~60% total private market share)



32

Dams



23

SPEs



16 mm

Inhabitants



+100 Municipalities

13 States



26-Years

Remaining contractual term^{/4}



63%

of concessions still in high-growth stage^{/5}



~115 k^{/6}

Olympic swimming pools of treated wastewater (2021)



~10 k^{/7}

Olympic swimming pools of water saved (2017-21)

Notes: /1 As per geographical footprint: BRK operates in all 5 Brazilian regions and in 13 States; /2 Internal estimate based on population (2021 YE); /3 BNDES pipeline and internal estimate; /4 Average concession tenor weighted by gross revenue; /5 Includes ramp-up assets and assets under development; /6 287 bn liters; /7 21bn liters

What are Dams?



- Irrigation
- Drinking water
- Bath, hygiene
- Recreation hydropower
- Flood control



Importance of Dam's Security

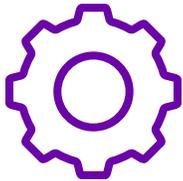
Before



After



Dams Safety and Hydraulic Structures



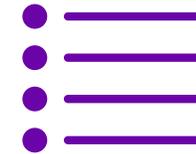
Challenge

- Water shortage problems due to climate changes, dam's malfunctioning or poor maintenance;
- Overflowing due to sudden elevation in the reservoir level, putting the stability of the structures at risk, which could lead to rupture.



Solution

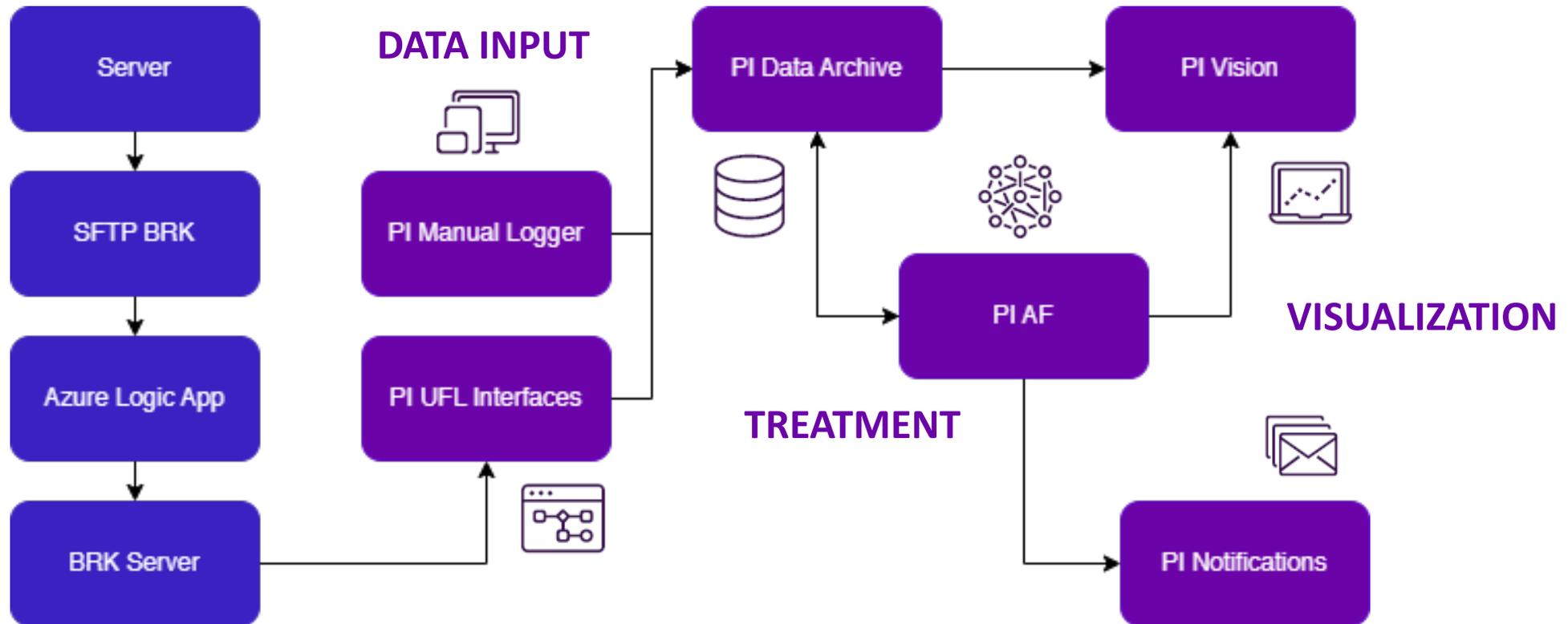
- Developed an algorithm that analyzes the behavior of dams based on data from previous years, allowing us to predict possible water shortages and abundance and work with predictive measures.



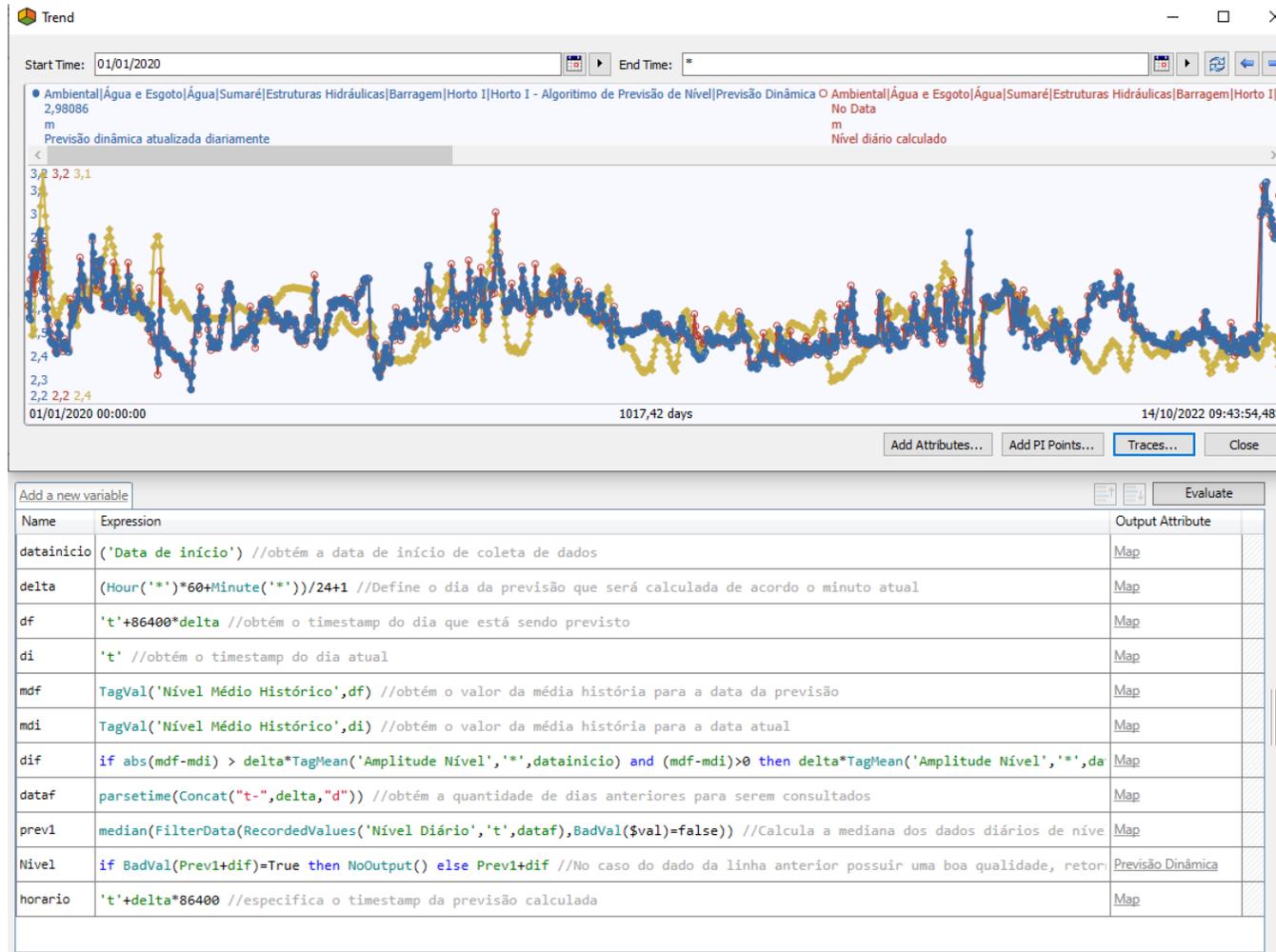
Benefits

- Increased operational efficiency, reduced costs, mobile inspections;
- Facilitate the delivery and consolidation of data from dams and hydraulic structures to increase Dam's Water Security;
- Near real-time Monitoring enhancing preventing maintenance;

AVEVA Product Portfolio use case

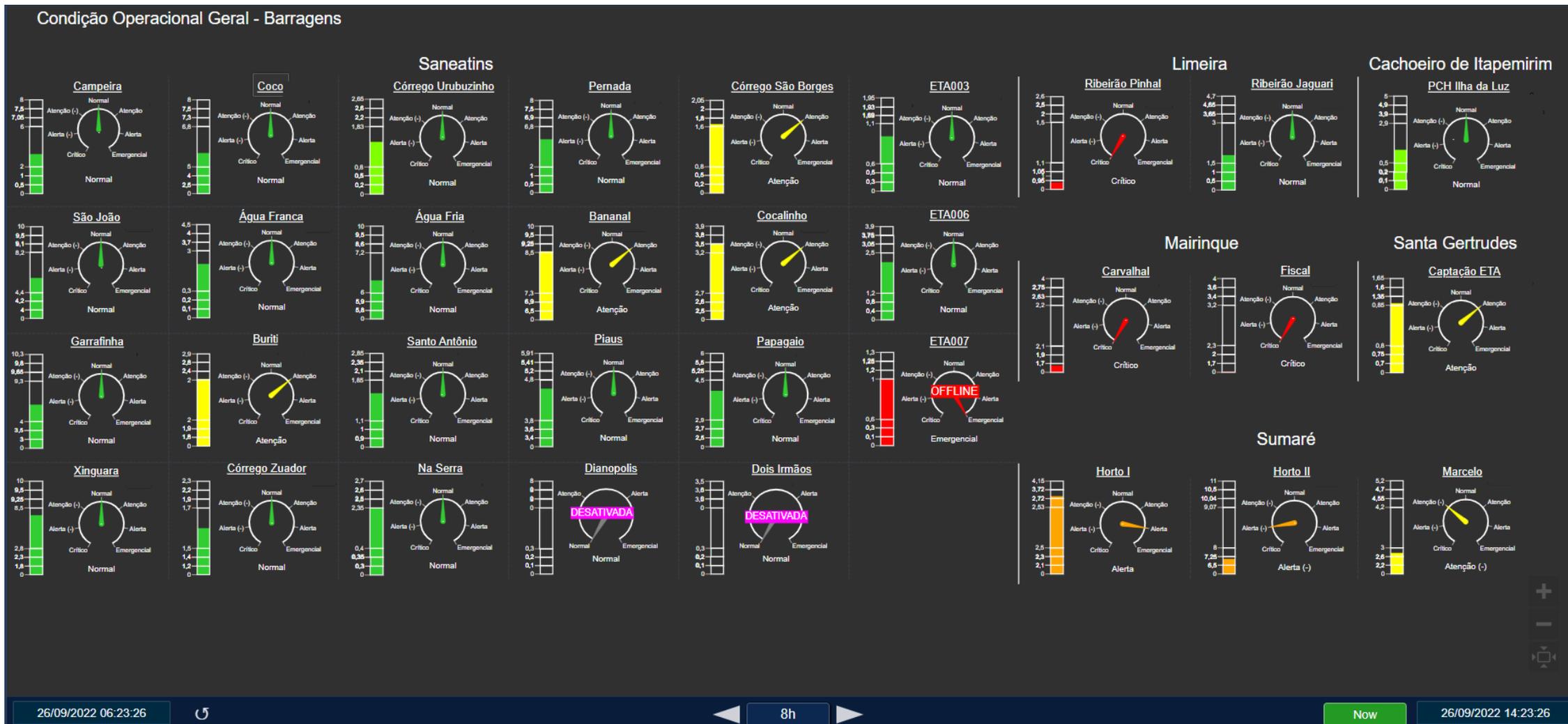


Implementation details



- We use PI AF to prepare data and to predict the behavior of dam levels for the next few days based on historical behavior and the current level.

Implementation details



Implementation details





Barragem Santo Antônio

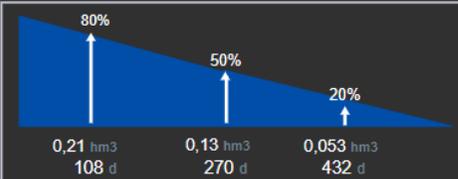
Figueirópolis

DATA:
26/09/2022

Operational Condition



Water Availability



Simular

Estimativa
540 d

Volume %
65 %

Volume Atual
0,26 hm³

Relatório

Description	Value	Units
Término da Construção	2.000	
Extensão da Crista	650	m
Capacidade do reservatório	0.405	hm ³
Vertendo?	Sim	
Descarregador de Fundo	Aberto	
Altura da Estrutura	2,85	m
Cidade	Figueirópolis	
Nome - Responsável pelo input	Isabella Monteiro Silva Galvão; Brend	
E-mail - Responsável pelo input	isabellasilva@brkambiental.com.br; brendhacoelho@b	
Telefone - Responsável pelo input		

Dam Informations



[Galeria de Fotos](#)

Dam Levels

Crista da Estrutura



19/09/2022 7d 26/09/2022

■ NA (Nível da Água)
 ■ Nível Máx. Oper.
 ■ Soleira
 ■ Alerta (+)
 ■ Emergência (+)

■ Nível Min. Oper.
 ■ Alerta (-)
 ■ Crítico (-)

Risk Classifications

CRI - Categoria de Risco



49
MEDIO

DPA - Dano Potencial Associado



11
MEDIO

Data da última inspeção: 10/07/2019 00:00:00

CRI \ DPA	ALTO	MÉDIO	BAIXO
ALTO	A	B	C
MÉDIO	A	C	D
BAIXO	A	D	D

Periculosidade Potencial



68
elevada

Estado Conservação



53
insatisfatório

Índice de Comportamento

IC = 0,4PP + 0,6EC



59
aceitável

META	META
2.019	2.020
42	100

Rainfall

Previsão do tempo



19/09/2022 (inicial) 7d 26/09/2022 (final)

■ Pluviometria
 ■ Vazão de Infiltração

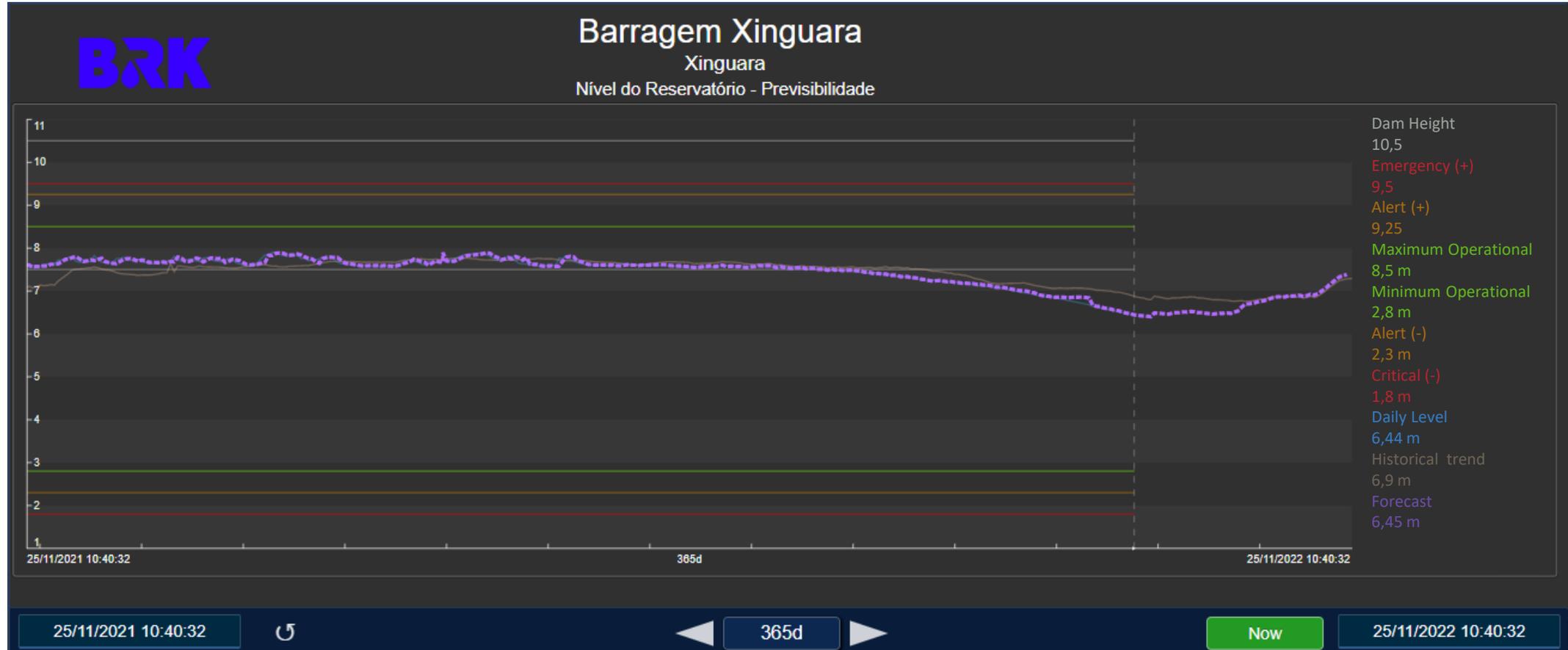
Classe A e B - se enquadra na resolução 236/17

Classe C e D - não se enquadra

Implementation details



Helping with the decision making: drain the water or wait for it to stabilize



Implementation details



Horto II

General Child Elements Attributes Ports Analyses Notification Rules Version

Name	Criteria
Barragem Alerta	Analysis = Barragem Alerta
Barragem Alerta - Nivel Minimo	Analysis = Barragem Alert...
Barragem Emergência	Analysis = Barragem Eme...
Barragem Emergência - Nivel Minimo	Analysis = Barragem Eme...
Falha nos dados	Analysis = Falha nos dado...
Interface com Problema	Analysis = Interface com f...
Valor do nível acima da Crista	Analysis = Valor de Nível...

BRK Ambiental - PI System



Sumaré -
 Horto I atingiu o nível
 Alerta às
 27/09/2022 14:00:10 E. South America Standard Time (GMT-03:00:00)

Informações Relacionadas:

Estrutura:

Horto I

Cidade:

Sumaré

Estado:

São Paulo - SP

Horário:

01/01/1970 00:00:00 E. South America Standard Time (GMT-03:00:00)

Condição Operacional:

Alerta

Nível:

3,14

m

Altura da Crista:

4,15

m

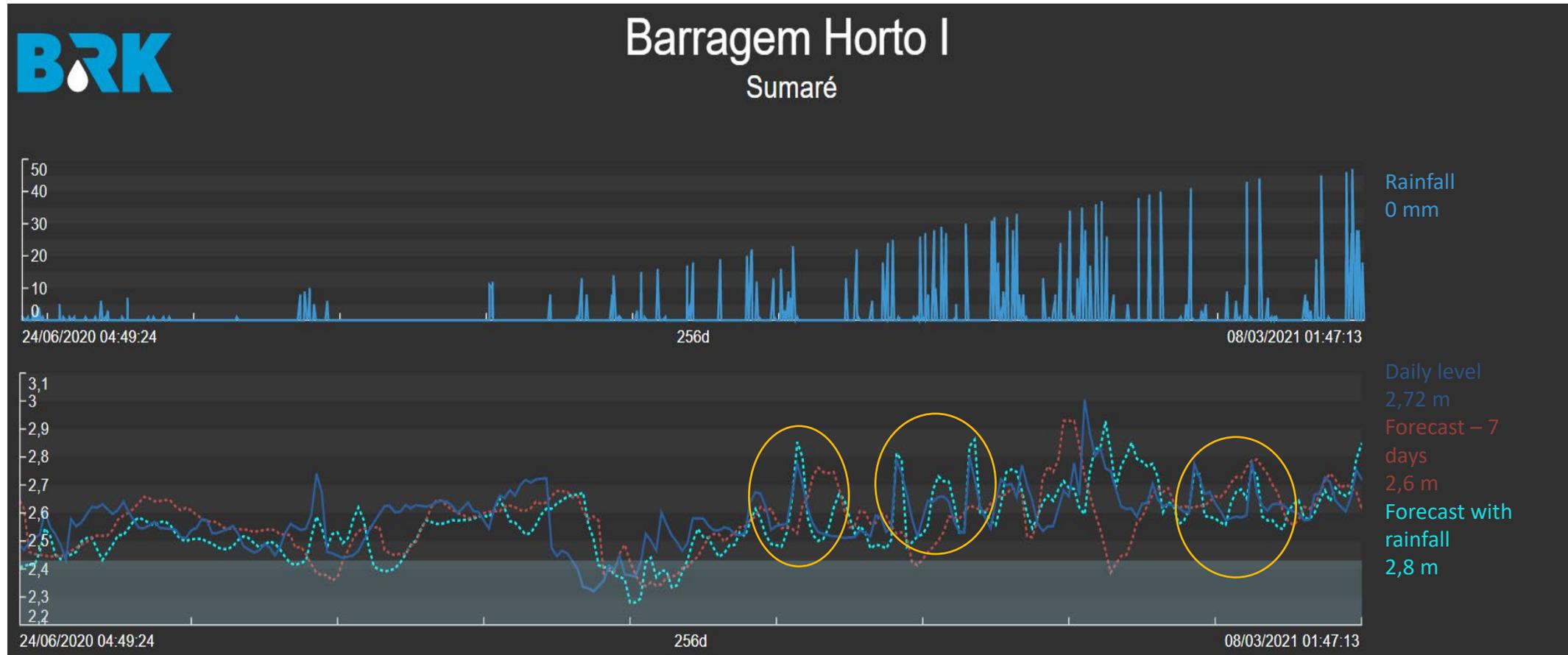
*** Favor verificar e realizar a leitura a cada 2 horas. ***

- In case operational limits are exceeded, emails are sent to dams' responsible

Implementation details



- The use of rainfall data allows greater assertiveness in level peaks



Benefits & Savings



Data

Facilitate the delivery and consolidation of data and store in historical database to increase dam's water security



Near Real Time

Near Real-Time Monitoring enhancing preventive maintenance



Analytics

Analytics to help Quick Decision Making to help prevent any ruptures or overtopping at dams



Avoided Costs

\$ 20 Million for all 32 dams

Conclusion

- With PI System we were able to facilitate the access to all the information necessary for the operation;
- We seek to increase the use of the data we collect in order that our projections become more assertive and we can have more confidence in decision making.
- The solutions implemented make it possible to have more security in the structures and greater guarantee in the availability of water supply.



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Questions?

Please wait for the microphone.
State your name and company.



Please remember to...

Navigate to this session in the mobile app to complete the survey.



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