

### **ANEXO III - 6**

#### **INTEGRACIÓN DE LA PROVINCIA DE DARIÉN AL SIN**

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## **1. Pronósticos de Compra de Energía Darién**

# PRONOSTICOS DE COMPRA DE ENERGIA

## INTEGRACION DE DARIEN AL SIN

### AÑOS 2013 - 2033

#### Compra de Energía (MWh)

| SISTEMAS de GENERACION | 2013   | 2014   | 2015   | 2016   | 2017   | 2018   | 2019   | 2020   | 2021   | 2022   | 2023   |
|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Santa Fe               | 30,886 | 32,538 | 34,190 | 35,841 | 37,493 | 39,145 | 40,797 | 42,449 | 44,101 | 45,753 | 47,405 |
| Yaviza                 | 8,095  | 8,747  | 9,307  | 9,899  | 10,358 | 10,834 | 11,253 | 11,684 | 12,171 | 12,658 | 13,115 |
| Boca de Cupe           | 741    | 774    | 806    | 839    | 871    | 903    | 936    | 968    | 1,000  | 1,033  | 1,065  |
| La Palma               | 4,330  | 4,496  | 4,661  | 4,826  | 4,992  | 5,157  | 5,261  | 5,426  | 5,591  | 5,757  | 5,910  |
| Garachiné              | 2,053  | 2,156  | 2,230  | 2,303  | 2,407  | 2,510  | 2,584  | 2,657  | 2,761  | 2,864  | 2,952  |
| Jaqué                  | 1,348  | 1,437  | 1,527  | 1,616  | 1,706  | 1,796  | 1,885  | 1,975  | 2,065  | 2,154  | 2,244  |
| Tucuti                 | 313    | 334    | 355    | 376    | 397    | 418    | 439    | 460    | 481    | 502    | 522    |
| PROVINCIA DARIEN       | 47,766 | 50,482 | 53,075 | 55,701 | 58,224 | 60,763 | 63,154 | 65,619 | 68,170 | 70,721 | 73,214 |

| SISTEMAS de GENERACION | 2024   | 2025   | 2026   | 2027   | 2028   | 2029   | 2030   | 2031   | 2032   | 2033   |
|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Santa Fe               | 49,057 | 50,709 | 52,361 | 54,012 | 55,664 | 57,316 | 58,968 | 60,620 | 62,272 | 63,924 |
| Yaviza                 | 13,572 | 14,029 | 14,485 | 14,942 | 15,399 | 15,855 | 16,312 | 16,769 | 17,226 | 17,682 |
| Boca de Cupe           | 1,098  | 1,130  | 1,162  | 1,195  | 1,227  | 1,259  | 1,292  | 1,324  | 1,356  | 1,389  |
| La Palma               | 6,063  | 6,216  | 6,369  | 6,522  | 6,675  | 6,828  | 6,981  | 7,134  | 7,287  | 7,440  |
| Garachiné              | 3,041  | 3,129  | 3,218  | 3,306  | 3,395  | 3,483  | 3,572  | 3,660  | 3,748  | 3,837  |
| Jaqué                  | 2,334  | 2,423  | 2,513  | 2,603  | 2,692  | 2,782  | 2,872  | 2,961  | 3,051  | 3,140  |
| Tucuti                 | 543    | 564    | 585    | 606    | 627    | 648    | 669    | 690    | 711    | 732    |
| PROVINCIA DARIEN       | 75,707 | 78,200 | 80,693 | 83,186 | 85,679 | 88,172 | 90,665 | 93,158 | 95,651 | 98,144 |

## **2. Pronósticos de Compra de Energía pertinente**



PRONOSTICOS DE CONSUMO

INTEGRACION DE DARIEN AL SIN

AÑOS 2013 -2033

Compra de Energía (MWh)

Proyeccion de Consumo

CONSUMO ANUAL EN MWh

| Sistema de Generación | 2013   | 2014   | 2015   | 2016   | 2017   | 2018   | 2019   | 2020   | 2021   | 2022   | 2023   |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Santa Fe              | 30,886 | 32,538 | 34,190 | 35,841 | 37,493 | 39,145 | 40,797 | 42,449 | 44,101 | 45,753 | 47,405 |
| Yaviza                | 8,095  | 8,747  | 9,307  | 9,899  | 10,358 | 10,834 | 11,253 | 11,684 | 12,171 | 12,658 | 13,115 |
| Boca de Cupe          | 741    | 774    | 806    | 839    | 871    | 903    | 936    | 968    | 1,000  | 1,033  | 1,065  |
| La Palma              | 4,330  | 4,496  | 4,661  | 4,826  | 4,992  | 5,157  | 5,261  | 5,426  | 5,591  | 5,757  | 5,910  |
| DARIEN AJUSTADO       | 44,053 | 46,554 | 48,963 | 51,405 | 53,714 | 56,039 | 58,247 | 60,527 | 62,864 | 65,201 | 67,495 |

| Sistema de Generación | 2024   | 2025   | 2026   | 2027   | 2028   | 2029   | 2030   | 2031   | 2032   | 2033   |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Santa Fe              | 49,057 | 50,709 | 52,361 | 54,012 | 55,664 | 57,316 | 58,968 | 60,620 | 62,272 | 63,924 |
| Yaviza                | 13,572 | 14,029 | 14,485 | 14,942 | 15,399 | 15,855 | 16,312 | 16,769 | 17,226 | 17,682 |
| Boca de Cupe          | 1,098  | 1,130  | 1,162  | 1,195  | 1,227  | 1,259  | 1,292  | 1,324  | 1,356  | 1,389  |
| La Palma              | 6,063  | 6,216  | 6,369  | 6,522  | 6,675  | 6,828  | 6,981  | 7,134  | 7,287  | 7,440  |
| DARIEN AJUSTADO       | 69,789 | 72,083 | 74,377 | 76,671 | 78,965 | 81,259 | 83,553 | 85,847 | 88,141 | 90,435 |

\* Representa el consumo Circuito 210 Meteti, Santa Fe , Agua Fria y Torti

### **3. Requerimientos de DMAX**

# REQUERIMIENTOS DE DMAX

## INTEGRACION DE DARIEN AL SIN

AÑOS 2018 - 2033

Proyección de Potencia Máxima (kW) - No Coincidente

Escenario:

Desaparece el Plantel de Boca de Cupe y su carga es alimentada desde Yaviza

| Subestación    | Circuito | 2018   | 2019    | 2020    | 2021    | 2022    | 2023    | 2024    | 2025    |
|----------------|----------|--------|---------|---------|---------|---------|---------|---------|---------|
| Santa Fe Total | 210      | 6831.7 | 7120.0  | 7408.3  | 7696.6  | 7984.9  | 8273.2  | 8561.5  | 8849.8  |
| Yaviza Total   | 215      | 2012.4 | 2089.7  | 2169.0  | 2257.7  | 2346.4  | 2430.0  | 2513.7  | 2597.3  |
| La Palma Total | 220      | 950.5  | 969.6   | 1000.1  | 1030.5  | 1061.0  | 1089.2  | 1117.4  | 1145.6  |
|                |          |        |         |         |         |         |         |         |         |
| TOTAL (kW)     |          | 9794.6 | 10179.3 | 10577.4 | 10984.8 | 11392.3 | 11792.4 | 12192.5 | 12592.6 |
| TOTAL (MW)     |          | 9.8    | 10.2    | 10.6    | 11.0    | 11.4    | 11.8    | 12.2    | 12.6    |

| Subestación    | Circuito | 2026    | 2027    | 2028    | 2029    | 2030    | 2031    | 2032    | 2033    |
|----------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Santa Fe Total | 210      | 9138.1  | 9426.4  | 9714.7  | 10003.0 | 10291.3 | 10579.6 | 10867.9 | 11156.1 |
| Yaviza Total   | 215      | 2680.9  | 2764.5  | 2848.1  | 2931.7  | 3015.3  | 3099.0  | 3182.6  | 3266.2  |
| La Palma Total | 220      | 1173.8  | 1202.0  | 1230.2  | 1258.4  | 1286.6  | 1314.8  | 1343.0  | 1371.2  |
|                |          |         |         |         |         |         |         |         |         |
| TOTAL (kW)     |          | 12992.8 | 13392.9 | 13793.0 | 14193.1 | 14593.2 | 14993.3 | 15393.4 | 15793.5 |
| TOTAL (MW)     |          | 13.0    | 13.4    | 13.8    | 14.2    | 14.6    | 15.0    | 15.4    | 15.8    |



#### **4. Requerimientos de DMIN**

REQUERIMIENTOS DE DMIN

INTEGRACION DE DARIEN AL SIN  
AÑOS 2018 -2033

Proyección de Potencia Mínima (kW) - No Coincidente  
Escenario:  
Desaparece el Plantel de Boca de Cupe y su carga es alimentada desde Yaviza

| Subestación    | Circuito | 2018   | 2019   | 2020   | 2021   | 2022   | 2023   | 2024   | 2025   |
|----------------|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Santa Fe Total | 210      | 2836.4 | 3042.2 | 3248.0 | 3453.8 | 3659.6 | 3865.4 | 4071.2 | 4277.0 |
| Yaviza Total   | 215      | 1008.8 | 1101.2 | 1193.7 | 1286.1 | 1378.6 | 1471.0 | 1563.5 | 1655.9 |
| La Palma Total | 220      | 359.3  | 383.3  | 407.2  | 431.1  | 455.0  | 479.0  | 502.9  | 526.8  |
|                |          |        |        |        |        |        |        |        |        |
| TOTAL (kW)     |          | 4204.5 | 4526.7 | 4848.8 | 5171.0 | 5493.2 | 5815.4 | 6137.5 | 6459.7 |
| TOTAL (MW)     |          | 4.2    | 4.5    | 4.8    | 5.2    | 5.5    | 5.8    | 6.1    | 6.5    |

| Subestación    | Circuito | 2026   | 2027   | 2028   | 2029   | 2030   | 2031   | 2032   | 2033   |
|----------------|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Santa Fe Total | 210      | 4482.8 | 4688.6 | 4894.4 | 5100.2 | 5306.0 | 5511.8 | 5717.6 | 5923.4 |
| Yaviza Total   | 215      | 1748.4 | 1840.8 | 1933.3 | 2025.7 | 2118.1 | 2210.6 | 2303.0 | 2395.5 |
| La Palma Total | 220      | 550.7  | 574.7  | 598.6  | 622.5  | 646.4  | 670.4  | 694.3  | 718.2  |
|                |          |        |        |        |        |        |        |        |        |
| TOTAL (kW)     |          | 6781.9 | 7104.1 | 7426.2 | 7748.4 | 8070.6 | 8392.7 | 8714.9 | 9037.1 |
| TOTAL (MW)     |          | 6.8    | 7.1    | 7.4    | 7.7    | 8.1    | 8.4    | 8.7    | 9.0    |

## **5. Caracterización de la Generación Existente en Darién**

# CARACTERIZACION DE LA GENERACION EXISTENTE EN DARIEN

AÑO 2013

| No. | SUB - SISTEMAS    |           | P. Efectiva |        | Combustible    | Consumo Especifico |                                  | Costos Variables O & M |                                   | Costos Evitados por kwh Generado |                            |
|-----|-------------------|-----------|-------------|--------|----------------|--------------------|----------------------------------|------------------------|-----------------------------------|----------------------------------|----------------------------|
|     | NOMBRE            | CENTRAL   | #           | Unidad | Unitaria<br>KW | Total<br>KW        | Unitario<br>Ponderado<br>(L/kwh) | Central                | Unitario<br>Ponderado<br>(\$/kwh) | Central                          | Total<br>O & M<br>(\$/kwh) |
| 1   | SANTA FE - YAVIZA | SANTA FE  | 1           |        | 1,200          |                    | 0.26                             | 0.0520                 | 0.0105                            | 0.0021                           |                            |
|     |                   |           | 2           |        | 1,200          |                    | 0.26                             | 0.0520                 | 0.0105                            | 0.0021                           |                            |
|     |                   |           | 3           |        | 1,200          |                    | 0.26                             | 0.0520                 | 0.0105                            | 0.0021                           |                            |
|     |                   |           | 4           |        | 1,200          |                    | 0.26                             | 0.0520                 | 0.0105                            | 0.0021                           |                            |
|     |                   |           | 5           |        | 1,195          | 5,995              | 0.26                             | 0.0518                 | 0.0105                            | 0.0021                           | 0.1820                     |
| 2   |                   | YAVIZA    | 1           |        | 1,250          |                    | 0.26                             | 0.0986                 | 0.0105                            | 0.0040                           |                            |
|     |                   |           | 2           |        | 910            |                    | 0.26                             | 0.0718                 | 0.0105                            | 0.0029                           |                            |
|     |                   |           | 3           |        | 1,135          | 3,295              | 0.26                             | 0.0896                 | 0.0105                            | 0.0036                           | 0.2344                     |
|     |                   |           | 1           |        | 440            |                    | 0.33                             | 0.0531                 | 0.0149                            | 0.0024                           |                            |
|     |                   |           | 2           |        | 559            |                    | 0.33                             | 0.0674                 | 0.0149                            | 0.0030                           |                            |
| 3   |                   | LA PALMA  | 3           |        | 675            |                    | 0.33                             | 0.0814                 | 0.0149                            | 0.0037                           |                            |
|     |                   |           | 4           |        | 1,063          | 2,737              | 0.26                             | 0.1010                 | 0.0105                            | 0.0041                           | 0.2739                     |
|     |                   |           | 1           |        | 365            |                    | 0.33                             | 0.1308                 | 0.0149                            | 0.0059                           |                            |
|     |                   |           | 2           |        | 278            |                    | 0.33                             | 0.0996                 | 0.0161                            | 0.0049                           |                            |
|     |                   |           | 3           |        | 278            | 921                | 0.33                             | 0.0996                 | 0.0161                            | 0.0049                           | 0.2998                     |
| 4   |                   | GARACHINE | 1           |        | 165            |                    | 0.39                             | 0.0935                 | 0.0177                            | 0.0042                           |                            |
|     |                   |           | 2           |        | 123            |                    | 0.39                             | 0.0695                 | 0.0177                            | 0.0032                           |                            |
|     |                   |           | 3           |        | 123            |                    | 0.39                             | 0.0695                 | 0.0177                            | 0.0032                           |                            |
|     |                   |           | 4           |        | 278            | 688                | 0.39                             | 0.1575                 | 0.0161                            | 0.0065                           | 0.3529                     |
|     |                   |           | 1           |        | 55             |                    | 0.51                             | 0.1700                 | 0.0300                            | 0.0100                           |                            |
| 5   |                   | TUCUTI    | 2           |        | 55             |                    | 0.51                             | 0.1700                 | 0.0300                            | 0.0100                           |                            |
|     |                   |           | 3           |        | 55             | 164                | 0.51                             | 0.1700                 | 0.0300                            | 0.0100                           | 0.4692                     |
|     |                   |           | 1           |        | 100            |                    | 0.39                             | 0.1741                 | 0.0177                            | 0.0079                           |                            |
|     |                   |           | 2           |        | 124            | 224                | 0.39                             | 0.2159                 | 0.0177                            | 0.0098                           | 0.3535                     |
|     |                   |           |             |        |                |                    |                                  |                        |                                   |                                  |                            |

| COMBUSTIBLE | \$/GI   | \$/L    |
|-------------|---------|---------|
| BUNKER      | 2.49703 | 0.65972 |
| Diesel      | 3.25926 | 0.86110 |

## **6. Pronósticos de consumo de Combustibles pertinente**



# PRONOSTICOS DE CONSUMO DE COMBUSTIBLES

## INTEGRACION DE DARIEN AL SIN

### AÑOS 2013 -2033

COMBUSTIBLE CONSUMIDO EN GENERACION  
Proyección de Consumo

CONSUMO ANUAL de COMBUSTIBLES EN LITROS (l)

| Sistema de Generación | 2013       | 2014       | 2015       | 2016       | 2017       | 2018       | 2019       | 2020       | 2021       | 2022       | 2023       |
|-----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Santa Fe              | 8,030,284  | 8,459,780  | 8,889,276  | 9,318,772  | 9,748,268  | 10,177,764 | 10,607,261 | 11,036,757 | 11,466,253 | 11,895,749 | 12,325,248 |
| Yaviza                | 2,104,729  | 2,274,290  | 2,419,735  | 2,573,707  | 2,693,050  | 2,816,773  | 2,925,781  | 3,037,879  | 3,164,520  | 3,291,160  | 3,409,911  |
| Boca de Cupe          | 289,152    | 301,777    | 314,402    | 327,026    | 339,651    | 352,276    | 364,901    | 377,526    | 390,151    | 402,775    | 415,400    |
| La Palma              | 1,311,299  | 1,361,372  | 1,411,446  | 1,461,520  | 1,511,594  | 1,561,667  | 1,593,019  | 1,643,092  | 1,693,166  | 1,743,240  | 1,789,569  |
| DARIEN AJUSTADO       | 11,735,463 | 12,397,219 | 13,034,859 | 13,681,025 | 14,292,563 | 14,908,481 | 15,490,961 | 16,095,254 | 16,714,089 | 17,332,925 | 17,940,129 |

| Sistema de Generación | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       | 2030       | 2031       | 2032       | 2033       |
|-----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Santa Fe              | 12,754,747 | 13,184,246 | 13,613,745 | 14,043,244 | 14,472,743 | 14,902,242 | 15,331,741 | 15,761,241 | 16,190,740 | 16,620,239 |
| Yaviza                | 3,528,663  | 3,647,414  | 3,766,165  | 3,884,916  | 4,003,667  | 4,122,419  | 4,241,170  | 4,359,921  | 4,478,672  | 4,597,423  |
| Boca de Cupe          | 428,025    | 440,650    | 453,275    | 465,900    | 478,524    | 491,149    | 503,774    | 516,399    | 529,024    | 541,649    |
| La Palma              | 1,835,899  | 1,882,228  | 1,928,557  | 1,974,886  | 2,021,216  | 2,067,545  | 2,113,874  | 2,160,203  | 2,206,533  | 2,252,862  |
| DARIEN AJUSTADO       | 18,547,334 | 19,154,538 | 19,761,742 | 20,368,947 | 20,976,151 | 21,583,355 | 22,190,560 | 22,797,764 | 23,404,968 | 24,012,173 |

|      |      |
|------|------|
| Tasa | 3.0% |
|      | 3.0% |
|      | 2.7% |
|      | 2.3% |
|      | 3.0% |

\* Representa el consumo Circuito 210 Meteti, Santa Fe , Agua Fría y Torti

## **7. Costos Evitados de Generación Aislada**

# COSTOS EVITADOS POR GENERACION AISLADA

## INTEGRACION DE DARIEN AL SIN

### AÑO 2018 - 2033

COSTOS VARIABLES DE GENERACION DE ENERGIA EVITADOS  
EN \$ 2013'

En Miles de Dolares ( \$ '000)

| Sistema de Generación | 2018   | 2019   | 2020   | 2021   | 2022   | 2023   | 2024   | 2025   |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Santa Fe              | 7,125  | 7,426  | 7,727  | 8,028  | 8,328  | 8,629  | 8,930  | 9,230  |
| Yaviza                | 2,539  | 2,638  | 2,739  | 2,853  | 2,967  | 3,074  | 3,181  | 3,288  |
| Boca de Cupe          | 319    | 331    | 342    | 354    | 365    | 377    | 388    | 399    |
| La Palma              | 1,413  | 1,441  | 1,486  | 1,532  | 1,577  | 1,619  | 1,661  | 1,703  |
| DARIEN AJUSTADO       | 11,397 | 11,836 | 12,294 | 12,766 | 13,237 | 13,698 | 14,160 | 14,621 |

| Sistema de Generación | 2026   | 2027   | 2028   | 2029   | 2030   | 2031   | 2032   | 2033   |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Santa Fe              | 9,531  | 9,832  | 10,132 | 10,433 | 10,734 | 11,034 | 11,335 | 11,636 |
| Yaviza                | 3,395  | 3,502  | 3,609  | 3,716  | 3,823  | 3,930  | 4,037  | 4,145  |
| Boca de Cupe          | 411    | 422    | 434    | 445    | 457    | 468    | 480    | 491    |
| La Palma              | 1,745  | 1,787  | 1,829  | 1,870  | 1,912  | 1,954  | 1,996  | 2,038  |
| DARIEN AJUSTADO       | 15,082 | 15,543 | 16,004 | 16,465 | 16,926 | 17,387 | 17,848 | 18,309 |

**8. L/T 115 kV Panamá II – Metetí y S/E asociadas**

**LINEA DE TRANSMISION DE 115 KV A METETI - DARIEN**  
**CIRCUITO SENCILLO CON TORRE PARA DOBLE CIRCUITO**  
**CONDUCTOR 636 ACSR**

| DESCRIPCION                     | CANTIDAD<br>KM | COSTO<br>UNITARIO<br>LOCAL | COSTO<br>UNITARIO<br>EXTR. | COSTO<br>TOTAL<br>LOCAL | COSTO<br>TOTAL<br>EXTR. | COSTO<br>TOTAL   |
|---------------------------------|----------------|----------------------------|----------------------------|-------------------------|-------------------------|------------------|
| 1. Aisladores y herrajes        | 215.00         |                            | 3.81                       | 0.00                    | 818.72                  | 818.72           |
| 2. Conductores y accesorios     | 215.00         |                            | 22.65                      | 0.00                    | 4,869.51                | 4,869.51         |
| 3. Hilo de Guarda y accesorios  | 215.00         |                            | 2.10                       | 0.00                    | 451.00                  | 451.00           |
| 4. OPGW y accesorios            | 215.00         |                            | 7.23                       | 0.00                    | 1,555.31                | 1,555.31         |
| 4. Sistema puesta a tierra      | 215.00         |                            | 3.60                       | 0.00                    | 773.64                  | 773.64           |
| 5. Torres y accesorios          | 215.00         |                            | 69.35                      | 0.00                    | 14,909.65               | 14,909.65        |
| <b>Sub-Total Materiales</b>     |                |                            |                            | <b>0.00</b>             | <b>23,377.83</b>        | <b>23,377.83</b> |
| 6. Fundaciones                  | 215.00         | 0.30                       |                            | 7,067.31                |                         | 7,067.31         |
| 7. Derecho de vía               | 215.00         | 0.01                       |                            | 257.27                  |                         | 257.27           |
| 8. Montaje                      | 215.00         | 0.27                       |                            | 6,287.64                |                         | 6,287.64         |
| <b>Total Costo Base</b>         |                |                            |                            | <b>13,612.21</b>        | <b>23,377.83</b>        | <b>36,990.03</b> |
| 9. Contingencias                | 0.10           |                            |                            | 1,361.22                | 2,337.78                | 3,699.00         |
| 10. Ingeniería y Administración | 0.08           |                            |                            | 2,959.20                |                         | 2,959.20         |
| 11. EIA B/. * kM                | 2.50           |                            |                            | 537.50                  |                         | 537.50           |
| 12. Diseño                      | 0.03           |                            |                            | 1,109.70                |                         | 1,109.70         |
| 13. Inspección                  | 0.03           |                            |                            | 1,109.70                |                         | 1,109.70         |
| 14. Indemnización B/. * kM      | 15.00          |                            |                            | 3,225.00                |                         | 3,225.00         |
| 15. IDC                         | 0.06           |                            |                            | 2,219.40                |                         | 2,219.40         |
| <b>COSTO TOTAL</b>              |                |                            |                            | <b>26,133.94</b>        | <b>25,715.61</b>        | <b>51,849.54</b> |

**DESGLOSE DE COSTO POR ITEM**

|                                                    |           |
|----------------------------------------------------|-----------|
| <b>Costo de torres de acero (B/. / KM)</b>         | 37,652.36 |
| <b>Costo de aisladores y herrajes (B/. /km)</b>    | 3,345.00  |
| <b>Costo de conductores (B/. /km)</b>              | 14,816.67 |
| <b>Costo total hilo de guarda y acc. (B/. /km)</b> |           |
| Costo total para OPGW                              | 6,712.62  |
| Costo total de 7N8 ALWD                            | 1,078.25  |
| <b>Costo de sist. puesta a tierra (B/. /km)</b>    | 2,400.00  |
| <b>Derecho de via (B/. /km)</b>                    | 587.97    |
| % DdV/costo de materiales                          | 0.0089    |
| <b>Montaje</b>                                     | 18,215.40 |
| % montaje/costo de materiales                      | 0.2760    |
| <b>Fundaciones</b>                                 | 6,873.21  |
| % fundaciones/costo de materiales                  | 0.1041    |



| S/E METETI 115 KV |                                                                                          |          |                                                                              |                      |
|-------------------|------------------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------|----------------------|
| ITEM N°           | DESCRIPCION                                                                              | Cantidad | Costo Unitario Suministro B/.                                                | Total Suministro B/. |
| 1                 | Interruptores 115 KV                                                                     | 2        | 72,450                                                                       | 144,900              |
| 2                 | Cuchillas Tripolares Motorizadas con cuchilla a tierra 115 KV                            | 1        | 15,000                                                                       | 15,000               |
| 3                 | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 115 KV                            | 4        | 11,000                                                                       | 44,000               |
| 4                 | Cuchillas Tripolares manuales sin cuchilla a tierra 115 KV                               | -        | 9,000                                                                        | -                    |
| 5                 | Cuchillas Tripolares manuales con cuchilla a tierra 115 KV                               | -        | 12,300                                                                       | -                    |
| 6                 | Transformadores 115/230 KV 100/120/150 MVA                                               | -        | 2,000,000                                                                    | -                    |
| 7                 | Autotransformador de Potencia 230/115/13.8 kV y 105/140/175 MVA                          | -        | 3,200,000                                                                    | -                    |
| 8                 | Sistema de extinción de incendio para transformadores                                    | -        | 218,000                                                                      | -                    |
| 9                 | Reactor Trifásico de 20 MVAR, 230 kV                                                     | -        | 1,400,000                                                                    | -                    |
| 10                | Cuchillas Tripolares Motorizadas con cuchilla a tierra 230 KV para Reactor               | -        | 50,000                                                                       | -                    |
| 11                | Interruptores 230 KV, de disparo monopolar                                               | -        | 115,000                                                                      | -                    |
| 12                | Interruptores 230 KV, de disparo tripolar                                                | -        | 148,732                                                                      | -                    |
| 13                | Cuchillas Tripolares Motorizadas con cuchilla a tierra 230 KV                            | -        | 21,000                                                                       | -                    |
| 14                | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 230 KV                            | -        | 17,000                                                                       | -                    |
| 15                | Cuchillas Tripolares manuales sin cuchilla a tierra 230 KV                               | -        | 14,000                                                                       | -                    |
| 16                | Pararrayos 192 KV                                                                        | -        | 6,000                                                                        | -                    |
| 17                | Pararrayos 96 KV                                                                         | 3        | 4,000                                                                        | 12,000               |
| 18                | CT 230 KV                                                                                | -        | 17,000                                                                       | -                    |
| 19                | CT 115 KV                                                                                | 12       | 13,000                                                                       | 156,000              |
| 20                | PT 230 KV                                                                                | -        | 17,000                                                                       | -                    |
| 21                | PT 115 KV                                                                                | 3        | 13,000                                                                       | 39,000               |
| 22                | PT de Potencia y Potencial 115 kV                                                        | -        | 35,870                                                                       | -                    |
| 23                | Autotransformador de Potencia 230/115/13.8 kV y 350 MVA                                  | -        | 3,500,000                                                                    | -                    |
| 24                | Autotransformador de Potencia 230/115/34.5 kV y 70 MVA                                   | -        | 2,700,000                                                                    | -                    |
| 25                | Autotransformador de Potencia 230/115/34.5 kV y 50 MVA                                   | -        | 2,150,000                                                                    | -                    |
| 26                | Transformador de Potencia 115/34.5 kV y 50 MVA                                           | 1        | 1,600,000                                                                    | 1,600,000            |
| 27                | Transformador de Puesta a Tierra 5 MVA , 34.5 kV                                         | -        | 160,000                                                                      | -                    |
| 28                | Banco de Capacitores 230 kV 30 MVAR                                                      | -        | 605,000                                                                      | -                    |
| 29                | Banco de Capacitores 115 kV 15 MVAR                                                      | -        | 155,000                                                                      | -                    |
| 30                | Interruptores 115 KV, Tripolar con seccionamiento y puesta a tierra incorporado          | -        | 74,065                                                                       | -                    |
| 31                | Interruptores 34.5 KV                                                                    | -        | 55,000                                                                       | -                    |
| 32                | Cuchillas Tripolares manuales sin cuchilla a tierra 34.5 KV                              | -        | 8,000                                                                        | -                    |
| 33                | Cuchillas Tripolares manuales con cuchilla a tierra 34.5 KV                              | -        | 11,000                                                                       | -                    |
| 34                | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 34.5 KV                           | -        | 9,500                                                                        | -                    |
| 35                | Reactor Trifásico de 20 MVAR, 34.5 kV                                                    | -        | 480,000                                                                      | -                    |
| 36                | Pararrayos 34.5 KV                                                                       | -        | 1,600                                                                        | -                    |
| 37                | PT 34.5KV                                                                                | -        | 7,000                                                                        | -                    |
| 38                | CT 34.5 KV                                                                               | -        | 6,920                                                                        | -                    |
|                   | <b>SUBTOTAL DE EQUIPOS DE COSTOS UNITARIO</b>                                            |          |                                                                              | <b>2,010,900</b>     |
|                   | <b>SUBTOTAL DE EQUIPOS DE COSTOS UNITARIO SIN EQUIPOS DE TRANSFORMACIÓN Y REGULACIÓN</b> |          |                                                                              | <b>410,900</b>       |
|                   |                                                                                          |          | % Sobre ítemes de Costos Unitario Sin Equipos de Transformación y Regulación |                      |
| 39                | Sistema de puesta a tierra                                                               | lote     | 5.00                                                                         | 20,545               |
| 40                | Servicios auxiliares                                                                     | lote     | 12.00                                                                        | 49,308               |
| 41                | Herrajes, Estructuras y Soportes                                                         | lote     | 50.00                                                                        | 205,450              |
| 42                | Equipo de Protección, Control y Monitoreo                                                | lote     | 70.00                                                                        | 287,630              |
| 43                | Equipo de Comunicaciones                                                                 | lote     | 15.00                                                                        | 61,635               |
| 44                | Cables, conductores, ductos, etc.                                                        | lote     | 25.00                                                                        | 102,725              |
|                   | <b>SUB TOTAL SUMINISTRO</b>                                                              |          |                                                                              | <b>2,738,192</b>     |
|                   |                                                                                          |          | % sobre Subtotal Suministro                                                  |                      |
| 45                | Montaje                                                                                  | lote     | 15.00                                                                        | 410,729              |
| 46                | Obras Civiles Generales                                                                  | lote     | 25.00                                                                        | 684,548              |
|                   | <b>TOTAL COSTO BASE</b>                                                                  |          |                                                                              | <b>3,833,468</b>     |
|                   |                                                                                          |          | % sobre Total Costo Base                                                     |                      |
| 47                | Contingencias                                                                            |          | 5.00                                                                         | 191,673              |
| 48                | Diseño                                                                                   |          | 3.00                                                                         | 115,004              |
| 49                | Ingeniería                                                                               |          | 4.00                                                                         | 153,339              |
| 50                | Administración                                                                           |          | 4.00                                                                         | 153,339              |
| 51                | Inspección                                                                               |          | 3.00                                                                         | 115,004              |
| 52                | IDC                                                                                      |          | 6.00                                                                         | 230,008              |
| 53                | EIA                                                                                      |          | 0.19                                                                         | 7,284                |
| 54                | Terrenos                                                                                 | m2       | 0.0                                                                          | 60,000               |
|                   | <b>COSTO TOTAL</b>                                                                       |          |                                                                              | <b>4,859,119</b>     |



## ADICION 2 INT. 115 KV S/E PANAMA II

| ITEM N°                                                                           | DESCRIPCION                                                                     | Cantidad | Costo Unitario Suministro B/.                                                | Total Suministro B/. |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------|----------------------|
| 1                                                                                 | Interruptores 115 KV                                                            | 2        | 72,450                                                                       | 144,900              |
| 2                                                                                 | Cuchillas Tripolares Motorizadas con cuchilla a tierra 115 KV                   | 1        | 15,000                                                                       | 15,000               |
| 3                                                                                 | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 115 KV                   | 4        | 11,000                                                                       | 44,000               |
| 4                                                                                 | Cuchillas Tripolares manuales sin cuchilla a tierra 115 KV                      | -        | 9,000                                                                        | -                    |
| 5                                                                                 | Cuchillas Tripolares manuales con cuchilla a tierra 115 KV                      | -        | 12,300                                                                       | -                    |
| 6                                                                                 | Transformadores 115/230 KV 100/120/150 MVA                                      | -        | 2,000,000                                                                    | -                    |
| 7                                                                                 | Autotransformador de Potencia 230/115/13.8 kV y 105/140/175 MVA                 | -        | 3,200,000                                                                    | -                    |
| 8                                                                                 | Sistema de extinción de incendio para transformadores                           | -        | 218,000                                                                      | -                    |
| 9                                                                                 | Reactor Trifásico de 20 MVAR, 230 kV                                            | -        | 1,400,000                                                                    | -                    |
| 10                                                                                | Cuchillas Tripolares Motorizadas con cuchilla a tierra 230 KV para Reactor      | -        | 50,000                                                                       | -                    |
| 11                                                                                | Interruptores 230 KV, de disparo monopolar                                      | -        | 115,000                                                                      | -                    |
| 12                                                                                | Interruptores 230 KV, de disparo tripolar                                       | -        | 148,732                                                                      | -                    |
| 13                                                                                | Cuchillas Tripolares Motorizadas con cuchilla a tierra 230 KV                   | -        | 21,000                                                                       | -                    |
| 14                                                                                | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 230 KV                   | -        | 17,000                                                                       | -                    |
| 15                                                                                | Cuchillas Tripolares manuales sin cuchilla a tierra 230 KV                      | -        | 14,000                                                                       | -                    |
| 16                                                                                | Pararrayos 192 KV                                                               | -        | 6,000                                                                        | -                    |
| 17                                                                                | Pararrayos 96 KV                                                                | 3        | 4,000                                                                        | 12,000               |
| 18                                                                                | CT 230 KV                                                                       | -        | 17,000                                                                       | -                    |
| 19                                                                                | CT 115 KV                                                                       | 12       | 13,000                                                                       | 156,000              |
| 20                                                                                | PT 230 KV                                                                       | -        | 17,000                                                                       | -                    |
| 21                                                                                | PT 115 KV                                                                       | 3        | 13,000                                                                       | 39,000               |
| 22                                                                                | PT de Potencia y Potencial 115 kV                                               | -        | 35,870                                                                       | -                    |
| 23                                                                                | Autotransformador de Potencia 230/115/13.8 kV y 350 MVA                         | -        | 3,500,000                                                                    | -                    |
| 24                                                                                | Autotransformador de Potencia 230/115/34.5 kV y 70 MVA                          | -        | 2,700,000                                                                    | -                    |
| 25                                                                                | Autotransformador de Potencia 230/115/34.5 kV y 50 MVA                          | -        | 2,150,000                                                                    | -                    |
| 26                                                                                | Transformador de Potencia 115/4,16 kV. y 24 MVA                                 | -        | 810,000                                                                      | -                    |
| 27                                                                                | Transformador de Puesta a Tierra 5 MVA , 34.5 kV                                | -        | 160,000                                                                      | -                    |
| 28                                                                                | Banco de Capacitores 230 kV 30 MVAR                                             | -        | 605,000                                                                      | -                    |
| 29                                                                                | Banco de Capacitores 115 kV 15 MVAR                                             | -        | 155,000                                                                      | -                    |
| 30                                                                                | Interruptores 115 KV, Tripolar con seccionamiento y puesta a tierra incorporada | -        | 74,065                                                                       | -                    |
| 31                                                                                | Interruptores 34.5 KV                                                           | -        | 55,000                                                                       | -                    |
| 32                                                                                | Cuchillas Tripolares manuales sin cuchilla a tierra 34.5 KV                     | -        | 8,000                                                                        | -                    |
| 33                                                                                | Cuchillas Tripolares manuales con cuchilla a tierra 34.5 KV                     | -        | 11,000                                                                       | -                    |
| 34                                                                                | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 34.5 KV                  | -        | 9,500                                                                        | -                    |
| 35                                                                                | Reactor Trifásico de 20 MVAR, 34.5 kV                                           | -        | 480,000                                                                      | -                    |
| 36                                                                                | Pararrayos 34.5 KV                                                              | -        | 1,600                                                                        | -                    |
| 37                                                                                | PT 34.5KV                                                                       | -        | 7,000                                                                        | -                    |
| 38                                                                                | CT 34.5 KV                                                                      | -        | 6,920                                                                        | -                    |
| SUBTOTAL DE EQUIPOS DE COSTOS UNITARIO                                            |                                                                                 |          |                                                                              | 410,900              |
| SUBTOTAL DE EQUIPOS DE COSTOS UNITARIO SIN EQUIPOS DE TRANSFORMACIÓN Y REGULACIÓN |                                                                                 |          |                                                                              | 410,900              |
|                                                                                   |                                                                                 |          | % Sobre ítemes de Costos Unitario Sin Equipos de Transformación y Regulación |                      |
| 39                                                                                | Sistema de puesta a tierra                                                      | lote     | 5.00                                                                         | 20,545               |
| 40                                                                                | Servicios auxiliares                                                            | lote     | 12.00                                                                        | 49,308               |
| 41                                                                                | Herrajes, Estructuras y Soportes                                                | lote     | 50.00                                                                        | 205,450              |
| 42                                                                                | Equipo de Protección, Control y Monitoreo                                       | lote     | 70.00                                                                        | 287,630              |
| 43                                                                                | Equipo de Comunicaciones                                                        | lote     | 15.00                                                                        | 61,635               |
| 44                                                                                | Cables, conductores, ductos, etc.                                               | lote     | 25.00                                                                        | 102,725              |
| SUB TOTAL SUMINISTRO                                                              |                                                                                 |          |                                                                              | 1,138,192            |
|                                                                                   |                                                                                 |          | % sobre Subtotal Suministro                                                  |                      |
| 45                                                                                | Montaje                                                                         | lote     | 15.00                                                                        | 170,729              |
| 46                                                                                | Obras Civiles Generales                                                         | lote     | 25.00                                                                        | 284,548              |
| TOTAL COSTO BASE                                                                  |                                                                                 |          |                                                                              | 1,593,468            |
|                                                                                   |                                                                                 |          | % sobre Total Costo Base                                                     |                      |
| 47                                                                                | Contingencias                                                                   |          | 5.00                                                                         | 79,673               |
| 48                                                                                | Diseño                                                                          |          | 3.00                                                                         | 47,804               |
| 49                                                                                | Ingeniería                                                                      |          | 4.00                                                                         | 63,739               |
| 50                                                                                | Administración                                                                  |          | 4.00                                                                         | 63,739               |
| 51                                                                                | Inspección                                                                      |          | 3.00                                                                         | 47,804               |
| 52                                                                                | IDC                                                                             |          | 6.00                                                                         | 95,608               |
| 53                                                                                | EIA                                                                             |          | 0.19                                                                         | 3,028                |
| 54                                                                                | Terrenos                                                                        | m2       | 0.0                                                                          | -                    |
| COSTO TOTAL                                                                       |                                                                                 |          |                                                                              | 1,994,863            |

## **9. L/T 230 kV Panamá II – Metetí y S/E asociadas**

**LINEA DE TRANSMISION DE 230 KV A DARIEN (METETI)  
CIRCUITO SENCILLO CON TORRE PARA DOBLE CIRCUITO  
CONDUCTOR 1200 ACAR**

| DESCRIPCION                     | CANTIDAD<br>KM | COSTO<br>UNITARIO<br>LOCAL | COSTO<br>UNITARIO<br>EXTR. | COSTO<br>TOTAL<br>LOCAL | COSTO<br>TOTAL<br>EXTR. | COSTO<br>TOTAL   |
|---------------------------------|----------------|----------------------------|----------------------------|-------------------------|-------------------------|------------------|
| 1. Aisladores y herrajes        | 215.00         |                            | 6.66                       | 0.00                    | 1,432.04                | 1,432.04         |
| 2. Conductores y accesorios     | 215.00         |                            | 28.64                      | 0.00                    | 6,158.33                | 6,158.33         |
| 3. Hilo de Guarda y accesorios  | 215.00         |                            | 2.09                       | 0.00                    | 450.05                  | 450.05           |
| 4. OPGW y accesorios            | 215.00         |                            | 7.23                       | 0.00                    | 1,555.31                | 1,555.31         |
| 4. Sistema puesta a tierra      | 215.00         |                            | 4.59                       | 0.00                    | 986.86                  | 986.86           |
| 5. Torres y accesorios          | 215.00         |                            | 87.08                      | 0.00                    | 18,721.36               | 18,721.36        |
| <b>Sub-Total Materiales</b>     |                |                            |                            | <b>0.00</b>             | <b>29,303.94</b>        | <b>29,303.94</b> |
| 6. Fundaciones                  | 215.00         | 0.33                       |                            | 9,548.73                |                         | 9,548.73         |
| 7. Derecho de vía               | 215.00         | 0.02                       |                            | 446.88                  |                         | 446.88           |
| 8. Montaje                      | 215.00         | 0.34                       |                            | 10,052.07               |                         | 10,052.07        |
| <b>Total Costo Base</b>         |                |                            |                            | <b>20,047.68</b>        | <b>29,303.94</b>        | <b>49,351.62</b> |
| 9. Contingencias                | 0.10           |                            |                            | 2,004.77                | 2,930.39                | 4,935.16         |
| 10. Ingeniería y Administración | 0.08           |                            |                            | 3,948.13                |                         | 3,948.13         |
| 11. EIA B/. * kM                | 2.50           |                            |                            | 537.50                  |                         | 537.50           |
| 12. Diseño                      | 0.03           |                            |                            | 1,480.55                |                         | 1,480.55         |
| 13. Inspección                  | 0.03           |                            |                            | 1,480.55                |                         | 1,480.55         |
| 14. Indemnización B/. * kM      | 15.00          |                            |                            | 3,225.00                |                         | 3,225.00         |
| 15. IDC                         | 0.06           |                            |                            | 2,961.10                |                         | 2,961.10         |
| <b>COSTO TOTAL</b>              |                |                            |                            | <b>35,685.27</b>        | <b>32,234.34</b>        | <b>67,919.61</b> |

**DESGLOSE DE COSTO POR ITEM**

|                                             |           |
|---------------------------------------------|-----------|
| Costo de torres de acero (B/. / KM)         | 44,185.34 |
| Costo de aisladores y herrajes (B/. /km)    | 3,220.84  |
| Costo de conductores (B/. /km)              |           |
| Costo de 1200 ACAR (B/. /Km)                | 20,140.00 |
| Costo total hilo de guarda y acc. (B/. /km) |           |
| Costo total para OPGW                       | 6,712.62  |
| Costo total de 7N8 ALWD                     | 1,078.25  |
| Costo de sist. puesta a tierra (B/. /km)    | 2,861.15  |
| Derecho de via (B/. /km)                    | 965.31    |
| % DdV/costo de materiales                   | 0.0123    |
| Montaje                                     | 30,161.84 |
| % montaje/costo de materiales               | 0.3857    |
| Fundaciones                                 | 18,339.59 |
| % fundaciones/costo de materiales           | 0.2345    |

| S/E METETI 230 KV                                                                 |                                                                                 |          |                                                                              |                      |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------|----------------------|
| ITEM N°                                                                           | DESCRIPCION                                                                     | Cantidad | Costo Unitario Suministro B/.                                                | Total Suministro B/. |
| 1                                                                                 | Interruptores 115 KV                                                            | -        | 72,450                                                                       | -                    |
| 2                                                                                 | Cuchillas Tripolares Motorizadas con cuchilla a tierra 115 KV                   | -        | 15,000                                                                       | -                    |
| 3                                                                                 | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 115 KV                   | -        | 11,000                                                                       | -                    |
| 4                                                                                 | Cuchillas Tripolares manuales sin cuchilla a tierra 115 KV                      | -        | 9,000                                                                        | -                    |
| 5                                                                                 | Cuchillas Tripolares manuales con cuchilla a tierra 115 KV                      | -        | 12,300                                                                       | -                    |
| 6                                                                                 | Transformadores 115/230 KV 100/120/150 MVA                                      | -        | 2,000,000                                                                    | -                    |
| 7                                                                                 | Autotransformador de Potencia 230/115/13.8 kV y 105/140/175 MVA                 | -        | 3,200,000                                                                    | -                    |
| 8                                                                                 | Sistema de extinción de incendio para transformadores                           | -        | 218,000                                                                      | -                    |
| 9                                                                                 | Reactor Trifásico de 20 MVAR, 230 kV                                            | -        | 1,400,000                                                                    | -                    |
| 10                                                                                | Cuchillas Tripolares Motorizadas con cuchilla a tierra 230 KV para Reactor      | -        | 50,000                                                                       | -                    |
| 11                                                                                | Interruptores 230 KV, de disparo monopolar                                      | 2        | 115,000                                                                      | 230,000              |
| 12                                                                                | Interruptores 230 KV, de disparo tripolar                                       | -        | 148,732                                                                      | -                    |
| 13                                                                                | Cuchillas Tripolares Motorizadas con cuchilla a tierra 230 KV                   | 1        | 21,000                                                                       | 21,000               |
| 14                                                                                | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 230 KV                   | 4        | 17,000                                                                       | 68,000               |
| 15                                                                                | Cuchillas Tripolares manuales sin cuchilla a tierra 230 KV                      | -        | 14,000                                                                       | -                    |
| 16                                                                                | Pararrayos 192 KV                                                               | 3        | 6,000                                                                        | 18,000               |
| 17                                                                                | Pararrayos 96 KV                                                                | -        | 4,000                                                                        | -                    |
| 18                                                                                | CT 230 KV                                                                       | 12       | 17,000                                                                       | 204,000              |
| 19                                                                                | CT 115 KV                                                                       | -        | 13,000                                                                       | -                    |
| 20                                                                                | PT 230 KV                                                                       | 3        | 17,000                                                                       | 51,000               |
| 21                                                                                | PT 115 KV                                                                       | -        | 13,000                                                                       | -                    |
| 22                                                                                | PT de Potencia y Potencial 115 kV                                               | -        | 35,870                                                                       | -                    |
| 23                                                                                | Autotransformador de Potencia 230/115/13.8 kV y 350 MVA                         | -        | 3,500,000                                                                    | -                    |
| 24                                                                                | Autotransformador de Potencia 230/115/34.5 kV y 70 MVA                          | -        | 2,700,000                                                                    | -                    |
| 25                                                                                | Autotransformador de Potencia 230/34.5 kV y 50 MVA                              | 1        | 2,000,000                                                                    | 2,000,000            |
| 26                                                                                | Transformador de Potencia 115/4,16 kV. y 24 MVA                                 | -        | 810,000                                                                      | -                    |
| 27                                                                                | Transformador de Puesta a Tierra 5 MVA , 34.5 kV                                | -        | 160,000                                                                      | -                    |
| 28                                                                                | Banco de Capacitores 230 kV 30 MVAR                                             | -        | 605,000                                                                      | -                    |
| 29                                                                                | Banco de Capacitores 115 kV 15 MVAR                                             | -        | 155,000                                                                      | -                    |
| 30                                                                                | Interruptores 115 KV, Tripolar con seccionamiento y puesta a tierra incorporado | -        | 74,065                                                                       | -                    |
| 31                                                                                | Interruptores 34.5 KV                                                           | -        | 55,000                                                                       | -                    |
| 32                                                                                | Cuchillas Tripolares manuales sin cuchilla a tierra 34.5 KV                     | -        | 8,000                                                                        | -                    |
| 33                                                                                | Cuchillas Tripolares manuales con cuchilla a tierra 34.5 KV                     | -        | 11,000                                                                       | -                    |
| 34                                                                                | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 34.5 KV                  | -        | 9,500                                                                        | -                    |
| 35                                                                                | Reactor Trifásico de 20 MVAR, 34.5 kV                                           | -        | 480,000                                                                      | -                    |
| 36                                                                                | Pararrayos 34.5 KV                                                              | -        | 1,600                                                                        | -                    |
| 37                                                                                | PT 34.5KV                                                                       | -        | 7,000                                                                        | -                    |
| 38                                                                                | CT 34.5 KV                                                                      | -        | 6,920                                                                        | -                    |
| SUBTOTAL DE EQUIPOS DE COSTOS UNITARIO                                            |                                                                                 |          |                                                                              | 2,592,000            |
| SUBTOTAL DE EQUIPOS DE COSTOS UNITARIO SIN EQUIPOS DE TRANSFORMACIÓN Y REGULACIÓN |                                                                                 |          |                                                                              | 592,000              |
|                                                                                   |                                                                                 |          | % Sobre ítemes de Costos Unitario Sin Equipos de Transformación y Regulación |                      |
| 39                                                                                | Sistema de puesta a tierra                                                      | lote     | 5.00                                                                         | 29,600               |
| 40                                                                                | Servicios auxiliares                                                            | lote     | 12.00                                                                        | 71,040               |
| 41                                                                                | Herrajes, Estructuras y Soportes                                                | lote     | 50.00                                                                        | 296,000              |
| 42                                                                                | Equipo de Protección, Control y Monitoreo                                       | lote     | 70.00                                                                        | 414,400              |
| 43                                                                                | Equipo de Comunicaciones                                                        | lote     | 15.00                                                                        | 88,800               |
| 44                                                                                | Cables, conductores, ductos, etc.                                               | lote     | 25.00                                                                        | 148,000              |
| SUB TOTAL SUMINISTRO                                                              |                                                                                 |          |                                                                              | 3,639,840            |
|                                                                                   |                                                                                 |          | % sobre Subtotal Suministro                                                  |                      |
| 45                                                                                | Montaje                                                                         | lote     | 15.00                                                                        | 545,976              |
| 46                                                                                | Obras Civiles Generales                                                         | lote     | 25.00                                                                        | 909,960              |
| TOTAL COSTO BASE                                                                  |                                                                                 |          |                                                                              | 5,095,776            |
|                                                                                   |                                                                                 |          | % sobre Total Costo Base                                                     |                      |
| 47                                                                                | Contingencias                                                                   |          | 5.00                                                                         | 254,789              |
| 48                                                                                | Diseño                                                                          |          | 3.00                                                                         | 152,873              |
| 49                                                                                | Ingeniería                                                                      |          | 4.00                                                                         | 203,831              |
| 50                                                                                | Administración                                                                  |          | 4.00                                                                         | 203,831              |
| 51                                                                                | Inspección                                                                      |          | 3.00                                                                         | 152,873              |
| 52                                                                                | IDC                                                                             |          | 6.00                                                                         | 305,747              |
| 53                                                                                | EIA                                                                             |          | 0.19                                                                         | 9,682                |
| 54                                                                                | Terrenos                                                                        | m2       | 0.0                                                                          | 60,000               |
| COSTO TOTAL                                                                       |                                                                                 |          |                                                                              | 6,439,402            |



| ADICION 2 INT. 230 KV S/E PANAMA II                                               |                                                                                 |          |                                                                              |                      |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------|----------------------|
| ITEM N°                                                                           | DESCRIPCION                                                                     | Cantidad | Costo Unitario Suministro B/.                                                | Total Suministro B/. |
| 1                                                                                 | Interruptores 115 KV                                                            | -        | 72,450                                                                       | -                    |
| 2                                                                                 | Cuchillas Tripolares Motorizadas con cuchilla a tierra 115 KV                   | -        | 15,000                                                                       | -                    |
| 3                                                                                 | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 115 KV                   | -        | 11,000                                                                       | -                    |
| 4                                                                                 | Cuchillas Tripolares manuales sin cuchilla a tierra 115 KV                      | -        | 9,000                                                                        | -                    |
| 5                                                                                 | Cuchillas Tripolares manuales con cuchilla a tierra 115 KV                      | -        | 12,300                                                                       | -                    |
| 6                                                                                 | Transformadores 115/230 KV 100/120/150 MVA                                      | -        | 2,000,000                                                                    | -                    |
| 7                                                                                 | Autotransformador de Potencia 230/115/13.8 kV y 105/140/175 MVA                 | -        | 3,200,000                                                                    | -                    |
| 8                                                                                 | Sistema de extinción de incendio para transformadores                           | -        | 218,000                                                                      | -                    |
| 9                                                                                 | Reactor Trifásico de 20 MVAR, 230 kV                                            | -        | 1,400,000                                                                    | -                    |
| 10                                                                                | Cuchillas Tripolares Motorizadas con cuchilla a tierra 230 KV para Reactor      | -        | 50,000                                                                       | -                    |
| 11                                                                                | Interruptores 230 KV, de disparo monopolar                                      | 2        | 115,000                                                                      | 230,000              |
| 12                                                                                | Interruptores 230 KV, de disparo tripolar                                       | -        | 148,732                                                                      | -                    |
| 13                                                                                | Cuchillas Tripolares Motorizadas con cuchilla a tierra 230 KV                   | 1        | 21,000                                                                       | 21,000               |
| 14                                                                                | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 230 KV                   | 4        | 17,000                                                                       | 68,000               |
| 15                                                                                | Cuchillas Tripolares manuales sin cuchilla a tierra 230 KV                      | -        | 14,000                                                                       | -                    |
| 16                                                                                | Pararrayos 192 KV                                                               | 3        | 6,000                                                                        | 18,000               |
| 17                                                                                | Pararrayos 96 KV                                                                | -        | 4,000                                                                        | -                    |
| 18                                                                                | CT 230 KV                                                                       | 12       | 17,000                                                                       | 204,000              |
| 19                                                                                | CT 115 KV                                                                       | -        | 13,000                                                                       | -                    |
| 20                                                                                | PT 230 KV                                                                       | 3        | 17,000                                                                       | 51,000               |
| 21                                                                                | PT 115 KV                                                                       | -        | 13,000                                                                       | -                    |
| 22                                                                                | PT de Potencia y Potencial 115 kV                                               | -        | 35,870                                                                       | -                    |
| 23                                                                                | Autotransformador de Potencia 230/115/13.8 kV y 350 MVA                         | -        | 3,500,000                                                                    | -                    |
| 24                                                                                | Autotransformador de Potencia 230/115/34.5 kV y 70 MVA                          | -        | 2,700,000                                                                    | -                    |
| 25                                                                                | Autotransformador de Potencia 230/115/34.5 kV y 50 MVA                          | -        | 2,150,000                                                                    | -                    |
| 26                                                                                | Transformador de Potencia 115/4,16 kV. y 24 MVA                                 | -        | 810,000                                                                      | -                    |
| 27                                                                                | Transformador de Puesta a Tierra 5 MVA, 34.5 kV                                 | -        | 160,000                                                                      | -                    |
| 28                                                                                | Banco de Capacitores 230 kV 30 MVAR                                             | -        | 605,000                                                                      | -                    |
| 29                                                                                | Banco de Capacitores 115 kV 15 MVAR                                             | -        | 155,000                                                                      | -                    |
| 30                                                                                | Interruptores 115 KV, Tripolar con seccionamiento y puesta a tierra incorporado | -        | 74,065                                                                       | -                    |
| 31                                                                                | Interruptores 34.5 KV                                                           | -        | 55,000                                                                       | -                    |
| 32                                                                                | Cuchillas Tripolares manuales sin cuchilla a tierra 34.5 KV                     | -        | 8,000                                                                        | -                    |
| 33                                                                                | Cuchillas Tripolares manuales con cuchilla a tierra 34.5 KV                     | -        | 11,000                                                                       | -                    |
| 34                                                                                | Cuchillas Tripolares Motorizadas sin cuchilla a tierra 34.5 KV                  | -        | 9,500                                                                        | -                    |
| 35                                                                                | Reactor Trifásico de 20 MVAR, 34.5 kV                                           | -        | 480,000                                                                      | -                    |
| 36                                                                                | Pararrayos 34.5 KV                                                              | -        | 1,600                                                                        | -                    |
| 37                                                                                | PT 34.5KV                                                                       | -        | 7,000                                                                        | -                    |
| 38                                                                                | CT 34.5 KV                                                                      | -        | 6,920                                                                        | -                    |
| SUBTOTAL DE EQUIPOS DE COSTOS UNITARIO                                            |                                                                                 |          |                                                                              | 592,000              |
| SUBTOTAL DE EQUIPOS DE COSTOS UNITARIO SIN EQUIPOS DE TRANSFORMACIÓN Y REGULACIÓN |                                                                                 |          |                                                                              | 592,000              |
|                                                                                   |                                                                                 |          | % Sobre ítemes de Costos Unitario Sin Equipos de Transformación y Regulación |                      |
| 39                                                                                | Sistema de puesta a tierra                                                      | lote     | 5.00                                                                         | 29,600               |
| 40                                                                                | Servicios auxiliares                                                            | lote     | 12.00                                                                        | 71,040               |
| 41                                                                                | Herrajes, Estructuras y Soportes                                                | lote     | 50.00                                                                        | 296,000              |
| 42                                                                                | Equipo de Protección, Control y Monitoreo                                       | lote     | 70.00                                                                        | 414,400              |
| 43                                                                                | Equipo de Comunicaciones                                                        | lote     | 15.00                                                                        | 88,800               |
| 44                                                                                | Cables, conductores, ductos, etc.                                               | lote     | 25.00                                                                        | 148,000              |
| SUB TOTAL SUMINISTRO                                                              |                                                                                 |          |                                                                              | 1,639,840            |
|                                                                                   |                                                                                 |          | % sobre Subtotal Suministro                                                  |                      |
| 45                                                                                | Montaje                                                                         | lote     | 15.00                                                                        | 245,976              |
| 46                                                                                | Obras Civiles Generales                                                         | lote     | 25.00                                                                        | 409,960              |
| TOTAL COSTO BASE                                                                  |                                                                                 |          |                                                                              | 2,295,776            |
|                                                                                   |                                                                                 |          | % sobre Total Costo Base                                                     |                      |
| 47                                                                                | Contingencias                                                                   |          | 5.00                                                                         | 114,789              |
| 48                                                                                | Diseño                                                                          |          | 3.00                                                                         | 68,873               |
| 49                                                                                | Ingeniería                                                                      |          | 4.00                                                                         | 91,831               |
| 50                                                                                | Administración                                                                  |          | 4.00                                                                         | 91,831               |
| 51                                                                                | Inspección                                                                      |          | 3.00                                                                         | 68,873               |
| 52                                                                                | IDC                                                                             |          | 6.00                                                                         | 137,747              |
| 53                                                                                | EIA                                                                             |          | 0.19                                                                         | 4,362                |
| 54                                                                                | Terrenos                                                                        | m2       | 0.0                                                                          | -                    |
| COSTO TOTAL                                                                       |                                                                                 |          |                                                                              | 2,874,082            |



## 10. Flujo de Caja L/T 115 kV

L/T PANAMA II - DARIEN 115 Kv, 240 km.

2018

| Age Group | Percentage |
|-----------|------------|
| 18-24     | 10.0%      |
| 25-34     | 15.0%      |
| 35-44     | 20.0%      |
| 45-54     | 25.0%      |
| 55-64     | 30.0%      |
| 65-74     | 35.0%      |
| 75-84     | 40.0%      |
| 85+       | 45.0%      |

| VALOR DE RESCATE | A UTILIZADOS |
|------------------|--------------|
| 0                | 35           |
| 0                | 35           |
| 0                | 35           |

| Estructura de Presupuesto |       |            |              |
|---------------------------|-------|------------|--------------|
| Año -4                    | 4.0%  | -          | VPN (15%)    |
| Año -3                    | 30.0% | -          | VPN (12%)    |
| Año -2                    | 42.0% | 23961.5750 | VPN (10%)    |
| Año -1                    | 24.0% | -          | VPN (5%)     |
|                           |       |            | VPN (3%)     |
|                           |       |            | VPN (2%)     |
|                           |       |            | VPN (1%)     |
|                           |       |            | -\$48,468.16 |
|                           |       |            | -\$48,468.16 |
|                           |       |            | -\$52,424.55 |
|                           |       |            | -\$56,951.20 |
|                           |       |            | -\$59,849.37 |
|                           |       |            | -\$59,351.95 |
|                           |       |            | -\$57,898.50 |

Archivo Flujo de caja Int. Danien 115.kv

## **11. Flujo de Caja L/T 230 kV**

# FLUJO DE CAJA DEL PROYECTO

LT PANAMA II - DARIEN 230 Kv, 240 km.

2018

PROYECTO  
INICIO DE OPERACIONES  
CAPACIDAD INSTALADA  
POTENCIA FIRME

FINANCIAMIENTO PROPIO  
TASA DE ACTUALIZACION  
TASA DE INTERES  
Tasa acumulada Impuesto

INVERSION  
(1987)

OPERACIONES  
MANTENIMIENTO  
OSM (N)

VIDA UTIL  
(AÑOS)

VALOR DE  
RESCATE

LT 230 Kv  
SE METETI 2004.6 Kv  
SE PANAMA II JORDON 230 Kv

LT 230 Kv  
SE Meteti 230 Kv  
SE PANAMA II JORDON 230 Kv

| PERIODOS | AÑOS | INVERSIONES                                      | ENERGIA                                          | BENEFICIOS                                       | DEPRECIACION                                     | OTM                                              | INGRESOS DE OPERACION                            | PAGO DE INTERESES                                | UTILIDAD A IMPUESTOS                             | IMPUESTOS D. (35%)                               | UTILIDAD D. IMPUESTOS                            | INGRESOS OPERATIVOS                              | NO OPERATIVOS                                    | AMORTIZACION DEL FINANCIAMIENTO                  | FLUJO DE CAJA DEL PROYECTO                       |
|----------|------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
|          |      | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) | LT 230 Kv<br>S/E Meteti<br>230 Kv<br>(1'000 \$.) |
| -4       | 2014 | 2,716.8                                          | 257.6                                            | 115.0                                            | 3,089.3                                          |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  | 3,089.3                                          |
| -3       | 2015 | 20,375.9                                         | 1,031.8                                          | 862.2                                            | 23,109.9                                         |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  | 23,109.9                                         |
| -2       | 2016 | 28,526.2                                         | 2,704.5                                          | 1,207.1                                          | 32,437.9                                         |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  | 32,437.9                                         |
| -1       | 2017 | 16,300.7                                         | 1,545.5                                          | 689.8                                            | 18,535.9                                         |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  | 18,535.9                                         |
| 1        | 2018 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 2        | 2019 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 3        | 2020 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 4        | 2021 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 5        | 2022 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 6        | 2023 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 7        | 2024 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 8        | 2025 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 9        | 2026 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 10       | 2027 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 11       | 2028 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 12       | 2029 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 13       | 2030 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 14       | 2031 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 15       | 2032 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 16       | 2033 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 17       | 2034 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 18       | 2035 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 19       | 2036 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 20       | 2037 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 21       | 2038 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 22       | 2039 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 23       | 2040 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 24       | 2041 |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| 25       | 2042 | -1,113.4                                         |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| TOTAL    |      |                                                  |                                                  | 2,215,868                                        | 154,890                                          |                                                  | 114,178                                          | 45,976                                           | 68,202                                           | 20,535                                           | 47,668                                           | 0                                                | 77,233                                           | 106,795.6                                        |                                                  |

Estructura de Presupuesto

Año -4  
Año -3  
Año -2  
Año -1

4.0%  
30.0%  
42.0%  
24.0%

VPN (15%)  
VPN (12%)  
VPN (10%)  
VPN (5%)  
VPN (3%)  
VPN (2%)  
VPN (1%)

10073.1106

-571,714.87  
-571,714.87  
-577,214.02  
-593,103.79  
-599,027.70  
-5102,573.44  
-5105,050.35

## **12. Flujo de Caja L/T 115 kV Sin Intereses**



# FLUJO DE CAJA DEL PROYECTO

LT PANAMA II - DARIEN 115 Kv, 240 km. Sin Intereses

|                             |                                  |                    |
|-----------------------------|----------------------------------|--------------------|
| PROYECTO                    | 2018                             | 0                  |
| INICIO DE OPERACIONES       |                                  |                    |
| CAPACIDAD INSTALADA         |                                  |                    |
| POTENCIA FIRME              |                                  |                    |
| FINANCIAMIENTO PROPIO       | 100.0%                           |                    |
| TASA DE ACTUALIZACION       | 12.0%                            |                    |
| TASA DE INTERES             | 0.0%                             |                    |
| Tasa acumulada impuestos    | 30.0%                            |                    |
| INVERSION (1000)            | OPERACION & MANTENIMIENTO (1000) | VALOR UTIL. (ANOS) |
| LT 115 Kv                   | 551,849                          | 35                 |
| SE METEOR 11504.EV          | \$4,859                          | 35                 |
| SE PANAMA II-ADICION 230 kV | \$1,955                          | 35                 |
|                             |                                  | 0                  |
|                             |                                  | 0                  |

| PERIODOS | AÑOS | INVERSIONES            | ENERGIA             | BENEFICIOS | DEPRECIACION        | OTM       | INGRESOS DE OPERACION | PAGO DE INTERESES | UTILIDAD A IMPUESTOS | IMPUESTOS (30%) | UTILIDAD D IMPUESTOS | INGRESOS/ NO OPERATIVOS | AMORTIZACION DEL FINANCIAMIENTO | FLUJO DE CAJA DEL PROYECTO |
|----------|------|------------------------|---------------------|------------|---------------------|-----------|-----------------------|-------------------|----------------------|-----------------|----------------------|-------------------------|---------------------------------|----------------------------|
|          |      | LT 230 Kv<br>(1000 \$) | S/E Meteo<br>230 Kv | LT 230 Kv  | S/E Meteo<br>230 Kv | LT 230 Kv | S/E Meteo<br>230 Kv   | LT 230 Kv         | S/E Meteo<br>230 Kv  | LT 230 Kv       | S/E Meteo<br>230 Kv  | LT 230 Kv               | S/E Meteo<br>230 Kv             | LT 230 Kv                  |
| -3       | 2014 | 2,074.0                | 194.4               | 78.8       | 2,348.1             |           |                       |                   |                      |                 |                      |                         |                                 | 2,348.1                    |
| -2       | 2015 | 15,564.7               | 1,457.7             | 598.4      | 17,610.9            |           |                       |                   |                      |                 |                      |                         |                                 | 17,610.9                   |
| -1       | 2016 | 21,776.6               | 2,040.8             | 837.8      | 24,655.2            |           |                       |                   |                      |                 |                      |                         |                                 | 24,655.2                   |
| 0        | 2017 | 12,443.8               | 1,166.2             | 478.8      | 14,088.7            |           |                       |                   |                      |                 |                      |                         |                                 | 14,088.7                   |
| 1        | 2018 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 2        | 2019 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 3        | 2020 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 4        | 2021 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 5        | 2022 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 6        | 2023 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 7        | 2024 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 8        | 2025 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 9        | 2026 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 10       | 2027 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 11       | 2028 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 12       | 2029 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 13       | 2030 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 14       | 2031 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 15       | 2032 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 16       | 2033 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 17       | 2034 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 18       | 2035 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 19       | 2036 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 20       | 2037 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 21       | 2038 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 22       | 2039 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 23       | 2040 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 24       | 2041 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| 25       | 2042 |                        |                     |            |                     | 1,481.4   | 138.8                 | 57.0              | 1,677.2              | 0.0             | 1,037.0              | 140.9                   | 57.8                            | 1,235.7                    |
| TOTAL    |      | 58,702.6               | 2,215,868           | 154,890    | 0                   | 25,925    | 3,523                 | 1,446             | 30,894               | 123,997         | 0                    | 123,997                 | 86,798                          | 30,608.0                   |

| ESTRUCTURA DE PRESUPUESTO | AÑO -4 | AÑO -3 | AÑO -2 | AÑO -1 |
|---------------------------|--------|--------|--------|--------|
| VPN (15%)                 |        |        |        |        |
| VPN (12%)                 |        |        |        |        |
| VPN (10%)                 |        |        |        |        |
| VPN (5%)                  |        |        |        |        |
| VPN (3%)                  |        |        |        |        |
| VPN (2%)                  |        |        |        |        |
| VPN (1%)                  |        |        |        |        |

### **13. Flujo de Caja L/T 115 kV Sin Intereses & Amortización**

# FLUJO DE CAJA DEL PROYECTO

LT PANAMA II - DARIEN 115 Kv, 240 km. Sin Intereses & Amortizacion

PROYECTO  
INICIO DE OPERACIONES  
CAPACIDAD INSTALADA  
POTENCIA FIRME

2018

0

FINANCIAMIENTO PROPIO  
TASA DE ACTUALIZACION  
TASA DE INTERES  
Tasa acumulada Impuestos

100.0%  
12.0%  
0.0%  
30.0%

OPERACION &  
MANTENIMIENTO  
O&M (M)  
2.0%  
2.5%  
2.9%

VIDA UTIL  
(AÑOS)  
35  
35  
35

VALOR DE  
RESCATE  
0  
0  
0

INTERSESION  
(1000' S)  
\$51,840  
\$4,859  
\$1,995

LT 115KV  
SE METETI 11504.6 KV  
SE PANAMA II-ADICION 230 K

| PERIODOS | AÑOS | INVERSIONES            | ENERGIA              | BENEFICIOS             | DEPRECIACION           | OYN                  | INGRESOS DE OPERACION  | PAGO DE INTERESES      | UTILIDAD/ A IMPUESTOS  | IMPUESTOS UTILIDAD/ D (30%) | INGRESOS/ NO OPERATIVOS | AMORTIZACION DEL FINANCIAMIENTO | FLUJO DE CAJA DEL PROYECTO |
|----------|------|------------------------|----------------------|------------------------|------------------------|----------------------|------------------------|------------------------|------------------------|-----------------------------|-------------------------|---------------------------------|----------------------------|
|          |      | LT 230 Kv<br>(1000 \$) | S/E Meteti<br>230 Kv | S/E PANAMA II<br>TOTAL | LT 230 Kv<br>(1000 \$) | S/E Meteti<br>230 Kv | S/E PANAMA II<br>TOTAL | LT 230 Kv<br>(1000 \$) | LT 230 Kv<br>(1000 \$) | LT 230 Kv<br>(1000 \$)      | LT 230 Kv<br>(1000 \$)  | LT 230 Kv<br>(1000 \$)          | LT 230 Kv<br>(1000 \$)     |
| -3       | 2014 | 2,074.0                | 79.8                 | 2,348.1                |                        |                      |                        |                        |                        |                             |                         |                                 | 2,348.1                    |
| -2       | 2015 | 15,567.0               | 184.4                | 17,010.9               |                        |                      |                        |                        |                        |                             |                         |                                 | 17,010.9                   |
| -1       | 2016 | 21,776.6               | 2,040.8              | 24,016.9               |                        |                      |                        |                        |                        |                             |                         |                                 | 24,016.9                   |
| 0        | 2017 | 12,443.8               | 1,166.2              | 14,088.7               |                        |                      |                        |                        |                        |                             |                         |                                 | 14,088.7                   |
| 1        | 2018 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 2        | 2019 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 3        | 2020 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 4        | 2021 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 5        | 2022 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 6        | 2023 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 7        | 2024 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 8        | 2025 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 9        | 2026 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 10       | 2027 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 11       | 2028 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 12       | 2029 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 13       | 2030 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 14       | 2031 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 15       | 2032 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 16       | 2033 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 17       | 2034 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 18       | 2035 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 19       | 2036 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 20       | 2037 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 21       | 2038 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 22       | 2039 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 23       | 2040 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 24       | 2041 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| 25       | 2042 |                        |                      |                        | 1,481.4                | 138.8                | 57.0                   | 1,677.2                | 0.0                    | 1,037.0                     | 140.9                   | 57.8                            | 1,235.7                    |
| TOTAL    |      | 58,702.9               | 2,215,868            | 154,890                | 0                      | 25,925               | 3,523                  | 1,446                  | 30,894                 | 123,997                     | 0                       | 123,997                         | 86,798                     |
|          |      |                        |                      |                        |                        |                      |                        |                        |                        |                             |                         |                                 | 0                          |
|          |      |                        |                      |                        |                        |                      |                        |                        |                        |                             |                         |                                 | 28,094.9                   |

| ESTRUCTURA DE PRESUPUESTO | AÑO -4      | AÑO -3 | AÑO -2 | AÑO -1 |
|---------------------------|-------------|--------|--------|--------|
| VPN (15%)                 | -428,090.79 |        |        |        |
| VPN (12%)                 | -428,090.79 |        |        |        |
| VPN (10%)                 | -424,259.97 |        |        |        |
| VPN (5%)                  | -512,171.00 |        |        |        |
| VPN (3%)                  | -51,464.62  |        |        |        |
| VPN (2%)                  | \$6,135.33  |        |        |        |
| VPN (1%)                  | \$15,794.32 |        |        |        |

#### **14. Flujo de Caja L/T 230 kV Sin Intereses**

# FLUJO DE CAJA DEL PROYECTO

LT PANAMA II - DARIEN 230 Kv, 240 km. Sin Intereses

2018

PROYECTO  
INVERSIONES  
CAPACIDAD INSTALADA  
POTENCIA FIRME

FINANCIAMIENTO PROPIO  
TASA DE ACTUALIZACION  
TASA DE INTERES  
Tasa acumulada impuestos

100.0%  
12.0%  
0.0%  
30.0%

VIDA UTIL  
(AÑOS)

35  
35  
35  
35

VALOR DE  
RESGATE

0  
0  
0  
0

INVERSION  
(1000 \$)

457,000  
50,130  
\$2,874

OPERACION &  
MANTENIMIENTO  
O&M (M)

2.0%  
1.5%  
2.5%

LT 230 kv  
SE METTI 230/245 kv  
SE PANAMA II-ADICION 230 kv

| PERIODOS | AÑOS | INVERSIONES |                   | ENERGIA |                             | BENEFICIOS         |           | DEPRECIACION      |         | OYM       |                   | INGRESOS DE OPERACION |            | UTILIDAD A IMPUESTOS |            | IMPUESTOS UTILIDAD D |            | INGRESOS OPERATIVOS |            | AMORTIZACION DEL FINANCIAMIENTO |            | FLUJO DE CAJA DEL PROYECTO |  |
|----------|------|-------------|-------------------|---------|-----------------------------|--------------------|-----------|-------------------|---------|-----------|-------------------|-----------------------|------------|----------------------|------------|----------------------|------------|---------------------|------------|---------------------------------|------------|----------------------------|--|
|          |      | LT 230 kv   | S/E Meteli 230 kv | TOTAL   | COMPROMISO DE ENERGIA (MWH) | COSTOS DE ENTREGAS | LT 230 kv | S/E Meteli 230 kv | TOTAL   | LT 230 kv | S/E Meteli 230 kv | TOTAL                 | (1'000 \$) | (1'000 \$)           | (1'000 \$) | (1'000 \$)           | (1'000 \$) | (1'000 \$)          | (1'000 \$) | (1'000 \$)                      | (1'000 \$) | (1'000 \$)                 |  |
| -4       | 2014 | 2,716.8     | 257.6             | 115.0   | 3,089.3                     |                    |           |                   |         |           |                   |                       |            |                      |            |                      |            |                     |            |                                 |            | 3,089.3                    |  |
| -3       | 2015 | 20,375.9    | 1,931.8           | 862.2   | 23,169.0                    |                    |           |                   |         |           |                   |                       |            |                      |            |                      |            |                     |            |                                 |            | 23,169.0                   |  |
| -2       | 2016 | 28,526.2    | 2,704.5           | 1,207.1 | 32,437.9                    |                    |           |                   |         |           |                   |                       |            |                      |            |                      |            |                     |            |                                 |            | 32,437.9                   |  |
| -1       | 2017 | 16,300.7    | 1,545.5           | 689.8   | 18,535.9                    |                    |           |                   |         |           |                   |                       |            |                      |            |                      |            |                     |            |                                 |            | 18,535.9                   |  |
| 1        | 2018 |             |                   |         |                             | 60,763             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 5,003.5    | 0.00                 | 5,003.5    | 1,501.0             | 3,502.4    | 0.0                             | 5,148.9    | 1,646.4                    |  |
| 2        | 2019 |             |                   |         |                             | 63,154             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 4,582.5    | 0.00                 | 4,582.5    | 1,374.8             | 3,207.8    | 0.0                             | 5,148.9    | 1,941.1                    |  |
| 3        | 2020 |             |                   |         |                             | 65,610             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 5,227.8    | 0.00                 | 5,227.8    | 1,568.4             | 3,659.5    | 0.0                             | 5,148.9    | 1,889.4                    |  |
| 4        | 2021 |             |                   |         |                             | 68,170             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 5,201.0    | 0.00                 | 5,201.0    | 1,578.3             | 3,682.7    | 0.0                             | 5,148.9    | 1,406.2                    |  |
| 5        | 2022 |             |                   |         |                             | 70,721             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 5,995.5    | 0.00                 | 5,995.5    | 1,730.7             | 3,165.0    | 0.0                             | 5,148.9    | 2,043.9                    |  |
| 6        | 2023 |             |                   |         |                             | 73,214             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 3,095.5    | 0.00                 | 3,095.5    | 1,138.9             | 2,196.7    | 0.0                             | 5,148.9    | 2,143.9                    |  |
| 7        | 2024 |             |                   |         |                             | 75,707             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 3,016.0    | 0.00                 | 3,016.0    | 1,085.6             | 2,530.0    | 0.0                             | 5,148.9    | 2,115.0                    |  |
| 8        | 2025 |             |                   |         |                             | 78,200             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 3,324.0    | 0.00                 | 3,324.0    | 997.2               | 2,326.8    | 0.0                             | 5,148.9    | 2,872.0                    |  |
| 9        | 2026 |             |                   |         |                             | 80,693             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 3,135.7    | 0.00                 | 3,135.7    | 940.7               | 2,195.0    | 0.0                             | 5,148.9    | 2,953.9                    |  |
| 10       | 2027 |             |                   |         |                             | 83,186             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 2,929.2    | 0.00                 | 2,929.2    | 878.8               | 2,050.5    | 0.0                             | 5,148.9    | 3,008.4                    |  |
| 11       | 2028 |             |                   |         |                             | 85,679             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 3,001.1    | 0.00                 | 3,001.1    | 918.3               | 2,142.8    | 0.0                             | 5,148.9    | 3,060.1                    |  |
| 12       | 2029 |             |                   |         |                             | 88,172             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 3,113.0    | 0.00                 | 3,113.0    | 967.9               | 2,235.1    | 0.0                             | 5,148.9    | 3,013.6                    |  |
| 13       | 2030 |             |                   |         |                             | 90,665             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 3,193.0    | 0.00                 | 3,193.0    | 1,017.5             | 2,326.4    | 0.0                             | 5,148.9    | 2,921.4                    |  |
| 14       | 2031 |             |                   |         |                             | 93,158             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 3,458.8    | 0.00                 | 3,458.8    | 1,076.6             | 2,512.1    | 0.0                             | 5,148.9    | 2,823.8                    |  |
| 15       | 2032 |             |                   |         |                             | 95,651             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 3,588.7    | 0.00                 | 3,588.7    | 1,116.2             | 2,604.4    | 0.0                             | 5,148.9    | 2,936.8                    |  |
| 16       | 2033 |             |                   |         |                             | 98,144             | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 3,720.5    | 0.00                 | 3,720.5    | 1,162.2             | 2,696.4    | 0.0                             | 5,148.9    | 3,004.4                    |  |
| 17       | 2034 |             |                   |         |                             | 100,637            | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 4,823.2    | 0.00                 | 4,823.2    | 1,477.0             | 3,446.3    | 0.0                             | 5,148.9    | 3,446.3                    |  |
| 18       | 2035 |             |                   |         |                             | 102,630            | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 5,129.9    | 0.00                 | 5,129.9    | 1,539.0             | 3,590.9    | 0.0                             | 5,148.9    | 3,500.9                    |  |
| 19       | 2036 |             |                   |         |                             | 104,623            | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 5,342.9    | 0.00                 | 5,342.9    | 1,602.9             | 3,740.1    | 0.0                             | 5,148.9    | 3,740.1                    |  |
| 20       | 2037 |             |                   |         |                             | 106,616            | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 5,562.7    | 0.00                 | 5,562.7    | 1,668.8             | 3,893.9    | 0.0                             | 5,148.9    | 4,002.3                    |  |
| 21       | 2038 |             |                   |         |                             | 108,609            | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 5,782.5    | 0.00                 | 5,782.5    | 1,730.7             | 4,045.5    | 0.0                             | 5,148.9    | 4,052.5                    |  |
| 22       | 2039 |             |                   |         |                             | 110,602            | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 6,002.3    | 0.00                 | 6,002.3    | 1,808.9             | 4,216.1    | 0.0                             | 5,148.9    | 4,216.1                    |  |
| 23       | 2040 |             |                   |         |                             | 112,595            | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 6,263.9    | 0.00                 | 6,263.9    | 1,879.2             | 4,384.7    | 0.0                             | 5,148.9    | 4,384.7                    |  |
| 24       | 2041 |             |                   |         |                             | 114,588            | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 6,512.4    | 0.00                 | 6,512.4    | 1,953.7             | 4,558.7    | 0.0                             | 5,148.9    | 4,558.7                    |  |
| 25       | 2042 |             |                   |         |                             | 116,581            | 184.0     | 82.1              | 2,206.7 | 0.0       | 1,358.4           | 180.7                 | 83.3       | 1,028.5              | 6,768.6    | 0.00                 | 6,768.6    | 2,030.6             | 4,738.0    | 0.0                             | 5,148.9    | 4,738.0                    |  |
| TOTAL    |      | 77,233.1    | 2,215,868         | 154,890 |                             |                    |           |                   |         | 0         | 33,960            | 4,669                 | 2,084      | 40,712               | 114,178    | 0                    | 114,178    | 34,254              | 79,925     | 0                               | 77,233     | 74,541.3                   |  |

| Estructura de Presupuesto |  | Año -4 | Año -3 | Año -2 | Año -1 |
|---------------------------|--|--------|--------|--------|--------|
| VPN (15%)                 |  |        |        |        |        |
| VPN (12%)                 |  |        |        |        |        |
| VPN (10%)                 |  |        |        |        |        |
| VPN (5%)                  |  |        |        |        |        |
| VPN (3%)                  |  |        |        |        |        |
| VPN (2%)                  |  |        |        |        |        |
| VPN (1%)                  |  |        |        |        |        |



## **15. Flujo de Caja L/T 230 kV Sin Intereses & Amortización**

# FLUJO DE CAJA DEL PROYECTO

L/T PANAMA II - DARIEN 230 Kv, 240 km. Sin Intereses & Amortización

2018

PROYECTO  
INICIO DE OPERACIONES  
CAPACIDAD INSTALADA  
POTENCIA FIRME

FINANCIAMIENTO PROPIO  
TASA DE ACTUALIZACIÓN  
TASA DE INTERÉS  
Tasa acumulada Impuestos

100.0%  
10.0%  
6.5%  
20.0%

OPERACIÓN &  
MANTENIMIENTO  
O&M/PN

VIDA ÚTIL  
(AÑOS)

35  
35  
35

VALOR DE  
RESCATE

0  
0  
0

INVERSIÓN  
(1000\$)

LT 230 KV  
SE METEY 230x245 KV  
SE PANAMA II-ADICION 230 KV

\$67,920  
\$6,439  
\$2,874

| PERIODO | AÑOS | INVERSIONES |                  | ENERGIA   |                  | DEPRECIACION |                  | OYM       |                  | INGRESOS DE OPERACIÓN | PAGO DE INTERESES | UTILIDAD/ A IMPUESTOS | IMPUESTOS (30%) | UTILIDAD/ D IMPUESTOS | INGRESOS/ NO OPERATIVOS | AMORTIZACION DEL FINANCIAMIENTO | FLUJO DE CAJA DEL PROYECTO |
|---------|------|-------------|------------------|-----------|------------------|--------------|------------------|-----------|------------------|-----------------------|-------------------|-----------------------|-----------------|-----------------------|-------------------------|---------------------------------|----------------------------|
|         |      | LT 230 Kv   | S/E Metey 230 Kv | LT 230 Kv | S/E Metey 230 Kv | LT 230 Kv    | S/E Metey 230 Kv | LT 230 Kv | S/E Metey 230 Kv | (1000 \$)             | (1000 \$)         | (1000 \$)             | (1000 \$)       | (1000 \$)             | (1000 \$)               | (1000 \$)                       | (1000 \$)                  |
| -4      | 2014 | 2,716.8     | 257.6            | 115.0     | 3,089.3          |              |                  |           |                  |                       |                   |                       |                 |                       |                         |                                 | 3,089.3                    |
| -3      | 2015 | 28,520.2    | 2,104.5          | 1,207.1   | 32,437.9         |              |                  |           |                  |                       |                   |                       |                 |                       |                         |                                 | 29,159.9                   |
| -2      | 2016 | 28,520.2    | 2,104.5          | 1,207.1   | 32,437.9         |              |                  |           |                  |                       |                   |                       |                 |                       |                         |                                 | 32,437.9                   |
| -1      | 2017 | 16,300.7    | 1,545.5          | 689.8     | 18,535.9         |              |                  |           |                  |                       |                   |                       |                 |                       |                         |                                 | 18,535.9                   |
| 1       | 2018 |             |                  |           |                  | 60,703       |                  |           |                  | 5,093.5               | 4,592.8           | 16.7                  | 0.0             | 16.7                  | 0.0                     | 0.0                             | 16.7                       |
| 2       | 2019 |             |                  |           |                  | 63,154       |                  |           |                  | 4,592.8               | 4,592.8           | 230.0                 | 0.0             | 230.0                 | 0.0                     | 0.0                             | 230.0                      |
| 3       | 2020 |             |                  |           |                  | 65,019       |                  |           |                  | 5,227.8               | 4,591.46          | 636.4                 | 199.0           | 445.5                 | 0.0                     | 0.0                             | 445.5                      |
| 4       | 2021 |             |                  |           |                  | 68,889.4     |                  |           |                  | 5,261.0               | 4,350.00          | 905.0                 | 271.5           | 633.5                 | 0.0                     | 0.0                             | 633.5                      |
| 5       | 2022 |             |                  |           |                  | 70,721       |                  |           |                  | 4,435.7               | 4,105.23          | 330.5                 | 99.1            | 231.3                 | 0.0                     | 0.0                             | 231.3                      |
| 6       | 2023 |             |                  |           |                  | 73,274.4     |                  |           |                  | 3,999.5               | 3,838.17          | 161.4                 | 48.4            | 113.0                 | 0.0                     | 0.0                             | 113.0                      |
| 7       | 2024 |             |                  |           |                  | 75,707       |                  |           |                  | 3,618.6               | 3,553.74          | 64.8                  | 18.4            | 45.4                  | 0.0                     | 0.0                             | 45.4                       |
| 8       | 2025 |             |                  |           |                  | 78,200       |                  |           |                  | 3,324.0               | 3,250.83          | 73.2                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 9       | 2026 |             |                  |           |                  | 80,693       |                  |           |                  | 2,939.2               | 2,864.65          | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 10      | 2027 |             |                  |           |                  | 83,186       |                  |           |                  | 2,554.4               | 2,479.82          | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 11      | 2028 |             |                  |           |                  | 85,679       |                  |           |                  | 2,169.6               | 2,094.99          | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 12      | 2029 |             |                  |           |                  | 88,172       |                  |           |                  | 1,784.8               | 1,709.99          | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 13      | 2030 |             |                  |           |                  | 90,665       |                  |           |                  | 1,399.9               | 1,325.00          | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 14      | 2031 |             |                  |           |                  | 93,158       |                  |           |                  | 1,015.0               | 940.00            | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 15      | 2032 |             |                  |           |                  | 95,651       |                  |           |                  | 630.1                 | 555.00            | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 16      | 2033 |             |                  |           |                  | 98,144       |                  |           |                  | 239.2                 | 169.99            | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 17      | 2034 |             |                  |           |                  | 100,637      |                  |           |                  | 0.0                   | 0.0               | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 18      | 2035 |             |                  |           |                  | 103,130      |                  |           |                  | 0.0                   | 0.0               | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 19      | 2036 |             |                  |           |                  | 105,623      |                  |           |                  | 0.0                   | 0.0               | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 20      | 2037 |             |                  |           |                  | 108,116      |                  |           |                  | 0.0                   | 0.0               | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 21      | 2038 |             |                  |           |                  | 110,609      |                  |           |                  | 0.0                   | 0.0               | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 22      | 2039 |             |                  |           |                  | 113,102      |                  |           |                  | 0.0                   | 0.0               | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 23      | 2040 |             |                  |           |                  | 115,595      |                  |           |                  | 0.0                   | 0.0               | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 24      | 2041 |             |                  |           |                  | 118,088      |                  |           |                  | 0.0                   | 0.0               | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| 25      | 2042 |             |                  |           |                  | 120,581      |                  |           |                  | 0.0                   | 0.0               | 74.4                  | 22.0            | 51.2                  | 0.0                     | 0.0                             | 51.2                       |
| TOTAL   |      | -1,113.4    |                  |           | 77,233.1         | 2,215,868    |                  | 0         | 33,960           | 4,669                 | 2,084             | 40,712                | 114,178         | 45,976                | 58,202                  | 20,535                          | 47,668                     |
|         |      |             |                  |           |                  |              |                  |           |                  |                       |                   |                       |                 |                       |                         |                                 | 29,565.6                   |

| Estructura de Presupuesto |  | Año -4      | Año -3 | Año -2 | Año -1 |
|---------------------------|--|-------------|--------|--------|--------|
| VPN (15%)                 |  | -552,150.79 |        |        |        |
| VPN (12%)                 |  | -552,150.79 |        |        |        |
| VPN (10%)                 |  | -553,201.38 |        |        |        |
| VPN (5%)                  |  | -551,571.07 |        |        |        |
| VPN (3%)                  |  | -546,802.25 |        |        |        |
| VPN (2%)                  |  | -542,846.10 |        |        |        |
| VPN (1%)                  |  | -537,244.15 |        |        |        |