Financial Modeling and Forward Financial Analysis

Workshop and Kick-off Meeting
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OVERVIEW OF THE PROGRAM

• County goals regarding the energy sector
  ➢ Energy security
  ➢ Supply reliability
  ➢ Lowest cost of power for consumers
  ➢ Maintenance of appropriate technical standards
  ➢ Regular and adequate investment in the sector

• USAID Central Asia Regional Electricity Market (CAREM)
  ➢ Launched in 2018
  ➢ Promotes the region’s
  ➢ Long-term energy security
  ➢ Promote Economic growth

• Platform for Central Asia-South Asia regional power market
KICK-OFF ACTIVITIES

▪ Brief Overview of CAREM
▪ Introduction of the different Tasks
  ➢ Methodology
  ➢ Data Gathering
  ➢ Preliminary Assessment
  ➢ Development of Financial Models
▪ Objectives of the Activity
  ➢ Bankable Financial Models (Generation, Transmission, Distribution)
  ➢ Power Sector Financial Sustainability (Cost-recovery Tariffs)
  ➢ Capacity Building
▪ Bilateral meetings between CAREM and each country.
  ➢ Discuss country specific needs and potential solutions.
  ➢ Address any questions and concerns
METHODOLOGY
METHODOLOGY: REQUIRED REVENUES VS GENERATION & DELIVERY COSTS

• Retail tariffs are set to fully recover costs associated with generation, transmission and distribution services.
GAP ANALYSIS: ESTIMATING FULL COST RECOVERY RETAIL TARIFFS

**Generation Model**
- Develop financial model for each country to determine full cost recovery tariffs for generation: gas, coal, hydro, RES
- Using energy mix, calculate the weighted average wholesale tariff for generation

**Transmission Model**
- Develop financial model to determine full cost recovery tariffs for transmission system
- Develop pricing methodology for wheeling charges

**Distribution Model**
- Develop financial model for each country/utility to determine full cost recovery tariffs for distribution system

**Retail Tariff**
- Determine the retail tariffs for each country using the three tariff components
  - Retail Tariff = Generation Tariff + Transmission Tariff + Distribution Tariff
A two-tier tariff structure for power sales is considered as standard

- **A capacity charge**
  - Covers the facility’s Fixed costs
  - Debt service payments
  - Return on invested capital
  - Fixed operations and major maintenance costs
  - If IPP, it is likely to constitute a “Take or Pay” obligation

- **Variable energy charge**
  - Covers day-to-day operational costs
  - Fuel cost
  - Other supplies and routine maintenance

- **To set proper tariff level need to:**
  - Understand the project costs
  - Operating (fixed, variable)
  - Financing (debt, equity)
STANDARD PPA TARIFF STRUCTURE

Overall Tariff

Capacity Price
- Debt Service Recovery
- Return on Equity
- Fixed O&M Expenses
  - Foreign
  - Local

Energy Price
- Variable O&M Expenses
  - Foreign
  - Local
- Fuel Costs

Covers the facility’s fixed costs, including debt service payments, return on invested capital, and fixed operations and maintenance costs.

Covers day-to-day operational costs, fuel cost and other supplies and maintenance.
TRANSMISSION PRICING CONCEPTS

The transmission function facilitates competitive electricity markets by impartially providing energy transportation services to all energy buyers and sellers, while fairly recovering the cost of providing these services.

In addition to meeting revenue requirements, transmission pricing should ideally address the following:

- Promote economic efficiency
- Encourage investment and determine location of generation
- Compensate transmission service providers
- Allocate transmission costs reasonably among native load and third party
- Maintain reliability of the transmission grid
Typically, utilities are required by the regulator to offer both point-to-point and network transmission service.

Point-to-point service has specified points of delivery and receipt, transmission direction, and quantities. Can be used to transmit and sell power to third party (wheeling).

Network service typically is negotiated through a long-term contract and involves flexible delivery points and quantities. Network service is arranged to meet a wholesale customer's varying native load requirements.
**TRANSMISSION PRICING CONCEPTS (cont’d)**

This approach is suitable for centralized markets, such as US. Fixed and variable costs are recovered simultaneously. Fixed costs are allocated to all nodes by tracing the upstream generators and/or downstream loads. Variable costs are allocated to all nodes via locational marginal pricing (LMP).

- **Existing System Cost**
- **Cost of Losses**
- **Cost of Congestion**
- **Other Uplift Costs**

**Systems With Centralized Dispatch**

This approach is suitable for decentralized markets, such as Europe or India. Fixed costs are calculated independently for each system. Congestion and loss costs are calculated separately. Point of connection tariff is the preferred method for decentralized markets.

- **Existing System Cost**
- **Other Uplift Costs**

**Systems With Decentralized Dispatch**
In the embedded transmission pricing method, all costs are summed up into a single number. These costs are then allocated to system users based on the extent of use.

In the incremental transmission pricing method, the customer pays for associated incremental costs: i.e. the full cost for any new facilities that the transaction requires. Existing system costs are still covered by the present (old) customers.

The composite pricing method includes the combination of existing system costs and the incremental costs of transmission transaction.
Postage stamp: This method is the most common and simple method used by utilities. Postage stamp rates are based on average system costs and may have a variety of rate designs, based on energy charges (cents per kWh), demand charges (cents per kW), or both energy and demand charges. Rates may include separate charges for peak and off-peak periods, may vary by season, and, in some cases, set different charges for weekday versus weekend and holiday usage. This method doesn’t require power flow calculations and is independent of the transmission distance and network configuration.
**TRANSMISSION PRICING CONCEPTS**

**Contract Path:** Traditional point-to-point transmission pricing is based on a routing scheme known as a "contract path", which is selected by the utility and the wheeling customer without power flow study. All or part of the transmission cost related to the specified path are then assigned to the transaction. The grid operator has to know all concluded bilateral contacts to determine the extent of usage of the single transaction.

**Distance Based:** This method allocates the transmission charges based on the magnitude of transacted power and the geographical distance between the delivery point and the receipt points. Compared to the postage stamp method, the distance based concept takes the distance between injection and consumption into account.

**Power Flow Based** rate of transmission is calculated using the real network conditions using power flow analysis, forecasted loads and the generation configuration. The cost allocated to the customer is calculated on the basis of extent of use of each network facility.
TRANSMISSION TARIFFS: POSTAGE STAMP

Postage Stamp Tariffs

Transmission Costs

Existing System Costs
- Operations
- Maintenance
- Capital Investments

Variable Costs
- Losses
- Other

Rt = TC * (P t/P peak)

Rt - transmission price for transaction t
TC – total transmission charges
Pt – transaction load
Ppeak – system peak load
Transmission charges are assigned to the customer based on the distance (km) between injection and receipt and the magnitude of transmitted power (MW).

\[ TC_t = TC \times \frac{\sum_{k \in K} C_k L_k M_{Wt,k}}{\sum_{t \in T} \sum_{k \in K} C_k L_k M_{Wt,k}} \]

- **TC** \(_t\) – cost allocated to transaction \( t \)
- **TC** – total cost of all lines in US$
- **L\(_k\)** - length of line \( k \) in km
- **C\(_k\)** - cost per MW per unit length of line \( k \)
- **M\(_Wt,k\)** – is the flow in line \( k \) due to transaction \( t \)
- **T** – is the set of transactions
- **K** – is the set of lines
DISTRIBUTION TARIFFS

- Distribution services are broadly divided in three categories:
  - Customer connection service: connect and integrate individual customers or customer groups
  - Customer service: metering, billing, and communications
  - Wires services: includes power transportation, mainly capital costs.

- The utility will typically calculate the revenue requirement for the coming year and adjust the tariffs accordingly.

- Customers are often grouped for pricing purposes:
  - Residential
  - Commercial
  - Industrial
  - Lighting
  - Irrigation
  - Other
DISTRIBUTION TARIFFS

• It is common for regulator to require that utilities disclose the pricing methodology
• The methodology should demonstrate:
  ➢ well defined and clearly explained prices
  ➢ the rationale for consumer groupings
  ➢ the method for determining the allocation of consumers to the consumer groupings
  ➢ quantification of key components of costs and revenues
  ➢ the cost allocation methodology and the rationale for the allocation to each consumer grouping
  ➢ the calculation of the tariffs to be charged to each consumer group
  ➢ the rationale for the tariff design
DATA GATHERING

• Data provided by each country team
• Data from CAREM engineering team
• Data from CAREM Financial team
• Use the data to develop modeling assumptions
DATA GATHERING (cont’d)

Electricity sector structure:

- List of all major companies in generation, transmission and distribution
- Consumer categories, including relevant data, if available
- Graph showing sector schematic
- Description/report on tariff legislation and regulation, if available
- Info on imports: total volume, tariffs paid, etc. for the last 3 years

For each component of the energy sector, if available (generation, transmission, distribution):

- Annual report for the last 3 years
- Financial statements (if not in the annual report) for the last 3 years
- Future investment plans
- Any forecasting model used for management of operations
- How the tariffs are determined / Historical tariffs
- Operating costs, by category (labor/wages, fuel, G&A, other)
- Recurring and non-recurring capex
- Loan agreements for each debt facility
- Corporate tax data applicable to the sector
PRELIMINARY ASSESSMENT

• Hold working meetings with representatives of each country
• Discuss country specific issues
• Identify data gaps and develop solution on how to bridge them
• Develop mutually acceptable solution if the required data is absent
• Tailor the data and methodology for financial analysis to country needs
FINANCIAL MODELS

Develop customized comprehensive financial models for each country

- Focus of analysis will be calculation of fully-cost recovery tariffs
- An iterative process, where each utility will be consulted on each model iteration
- The goal will be determining the gap that needs to be eliminated to achieve full cost recovery
POWER SECTOR FINANCIAL SUSTAINABILITY

Power sector Financial Sustainability Analysis and Recommendations

- **Cash flow analysis - improving cash availability**
  - collections
  - system losses
  - tariff structure

- **Capital structure & financing analysis**
  - long-term investments
  - capital sources
  - enabling access to capital markets
  - debt capacity analysis

- **Financial management**
  - treasury functions
  - asset-liability matching
  - currency hedging, if necessary
CAPACITY BUILDING

• Financial modeling
• Project finance
• Financial planning
• Forward-looking financial statement analysis
FORWARD FINANCIAL ANALYSIS
FINANCIAL STATEMENTS: BALANCE SHEET

• Balance Sheet = What you **have** is equal to what you **own** plus what you **owe**
• Asset = Liabilities + Net Worth
• Snapshot at a point in time

<table>
<thead>
<tr>
<th>ASSETS</th>
<th>LIABILITIES</th>
<th>EQUITY/ NET WORTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Assets</td>
<td>Current Liabilities</td>
<td>Paid-in Capital</td>
</tr>
<tr>
<td>Cash</td>
<td>Accounts Payable</td>
<td>Retained Earnings</td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>Current Portion of Long Term Debt</td>
<td></td>
</tr>
<tr>
<td>Inventory</td>
<td>Non-Current Liabilities</td>
<td></td>
</tr>
<tr>
<td>Non-Current Assets</td>
<td>Fixed Assets (depreciated capex)</td>
<td></td>
</tr>
<tr>
<td>Fixed Assets</td>
<td>Long-Term Debt</td>
<td></td>
</tr>
<tr>
<td>Other Capitalized Costs</td>
<td>Non-Current Liabilities</td>
<td></td>
</tr>
</tbody>
</table>

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FINANCIAL STATEMENTS REFRESHER: INCOME STATEMENT

- Income Statement also known as Profit and Loss Statement

- Profit on paper does not really inform you if you are generating cash

- It is measured over a period of time

<table>
<thead>
<tr>
<th>INCOME STATEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(+) Revenues</td>
</tr>
<tr>
<td>(-) Opex</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>EBITDA</td>
</tr>
<tr>
<td>(-) Depreciation and Amortization</td>
</tr>
<tr>
<td>EBIT</td>
</tr>
<tr>
<td>(-) Interest Expenses</td>
</tr>
<tr>
<td>EBT</td>
</tr>
<tr>
<td>(-) Taxes</td>
</tr>
<tr>
<td>EBT</td>
</tr>
<tr>
<td>(-) EBIT</td>
</tr>
<tr>
<td>Net Income</td>
</tr>
</tbody>
</table>
FINANCIAL STATEMENTS REFRESHER: CASH FLOW STATEMENT

- Cash Flow Statement measures the actual cash inflows and cash outflow calculating the end cash position

- It is measured over the same period of time as the Income Statement

<table>
<thead>
<tr>
<th>CASH FLOW STATEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Income</td>
</tr>
<tr>
<td>(+) Depreciation</td>
</tr>
<tr>
<td>(+/-) Changes in Working Capital</td>
</tr>
<tr>
<td>Cash from Operating Activities</td>
</tr>
<tr>
<td>(-) Addition to Fixed Assets</td>
</tr>
<tr>
<td>(-) Addition to other Capitalized costs</td>
</tr>
<tr>
<td>Cash from Investment Activities</td>
</tr>
<tr>
<td>(+) Debt Proceeds</td>
</tr>
<tr>
<td>(+) Equity Proceeds</td>
</tr>
<tr>
<td>(-) Principal Repayment</td>
</tr>
<tr>
<td>(-) Dividends</td>
</tr>
<tr>
<td>Cash from Financing Activities</td>
</tr>
</tbody>
</table>

Cash Generated During the Period

(+) Beginning Cash

End Cash
METHODS FOR DETERMINING UTILITY’S DEBT CAPACITY

• No single, broadly accepted methodology for determining debt capacity
• Generally three approaches are used for debt capacity calculation
  ➢ based on maintaining the targeted credit rating
  ➢ based on asset’s market value
  ➢ based on free cash flow assessment
METHODS FOR DETERMINING UTILITY’S DEBT CAPACITY

I. Debt Capacity using Targeted credit rating

- Set debt levels to achieve and/or maintain target credit ratings
- Determine the target credit rating of the company
- Ascertain the metrics used by debt rating agencies to assign ratings to the utility companies (interest coverage ratio, long term debt to asset ratio, debt service ratio, etc.)
- Build pro-forma financial statements, flexible enough to very the debt levels to determine how the ratios change and ultimately impute the ratings of the company

Once the maximum debt capacity is determined, a stress test of the projected capital structure is necessary to make sure there is always sufficient cash available for any foreseeable long term strategic needs.
METHODS FOR DETERMINING DEBT CAPACITY

II. Debt Capacity using Asset’s Market Value

• Subtract the current liabilities on the balance sheet from the current assets after an impairment test of those assets has been completed

• This method requires analysis of the market value of the assets and marking the value of those assets on the books to the market value

• Then a simple subtraction calculation of the sum of assets minus the sum of liabilities informs regarding the additional debt capacity that the company can afford
METHODS FOR DETERMINING DEBT CAPACITY

III. Debt Capacity Using Free Cash Flow Analysis

- Analyze financial statements for the last 3-5 years
- Review projections (20 to 30 years) of key value drivers, such as, electricity tariffs and growth in sales and the cost of fuel used in generation, to determine the company’s growth prospects
- Analyze historic statements compared with those of other electric utilities across Central Asia (if available).
- Use this analysis to determine utility’s operating margins and establish performance metrics applicable to the utility going forward
III. Debt Capacity Using Free Cash Flow Analysis

- Estimate the values of capex, and cash flows available for debt service (CFADS) associated with the construction and management of the future power plants and import these into corporate financial model
- Approximate the debt amortization schedules of existing and planned facilities to assess their impact on the overall debt capacity of the utility
- Use the targeted d/e ratios as a constraint when sizing the facility and calculating the borrowing capacity
CHARACTERISTICS OF SUSTAINABLE UTILITY

- Solid financial health
- Technological and economic viability
- Predictable cash flows
- Full cost recovery tariffs
- Viable long term investment strategy
- Satisfactory risk allocation and mitigation
- Dependable contract dispute resolution procedures
- Credible and creditworthy counterparties
- Superior management abilities and experience
- Stable legal and regulatory framework
## STAND ALONE PROJECT RISKS & CONTRACTUAL MITIGANTS

<table>
<thead>
<tr>
<th>Risk Area</th>
<th>Description</th>
<th>Contractual Mitigants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit risk</td>
<td>Sovereign ceiling, Access to credit at competitive rates.</td>
<td>Offshore reserve accounts, late payment penalties.</td>
</tr>
<tr>
<td>Construction and Completion</td>
<td>Delays, cost overruns, performance issues. Rising EPC costs leading to rising break-even output prices. Greater costs in difficult or remote regions.</td>
<td>Sponsor completion guarantees on equal basis, turnkey EPC contracts, performance LDs.</td>
</tr>
<tr>
<td>Legal</td>
<td>Change of laws/regulations that adversely affects cash flows. Taxation, local content, profit repatriation, property rights, intellectual property, labor, dispute resolution, etc.</td>
<td>Dispute resolution mechanisms, enforcement through expedited international arbitration.</td>
</tr>
</tbody>
</table>
# Stand Alone Project Risks & Contractual Mitigants

<table>
<thead>
<tr>
<th>Description</th>
<th>Contractual Mitigants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political</td>
<td>Expropriation, currency inconvertibility &amp; transfer, political violence.</td>
</tr>
<tr>
<td>Financing</td>
<td>Exchange rates, inflation, interest rate.</td>
</tr>
<tr>
<td>Operational and technology risks</td>
<td>Performance issues, scope creep.</td>
</tr>
<tr>
<td>Force majeure</td>
<td>Non-preventable risks such as natural events, general strikes, etc.</td>
</tr>
<tr>
<td>Revenue</td>
<td>Prices, quantities.</td>
</tr>
<tr>
<td>Country Level</td>
<td>Corporate Level</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>- Committed government support</td>
<td>- Creditworthy participants</td>
</tr>
<tr>
<td>- Host government coordination</td>
<td>- Financial information</td>
</tr>
<tr>
<td>- Predictable regulatory environment</td>
<td>- Secured long term contracts</td>
</tr>
<tr>
<td>- Credible protection for foreign investment</td>
<td>- Economic viability</td>
</tr>
<tr>
<td>- Established lender rights</td>
<td>- Technical viability</td>
</tr>
<tr>
<td>- Enforceable contracts</td>
<td>- Proper allocation of risks</td>
</tr>
<tr>
<td>- Government guarantees against risk</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### SOURCES OF FINANCE (1/3)

<table>
<thead>
<tr>
<th></th>
<th>Characteristics</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercial Bank Debt</strong></td>
<td>Amount and type of finance (senior loan, subordinated debt) depends on the bank’s evaluation of the project’s risk profile.</td>
<td>More flexible terms than other types of financing.</td>
<td>Country and project exposure limits restrict size. Shorter maturities and higher rates than other types of financing. Variable interest rates.</td>
</tr>
<tr>
<td><strong>Capital Markets</strong></td>
<td>Bond financing on capital markets, where availability and terms are tied to project credit rating.</td>
<td>Long tenors, fixed interest rates, large size, few covenants. Host country sovereign rating does not necessarily act as ceiling.</td>
<td>Not generally available for greenfield projects. Must achieve investment grade rating. Raised as lump sum, creating negative carry.</td>
</tr>
</tbody>
</table>
## SOURCES OF FINANCE (2/3)

<table>
<thead>
<tr>
<th>Source</th>
<th>Characteristics</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Islamic Finance</td>
<td>Becoming increasingly common in the Middle East, North Africa, and South Asia. Financier takes risk beyond just provision of capital.</td>
<td>Can allow investors to tap into local lending markets. Increases lender security due to asset-backed nature of transaction. May improve project image in Islamic countries.</td>
<td>Compliance with Shariah law requires special financing structures and shariah panels whose policies are not fully standardized. Can result in longer structuring periods and higher structuring costs.</td>
</tr>
<tr>
<td>Export Credit Agency</td>
<td>May provide guarantees, insurance, and direct loans. Eg. US EXIM, JBIC, Coface, SACE, etc</td>
<td>Loans can add capacity, offer longer tenor, lower rates (often fixed) than commercial banks. Can offer some protection against sovereign risk, thereby attracting commercial lenders.</td>
<td>Relatively high premiums. Typically tied to export of equipment or goods manufactured in the ECA’s home country. Country restrictions. Lengthy approval process.</td>
</tr>
</tbody>
</table>
# SOURCES OF FINANCE (3/3)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multilateral Agency</strong></td>
<td>Offer direct loans or act as lender of record for commercial banks. Eg. World Bank, African Development Bank</td>
<td>May provide protection against sovereign risk in form of insurance or ‘halo’ effect. Can attract commercial capital. Preferred Creditor status.</td>
</tr>
<tr>
<td><strong>Private Equity, Mezzanine Debt, other alternative sources</strong></td>
<td>Direct equity investments or debt with equity return characteristics. Subordinate to regular bank debt.</td>
<td>Growing source of capital, particularly in emerging markets and infrastructure.</td>
</tr>
</tbody>
</table>
WAYS TO ENHANCE CREDIT OF FUTURE STAND ALONE INVESTMENTS

• Line of Credit
  – During construction or during operations.
  – Debt service line of credit.

• Reserve Account
  – Operating account. and management reserve account.
  – Debt service reserve

• Contingent Equity Account
  – During construction.

• Performance Guarantees - host government

• Insurance
  – Commercial
  – Political
WORLD BANK/PRG GUARANTEES (1/3)

• World Bank

• Partial risk guarantees (PRG)
  – Cover commercial lenders for a private sector project against default arising from a government-owned entity failing to perform its contractual obligations.
  – Risks eligible for coverage
    ➢ changes in law
    ➢ expropriation
    ➢ nationalization
    ➢ currency transfer and convertibility
    ➢ nonpayment of a termination amount
    ➢ failure to issue licenses in a timely manner
    ➢ PRGs require a government counter-guarantee
WORLD BANK GUARANTEES (2/3)

- Multilateral Investment Guarantee Agency (MIGA)
  - Provides political risk insurance (PRI) coverage to foreign direct investors
  - Risks eligible for coverage
    - transfer restriction
    - expropriation
    - war and civil disturbance
    - breach of contract
OPIC/US DFC GUARANTEES

• OPIC provides loan guarantees, which are typically used for larger projects.
• Generally requires US equity ownership of at least 25 percent of the equity of a project (subject to change).
• OPIC insurance can cover the following three political risks:
  – currency inconvertibility
  – expropriation
  – political violence
FORWARD FINANCIAL AND ANALYSIS
## PROJECT FINANCE VS. CORPORATE MODELS

### CORPORATE MODELS
- Multiple lines of business with various types of risk
- Financial ratio criteria based on industry type.
- Often use a financial modeling package rather than a spreadsheet to present history and alternative financing methods
- Use short-term debt/temporary securities as a plug.
- Data is obtained from annual reports and published reports of capital expenditures.
- Public data on historical trends.

### PROJECT FINANCE MODELS
- Single asset with identifiable revenue, cost, and technological risks.
- Financial ratio criteria depend on contract structure and technology.
- Generally use a spreadsheet model.
- Pay cash flow over maturities as dividends.
- Specific financial projections and technical data from project sponsors.
- Little public data; often no history.
CONSIDERATIONS WHEN MODELING

• How Much Detail
  – How important is additional detail?
  – Is there enough information to warrant complexity?
  – What information is conveyed by detail?
  – Tradeoff with time to complete.
  – Context of Objectives.

• Model Flexibility
  – Changing assumptions.
  – Future Updates.
  – Using base model for other projects.
  – Changing construction period.
  – Changing terms of loan.
FINANCIAL MODEL STRUCTURE

- Achieving optimal financial structure requires development of a financial model that accurately simulates the project’s cashflows given its technical, contractual, and market characteristics.

- Key elements for successful modeling:
  - Clear and flexible setup
  - Easy to follow logic
  - Modular approach

### Input Worksheet
- Group the assumptions by categories:
  - Timing
  - Financing
  - Capital expenditures
  - Operating
  - Working capital
  - Depreciation
  - Tax
  - Major maintenance

### Intermediate Worksheets
- All calculated data:
  - Timing
  - Capex
  - Spending Curve
  - Funding
  - Revenue
  - Expenses
  - Operations
  - Debt Amortization
  - Tax
  - Depreciation
  - Waterfall

### Output Worksheet
- Recalled data:
  - Summary
  - Cash Analysis
  - Debt Analysis
  - Return Analysis
  - Financial Statements Ratios
TYPICAL MODEL DATA FLOW

Scenario Manager / Time Constant Inputs

Time & Inflation

Development Funding

Time Variable Inputs

Reserve Accounts

Waterfall Calculations

Operations & Sales

Ratio & Return Calculations

Debt Calculation

Financial Statements

Accounting Calculations

Summary Financials

Tax Calculations

Key Outputs & Sensitivities

Graph Data

Error Checks
PROJECT KEY INPUTS (1/6)

Construction

▪ EPC Cost
▪ EPC Drawdown Schedule
▪ Timing
▪ Development Costs
▪ Contingency
PROJECT KEY INPUTS (2/6)

Operations

- Scheduled Outage Rate
- MW Capacity
- Heat Rat
- Dispatch Factor
- Number of Starts
- Ramping
- Frequency of Major Maintenance
PROJECT KEY INPUTS (3/6)

Cost Data

- Utility costs (water, auxiliary power)
- Labor
- Insurance
- Land lease
- G & A
- Chemicals
- Routine maintenance costs
PROJECT KEY INPUTS (4/6)

Financial

- Loan Term
- Base Interest Rate
- Interest Spread
- Commitment fees
- Exposure fees
- Arrangement fees
- Debt amortization schedule
PROJECT KEY INPUTS (5/6)

Contractual

– Electricity Tariff
– Fuel Price
– Fuel Transportation Costs
– Penalties
– Major Maintenance costs
– Operating fees
– Escalation rates
Macroeconomic & General

- Inflation
- Exchange Rates
- Working Capital
- Depreciation Allocations
- Capital Expenditures
POWER PLANT OPERATING CHARACTERISTICS

Power plants key parameters:

- Capacity (MW)
- Capacity Factor (CF)
  - Based on availability and dispatch factors
  - \( CF = AF \times DF \)
- Availability Factor (AF)
  - Percentage of the time a plant is operational
  - Typical availabilities:
    - Coal 85-95%
    - Gas 90-95%
    - Hydro 20-70%
    - Nuclear 93%
- Dispatch Factor (DF)
  - Percentage of the time a plant is called by the grid operator
POWER PLANT OPERATING CHARACTERISTICS

Power plants key parameters:

- **Heat Rate**
  - Amount of heat energy required to produce a unit of electricity (btu/kwh)
  - Fuel Expense calculation for a period:
    - Electricity produced (KWh) = Net capacity * hours in operation per period
    - Heat used (MMBTU) = heat rate * electricity produced
    - Fuel expense (USD) = fuel cost per MMBTU * Heat used
  - Higher efficiency demands less heat rate
    - Steam turbines 8,000 to 10,000 btu/kwh
    - Gas turbines 6,800 to 9,000 btu/kwh
    - Combined cycle gas turbines 5,500 to 6,500 btu/kwh

- **Ramp Rate**
  - How quickly a plant is able to change its output from min to max load

- **Cycling**
  - Ability to completely shut down and restart
  - Gas fired power plants have good cycling ability
  - Coal power plants usually base load (poor cycling ability)
SAMPLE FINANCIAL MODEL
ACTION ITEMS
NEXT STEPS

- Formation of working groups
- Points of Contact
- Roadmap & discussion of next steps