Northwest **Power** and **Conservation** Council

September 30, 2014

MEMORANDUM

TO: **Council members**

FROM: **Steven Simmons**

SUBJECT: **Financial Assumptions for Resource Development**

BACKGROUND:

Presenter: Steven Simmons

Summary: The finance model – MicroFin - is used to calculate both the fixed levelized cost, and the full levelized cost of energy (LCOE) for power generating resources. The finance assumptions which are input to MicroFin have an impact on the resulting levelized costs. For example, each generating resource type has a set estimate for the overnight capital cost, regardless of who builds pays for the plant. However, the cost of capital to actually build the plant may vary based on the financial sponsor – such as a municipal or public utility, an investor owned utility or an independent power producer. Other important finance assumptions include the discount rate, rates of return, and investment tax credits. Important operating assumptions include gas price forecasts, O&M, and capacity factors.

Relevance: MicroFin takes estimates for the capital costs and operating performance of generating resources and calculates a levelized cost. Two power planning modeling tools use these cost estimates, including the Regional Portfolio Model (RPM) and the AURORAxmp market model. In addition, the LCOE is used to quickly gauge how new generating resources compare to one another on an overall cost basis.

Workplan: 1.D. Update generating resource characterization

Background: The staff has presented previously on the calculation of the levelized cost of energy at both GRAC meetings and Council meetings.
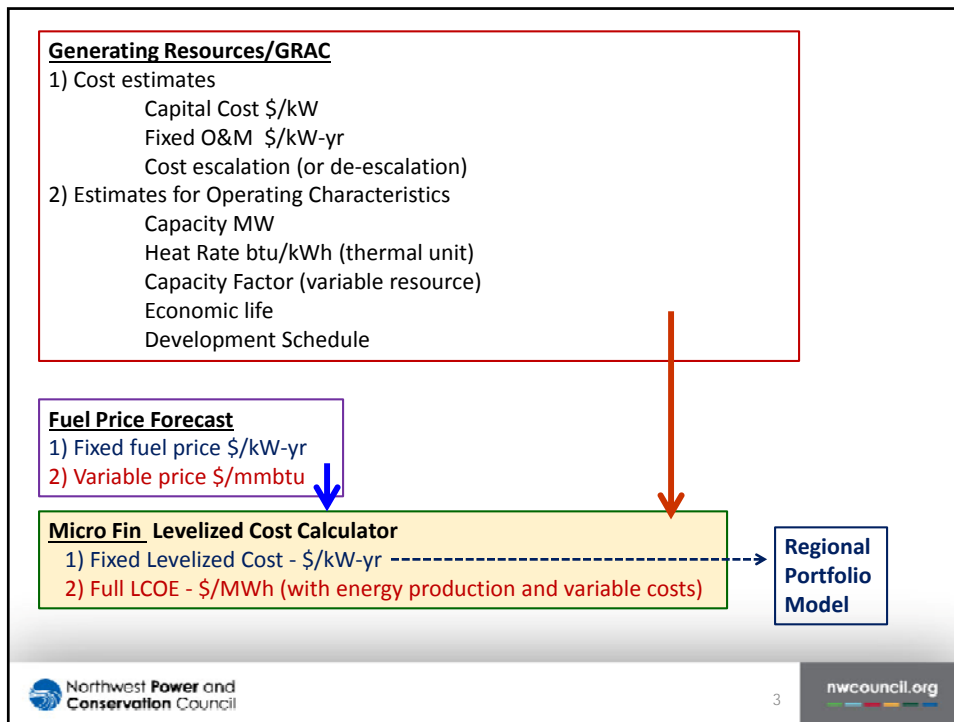
More Info: For a primer on the LCOE calculation, see the April 2013 presentation
http://www.nwcouncil.org/media/6838753/4.pdf

Generating Resource Financial Assumptions

- **Overview Generating Resource Cost Development Process & MicroFin**
- **Proposed Financial Sponsor Assumptions**
- **Levelized Cost of Energy Sensitivities**
- **Questions ?**

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Supply Side Cost Estimation

- **Generating Resources/GRAC – provides estimates of capital cost and operating characteristics for new resources**
- **MicroFin – used to produce estimates for the fixed cost of capital ($KW-yr) for these resources**
  - Also produces levelized cost of energy ($/MWh) for *single* gas price and capacity factor

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Generating Resources/GRAC
1) Cost estimates
          Capital Cost $/kW
          Fixed O&M $/kW-yr
          Cost escalation (or de-escalation)
2) Estimates for Operating Characteristics
          Capacity MW
          Heat Rate btu/kWh (thermal unit)
          Capacity Factor (variable resource)
          Economic life
          Development Schedule

Fuel Price Forecast
1) Fixed fuel price $/kW-yr
2) Variable price $/mmbtu

Micro Fin Levelized Cost Calculator
  1) Fixed Levelized Cost - $/kW-yr -------------------------------->
  2) Full LCOE - $/MWh (with energy production and variable costs)

Regional Portfolio Model

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MicroFin

<u>Revenue requirements financial model</u>
1. Calculates annual cash flows over the plant lifetime that satisfy revenue requirements
2. Annual cash flows are compressed into a single year dollar value – Net Present Value (NPV)
3. NPV is converted into an even, annualized payment (like a mortgage payment) – Levelized Cost. When divided by annual energy production – it becomes the Levelized Cost of Energy $/MWh

Three financial sponsor options
    1.   Muni/PUD
    2.   IOU
    3.   IPP

Key assumption differences among the sponsor types
    1.   Tax rates
    2.   Debt rates and service periods
    3.   Equity return rates and service periods

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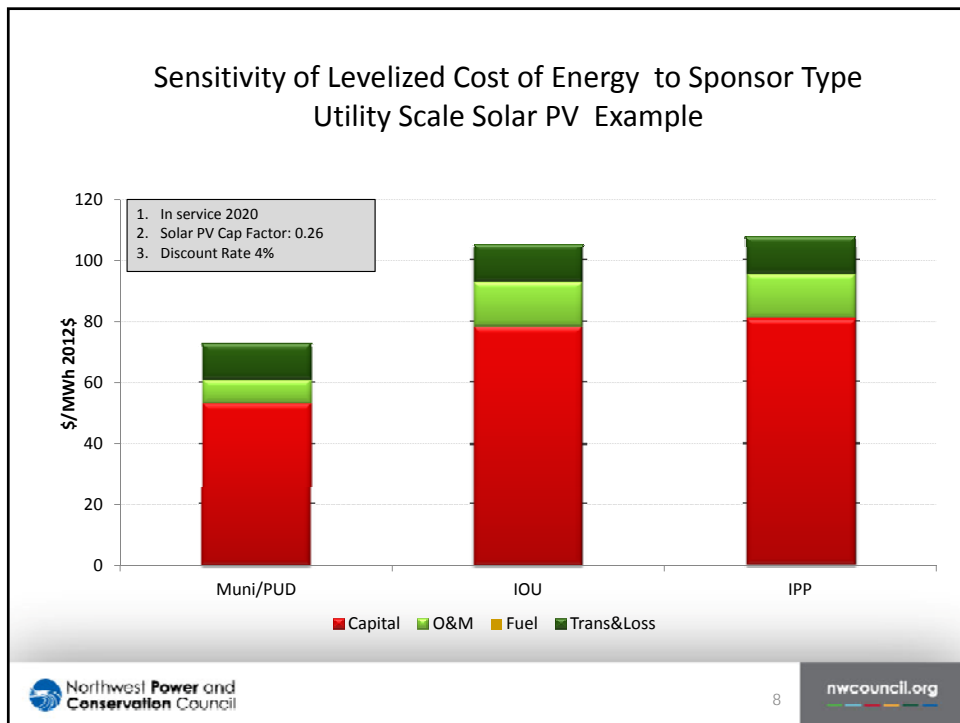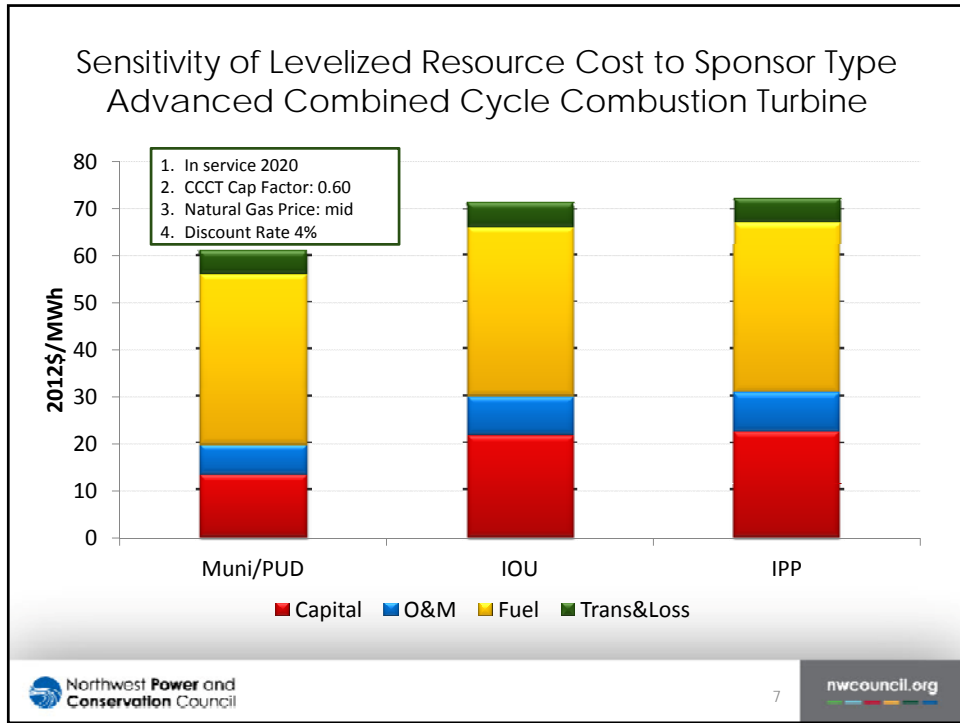
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Proposed Assumptions

MicroFin Financials Key Assumptions	Municipal/PUD	Investor Owned Utility	Indep. Power Producer
Federal Tax - %	0	35	35
State Tax - %	0	5	5
Fed Tax Inv Credit - %	0	30/10[1]	30/10[1]
Property Tax - %	0	1.4	1.4
Insurance - %	0.25	0.25	0.25
Debt Fraction - %	100	50	60
Debt Interest Rate (not tax adjusted)	5.24	6.69	6.69
Debt payment Period	25[2]	25[2]	20[2]
Return on Equity	0	10	13.7
Equity Payment Period	25[2]	25[2]	20[2]
Discount Rate	4	4	4
Inflation Rate	1.64	1.64	1.64

[1]Solar only – Fed ITC 30% thru 2016, 10% following
[2] Gas 30/30/15

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Sensitivity of Levelized Cost of Energy to Sponsor and Tax Credit Assumptions

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Sensitivity of Levelized Resource Cost to Sponsor Type
Advanced Combined Cycle Combustion Turbine

1. In service 2020
2. CCCT Cap Factor: 0.60
3. Natural Gas Price: mid
4. Discount Rate 4%

Sensitivity of Levelized Cost of Energy to Sponsor Type
Utility Scale Solar PV Example

1. In service 2020
2. Solar PV Cap Factor: 0.26
3. Discount Rate 4%

Draft 7th Plan Assumption for Federal Investment Tax Credit for Solar?

- **Available to solar pv projects at 30% through 2016, then drops to 10%**
- **Reduces levelized costs by reducing the amount of federal income tax**

Solar PV 20MW Plant Example		
	In Service – 2015	In Service - 2025
Capital Cost $/kW	2,639	2,019

ITC Rate (%)	LCOE ($/MWh)	LCOE ($/MWh)
0	130	102
10	127	100
30	121	95

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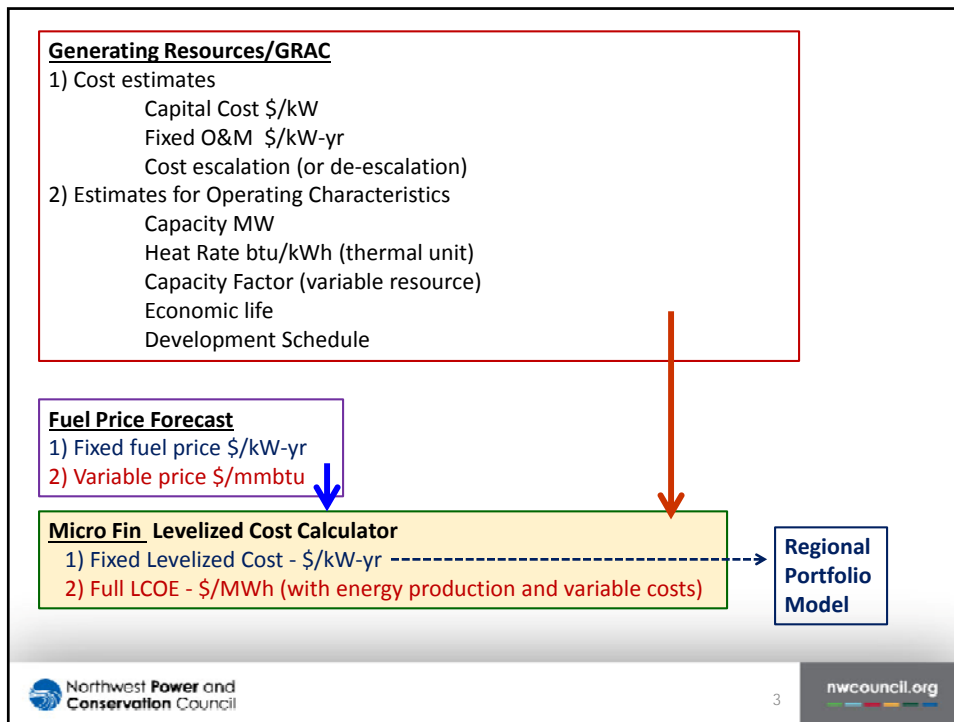
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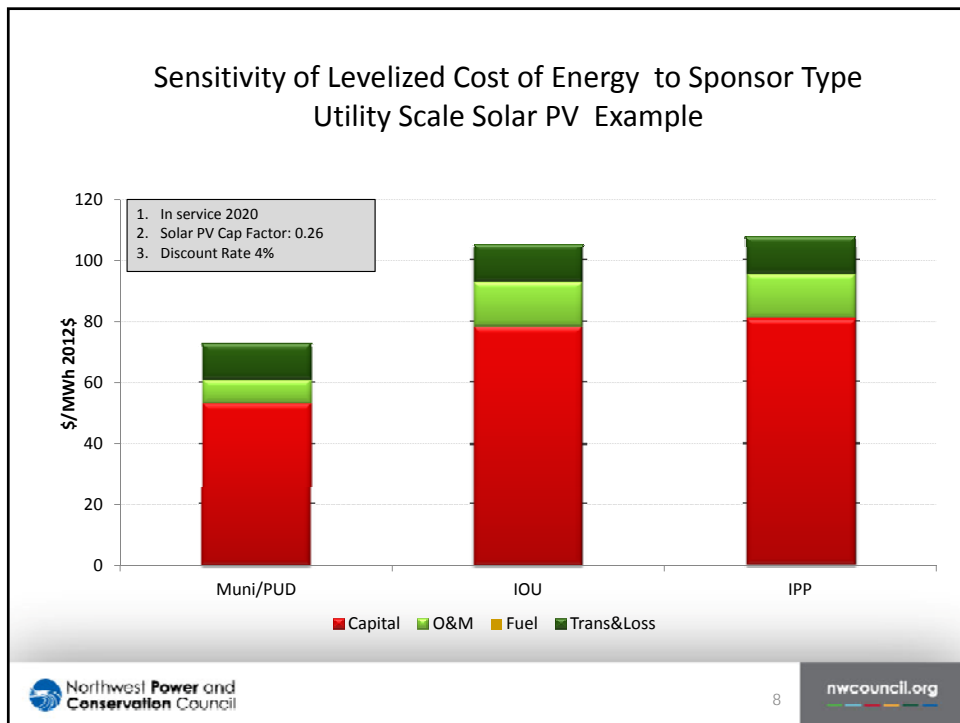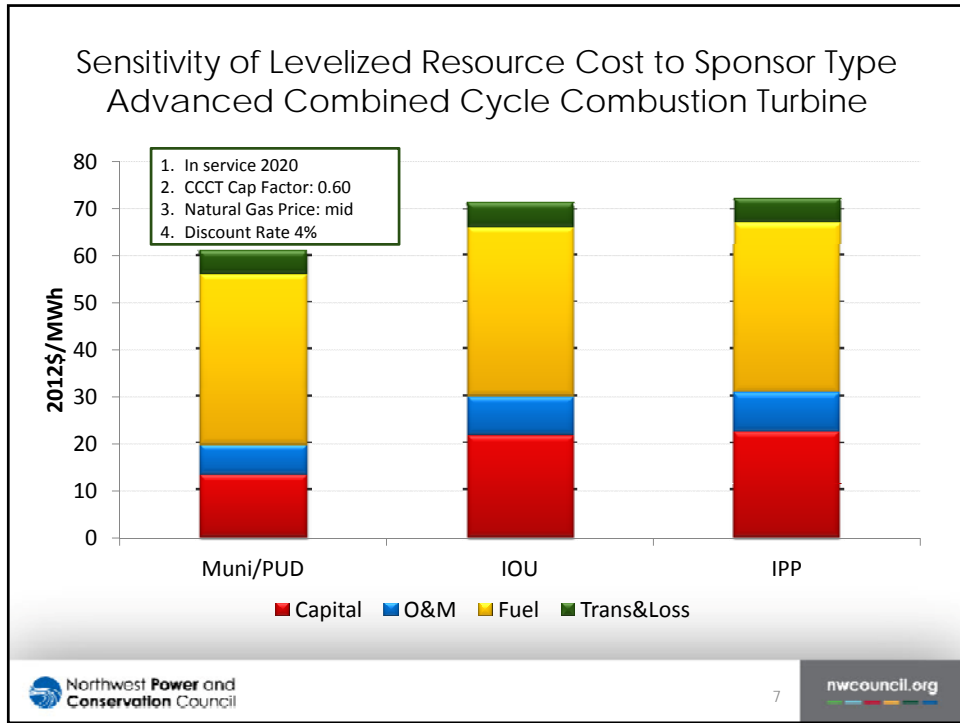
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