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

July 29, 2014

MEMORANDUM

TO: Power Committee

FROM: Massoud Jourabchi

SUBJECT: Financial Assumptions for the Seventh Power Plan

Staff will brief the power committee on the impact of discount rates on resource economics, options to selecting a discount rate, and the staff's recommended discount rate for developing the Seventh Power Plan.

A discount rate reflects the time preference for payment or expenditures — whether one prefers to pay or be paid now or in the future. It is one of several financial assumptions, along with the cost of capital for resource development (debt and equity costs) and inflation rates, used in the Council's economic analysis.

Discount rates are used to translate the costs incurred at different times into comparable present values in order to compare energy generating and efficiency projects that have different patterns of expenditure. Installing an efficiency project or a wind turbine, for example, is characterized by high upfront investment costs and low or no ongoing operating expenses, while constructing a combined-cycle combustion turbine has relatively lower upfront costs and higher ongoing expenditures for fuel and operation.

Using a discount rate is important for three reasons: first, the values used directly influence the outcome of the analysis; second, the values used in the various components of the analysis must be consistent; and third, some assumptions reflect policy judgments about the relative weight of the present and the future.

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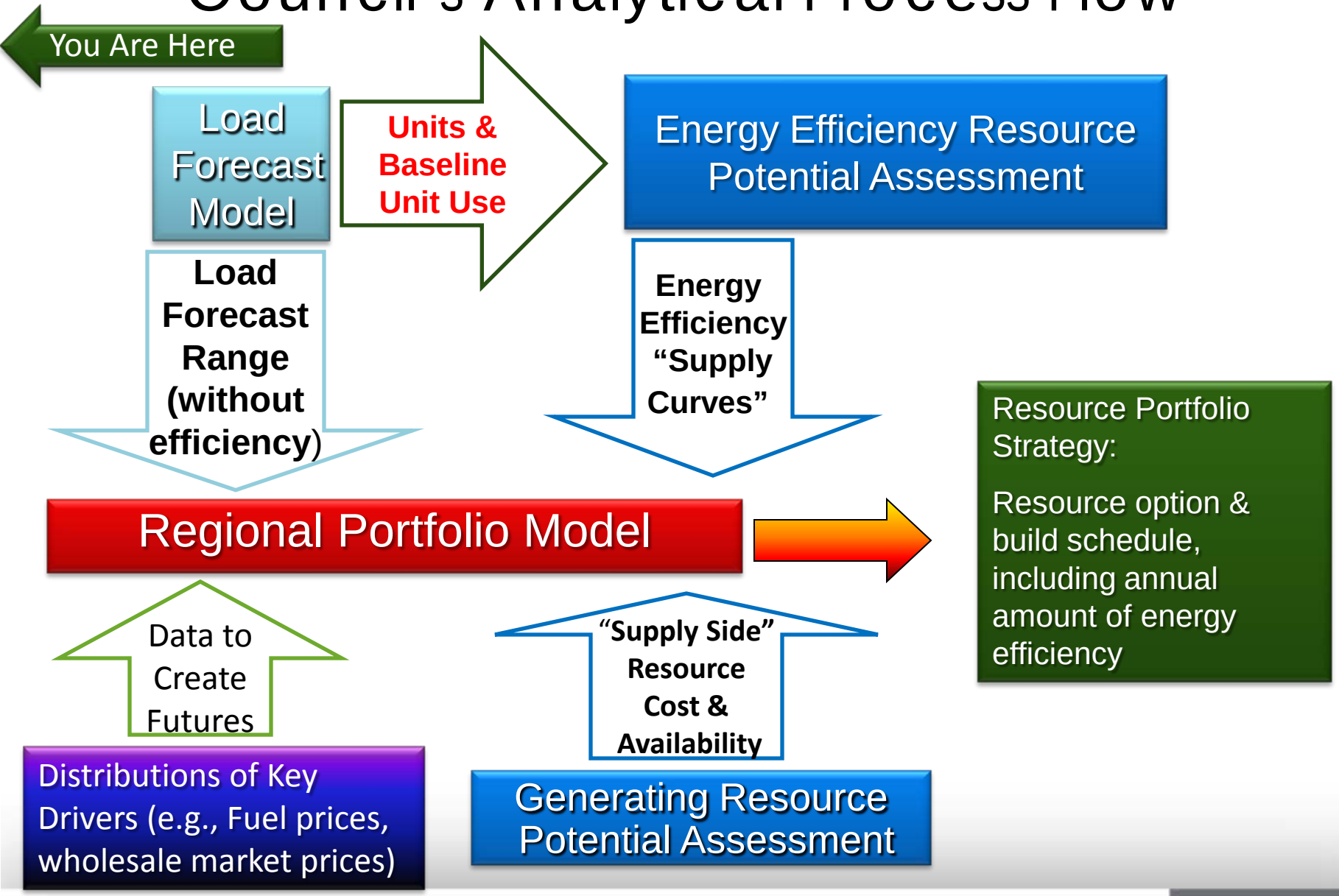
Staff analysis found that while discount rates are a key financial assumption effecting resource selection, selecting a discount rate within the range used in the Council's past plans does not typically alter the economic ranking of resources. Although the levelized costs across resources change by varying the discount rate, the economic ranking of resources is generally stable, unless the discount rate is well outside the range supported by economic and finance theory.

Staff has also prepared an issue paper on discount rates that could be used to solicit public comment.

Discount Rate for the Seventh Power Plan

Issue Background
and
Staff Recommendation
August 5, 2014

Council's Analytical Process Flow



Plan Development Process

- Establish Values for Key Drivers
- Identify Major Issues
- Estimate cost and availability of conservation and generating resources
- Conduct Resource Portfolio Analysis
  - Identify resource needs
  - Test alternative portfolios and "decision rules"
  - Agree on a preferred draft plan, including action plan
- Issue Draft Plan for Comment
- Conduct Additional Analysis/Revise Existing Analysis in Response to Comments on Draft Plan
- Adopt Final Plan

Decisions on Global Values and for the Seventh Plan

- Economic and Fuel price forecast range
- Presented July 2014

- Financial Assumptions- initial presentations in Feb 2013 with follow-ups in April 2013 and tentative decision August 2014
  - Base Year Dollars: Constant 2012$
  - Inflation rate (2013-2035)
  - Standardized GDP Deflators to Adjust to Constant Years Dollars
  - Discount rate: Societal or Weighted After Tax Cost of Capital?
- Study Horizon: 2016 – 2035
- Study Start in Quarters: Q4 of 2015?
- Treatment of state and federal taxes and tax incentives
- Treatment of Transmission & Distribution system losses and costs.
  - Load Forecast
  - Aurora
  - ProCost
  - RPM
- Peak Period definition
  - Driven by Resource Adequacy Assessment and LOLP
  - Single hour coincident peak for a month, or year?

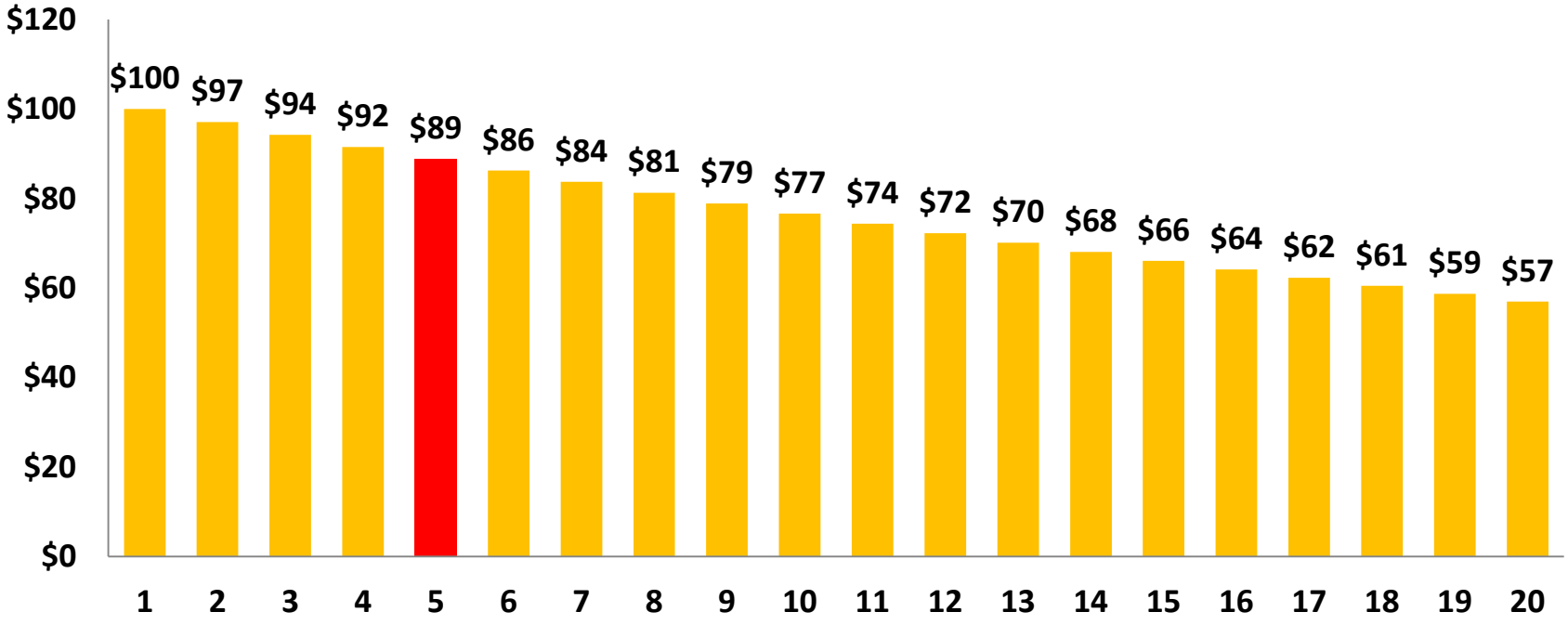
Today's Presentation

- What is a discount rate?
- What role does the discount rate play in the Council's analysis?
- What factors should the Council consider in deciding on a discount rate?
- How does the Council wish to proceed on the decision on discount rate for use the 7th plan.

What is a "Discount Rate"

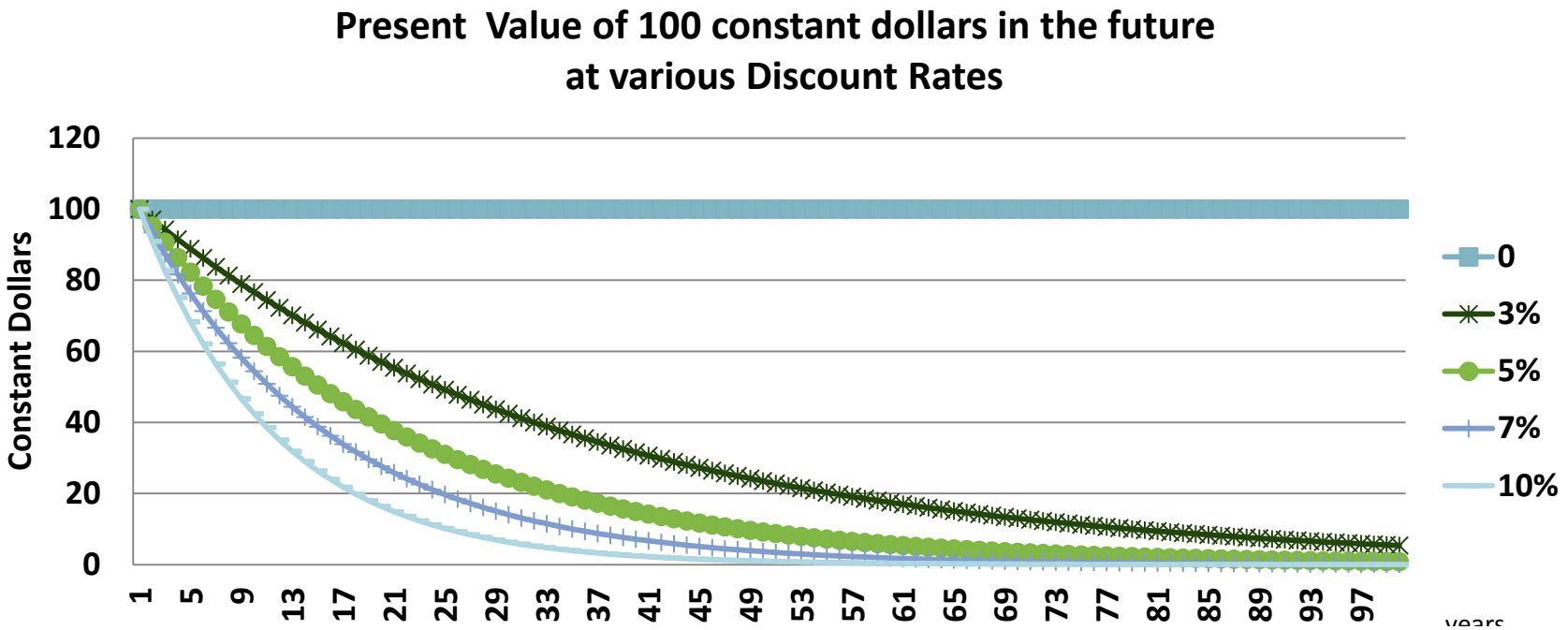
- In simple terms, a discount rate reflects the "rate of time preference" of an individual, entity or society
- Discount rates work like interest rates, except in the opposite direction
- Lower discount rates place a greater value on *future* costs and benefits than do higher discount rates

What is a Discount Rate?



Amount of consumption now that is equivalent to consumption in the future
For example: If you are willing to consume $89 dollars now instead of $100 dollars 5 years from now, then your discount rate is 3%.

What is the impact of different Discount Rates?



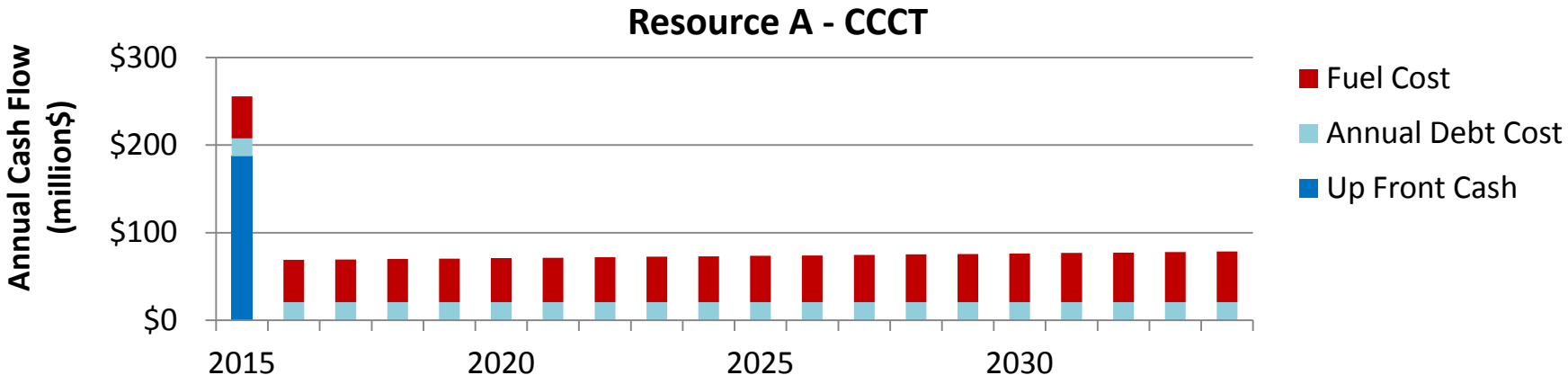
The higher Discount rate the faster present value drops off. This is not due to inflation, but due to discounting.

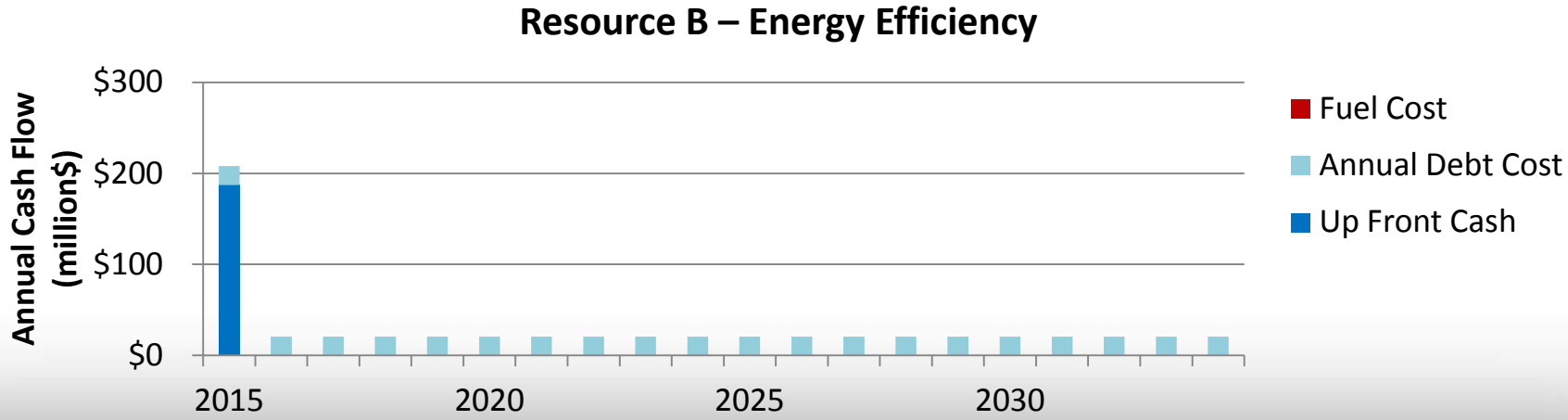
So if you are willing to consume less now so that your grand-children consume more later, then you exhibit a preference for a lower discount rate.

We Use Discount Rates To Compare the Lifecycle Cost of Resources

	Resource A - CCCT	Resource B - Efficiency
Nameplate Capacity (MW)	390	195
Annual Capacity Factor (%)	50%	100%
Annual Energy (MWh)	1,708,200	1,708,200
Annual Energy (MWa)	195	195
Capital Cost ($/kW)	$1,200	$2,400
Captital Cost ($)	$468,000,000	$468,000,000
Capital Equity Share (%)	40%	40%
Capital Debt Share (%)	60%	60%
Finance Interest Rate (%)*	4%	4%
Finance Interest Term (Years)	20	20
Initial Fuel Cost ($/MWh)	$28	$0
Annual Fuel Escalation Rate (%)*	1%	0%

Discount Rates Are Used to Compare Resources With Widely Varying Annual Cost ("cash flows")





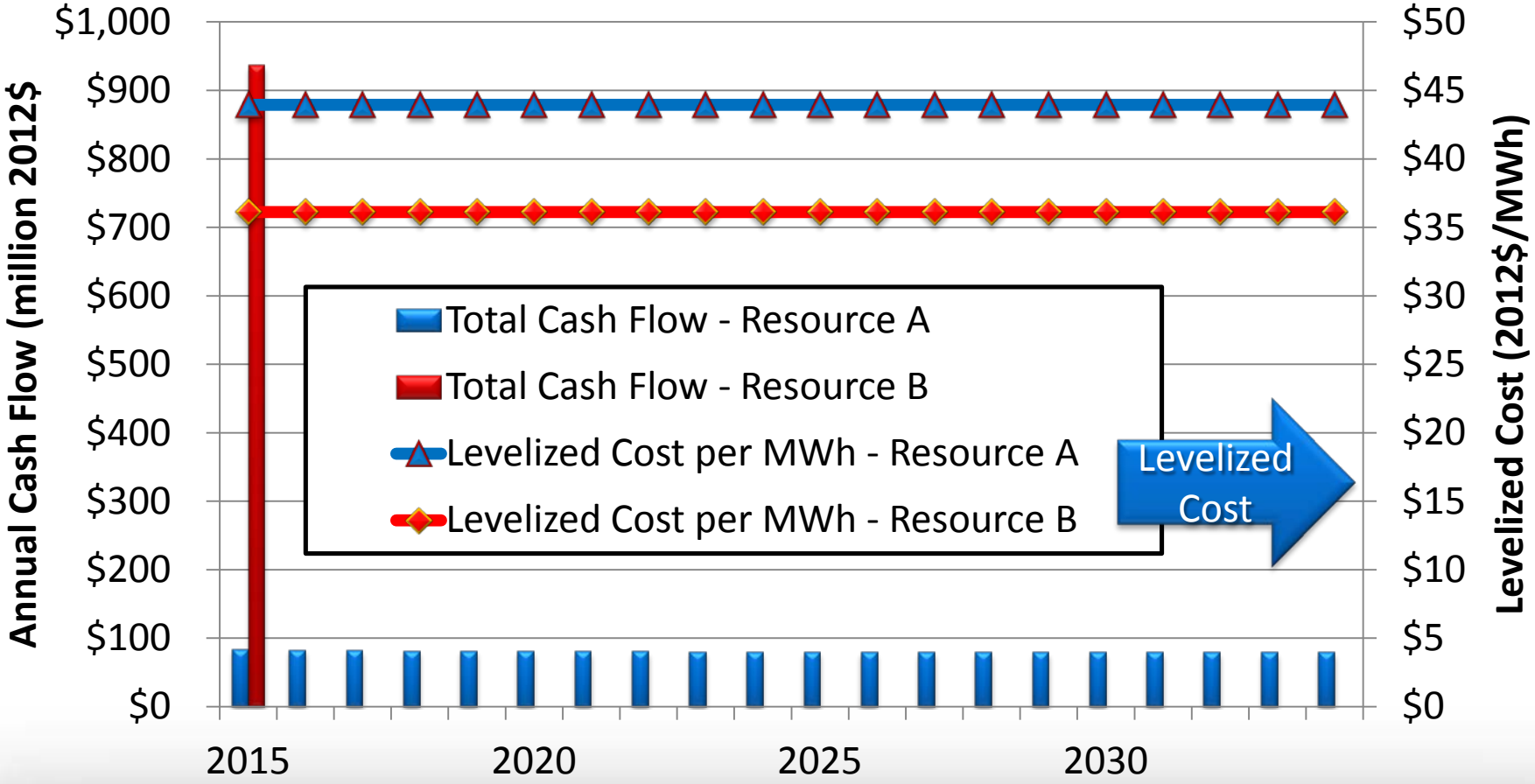
How A Discount Rate is Used in Council's Analytics

- A ***Discount Rate*** is used to calculate the value today of all future costs and benefits . This is referred to as the ***Present Value*** of all future costs or benefits.

- In order to compare resources that have different lives, different annual cash flows and are of differing sizes we calculate the ***Levelized Cost*** of the ***Present Value*** of the stream of costs by converted it into a stream of equal annual payments. ***Levelized Cost*** is the "mortgage payment" per MWh of a resource.

- For example, if no down payment is paid on a house, and the entire amount needed to buy it is borrowed from a bank, that amount is the ***present value*** of buying a house. The annual mortgage payment including interest on a house is the ***levelized cost*** of that house.

Levelizing Costs Allows Comparison of Resources with Different Lifetimes, Annual Cash Flows and Sizes



Now. . .
Enough Background
On to the Choice of A Discount Rate

Perspective Matters

Like Most Things, Discount Rates Depend on Your View

- Investor/Corporate Perspective
  - Entities who finance and build the resources
- Consumer/Ratepayer Perspective
  - People who pay the bills for resources.
- National or Societal Perspective
  - Based on either above perspectives
  - Differs with respect to the treatment of taxes
  - Often considers externalities

Factors To Consider in Council Decision on Discount Rate

- Whose rate of *time preference* should be used?
  - Those who will make decisions to invest in new resources such as wind projects, combustion turbines, and conservation measures (i.e., the corporate perspective), or
  - Those who will be paying the costs of those investments and other costs of operating the region's power system (i.e., the consumer's perspective).
  - Historically, the Council has adopted the corporate perspective in three plans, the consumer's perspective in three others.
  - Staff recommends that the consumer's perspective is more consistent with the Council's mandate.

How Different Are The Perspectives?

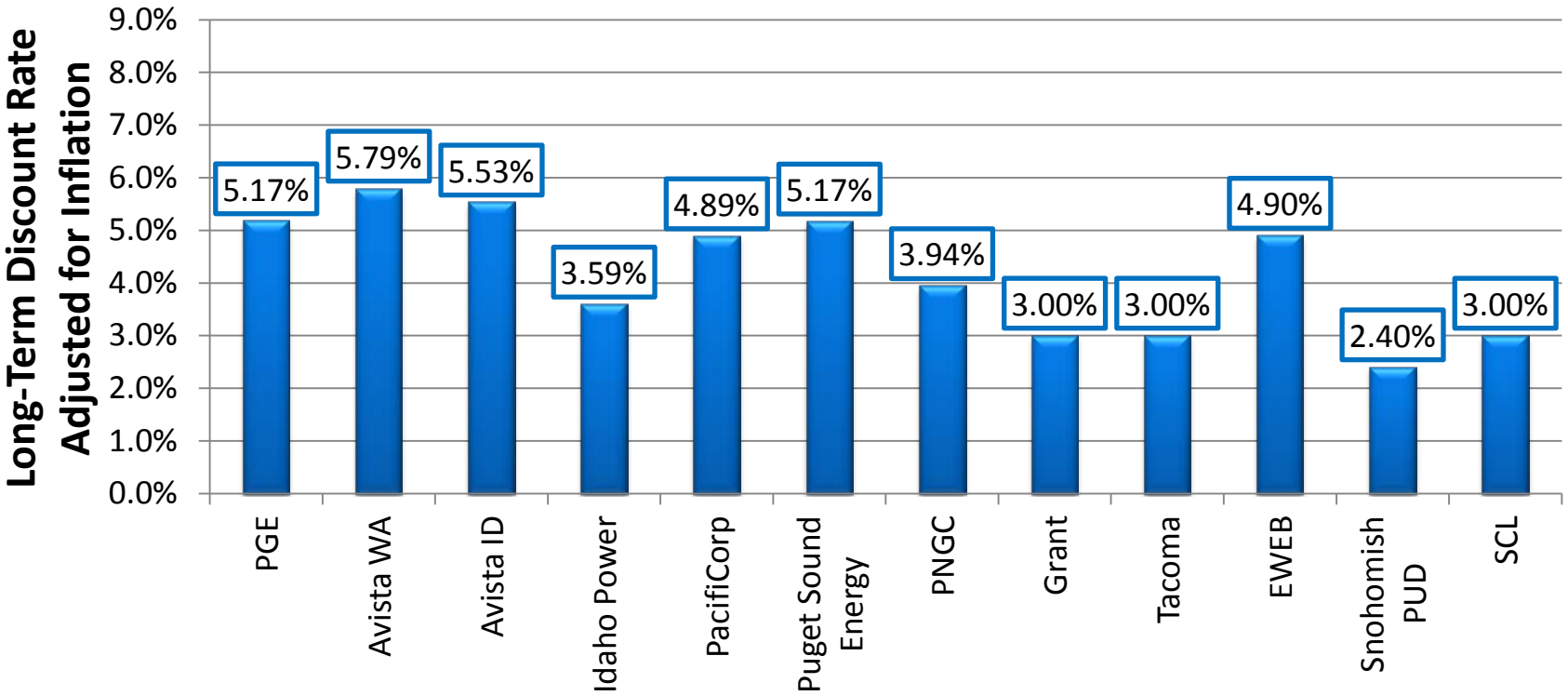
- Investor/Corporate Perspective-
  - Based on Weighted Average After-Tax Cost of Capital (WAACC)
  - Stops at investor rather than going to ultimate consumer
- Consumer perspective
  - Based on Real After Tax Returns on Investments (used to estimate "consumption rate of interest")
  - Imputed from observed behavior in investing
  - Decision on consumption now vs. future.

Derivation of Discount Rates from Consumer and Corporate Perspectives

Resource Sponsor	Consumer Perspective Real Rate of Return (Adjusted for Taxes)	Corporate Perspective Real Cost of Capital (Adjusted for Taxes)	Assumed Share of Project Cost (Weight)
Municipal Utility	3.54%	3.54%	17.5%
Co-op	2.84%	4.49%	5.0%
IOU	3.98%	5.45%	32.5%
BPA	4.39%	4.39%	5.0%
Residential Customers	3.02%	3.02%	17.5%
Business Customers	4.27%	7.7%-5.01%*	22.5%
Weighted Average After Tax Real Discount Rate	3.7%	5.1%-4.5%	100%

*- Based on DOE analysis, not clear on corporate tax

More Input To Your Decision
Discount Rates Used by Regional Utilities



IOUs Range: 3.6% to 5.79% simple average: 5.0%
Publics Range: 2.4% to 4.9% simple average: 3.4%

Source : Survey of Demand Forecast Advisory Committee Members- Feb 2013

Summary of Different Perspectives

- Corporate Perspective - 4.9%
  - Average for IOUs surveyed - 5.0%
  - Average for Publics surveyed - 3.4%
  - OMB Recommendation - 5%
- Consumer Perspective - 3.9%
  - Residential bill payer perspective - 3 %
  - Business bill payer perspective - 4.3%
  - OMB Recommendation - 3.0%

Selecting A Discount Rate Within The Range of Observed for Either Corporate or Consumer Perspectives Does Not Materially Alter The Economic Ranking of Resources

Resource Type	Real Levelized Cost ($/MWh)with Real Discount rate at 3%	Real Levelized Cost ($/MWh)with Real Discount rate at 4%	Real Levelized Cost ($/MWh)with Real Discount rate at 5%	Real Levelized Cost ($/MWh)with Real Discount rate at 7%
Energy Efficiency	**$60**	**$51**	**$48**	**$46**
Wind	**$105**	**$79**	**$73**	**$67**
Combined-Cycle Combustion Turbine	**$94**	**$69**	**$63**	**$58**
Single-Cycle Combustion Turbine	**$304**	**$228**	**$209**	**$192**

Summary of Recommendation for the 7th Plan?

- Council has used both Corporate and Consumer perspectives.
- Ratepayer/Consumer perspective was used in the first three plans.
- Corporate perspective was used in the last three plans.
- Within the observed range of discount rates the actual value has real, but small impacts on the economic ranking of resources.
- For the 7th plan staff recommendation is to use 4% real discount rate.