



# Cost of capital

Its application in electricity regulation

24 August 2011

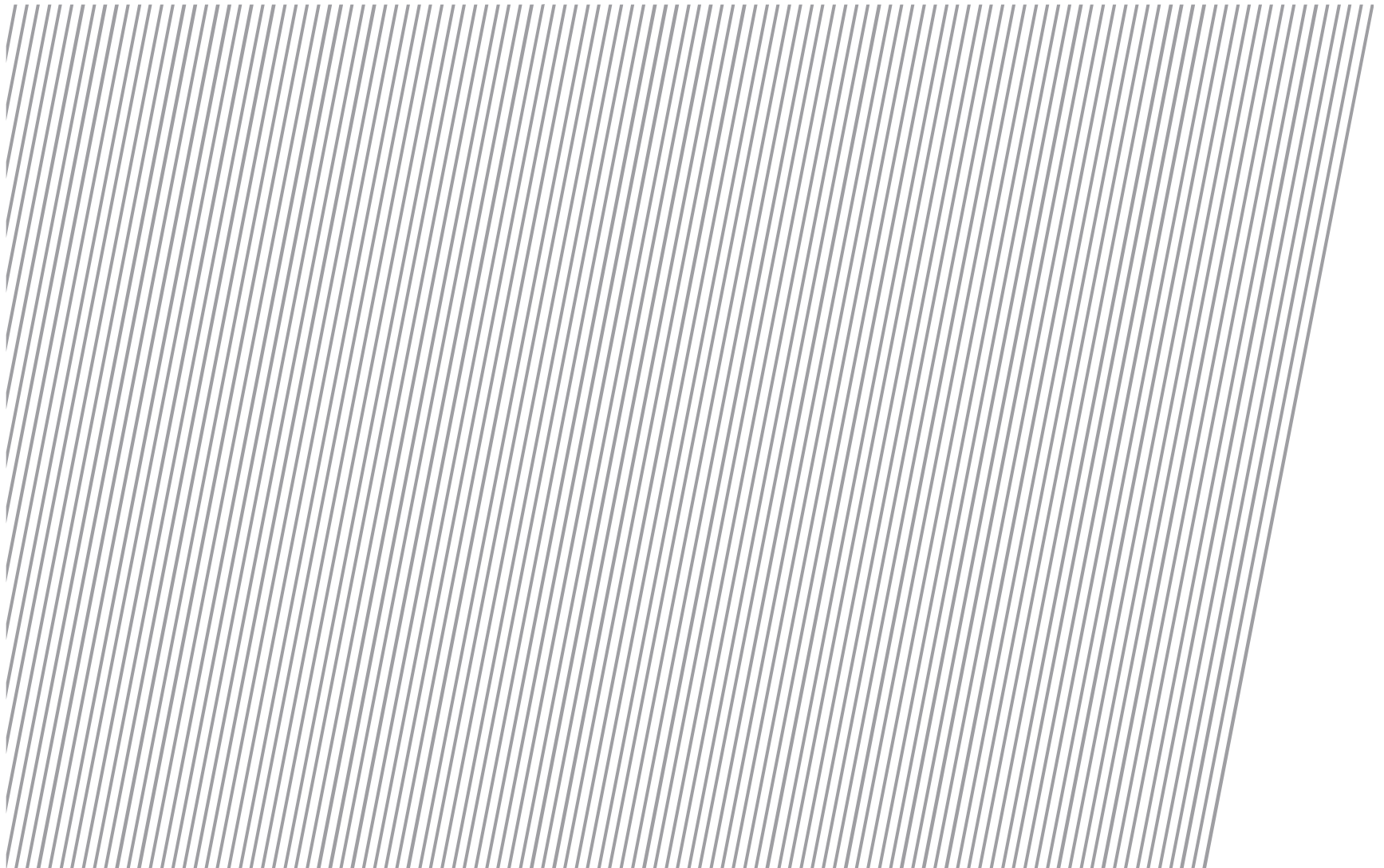
# Presentation overview

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- ▶ Introduction
- ▶ Agenda for today
  - ▶ Overview of theoretical foundations
  - ▶ The cost of capital in Australian electricity regulation
  - ▶ Trends in the regulated cost of capital
- ▶ Questions & comments

# Theoretical foundations

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# Definition of WACC

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- ▶ The cost of capital reflects the rate of return that a provider of capital requires as compensation for the time value of money and the risk of the relevant investment
- ▶ Akin to an interest rate ... but takes into account the risk of the underlying investment
- ▶ Companies are usually funded by a combination of debt and equity capital ...
  - ▶ So the cost of capital for a company reflects the rate of return required by its debt and equity holders. This is usually measured as a “weighted average cost of capital” (WACC).

# Formula variations

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- ▶ WACC can be defined in a number of ways
  - ▶ Pre-tax
  - ▶ Post-tax
  - ▶ “No-tax” = used by the AER (also known as the “vanilla” WACC)
  - ▶ Nominal
  - ▶ Real
- ▶ In Australia, due to the imputation tax system, there are also versions of the WACC formula which incorporate the value of imputation credits

# The problem with WACC

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- ▶ The cost of capital is about “expected returns” which are not observable
  - ▶ The “true” value can only be estimated
- ▶ There are various theoretical models about how investors form their return expectations
  - ▶ Models frequently based on assumptions which abstract from the real world (e.g. Zero taxes, homogenous assumptions)
- ▶ Problems with data sources and statistical methodologies for measuring parameters
  - ▶ Parameter estimates are inherently imprecise



**Applying WACC in access regulation is a difficult task as there are undesirable consequences to both over-estimating and under-estimating WACC**

# The Productivity Commission's Review of the National Access Regime (2001)

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The PC accepted that in regards to the regulated rate of return, both over-compensation and under-compensation were undesirable but nonetheless...

*“... the Commission accepts that there is potential asymmetry in effects:*

- over-compensation may sometimes result in inefficiencies in the timing of new investment in essential infrastructure (with flow-ons to investment in related markets), and occasionally lead to inefficient investment to by-pass parts of a network. However, it will never preclude socially worthwhile investments from proceeding.*
- On the other hand, if the truncation of balancing upside profits is expected to be substantial, major investments of considerable benefit to the community could be forgone, again with flow-on effects for investment in related markets.*

*In the Commission's view, the latter is likely to be a worse outcome. Accordingly, it concurs with the argument that access regulators should be circumspect in their attempts to remove monopoly rents perceived to attach to successful infrastructure projects.” (page 83)*

# The Capital Asset Pricing Model (CAPM)

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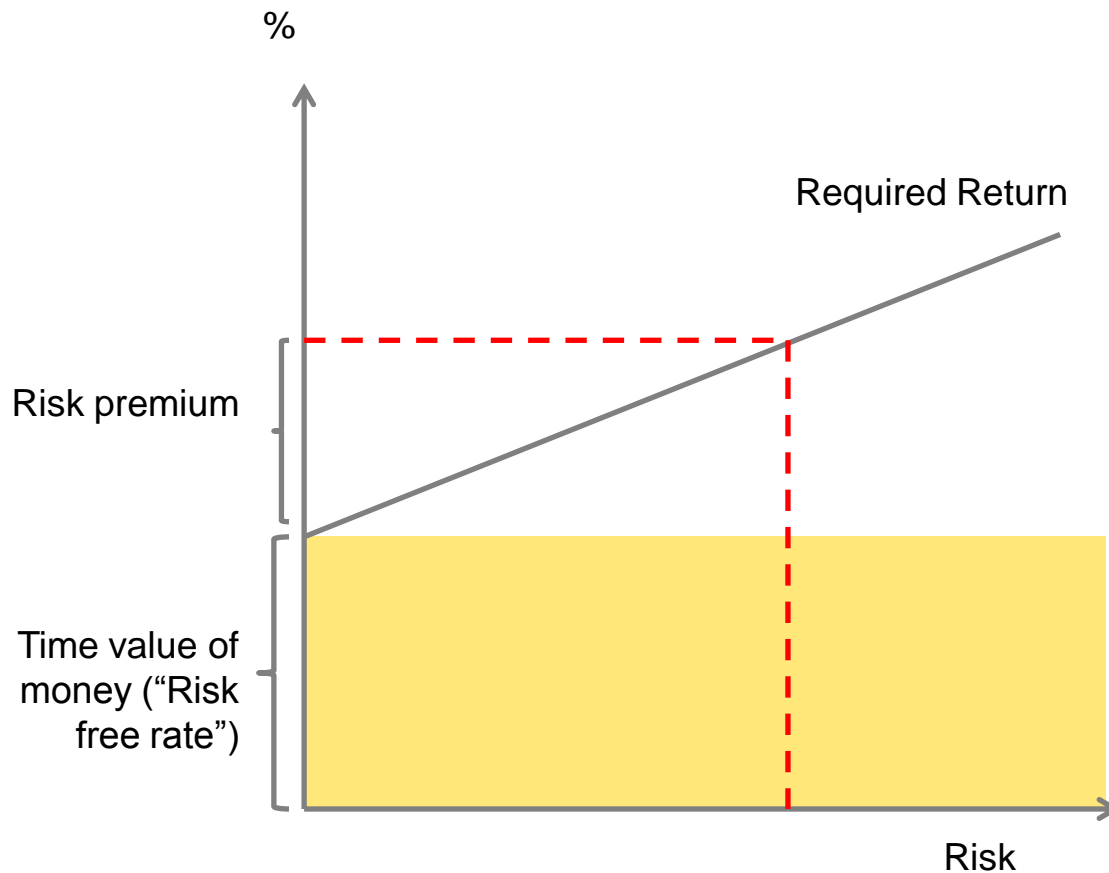
- ▶ One of the most commonly used models for estimating expected returns
  - ▶ There are different versions of the CAPM but the single factor CAPM is most commonly used
- ▶ Based on traditional portfolio theory (where only mean-variance efficient portfolios matter)
  - ▶ CAPM turns portfolio model into a testable proposition about the relationship between expected returns and risk ... by making a few “simplistic” assumptions
- ▶ The CAPM has its critics

# The CAPM's risk-reward framework

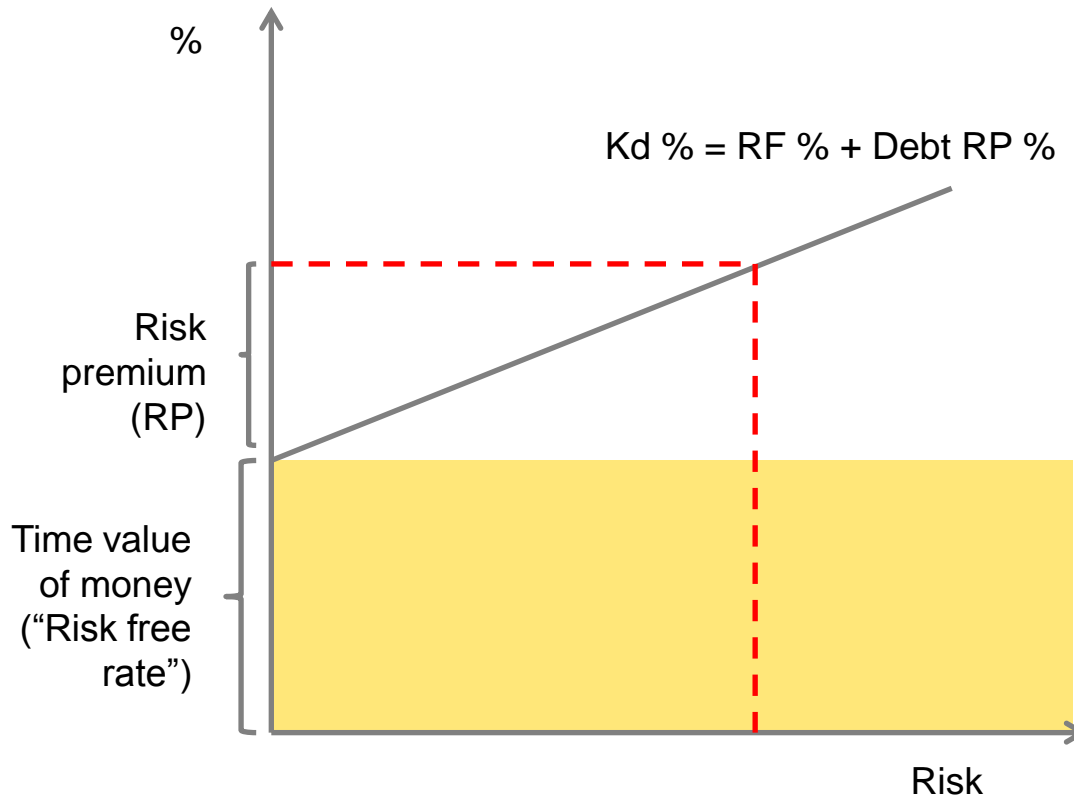
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- ▶ For risk free investments, the required return is one that compensates investors for the time value of money
  - ▶ Fundamental concept of financial theory
  - ▶ A given amount of money today is worth more than the certainty of receiving the same amount of money at some time in the future
  - ▶ The rate of return on government bonds is a common reference point for the time value of money
- ▶ For risky investments, the required return must not only compensate the investor for the time value of money, but also for the risk associated with the investment

# Required rate of return for risky assets

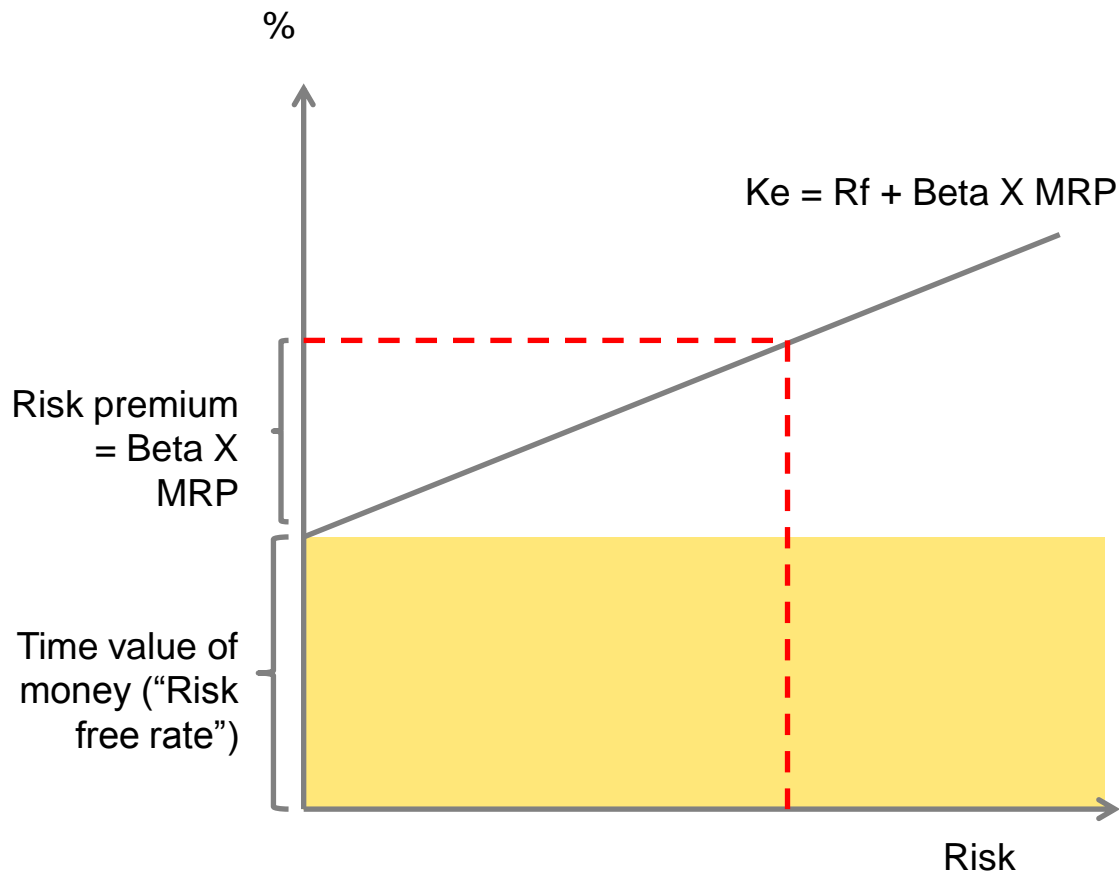


# Required rate of return on debt (Kd)



- ▶  $Kd$  = the rate at which the company is able to raise new debt today
  - ▶ This is not necessarily the same as the interest rate currently being paid on corporate borrowings
- ▶ Debt RP reflects the credit quality of the borrower / asset

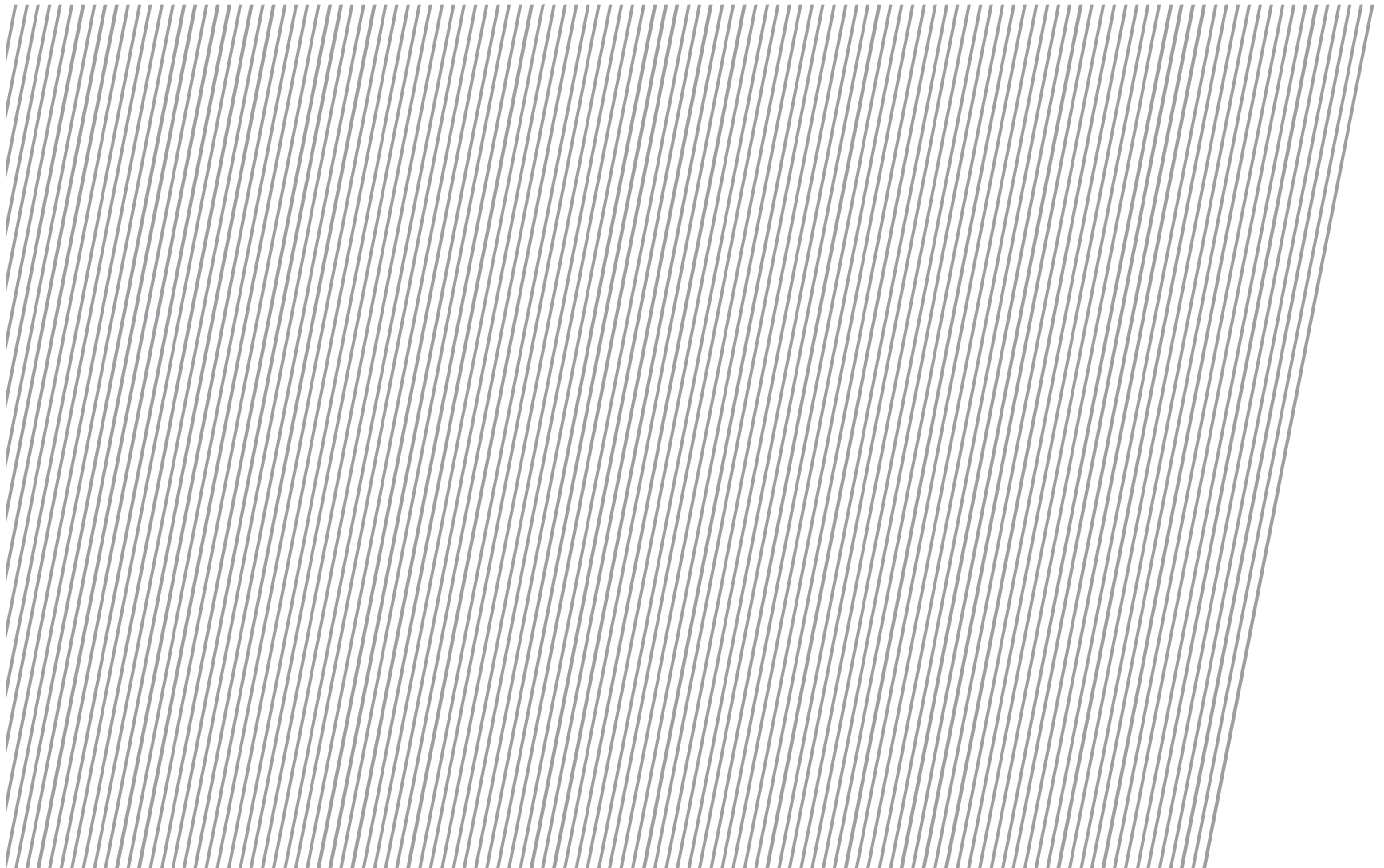
# Required rate of return on equity (Ke)



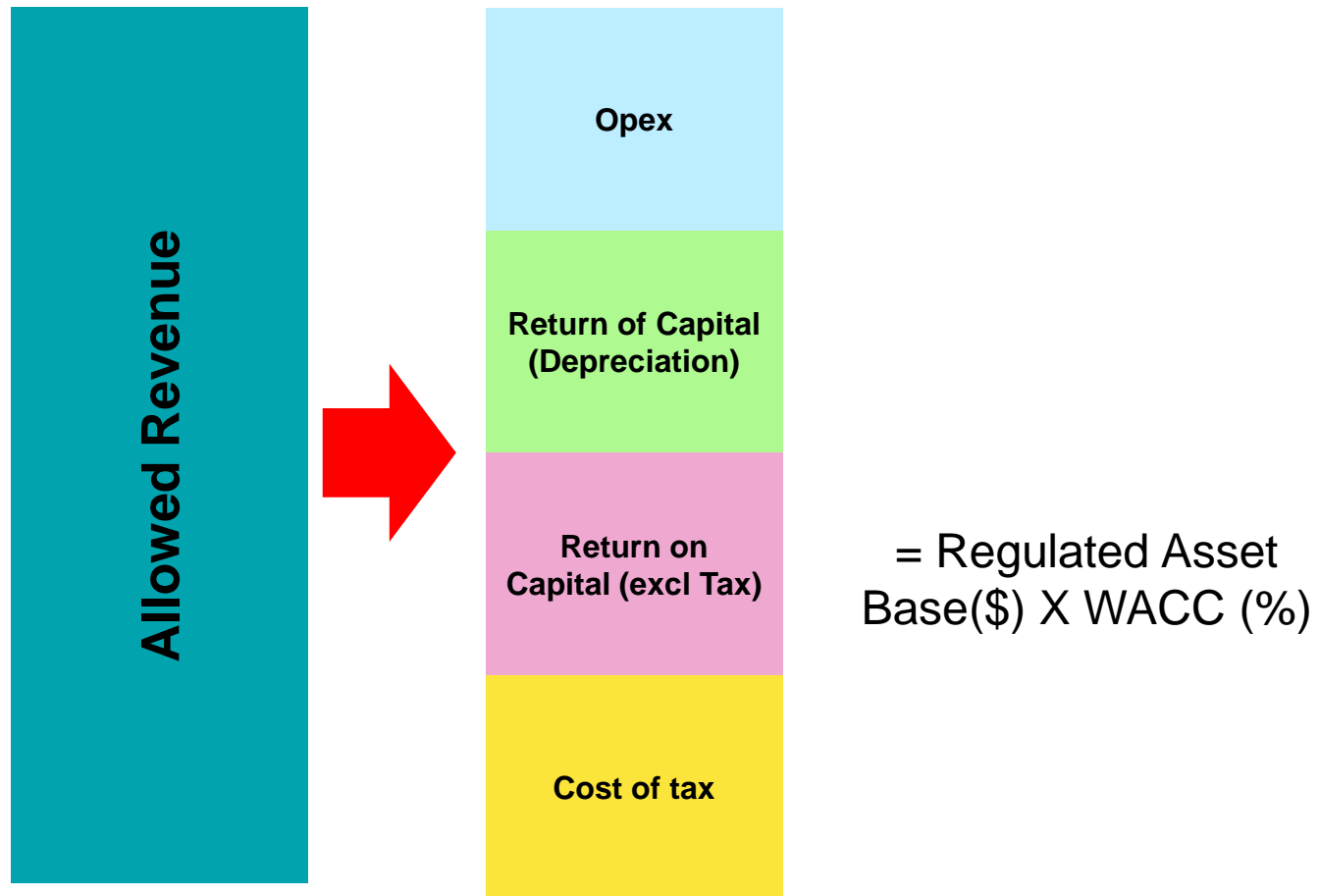
- ▶ Ke = CAPM required rate of return
- ▶ Ke has two broad components:
  - ▶ Rf
  - ▶ Risk premium
- ▶ Risk premium is determined by:
  - ▶ Beta – measure of the amount of risk that is non-diversifiable
  - ▶ MRP – market risk premium is the return that investors expect from investing in a well-diversified portfolio (the “market” portfolio)

# The cost of capital in the “building block” model

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# The building block model



# AER's May 2009 WACC decision

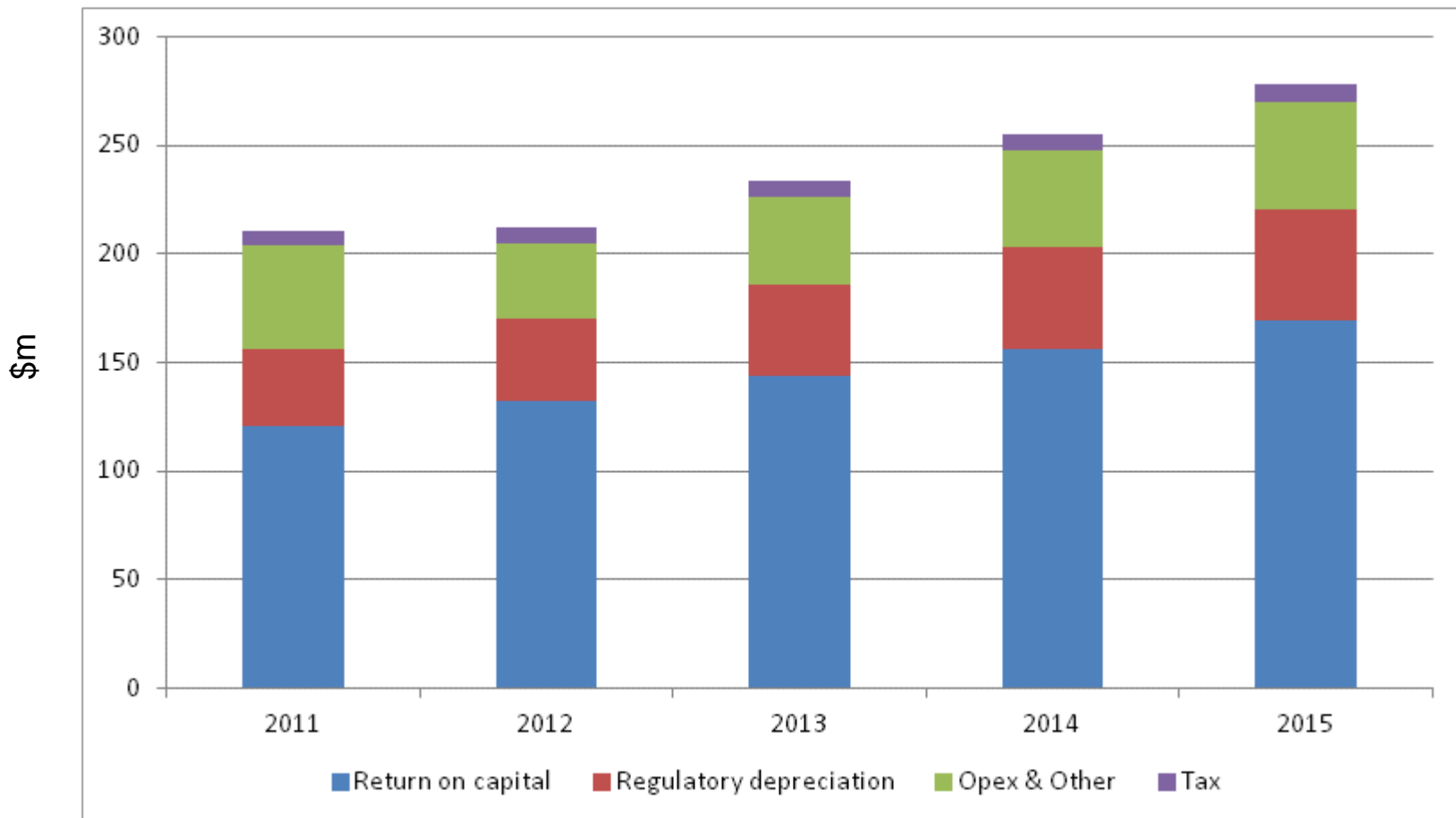
<b>SORI Parameters</b>	<b>Methodology / Value</b>
Risk free rate	<ul style="list-style-type: none"><li>• Moving average annualised yield on 10 Year Commonwealth Government Bonds</li><li>• Measured over an agreed time period</li></ul>
Market risk premium	6.5%
Beta	0.8
Credit rating	<ul style="list-style-type: none"><li>• To be based on a BBB+ credit rating</li><li>• Affects the measurement of the DRP</li></ul>
% Debt	60%
% Equity (1-% Debt)	40%
Value of imputation credits	0.65

Note that:

1. Value of imputation credits not technically in the WACC formula as defined by the AER but affects the cost of tax
2. Methodology for estimating the DRP is set out in Cl. 6.5.2(e) of the NER and refers to "...the margin between the annualised nominal risk free rate and the observed annualised Australian benchmark corporate bond rate for corporate bonds which have a maturity equal to that used to derive the nominal risk free rate and a credit rating from a recognised credit rating agency. "

# How significant is the return on capital to electricity network businesses?

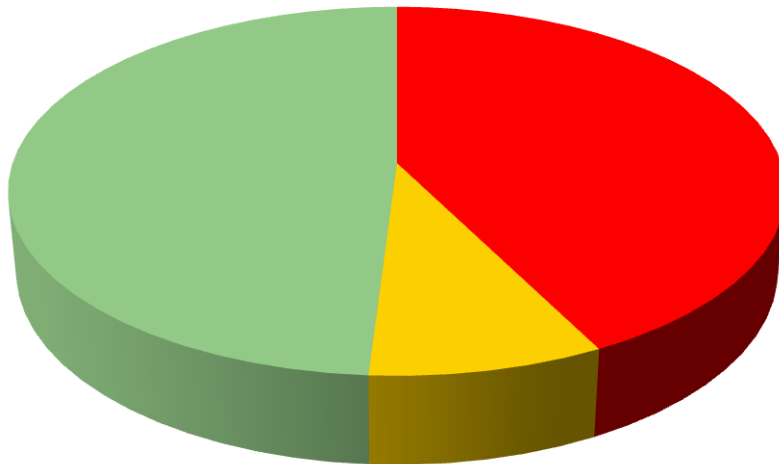
Example: CitiPower Final Distribution Determination 2011-2015



# What contribution does it make to the price paid by final consumers?

If we assume....

## Price to consumers



- Distribution ~ 35-50%
- Transmission ~ 7-10%
- Energy, retail & other

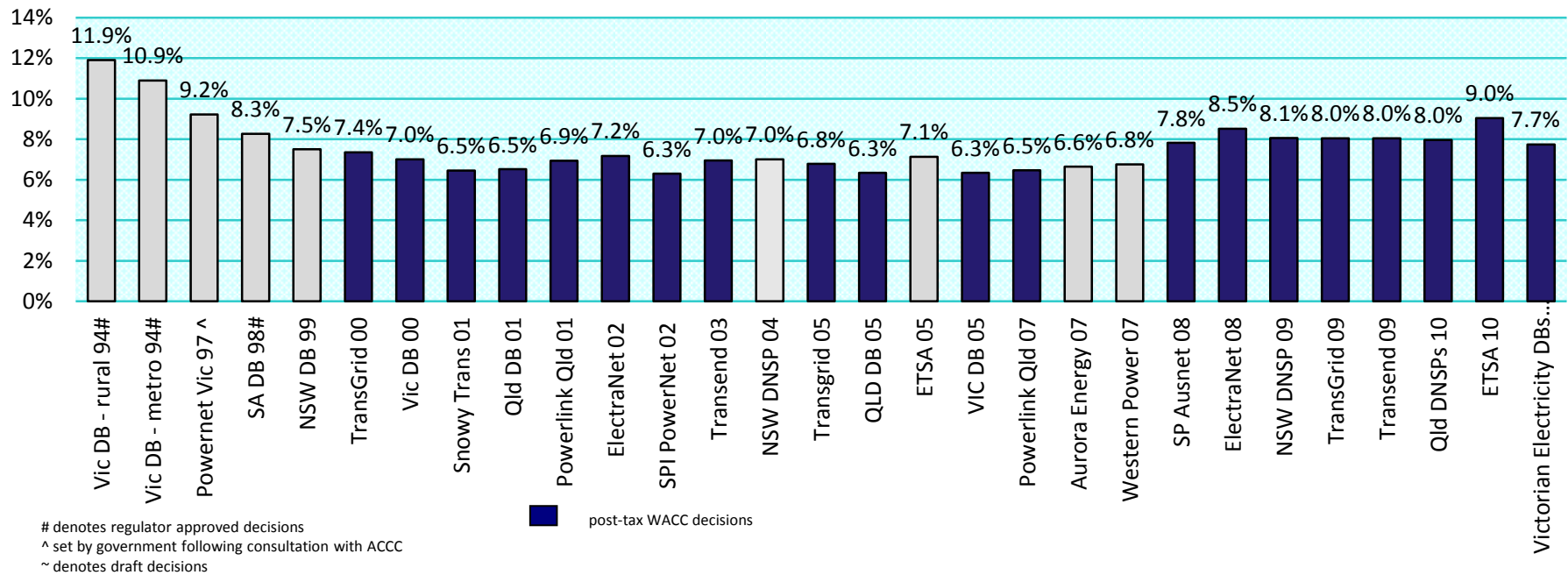


Return on capital accounts for ~ 25% - 29% of consumer's bill

- WACC
- RAB & Capex

# Regulated electricity WACC trend

## Pre-tax real WACC

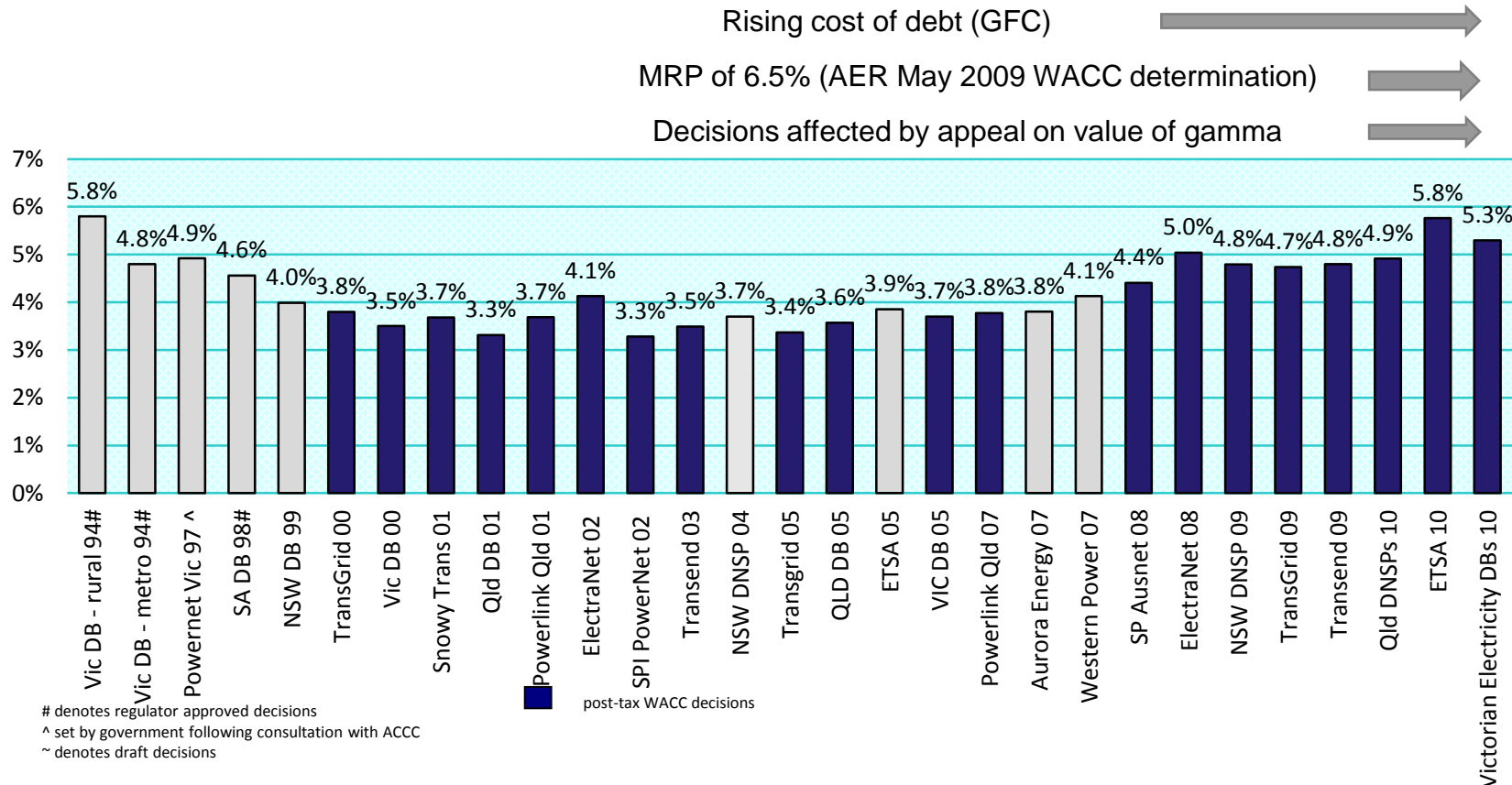


Source: Ernst & Young estimates

# Regulated electricity WACC trend

## Pre-tax real WACC

Expressed as premium over real risk free rate



Source: Ernst & Young estimates

# Concluding comments

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- ▶ Next AER WACC review must be completed by May 2014
- ▶ Debate on WACC will continue
  - ▶ Technical debate
  - ▶ Professor Garnaut has put WACC (amongst other things) into the spotlight as one of the reasons for rising electricity prices
- ▶ There will continue to be pressure to reduce WACC parameter values
  - ▶ MRP
  - ▶ Equity beta
  - ▶ How will the regulator respond to the recent Australian Competition Tribunal decision on the value of imputation credits?