Draft methodology workshop

Methodology for estimating energy costs, retail costs and retail margin

2 November 2006

Scope of work – two linked consultancies

Frontier have been retained by IPART for two related consultancies:

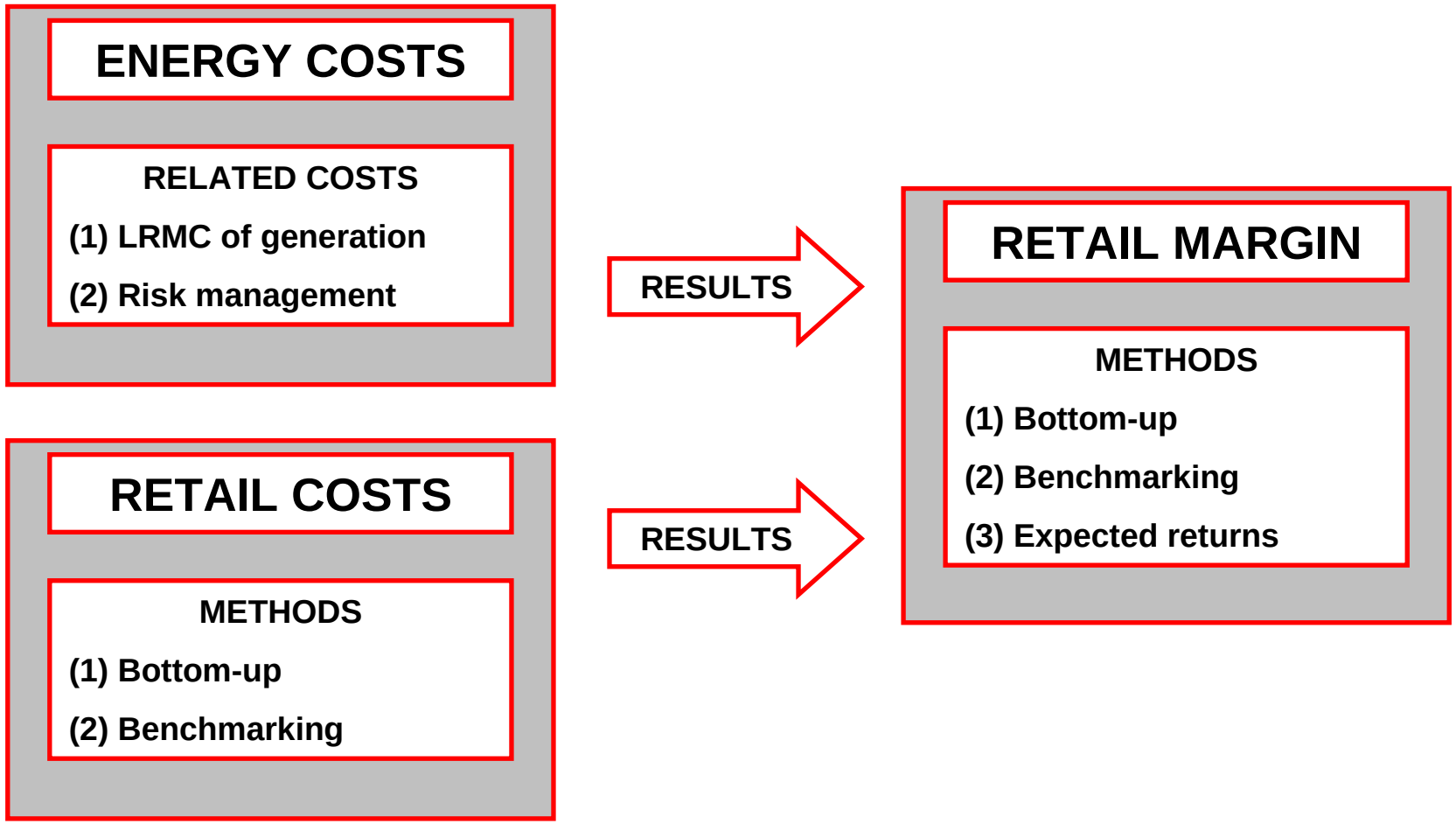
- Energy costs – Frontier is to provide advice on the cost range that should be allowed for energy costs.
- Retail costs and retail margin – Frontier is to provide advice on the amount that should be allowed for retail costs and retail margin.

Appropriate allowances for these three elements are linked. In particular:

- the appropriate allowance for retail margin depends on the riskiness of the purchasing.
- the appropriate allowance for retail margin depends on the the costs included in the allowance for retail costs.

Important that there is a consistent approach to ensure appropriate relationship between energy costs and margin. Also to ensure no double counting.

A consistent approach



ENERGY COSTS

Key Terms of Reference related to energy costs

General principle

- *"… in order to promote retail competition and investment, regulated retail tariffs which are below the cost of supply should be moved to full cost reflectivity."*

Matters to consider:

- *"an allowance for electricity purchase costs based on an assessment of the long-run marginal cost of electricity generation from a portfolio of new entrant generation to supply the load profile of customers remaining on regulated retail tariffs."*
- *"recognition that ETEF will cease operation within the determination period"*
- *"recognition of hedging, risk management and transaction costs faced by retailers in the absence of the ETEF"*
- *"recognition of the forecasting risks faced by retailers in the absence of the ETEF"*

Interpretation of ToR - energy costs

The ToR refers to two aspects of energy costs to be considered:

- Long run marginal costs (LRMC)
- Costs associated with managing roll-off of ETEF

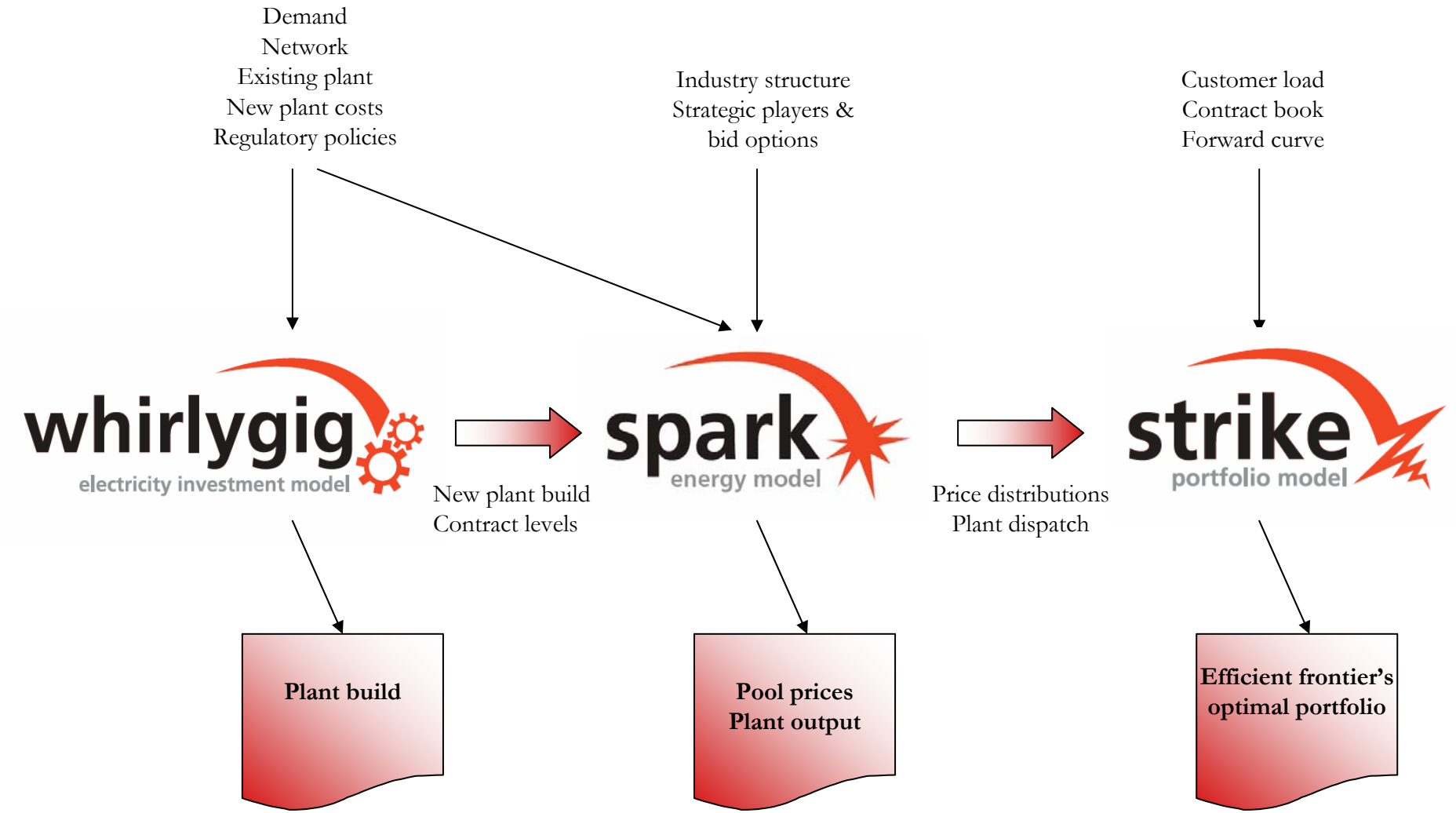
These concepts are compatible when a proper account of risks and the costs of managing these risks is taken – for example, risk of plant outages, demand and price spikes.

Therefore, look at costs of efficient generation mix, adjusted for the prudent costs of managing the real life risk of purchasing electricity in the NEM on behalf of regulated customers.

ToR identify that these cost concepts are to reflect the differences in the load profile of each standard retailer.

Energy costs are to include an allowance for green and NEM fees.

Energy modelling framework



Energy modelling framework

As ETEF is phased out, retailers will be increasingly exposed to energy purchase risk.

Frontier's modelling framework will take this risk into account when estimating energy costs:

- *WHIRLYGIG* determines efficient mix of investment
- *SPARK* determines price distributions
- *STRIKE* determines efficient mixes of hedging products to meet load profile

Outcome for each load profile:

- a frontier representing the efficient mixes of hedging products to meet the load profile
- the costs and risks of each mix of hedging products

LRMC approach – *WHIRLYGIG*

***WHIRLYGIG* will be used to estimate LRMC of meeting stand alone regulated load of each retailer.**

***WHIRLYGIG* used in this study as a long-term electricity investment model:**

- provides optimal (least-cost) mix of investments and operation patterns to meet demand for electricity:
  - optimal size, type, location, timing and operation of supply and demand options
- optimises total costs (fixed + variable) using mixed integer programming techniques
- includes a number of constraints, including:
  - greenhouse targets (technology specific, cap & trade)
  - limits on availability of certain supply and demand options
  - project lead times
  - system reserve requirements
  - lumpy investments

SPARK – overview

In order to determine the costs of hedging products over the determination period, it is necessary to form a view as to spot prices.

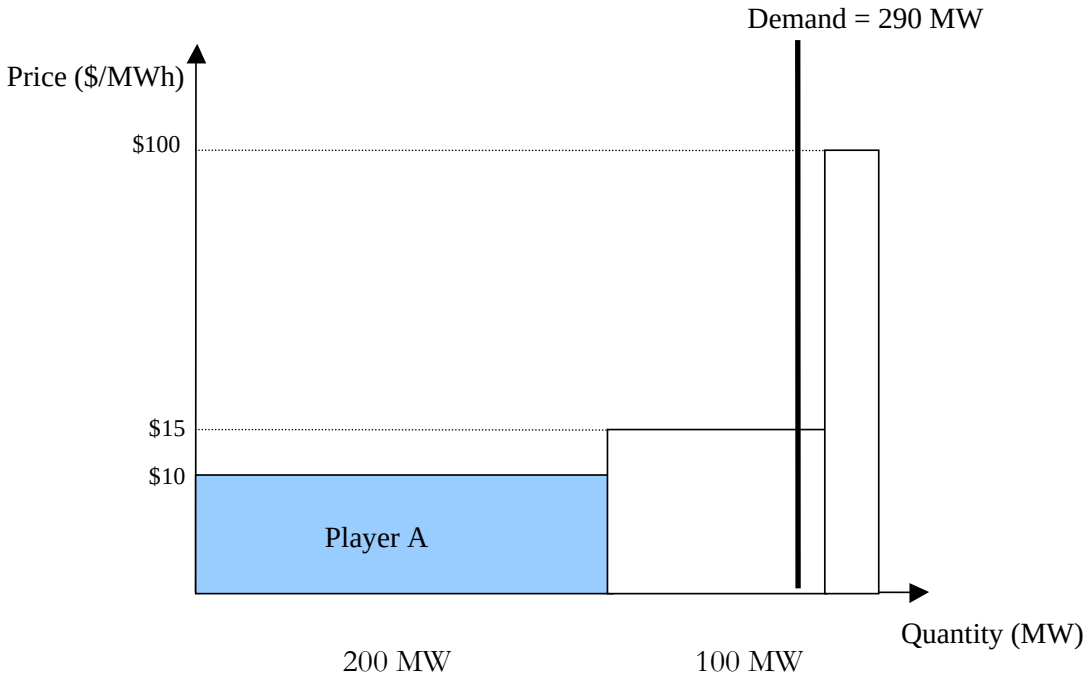
***SPARK* is a short-term electricity market simulation model:**

- incorporates key physical and economic characteristics of the power system
- incorporates price setting rules

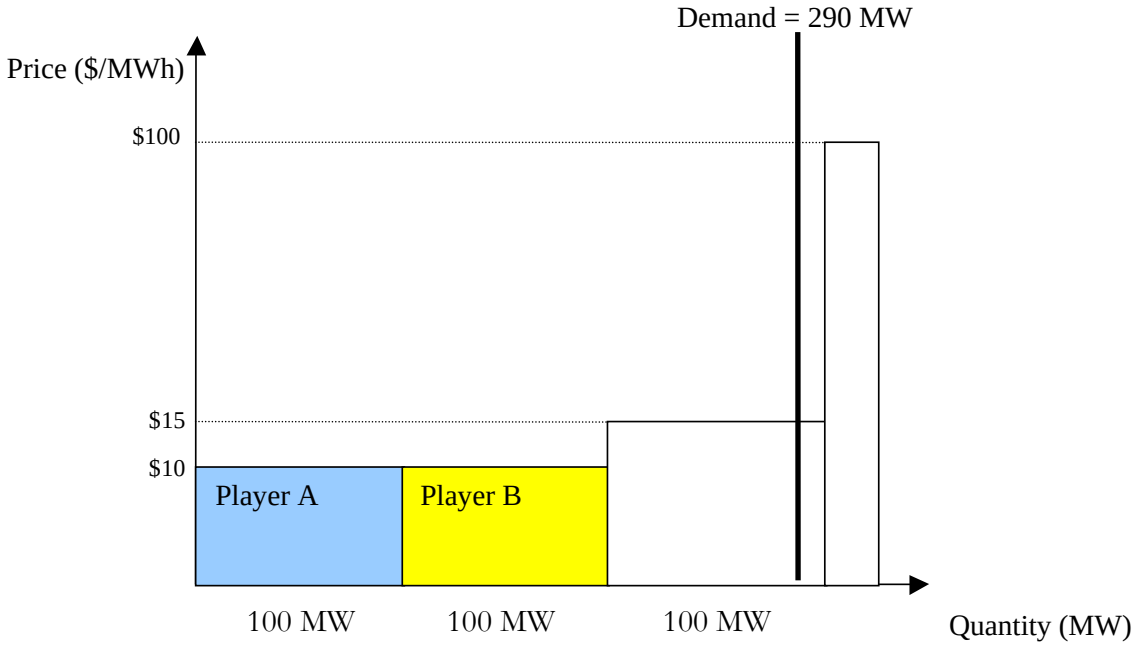
***SPARK* outcomes:**

- optimal (least-cost) dispatch of plant to meet demand
- a set of sustainable generator bids for every market condition (using game theory)

Game theory example (1)

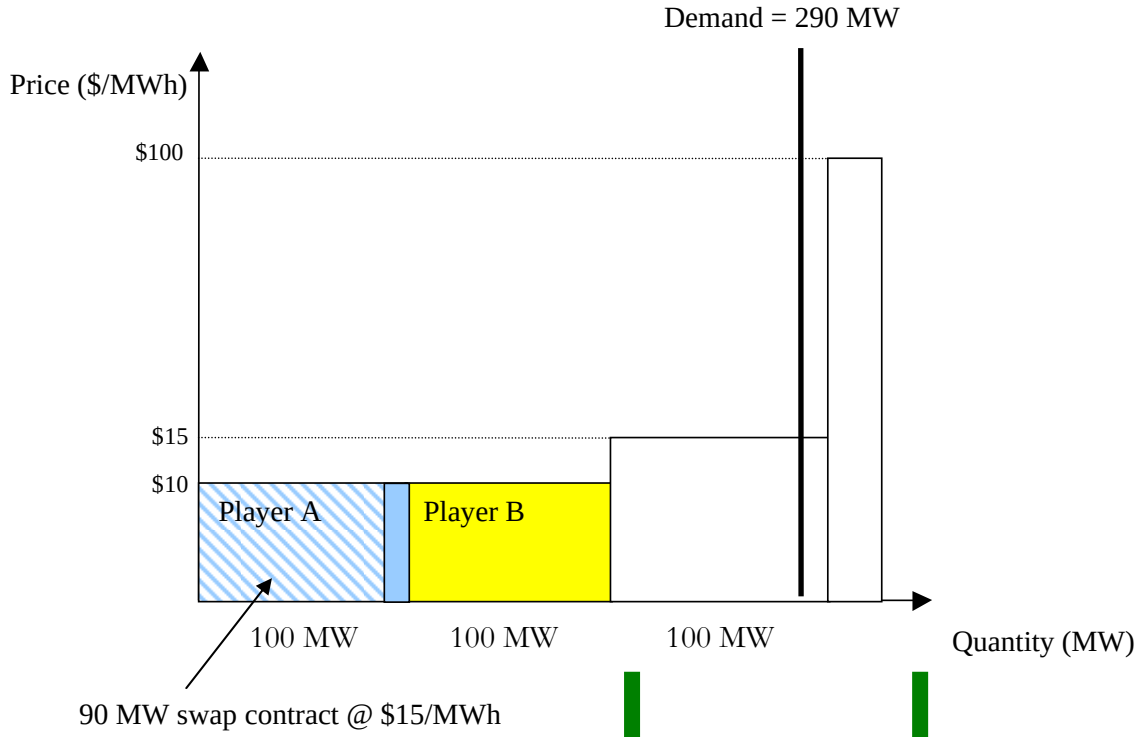


Game theory example (2)



		Player B	
		Bid 100MW	Bid 90MW
Player A	Bid 100MW	$500 , $500	$9000 , $8100
	Bid 90MW	$8100 , $9000	$8100 , $8100

Game theory example (contracts)



		Player B	
		Bid 100MW	Bid 90MW
Player A	Bid 100MW	$500 , $500	$1350 , $8100
	Bid 90MW	$450 , $9000	$450 , $8100

Operation of *SPARK*

***SPARK* is formulated in fundamentally the same way that *WHIRLYGIG* is formulated.**

***SPARK* is run for each level of demand:**

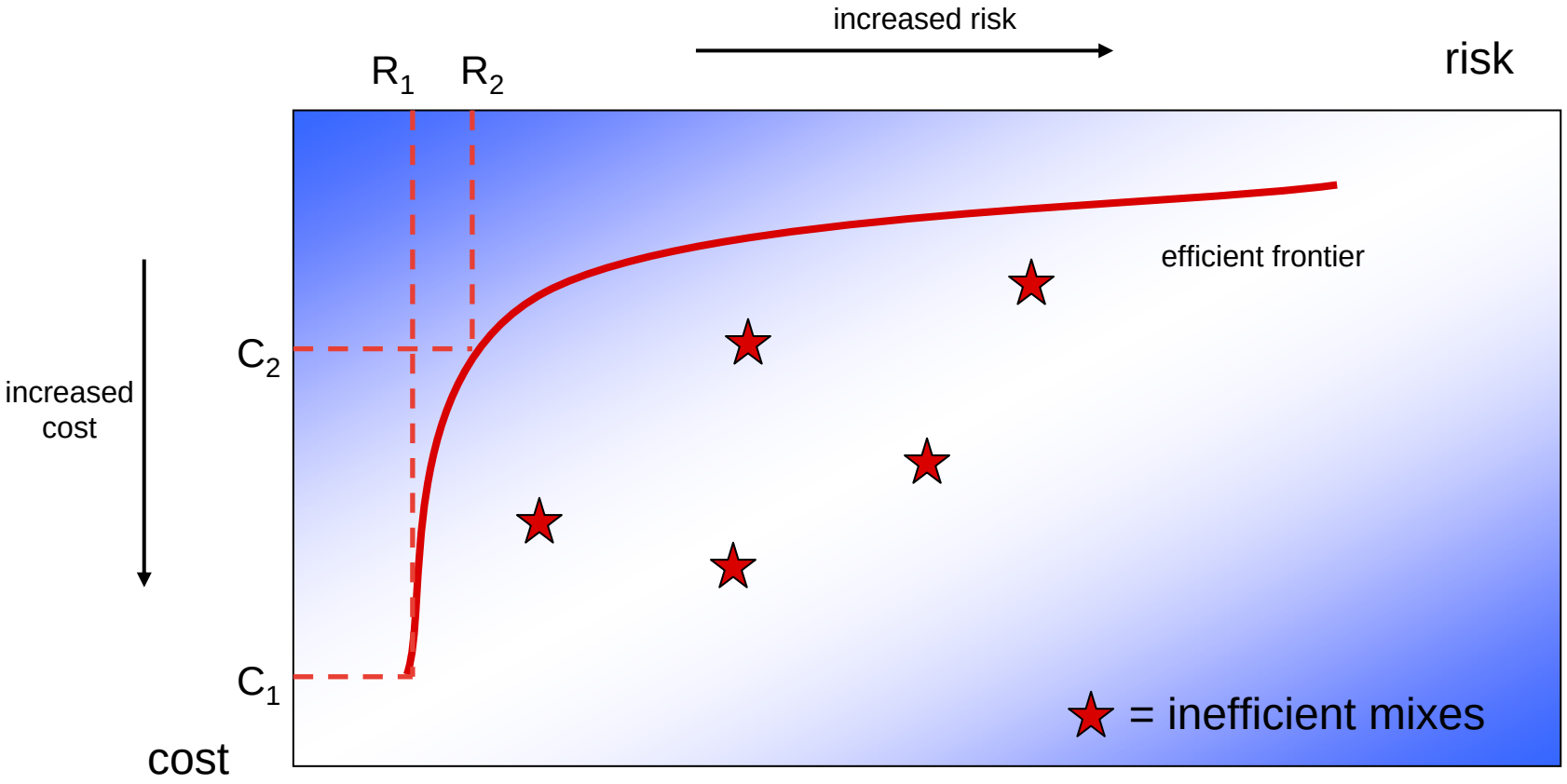
- generators are divided into two categories – strategic or non-strategic
- strategic generators are assigned a range of bidding choices
- for each combination of bidding choices, SPARK computes prices and operating profits
- SPARK searches for those outcomes that are Nash equilibria

Accounting for risk - *STRIKE*

We will estimate the impact of energy purchase risk on energy cost by adopting a market-based approach:

- Consideration of the portfolio of retail 'assets':
  - Characteristic of customer load (need data on current and forecast load, including volatility)
  - Available hedging instruments (need data on form, quantity and price of available contracts over review period)
  - Characteristics of spot prices (need data on spot price levels by half hour over review period)
- Determine optimal suite of purchasing instruments having regard to risks of different 'portfolios' of energy purchasing instruments
- Approach will give a range of purchasing outcomes – to reflect different levels of risk

Energy purchase risk – portfolio optimisation



STRIKE – outcomes

STRIKE determines an efficient frontier for each business for the load profile:

- no greater reward can be achieved for less risk
- no lower risk can be achieved for greater reward

The efficient frontier is dependent on:

- the forward curve
- spot expectations
- load expectations
- existing book
- time period of analysis

Recommended energy costs

For each standard retailer, Frontier will estimate a range for each of:

- LRMC of new entrant generation
- market-price of managing risk

Recommended range of energy costs will reflect the results of both these estimates.

RETAIL COSTS and RETAIL MARGIN

Key Terms of Reference related to retail costs and margins

ToR refers to the retail costs and retail margin of a mass market new entrant (MMNE).

What is a MMNE?

- The ToR indicates that a MMNE is of sufficient size to achieve economies of scale.
- The ToR does not define the *form* of a MMNE. Broad options are:
  - Option 1: A stand alone retailer serving mass market customers only (perhaps just in NSW)
  - Option 2: A large retailer that operates elsewhere in the NEM but does not have significant load in NSW
- Guided by what would happen in the practice – Option 2.
  - Option 1 would probably not achieve economies of scale

Retail costs – two approaches

Two approaches to estimate retail costs of a MMNE:

- Bottom-up estimate – principally based on information provided by retailers
- Benchmarking – against retail costs in other regulatory decisions

Recommended range for retail costs will consider results from both approaches.

Two principal components of MMNE retail costs:

- Customer acquisition costs – these are costs that a MMNE would face in acquiring small retail customers
- Retail operating costs – these are costs a MMNE would face in supplying small retail customers in NSW

Retail costs – bottom-up approach

Total allowance for retail costs built up from individual components of retail costs.

Bottom-up approach based on requested information:

- details on customer acquisition costs
- details on retail operating costs
- details on customer numbers
- details on how costs are allocated to small retail customers

Responses used:

- to estimate retail costs by standard retail area
- to estimate the extent of economies of scale

Testing reasonableness of bottom-up results

Reasonableness of results from bottom-up approach tested:

- cost estimates compared over time
- breakdown of cost components, and allocation method, compared across retailers
- cost estimates compared against third-party estimates of retail costs

Retail costs – benchmarking

Retail costs informed by benchmarking against other regulatory decisions.

Benchmarking against other regulatory decisions must consider:

- economies of scale of regulated retailers
- treatment of customer acquisition costs

It is important that like is compared with like:

- consider the costs included in the retail cost allowance from other decisions
- greater weight given to regulatory decisions dealing with retailers that are most comparable to a MMNE in NSW
- make sure that all costs are counted, but only counted once

Retail margin – three approaches

Three approaches will be used to estimate the retail margin for a MMNE:

- bottom-up approach – build retail margin from its individual components
- benchmarking – against retail margins in other regulatory decisions
- expected returns approach – estimate retail margin that provides appropriate cash flows to electricity retailers

Recommended retail costs will consider results from each of these three approaches.

Retail margin – bottom-up approach

Bottom-up approach estimates contribution to total margin from each risk.

Contribution of each risk to total margin can be calculated:

- by benchmarking against outcomes in other jurisdictions/industries
- by considering costs that retailers face, as requested from retailers

Approach must be consistent with energy costs and retail costs, so that there is no double-counting.

Bottom-up approach has been proposed by Integral.

Retail margin – benchmarking

Retail margin informed by benchmarking against other regulatory decisions.

Benchmarking against other regulatory decisions must consider:

- risks to which regulated retailers are exposed – in particular, the extent to which retailers are exposed to energy purchase risk

Again, important to compare like-with-like:

- consider risks included in retail margin in other decisions
- greater weight given to regulatory decisions dealing with retailers that are most comparable to a MMNE in NSW
- make sure that all costs and risks are counted, but only counted once

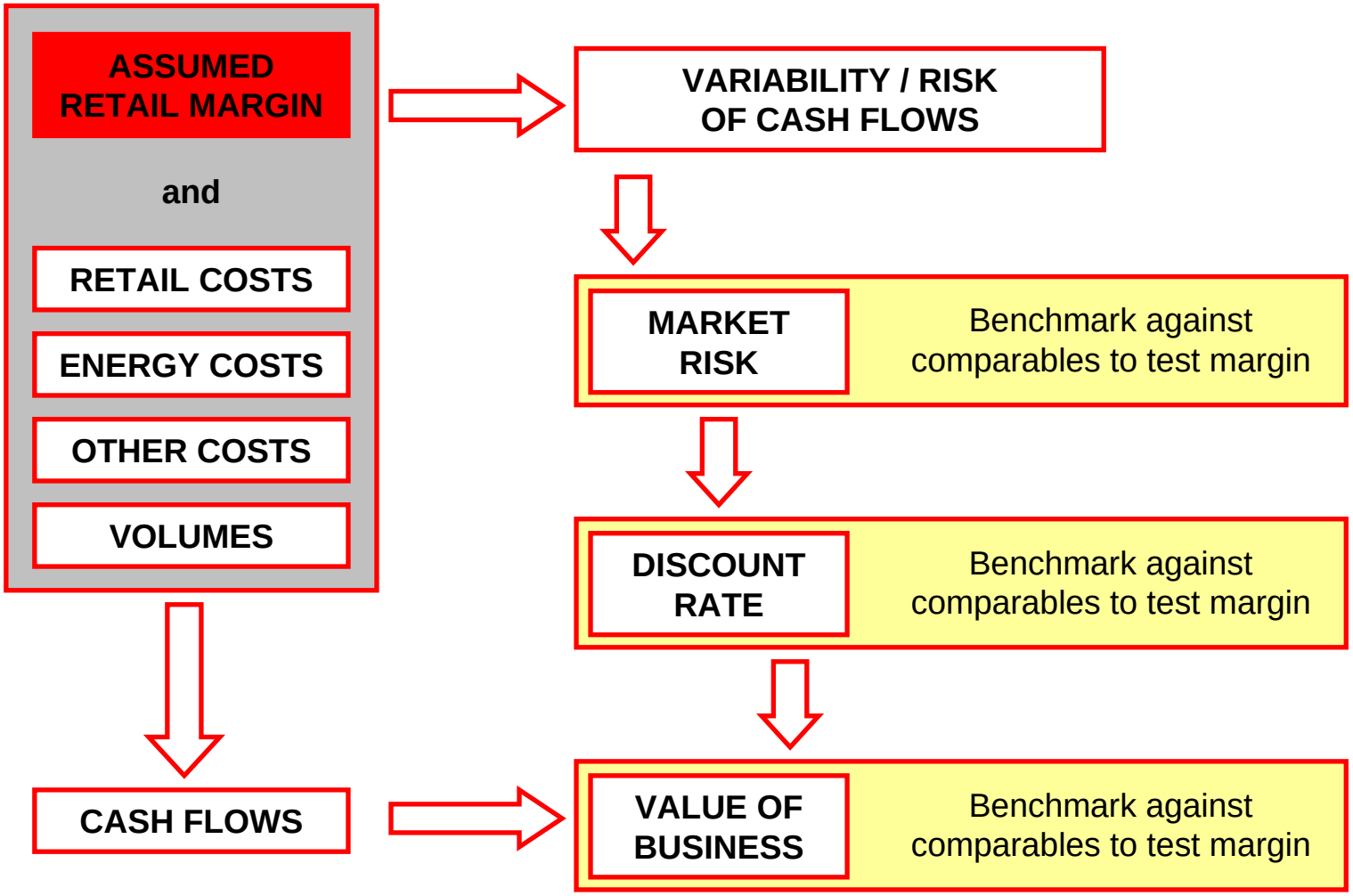
Expected returns approach – overview

Expected returns approach tests the reasonableness of retail margins against market data from comparable businesses. The return must simply provide reasonable compensation for the systematic risk that is borne.

The approach is as follows:

- for an assumed retail margin and energy acquisition/hedging strategy, estimate:
  - possible cash flows to the MMNE
  - the risk associated with those cash flows
- these imply a range of indicators for the MMNE, including:
  - market risk
  - discount rate
  - value of business
- each of these can be benchmarked against comparables to test reasonableness of retail margin

Expected returns approach – overview



Expected returns approach – risks

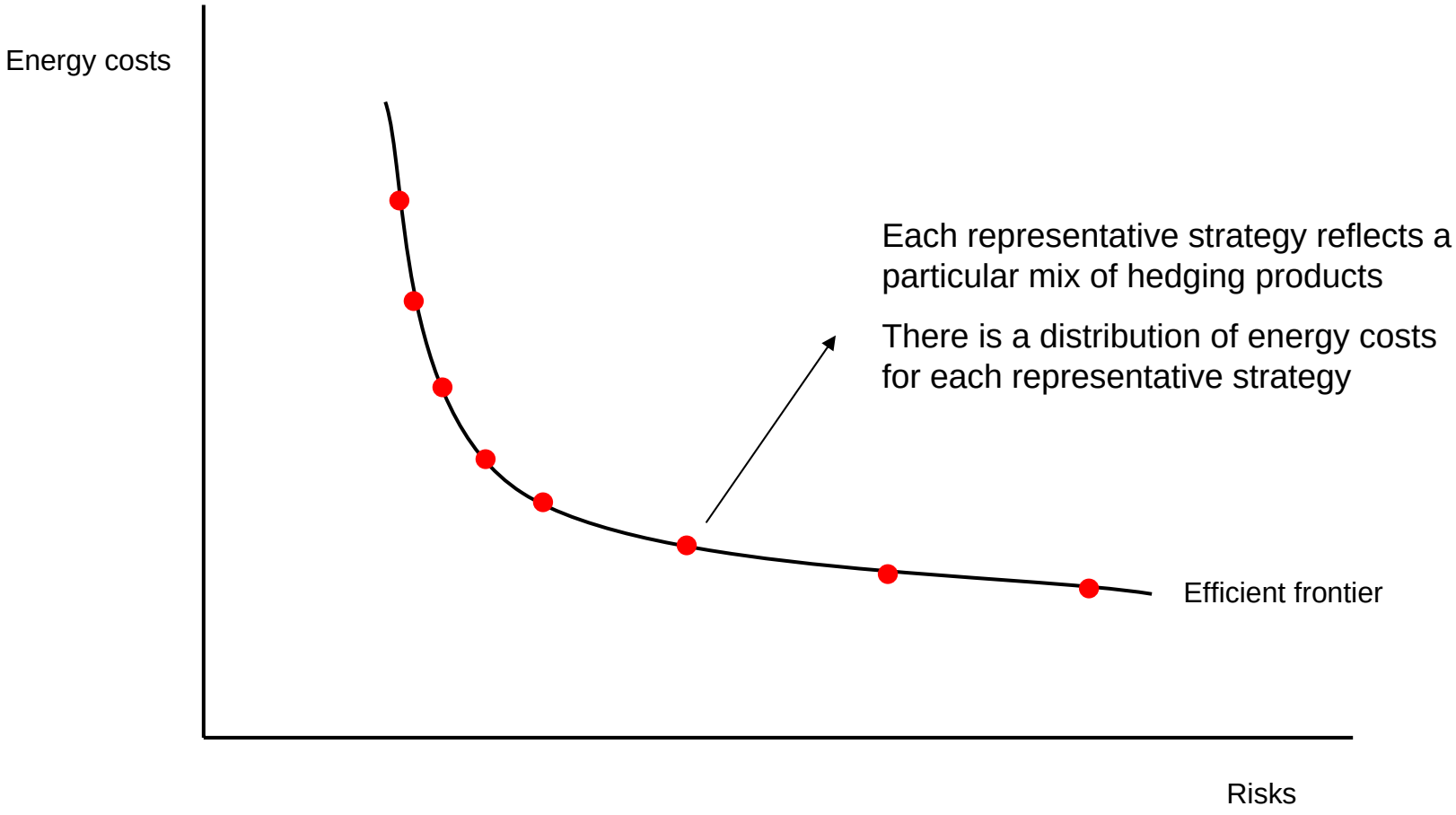
A key advantage of expected returns approach is that it can reflect risks in a systematic way. The objective is to ensure that an appropriate return is provided for the risk involved.

Outputs from *STRIKE* are used as inputs into expected returns approach:

- identify representative energy purchasing strategies from output of *STRIKE*
- *STRIKE* provides an estimate of energy costs and risks for each of these representative strategies
- these energy costs and risks used as an input to estimate an appropriate retail margin associated with each representative strategy

Result is a link between allowed energy cost and allowed retail margin. There is a matching of return with risk.

STRIKE output



Estimating cash flows and risk

Corporate finance and regulatory practice is that returns are required to compensate systematic (or market-related) risk.

Net cash flows to a MMNE are determined by several inputs, some of which depend on the state of the economy and therefore have a systematic component:

- **retail margin** (which is independent of the state of the economy)
- retail costs (which is largely independent of the state of the economy)
- energy costs, as determined by *STRIKE* (which depend on the state of the economy)
- other costs (which may depend on the state of the economy)
- volume (which depends on the state of the economy)

There is a link between net cash flows to a MMNE and the state of the economy. This link is the systematic risk of the MMNE, which requires a fair return.

Benchmarking

Calculating the link between net cash flows to a MMNE and the state of the economy enables a series of benchmarking exercises to be conducted:

- the level of systematic risk implied by a particular retail margin can be benchmarked against other entities.
- the return required for that systematic risk can be benchmarked against other entities and regulatory determinations
- the expected cash flows and required return implied by a particular retail margin imply a valuation of the business. This enables a whole range of ratios to be benchmarked, including:
  - enterprise value per customer – i.e. implied value of each customer
  - enterprise value to earnings

The idea is to ensure that the risk, return, and business value that result from a particular retail margin are commensurate with industry benchmarks, comparable firms, and commercial common sense.

Recommended retail margin

The recommended retail margin will be informed by the results of the three approaches:

- where the results converge, estimated retail margin can be recommended with greater confidence
- where the results do not converge, the explanations for divergence will be investigated – where the explanations suggest one of the approaches is more appropriate to MMNE, the results of this approach will be given more weight

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