GUIDANCE NOTE: THE USE OF INTERNAL RATES OF RETURN IN PFI PROJECTS

1 INTRODUCTION

1.1 The Internal Rate of Return (IRR) is most commonly used in PFI Contracts as a measure of the rate of return expected to be earned by private sector capital in the project, and is thus the basis for:

- calculation of the Unitary Charge at Financial Close;
- recalculation of the Unitary Charge to take account of capital expenditure resulting from Compensation Events, Authority changes in Service and Qualifying Changes in Law, where this expenditure is being financed by the Contractor (cf. Section 5.2.3.5 of SoPC4);
- calculation of compensation for Authority Default / Voluntary Termination (cf. Sections 21.1.3 / 21.5 of SoPC4);
- calculation of the Estimated Fair Value of the Contract, on Contractor Default (cf. Section 21.2.9 of SoPC4); and
- calculation of the Refinancing Gain to be shared with the Authority (cf. Section 34 of SoPC4).

1.1 It is therefore fundamental to the negotiations, and Authorities should take care to understand thoroughly the definitions, methodology for calculation and correct usage of IRRs in PFI Contracts.

1.1 Capitalised terms used in this Guidance Note are as defined in Standardisation of PFI Contracts Version 4 ("SoPC4").

2 THE IRR CALCULATION

2.1 The IRR is defined mathematically as the discount rate which, when applied to discount a series of cash outflows followed by cash inflows, returns a net present value (NPV) of zero. The most intuitive way of understanding the meaning of the IRR is to think of it as the equivalent constant interest rate at which a given series of cash outflows must be invested in order for the investor to earn a given series of cash inflows as income. It is in this sense a measure of the underlying return the private sector expects to achieve by investing in the project.

2.2 Thus in the table below Investment A, of 1,000, produces cash flows of 1,350 over the next 5 years. The IRR of this investment is 12.08%, *i.e.* as shown in the NPV column when each of the cash flows is discounted at 12.08% *per annum* the NPV of all of them is zero.

End Year	Investment A		Investment B	
	Cash flow	NPV @ 12.08%	Cash flow	NPV @ 9.94%
0	-1,000	-1,000	-1,000	-1,000
1	340	303	200	182
2	305	243	235	194
3	270	192	270	203
4	235	149	305	209
5	200	113	340	212
Total	**350**	**0**	**350**	**0**

2.3   IRR calculations are highly sensitive to the timing of cash flows: as can be seen by comparing Investments A and B in the above table. Both are investments of 1,000 which each produce a net cash flow of 1,350 over 5 years, but different IRRs (9.94% in the case of Investment B) because of the different timings of these cash flows.

2.4   The IRR calculation is most properly applied in situations where a project produces negative cash flow (outflows) in the beginning, followed by positive cash flow (inflows) in later years. This is typical of most PFI projects, where large construction costs are incurred by the Contractor early on, followed by cash inflows in the form of surpluses from operations. In cases where positive and negative cash flows alternate with each other, the IRR will not be uniquely determinate and is unlikely to be the appropriate measure.

2.5   The Authority should be aware that IRRs are generally not a reliable alternative to NPV-based calculations for the measurement of the value of an investment. For example, two projects with the same IRR but different concession periods (*e.g.* 15 and 25 years) will have very different NPVs at all discount rates except the IRR. The widespread use of IRRs in PFI projects reflects the generally even pattern of year-on-year operational cash flows in such projects. However, if a project has an uneven cash flow profile, the Authority should exercise great caution in using an IRR as the basis of valuing investment in the project.

3 TYPES OF IRRS IN PFI PROJECTS

3.1   IRRs can be calculated for different cash flow streams of a project, depending upon:

- which category of investor the IRR is being calculated for;
- whether inflation is or is not included in the underlying cash flows; and
- whether tax is or is not included in the underlying cash flows.

3.2   Category of Investor: The **Project IRR** represents the weighted average cost of capital for a project. It is usually calculated from all of the non-financing project cash flows, including capital costs, operating and maintenance costs, revenues and working capital adjustments. The **Equity IRR** represents the return to investors after taking account of Senior Debt service. For tax and accounting reasons investors typically provide a mixture of share capital (equity) and Junior Debt: in which case the IRR calculation takes into account all payments received on both equity and Junior Debt, *i.e.* not just dividends, but also interest and capital repayments on the Junior Debt. This is known as the **Blended Equity IRR**.

3.3   Inflation: Where the cash flows are in real terms, *i.e.* based on constant prices,[1] the IRR calculation based on these is known as the **Real IRR**. Where cash flows are in nominal terms, *i.e.* are based on current prices,[2] the IRR calculation based on these is known as the **Nominal IRR**.

3.4   Taxation: IRR calculations may be done on a pre- or post-tax basis. In either case, the taxation taken into account should only be the tax paid by the SPV, not tax suffered by investors on the payments received from the SPV. Investors may order their tax affairs so as to pay more or less tax on investments, and this is not the concern of the Authority, nor can the Authority check whether or not calculations of the investors' own taxes are correct.

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[1]   Prices are "constant" when they are expressed by reference to a particular consistent (and usually historic) date. Hence, if sums of money arising after the year 2000 are all to be expressed in "2000 prices " (i.e. "constant" prices as at the year 2000), then each sum of money must be deflated (using RPI) back to 2000 to strip out the effects of inflation (i.e. RPI) on general prices in the economy in the intervening years. Typical constant price items in a PFI cash flow would include the Unitary Charge to the extent it is indexed by RPI. Such items have to be indexed by the projected rate of inflation (RPI) to produce a cash flow in nominal terms.

[2]   Prices are "current" when they are expressed by reference to the purchasing power of the time period to which they relate. Hence, a sum of money arising in the year 2010 will be assumed to be expressed in 2010 current prices—*i.e.* nominal terms (sometimes referred to as "money of the day") unless otherwise stated. It naturally follows, therefore, that a price which is fixed in nominal terms across more than one time period will reduce in real terms by the effect of inflation (RPI) during the intervening time periods. Typical fixed nominal price items in a PFI project cash flow would include a fixed-price turnkey construction contract, or the unindexed element of a Unitary Charge. Such items have to be deflated by the projected rate of inflation (RPI) to produce a cash flow in real terms.

3.5   The table below summarises these different types of IRR calculation:

		Category of Investor	
		All investors (Senior + Junior Debt + Equity)	**Junior Debt + Equity**
Constant prices	**Tax on SPV excluded**	Real Pre-Tax Project IRR	Real Pre-Tax Blended Equity IRR
	Tax on SPV included	Real Post-Tax Project IRR	Real Post-Tax Blended Equity IRR
Current prices	**Tax on SPV excluded**	Nominal Pre-Tax Project IRR	Nominal Pre-Tax Blended Equity IRR
	Tax on SPV included	Nominal Post-Tax Project IRR	Nominal Post-Tax Blended Equity IRR

4 USING IRRs IN PFI CONTRACTS

4.1   It is important that the Authority bears the following principles in mind when using IRRs in the Contract:

4.2   All the cash flows used to compute the relevant IRR should relate exclusively to the investor in respect of whom the IRR is being computed. For instance, if an IRR is being computed to reflect the measure of return on the project as a whole, a Project IRR should be used whereas if it is being computed to reflect the return earned by investors in equity and Junior Debt, a Blended Equity IRR should be used.

4.3   The timing of underlying cash flows used to compute IRRs (or cash flows which IRRs are used to discount) should always reflect the dates on which cash payments are made from the investors' account to the Contractor or *vice versa* for all historical cash flows, and should always reflect the dates when cash is available for Distributions to investors for all projected cash flows. All cash flows used to calculate IRRs in the Financial Model should be assumed to occur at the end of each relevant period.[3]

4.4   Inflation should be treated consistently. Real IRRs can be calculated if the underlying cash flows are expressed in constant prices, while Nominal IRRs can be computed if the underlying cash flows are expressed in current prices. Similarly, when using discount rates, cash flows in constant prices should be discounted using real discount rates, and cash flows in current prices should be discounted using nominal discount rates. Many PFI projects have Unitary Charges which are partially indexed to inflation. In such cases it is preferable to use the Nominal IRR, but if the Real IRR calculation is used the future cash flows which are <u>not</u> indexed or subject to inflation (*i.e.* are in current prices) should be <u>decreased</u> by the rate of inflation.

4.5   In SoPC4, IRRs are used as discount rates to compute compensation and termination payments or refinancing shares. The table below summarises the type of IRR and the Section of SoPC4 in which it is recommended for use:

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[3]   Most spreadsheet programs use this methodology in the algorithms they use to compute IRRs.

Section of SoPC4	Relating to	Type of IRR	Usage
21.1.3.6 and 21.5	Compensation on termination for Authority Default / Voluntary Termination	Real Post-tax Blended Equity IRR	To calculate compensation amount for junior debt and equity holders
21.2.9	Estimated Fair Value of Contract	Nominal Pre-tax Project IRR*	To discount future Unitary Charges less costs.
34	Refinancing	Nominal Post-tax Blended Equity IRR **	To compute Refinancing Gains for sharing

*   This should be adjusted for movements in underlying market interest rates as discussed in 21.2.9.9

**   The base case (Financial Close) calculation of this is used as the "Threshold Equity IRR" in the Refinancing provisions.

5 METHODOLOGY FOR CALCULATING IRRS

5.1   IRRs are normally calculated using standard formulæ which are embedded in the software being used to model the IRR for the Project,[4] and most Project Agreements refer to a particular cell in the Financial Model which reflects the relevant IRR. Consequently, it is important to ensure that the underlying cash flows in the Financial Model from which the software calculates the IRR are entirely consistent with the principles intended in the PFI Contract.

5.2   The calculation of equity cash inflows going into an IRR calculation should reflect all actual or projected cash available for distributions to investors, once Senior Debt service and covenant requirements have been satisfied. In the case of the Blended Equity IRR calculation used for calculation of Refinancing Gains, Distributions to investors should include the elements set out in Section 34.7 (Model Refinancing Provisions) of SoPC4.

5.3   The calculation of cash outflows is relatively straightforward in most IRR calculations. It reflects the amounts invested (in cash or kind) by investors into the project, timed according to the date on which the investment amount was transferred into the control of the Contractor. The Authority should ensure that this approach is followed throughout the Contract and in the Financial Model. An IRR calculated on this basis is referred to as an IRR calculated on a "Cash-on-Cash" basis, and is invariably the most accurate measure of return available to the Authority.

5.4   In some instances, particularly in negotiations relating to refinancing, investors may suggest a different method for estimating cash outflows. In this method, outflows are timed not on the date when investment amounts are transferred to the control of the Contractor, but the date on which the investment amounts are committed to (but not necessarily transferred to or drawn down by) the Contractor. The former is usually an earlier date than the latter, and the effect of this is to reduce the IRR compared to the Cash-on-Cash basis. An IRR calculated on this basis is usually referred to as an IRR calculated on a "Cash-on-Commitments" basis.

5.5   The most common justification provided by bidders for the use of Cash-on-Commitment IRRs is that Senior Lenders typically require the investors to commit funding to the project (through a letter of credit or otherwise), which can be accelerated at any time. As a result, investors are required to "lock up" funds to meet this commitment on the date they are committed, and it is argued that they are as good as invested in the project on that date.

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4   The software used in the calculation of an IRR in the Financial Model should be specified in the Contract as different spreadsheet programs may generate different values an IRR because of the differences in the algorithms used in different software.

5.6   As this is a hybrid measure of return on investment it is not one which can be recognised as providing a meaningful financial measure of return on investment, unless a suitable adjustment is also made for the return which can be earned by investors on capital committed but undrawn. This adjustment is normally effected by crediting a notional deposit rate on the undrawn funds as a distribution to the providers or equity or Junior Debt.[5]

5.7   A Cash-on-Cash calculation is always preferable, but if the Authority agrees to a Cash-on-Commitment IRR methodology, it must ensure that the methodology is applied consistently, and its limitations recognised. This is especially relevant should a refinancing occur.

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[5]   More correctly, it is the opportunity cost of capital rather than a deposit rate which should be credited back in this way, but this is difficult to assess, so market practice has been to credit the deposit rate.