CORE TECHNOLOGY VENTURES SERVICES

Market Development and Financing of Fuel Cell Businesses

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Outline

- **Prelude: Some Financial Terminology**

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a) The Economy & the Supply of Investment Funds: (Savings ≡ Investment)
b) Investment & the Financial System
c) Matching Financial Providers with Users

- **Structure of the European H2&FC Industry**

1. Finance Market Drivers

a) Investment Drivers: Regulation, Insecurity
b) China, an example of Resource Competition

3. Fuel Cells as Investments in the Context of Renewables

a) Stock Market: Investors have a wide choice of 'Renewables'
b) Stock market performance of Renewables companies
c) Fuel Cells as Investments & Investor Requirements

4. Closing Remarks

Some Financial Terminology

- Finance has many meaning that can result in substantial confusion, depending on the users' and the listeners' perspective
  - **Debt**: Money raised on a debt market (bonds) or obtained from a bank (loans). This requires the borrower to prove he has the resources to pay both the debt back AND the interest payable. It is available to corporate entities (bonds or loans) or private individuals (loans, mortgages). Potentially available to Joint Technology Initiatives depending on legal structure. Not suitable for university R&D projects or independent developers who have little or no revenues. Corporations and public bodies can raise debt to be provided to demonstration projects.
  - **Equity**: Or risk capital or permanent capital, is money raised on a bourse or private market from professional investors (insurance companies, pension funds, etc) venture capitalists or private individuals, and which is not returned to the providers. Available to established corporations (bourse: secondary issue of shares, or initial public offering) and is possible though difficult for start-up companies from VCs and private individuals. The provider of equity becomes an owner of the company with corresponding rights. Requires assets (physical & intellectual) that can be owned. Highly unlikely to be available source of finance to demonstration projects and extremely difficult for seed companies.
  - **Subsidies 1**: Tax breaks and capital grants are made available to corporations and are only of use where the corporation has taxable revenues it can use to claim the tax break and the capital resources to match the capital grant which normally a percentage of the specified capital cost incurred by the corporation. Only indirectly useful for demonstration projects in as far as corporate participants may have access to tax breaks and grants against which the project could be used. Will be different across the EU depending on local tax regimes.
  - **Subsidies 2**: R&D grants e.g. EU Framework grants are available to academe and corporations with the capital reserves available to cover that part of the project's cost not paid for by the grant. Whether such subsidies will be directly available to demonstration projects needs clarification. They are indirectly available to participating companies and as such are similar to the subsidies outlined above.
  - **Budget**: Cash that is made available to a department of a company or public body for specific purposes over a specified period of time.

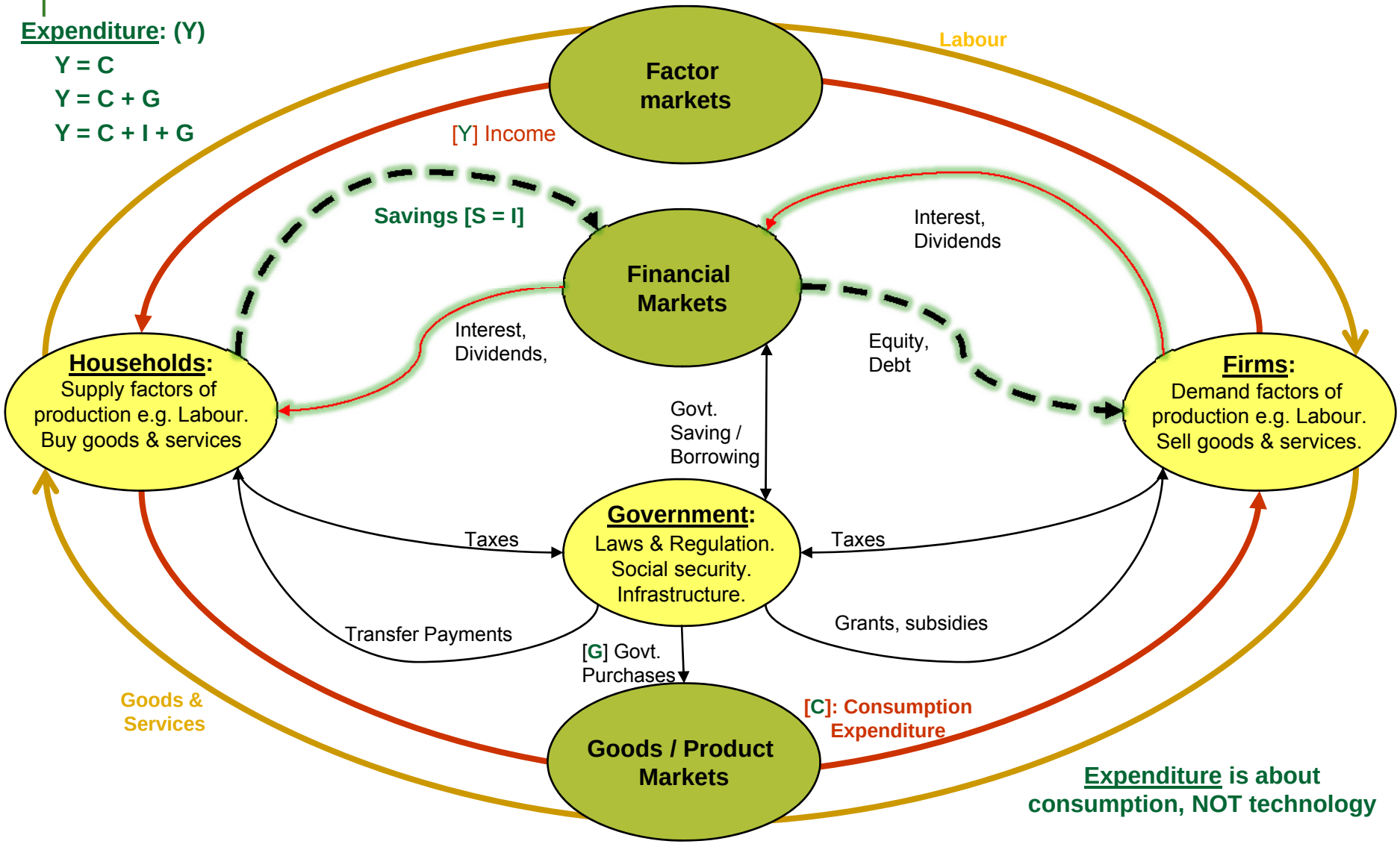
Financial Instruments Matrix

	Debt		Equity		Subsidies	
Type of Instrument	**Bonds**	**Mortgages**	**Publicly traded shares**	**Privately traded shares**	**R&D Grants: e.g. EU Framework Grants**	**Tax Credits: e.g. accelerated depreciation**
Examples of users	Institutional Investors, Financial companies	Companies, Home owners	Institutional investors, Private Individuals	Business angels, Venture capitalists, Corporate Venturers	Companies Universities Research Institutes	Companies
Typical Issuers	Companies, Governments	Retail banks Building societies	Quoted Companies	Private Companies	National & local governments, European Union	National & local governments
Constraints	Ability to pay interest & principal	Ability to pay interest & principal	Capacity to generate profits and pay dividends	Ability to show superior technology & management	For companies, proven capacity to match the subsidy	Ability to make profits to benefit from tax credit
Purpose of issue	Debt allows companies to pursue their own interests by leveraging profits with little or no impact on control. Unlike equity, debt can attract tax breaks with interest payments treated as a cost. Typically companies choose a mixture of debt and equity that suits their aims and the current state of the economy. E.g. as interest rates fall companies may seek to finance increased investment by debt rather than issuing new equity to shareholders.		Equity gives companies the freedom to pursue their own best interests in the manner they regard as most appropriate, as well affording them the ability to make use of various government subsidies, such as EU Framework grants. However, subsidies related to income tax relief require a company to generate taxable profits.		Subsidies can allow both governments & companies to pursue social welfare & profit simultaneously by promoting economic growth (jobs). In the case of R&D, subsidies encourage firms to pursue socially beneficial projects that otherwise may be lost to society. The drawback for newly emerging companies is that they often do not have the capital required to match grants nor the profits to benefit from tax breaks.	

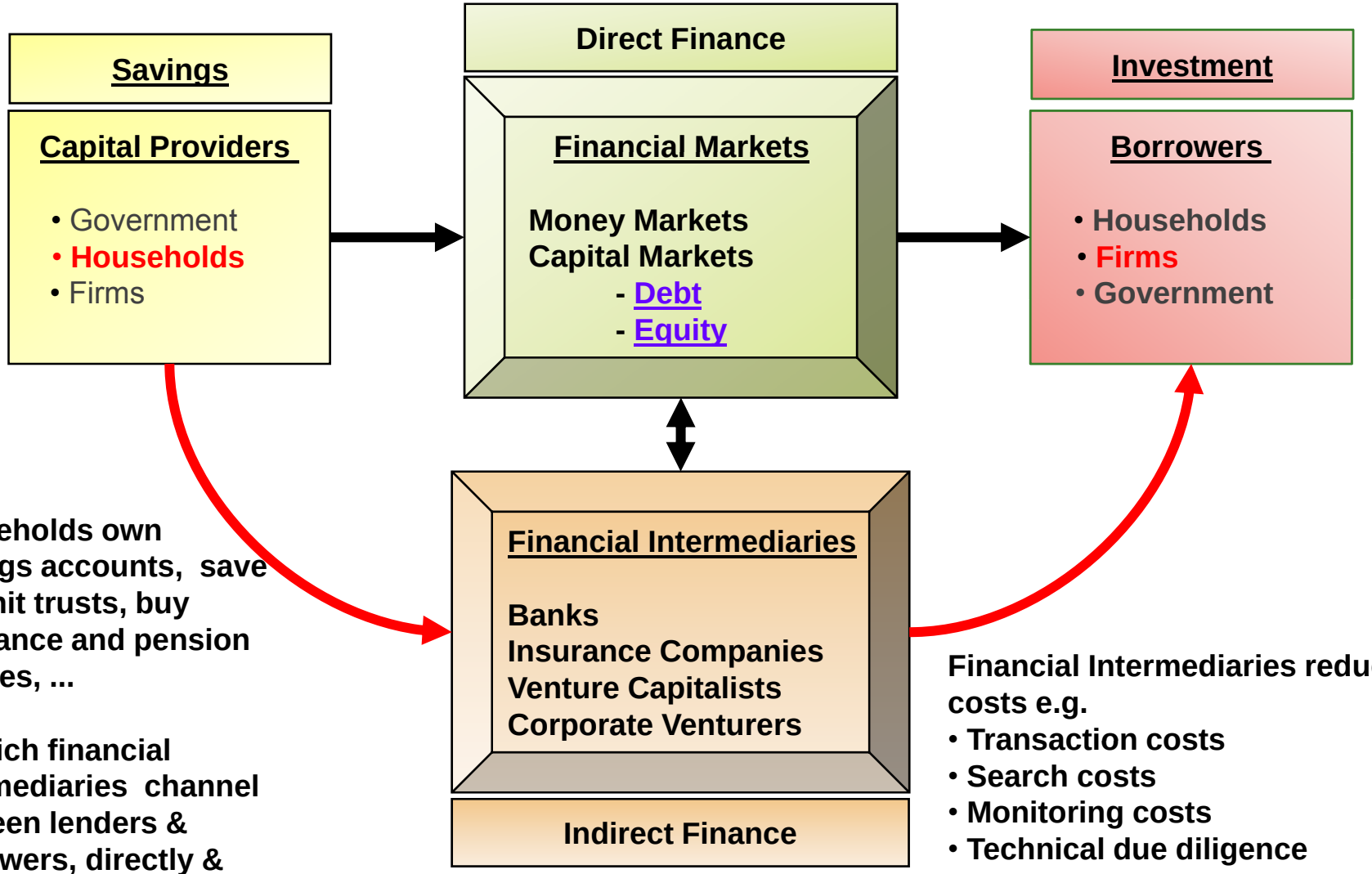
1: The Financial System in the Context of the Economy:

a. The Economy & the Supply of Investment Funds
b. Investment & the Financial System
c. Matching Financial Providers with Users
d. Structure of the European H2&FC Industry

a. The Economy & the Supply of Investment Funds: ($S_H + S_F \equiv S \equiv I$)



b. Investment & the Financial System

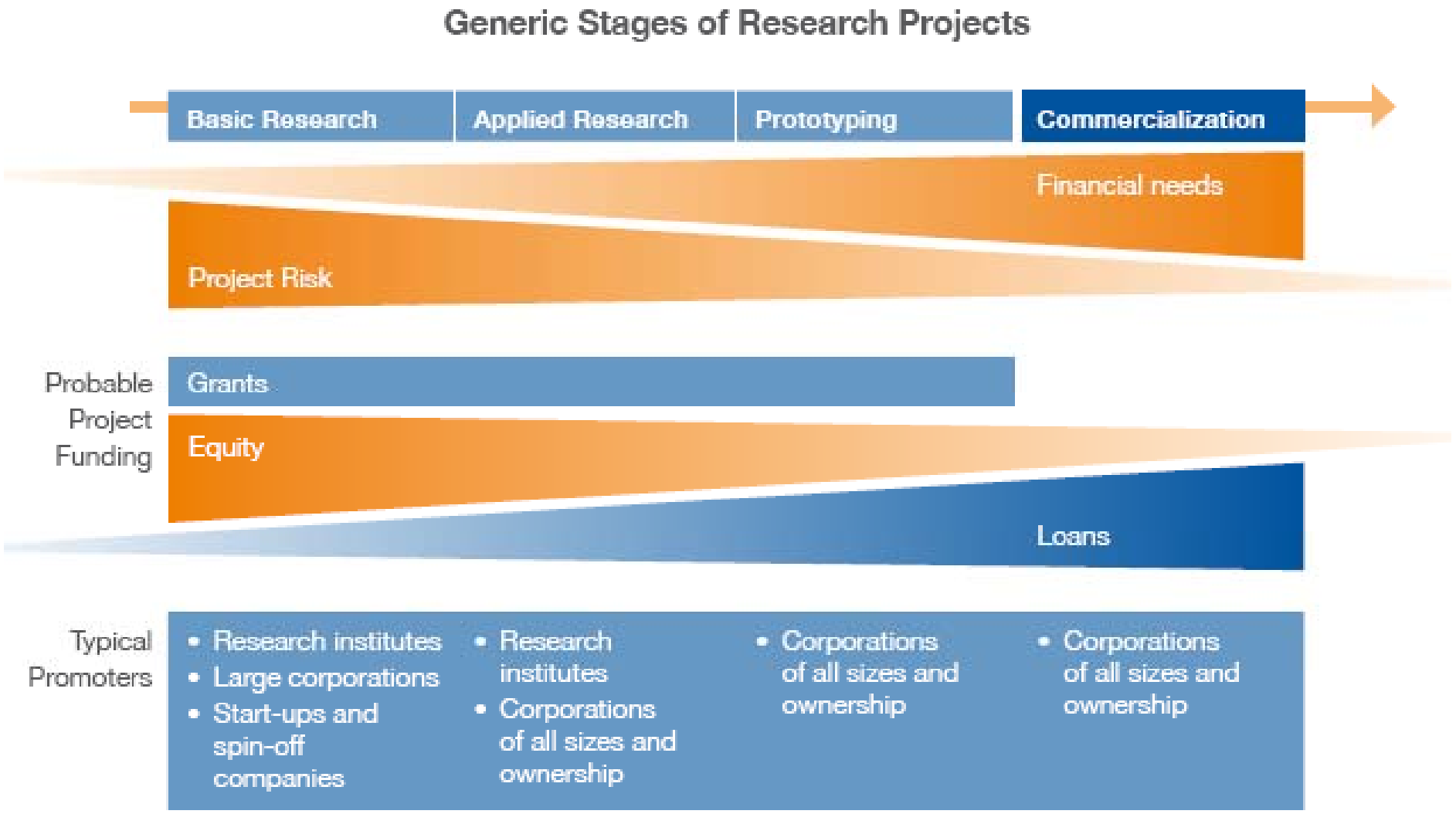


Households own savings accounts, save via unit trusts, buy insurance and pension policies, ...

... which financial intermediaries channel between lenders & borrowers, directly & indirectly

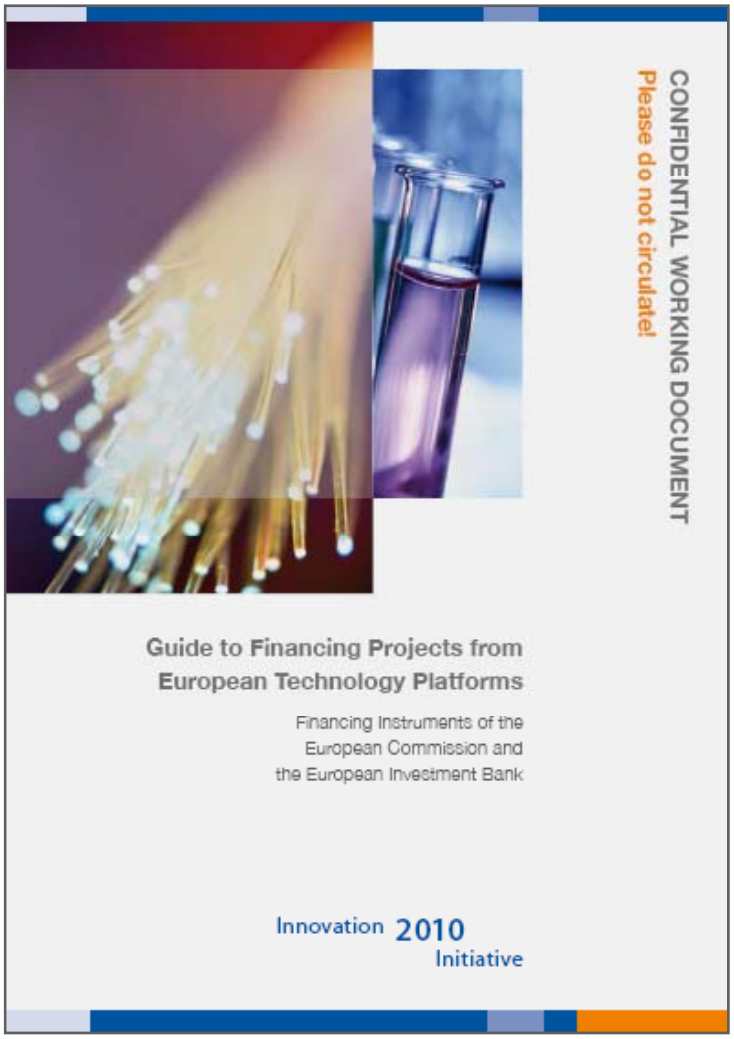
Financial Intermediaries reduce costs e.g.
- **Transaction costs**
- **Search costs**
- **Monitoring costs**
- **Technical due diligence**
- **Legal & other professional costs**

Interlude: Relation of Debt & Equity to the Risk Profile



Source: EIB Guide to Financing Projects from European Technology Platforms

c. Matching Financial Providers with Users: Debt



EIB Guide to financing Projects …

- **…is especially oriented towards R&D Managers involved in the European Technology Platforms or other initiatives focusing on Research, Development and Innovation (RDI).**
- **…demonstrates how a financing plan for a RDI Project can be structured**
- **…shows how the EIB involvement can add value to project promoters and/or the R&D projects themselves**
- **…gives an overview on a new higher risk lending initiative, the Risk Sharing Finance Facility (RSFF) of the European Commission and the EIB**
- **Contact: European Investment Bank,**
  Action for Growth Instruments,
  Email : RDI@eib.org, Tel .: +352 4379 1 www.eib.org

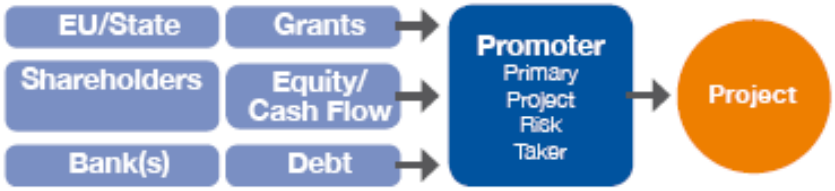
The brochure can be downloaded from:
http://www.coretecventures.com/presentations/eibfinancing.pdf

Key Finding of the Brochure re Financing Projects

Corporate Finance Model vs. Project Finance Model

European Investment Bank

Corporate Finance Model



- Financing partners provide funding to the promoter on the basis of its financial strength.
- A promoter can be a company, a consortium of companies or an institution
- The financing partners are thereby exposed to the **credit risk of the promoter, not of the project**.

Project Finance Model

- In the Project Finance Model, the project is realized and financed via a legally and financially standalone project company.
- The promoter(s) usually have the role of a strategic partner (e.g shareholder).
- **The financing partners are thereby exposed to the credit risk project only .**

New EIB Initiatives in Higher Risk Financing

Potential new products for Corporates & Academia?

European Investment Bank

Risk Sharing with Banks

- **Targeted beneficiaries**: SMEs & MidCaps (low/sub-investmentgrade)
- **Product Ideas**: Risk Sharing Global Loan; Interest Contingent Supplier Facility, Co-financing
- **EIB value added**: Banks: risk sharing, capital relief, new customers/cross selling, Beneficiaries: risk sharing, higher debt capacity, lower financing cost

Risk Sharing with Universities

- **Targeted beneficiaries**: Universities
- **Product Idea**: Royalty fund for scientific research projects
- **EIB value added**: Facilitate financing for universities, utilize royalty streams of research results (e.g. patents, lower financing cost

Action for Growth Instruments (SFF/RSFF)
NEW PRODUCT DEVELOPMENTS

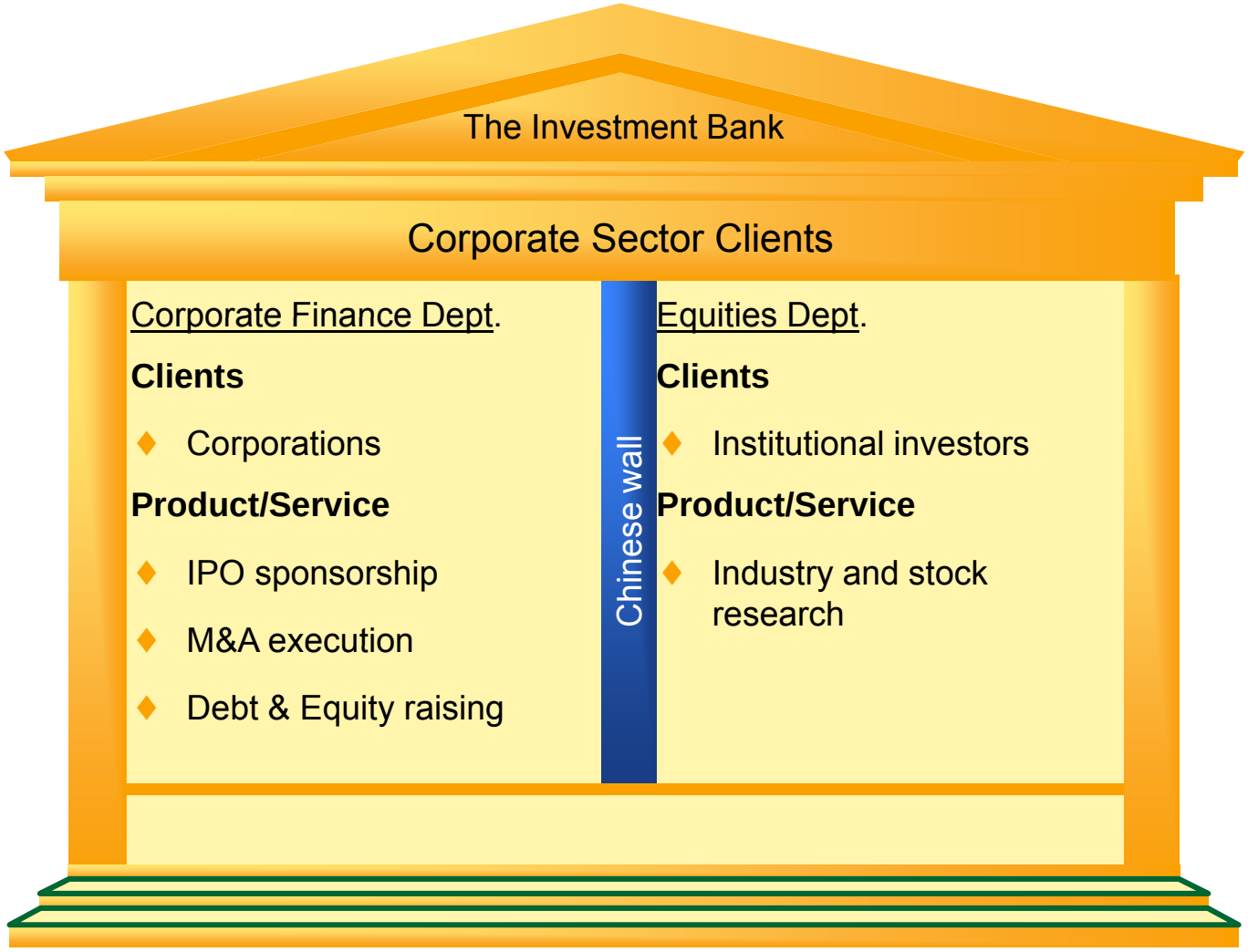
- **Targeted beneficiaries**: Mid-sized and large corporations (low/sub-investmentgrade),
- **Product Ideas**: Structured individual corporate loans for R&D projects (senior/junior debt, mezzanine)
- **EIB value added**: Lower Financing Cost, increase of debt capacity (in case of subordination), project risk sharing

Corporate/Project Finance

- **Targeted beneficiaries**: JTIs, Technology Platforms, EUREKA Joint Ventures,…
- **Product Ideas**: SPV based structures for individual R&D consortia
- **EIB value added**: Provide structuring know-how (Project Financing) and facilitate private sector funding

Financing R&D Consortia

c. Matching Financial Providers with Users: Debt & Equity



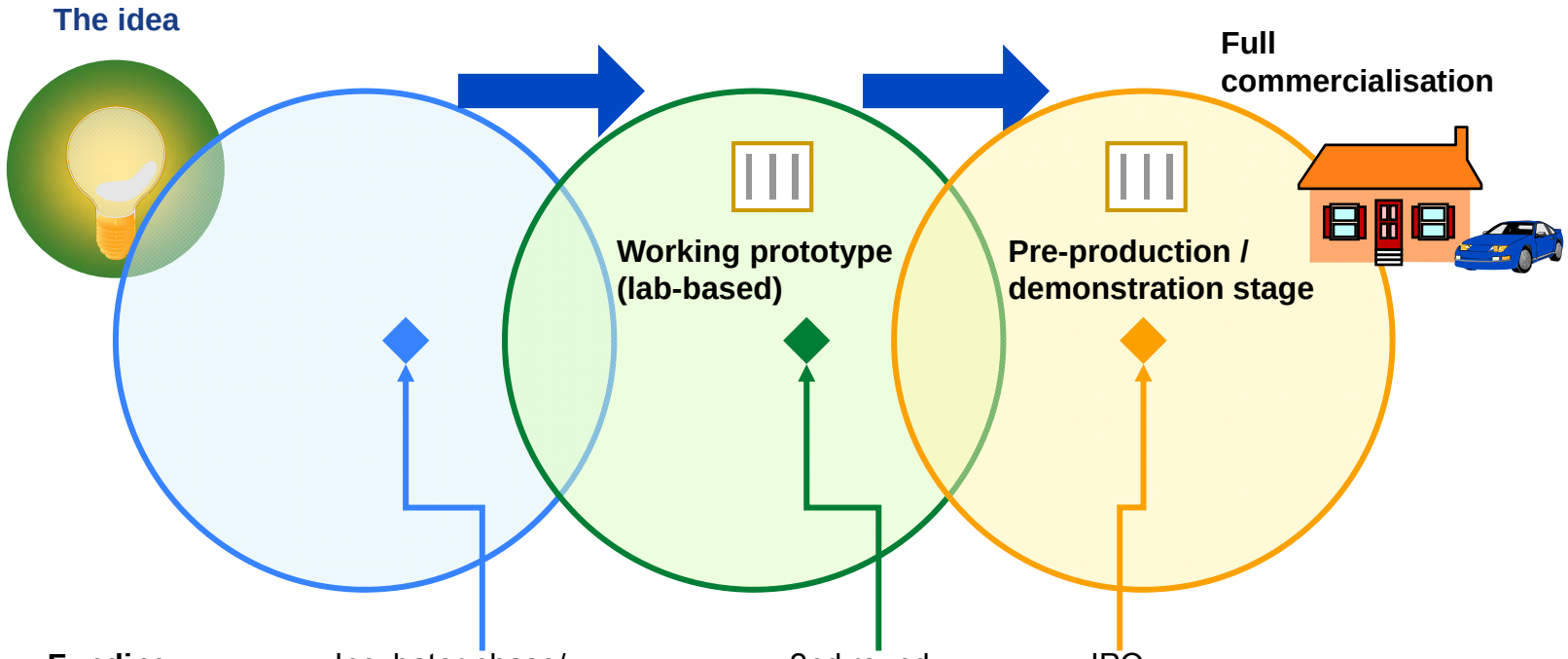
c. Matching Financial Providers with Users: Private Equity

I. **Seed Capital** *(Typically raising less than €300,000)*
   a. **Company Characteristics**: ' technology' is a scientific concept with a potential future use which has yet to be practically demonstrated. Risk of failure and thus loss of capital for the investor at its highest.
   b. **Use of Capital**: to cover the cost of 'proof of concept, to pay salaries, develop the business plan & fund additional technical and market research. Unlikely to meet banks requirements for lending and very few venture capital funds will invest at such an early stage
   c. **Sources of funds** Friends & Family, maybe business angles

II. **Start-Up / Early Stage:** (Typically raising less than *€3m*)
   a. **Company Characteristics**: business concept technically proven, an outline business plan is in place, although likely based on fairly rudimentary market forecasts. Few, if any, non-scientific members of staff may as yet exist. There have been some high profile, though not public failures by fund managers attempting to raise funds to invest in the sustainable energy industry
   b. **Start-Up / Early Stage: Use of Capital**: develop the technology from 'proof of concept' to prototype Some patents may be filed or granted. Specialist members of staff, including project engineers and experienced start-up business executives will be hired to enable the start of the transition by the company from technology to product developer. Stricter financial controls will need to be put in place.
   c. **Sources of funds**, friends & family, specialist early-stage VCs &/or corporate ventures with a strategic interest are active at this stage. Although the broad energy sector is starting to attract the venture capital community, few funds exist with the expertise needed to invest in the H2&FC sector.

III. **Development Capital/ *Expansion Capital:*** (Typically raising in excess of *€3m*)
   a. **Company Characteristics**: prototype demonstrated. Collaborations established to access addition technology, engineering, routes to market. Most continue to be loss-making, which limits ability to raise debt from lending institutions
   b. **Use of Capital**: to participate in the funding of collaborations & expand workforce e.g. marketing and finance. The company may also need to move to more spacious or more convenient premises. The business may also be looking to acquire specialist teams or to acquire businesses to accelerate its growth beyond what is possible organically. Once companies have established the market viability of their product, they often require additional capital to expand and bolster their infrastructure, to accelerate market penetration or to expand into new geographic markets.
   c. **Source of funds** Venture Capitals, Corporate ventures, hedge funds)

Non-Public Markets in the Context of Independent Developers

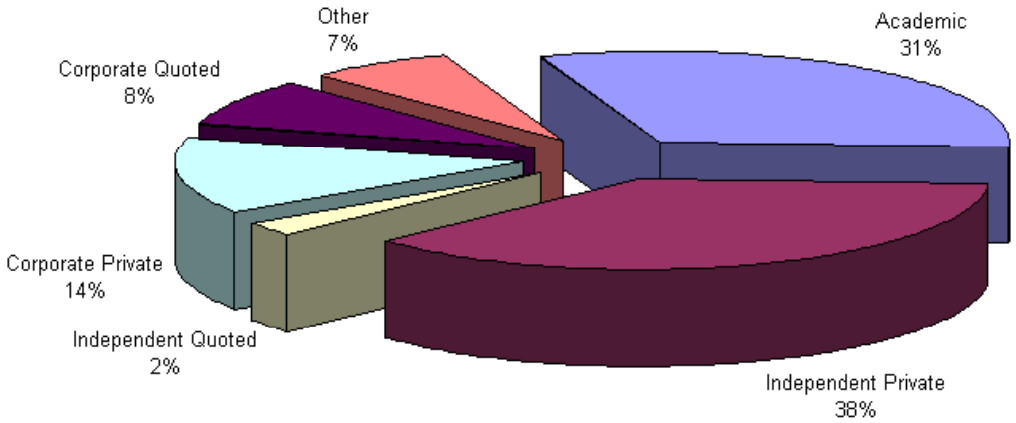


Funding level	Incubator phase/ seed-corn funding	2nd round financing	IPO
Capital providers	'Angels'/government corporate sponsorship	Venture Capital funds	The investment banks/ Stock Market
Comment	Little investigative rigour	IPO -2 to 5 years detailed business plan required	Full prospectus for listing

Corporate developers typically funded from company funds & subsidies
Academic developers typically funded by governments

Structure of the European H2&FC Industry: Numerically dominated by innovative Independent and Academic organisations

Provisional data from Roads2HyCom



H2&FC Developers	**Potentially Available Financial Instruments**
Corporate Quoted	Debt & Equity, Grants & Subsidies, Tax breaks, Retained Profits
Corporate Private	Debt, Grants & Subsidies, Tax breaks, Retained Profits
Independent Quoted	Debt & Equity, Grants & Subsidies, Tax breaks
Independent Private	Venture Capital, Private Sources
Academic	R&D Grants, Industry sponsorship

Corporate Developers, refers to companies whose main business activity is not the development of H2&FC technologies.

Independent developers refers to companies whose business activity is exclusively the development of H2&FC technologies

Academic developers refers to both universities and national research institutes which are developing H2&FC technologies. (A significant problem for these entities arises when the technology is spun out and 100% funding evaporates)

2: Finance Market Drivers

a. Investment Drivers: Regulation, Insecurity

b. China: an Example of Resource Competition

Investment Drivers: Regulation, Insecurity → Investment

- **Environmental Regulation (Regulatory Risk)**

  Carbon Trading Kyoto & Beyond

  EU Biofuels Directive US Clean Tax Credits

All Shift Relative Prices in Favour of Clean Technologies

- **Energy *In*-Security (Foreign Policy)**

  E.g.. UK, US & EU Dependence on Oil & Gas

  Global Competition for Limited Resources

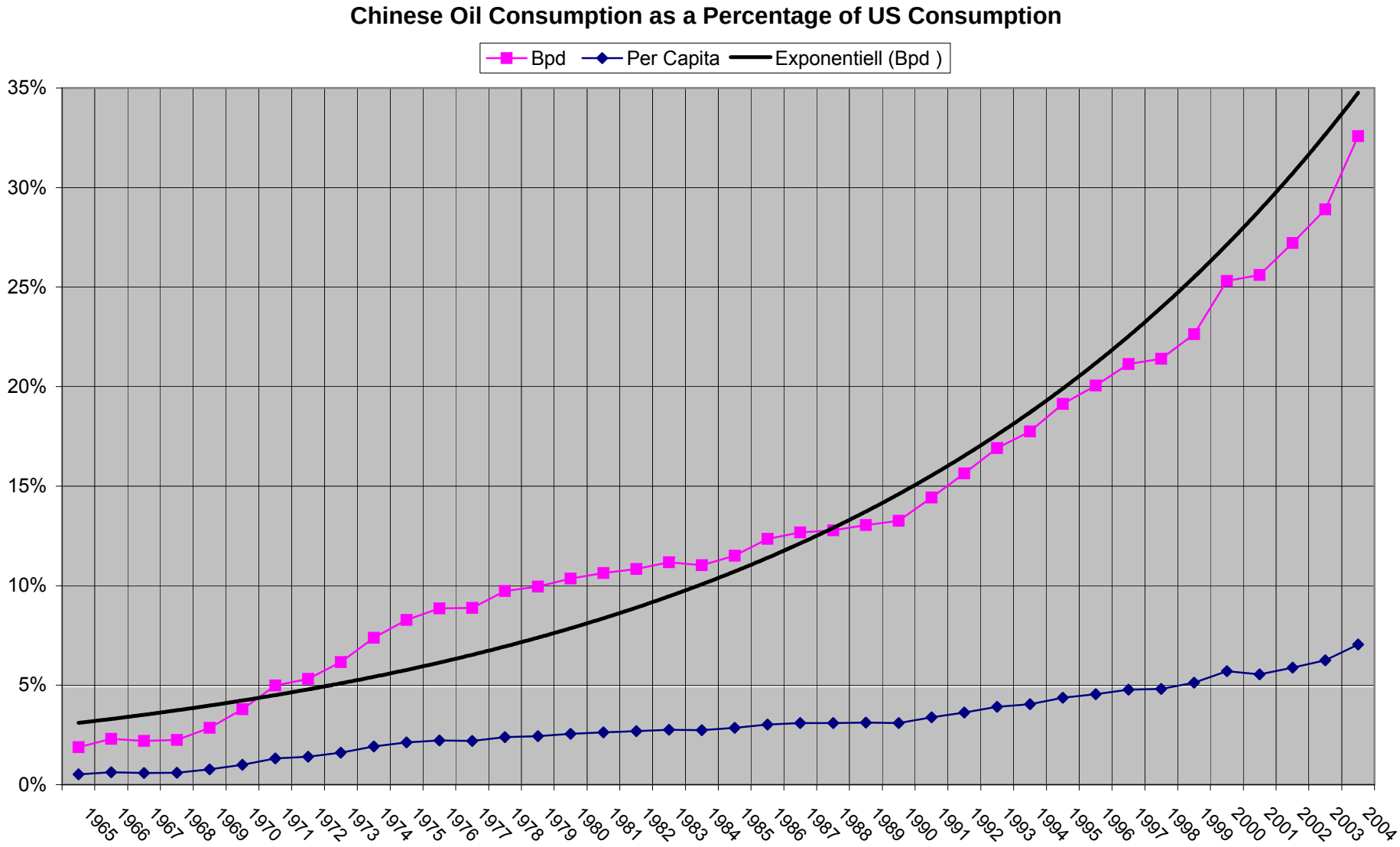
  Volatile Energy Prices

- **Investment**

  US Gov Inv $2.7bn EU Inv €1.7bn

  VC $1.3bn £4bn Inv in AIM Co's

Global Competition for Resources: Chinese Oil Consumption



Source: CTV using data from BP Plc

3. Fuel Cells as Investments

a. **Stock Market: Investors have a wide choice of 'Renewables'**

b. **Stock market performance of Renewables companies**

c. **Fuel Cells as Investments & Investor Requirements**

"Large increases in costs with questionable increase in performance can be tolerated only for race horses and fancy spouses"

Lord Kelvin

Investors have a wide choice of ‘Renewables’

Jefferies Global Clean Technology Composite Index

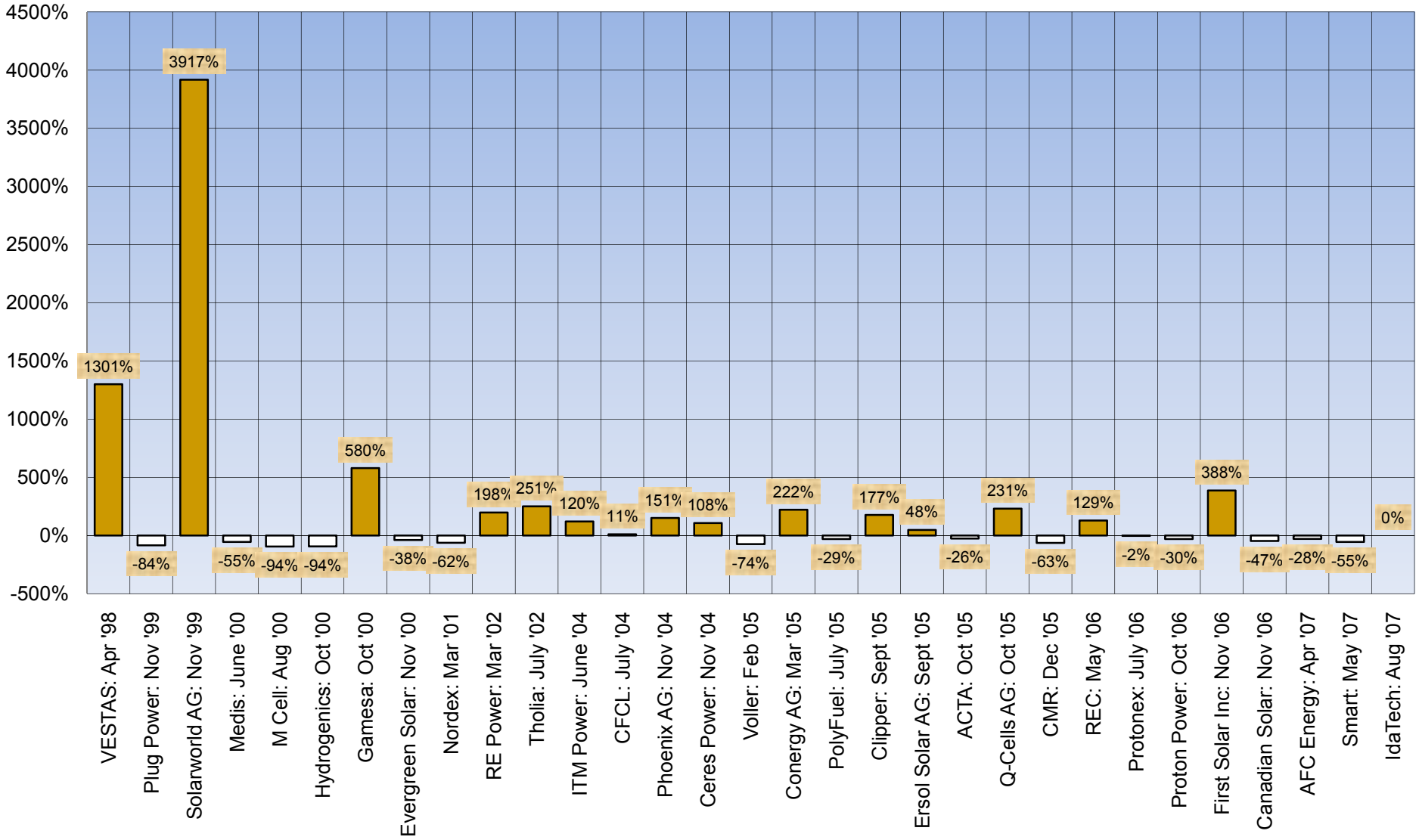
(Includes solar, wind, fuel cells, microturbines, batteries, biofuels, bio-based materials

Vestas Wind Systems A /S
Q-Cells AG
Gamesa Corp Tecnologica SA
Solarworld AG
Renewable Energy Corp
Itron, Inc.
Clipper Windpower Plc
First Solar Inc
Conergy AG
Motech Industries
Nordex AG
Energy Conversion Devices
Suntech Power Holdings
Suzlon Energy
Repower Systems
Sunpower Corp.
Andersons Inc Com
American Superconductor
Insituform Technol'A'
MPG Ingredients Inc

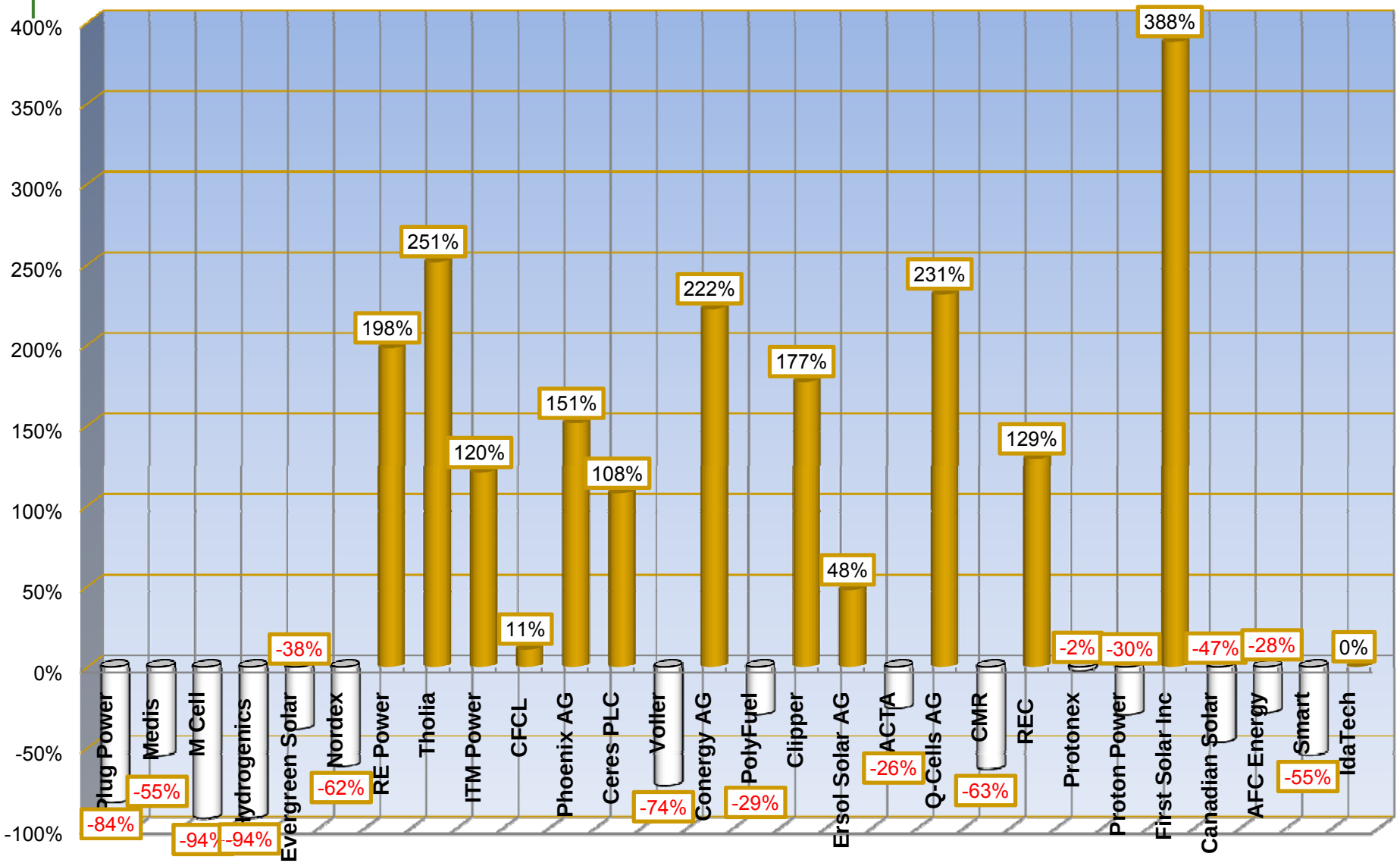
Fuelcell Energy Inc
Enersys
Saft Groupe SA
Ersol Solar Energy AG
Badger Meter Inc
Ballard Power Systems
Energy Developments Limited
Solon AG
Pacific Ethanol Inc
VeraSun Energy Corp
Canadian Solar
Ceres Power Holdings Plc
Altair Nanotechnologies Inc
Xantrex Technology Inc.
Maxwell Technologies Inc
Aleo Solar AG
Verbio AG
D1 Oils Plc
Boralex Inc

Aventine Renewable Energy
Ocean Power Technologies Inc
Plug Power Inc
Capstone Turbine Corp
Ultralife Batteries
Phoenix Sonnenstrom AG
ITM Power Plc
Biopetrol Industries AG
Hydrogenics Corp
Green Plains Renewable Energy
Quantum Fuel Systems Tech
Daystar Technologies Inc Com
Nova Biosource Fuels Inc
Environmental Pwr Corp Com
Mechanical Technology Inc
EOP B iodiesel
Xethanol Corp
Distributed Energy Systems
Evergreen Solar Inc

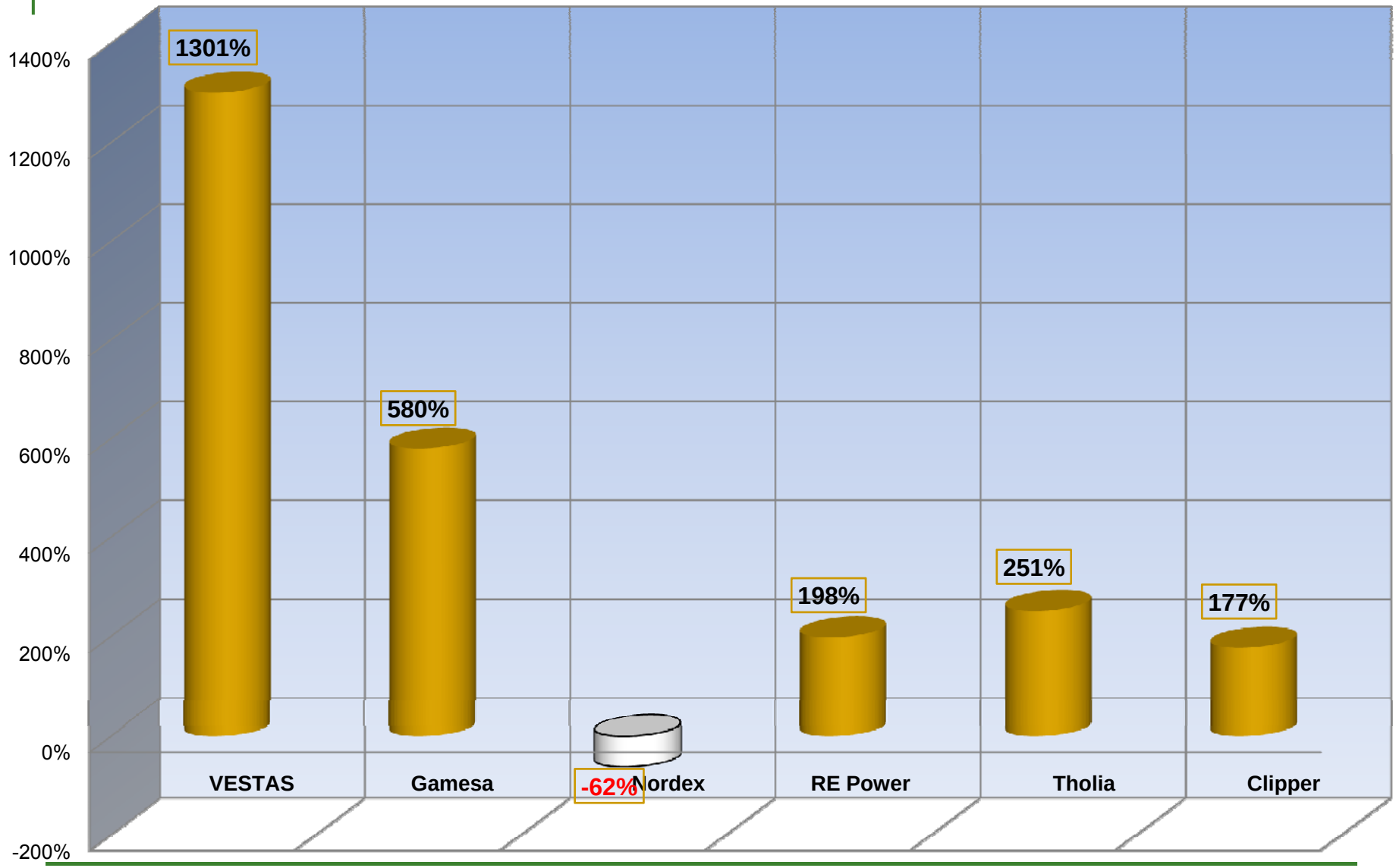
1. Price Changes Since IPO: Wind, Solar & Fuel Cells



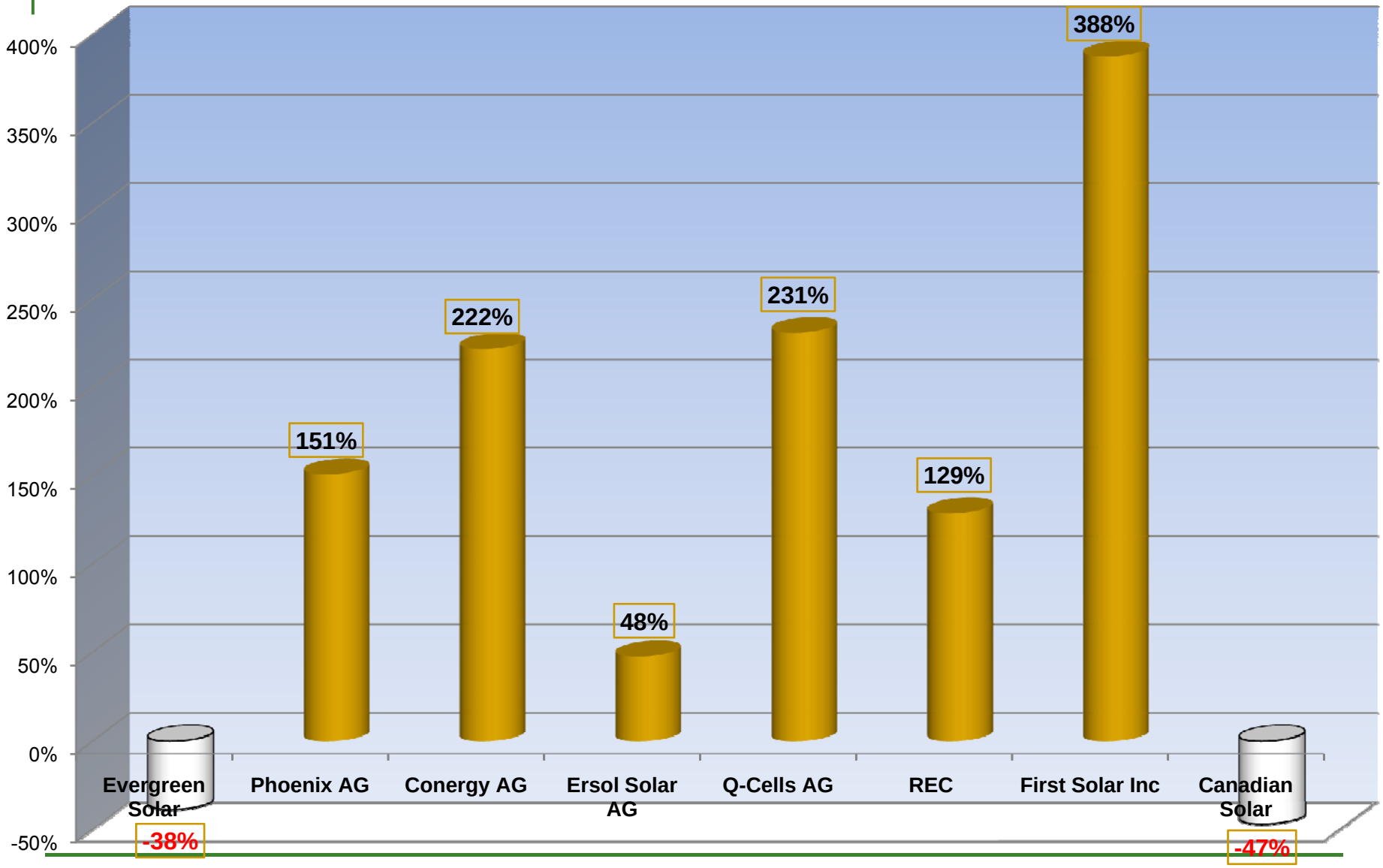
2. Price Changes Since IPO: ex Vestas, Solarworld and Gamesa



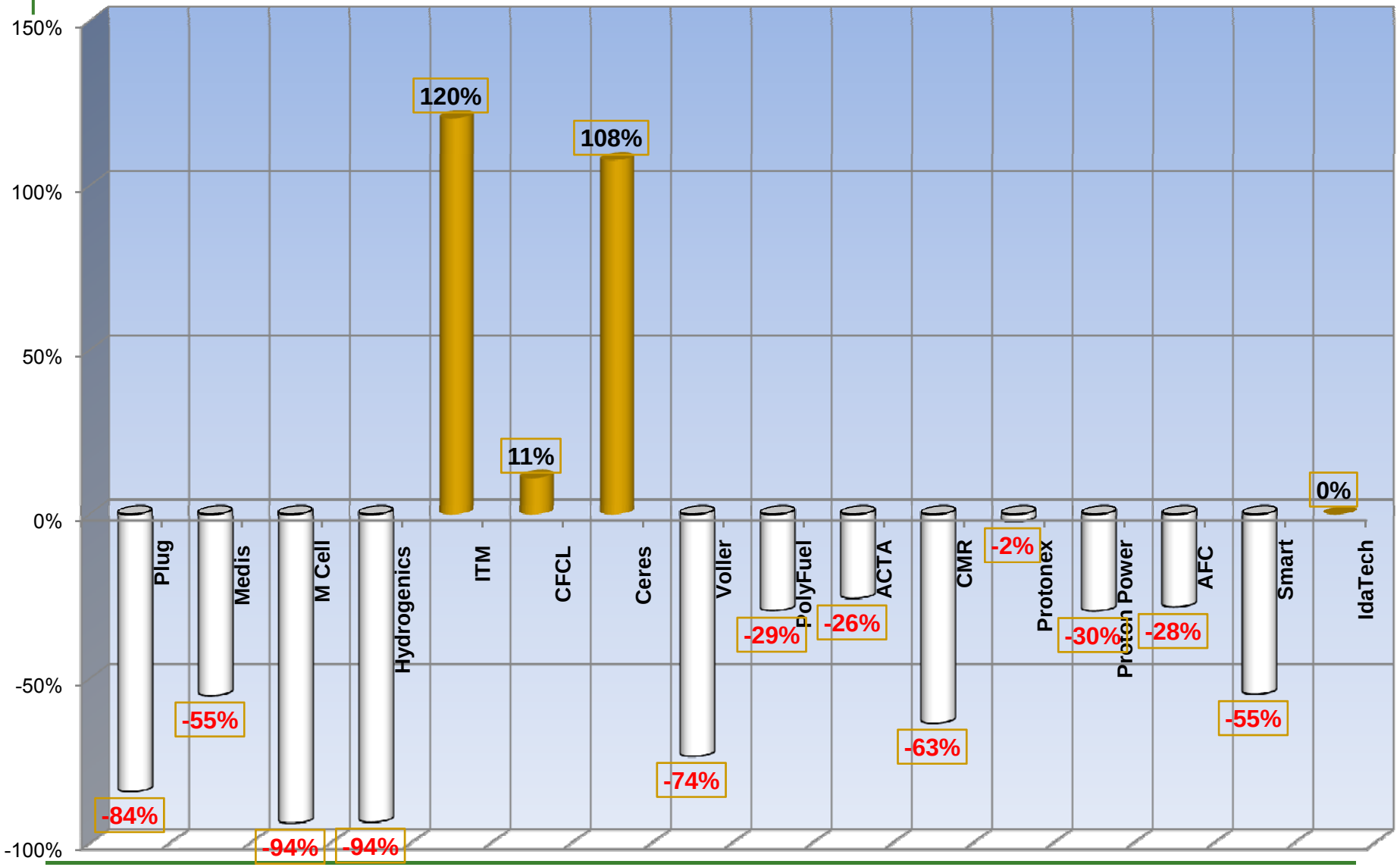
3. Price Changes Since IPO: Wind Companies



4. Price Changes Since IPO: Solar Cos (Ex. Solarworld +3917%)



5. Price Changes Since IPO: Fuel Cell Companies



Portfolio Returns Since IPO: Wind, Solar & Fuel Cell Companies

	Total	Wind	Solar	Wind + Solar	Fuel Cells
Portfolio Value	**10.151 €**	3.045 €	5.901 €	8.946 €	1.205 €
Of Which					
Initial Investment	**3.100 €**	600 €	900 €	1.500 €	1.600 €
Net Absolute Return	**7.051 €**	2.445 €	5.001 €	7.446 €	-395 €
Percentage Return	**227%**	408%	556%	496%	-25%

Assumes a €100 investment in each company on its first trading day, based on closing prices on Friday August 25th 2007.

Source: Bloomberg

Fuel Cells as Investments & Investor Requirements

Not ordinary equity investments

- Investment outcome is potentially binary
  - Established company share prices go up and down, many fuel cell businesses face huge success or catastrophic failure
- Some listed FC companies look very early
  - 'Products' are often far from proven
  - Competitive landscape ill-defined
  - Sales look far from reality
  - Profits even further
- Investment risks include
  - Regulatory
  - Technical
  - Management

Investor Requirements(*)

- Management
  - Focussed on product not technology (Sales = Products)
  - Commercial products means that the Sales less Cost residual is positive
- Robust business model
  - Including a realistic manufacturing strategy
  - Supported by development and financial milestones
- Strong, defendable IP
  - Preferably utilised in application-specific development
- Evidence of real 3rd party risk sharing
  - Partnerships in R&D, marketing and product development

(*) See: Finance & the Fuel Cell Industry. Doran & Robesen et al., International Journal of Hydrogen Energy 28 (2003) 713 - 715

Closing Remarks

- ✓ **Finance is a key part of the development and commercialisation process**
  - ✓ **Households savings are a major source of investment finance**
  - ✓ **Individuals with savings accounts, pension & insurance policies contribute to the flow of investment capital**
- ✓ **Financial markets and financial products are highly diverse**
  - ✓ **Identify where your level of development relative to the appropriate financial provider**
  - ✓ **Remember, non-government investors are motivated by practical products, not the elegance of your technology**
- ✓ **Fuel Cells are but one of a number of renewable technologies competing for public and private funding**
  - ✓ **Currently fuel cells are out of favour with investors: on the one hand because product commercialisation plans are being constantly postponed, on the alternatives to fuel cells e.g. Wind & solar companies already generating revenues**
- ✓ **In current market conditions fuel cell companies are finding it extremely difficult to attract financial investors**
  - ✓ **But note, the finance sector goes through cycles; When cash is tight or uncertainty is high and or interest rates are rising investors seek safety (the so-called flight to quality)**
  - ✓ **Even so quality is always in demand**
  - ✓ **Taking the time to understand the importance of finance and the motivations of financiers will pay dividends**