

# Geodynamics (GDY)

## Hot rocks has plenty in reserve

The recent Cooper Basin steam release demonstrated the viability of thermal energy recovery. What remains unanswered is the energy reserve size and recovery efficiency. Both are critical and answers are expected in the next few months.

### Key forecasts

	FY03A	FY04A	FY05F	FY06F	FY07F
EBITDA (A\$m)	-0.53	-2.02	-3.28	1.94 ▼	7.46 ▼
Reported net profit (A\$m)	-2.11	-3.08	-4.24	-0.92 ▼	-5.22 ▼
Normalised net profit (A\$m) <sup>1</sup>	-0.58	-2.14	-4.24	-0.92 ▼	-5.22 ▼
Normalised EPS (c) <sup>1</sup>	-1.93	-2.98	-4.46 ▲	-0.97 ▼	-5.49 ▼
Normalised EPS growth (%)	n/a	54.7	49.7	-78.3	466.0
Dividend per share (c)	n/a	n/a	n/a	n/a	n/a
Dividend yield (%)	n/a	n/a	n/a	n/a	n/a
Normalised PE (x)	n/m	n/m	n/m	n/m	n/m
EV/EBITDA (x)	n/m	n/m	n/m	85.7	34.8
Price/net oper. CF (x)	17.2	217.8	-51.9 ▼	87.5 ▲	22.8 ▲
ROIC (%)	n/a	-17.0	-11.0	-1.80	-6.26

1. Pre-goodwill amortisation and exceptional items

year to Jun, fully diluted

Source: Company data, ABN AMRO Morgans forecasts

### Results so far confirm potential

The controlled release of the hot pressurised water confirmed that temperatures and pressures are in line with expectations (270°C and 346bar), energy recovery is possible and a hydraulic connection exists. Subsequently, efficiency of energy recovery becomes all-important as this will determine the cost of recovery (margins).

### The next few months is critical

We re-emphasise the importance of the reservoir testing program and its aim to prove a geothermal reserve (from resource). During this period, we seek further information with respect to circulating flows, temperatures and pressures, flow impedance and subsequent enhancement activities.

### Pursuit of green credits

The commercial significance of this project to all stakeholders, including Origin, is the potential quantity of green credits and their respective value that a commercial operation may generate. We estimate a 275MW Cooper Basin geothermal power station at current Renewable Energy Certificate (REC) pricing could generate in the order of A\$100m of green credit revenue per annum.

### Valuation and recommendation

We have increased the number of shares on issue in accordance with the recent placement and pending SPP. Subsequently, our reserve-based valuation has reduced to A\$3.10 from A\$3.39 per share. Our price target equates to our DCF valuation and, therefore, has been reduced to A\$3.10 also. We stress that our price target downgrade does not reflect a change in view. It simply reflects that our valuation is entirely Cooper Basin reserve proving based. We have somewhat harshly neglected HFR resource and GPS value at present. We consider energy recovery efficiency as the primary risk to our valuation. We maintain our speculative Buy recommendation.

### Important disclosures regarding companies that are the subject of this report and an explanation of recommendations and volatility can be found at the end of this document.

Priced at close of business 26 May 2005. Use of ▲ ▼ indicates that the line item has changed by at least 10%.

## Buy

**Important:** The above recommendation has been made for shorter-term investors and may not suit your individual investment requirements. The recommendation structure is summarised on the last page of this report. **PLEASE CONTACT YOUR ADVISOR**

## Moderate Volatility

### Absolute performance

### Overweight

### Market relative to region

Equities	Cash	Bonds
U	O	U

### Asset allocation

### Utilities

### Australia

### Price

A\$1.79

### Target price

A\$3.10 ▼

### Market capitalisation

A\$152.17m (US\$115.73m)

### Avg (12mth) daily turnover

A\$0.25m (US\$0.19m)

### Reuters

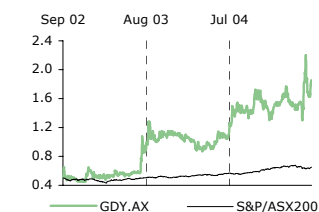
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### Price performance

	(1M)	(3M)	(12M)
Price (A\$)	1.46	1.58	1.08
Absolute %	23.3	13.9	66.7
Rel market %	21.6	15.0	38.3
Rel sector %	24.1	16.3	48.6

Source: Bloomberg



Source: Bloomberg

52-week range: 2.38-1.02

S&P/ASX200: 4091.10

BBG AP Electricity: 124.66

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## Three crucial months – what to look for

The next few months is critical with respect to the long-term value of GDY. We re-emphasise the importance of the reservoir testing program and its aim to prove a geothermal reserve (from resource) and demonstrate that energy can be economically reecovered. Below, we have briefly outlined the three phases of the reservoir testing program and highlighted some key resource properties to look out for.

### Diagnostic Phase

The aim of the Diagnostic Phase is to:

- determine the hydraulic properties of the HFR reservoir; and
- determine the properties of the natural (artesian) geothermal resource.

The controlled release of the hot pressurised water entrained in the reservoir via Habanero no. 2 was carried out in early May. To date, tests have shown:

- Reservoir temperatures and pressures are indeed in excess of 2700C and 346bar respectively.
- Preliminary circulation tests have illustrated that energy recovery is possible i.e. water/steam being released at the surface at temperatures approaching 2000C.
- A hydraulic connection between the two wells, situated 500m apart and 4km in depth, does exist.

The data collected as a result of these flow tests will assist understanding of the reservoir's hydraulic properties. This information is necessary to determine the size of the reservoir (proved reserve).

A final test planned for the Diagnostic Phase is a two–three-day circulation test (ie pumping of water into Habanero no. 1 through the reservoir and returning up Habanero no. 2. This is aimed at providing some preliminary information regarding flow impedance (resistance). The subsequent impedance measurement will give further indication of the nature of the fractures (fissure) within the reservoir and will also provide an initial indication of the power requirement necessary to circulate water through the reservoir and the two wells.

The testing program includes several optional steps to maximise the value of the resource. At the end of the Diagnostic Phase, GDY should be in a position to determine whether additional enhancement of the reservoir is required.

### Enhancement Phase

The requirements and duration of the Enhancement Phase depends upon the findings of the Diagnostic Phase. The aim of the Enhancement Phase is to improve the flow and/or number of flow paths of the underground heat exchanger if required. In other words, if GDY can identify opportunities to improve the physical properties of the reservoir with respect to maximising economic energy recovery, then it will make all efforts to do so. Of course activities carried out during this phase will incur a cost (likely to be between A\$0.5m and A\$3m depending upon the extent of enhancement activities). It will be imperative for GDY to clearly identify and understand the

benefits of enhancement activities. Resource enhancements are likely to deliver significant efficiency gains and will go a long way to minimising operating costs per megawatt hour of electricity generation.

**Demonstration phase and scale-up study**

Following the enhancement phase, GDY intends to circulate water through a closed loop (Habanero no. 1, underground reservoir, Habanero no. 2 and back to Habanero no. 1). This is termed the demonstration phase and is likely to continue for a period of one-three months. The aim of this phase is to determine and obtain expert sign-off of geothermal reserves. This will allow GDY to construct a small-scale HFR geothermal power generation plant. The key announcements during this phase will be prolonged flow, temperature and pressure characteristics and the purported improvements as a result of the enhancement phase. Ultimately key share price triggers will be a formal definition the definition of an initial geothermal reserve (similar in concept to an oil reserve or gold reserve.)

In parallel to the demonstration phase, GDY intends to undertake a scale-up study of large scale power generation (300 MW and above).

Table 1 : Key data to look for during reservoir testing	
<b>Temperature</b>	The greater the surface temperature of return water the better. Reservoir temperatures have been measured at 272°C and to date surface temperature of almost 200°C have been measured. Prolonged circulation will allow the entire system to reach steady state i.e. heat up, following which we are hopeful that surface temperatures of 250°C may be achieved.
<b>Pressure</b>	The enormous over pressures measured (>5000 psi) were unexpected but are believed to be of significant benefit to the heat transfer properties of the reservoir. Essentially the overpressures minimise circulating water loss (expected to be <2%), increase reservoir permeability (reservoir shattering), thus increasing the heat transfer surface area, and the horizontal stress regime significantly simplifies well and field geometry. As tests progress it will be interesting to observe whether these over pressures remain constant, particularly with respect to controlling water circulation and water losses.
<b>Flow / impedance</b>	Empirically circulating flowrate is positively correlated to heat transfer (surface temperature) and flow impedance. As such all heat exchangers exhibit an optimum economic flowrate where energy recovery efficiency is maximised (e.g. energy recovered minus energy required to circulate water is at maximum). Consequently information of interest is the combination of surface temperatures and impedance at a specific flowrate.
<b>Resource enhancement</b>	We expect some enhancement activities. In the least we expect further reservoir fracking (rock fracturing). Following the recent site visit the reservoir testing engineer although impressed with the nature of the raw properties of the reservoir indicated that via enhancement activities he expected to achieve a two fold improvement in heat transfer / impedance properties.

Source: ABN AMRO Morgans

**Thermal energy recovery demonstrated, the question now is one of efficiency**

As noted, we are confident that energy can be recovered from this HFR reservoir. What is yet to be determined is the efficiency at which energy can be recovered. Efficiency of energy recovery is important as this will determine the cost of recovery. GDY’s computer modelling to date suggests that on scale-up to commercial levels it should be possible to generate electricity, from this particular geothermal resource, at operating costs which are competitive with current fossil fuel generators.

The social significance of this is the generation of emission free energy from a very large energy source, estimated at 50billion barrels of oil equivalent or 10bn tonnes of coal.

The commercial significance of this is the potential quantity of green credits and their respective value above and beyond standard wholesale electricity pricing. We estimate a 275MW geothermal power station at Innamincka (Cooper Basin) at current Renewable Energy Certificate (REC) pricing could generate in the order of A\$100m of green credit revenue per annum.

This level of green credit generation will attract significant interest, particularly from fossil fuel producers and users.

### Origin off-take agreement emphasises green value

Origin Energy's agreement to purchase up to 50% of the power generated by GDY at the large commercial power plant (which has a nominal capacity of 200MW or more) illustrates the value it places on the project and in particular access to the green credits. As part of the off take agreement, Origin will have the right to purchase any REC's and/or other environmental credits generated.

### Transmission losses manageable

GDY recently announced that a study had been undertaken by expert consultants on the cost of connecting the Cooper basin to the national grid. The study confirmed that costs are in the order of A\$5 to A\$10 per megawatt hour transmitted, including the cost of transmission. Typical eastern board high voltage transmission costs are in the vicinity of A\$5 to A\$7 per megawatt hour transmitted. We concur with GDY's view that the potential economic benefits of the geothermal resource in the Cooper Basin far outweigh the transmission cost.

### Increased resource base of value pending recovery viability

The attainment of Geothermal Exploration License (GEL) 99 does increase GDY's total resource. However, resource and reserve value is dependent upon reserve proving and subsequent energy recovery efficiency.

### First footing for Kalina Cycle Technology at WMC

The feasibility study to develop a waste heat generation project at WMC's Mt Keith Nickel Mine using Kalina Cycle Technology is significant for two reasons:

- 1) If successful, this will be the first Australian demonstration of the Kalina cycle using waste heat from an open cycle gas turbine. It will provide a reference site for others including GDY's own Cooper Basin project.
- 2) Once commercially agreed and installed, it will constitute GDY's first source of cash flow.

Geodynamics Power Systems (GPS) has been commissioned by WMC to undertake a feasibility study for the installation of a 13MW high efficiency Kalina generation plant at Mt Keith Nickel mine in WA. We estimate total installation cost would be around A\$25-30m. GDY has received capital assistance of A\$2.08m via a federal Government grant. It is planned that GPS would own and operate the plant with electricity sales under a long term arrangement with WMC. The project go-ahead is subject to reaching suitable commercial arrangements with WMC.

### Capital hungry but signs are positive

GDY recently completed a A\$5m placement to institutions and sophisticated investors. It has also announced a share purchase plan whereby it is offering shareholders to purchase up to A\$5,000 worth of shares in GDY at an issue price of A\$1.55. We expect the SPP to raise a further A\$10m. The funds raised are essentially to replenish depleting working capital and preparation of Stage Two, commercial demonstration, commencement. GDY has been a little vague on fund use primarily because reservoir enhancement requirements are as yet unknown. By interpretation, however, we anticipate that a reasonable proportion of capital raised will be directed toward reservoir enhancement activities and to initiate procurement of demonstration plant equipment. The cost of a 3-5MW demonstration plant is expected to be up to A\$12.5m. As is the nature of a development project such as GDY's Cooper Basin Geothermal Project we do anticipate a further capital raising, most likely another placement, later this calendar year.

## Valuation

We have increased the number of shares on issue in accordance with the recent placement and have assumed an additional 6.45m shares will be issued following the SPP. Whilst our view on GDY has not changed, with the issue of additional shares, we have reduced our reserve based per share valuation to A\$3.10 from (A\$3.39). Our valuation is based on a DCF reserve valuation of around A\$1m per MW of proven reserve and the determination of a 275MW reserve. Our price target equates to our DCF valuation and, therefore, has been reduced to A\$3.10 also. We stress that our price target downgrade does not reflect a change in view. We are simply trying to be consistent in our valuation approach for this stage of the Cooper Basin project. Indeed our valuation methodology may be considered very conservative as we do not attribute any value to the Cooper Basin resource or Geodynamics Power Systems at present. Additionally although technical risk has diminished with the demonstration of thermal energy release we have refrained from reducing our WACC as it is still early stages in the development towards commercial operation.

Reserve determination is the most imminent trigger to GDY value and will be based upon the findings of the reservoir testing program discussed above. Consequently, we consider the outcome of these tests represent the primary risk (up or down) to our price target. We reiterate that attention should be focussed on reserve determination and process proving and not the inevitable technical hurdles inherent with a development such as this.

### Valuation snapshot

Fair value* (A\$)	3.10
Target price (A\$)	3.10
Current price (A\$)	1.80
Upside/downside	67%
* Methodology	DCF

### Assumptions

WACC	10.13%
Beta	1.24
Equity risk premium	4.50%
Risk-free rate	5.75%

Source: ABN AMRO Morgans estimates

## GEODYNAMICS: KEY FINANCIAL DATA

### Income statement

A\$m	FY03A	FY04A	FY05F	FY06F	FY07F
Revenue	3.20	3.84	0.00	13.5	16.7
Cost of sales	n/a	n/a	n/a	n/a	n/a
<b>Gross profit</b>	<b>3.20</b>	<b>3.84</b>	<b>0.00</b>	<b>13.5</b>	<b>16.7</b>
Operating costs	-3.73	-5.86	-3.28	-11.6	-9.21
<b>EBITDA</b>	<b>-0.53</b>	<b>-2.02</b>	<b>-3.28</b>	<b>1.94</b>	<b>7.46</b>
DDA & Impairment (ex gw)	-0.04	-0.11	-0.96	-2.87	-12.7
<b>EBITA</b>	<b>-0.58</b>	<b>-2.14</b>	<b>-4.24</b>	<b>-0.92</b>	<b>-5.22</b>
Goodwill (amort/impaired)	0.00	0.00	0.00	0.00	0.00
<b>EBIT</b>	<b>-0.58</b>	<b>-2.14</b>	<b>-4.24</b>	<b>-0.92</b>	<b>-5.22</b>
Net interest	0.00	0.00	0.00	0.00	0.00
Associates (pre-tax)	0.00	0.00	0.00	0.00	0.00
Other pre-tax items	0.00	0.00	0.00	0.00	0.00
<b>Reported PTP</b>	<b>-0.58</b>	<b>-2.14</b>	<b>-4.24</b>	<b>-0.92</b>	<b>-5.22</b>
Taxation	0.00	0.00	0.00	0.00	0.00
Minority interests	0.00	0.00	0.00	0.00	0.00
Other post-tax items	-1.53	-0.94	0.00	0.00	0.00
<b>Reported net profit</b>	<b>-2.11</b>	<b>-3.08</b>	<b>-4.24</b>	<b>-0.92</b>	<b>-5.22</b>
Tot normalised items	-1.53	-0.94	0.00	0.00	0.00
Normalised EBITDA	-0.53	-2.02	-3.28	1.94	7.46
Normalised EBIT	-0.58	-2.14	-4.24	-0.92	-5.22
Normalised PTP	-0.58	-2.14	-4.24	-0.92	-5.22
Normalised net profit	-0.58	-2.14	-4.24	-0.92	-5.22

Source: Company data, ABN AMRO Morgans forecasts

year to Jun

### Balance sheet

A\$m	FY03A	FY04A	FY05F	FY06F	FY07F
Cash & market secs (1)	1.67	0.77	19.0	5.94	13.4
Other current assets	9.42	15.4	15.4	15.4	15.4
Tangible fixed assets	0.24	0.23	12.8	44.9	832.2
Intang assets (incl gw)	0.00	6.30	6.30	6.30	6.30
Oth non-curr assets	7.12	19.6	19.6	19.6	19.6
<b>Total assets</b>	<b>18.5</b>	<b>42.3</b>	<b>73.1</b>	<b>92.1</b>	<b>886.9</b>
Short term debt (2)	0.00	0.50	0.50	0.50	0.50
Trade & oth current liab	4.21	2.85	2.85	2.85	2.85
Long term debt (3)	0.00	0.00	0.00	20.0	120.0
Oth non-current liab	0.00	0.00	0.00	0.00	0.00
<b>Total liabilities</b>	<b>4.21</b>	<b>3.35</b>	<b>3.35</b>	<b>23.3</b>	<b>123.3</b>
Total equity (incl min)	14.2	38.9	69.7	68.8	763.6
<b>Total liab &amp; sh equity</b>	<b>18.5</b>	<b>42.3</b>	<b>73.1</b>	<b>92.1</b>	<b>886.9</b>
Net debt (2+3-1)	-1.67	-0.27	-18.5	14.6	107.1

Source: Company data, ABN AMRO Morgans forecasts

year ended Jun

### Cash flow statement

A\$m	FY03A	FY04A	FY05F	FY06F	FY07F
EBITDA	-0.53	-2.02	-3.28	1.94	7.46
Change in working capital	1.25	2.91	0.00	0.00	0.00
Net interest (pd) / rec	-0.36	-0.44	0.00	0.00	0.00
Taxes paid	0.00	0.00	0.00	0.00	0.00
Other oper cash items	2.77	0.15	0.00	0.00	0.00
<b>Cash flow from ops (1)</b>	<b>3.13</b>	<b>0.59</b>	<b>-3.28</b>	<b>1.94</b>	<b>7.46</b>
Capex (2)	-6.75	-16.4	-13.5	-35.0	-800.0
Disposals/(acquisitions)	0.00	0.01	0.00	0.00	0.00
Other investing cash flow	-8.98	-8.46	0.00	0.00	0.00
<b>Cash flow from invest (3)</b>	<b>-15.7</b>	<b>-24.8</b>	<b>-13.5</b>	<b>-35.0</b>	<b>-800.0</b>
Incr / (decr) in equity	14.1	23.3	35.0	0.00	700.0
Incr / (decr) in debt	0.00	0.00	0.00	20.0	100.0
Ordinary dividend paid	0.00	0.00	0.00	0.00	0.00
Preferred dividends (4)	n/a	n/a	n/a	n/a	n/a
Other financing cash flow	0.00	0.00	0.00	0.00	0.00
<b>Cash flow from fin (5)</b>	<b>14.1</b>	<b>23.3</b>	<b>35.0</b>	<b>20.0</b>	<b>800.0</b>
Forex & disc ops (6)	n/a	n/a	n/a	n/a	n/a
<b>Inc/(decr) cash (1+3+5+6)</b>	<b>1.53</b>	<b>-0.90</b>	<b>18.2</b>	<b>-13.1</b>	<b>7.46</b>
Equity FCF (1+2+4)	-3.62	-15.8	-16.8	-33.1	-792.5

Lines in bold can be derived from the immediately preceding lines.

Source: Company data, ABN AMRO Morgans forecasts

year to Jun

## GEODYNAMICS: PERFORMANCE AND VALUATION

Standard ratios	Geodynamics					Energy Developments			Pacific Hydro		
	FY03A	FY04A	FY05F	FY06F	FY07F	FY05F	FY06F	FY07F	FY05F	FY06F	FY07F
<b>Performance</b>											
Sales growth (%)	n/a	20.0	n/a	n/a	23.5	7.22	24.2	21.9	66.4	56.6	42.0
EBITDA growth (%)	n/a	278.6	62.1	n/a	283.5	19.0	20.6	14.5	62.3	86.6	50.4
EBIT growth (%)	n/a	269.4	98.5	-78.3	466.0	12.7	16.4	7.92	69.2	83.6	65.3
Normalised EPS growth (%)	n/a	54.7	49.7	-78.3	466.0	30.7	26.1	15.6	-0.09	10.9	24.2
EBITDA margin (%)	-16.7	-52.6	0.00	14.4	44.7	66.0	64.1	60.2	60.3	71.8	76.1
EBIT margin (%)	-18.1	-55.6	0.00	-6.83	-31.3	37.9	35.5	31.5	41.7	48.9	57.0
Net profit margin (%)	-18.1	-55.6	0.00	-6.83	-31.3	18.7	19.0	18.1	61.6	45.4	41.1
Return on avg assets (%)	0.00	-7.03	-7.35	-1.12	-1.07	5.76	5.89	5.55	6.72	6.65	7.50
Return on avg equity (%)	0.00	-8.03	-7.80	-1.33	-1.25	8.05	9.43	10.0	10.7	10.1	11.2
ROIC (%)	n/a	-17.0	-11.0	-1.80	-6.26	6.77	8.16	6.43	4.21	4.51	5.34
ROIC - WACC (%)	-10.1	-27.1	-21.1	-11.9	-16.4	-1.75	-0.35	-2.09	-2.39	-2.09	-1.27
				<i>year to Jun</i>			<i>year to Jun</i>			<i>year to Jun</i>	
<b>Valuation</b>											
EV/sales (x)	47.0	39.6	n/a	12.4	15.6	4.79	4.81	4.12	18.8	14.4	10.4
EV/EBITDA (x)	n/m	n/m	n/m	85.7	34.8	7.26	7.50	6.84	31.3	20.1	13.7
EV/EBITDA @ tgt price (x)	n/m	n/m	n/m	143.0	49.7	8.13	8.23	7.47	31.4	20.2	13.7
EV/EBIT (x)	n/m	n/m	n/m	n/m	n/m	12.6	13.5	13.1	45.2	29.5	18.3
EV/invested capital (x)	12.0	3.93	2.61	2.00	0.30	1.27	1.15	1.08	1.59	1.36	1.26
Price/book value (x)	3.77	3.29	2.44	2.47	0.22	1.54	1.42	1.30	2.14	1.93	1.73
Normalised PE (x)	n/m	n/m	n/m	n/m	n/m	19.7	15.7	13.5	22.3	20.1	16.2
Norm PE @tgt price (x)	n/m	n/m	n/m	n/m	n/m	22.8	18.1	15.7	22.5	20.3	16.3
Dividend yield (%)	n/a	n/a	n/a	n/a	n/a	0.81	0.81	0.81	0.99	0.99	0.99
Dividend Franking (%)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00	0.00	0.00
				<i>year to Jun</i>			<i>year to Jun</i>			<i>year to Jun</i>	
<b>Per share data</b>						<b>Solvency</b>					
Tot adj dil sh, ave (m)	30.0	71.7	95.0	95.0	95.0	Net debt to equity (%)	-11.7	-0.70	-26.5	21.2	14.0
Reported EPS (c)	-7.03	-4.29	-4.46	-0.97	-5.49	Net debt to tot ass (%)	-9.06	-0.65	-25.3	15.8	12.1
Normalised EPS (c)	-1.93	-2.98	-4.46	-0.97	-5.49	Net debt to EBITDA	3.13	0.14	5.64	7.49	14.4
Dividend per share (c)	n/a	n/a	n/a	n/a	n/a	Current ratio (x)	2.64	4.84	10.3	6.38	8.61
Equity FCF per share (c)	-12.1	-22.0	-17.7	-34.8	-833.9	Operating CF int cov (x)	9.69	2.33	0.00	0.00	0.00
Book value per sh (c)	47.5	54.3	73.3	72.4	803.4	Dividend cover (x)	0.00	0.00	0.00	0.00	0.00
				<i>year to Jun</i>						<i>year to Jun</i>	

Source: Company data, ABN AMRO Morgans forecasts

## RESEARCH TEAM

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