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20 November 2018

#### J.P. MORGAN INVESTOR DAY PRESENTATION

The following presentation will be used to support discussions between Infigen Energy senior management and guests of J.P. Morgan at the Capital and Woodlawn Wind Farms today.

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For further information please contact:

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#### **About Infigen Energy**

Infigen (ASX: IFN) is a leading Australian Securities Exchange listed energy market participant delivering energy solutions to Australian businesses and large retailers.

Infigen supplies clean energy from a combination of renewable energy generation and firming solutions available from the broader energy market to Australian business customers.

Infigen is a licensed energy retailer in the National Electricity Market (NEM) regions of Queensland, New South Wales (including the Australian Capital Territory), Victoria and South Australia. The company has wind generation assets in New South Wales, South Australia and Western Australia. Infigen is also developing options for firming in the NEM to support its business strategy.

Infigen is proudly Australia's largest listed owner of wind power generators by installed capacity of 557MW, with a further 113.2MW under construction in New South Wales, and actively supports the communities in which it operates. For further information, please visit: <u>www.infigenenergy.com</u>

# J.P.Morgan Investor Day

Capital and Woodlawn Wind Farms, NSW Infigen Energy Senior Management





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- 8. Multi-Channel Route to Market Strategy
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### AN OVERVIEW OF THE OPERATIONS, MAINTENANCE & DISPATCH OF OUR WIND FARMS

# Infigen's Portfolio (1/3) - Photos

Clockwise from top-left: wind farm construction; battery (graphic only); wind farm maintenance; grid-connection substation; operating windfarm



# Infigen's Portfolio (2/3) – Asset Map

Assets located across New South Wales, South Australia and Western Australia



# Infigen's Portfolio (3/3) – FY18 Highlights

**Production sold** Net Revenue increased 6% increased 7% \$210.1 1,480 **Gigawatt Hours** Million **Underlying EBITDA Net Operating Cash** Flow increased 2% increased 7% \$100.4 \$149.1 Million Million **Net Assets per** Net Profit after Tax increased 41% Security increased 20% **60¢** \$45.7

Million

Cents

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# **Overview of the NEM (1/2)**

A shared transmission network moves power between generators and customers Prices settle each half-hour in each region, based on supply and demand Interconnectors allow sale of energy across regional boundaries



## **Overview of the NEM (2/2)**

The NEM is a financial market, underpinned by a physical transmission and distribution network

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#### The physical electricity market

 Users can draw electricity from the Grid provided electricity is available – source is not relevant

#### The financial electricity market

- Payment flows depend on whether the generator is the retailer to the customer (i.e. a gentailer) or has entered into a financial contract with the customer
- In either case the economic outcome for the generator is the same – i.e. it receives the contract price for electricity



# **Infigen's Role in the NEM**

Infigen participates in the NEM in two ways:

- 1. A Generator: our Wind Farms produce (and our SA Battery will store and discharge) energy
- 2. A Retailer to C&I Customers: we deliver energy solutions to customers through fixed or structured prices to best suit their business needs (for electricity and LGCs)



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### **Dispatch**

Infigen's 24/7 Operations Control Centre ("OCC") is linked to all our Wind Farms. It monitors market conditions, our portfolio, market pricing and transmission constraints. The OCC is responsible for bidding our generation portfolio into the NEM

#### **Generator bidding**

- Participants bid their generation into the NEM at the price they are willing to generate for each 5 minute interval
- All dispatched generators receive the highest bid price set by the marginal generator which was required to meet the forecasted demand in that period. The marginal bidders are typically:
  - gas generation in South Australia; and
  - coal or gas generation in New South Wales & Victoria
- Participants tend to bid their generation into the NEM based on their marginal cost of fuel. As wind is "free" and an LGC is created for every MWh of generation, wind farms will always want to dispatch unless the market price of electricity is a negative price and below the sale price of an LGC



#### Bidding the wind farms into the NEM

- Infigen can adjust the output of its Wind Farms in response to price signals
  - For example, if due to transmission constraints there was an oversupply of generation in SA which led to negative spot prices, the OCC would reduce Infigen's export of electricity in response until prices recovered
- Infigen's SA Battery will be manged dynamically by the OCC using real-time software to forecast optimal strategies for charging, discharging and providing frequency control services

#### Time weighted price vs dispatch weighted price

- An efficient generator will seek to be dispatched to maximise net revenues
- When comparing the dispatch weighted price of renewable generation to the time weighted average spot price, there is often a discount. Capital and Woodlawn Wind Farms output closely aligns with demand. In 2017-18, the average revenue from AEMO spot sales was \$82/MWh, equal to the average NSW wholesale price of \$82/MWh



### **Maintenance – Overview**

Maintenance is critical to production outcomes. Our maintenance program extends over all aspects of the wind farm



# Maintenance – Infigen's Approach

Infigen has long-term relationships for O&M with original equipment manufacturers to ensure high quality long term maintenance outcomes with the focus on availability and reliability

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#### **O&M Contract overview**

- Vestas provides O&M Services on the six operating wind farms until the 20th anniversary of the commencement of commercial operations of each Wind Farm
- GE will provide these services on the Bodangora wind farm for 20 years from commercial operations
- Service contracts include:
  - Scheduled and unscheduled wind turbine maintenance and component replacement; and
  - Scheduled and Unscheduled balance of plant maintenance
- Fees cover all scheduled maintenance as well as unscheduled maintenance subject to a liability cap thereby providing a high degree of cost visibility and certainty
- Contracts include a structured bonus/liquidated damages performance regime which provides for good alignment of respective commercial interests



#### Infigen's approach to maintenance

- Internal Operating Cost Model assumes 30 years life, with slightly declining production in years 25 30. This reflects that some individual WTGs will experience component failure which is uneconomic to repair in the last several years of operation.
- Six operating wind farms depreciated over 25 years; Bodangora wind farm will be depreciated over 30 years



### **INFIGEN - AN ACTIVE ENERGY MARKET PARTICIPANT**

### **Role of Renewables and Infigen's opportunity**

Infigen's business strategy is designed to respond to the dynamic energy market. Infigen's focus is on C&I customers seeking medium to longer term electricity contracts and selling LGCs to obligated parties



## **Three Growth Opportunities**

Despite policy uncertainty the Energy Market fundamentals and Infigen's existing generation and contracted portfolio create three interrelated growth opportunities which underpin our strategic pathway

Infigen's ability to contract with customers is dependent upon managing the risk of intermittent generation against customer requirements at periods when the spot price is higher than the contract price. Generation Firmina Physical and financial firming solutions Capacity can manage the risk and allow increasing amounts of renewable electricity to be sold on a firm basis. Physical firming investment options to enhance the reliability of product sold from our existing Customer assets include: Storage (SA BESS is currently Service under construction) Capability Peaking generation, such as gas peaking

 Peaking generation, such as gas peaking plant ownership or tolling agreements with existing assets

**Firming capacity** 



Infigen will respond to the emergent demand for energy from C&I Customers by enhancing its customer service capability through enhanced pricing systems, better load and forecast systems, growing our team and trading experts

With enhanced capability, Infigen would be able to service C&I Customers with multi-sites and greater variability in load profile. Enhanced capability will increase the number and type of customers with which Infigen is able to contract

#### **Growth in capacity**

Infigen believes there are price signals for investment in certain regional markets. This requires a disciplined approach to expansion. Investment can be on balance sheet or Capital Lite. The mix will be structured to maximise value creation within a prudent capital management strategy.

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Based on the evolution of the energy market and expected future dynamics, Infigen has identified NSW and VIC as the focus for access to additional generation capacity.

- Kiata PPA underpins Victorian entry strategy
- Potential development of Cherry Tree WF under a Capital Lite funding model
- Flyers Creek WF is in development with a final investment decision scheduled for 2H FY19

### **Establishing Benchmark Price For Base Load Generation**

The long-end of the forward curve gravitates towards the cost of new entrant. This currently reflects renewables plus firming (OCGT). This assumes considerable gains from exchange in NEM spot market. Once OCGT must be used >30% of the time, CCGT becomes a more efficient solution. Any value for zero emissions will be additional

Short term view – NEM wholesale price	Medium term vie	ew	New	entr	cant cost of genera	tion	by sou	rce (\$	SAUD	/ <b>MWh</b> ) 100+
Supply = Demand	Supply is determine	ed by:		Н	ligh Efficiency Low Emissior (HELE) Coal			-	80	
				Nuclear	-				100+	
<ul> <li>Oversupply -&gt;</li> <li>Price lower than cost</li> <li>Under supply -&gt;</li> </ul>	Replacement cost of existing generation and/or increased supply to meet new demand			Co	mbined Cycle Gas Turbines (CCGT)				9	0
Price higher than cost			Wind, Solar & Open Cycle Turbines (OCGT)			3 75-80				
						0	20 40	60	80 10	0 120
	Timeline view o	of New Genera	ation and	long	y term pricing					
\$35/MWh	\$55-60/MWh	> \$70/	WWh		c. \$80/MWh		с. \$10	\$90- 0/MW	<b>/h</b> <sup>1, 2</sup>	
Super critical pulverized coal generation	Gas fired generation 5000MW GT committed	CCGT + Re developed in r separate prio	newables response to ce signals		Wind (\$60 - \$65) + OCGT (\$15) BUT relies on NEM availability		CCG1 driv	<sup>-</sup> ->Gas /e price	will	
1998 - 2004	2005 - 2011	2012 - 2	016		2017 - Current		Future	Outlo	ok	

1. This analysis does not assume a price for emissions or a premium for emissions abatement. Any additional value available to renewable generation would be in addition to the revenue from electricity sales

2. Assumes gas price of \$8.50 gj

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### **LGC Pricing**

The trajectory for the decline in pricing for LGCs is unknown – a decline in LCG prices will need to be offset, to some degree, by an increase in wholesale electricity prices if the market is to deliver the price signal for new renewable generations

#### **Relevant considerations**

- Creation of new supply:
  - Connection and grid-related hurdles may slow and curtail the rate of new generation/production in the absence of strong electricity price signals
  - Increasing investor return requirements coupled with increasing lender constraints:
    - arising from concerns around grid connection; or
    - concern on marginal loss factors ("MLF")

may adversely affect near-term project economics and slow down the rate of supply until the market signals from electricity support new production

- Low hydro production years can significantly impact on supply, creating short-term shortfalls
- Demand
  - Greenpower increases the 33m RET required by c.2-3m LGCs pa
  - State based initiatives increase demand if LGCs not acquitted
  - Desalination Plants increase demand (NSW Desalination Plant will be turned on if Greater Sydney Dam levels <60% (62.2% on 1 November 2018)

#### The effect on Infigen

Existing contracted protection against decline

	FY19	FY20	FY21	FY22	FY23
Current Contracts	90%	87%	60%	32%	22%
SDP ON		97%	70%	42%	32%

- Depends on what happens to the Electricity Price
  - If the RET is met and supply matches demand, the LGC price should be stable at the opportunity cost of carbon
  - If supply exceeds demand then in the absence of withholding of LGCs by producers, LGC price will decline
  - If the economics of renewable generation support new build then the supply of LGCs will continue to increase and price will decline sharply
  - If new build generation is not economically rational in the absence of an LGC price, then the generation should not be built

Accordingly, it's the Benchmark Price for New Generation that is critical to Infigen (refer slides 16)

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## Is there a value for zero emissions generation?

The RET may be met, but the challenge to meet Australia's Paris Agreement commitments of a 26% reduction in 2005 carbon emissions across the entire economy is expected to result in the electricity sector being asked to 'do more'

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#### **Relevant considerations**

- RET allows the electricity sector to reduce carbon emissions by 26% against 2005 levels
- Electricity sector produces 34% of Australia's emissions
- The other main contributors to carbon emissions are<sup>1</sup>

Transport	19%
Agriculture	14%
Industrial processes and product use	7%
Stationary energy (ex electricity)	18%
Fugitive emissions	11%
LULUCF	4%
Waste	2%

- Electricity sector is among the most flexible industries because amongst other matters:
  - The electricity sector has a range of lower emissions technologies available to it
  - The electricity sector can switch to these technologies relatively quickly
  - · Technology switching is able to be done at relatively low cost
- ALP Policy is for the electricity sector to reduce its 2005 emissions by 45% by 2030

#### The value of the electricity sector 'doing more'

- Modelling indicates that a price of c. \$20 \$30/t is required on electricity emissions to meet Australia's Paris Agreement commitments
- If the electricity sector is asked to 'do more' the price rises accordingly
- The price will be in addition to the electricity price and create the price signal for new clean generation to enter the system

#### How this might work

- Government policy mechanisms are required in the long-run. Many are available. For example:
  - Emissions obligation
  - Forced closures
  - · Carbon tax / price
  - · Emissions trading
  - Extended RET
- Short-run options are available and can be implemented quickly with valuable effect. For example:
  - · altering power plant dispatch from coal to CCGT / Hydro

## **Multi-Channel Route to Market (1)**

Volume, price and tenor - managing risk to deliver stable and reliable revenue outcomes

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#### **Routes to market**

- Run of Plant PPAs ("PPAs")
  - · Lowest risk route to market for Infigen:
    - Limited production risk (as volume linked to production)
    - Generally no price risk for Infigen
  - Tenor varies (generally 3-20 years)
  - Customers manage individual energy use requirements e.g. large retailers or substantial consumers with energy markets management skills
- Commercial & Industrial Customers ("C&I")
  - · Structures may or may not be linked to production
  - There may be times where Infigen is exposed to low production from its assets, and high prices in the NEM – Infigen manages this risk through firming
  - Typical Load > 5 MW
  - Typical Tenor 3 years to 7 years
  - Contracts tailored with customers to create value (demand side management / risk-reward sharing etc.)
- Spot Market for electricity
  - Price received for uncontracted electricity
  - No production risk Infigen receives the market price
  - Prices in the NEM fluctuate between \$1,000/MWh and \$14,500/MWh
- Wholesale Market
  - Not linked to production
  - There may be times where Infigen is exposed to low production from its assets, and high prices in the NEM – Infigen manages this risk through firming
  - Substantial visible forward market with reasonable liquidity
  - Tenor of 3-36 months forward sales
  - Can be used to forward purchase and manage market exposure on C&I sales

**Contracted volumes of electricity**<sup>1,2</sup>



#### **Contracted volumes of LGCs**<sup>3,4</sup>



1. Including production expected from the Bodangora WF due for completion in FY19

- 2. Expected electricity sales outcomes having regard to historical production for operating facilities
- 3. Expected LGC production outcomes having regard to historical production for operating facilities and Bodangora WF

4. LGC volume contracted as at 31 October 2018. These numbers assume Sydney Desalination Plant remains off. If it turns on, then LGC volume contracted will increase to FY20 97%, FY21 70%, FY22 42% and FY23 32%

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## **Multi-Channel Route to Market (2)**

Risk management is a critical aspect of operating the business given the intermittent fuel resource and the success of the execution of the Multi-Channel Route to Market sales strategy delivering solid contracted positions

#### The requirement for firming

- The need for firming
  - · Wind output is a variable energy resource
  - Infigen may not be producing electricity when required to provide a firm price to a customer for its electricity consumption
  - Infigen adjusts contracting and firming strategies to ensure its exposure to financial risk is managed
- The effect on revenue
  - When Infigen has entered into a firm sales contract the economic effect is it receives a fixed contracted sales price
  - When Infigen is producing this means that the contract price is received rather than the spot price - so Infigen is indifferent to the spot price
  - If Infigen has no firming strategy in place, when Infigen is not producing, but has entered into a contract, then:
    - Infigen will make a profit if the spot price is less than the contract price
    - Infigen will incur a loss if the spot price is greater than the contract price.
  - It is because of this risk of loss that "firming" is a critical aspect of Infigen's business and risk management strategy



#### **Risk management**

140

120

100

80

40

Production and load (MW)

- To manage the risk associated with intermittent production and contract obligations Infigen:
  - Employs multiple models that simulate hundreds of potential wind output and NEM pricing scenarios, calibrated to historical and forecast market conditions
  - Adjusts its contracting level, and pricing offers, to meet approved risk parameters – which deal with maximum potential loss and volumetric trading
    - Quantitative volumetric hedging limits
    - Earnings at Risk analysis
    - Strategic portfolio balancing
  - Financial and physical solutions are used to ensure compliance with risk parameters. Refer Slide 21

# **Multi-Channel Route to Market (3)**

Firming strategies are both financial and physical. Infigen uses both and as the requirement for systems reliability grows, the value of physical firming is expected to increase

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#### **Physical firming**

- Fast response physical firming controlled by Infigen allows it to protect its contract position in times of high price and where production is less than contracted loads
  - in this instance Infigen would turn on the asset and sell into the NEM thereby capturing the high price (offsetting the high electricity cost of meeting contracted loads)
- SA Battery Development: an example of physical firming that allows Infigen not only to protect its contract position but to supply frequency control services to the grid
- Open Cycle Gas Turbines: fast start machines can provide protection to contract positions. Even with high gas prices OCGT can protect contracted positions, noting that sustained high prices are not a regular feature of the NEM
- Pumped Storage Hydro: fast start and can provide substantial electricity "storage" as well as short term firming depending on its scale



#### **Financial firming strategies**

- In the NEM there is a liquid market for financial derivative products which provide financial protection in times of high price – generally regardless of Infigen's actual production
  - Standardised traded caps provide an efficient risk management tool against extreme price events – these are both exchange traded and OTC traded
  - Exotic derivatives can also be structured OTC

#### **Natural firming opportunities**

- The Value of the Portfolio Effect: Infigen's diverse wind portfolio across multiple geographical locations and regions reduces both portfolio volatility and favourably impacts the requirement for firming
- Demand Response: Some customers are able to curtail their electricity usage on demand.
  - An increasing number are prepared to do so in times of high price if Infigen isn't producing in order to secure a lower overall contract price
  - Some customers are expected to be willing to curtail even if Infigen is producing, in order to share the value of high priced events

## **Increasing our Customer Service Capability**

Infigen will increase its Customer Service Capability to increase the number and type of customers with which Infigen is able to contract

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#### Current capability

- Staff
- Risk systems
- Retail Licences and Network Agreements
- Billing capability
- Compliance and Risk Management systems, policies and procedures

#### **Expanded capability**

Infigen may develop or partner with 'value add services' to be able to provide C&I customers wholistic energy solutions over a longer period.

- Increased sales and trading staff
- Outsourced billing systems
- Enhanced pricing systems
- Load forecast systems
- Marketing the Infigen Value Position



# **Infigen's Competitive Advantages**



### **Infigen's Wind and Solar Development Pipeline.**



1. Infigen has a 32% equity interest 2. Infigen has a 50% equity interest







For further information please contact: ir@infigenenergy.com | +61 2 8031 9900

**Sylvia Wiggins** Executive Director, Finance & Commercial

# **Our Senior Leadership Team**

A senior experienced and dedicated team with the skills and experience required to continue to develop and execute Infigen's strategic plan in an evolving energy market

Ross Rolfe AO CEO & Managing Director



Sylvia Wiggins Executive Director – Finance & Commercial

- 30+ years industry experience and 6 years at Infigen
  - Substantial and broad experience in the Australian energy and infrastructure sectors, with positions in senior management, government and strategy
  - Extensive experience in stakeholder management at the governmental, commercial and community levels including managing relationships and negotiating projects and policy positions
- 20+ years corporate experience and 2 years at Infigen
  - Substantial experience across a broad range of businesses and countries, most recently working in the energy, infrastructure, defence and structured finance areas
  - · Strategic planning, commercial negotiations, capital management and corporate finance



Paul Simshauser Executive General Manager – Corporate Development

- 25+ years industry experience and 1 year at Infigen
  - Significant experience in energy markets including roles in systems development, environmental markets trading, strategic and business planning, mergers and acquisitions, and corporate affairs
  - Most recently held the position of Director General of the Queensland Department of Energy
     and Water Supply

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# **Our Senior Leadership Team**

A senior experienced and dedicated team with the skills and experience required to continue to develop and execute Infigen's strategic plan in an evolving energy market

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**Owen Sela** EGM – Energy Markets



**Tony Clark** *EGM – Projects & Operations* 

- 18+ years industry experience and 2 years at Infigen
  - Commercial development, corporate strategy, contract negotiations, and mergers and acquisitions
  - Trading and portfolio management, commodity, foreign exchange, and interest rate risk management

- 20+ years industry experience and 2 years at Infigen
  - Extensive experience in the power sector having been involved in the operation and construction of a number of key Australian power stations
  - Former senior manager with ERM Power, Stanwell Corporation and Worley Parsons working on the development and delivery of generation and gas infrastructure projects.

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