Financing DeGrussa hybrid project
Solar PV + Storage

Energy and Mines London Summit

28 January 2016

neoen
renewing energy

Agenda

1. **Neoen**
2. Sandfire offgrid PV project
3. Challenges
4. Organisation & financing
5. Conclusion

Neoen: a renewable and integrated IPP

Founded in 2008, Neoen has a long-term approach oriented towards energy production with a develop-and-hold strategy, through 4 businesses and 3 main energy sources

Development

Funding

Construction

Operation

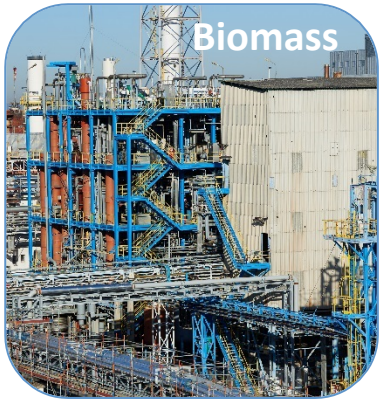
From the **selection of appropriate sites** to the management of **permitting processes**, Neoen crafts the most competitive **technical solutions** for our projects

Neoen provides the **equity** and negotiates the **best financing structure** with first-rate financial institutions thanks to **high-standards** projects and **long-term** commitment

Neoen manages **project's construction**, subcontracting to a **tier-one EPC** contractors, ensuring strict technical requirements and quality suppliers

Neoen **sells the electricity** produced by its plants. Its operating center in Paris provides **on-going supervision** of the assets, ensuring **maximal production** for the life of the plant

Réclainville, France, 12MW

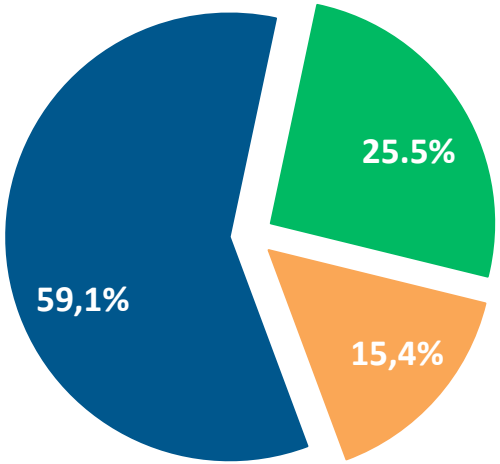


Commentry, France, 15MWe

Ambitious and recognized shareholders

IMPALA

- Holding owned and managed by Mr. Jacques Veyrat, well recognized French entrepreneur and former president of the Louis Dreyfus Group
- Mr. Jacques Veyrat sits at the company's board and is actively involved in the development strategy of Neoen.
- Impala is Neoen Reference shareholder. Its equity stands at €350 million.



OMNES CAPITAL

- Omnes Capital, formely Crédit Agricole Private Equity, is among the French PE leaders with 1.8 billion Euros assets under management
- Omnes Capital is very active in renewable energy, and Neoen is one of its major investment in this sector alongside recognized other companies : Valorem, Exosun, Abakus, Ikaros…

bpifrance

- Bpifrance is a public Fund, a strategic tool for French economic policy, which aims at financing and stimulating the growth of small & medium French businesses
- Bpifrance has a clear ambition to support the energy transition by complementing the capitalistic structure of renewables companies

- **Neoen is supported both by very ambitious and recognized shareholders, and by the French Government which has put its trust in its strategy through a minority stake**
- **Neoen implements its develop-and-hold strategy rapidly thanks to a quick decision process**

A highly experienced international team in 7 countries backed by a solid hub in Paris

AN INTERNATIONAL TEAM TO SERVE OUR DEVELOPMENT

Flagship project: 300 MW Cestas solar park in France

- **The most powerful solar plant in Europe, able to meet the needs of the 250,000 inhabitants of Bordeaux**
- **This Neoen-developed facility, located in the town of Cestas, near Bordeaux, consists in several power plants with a total combined output of 300 MW.**
- **Neoen own 120 MW while eight other reputable investors will own the remaining 180 MW.**
- **Key facts and figures**
  - Highly competitive : Electricity sold at € 105/MWh (i.e. US$ 138/MWh)
  - Total investment: over 360 M€ ;
  - EPC : a consortium comprising Eiffage-Clemessy / Schneider Electric / Krinner
  - Almost 1 million PV panels and more than 69 millions of PV cells
  - Connected to the grid in October 2015

Drone views of the plant

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DeGrussa Mine

SANDFIRE RESOURCES NL

- High grade copper mine in Western Australia
- Greenfield discovery in 2009
- 65,000+ tons/yr Copper
- 35,000 ounces/yr Gold

DeGrussa Mine

Project Presentation

Project characteristics

- 10.6MWp solar PV (single-axis tracking system)
- 20 hectares of land required for the installation
- 4MW/6MWp battery power (lithium-ion) to provide spinning reserve as opposed to load levelling
- Integration to a 19MW diesel plant
- 21GWh annual generation (20%+ of DeGrussa mine's annual electricity needs)
- 6Y+ Power Purchase Agreement
- Largest project of its kind in the world (offgrid hybrid solar PV with storage)
- 100% owned by Neoen (IPP structure with mine PPA)
- Development, EPC and O&M: Juwi
- Recoupable funding: ARENA
- Project finance: CEFC
- Great remoteness (150km from the closest town)

Video

Project Presentation

Main benefits for Sandfire

- Cheaper electricity generation, especially in the long term
- No more volatility in electricity prices;
- Better electricity quality;
- No capital required (provided by Neoen);
- 5 million litres annual diesel savings resulting in 12,000 tonnes annual CO2 savings;
- Modern and sustainable image.

Construction timeline

Beginning of construction:

15 July 2015

Current status

- All trenches dug and cables laid;
- All mounting systems installed;
- 25% solar panels installed;
- Inverters/transformers and control system deliveries expected by the end of January 2016.

Modules Installation (ground view)

Modules installation (drone view)

Expected commissioning:

March 2016

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Project challenges

Construction and Operation in a remote mining environment

- Application of mining standards to the project
- Adaptation of PV procedures to the mine's Health & Safety requirements
- Dust issues

→ Close collaboration with Sandfire, including on accomodations, flights, water, materials...

Potential conflict with current diesel generators operator

- Conflict of interest between diesel-generated electricity and renewable energy supply
- Strong risks as intermittent energy may be demanding on equipment

→ Management of interface risk and provision of ancilary services to increase genset efficiency

Project structuring

- Gap between PV lifetime (25 years) and mine's
- Strong technical risks
- Strong counterparty risks as the mine is the only possible offtaker of the project
- Competitiveness requirement in a reduced energy price environment

→ Requirement to have strong sponsor's commitment

System optimisation

Before construction

- Analysis of the mine load including extreme variation scenarios
- Analysis of weather data including extreme variation scenarios
- Analysis of the diesel generators constraints
- Evaluation of solar, storage and control system technology choices

→ Definition of solar and batteries technologies and sizing

→ Conservative approach given limited global track record on similar projects

During operations

- Analysis of real-life system integration
- Optimisation of battery charge and discharge cycles
- Optimisation of diesel generators parameters
- Use of batteries as night-time spinning reserve to improve diesel generators efficiency
- Use of cloud prediction tools to decrease requirement for spinning reserve and increase solar penetration

→ The system can be significantly optimised through the operation phase

→ A long-term approach is required to ensure the best system performances

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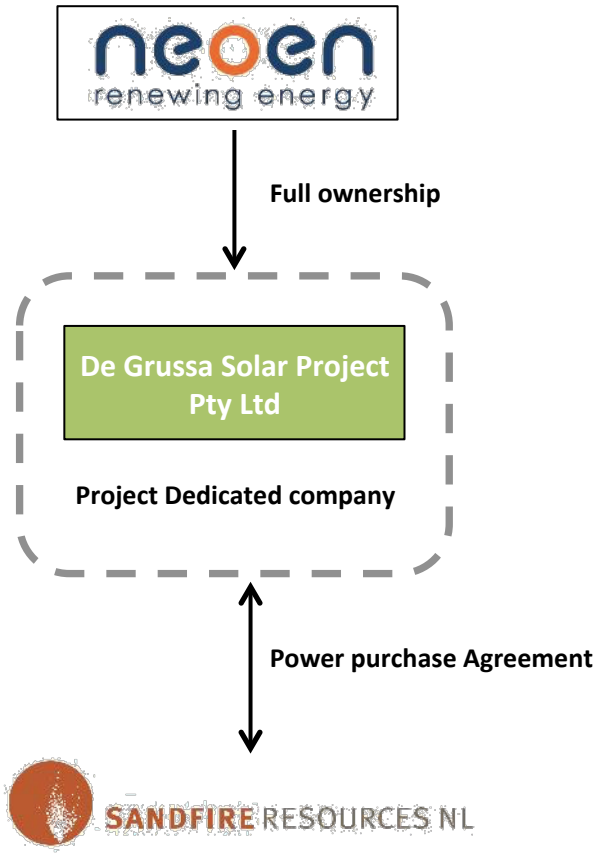
Project structuring: Independent Power Producer



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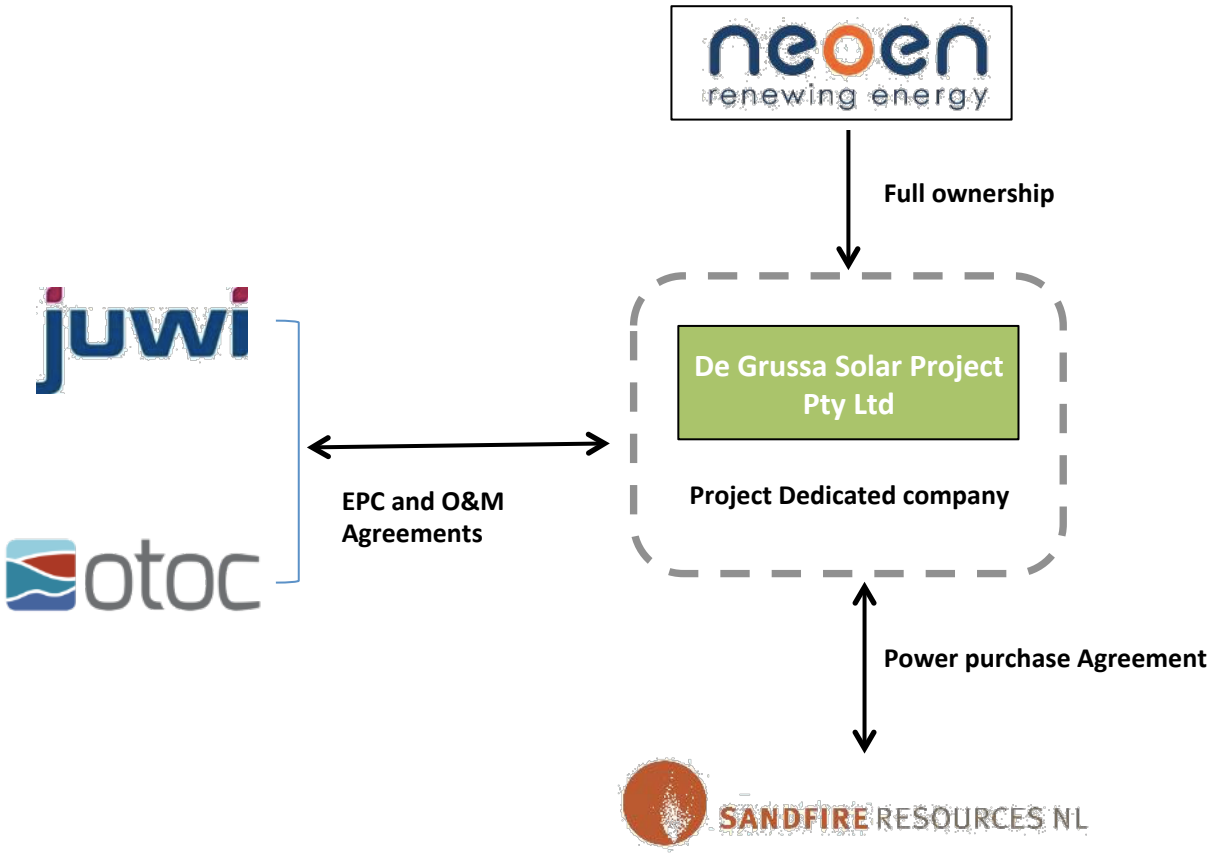

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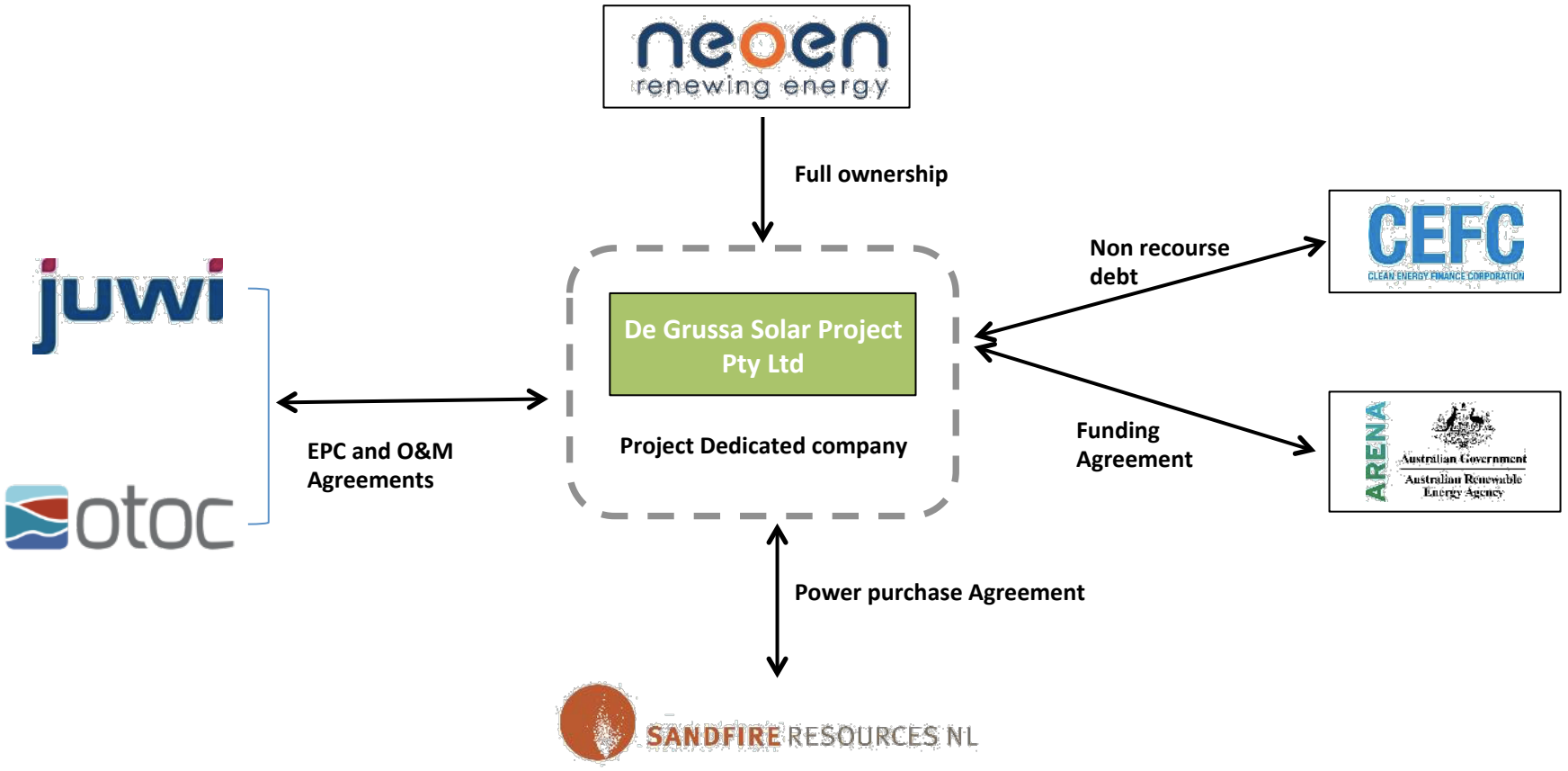

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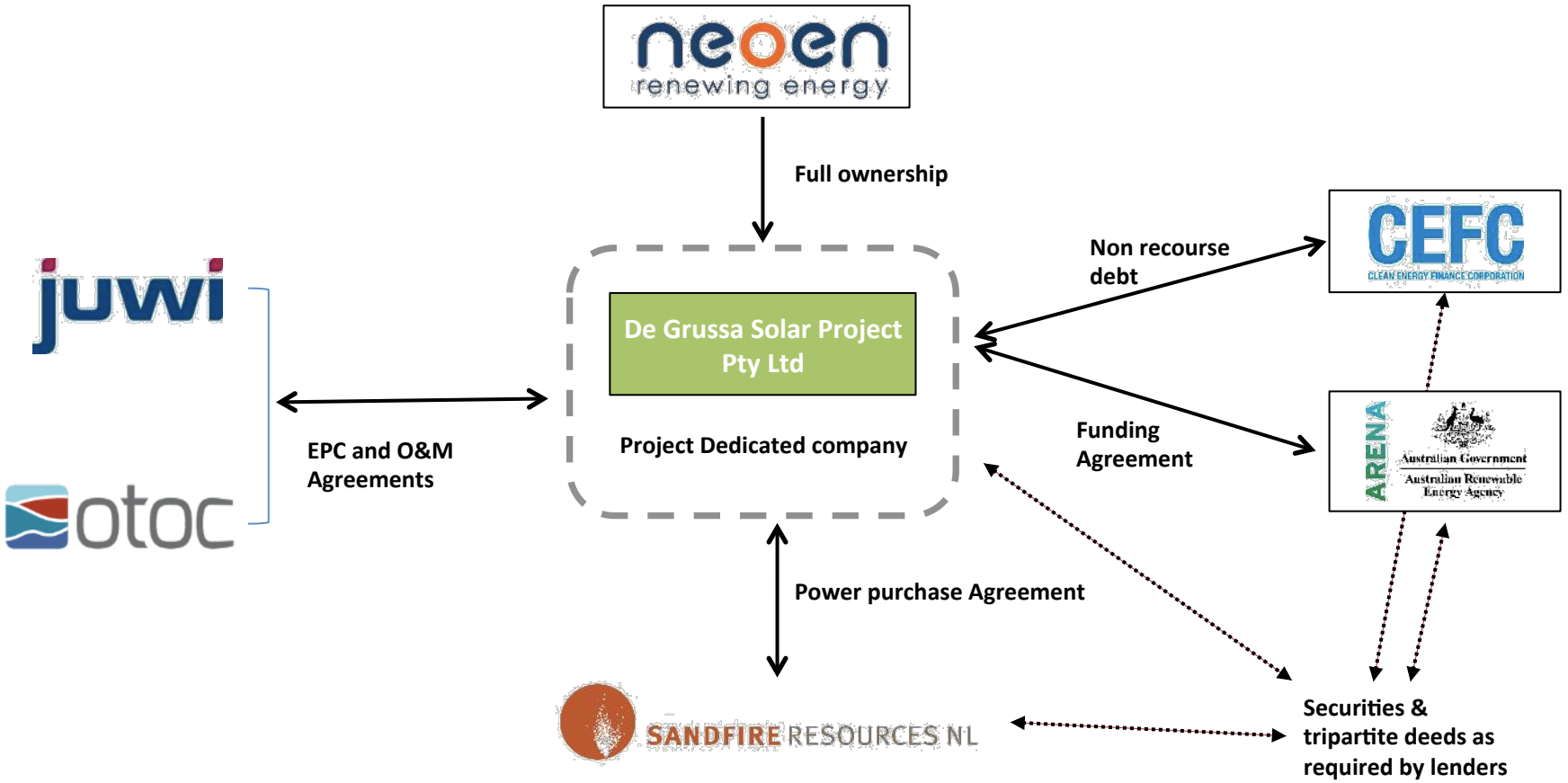

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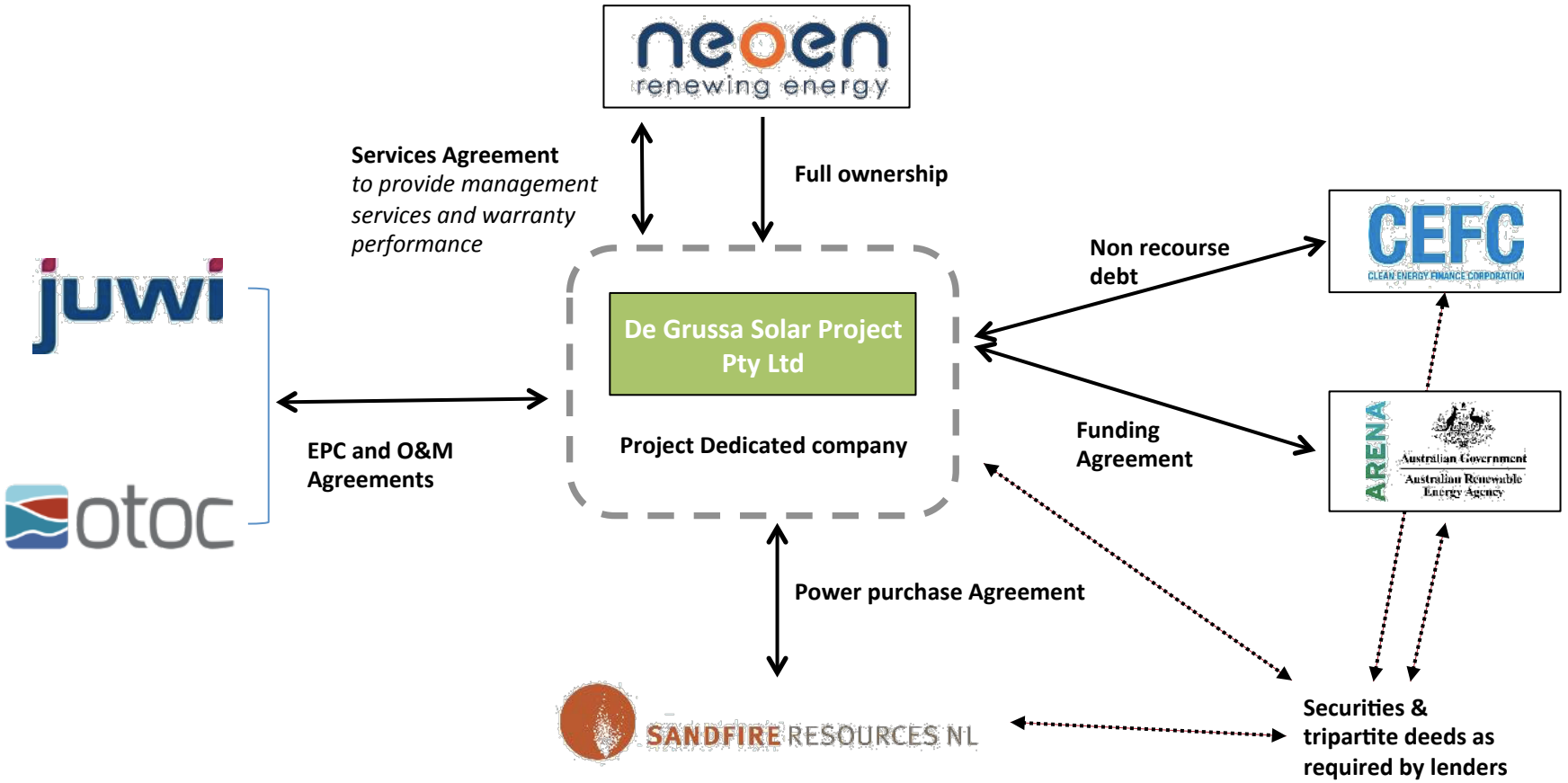

IPP approach to renewable projects

- **De Grussa PV project is structured as an Independent Power Producer (IPP)**
- **Sandfire's commitment is about long-term energy purchase**
- **Neoen commits to the long-term efficient operation**
  - » Neoen provides the equity and secures long-term debt to ensure competitive price
  - » Neoen commits to energy quality and stability on the long term
  - » Neoen manages the construction and operation contract
- **Governments purchase solar energy as low as 60USD/MWh**
  - » With tax benefits and force majeure risk
  - » With 20Y+ purchase contract
  - » Without storage or intermittency challenge (no battery)
- **Energy for offgrid short-term solution is more expensive!**

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Conclusion

- **De Grussa PV project is the largest off-grid photovoltaic project with storage**

- **These types of projects must overcome a number of challenges**
  - Compliance with mining standards
  - Stability of the electricity generation to avoid impact on the mining operations or risks of downtimes
  - Long term operation of the PV plant to actually deliver electricity
  - Bankability requirement in order to raise project finance
  - Adaptation to the mine lifetime
  - Competitiveness with current low price of diesel electricity generation

- **Given such constraints, the IPP solution allows to offer long term warranties for the mines…**

- **…but projects ultimately depends on the motivation of miners such as Sandfire**

Thank you for your attention

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