

# How to identify and develop key enabling technologies for future products

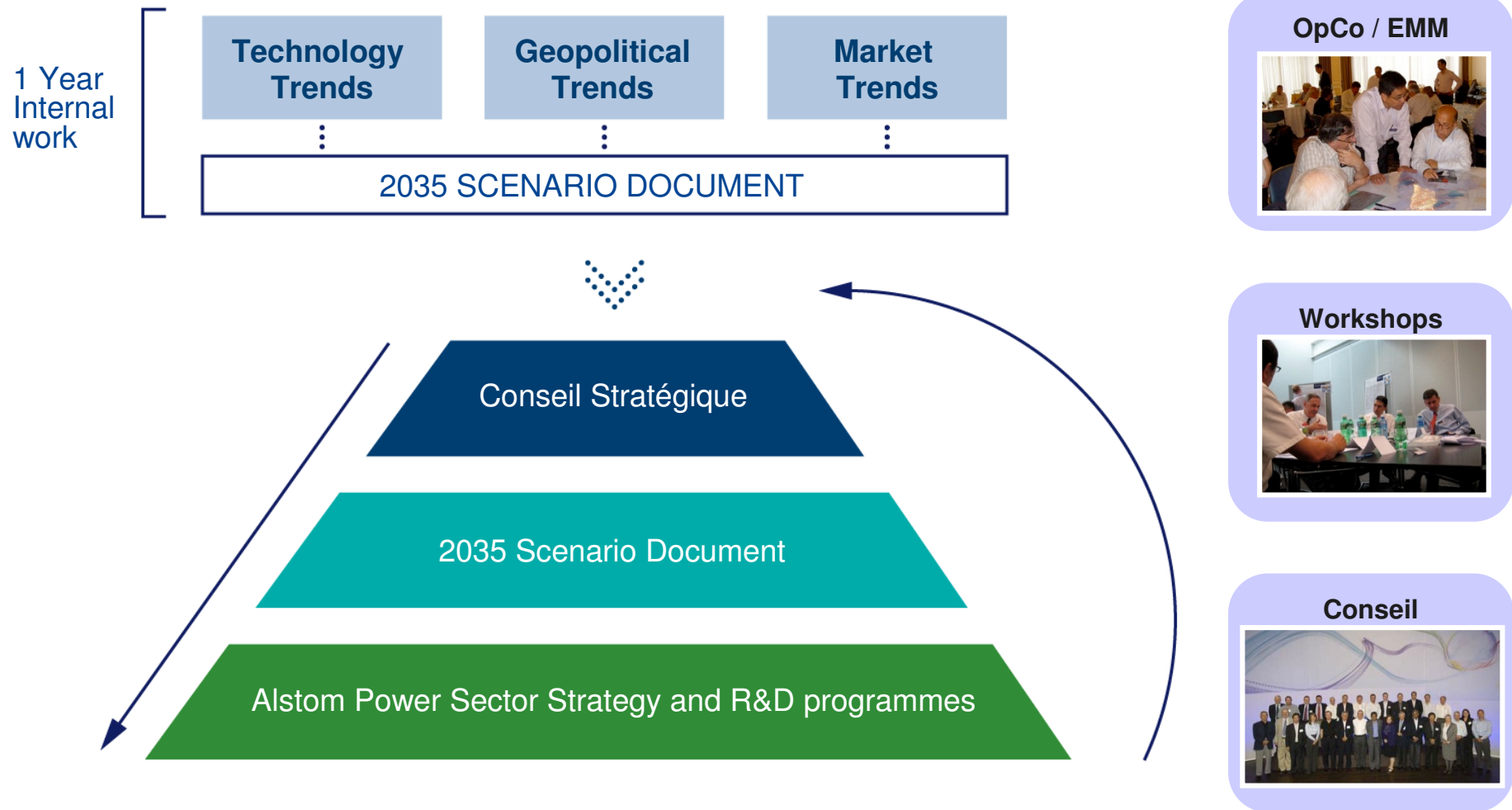
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Alstom Switzerland Ltd.

Nov 2011, Energieforschungskonferenz, Bern

# Vision 2035: Alstom Power Process



## Process



# Scenarios



## What are they?

- Not predictions of the future
- However, consistent bundles of assumptions concerning future development, trends - mapping out the future horizon of how things could be
- **Scenarios** have emerged as a key instrument for corporations to develop and implement visions and mid- to long-term strategies
  - e.g. Shell, Siemens, Volkswagen, IBM and others



## Why use them?

- The number of factors influencing business environment and strategic decision is very high and change is rapid – clarity needed for strategy
- Serve as mind-opener and the process as an “open radar” to become aware of Blind Spots

## Alstom's Vision 2035

- Develop **scenarios for the power sector for 2035**
- Monitor and understand **disruptive trends**

Anticipate future developments to adapt our business today to the challenges of tomorrow!

# Scenario Overview



## No Return

In 2035, fossil fuels and conventional grid structures still dominate the power sector. Capped subsidies and the lack of a global climate agreement have throttled the development of renewables. Power generation is carbon intensive and there are dramatic climate change impacts

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## The Asian Dragons

In 2035, Asian-based companies dominate global power markets, driven by being both a coal/CCS market leader and a nuclear market leader. While the West struggles to agree on a clear energy strategy, Asia pushes nuclear and deploys CCS as a key transition technology towards renewables

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## The Gas Wave

A global gas glut grips the power industry. Gas is regarded as the most promising solution to simultaneously guarantee medium term supply security and reach climate change goals substituting coal. Gas provides the flexibility needed to support renewables in the future; a balanced energy portfolio

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## All Renewables

Public and private demand for reliable clean power triggers the restructuring of power systems, so that in 2035, fossil fuels and nuclear are largely replaced by large- and small-scale renewables

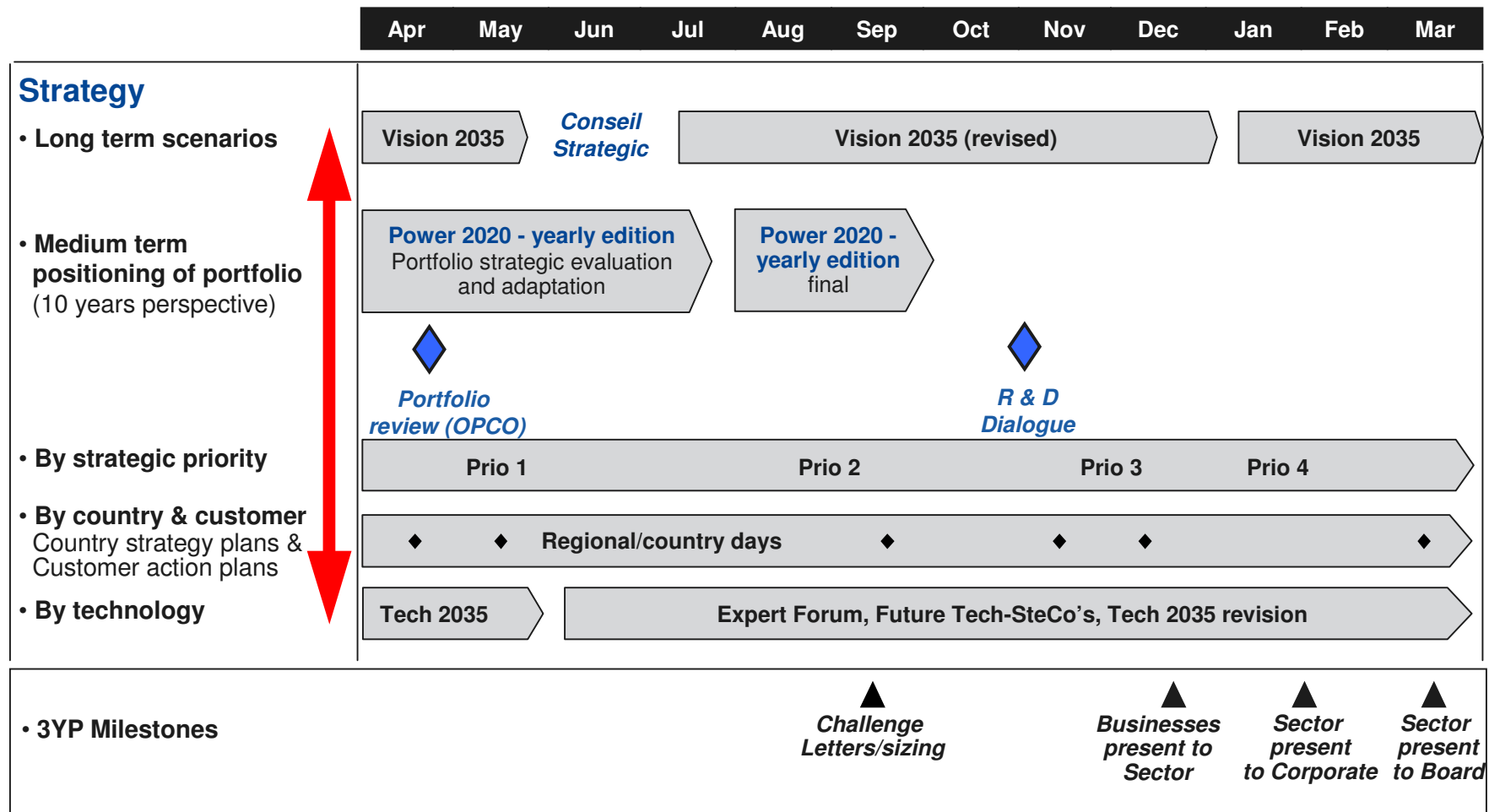
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## The 2°C World

Maps out one possible layout of the power sector that would get the world on a path to safely achieve a 2°C global warming limit by 2100

# Strategic planning process and technology/Product Portfolio management



Provide technical input into the strategy process

- **What is Tech 2035?**

- Tech 2035 is a collection & summary of technical reports & presentations

- **What is Tech 2035 used for?**

- Tech 2035 serves as input into the strategy process of Alstom Power

- **Who is behind Tech 2035?**

- Tech 2035 is expected to represent the opinion of the technical community of Alstom Power

- **Who writes the reports?**

- R&D Execution of the defined technology domains and Future Technology Execution

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1. Global Technology Trends
  2. Breakthrough/Disruptive Technologies/Trends
  3. Competitor Analysis/Profiling (R&D, technology development)
  4. Recommendations for (future) R&D in Alstom

## Technical Input into the Strategy Process

# Future technology identification initiates/supports Alstom's entering in new markets

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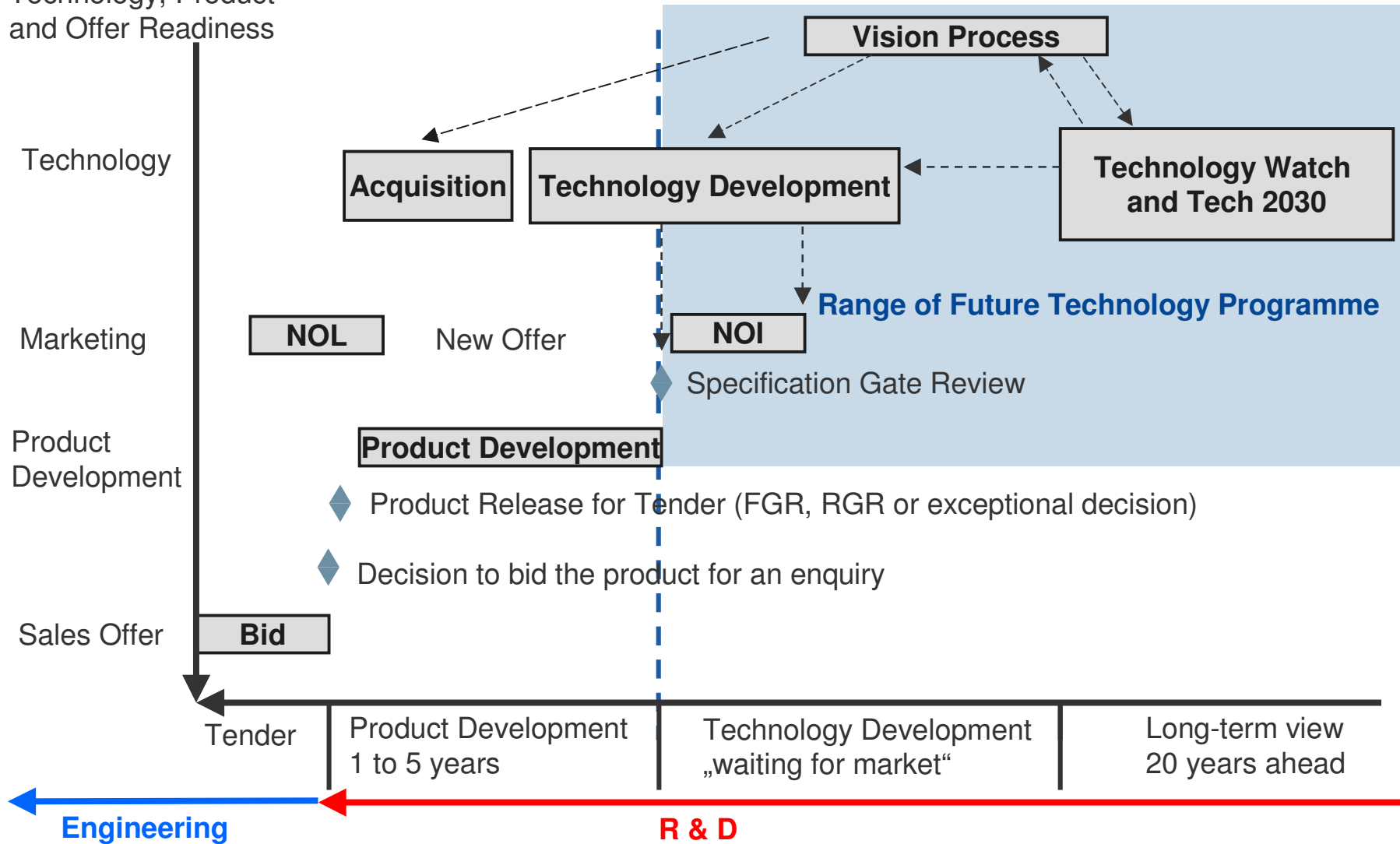
## Future technology identification initiatives lead to successful portfolio expansion in renewable energy technologies

- Wind energy - acquisition of Ecotecnia
- Marine renewables
  - Tidal Power: licencing cooperation agreement with Clean Current Power Systems)
  - Wave Power: acquisition of 40% equity share in AWS Ocean Energy)
- Solar Power
  - Solar thermal: business partnership agreement with Brightsource; 55MUSD investment of Alstom

# Future Technology Programme as part of R&D process



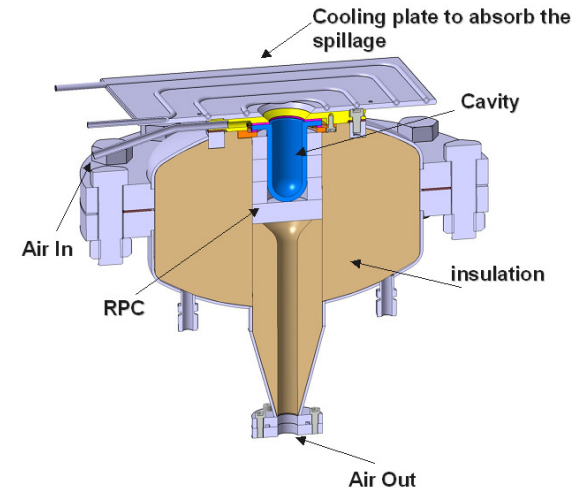
Technology, Product  
and Offer Readiness



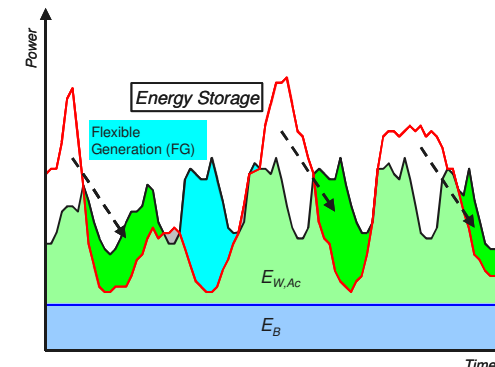


## Portfolio

- New and advanced technologies for renewable energy
- Advanced energy storage and system integration of renewable energy sources
- Reduced energy and cost efficient carbon capture technologies
- Advanced manufacturing methods
- New materials
- Advanced Diagnostics for smart control and condition monitoring systems
- Future nuclear concepts for GenIV fission and fusion
- Evaluation of carbon utilisation options as alternative to storage
- Innovative plant cycles
- Fuel Cells
- Tech2035 and technology evaluation studies
- Technology scouting and M&A support



**Solar thermal: design of pressurized volumetric air receiver for CSP (cooperation with ETHZ)**



**Modelling of grid integration of renewables with energy storage systems**

[www.power.alstom.com](http://www.power.alstom.com)

# Future Technology Programme

## Vision, Mission and Responsibilities

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### **Mission:**

“Identify and develop key enabling technologies for future products of ALSTOM Power. Cover existing product lines, as well as new fields of technology with high market potential or disruptive potential.”

### **Tasks and responsibilities:**

- Define and identify potential breakthrough technologies as part of the long term vision process (Vision 2035).
- Provide technology input to Businesses for future products.
- Technology watch (e.g. Exinno).
- Strengthen the image of a forward looking, sustainable technology company.
- Support the recruitment of world-class technical specialists.
- Build long-term technology cooperation's with leading universities worldwide.

**Vision: Ensure a new baseline of innovative ideas and core skills to develop the next generation of technologies and products.**