

Potencial del I+D+i español en el área de las tecnologías energéticas: la oferta y la demanda

Mauro Villanueva Monzón
Director Desarrollo Tecnológico

14 de septiembre de 2010

Gamesa R&D value chain

TECHNOLOGICAL DEVELOPMENT PROJECTS (TDP)

- o Develop & mature technologies up to a system/subsystem model or prototype demonstration in a relevant environment (TRL 6)
- o **Prioritized by TD project selection (TDSELECT) process**

PRODUCT DEVELOPMENT PROJECTS (PDP)

- o **WFS** (Wind Farm Systems)
- o **G5X** Wind turbine (850 kW nominal power)
- o **G8X** Wind turbine (2 MW nominal power)
- o **G10X** Wind turbine (4.5-4 MW nominal power)
- o **Offshore** Wind turbine
- o Others in the way....

C&I PROJECTS

- o **Master worldwide manufacturing process**

PRODUCT REACHES MARKET

↓ CoE

TECHNOLOGY MANAGEMENT

Gamesa



CHANGE IN WIND ENERGY R&D PARADIGM

- **Until now, wind energy R&D has been focused on a (progressively larger in MW) product consolidation.**
- **Process were basically “workshop type”, although this will continue to be the case for some years for those new process specifically for offshore (substructures, electric lines, etc.)**
- **Also, certain technological exhaustion is perceived (i.e. more sophisticated CFD's)**
- **FOCUS MUST NOW BE PLACED IN PROCESS R&D, SEEKING:**
 - **COST COMPETIVENESS**
 - **BETTER COMPETITIVE BARRIERS (THAN PRODUCT BASED ONLY).**
- **Wind energy sector must follow the path followed by other mass production sectors, such as the car industry, in terms of process automation, logistic supply chain, O&M, commissioning, etc.**

Wind Energy cost reduction



Source: Unspecified consulting firm.

WIND ENERGY R&D UNTIL 2009

PRODUCT HORIZONTAL TECHNOLOGIES:
Rotor, control, loads, power electronics, etc.

PROCESS HORIZONTAL TECH.: Little, mostly workshop type

ONSHORE SPECIFIC
TECHNOLOGIES:
Complex terrain,
Split blade, etc.

OFFSHORE
SPECIFIC
TECHNOLOGIES
Substructures,
Marinization,
etc.

**Area is indicative of
R&D investment**

WIND ENERGY R&D AFTER 2009

PRODUCT HORIZONTAL TECHNOLOGIES :

Rotor, control, light structures, grid connection,
O&M oriented design

PROCESS HORIZONTAL TECHNOLOGIES :

In-works: Automated manufacturing of components (blades, towers?)
Ex-works: Supply Chain Management, transport, construction, O&M

ONSHORE SPECIFIC TECHNOLOGIES:

Noise, extreme conditions, etc.

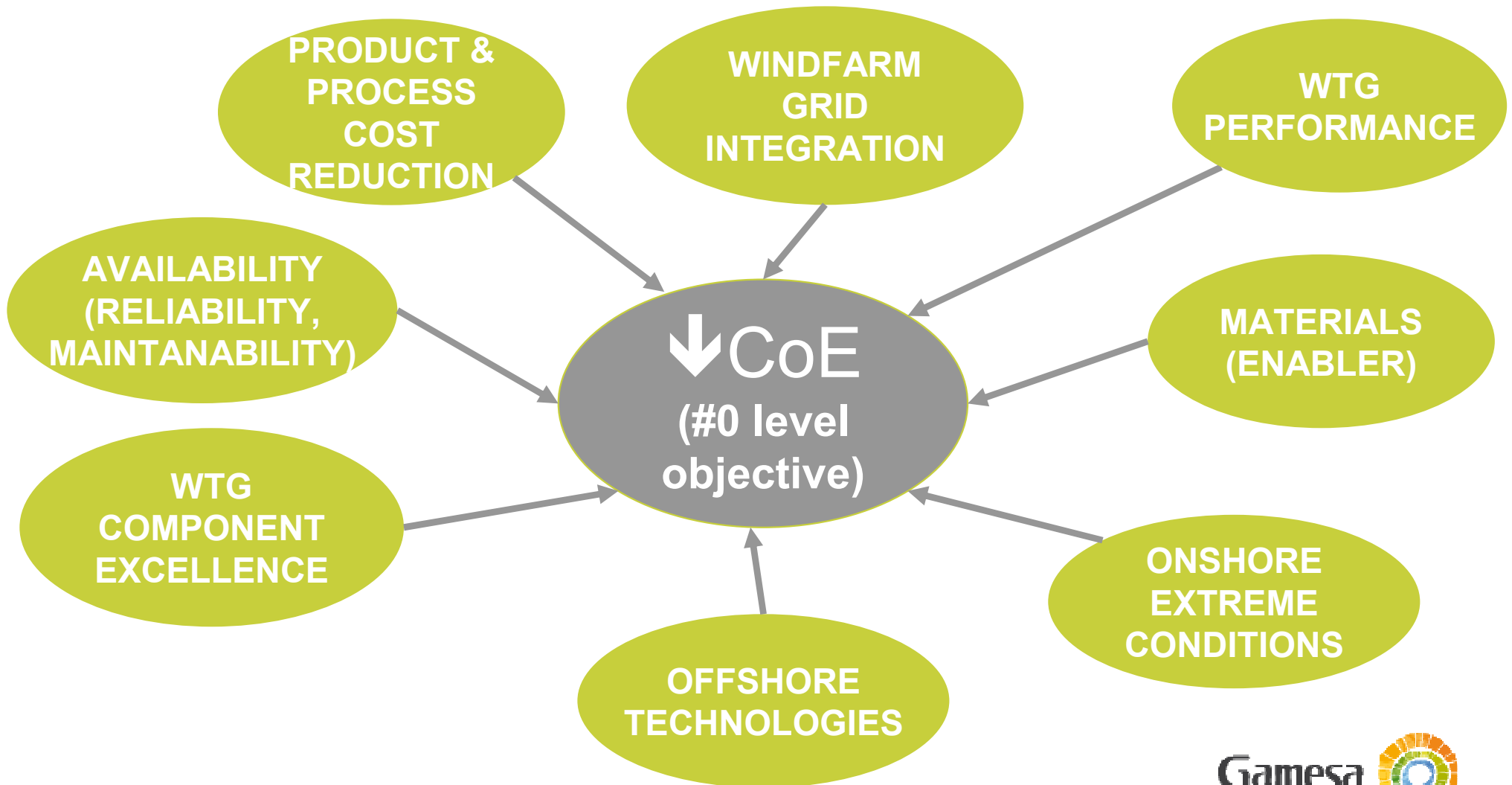
OFFSHORE SPECIFIC TECHNOLOGIES

Substructures,
Health Monitoring,
etc.

Area is indicative of
R&D investment



TECHNOLOGY DEVELOPMENT DESIGN DRIVERS (#1 level objectives)



BASIC REFERENCE

o TIMEFRAME:

- PD IS "TODAY & TOMORROW".
- TD IS "THE DAY AFTER TOMORROW"

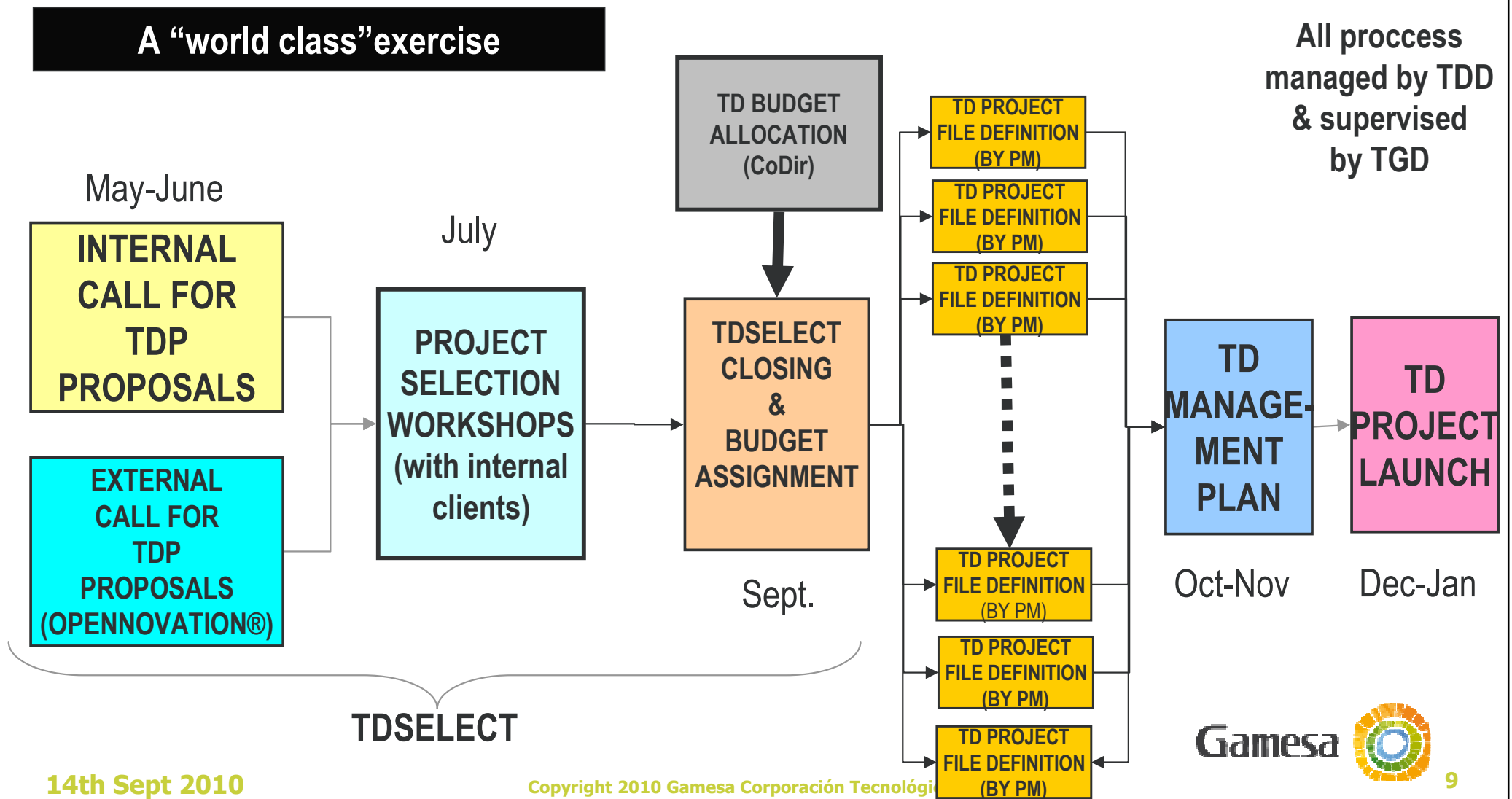
o BREAKTHROUGH TD PROJECT PHILOSOPHY: COULD THIS TECHNOLOGY PROVIDE A COMPETITIVE EDGE TO OUR PRODUCTS? (FIND, BITE, CHEW)

- NO: THROW IT AWAY (SPIT). IT IS NOT A FAILURE.
- YES (SWALLOW, DIGEST & REGURGITATE): DEVELOP IT UP TO TRL 6 AND PASS IT ON TO PD.

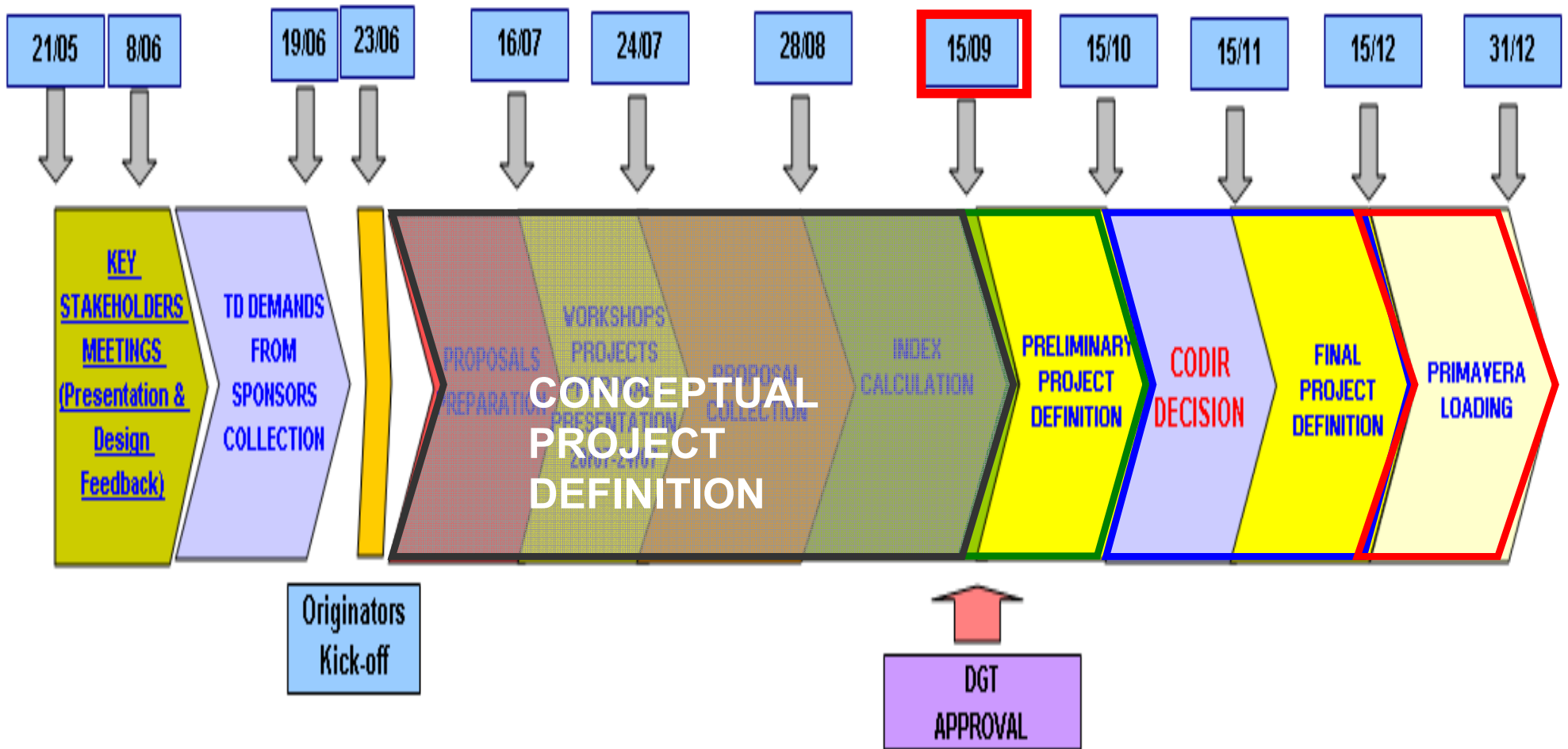


TDSELECT PROCESS

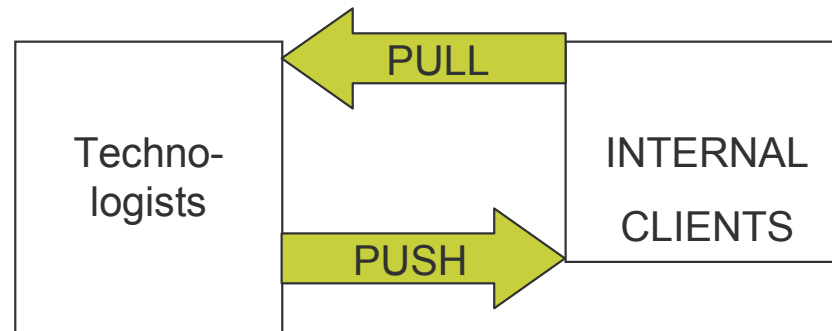
A "world class" exercise



TDSELECT PROCESS 2010



Optimal balance push / pull proposals (I)



1) PULL:

- o TD needs & priorities expressed by internal clients:
 - Product managers & Marketing.
 - Operations (Manufacturing) managers.
 - Service (O&M) managers.
- o Ideas coming up on daily job but no available time, tools and budget to develop.
- o Easier to “be bought”, but not necessarily.

Optimal balance push / pull proposals (II)

2) PUSH:

- o There should also be breakthrough TD project proposals from technologists (knowledge).
- o These are the most breakthrough / risky proposals, but where greater competitive advantage might result.
- o More difficult to be “bought” by internal clients, but it is a “must” that an internal client backs the proposal.

RESULTS PURSUED BY TD PROJECTS

- o PRODUCT & PROCESS COST REDUCTION:
 - Technologies to directly reduce product & process cost.
 - Incorporated when product / operations process managers decides so (i.e. product / process change or immediately).
- o PRODUCT PERFORMANCE IMPROVEMENT
 - Technologies to increase product competitiveness.
 - Incorporated when product managers decides so (i.e. product / process change or immediately).
- o ENGINEERING PRODUCTIVITY
 - Technologies to increase engineering personnel productivity (windfarm siting, loads validation, etc.)
 - Incorporated when KPR managers decides so (mostly immediately).
- o TECHNOLOGY LEADERSHIP
 - Very heterogenous. Aimed at presenting GAMESA as world technology leader.
 - Incorporated when product managers decides so (i.e. product / process change or immediately). Very heterogenous.

THE COMPANY SEEKS RESULTS FROM TD INVESTMENT

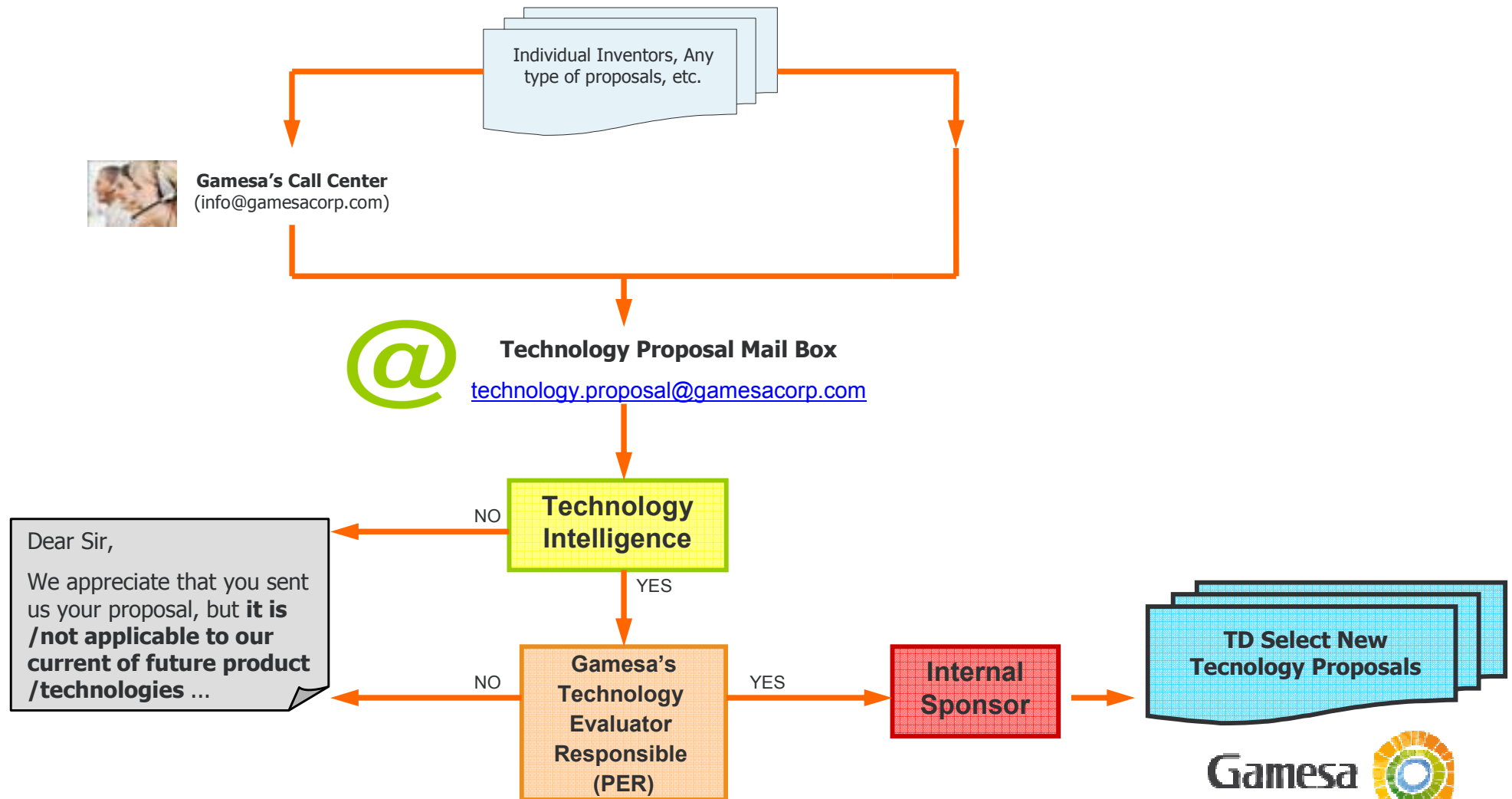
	G-5X	G-8X	G-10X	WFS
Material saving (K€/WTG)				
Process cost saving (K€/WTG)				
Non-quality cost saving (K€/WTG)				
Transportation cost saving (K€/WTG)				
Installation cost saving (K€/WTG)				
Subcontracting cost saving (K€/WTG)				
Repair and maintenance cost saving (K€/WTG)				
Engineering cost saving (total hours/year)				
Annual increase of AEP (%)				
Increasing of annual availability (%)				
% of WTG where the development will be applied the next 5 years				

**Anhelamos propuestas tecnológicas externas,
especialmente en temas breakthrough**

EXTERNAL TECHNOLOGY PROPOSALS

- o “Technology Proposals” mailbox (technology.proposal@gamesacorp.com) has been created to process all **external** technological proposals received by any Gamesa’s personnel (i.e. Call Center, Gamesa China, President, anybody,...).
- o NOTE: Gamesa’s “non technology” personnel originated proposals (outside of TDSELECT formal process) should also be sent here.
- o These will be evaluated by the “Technology Intelligence” project, that will decide the applicability and interest of these proposals for Gamesa’s current TD priorities and product roadmaps.

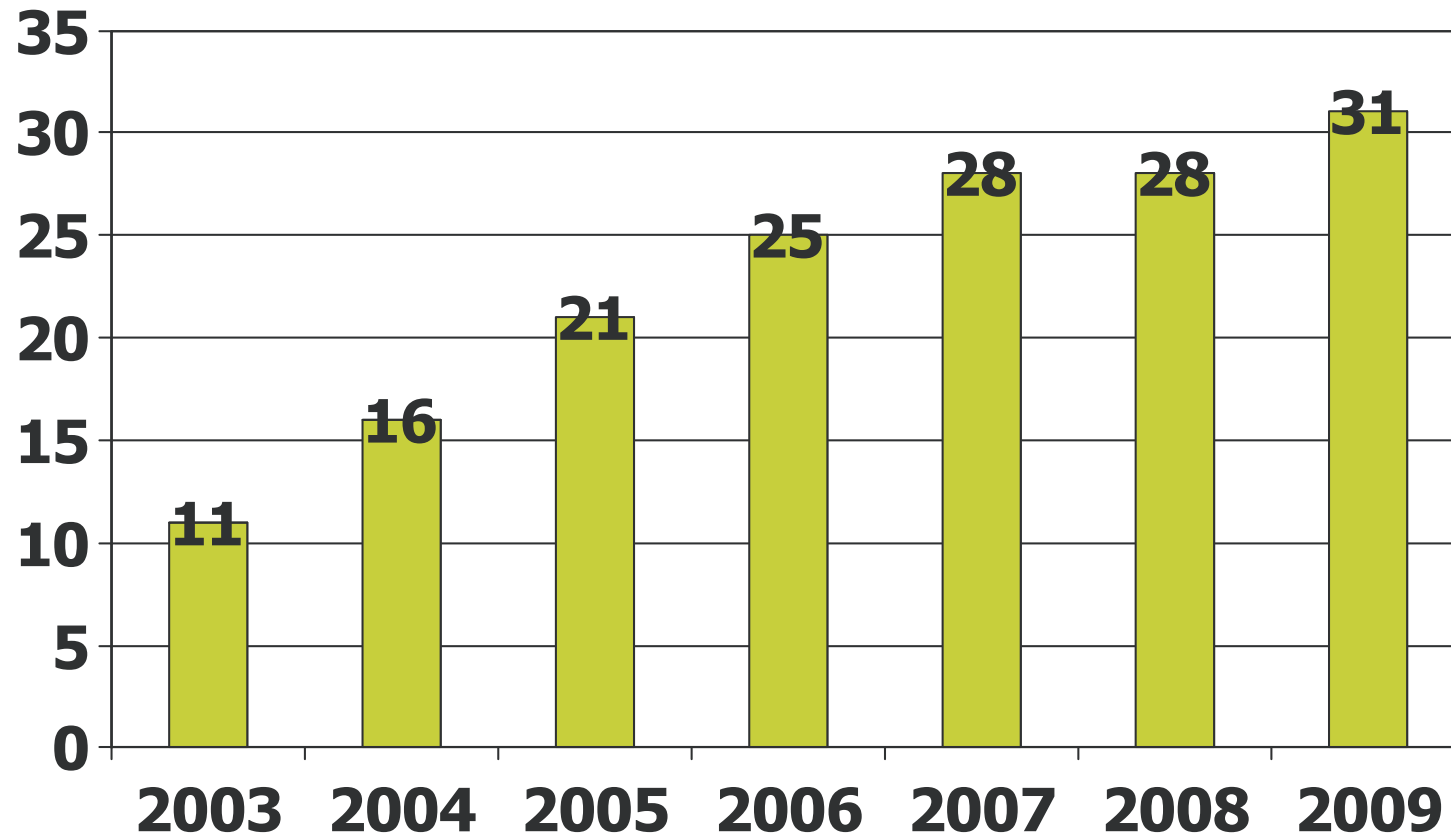
Procedure



**No sólo demandamos tecnología....también
disponemos de una oferta**

Evolution of patent application per year

■ New Application per year



Gamesa



2009 Portfolio

- o 419 patents in the portfolio
 - Included application published or not published and granted - in all countries.

- o 151 family patents
 - Each one is a new invention

- o 72 granted family patents
 - Full rights & legal protection

Top patent submitters 2009



Estadísticas de la Propiedad In

Tabla I.1.1.a

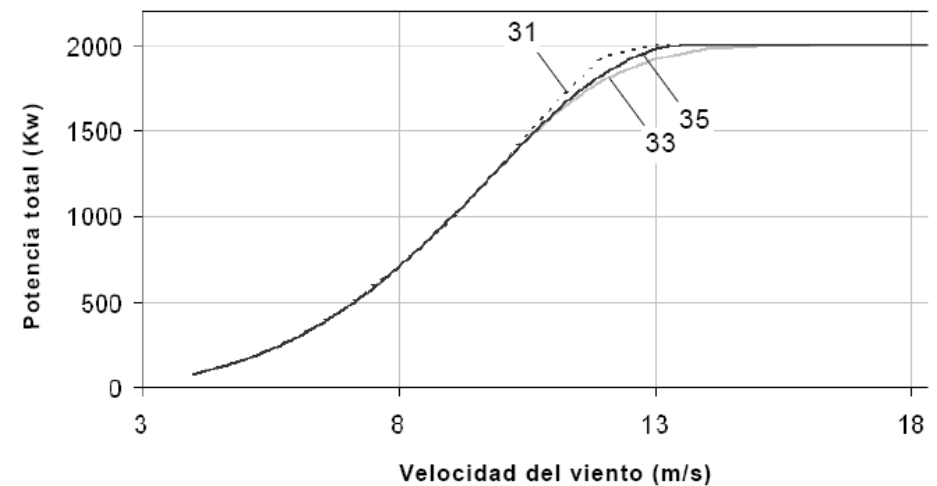
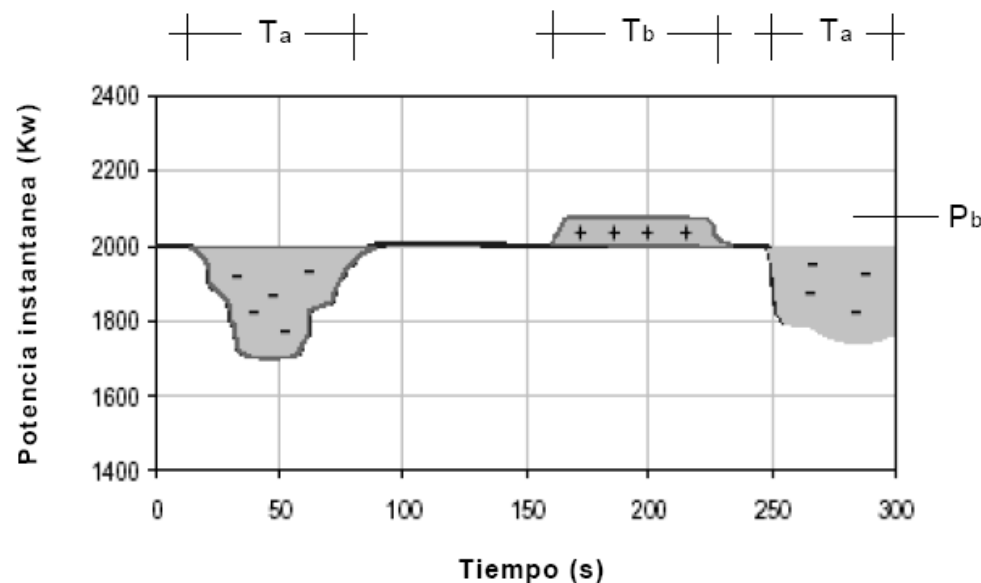
LISTA DE LOS 50 MAYORES SOLICIT


Nº Orden	Residentes
1	Consejo Superior Investigaciones Científicas (CSIC)
2	BSH Electrodomésticos España S.A.
3	Universidad Politécnica de Madrid
4	Airbus Operations, S.L.
5	Universitat Politecnica de Catalunya
6	Vodafone España, S.A.U.
7	Muñoz Saiz, Manuel
8	Telefónica, S.A.
9	Abengoa Solar Solar New Technologies S.A.
10	Porras Vila, Francisco Javier
11	Gamesa Innovation & Technology S.L.

Patent example

Corner improvement patent. Inventors: Juan Carlos García Andujar, Jose M^a López Rubio, Angel Martín da Silva y Mario Jimenez Lago

Reduce the energy losses increasing the nominal power along determinate time periods





The present document, its content, its annexes and/or amendments (the "Document") has been drawn up by GAMESA CORPORACIÓN TECNOLÓGICA, S.A. ("Gamesa") for information purposes only, and contains private and confidential information regarding Gamesa and its subsidiaries (the "Company"), directed exclusively to its addressee. Therefore it must not be disclosed, published or distributed, partially or totally, without the prior written consent of Gamesa, and in any case expressly indicating the fact that Gamesa is the owner of all the intellectual property. All the content of the Document, whether it is texts, images, brands, trademarks, combination of colours or any other element, its structure and design, the selection and way of presenting the information, are protected by intellectual and industrial property rights owned by Gamesa, that the addressee of the Document must respect. In particular (notwithstanding the general confidentiality obligation), the addressee shall not reproduce (except for private use), copy, transform, distribute or publish to any other third party, any of the information, totally or partially.

Thank you for your attention

