Integrating Green Energy into a diesel driven grid

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Overview of the presentation

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Business case

Producing electricity with a single diesel generating sets running at constant speed has many drawbacks that a properly engineered Green Energy Integrating System would alleviate, an thus, reduce the burden on environmental issues and free funds to pay for its own implementation

Every needed piece of equipment to implement such a control system is in use and long time operating in industrial applications; they only require to be repackaged to optimize both diesel engine and green energy sources in an integrated system

This apply for most of the 500 isolated communities in Northern Canada and Alaska where electricity is produced with diesel engines and even more sites of industrial, military and commercial settlements scattered in Northern North America wilderness

It also apply to hundred of thousand of islands and isolated settlements all around the world

A diesel grid owner/operator whishing to make his system state of the art will trigger a true business opportunity

To convince them it might be necessary to build a full size running demonstrator unit in order for them to do their own testing and to train their personnel

Our plan was to be ready by 2005; one year after we first started our wind energy system in Rouyn-Noranda

Our plan had to be modified but the business opportunity is still there, waiting for anyone whishing to address it

Our Business development strategy

For technology packaging

- Find a host region having climate conditions comparable to the Northern North American Market
- Use local engineering and manufacturing facilities to design and build wind turbine generators
- Reach an agreement with the local university to ascertain that the new knowledge will be shared and to have access to University and Cegep facilities

- Except for the generator, the speed increaser, brakes and bearings, the wind turbine was designed, built and tested locally
- A wind test site was established on university premises were the prototype was installed
- A copy of all the prototype drawings was handled to the university

For funding

- Create a new company eligible to Research and Development Governments funding
- Raise 2 400 000 $ of private and Canadian and Québec Governments programs funds for the prototype
- Refinance the development of a first commercial unit and replace the prototype by a full size demonstrator unit

- The private funding for the prototype was provided by a U.S. company at the cost for us that we had to sell our company
- The U.S. company decided they did not need us anymore after the prototype was successful and put their money into another prototype in Michigan
- By the end of January 2010 the patent we obtained on the technology became public and we can now resume our activities with new partners

- Next step would be to find industrial partners, raise funding to market the technologies, design and build a first wind turbine commercial unit

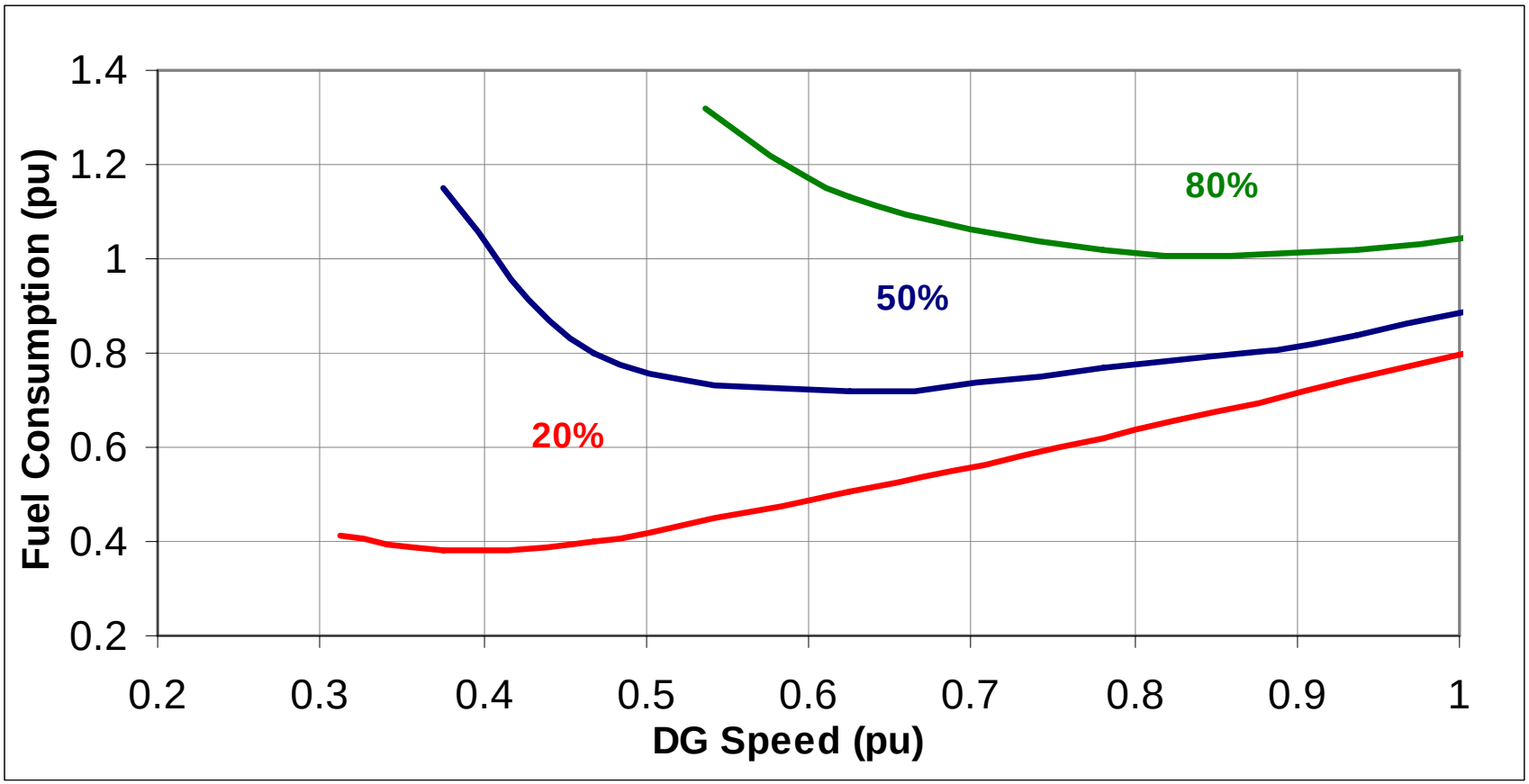
- Electronic controllers are operational as they are; they only need to be reviewed and optimized

Our System Implementation Strategy

Integrating Green Energy in a diesel driven grid reduce the load on site gensets; a net efficiency loss since diesel engine are less efficient at low load

This is avoided when the diesel is permitted to run at variable speed (shaft torque regulated instead of generator speed regulated)

This is a typical diesel engine fuel consumption respectively at 20%, 50% and 80% of full load



- This shows that in constant speed mode of operation, at 20 % load diesels burn 80 % of the fuel needed for 80 % load

- It shows also that reducing diesel speed to 40 % of full speed will save 50 % of fuel at 20 % load

- Our approach is a modular add-on to existing installation. It consist in :
  - A main control panel housing all the integration electronics and the connection to grid
  - A series of half panels dedicated to each energy sources (diesel,wind, solar, battery, flywheel, super-capacitor) to control each individually

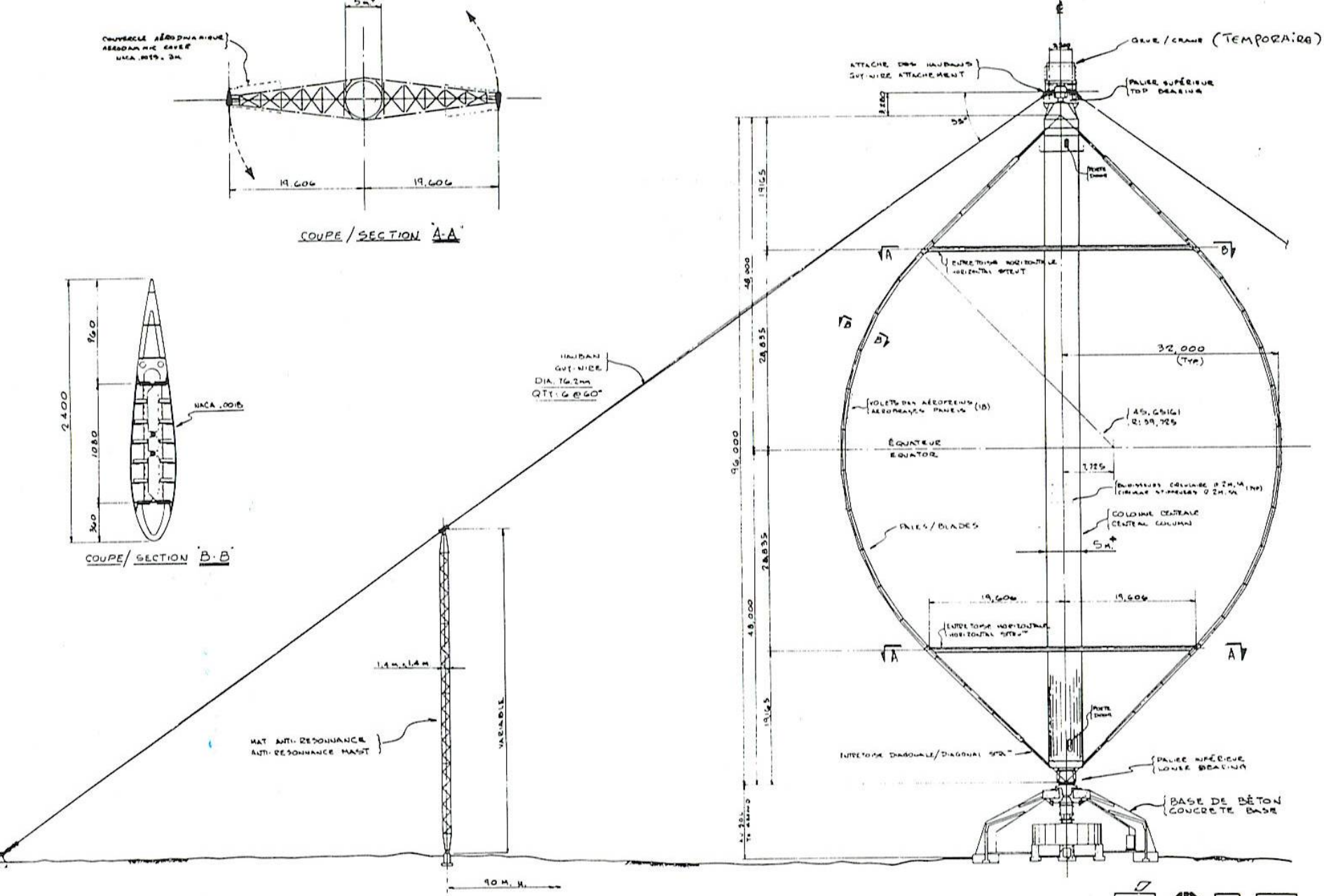
Our Implementation Strategy is stepwise :

- Analyse grid owners operating data and see the economics of adding a diesel controller to the grid
- In a second step, add a short term battery bank to improve grid power quality
- In third and/or forth step add wind and solar energy when appropriate

- The electronic controllers developed on our specification by a reputable company are operational and commercially available.
- They can be readily implemented for all energy sources
- Practically it means adding control panels to existing facilities

- The wind turbine tested in Rouyn-Noranda has to be redesigned to fully implement the findings on the experiment and to be optimized as a commercial product

- Our findings show that this wind turbine will offer a better return on investment to any other commercially available wind turbines on the market for the application it is designed for



AMÉNAGEMENT GÉNÉRAL - ÉLÉVATION

GENERAL LAYOUT - ELEVATION

ÉOLE

To conclude

- It is only a matter of time before wee see a real and important market opportunity in Integrating Green Energy to Diesel Driven Grids
- When that happen many jobs will be created and one way for the region to benefit from it would be to continue what we started
- To take full advantage of it, if a new entity is created, it needs to be rooted in the region