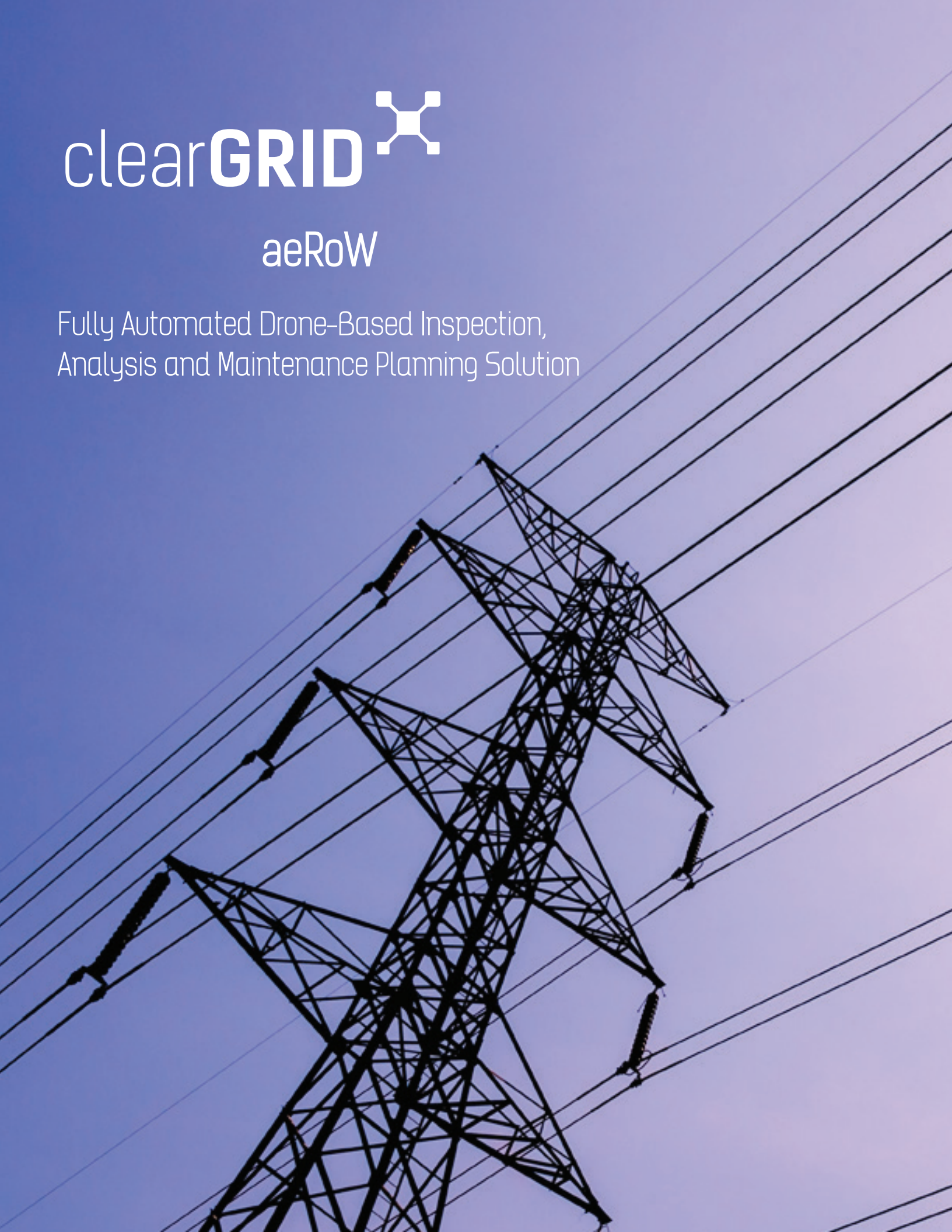


clear**GRID** 

aeRoW

Fully Automated Drone-Based Inspection,
Analysis and Maintenance Planning Solution





Introduction

Diligent and efficient maintenance of right-of-way infrastructure is critical to the power industry. Canadian operators spend billions of dollars per year on maintenance, yet the industry still suffers from unplanned outages, safety issues, and fires. clearGRID is meeting that challenge head on, by bringing the best technology for powerline right-of-way management to the Canadian market.

Our right-of-way management solution captures vegetation & component information, identifies critical asset conditions and addresses them in a maintenance plan optimized for your business objectives.

clearGRID offers a comprehensive, turn-key solution, that is easy to implement, cost effective, and quick to show results. Our technology stack combines long distance drone-based automated inspection using LiDAR, UV, IR, Multispectral & High Res Image & Video. Fully automated analysis, optimization, and maintenance planning software, deliver a new era of cost savings and operational efficiencies to Canadian electrical operators.

clearGRID moves Operators from to reactive to proactive operations

Our goal is to help operators move beyond manual inspection methods, ad-hoc analysis, and spreadsheet planning, by integrating best in class technology foreach component of inspection,analysis and maintenance planning:

1

Field data capture

Best long distance drones in the world & full stack sensors

2

Cloud Analytics

World class software ACCA (Automatic Corridor Clearance Analysis)

3

Cloud Optimization

Optimization engine automatically creates prioritized plan

4

Cloud Storage & Sharing

Create, store & share prioritized maintenance plan

5

Integration

Generate work orders and custom integration into existing practices

Field data capture is the **first** priority in order to truly optimize work, and the first step is to enable **frequent intelligence gathering** at a low enough cost that all ROW's can be inspected on a 3 year cycle at very high resolution,thereby identifying and addressing grid problems in an optimized plan. clearGRID long distance drones enable a low cost, ultra high resolution solution getting operators ahead of the curve. Vegetation and component information are collected automatically: we capture LiDAR (approx 300pts/m²), high-resolution imagery, video,multispectral, UV, IR and thermal.

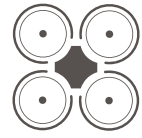
Secondly, most companies are already drowning in data, so unless management and analysis of that data is automated, it is potentially useless. The solution is not more data. clearGRID addresses this head on with ACCA (**Automatic Corridor Clearance Analysis**) and 3-D modeling of the right-of-way. We identify "critical" asset conditions and provide visualization of hotspots in easy to view digital form, accessible to all groups in the company, anytime, anywhere. Our cloud service solves the data management & access problems that prevent companies from getting value from their data collection efforts. We eliminate issues around where inspection images are stored, where LiDAR models are located, and who can access them.

Third, to truly drive a new paradigm of preventative maintenance, a solution must provide a robust methodology to **optimize** timing, importance, risk and other business constraints that are unique and customizable for each operator. We then create work plans, laying out where and when to deploy people and equipment, to get the highest return on capital, allowing the operator to convey that information quickly and easily to field staff.

clearGRID's technology stack

clearGRID's automated inspection, analysis and planning product is based on the use of Unmanned Aerial Vehicles (UAV), automated analysis of the collected data and automated generation of optimized maintenance plans, in a modern easy to use interface.

UAVs



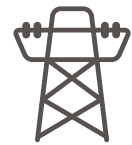
Sensors LiDAR / IMU / Cameras

- Proprietary Integration
- Lightweight
- Optimized for UAV use



Multi Sensor Acquisition

Assets to inspect



CLOUD

Environment 3D
Modelling

Automatic
Analysis

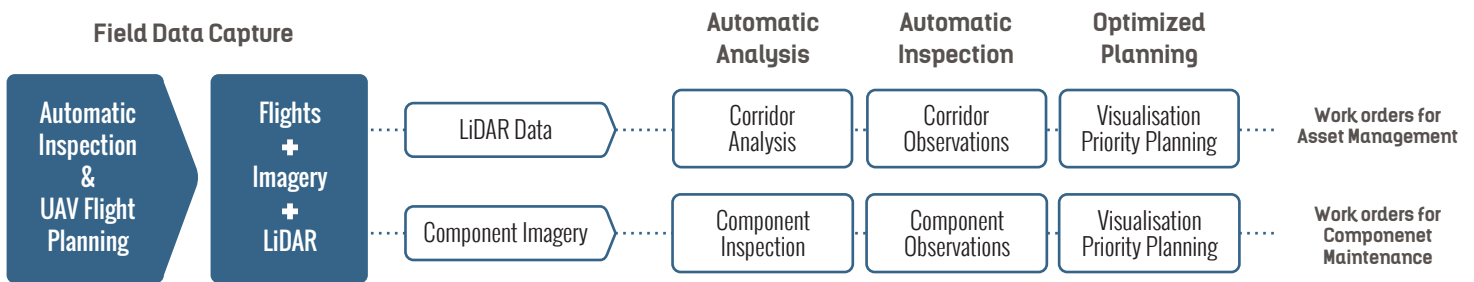
Reporting /
Maintenance Plans

CLOUD

Cloud-based Analysis and Planning

Maintenance Plans



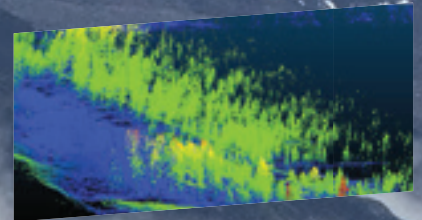


Here's how it works

1. **Field Data Capture:** We capture infrastructure and ROW information from drone based inspections combining LiDAR, imagery and video, at a lower cost than has ever been possible.
2. **Next Generation Analytics:** We build a 3-D model of the infrastructure and ROW to identify "hot spots" or areas require maintenance.
3. **Prioritized Maintenance Plan:** Our software prioritizes "hotspots", ranking and grouping them into work plans based the clients business objectives, ensuring resources are focused on the highest return projects.
4. **Delivery** of plans and work orders

First pilot projects launching Spring 2016 - what is included:

clearGRID's Automated Inspection, Analysis and Planning Solution is being launched this spring 2016. Pilot projects of 50-100km of line will be selected by the electrical operator with input from clearGRID. Pilots include:



Automated Drone Survey

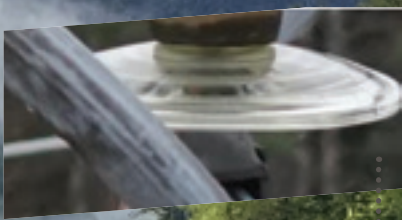
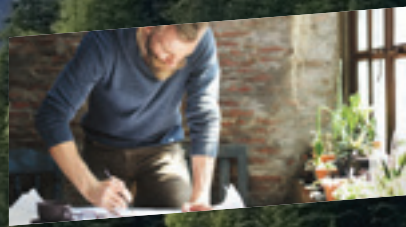
Capturing the raw data from the field - LiDAR + Images + Video.

Digitizing of the physical ROW into an object model

Understanding exact location, condition and form of each infrastructure component - vegetation, pylons, line, components.

Vegetation analysis

Automatic analysis to identify the hotspots and priorities for vegetation management.



Component analysis

Automatic analysis to identify hotspots and priorities for component maintenance and replacement.

Prioritization and optimization of work plans

Provides the insight for maintenance to be directed to where it can yield highest return, and ensures legal and regulatory compliance.

Managing and storing the information on condition, observations, hotspots and plans

to ensure the data is accessible and usable for actual maintenance work execution, future analysis and reporting.

Pilot Project Details

Project Deliverables to Client:

- An evaluation of automated inspection & maintenance practices by combining long distance drones, multi sensors, automated clearance analysis, optimization software to generate planning models and automatically generated work orders for maintenance.
- A visual representation of the hotspots (defined by critical asset conditions) and the prioritization of these.
- Understanding of the technical capabilities of clearGRID versus other solutions.
- Understanding of the costing factors to implement clearGRID for ROW management.
- Develop the basis for a long term inspection & maintenance planning contract with clearGRID
- Opportunity to communicate operative needs to Transport Canada for the planning of further drone regulation (achieved through the negotiations with Transport Canada during the permission application process)

Project Schedule:

(These are tentative timeline - subject to change)

- Kickoff - pilot contract signed, write letter of support for Transport Canada
- *ongoing* – TRANSPORT CANADA: area, scope, type of flight (operations planning of pilot). Discussion with TRANSPORT CANADA started already in Nov 2015, requires continuous tight co-operation and collaboration.
- 30 days: submit detailed project plan TRANSPORT CANADA: targeted inspection and analysis types
- (Subject to Transport Canada's timeline) - Receive Approval from Transport Canada
- Mobilization (30 days)
- Field work (2-3 days) - Field Work, Flights
- 30 days - Post processing of data
- 1 day - Presentation / Delivery of Maintenance Plan and recommendations, Project Review & Analysis of data applicability for different use cases

*Schedules are subject to TRANSPORT CANADA decision-making schedules.



Roles and responsibilities

clearGRID shall:

Allocate a project manager for managing the project

Negotiate with TRANSPORT CANADA on the safety matters for Beyond Line Of Sight (BLOS) flights and apply required TRANSPORT CANADA permissions and waivers for the pilot

Supply and operate drones and sensors (LiDAR, cameras, video) according to TRANSPORT CANADA permit

Post process the data

Analyze LiDAR data automatically for critical conditions

Provide access to cloud software for analyzing the results

Final presentation of results

Operator shall:

Allocate a project manager for managing the project

Support clearGRID in negotiations with TRANSPORT CANADA as required e.g. providing a letter of support to TRANSPORT CANADA stating the importance of application of drones in improving power distribution reliability and safety

Propose an area for the pilot project

Provide network data (location of poles and lines) in the selected area

Observe the pilot flights



clearGRID's

*solution is a full technology stack
combining long distance drone-
based automated inspection, LiDAR
& multiple sensors, fully automated
analysis and optimization, and
maintenance planning software*

clearGRID: Cutting through the noise in maintenance planning

Characteristics	Field Visual Inspection Companies	Helicopter Visual Inspection Companies	Helicopter LiDAR Inspection Companies	clearGRID	Competitive Advantages
Inspection Delivery Time	Years	Months	Months	Weeks	Automated VS. visual analysis
Production Cost	Very High	Medium	High	Low	<ul style="list-style-type: none"> • UAV VS. helicopter cost • Automated VS. manual analysis
Actionable Plans	No	No	No	Yes	Only solution including maintenance plans generation
Accuracy of results	Varying	Varying	Varying	Consistent	Automatic analysis is not subject to visual interpretation
Reactiveness	Very High	Medium	Low	High	Availability of UAV fleets (lower CAPEX than helicopters)
Throughput	Very Low	Medium	Low	High	Very scalable UAV fleets (lower CAPEX requirements)



About Us

clearGRID is a division of a leading drone based service provider to heavy industry in Western Canada.

We help our clients harness the power of drones to create more efficient operations. We believe that drones will lead next iteration of efficiency gains for industry and are committed to leading that change.

This fall, clearGRID is launching an automated inspection and maintenance planning solution specifically developed for electrical transmission and distribution operators. This product has produced excellent results for European grid operators and we are now introducing it in Canada.

clearGRID combines drone, sensors (LiDAR), and software specifically designed for powerline right of way management to significantly reduce inspection and maintenance costs. Some clients have seen up to a 70% reduction in vegetation maintenance costs.

clearGRID's turn-key service allows grid owners/operators to fully harness the power drones make their operations more efficient, focusing on optimal planning of maintenance and vegetation management work for grid ROW's.

Contact clearGRID Solutions to schedule a face-to-face meeting or a Pilot Project.

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