THE FUTURE OF ENERGY & UTILITIES

Connected. Intelligent. Distributed. Accelerating.

For more than a quarter-century, Jim Carroll has helped utility executives, energy companies, infrastructure firms and technology leaders understand how the energy system is changing - and what leadership must do about it.

The future of energy was never about a bigger smokestack. It was always about the panel on your roof and the battery in your garage.

BEFORE “SMART GRID” WAS A BUZZWORD.

The ideas arrived years before the labels.

In the late 1990s and early 2000s, Jim was already speaking to utilities about electronic bill presentment, interval metering, distributed generation, telecom networks, blackout resilience, smart fields, bio-energy and the digitally empowered customer.

Distributed generation was the Internet of power: more nodes, more intelligence, more resilience, and less dependence on a single path.

THE EARLY ENERGY & UTILITY CLIENT MAP.

Digital utility. Deregulation. Smart metering. Grid communications. Resilience.

01

NOVA SCOTIA POWER

1999 annual dinner: future trends and utility change.

02

CONSUMERS / CMS ENERGY

1999-2000: electronic bill presentment, web self-service and deregulated customer communication.

03

SASKPOWER + SASKENERGY

2001-2004: leadership development, e-business, distribution and digital customer care.

04

NRECA

2002 annual meeting: invest through the downturn in distributed generation and community technology.

05

TAMPA BAY WATER

2003: long-term infrastructure, technology forecasting and economic planning.

06

BC HYDRO

2006 Power Smart Excellence Awards: permanent conservation culture and customer innovation.

THE IDEAS ARRIVED BEFORE THE LABELS DID.

Three ideas from the early 2000s still define the modern energy system.

01

DISTRIBUTED GENERATION = THE INTERN

Micro-turbines, solar, wind and local co-generation create a decentralized architecture with more resilience and more local control.

02

INTERVAL METERS = THE EMPOWERED CU

Real-time usage and rate information turns a passive customer into an active manager of consumption and cost.

03

COMPLEXITY PARTNERS

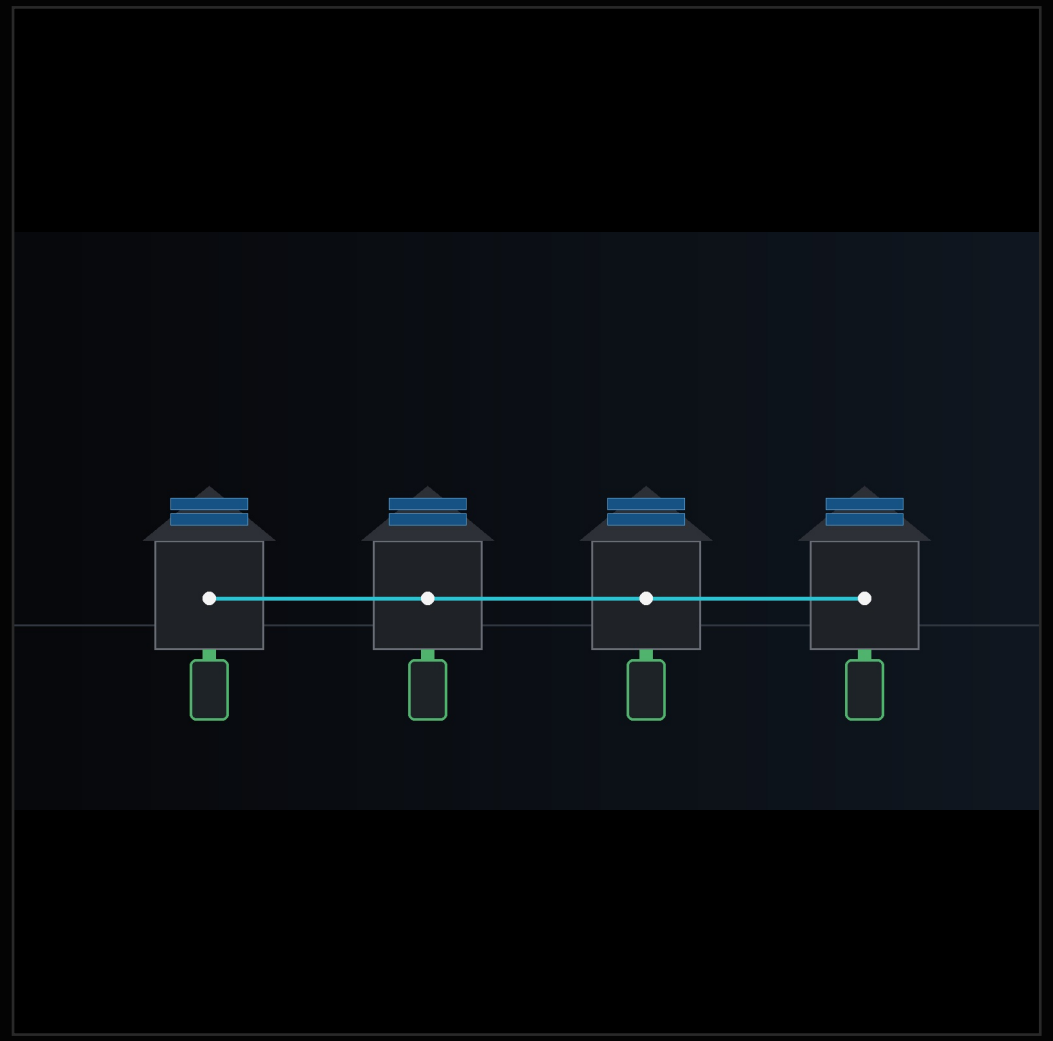
The convergence of telecom, software and grid hardware means no single utility can master the future alone.

SMART FIELDS. BIOGAS. GRID COMMUNICATIONS.

Energy innovation was already becoming digital, distributed and data-rich.

Shell's Smart Fields program targeted production improvement and operating-cost reduction through real-time reservoir surveillance. At the same time, Jim was using European centralized biogas systems as an example of farm waste becoming electricity, and speaking about SCADA, utility telecom and remote energy management.

The energy system was beginning to behave less like a pipeline and more like a network.



MORE THAN A QUARTER-CENTURY INSIDE ENERGY CHANGE.

The technology changed. The structural direction remained remarkably consistent.

1999-03

DIGITAL UTILITY

Online billing, deregulation, interval metering and distributed generation.

2003-07

RESILIENCE + SMART INFRASTF

Blackout preparedness, SCADA, utility telecom, bio-energy and conservation.

2008-14

SMART GRID

Demand response, grid-aware devices, renewables and intelligent infrastructure.

2015-21

DISTRIBUTED ENERGY

Microgrids, batteries, EVs, prosumers, V2G and business-model disruption.

2022+

THE CAPACITY ECONOMY

AI data centers, speed-to-power, software-defined grids and storage acceleration.

THE OLD GRID WAS BUILT FOR A WORLD THAT NO LONGER EXISTS.

Six transitions define the future energy system.

01

CENTRALIZED → DISTRIBUTED

More local generation and distributed resources.

02

CARBON → ELECTRONS

Transport, buildings and industry electrify.

03

ONE-WAY → TWO-WAY

Power and data flow in both directions.

04

DUMB → INTELLIGENT

Sensing, software and AI reshape operations.

05

CONSUMER → PROSUMER

Customers produce, store and sell energy.

06

PRODUCT → SERVICE

Utilities deliver reliability, intelligence and services.

A SLOW INDUSTRY IN A FAST WORLD.

Demand and technology are accelerating faster than many systems built to respond.

AI data centers, electrification, grid modernization, extreme weather and new generation technologies are increasing pressure to make large decisions faster. Yet permitting, regulation, capital planning and physical infrastructure still move on very different clocks.

Good energy leaders do not manufacture certainty. They create clarity when certainty is impossible.

THE ENERGY TRANSITION IS ALSO A LEADERSHIP TRANSITION.

Technology matters. So do assumptions, decision speed, innovation discipline and readiness.

01

CHALLENGE EXPIRING ASSUMPTIONS

Generation economics, load forecasts and customer behaviour can change faster than legacy planning models.

02

MAKE BIG BETS WITH DISCIPLINE

Energy infrastructure requires conviction, scenario thinking and careful execution.

03

BUILD TECHNOLOGY FLUENCY

Executives need to understand AI, storage, DER and software enough to make strategic choices.

04

MOVE BEYOND PILOT THEATRE

Experiment safely, learn quickly and scale what creates measurable value.

05

PREPARE THE WORKFORCE

Modernization demands new combinations of engineering, software, analytics and field skills.

06

USE FORESIGHT AS A TOOL

Scenario thinking creates better options before a bottleneck becomes a crisis.

ONE KEYNOTE. MULTIPLE WAYS INTO THE FUTURE.

Directions are selected and blended around the audience and strategic issues.

01

THE FUTURE OF ENERGY & UTILITIES

Connected. Intelligent. Distributed. Accelerating.

02

ENERGY AT THE SPEED OF AI

Grid intelligence, forecasting, reliability and the new load economy.

03

THE INTELLIGENT GRID

From one-way infrastructure to a software-defined, two-way system.

04

POWERING 2036

Storage, renewables, nuclear, electrification and the next grid architecture.

05

THE RESILIENT UTILITY

Reliability, extreme weather, cybersecurity and adaptive infrastructure.

06

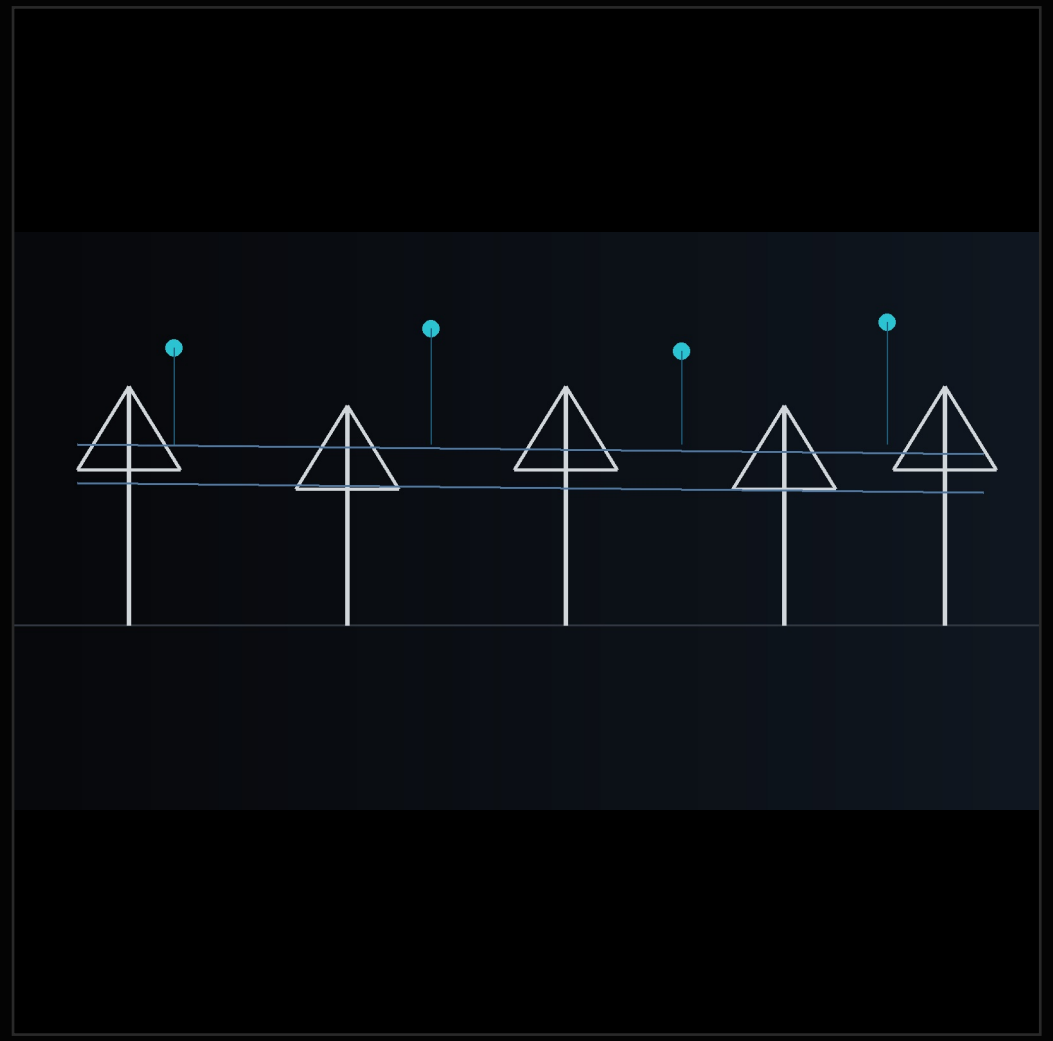
LEADERSHIP IN THE ACCELERATION GAP

How to lead when demand and technology move faster than the system.

THE GRID GETS A BRAIN AND A REVERSE GEAR.

The inherited architecture was one-way. The emerging architecture is interactive.

Smart meters, sensors, distributed resources, software and AI turn the grid into a more visible and adaptive system where both power and information move in multiple directions.



This is not simply an upgrade to the old grid. It is a different architecture.

AI IS BOTH THE LOAD AND THE SOLUTION.

The AI economy creates extraordinary new demand while AI becomes essential to operating the grid that must serve it.

Data centers compress utility timelines. Large loads can appear faster than traditional planning cycles. At the same time, AI improves forecasting, asset optimization, predictive maintenance, demand response and real-time grid operations.

The biggest grid problem may no longer be finding demand. It may be delivering power fast enough.

HYPERCONNECTED TRENDS CREATE HYPERCONNECTED OPPORTUNITIES

Homes, buildings, vehicles, storage and the grid increasingly become one connected system.

01

SMART METERS

Visibility and two-way communication.

02

CONNECTED HOMES

Thermostats, appliances and home energy systems respond to grid conditions.

03

SMART BUILDINGS

HVAC, storage, EV charging and energy management converge.

04

INDUSTRIAL IoT

Assets become measurable, predictive and more responsive.

05

GRID SOFTWARE

Data becomes an operating layer for balancing and optimization.

STORAGE CHANGES THE ECONOMICS UNDERNEATH YESTERDAY'S DECISIONS

Time becomes a design variable in the energy system.

01

SHIFT ENERGY IN TIME

Store when supply is abundant; use when value is higher.

02

MANAGE PEAKS

Storage can reduce peak demand and support capacity planning.

03

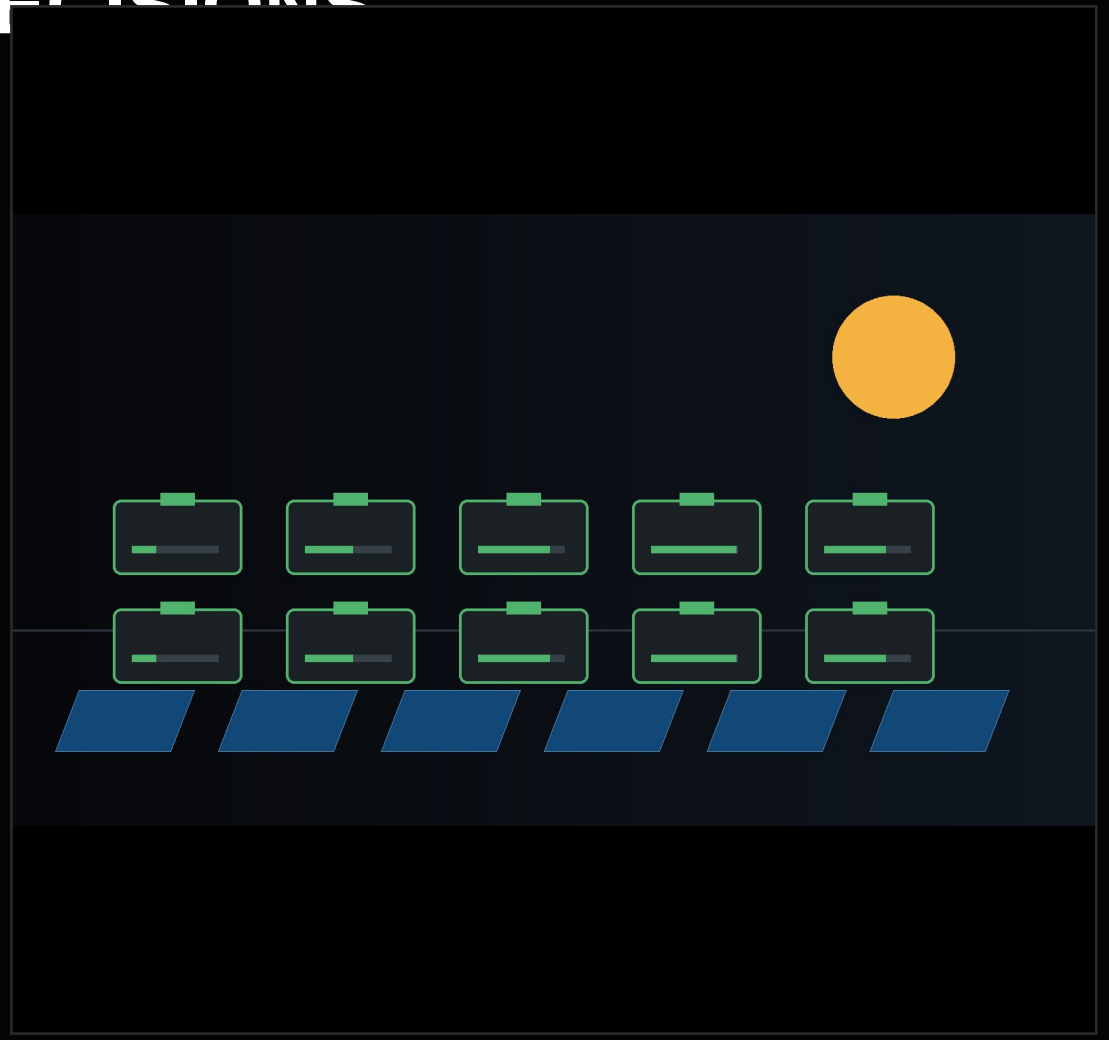
INTEGRATE RENEWABLES

Storage helps manage variable generation.

04

BUILD RESILIENCE

Local storage improves continuity for homes, facilities and microgrids.



YOU'VE GOT A GRID. I'VE GOT A GRID. LET'S CONNECT OUR GRIDS.

The customer becomes a participant in the energy system.

Rooftop generation, behind-the-meter storage, smart inverters, demand response and community microgrids create a world in which energy is increasingly produced and managed locally as well as centrally.

The future grid is not just bigger. It is more distributed.

THE CAR BECOMES PART OF THE GRID.

Electric vehicles are load, storage and infrastructure.

Charging infrastructure pulls utilities deeper into transportation planning. Vehicle-to-grid systems allow mobile batteries to become distributed grid assets. Electrification also expands into buildings and industrial systems, creating new load shapes and new opportunities for coordination.

Electrification rewrites the boundary between the utility industry and the industries it serves.

THE NEW BOTTLENECK IS SPEED-TO-POWER.

Economic development increasingly depends on how quickly reliable power can be delivered.

01
GENERATION
What can come online, how fast and at what cost?

02
TRANSMISSION
Can power reach the load that needs it?

03
INTERCONNECTION
Queues and studies can become strategic constraints.

04
PERMITTING
Institutional speed can lag far behind market demand.

05
EQUIPMENT
Transformers, switchgear and critical components can define schedules.

06
WORKFORCE
Engineering and field capacity can become the limiting resource.

RELIABILITY IS BECOMING AN ADAPTIVE CAPABILITY.

The resilient utility senses earlier, isolates faster, restores intelligently and learns continuously.

01

EXTREME WEATHER

Heat, storm, wildfire and flooding change asset assumptions.

02

CYBER-PHYSICAL RISK

Digital compromise can become physical service disruption.

03

AGING INFRASTRUCTURE

Condition visibility becomes more valuable as assets age.

04

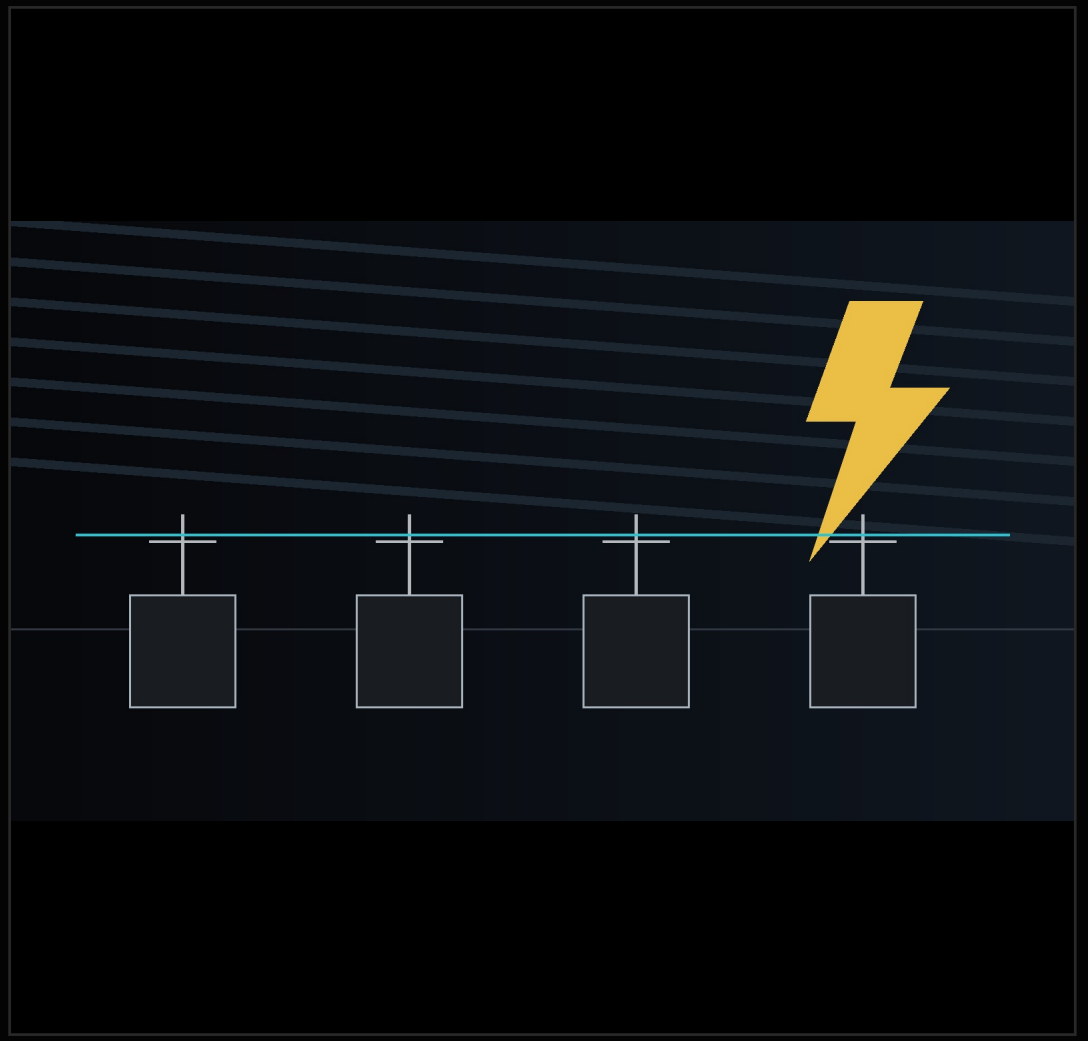
DISTRIBUTED RECOVERY

Microgrids and local resources can improve continuity.

05

PREDICTIVE MAINTENANCE

Analytics helps intervene before failure.



THE FUTURE IS NOT ONE TECHNOLOGY.

The system becomes more diverse, more local and more software-driven.

01

SOLAR + WIND

Fast scaling and changing economics.

02

NUCLEAR

Reliability and emerging reactor technologies remain strategically important.

03

NATURAL GAS

A continuing reliability and transition role in many markets.

04

STORAGE

A core infrastructure layer rather than a peripheral technology.

05

DISTRIBUTED RESOURCES

More capacity appears behind the meter and at the edge.

06

DEMAND MANAGEMENT

Flexible load becomes an increasingly important grid resource.

COULD UTILITIES BE MP3'D?

When customers gain new technology and new choices, entrenched business models become vulnerable.

Jim began challenging utility CEOs years ago with a deliberately uncomfortable analogy: what happens if an established industry defends the old model while customers, technology companies and new entrants build a different one?

The utility of the future may sell less energy - and more reliability, intelligence, flexibility and service.

I'VE BEEN MAKING THESE CALLS FOR YEARS.

The structure aged better than some of the timing.

2002

DISTRIBUTED GENERATION

Local power nodes improve resilience and change the architecture.

2012

GRID-AWARE APPLIANCES

Devices schedule themselves around grid conditions and pricing.

2015

THE MP3'D UTILITY

Distributed energy challenges the old business model.

2016

TWO-WAY INTELLIGENT GRID

The old grid gets a brain and a reverse gear.

2019

V2G + DISTRIBUTED ARCHITECTURE

Vehicles and local resources become part of the grid.

ITRON: CONNECTED, INTELLIGENT, LOCALIZED ENERGY.

A leadership discussion about the future utility model.

Jim addressed Itron's leadership team on microgrids, renewable acceleration, smart-city infrastructure and electric vehicles, while also exploring the shift from selling a product toward delivering a service.

The future utility is connected, intelligent and increasingly localized.

THE ENERGY AUTHORITY: WHEN THE FUTURE REDEFINES THE FUTURE.

A few hundred utility executives confronting multiple trends at once.

The keynote connected microgrids, renewable energy, vehicle-to-grid technology, intelligent infrastructure and the Internet of Things. The strategic message was straightforward: grasp the full scope of transformation and build an innovation mindset to keep pace.

The future is not one trend. It is what happens when many trends collide.

NOVA SCOTIA POWER: THE LONG VIEW MATTERS.

One of the early utility engagements in the archive.

> **The guest speaker, Jim Carroll, gave a highly entertaining, valuable and informative presentation. It was an evening well spent.**
>
> THOMAS HALL • CEO • NOVA SCOTIA POWER

ENERGY TRANSFORMATION IS EXECUTIVE WORK.

The strategic conversation extends well beyond the technology.

01

SIEMENS ENERGY

Global leadership meeting focused on disruption, transformation, renewables, storage and the accelerating energy system.

02

BLACK & VEATCH

CEO transformation work connecting energy, water, infrastructure and the need to disrupt before being disrupted.

03

CF INDUSTRIES

CEO-level global leadership meeting on reinvention, renewables and cultural change.

04

EXELON NUCLEAR

Intimate working session with nuclear engineers on the future and disruption of the sector.

05

ACCENTURE ENERGY SUMMIT

Global executives challenged to make big bold bets around the interconnected energy future.

06

NRECA

Rural cooperative leaders exploring local grids, distributed generation and changing customer relationships.

BUILT FROM YOUR ENERGY SYSTEM OUTWARD.

A municipal utility, co-op, generator and grid technology company do not face the same future.

25-50+

HOURS OF CUSTOM RESEARCH

Client calls, utility reports, market data, research papers, current news, agenda analysis and sector-specific examples.

For major sector keynotes Jim will often access 1,000-2,000 articles and reports through deep research services.

LISTEN → RESEARCH → MAP THE TRENDS → BUILD THE STORY → CONNECT THE ROOM → LEAVE A PLAYBOOK

ACROSS THE ENERGY ECOSYSTEM.

Generation, utilities, cooperatives, grid technology, infrastructure and industrial transition.

01

UTILITIES + GENERATION

BC Hydro • Nova Scotia Power • SaskPower • SaskEnergy • Consumers Energy / CMS Energy • Toronto Hydro • Exelon Nuclear • The Energy Authority • IMPA • OPG • PG&E • Hydro One • TransCanada • EPRI

02

COOPERATIVES + REGIONAL

NRECA • Rocky Mountain Electrical League • Utility Telecom Council

03

ENERGY TECH + SMART GRID

Itron • Siemens Energy • Schneider Electric • GE Lighting • Lennox • SAP Utilities

04

SUMMITS + SERVICES

DTN Energy • Accenture Global Energy Summit • SURGE Accelerator • Canadian Gas Association • CAPPA

05

ENGINEERING + INFRASTRUCTURE

Black & Veatch • FM Global • CCI Wireless • National Mining Association • Tampa Bay Water

06

INDUSTRIAL + TRANSITION

CF Industries • Noble Energy • Southern Gas Association • Shell E&P • major oil, gas and petrochemical audiences

WHAT DOES YOUR ENERGY LEADERSHIP TEAM NEED TO UNDERSTAND NEXT?

You do not need a finished brief before getting in touch.

01

AUDIENCE + SYSTEM

Utility? Co-op? Generator? Grid technology? Energy customer? Infrastructure?

02

KEYNOTE DIRECTION

Grid transformation, AI, capacity, storage, resilience, leadership or a blend.

03

CUSTOMIZATION

Stakeholder calls, market-specific research and integration with your strategic agenda.

04

PRACTICAL DETAILS

Timing, format, fees, travel, logistics and the best next step.

DIRECT ACCESS TO JIM

Jim is always pleased to jump on a quick exploratory Zoom or phone call to learn more about the audience, discuss the issues you want to address and talk through possible keynote directions.

CONTACT JIM

THINK BIG. START SMALL. LEARN FAST. SCALE WHAT WORKS.