# World Energy Engineering Congress

Washington DC

September 21-23, 2016

Kat Janowicz, MSME, MBA, CEM, LEED GA, ENV SP
President

Photo: Nitish Meena

# PLAN FOR RESILIENCE TO SAVE LIVES AND BUSINESSES

## ENERGY, WATER, AND ENVIRONMENTAL SUSTAINABILITY AND RESILIENCE

Businesses and governments need to take resiliency seriously and plan for it. If they don't, they are subject to litigation, not only revenue can be lost, but also lives.

To reduce and mitigate the risks we can build higher bridges and stronger infrastructure, adopt stormwater and energy management practices, and create backup plans. But when disasters happen we need to recover and adapt quickly.

## ENERGY GOALS AND PRIORITIES

- IMPROVE RESILIENCY
- REDUCE DEMAND
- ASSURE SUPPLY
- PROMOTE ENERGY CONSCIOUS CULTURE

3CTECH
*Profitable Sustainability*

## SEA LEVEL RISE AND FLODING BY 2050

EXPECTED SEA LEVEL RISE (SLR)
FROM **8 IN** IN 1992
TO ESTIMATED **1.24 FT**

COASTAL AREAS WILL FACE
**30 OR MORE DAYS**
OF FLOODING EACH YEAR
BECAUSE OF SLR

Source: NOAA

Photo: Bruno Camargo

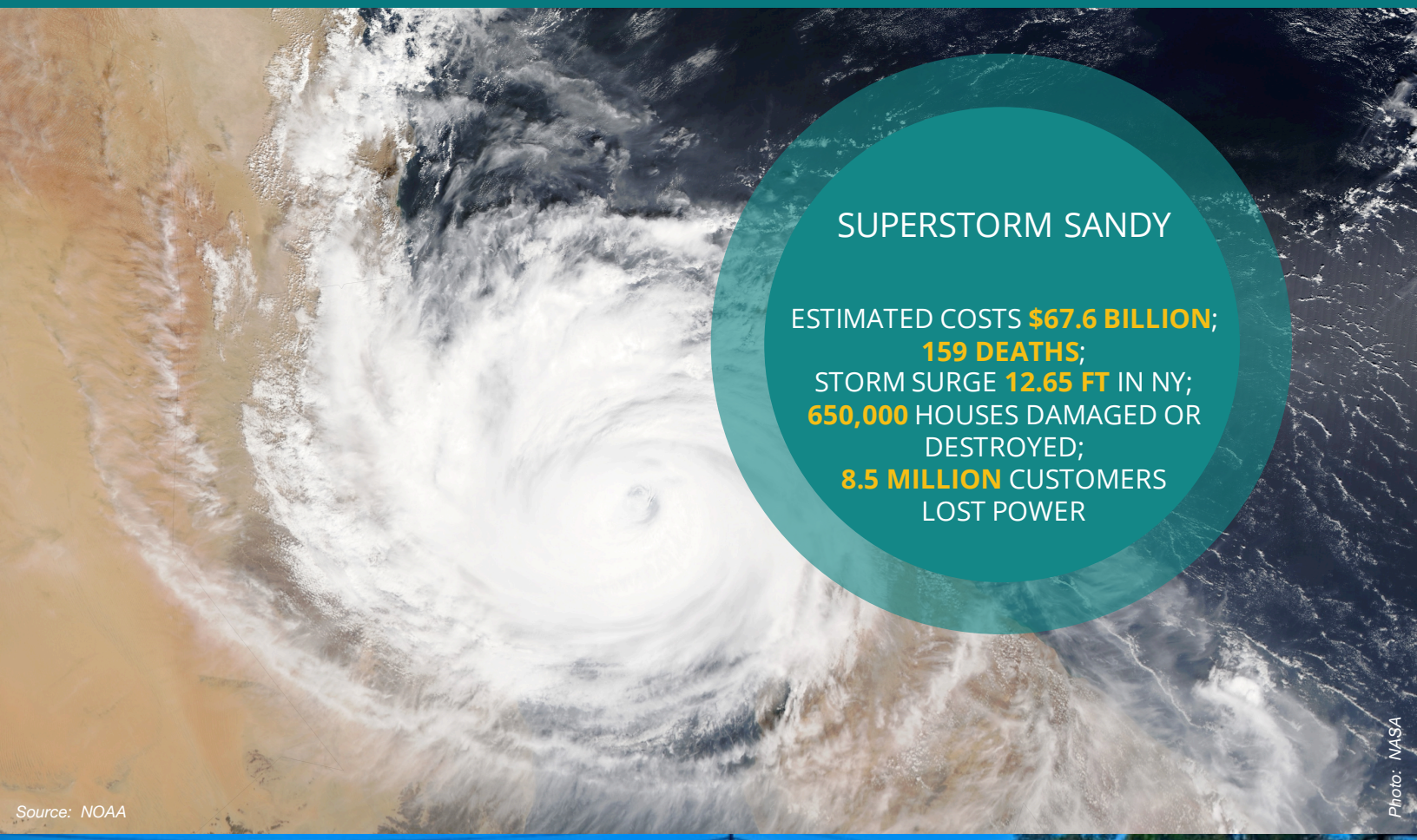
## U.S. BILLION-DOLLAR WEATER AND CLIMATE DISASTERS 1980-2016

**196** DISASTERS SINCE 1980
TOTAL COST OVER **$1.1 TRILLION**
THE 1980-2015 ANNUAL
AVERAGE IS **5.2 EVENTS**
**8 EVENTS** IN 2016:
2 FLOODING AND
6 SEVERE STORMS

Source: NOAA

Photo: David Creixell Mediante

# BACKUPS DO NOT ALWAYS WORK

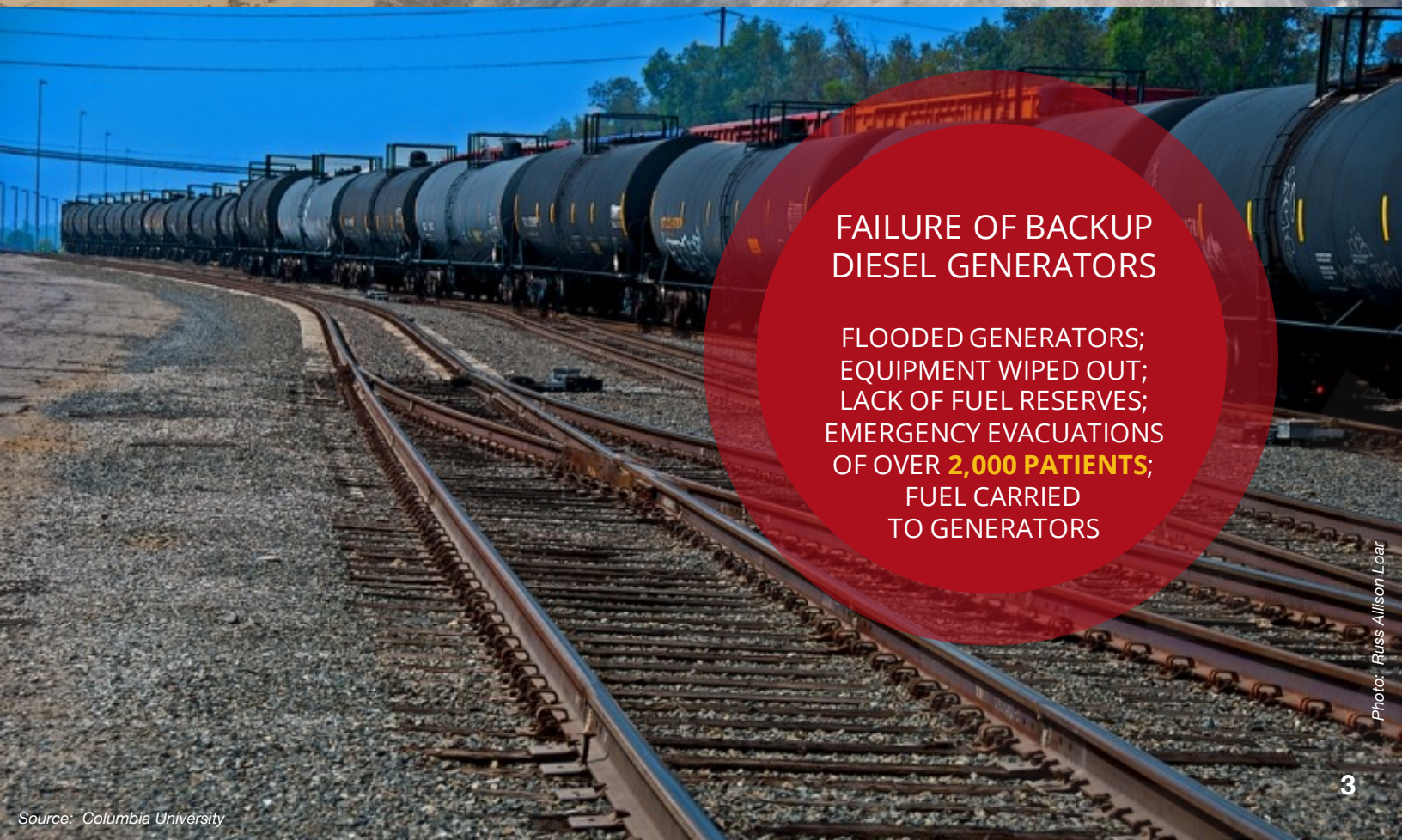


## SUPERSTORM SANDY

ESTIMATED COSTS **$67.6 BILLION**;
**159 DEATHS**;
STORM SURGE **12.65 FT** IN NY;
**650,000** HOUSES DAMAGED OR DESTROYED;
**8.5 MILLION** CUSTOMERS LOST POWER

Source: NOAA

Photo: NASA



## FAILURE OF BACKUP DIESEL GENERATORS

FLOODED GENERATORS;
EQUIPMENT WIPED OUT;
LACK OF FUEL RESERVES;
EMERGENCY EVACUATIONS OF OVER **2,000 PATIENTS**;
FUEL CARRIED TO GENERATORS

Photo: Russ Allison Loar

Source: Columbia University

# EMERGENCY PREPAREDNESS AND RECOVERY


## FAILURE TO PREPARE FOR RAINS AND FLOODING

IN 2014 FARMERS INSURANCE FILED **9 CLASS ACTIONS** AGAINST NEARLY **200 COMMUNITIES** IN THE CHICAGO AREA.
THE LAWSUITS WERE LATER WITHDRAWN.

Photo: johndal

Source: NBC, Reuters


## HURRICANE SANDY NY

**2,000+** MILES OF ROADS AFFECTED **$289.9** MILLION TO SINGLE-FAMILY HOMES; **10,000** HOUSEHOLDS ASSISTED FOR REBUILDING AND REPAIRS; **232+** PUBLIC ENGAGEMENTS MEETINGS; **$20.8** MILLION IN GRANTS TO SMALL BUSINESSES

Photo: jmywuaco

Source: NY Governor's Office of Storm Recovery


Source: Port of Long Beach , Port of Los Angeles

Photo: Port of Long Beach

## GREEN PORT TREND SPRUNG FROM LITIGATIONS AND PROTESTS

ENVIRONMENTAL IMPACT REPORTS CHALLENGED,
LAWSUITS, DELAYS, HIGH COSTS,
E.G. **$50 MILLION** MITIGATION;

GREEN PORT POLICY ADOPTED **IN 2005**

| Sulfur Oxides SOx | Diesel Particulate Matter DPM | Nitrogen Oxides NOx | Greenhouse Gases |
|---|---|---|---|
| **97%** | **85%** | **50%** | **21%** |

**2%**

**TEUs**

Source: Port of Long Beach

Photo: Kat Janowicz

# EMISSIONS AND ENERGY GAP

## EMISSIONS REDUCTION

2015 EPA CLEAN AIR ACT (**CAA**); MERCURY AND AIR TOXICS STANDARDS (**MATS**); CROSS STATE AIR POLLUTION RULE (**CSAPR**); NHTSA CORPORATE AVERAGE FUEL ECONOMY (**CAFE**) STANDARDS; STATE LAWS; PRESIDENT'S GOAL OF **80%** OF CLEAN POWER BY 2035

*Source: EPA, DOT, The White House*

*Photo: Kat Janowicz*

SHORTAGE IN ENERGY SUPPLY 2012-2020 **60 GW** OF COAL-FIRED PLANTS WILL **RETIRE**; UNEXPECTED SHUTDOWNS, E.G. SONGS

INCREASING DEMAND WILL **QUADRUPLE** AT SAN PEDRO BAY PORTS

UTILITIES **UNABLE** TO MEET DEMANDS

*Source: EPA, EIA, San Pedro Bay Ports*

*Photo: cherezoff*

# TECH TO LOOK OUT FOR

## MOBILE INTERNET

POTENTIAL ECONOMIC IMPACT*
**$3.7 TRILLION - $10.8 TRILLION**

**10-20%** POTENTIAL COST REDUCTION IN TREATMENT OF CHRONIC DISEASES THROUGH REMOTE HEALTH MONITORING

## CLOUD

POTENTIAL ECONOMIC IMPACT*
**$1.7 TRILLION - $6.2 TRILLION**

**15-20% POTENTIAL** PRODUCTIVITY GAINS ACROSS IT INFRASTRUCTURE, APPLICATION DEVELOPMENT, AND PACKAGED SOFTWARE

## INTERNET OF THINGS

POTENTIAL ECONOMIC IMPACT*
**$2.7 TRILLION - $6.2 TRILLION**

OFFERS POTENTIAL TO DRIVE **PRODUCTIVITY ACROSS $36 TRILLION** IN OPERATING COSTS OF KEY AFFECTED INDUSTRIES: MANUFACTURING, HEALTH CARE, AND MINING

## INTELLIGENT SOFTWARE

POTENTIAL ECONOMIC IMPACT*
**$5.2 TRILLION - $6.7 TRILLION**

ADDITIONAL LABOR PRODUCTIVITY COULD EQUAL THE OUTPUT OF **110 MILLION – 140 MILLION** FULL TIME WORKERS

## ADVANCED MATERIALS

POTENTIAL ECONOMIC IMPACT*
**$0.2 TRILLION - $0.5 TRILLION**

NANOMEDICINE COULD BE USED TO **DELIVER TARGETED DRUGS** TO 20 MILLION NEW CANCER CASES WORLDWIDE IN 2025

## NEXT GEN GENOMICS

POTENTIAL ECONOMIC IMPACT*
**$0.7 TRILLION - $1.6 TRILLION**

**EXTENDING AND ENHANCING LIVES** ACCOUNTS FOR 75% OF POTENTIAL IMPACT, E.G. THROUGH FASTER DISEASE DETECTION, NEW DRUGS

## ENERGY STORAGE

POTENTIAL ECONOMIC IMPACT*
**~$3.7 TRILLION - $10.8 TRILLION**

**40-100% OF NEW VEHICLES** SOLD IN 2025 COULD BE ELECTRIC OR HYBRID

## RENEWABLE ENERGY

POTENTIAL ECONOMIC IMPACT*
**$0.2 TRILLION - $0.3 TRILLION**

POTENTIAL TO AVOID EMISSIONS OF **1,000 MILLION - 1,200 MILLION TONS OF $CO_2$** ANNUALLY BY 2025

## ADVANCED OIL AND GAS EXPLORATION AND RECOVERY

POTENTIAL ECONOMIC IMPACT*
**$0.1 TRILLION - $0.5 TRILLION**

OFFERS POTENTIAL TO SUPPLY AN **ADDITIONAL 3.6 BILLION - 6.2 BILLION OIL-EQUIVALENT BARRELS** OF OIL AND GAS ANNUALLY BY 2025

## 3D PRINTING

POTENTIAL ECONOMIC IMPACT*
**$0.2 TRILLION - $0.6 TRILLION**

CONSUMERS USE OF 3-D PRINTING COULD SAVE THEM **35-60% IN COSTS** PER PRINTED PRODUCT, WHILE ENABLING A HIGH LEVEL OF CUSTOMIZATION

## DRIVERLESS VEHICLES

POTENTIAL ECONOMIC IMPACT*
**$0.2 TRILLION - $1.9 TRILLION**

COULD SAVE **30,000-150,000 LIVES** FROM POTENTIALLY FATAL TRAFFIC ACCIDENTS

## ADVANCED ROBOTICS

POTENTIAL ECONOMIC IMPACT*
**$1.7 TRILLION - $4.5 TRILLION**

OFFERS POTENTIAL TO **IMPROVE THE LIVES** OF 50 MILLION AMPUTEES AND THOSE WITH IMPAIRED MOBILITY



*Source: McKinsey Global Institute analysis*

**Potential economic impact in 2025 across sized applications*


Source: The White House, FEMA

Photo: MDGovpics

## RESILIENCE PLANNING

CLIMATE DATA INITIATIVE (**CDI**) AND CLIMATE RESILIENCE TOOLKIT (**CRT**) NOW AVAILABLE

DOWNLOAD **FEMA APP**; KEEP IMPORTANT **DOCUMENTS** IN A SAFE PLACE; CREATE EMERGENCY **SUPPLY KIT** AND **COMMUNICATION** PLAN

## ENGAGE COMMUNITIES EARLY AND OFTEN

DOCUMENT PROJECT OUTCOMES; COORDINATE WITH **OTHER PROGRAMS**; LEVERAGE LOCAL **MEDIA**; ENGAGE **ASSOCIATIONS** FOR A THIRD-PARTY PERSPECTIVE; ASSIGN **RESPONSIBILITIES**; USE **LANGUAGE** EASY TO UNDERSTAND

Photo: Rawpixel

Source: FEMA

# RESILIENCE AND ADAPTATION STRATEGIES

## 6 RESILIENCE GOALS


## 9 CROSS-CUTTING RECOMMENDATIONS

- PROTECT, UPGRADE, AND STRENGTHEN EXISTING SYSTEMS
- REBUILD SMARTER: ENSURE REPLACEMENT WITH BETTER OPTIONS AND ALTERNATIVES
- ENCOURAGE THE USE OF GREEN AND NATURAL INFRASTRUCTURE
- CREATE SHARED EQUIPMENT AND RESOURCE RESERVES
- PROMOTE INTEGRATED PLANNING AND DEVELOP CRITERIA FOR INTEGRATED DECISION-MAKING FOR CAPITAL INVESTMENTS
- ENHANCE INSTITUTIONAL COORDINATION
- IMPROVE DATA, MAPPING, VISUALIZATION, COMMUNICATION SYSTEMS
- CREATE NEW INCENTIVE PROGRAMS TO ENCOURAGE RESILIENT BEHAVIORS AND REDUCE VULNERABILITIES
- EXPAND EDUCATION, JOB TRAINING AND WORKFORCE DEVELOPMENT OPPORTUNITIES

*Source: The White House, NYS 2100 Commission*

1. PLAN BETTER FOR RESILIENCE TO SAVE LIVES AND BUSINESSES
2. CLIMATE CHANGE
    2.1. SEA LEVEL RISE
    2.2. HEAVY RAINS AND FLOODING
    2.3. BILLION DOLLAR DISASTERS
3. BACKUPS DO NOT ALWAYS WORK
    3.1. HURRICANE SANDY
    3.2. FUEL DELIVERY RESTRICTIONS
    3.3. ELECTRIC ROOMS IN BASEMENTS
4. PREPARE FOR EMERGENCY OR FACE LITIGATION
    4.1. CLASS ACTION BY FARMERS INSURANCE
5. GREEN PORTS
    5.1. LITIGATIONS, LOST REVENUE
6. EMISSIONS AND ENERGY GAP
    6.1. ENERGY EFFICIENCY ALONE IS NOT ENOUGH
7. DISRUPTION - TECH TO LOOK OUT FOR
8. PLAN BETTER
    8.1. LOCAL ASSESSMENTS
    8.2. COMMUNITY ENGAGEMENT AND COLLABORATION
9. RESILIENCE AND ADAPTATION STRATEGIES
    9.1. HIGHER BRIDGES - ADVANCED ENGINEERING
    9.2. ADOPT STORMWATER AND ENERGY MANAGEMENT PRACTICES

1. PLAN BETTER FOR RESILIENCE TO SAVE LIVES AND BUSINESSES - Businesses and governments need to take resiliency seriously and plan for it. If they don't, they are subject to litigation, not only revenue can be lost, but also lives.

2. CLIMATE CHANGE Disruptive companies interfere with established markets. With added complexity and unexpected events, more projects get delayed, budgets overrun. Uncertainty is the new reality. Nobody can prepare for every possible outcome. The traditional response doesn't work anymore. We need to plan better.

3. BACKUPS DO NOT ALWAYS WORK. Failure of diesel backup generators and their restrained fuel supplies during hurricane Sandy are good examples.

4. PREPARE FOR EMERGENCY OR FACE LITIGATION - Failure to prepare for emergencies can lead to litigation, e.g. class actions by Farmers Insurance against Chicago municipalities for failing to prepare for rainstorms and flooding. Some disasters could have been avoided and money saved.

5. GREEN PORTS For years environmental challenges were stalling harbor development projects in San Pedro Bay. The green ports idea, now a global trend, sprung from litigations and protests questioning environmental impact reports.

6. ENERGY EFFICIENCY ALONE IS NOT ENOUGH - It's only part of the solution. EE saves money, but employing EE alone is like cutting your monthly budget without adding to your paycheck.

7. EMISSIONS AND ENERGY GAP - Global climate change calls for significant emissions reduction and consequently a shift towards electrification. With growing electrification energy demand is increasing. Concurrently the energy supply is decreasing. Hence, energy gap. Yet, some of our customers are not aware of it.

8. RESILIENCE AND ADAPTATION - To reduce and mitigate the risks we can build higher bridges and stronger infrastructure, adopt stormwater and energy management practices, and create backup plans. But when disasters happen we need to recover and adapt quickly.

9. PLAN BETTER - To save lives, avoid preventable litigation, ensure resources, and sustain successful business operations, we need to plan better and develop strategy for resilience.

# ABSTRACT

Businesses and governments need to take resiliency seriously and plan for it. If they don't, they are subject to litigation, not only revenue can be lost, but also lives.

Climate change is happening. Disruptive companies interfere with established markets. With added complexity and unexpected events, more projects get delayed, budgets overrun. Uncertainty is the new reality. Nobody can prepare for every possible outcome. The traditional response doesn't work anymore. We need to plan better.

Backups do not always work. Failure of diesel backup generators and their restrained fuel supplies during hurricane Sandy are good examples.

Failure to prepare for emergencies can lead to litigation, e.g. class actions by Farmers Insurance against Chicago municipalities for failing to prepare for rainstorms and flooding. Some disasters could have been avoided and money saved.

For years environmental challenges were stalling harbor development projects in San Pedro Bay. The green ports idea, now a global trend, sprung from litigations and protests questioning environmental impact reports.

Energy efficiency (EE) is not enough. It's only part of the solution. EE saves money, but employing EE alone is like cutting your monthly budget without adding to your paycheck.

Global climate change calls for significant emissions reduction and consequently a shift towards electrification. With growing electrification energy demand is increasing. At the same time the energy supply is decreasing. There is an energy gap. Yet, some of our customers are not aware of it.

To reduce and mitigate the risks we can build higher bridges and stronger infrastructure, adopt stormwater and energy management practices, and create backup plans. But when disasters happen we need to recover and adapt quickly.

To save lives, avoid preventable litigation, ensure resources, and sustain successful business operations, we need to plan better and develop strategy for resilience.

## RESILIENCE AND ADAPTATION STRATEGIES

Develop adaptation strategies and framework

Determine the site-specific conditions

Determine immediate and future improvements, including shoreline modifications

Identify immediate actions to mitigate or strengthen existing infrastructure systems

Identify infrastructure projects to improve resilience and bring economic and quality of life benefits to communities

Assess long-term options for the use of "hard" barriers and natural systems to protect coastal communities

Create opportunities to integrate resilience planning, protection and development approaches into economic development decisions and strategies

Shape reforms in the area of investment, insurance and risk management related to natural disasters and other emergencies

NYS 2100 Commission Recommendations:

### Cross-cutting Recommendations

1. Protect, upgrade, and strengthen existing systems
2. Rebuild smarter: ensure replacement with better options and alternatives
3. Encourage the use of green and natural infrastructure
4. Create shared equipment and resource reserves
5. Promote integrated planning and develop criteria for integrated decision-making for capital investments
6. Enhance institutional coordination
7. Improve data, mapping, visualization, communication systems
8. Create new incentive programs to encourage resilient behaviors and reduce vulnerabilities

9. Expand education, job training and workforce development opportunities

## Sector-specific Recommendations

### Transportation

Develop a risk assessment of the State's transportation infrastructure

Strengthen existing transportation networks

Strategically expand transportation networks in order to create redundancies

Build for a resilient future with enhanced guidelines, standards, policies, and procedures

### Energy

Strengthen critical energy infrastructure

Accelerate the modernization of the electrical system and improve flexibility

Design rate structures and create incentives to encourage distributed generation and smart grid investments

Diversify fuel supply, reduce demand for energy, and create redundancies

Develop long-term career training and a skilled energy workforce

### Land Use

Protect coastal communities

Reduce inland vulnerability to extreme weather events

Strengthen wastewater infrastructure

Develop probabilistic hazards mapping and risk mapping

Strengthen land use programs, standards, policies, guidelines, and procedures

### Insurance

Mitigate and manage State-level risks

Protect consumers and businesses

**Infrastructure Finance**

Establish an “Infrastructure Bank” to coordinate, allocate, and maximize investment

Adopt a standard set of criteria for project selection and prioritization

Develop a range of sources of revenue and cash flow

Continue to improve the enabling environment

**Resilience Goals**

Goal1: Data Collection and Integration

Goal2: Communicating Risk to Critical Infrastructure

Goal3: Planning and Capacity Building

Goal4: Coordination of Federal, State and Local Activities

Goal 5: Market-Based Approaches for Infrastructure and Efficiency

Goal6: Innovative Water Use, Efficiency, and Technology

**Drought-Resilience Goals**

Goal1: Data Collection and Integration

Goal2: Communicating Drought Risk to Critical Infrastructure

Goal3: Drought Planning and Capacity Building

Goal4: Coordination of Federal Drought Activity

Goal 5: Market-Based Approaches for Infrastructure and Efficiency

Goal6: Innovative Water Use, Efficiency, and Technology

Elevate new building pads, streets and vital infrastructure

Enhance the island's perimeter to protect from wave over-topping for SLR, balancing flood protection, public access and view preservation
Set development back 200 – 350 feet from the shoreline to provide land for future SLR mitigation
Raising the shoreline edge embankment in place to function as a storm surge and flood barrier or levee

Constructing a series of embankments of increasing heights inland from the shoreline.

Constructing sea walls

Laying back the shoreline to create cobblestone or natural beaches, tidal wetlands, and other ecosystems to limit wave run-up and overtopping, creating accessible public amenities

Focus on Priority Areas

- Modernizing federal programs to support climate–resilient investments
- Supporting communities in their efforts to increase climate preparedness and resilience
- Managing lands and waters for climate preparedness and resilience
- Providing information, data and tools for climate change preparedness and resilience
- Planning for climate change–related risk

Management and Infrastructure Resilience

Vulnerability Assessments: Coastal Flooding, Sea Level Rise, Projections

Risk-Informed Decision-Making for Climate Change

Engagement Internal and External Collaboration, Workshops

Adaptive Management Plan

Funding

Education and training

Developing Policy and Guidance for Infrastructure Resilience

responsibilities, Monitoring Program: sea level rise measurements and perimeter elevations, Trigger mechanisms and actions, Implementation

CLIMATE CHANGE ADAPTATION PLAN

MODERNIZING PROGRAMS AND POLICIES TO SUPPORT CLIMATE RESILIENT INVESTMENT

MANAGING LANDS AND WATERS FOR CLIMATE PREPAREDNESS AND RESILIENCE 28

PROVIDING INFORMATION, DATA, AND TOOLS FOR CLIMATE CHANGE PREPAREDNESS AND RESILIENCE 30

PLANNING FOR CLIMATE CHANGE RELATED RISK 31 Specific Examples of Planning for Climate-Related Risk 32 Updating Drought Contingency Plans to Account for Climate Change 32 Evaluating Reservoir Sediment Impacts from Climate Change 32

INTERNATIONAL LEADERSHIP FOR CLIMATE PREPAREDNESS 33

International Leadership and Collaboration 33 Work with International Organizations 33 Engagement with NATO 33 International Support to the US Military 34

REPORT OF PROGRESS TO MAINSTREAM

CLIMATE ADAPTATION

Establishes an overarching vision, goals, and a set of guiding principles for sea level rise planning;
Summarizes current climate science, relevant policies and regulations, and vulnerability and risk assessments conducted to date;

Identifies data gaps and establishes a framework for further assessment, adaptation planning, and implementation; and
Provides the foundation and guidance to develop a Citywide Sea Level Rise Adaptation Plan.

3COTECH
*Profitable Sustainability*

# AREAS OF EXPERTISE

## Sustainability

- Strategic Planning
- Resilience Planning
- Climate Change
- Social Responsibility
- Behavior Change

## Energy

- Energy Planning
- Energy Efficiency
- Audits & Performance
- Demand Forecasts
- Renewables

## Environment

- Compliance
- Emission Strategies
- GHG & Carbon
- Health & Safety
- Site Assessments

## Risk

- Assessment
- Management
- Workshop Facilitation
- Strategy & Control
- Opportunities

## Research

- Research & Analyses
- LCC, LCA, CBA, SWOT
- Grant Applications
- Technology
- Market Intelligence

## Management

- Projects & Programs
- Construction
- Value Engineering
- Assets
- Business Consulting

## Outreach

- Stakeholder Mgmt
- Engagement
- Training & Education
- Marketing
- Communication

## Gov Relations

- Policy & Regulations
- Legislation Tracking
- Public Affairs
- Support & Advocacy
- Partnerships

## Certification

- Envision
- LEED