3. The role of environmental liability and insurance in improving environmental safety

This section characterizes insurance as an economic tool of environmental policy meaningful for ensuring environmental safety of industrial operations. The importance of insurance mechanisms in securing an environmental liability regime, which is an integral part of the regulatory framework for environmental safety, is demonstrated. The author follows Russian researchers asserting that insurance can and should be considered as a mechanism for assuring environmental security through improved environmental safety (e.g. Shutov, 2002, Baydakov and Serov, 2003).

The chapter starts with outlining environmental liability regime as the legal framework for managing environmental risks related to industrial operations. Then a brief overview of functions of environmental insurance is provided including the discussion on environmental risk insurability. In the following section the author reviews key policy issues in applying insurance to manage corporate environmental performance. Finally, policy conclusions on the incorporating insurance into environmental safety policies are presented.

3.1 Environmental liability: managing environmental risks though the legal system

Today the potential of industrial enterprises pose threats to biophysical environmental and public health is acknowledged in the law through the system of liability rules. Through environmental liability regime the government forces the causer of the environmental damage ('the polluter') to pay compensation for the damages caused to the environment and third-parties. Therefore, risks are involuntarily transferred from potentially affected parties to those who generate environmental risks (Freeman and Kunreuther, 1997).

In general, environmental liability seeks to pursue two interrelated policy goals: i) to create provisions for adequate compensation for damages and ii) to deter economic actors from inefficient industrial activities providing incentives to avoid environmental liability risks. Most of the current environmental liability regimes in place identify the 'operator' or 'owner' as responsible for environmental damages (those who should pay for pollution). It recognizes the their ability to take preventive actions for risk reduction.

Growing concern on the inefficient use of natural resources industrial pollution threats led to imposing much stricter standards of care for private sector. In a number of legal systems (firstly in U.S. then in many EU countries) liabilities for *environmental damages* (damages to air,

water, soil, biodiversity, etc) in addition to traditional third-party damages (bodily injury, property damage, and economic losses) has been assigned to industrial enterprises.

The scope of environmental liability is expanding to historical contamination incidents: owners and/or occupiers of polluted sites have become liable for site remediation and pollution prevention costs. Moreover, there are attempts to provide for compensation to so called 'ecological damages' resulted from impacts on ecosystems, endangered species, biodiversity reduction.

With regard to civil law mechanisms for enforcing environmental liabilities one should note a general trend towards strict liability[3] for industrial operators of facilities with high potential to affect the environment; where several potentially responsible parties are identified they are held jointly and severally liable for causing damage and paying compensations (OECD, 2003).

At the international level there are operational civil liability regimes for two types of environmental damage: damage resulted from nuclear material handling and maritime oil pollution. Since late 1980s a new generation of environmental liability regimes relevant to the environment has been developed that focused on damage caused by potentially hazardous substances including

- the UNECE Convention on Civil Liability for Damage Caused during Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessels (1989);
- the International Convention on Liability and Compensation for Damage in connection with the Carriage of Hazardous and Noxious Substances by Sea (1996);
- the EC Lugano Convention on Civil Liability for Damage resulting from Activities Dangerous to the Environment (1993);
- the Basel Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and Their Disposal (1999).

According to Piery (2004) none of them are in force today, and there concerns about they ever being operational.

[3] Under 'normal' civil liability regime a person will not usually found liable unless he is at fault. A plaintiff have to prove defendant's intentional or negligent acts to recover damages. Under strict (absolute) liability a defendant is held liable if a plaintiff is merely able to show that defendant's dangerous activities caused him or her to suffer any losses (McLoughlin and Bellinger, 1993)

Meanwhile, in many developed countries national environmental liability regimes has been elaborated during the same period. They are quite diverse in addressing specific environmental liability issues: defining potentially responsible parties, types of polluter's liability, types of specific damages to cover, requirements on ensuring financial guarantees (see OECD (2003) for detailed analysis of environmental liability regimes of selected developed countries).

In order to make legal developments in the field of environmental pollution liabilities within the EU Member States more systematic and consistent, the Commission of the European Communities elaborated the 2004/35/EC Directive on Environmental Liability with Regard to the Prevention and Remedying of Environmental Damage (EC, 2004).

The Directive adopted in April 2004 is the most latest international environmental policy instrument aimed at addressing environmental pollution risks. It reflects all above-mentioned recent trends in developing legal approaches in environmental risk and liabilities.

Firstly, the Directive proposes strict liability for environmental damage. An industrial operator carrying out the activity that caused, or may cause, environmental damage, is required to undertake appropriate environmental risk prevention and mitigation actions. The operator bears preventive and remedial costs irrespective of whether the operator or competent authority carries out the measures. The competent authority can recover costs, but may decide not to do so where expenditure to do this would be greater than the recovered amount. A list of exemptions for covering these costs is listed in the Directive, e.g. if the operator can prove the damage was caused by a third-party and all safety measures were in place.

Secondly, the Directive focuses on environmental damage, or imminent threat of damage, related to the specialized list of industrial activities (Annex III) and damage to protected species and natural habitats caused by any other operational activities. 'Traditional damage' (personal injury and property damage) is out of the Directive's scope. Annex III activities include:

- Installations covered by the IPPC Directive;
- Waste management activities subject to a permit or registration;
- Wastewater discharges that require authorization.
- Water abstraction that requires authorization.

- Manufacture, use, storage, processing, filling, release to the environment and onsite transport of dangerous substances, dangerous preparations, plant protection products and biocides.
- Transport of dangerous goods (by road, rail, inland waterways, sea or air).
- Transboundary shipment of waste requiring an authorization (EC, 2004).

Of importance, the Directive recommends Member States "to encourage the use by operators of any appropriate insurance or other forms of financial security and the development of financial security instruments and markets" (EC, 2004). The Directive proposals were more radical and had provisions for compulsory environmental liability insurance.

Therefore, through the environmental liability regime the Government transfers the responsibilities for environmental risks to private sector and promotes internalization of environmental impairment costs.

Meanwhile, it is obvious that efficiency of any liability regime rests on the capacity of potentially responsible parties bear these costs. In case of polluter's insolvency the overall result would be additional wasting resources for litigation instead of expected investments into environmental cleanup and compensation. Therefore, any environmental liability regime must be linked with appropriate mechanisms to ensure financial security in order to implement the polluter pays principle effectively (UNEP, 2002; OECD, 2003). The following section discusses one of common financial security tools – insurance – as applied to environmental risks related to industrial operations.

3.2 Managing environmental risks with insurance

There are two interpretations the term 'environmental risk' applicable in the context of the current research. From the viewpoint of society environmental risks related to industrial operations are risks of developing adverse effects in specific components of industry's environment (firstly, biophysical environment). Meanwhile, for owners and operators of dangerous facilities environmental risks are usually defined as risks of incurring legal liability for the adverse consequences of facility's operation. At the same time, these enterprises can potentially be exposed adverse impacts of other facilities mediated through the environment and suffers from losses related to environmental impairment. Insurance can protect from both types of environmental risks and provide coverage either for causers of damages or for victims. This section is focused on the potential role that insurance can play in managing industry-related societal risks.

3.2.1 Risk management functions of insurance

Attitudes of economic actors towards risks are different; this depends on the nature of the risk, probability and magnitude of losses incurred, capacity to overcome negative economic consequences with help of internal resources, etc. Having estimated and evaluated a risk of concern one should attempt to manage the risk (if its significance is perceived as high enough to spend resources for this task), i.e. decrease probability of adverse subsequences and lessen magnitude of potential losses to the acceptable level.

One can distinguish two alternative approaches to corporate risk management: risk control and risk financing (Broderick *et al,* 2000). Every risk manager seeks to employ optimal combination of both methodologies to maximize their beneficial effect.

Insurance is one of risk finance techniques. It transfers some portion of risk an economic actor is exposed to a specialized company which are willing to undertake risk in exchange for insurance premium. In other words, it shifts risks from actors with inferior risk-bearing capabilities to actors with superior risk-bearing capabilities thus meeting societal need for strengthening security. (Bergkamp, 2003). Those who contract insurance (either businesses or individuals) choose to incur "a small and certain risk not in exchange of not being exposed to uncertain losses in the future" (Bergkamp, 2003; 271).

How does insurance manage risks? One can identify four risk management functions of insurance (Freeman and Kunreuther, 1997; 25):

1) **Risk spreading** – distributing losses of an individual or a business resulted from an unforeseen event among a broad group of actors; negative consequences of this event are absorbed by a third-party - an insurance company – that is able to pay for unexpected losses of a few actors owing to collecting premiums of the many.

2) **Variance reduction** – reducing uncertainty; pooling together a large number of independent risks insurance improves the certainty about magnitude and severity of potential losses to occur. The purpose of any insurance company is to be risk neutral.

3) **Risk segregation** – differentiating between classes of potential policyholders by their risk potential insurance is able to tailor flexible risk allocation (premium setting) schemes.

4) **Encouraging loss reduction** – insurance can manage the behavior of potential and actual insureds. e.g. they may be required undertake specific loss reduction activities before receiving insurance coverage. Premium reduction offers to policyholders who have taken

actions to reduce their risks or have better-than-average performance is indirect tool to encourage risk reduction behavior.

Reinsurance bear the same function for insurers what primary insurance does for policyholders – protect again unexpected and unforeseen losses. Primary carriers who use reinsurance agreements as risk transfer tools.

The current paper focuses on risk reduction/preventive effect of insurance with regard to environmental risks related to current environmental operations; this issue is separately discussed below.

3.2.2 Insurability of environmental risks

Insurance is a viable solution for those risks that are insurable and marketable, i.e. eligible for coverage from the part of insurance carriers and having potential to yield profits for insurers.

There are two key conditions for risk insurability. The first one is the ability to identify and, possibly, quantify the risk to allow the insure estimating potential losses to incur. To be quantifiable with sufficient degree of confidence the risk should ideally meet the following criteria: i) probabilistic character; ii) considerable amount of statistical information on occurrence of hazardous events and amount of resulted losses, iii) statistical independence (Bergkamp, 2003). The second condition is the ability to set premiums for each potential policyholder or a class of policyholders. To define a adequate premium insurer must have knowledge on the level of policyholder's risk in comparison to others in the population of potential insureds (Kunreuther and Freeman, 1997). If the potential insured possesses more information about the risk, problems of adverse selection and moral hazard may occur (see OECD (2003) for more in-depth discussion). These two problems together with too high uncertainty regarding the probability and severity of expected losses may pose a threat to risk marketability underlying extremely high insurance premiums.

Risks that do not meet these two conditions may be considered by professional risk carriers as uninsurable and are met the risk can be considered as insurable and coverage may not be available on the market. At the same time, insurable risks may be unprofitable. Therefore, actual risk marketability depends not only the its intrinsic features but also on market situation .In turn, demand for insurance coverage is influenced by 'non-economic' factors, e.g. imposing new administrative standards.

Environmental risks resulted from industrial operations present many difficulties for underwriters. They incorporate elements of both factual and legal uncertainty. This is especially true for gradual pollution incidents when adverse effects develops slowly and may be manifested in years an even decades.

Key problems with factual uncertainly of environmental risk related to current industrial operations are summarized in Box 3.1.

Box. 3.1. Key issues in factual uncertainty of environmental risk related to current industrial operations

The following features of environmental risks creates factual uncertainty that undermines their insurability:

- Insufficient probabilistic character (e.g. health effects of toxic substance releases that will certainly takes place)
- Many risks are not statistically independent to be pooled (strong correlation between increase in CO_2 emissions and risk of global warming)
- Low predictability of many environmental risks: there is significant uncertainty on both occurrence of loss ant its magnitude
- High-magnitude environmental consequences of industrial accidents and extreme amount of expected losses creates difficulties for risk pooling (pools that include such risks become unstable)
- Problems with causality – lack of scientific evidence to trace relationships between a cause (and causer) of the damage and adverse effects posed on injured parties
- Complexity of new technologies and substances and difficulties with comprehensive risk specific risk assessments creates information asymmetry in favor of insureds and can lead to adverse selection (purchasing insurance for only worse-than average cases) and moral hazard (perceiving insurance as a license to pollute brought in exchange of insurance premium) problems.
- Need for expensive monitoring and bonding programs to cope with asymmetrical uncertainty.
- Lack of credible historic information and actuarial statistics on environmental disasters undermines sound underwriting and pricing decisions.

These features of environmental risks are common to every legal system; but different jurisdictions implies various levels of legal uncertainty.

It is important to note that from the viewpoint of insurance industry, environmental risk is a liability risk. Generalized uncertainty introduced by the legal system depends on i) the design of specific environmental liability regime, and ii) the way of applying legal and regulatory

provisions by respective actors (government agencies, local authorities, judges, assessors, etc) (OECD, 2003). Therefore, decisions made by legal actors have significant influence on the insurability of these risks and development of environmental insurance market as a whole.

Current trends in expanding the scope of environmental liabilities both by court interpretations and evolution of legal systems leads to the fact that more and more risks are transferred to industrial actors, sometimes retrospectively. The general tendency towards strict liability for environmental damage do not hinder insurability of environmental risks. At the same time, joint and several standard increases uncertainty and unpredictability in risk assessment and allocation. Retroactive regimes, in turn, incompatible with the very nature of insurance mechanism and the idea of using insurance for risk reduction purposes. In addition, this brunch of law, as any emerging areas, suffers from incoherence and points of contradiction (see OECD (2003) for details).

All these factors can explain why insurance coverage for environmental damage is not always and everywhere available and if available it is seriously limited.

3.2.3 Modern environmental insurance coverage

The formation of environmental risk segment of insurance market has evolved as a result of the need to fill gaps in coverage provided by Comprehensive General Liability (CGL) policies. These policies were written before 1970s when there was little knowledge about environmental consequences of industrial pollution. They did not mention pollution but provided very broad coverage and might be activated whenever environmental damage was caused.

A number of strict governmental regulations on industrial pollution was enacted in many developed countries in 1980s - early 1990s (e.g. The US Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), the German Environmental Liability Act of 1991, the Italian Law No. 349 of 1986). As a result, national insurer's associations introduced an absolute pollution exclusion clause into standard CGL polices (Broderick *et al,* 2000; OECD, 2003). The insurance market responded to demand for pollution coverage with various types of Environmental Impairment Liability (EIL) insurance policies that have exist at U.S. market since 1977 (Dybdahl, 2004).

In early 1980s environmental insurance was an extremely risky business due to lack of experience in environmental risk assessment and allocation, actuarial statistics to underpin sound insurance decisions, and high legal uncertainty while regulations on environmental liability was relatively new. In addition, reinsurance were not willing to accept new exposures associated with

environmental damages and liability to compensate related losses. The insurance industry was very conservative in its response to promising market opportunities: environmental pollution coverage was limited, very expensive, and carried self-insured retentions and deductibles (Bressler, 2002). A handful of insurance companies accepted environmental risks for underwriting; some of them incurred severe losses stemmed from lack of professional capacity to manage this specific type of risks (Broderick *et al,* 2000; Hannah, 2000). This resulted in ill-famed insurance crisis of mid-1980s in the USA that was the most advanced in environmental insurance and environmental liability insurance in particular (Bregkamp, 2003; Dybdahl, 2004).

Over time, regulatory climate became more favorable to environmental insurance and insurers have gained experience in environmental risk underwriting. This resulted in ongoing innovations in coverage and stabilization of pricing in 1990s. Consequently, many risk managers tend to include environmental insurance contracts into corporate risk management strategies to comply with legal or contractual obligations.

The amount of coverage available at maturing international environmental insurance market have grown dramatically. The market capacity for environmental insurance exceeds $400,000,000 in 2004 with written premiums in excess of $2.3 billion dollars (ERRA, 2004) (for comparison, in 1999 the annual premium volume was 1.3 billion US dollars (Kreuzer, 2001), in 2001 – 1.5 billion U.S. dollars (Willis, 2002); according to Hannah (2000) the volume of US environmental insurance market was 1.2 billon US dollars). According to various estimations, the projected growth in premium volumes varies from 15 to is 20-25% per year (Kreuzer (2001) and Hannah (2000) respectively).

The vast majority of the premium is generated in the United States where insurers are most advanced in environmental insurance solutions. European environmental insurance is in the making but is growing significantly stimulated by the increase in demand for this coverage. In general, large US insurance companies including AIG, Zurich, ECS (which is now part of XL Capital), Chubb and Kemper (Willis, 2002) dominates on environmental insurance markets all over the world. However, national insurance providers has been doing a lot to win market competition and their share overall market capacity is constantly glowing (Willis, 2002).

The impressing growth in coverage can be also associated with joining efforts within the insurance industry to manage environmental risks related to economic developments. The obvious ‘market’ outcome is creating *insurance pools* and overall development of reinsurance in the field (see OECD (2003) for details).

In the policy arena this tendency is marked with a number of international initiatives that demonstrate the insurance industry acknowledges the importance of modern development challenges and intend participating in environmental protection. It is worth mentioning a UNEP Statement of Environmental Commitment of Environmental Commitment of 1995 signed by leading insurance companies (UNEP, 2004). The Statement expresses insurance industry's commitment to contribute to improving manufactures' environmental performance though appropriate risk management and loss prevention practices. In 2003 88 companies from 26 countries were in signatory's list and the number of participants is constantly increasing.

Modern environmental insurance policies are tailored on insured's needs and focused on specific types of environmental risks related to industrial activities. Lion's share of environmental insurance deals with adverse consequences of releases of toxic substances to various compartments of the environment: soil, surface waters and groundwater aquifers. However, other types of environmental damage related to industrial activities (negative exogenic processes (e.g. soil erosion), change of hydrogeological conditions, technogenic floods and droughts) has come into agenda as well.

Environmental insurance addresses both on-site and off-site effects and first-party and third-party environmental liabilities imposed on industrial operators. For instance, on-site spills of chemicals at a private plant lead to on-site pollution damage and result in civil claims under contaminated land regime. If pollution conditions migrates beyond the site boundaries third-parties (either individuals or legal entities - other businesses) may be affected. Under strict liability regime the polluter is held liable for any damage caused to affected third parties: from bodily injury to business interruption. In turn, a major pollution accident can make the polluter suffering from catastrophic losses resulted from cleanup, third-party compensations and litigation costs which may lead to shutdown of its operations. Moreover, any business venture is threatened by pollution conditions emanating from an off-site source and suddenly discovered pollution legacy that may affect on-site personnel, disturb operations, and lead to unexpected (or unexpectedly high) rehabilitation costs.

Industrial operators that undertake environmentally dangerous activities (actual 'polluters') seem to be a key target group of economic actors interested in environmental insurance. However, there is a number of other private parties who may and do seek environmental insurance solutions to manage environment-related risks. Besides site operators, site owners and lenders may be affected: they either may held liable for damages under the joint and several liability scheme or incur losses dues to diminishing value of a contaminated

property. Moreover, contractors engaged in construction, transportation, contaminated site cleanup needs protection from liability risks related to unanticipated adverse impacts of their activity (e.g. impacts of unanticipated releases of contaminants). Consulting firms advising for industries are among potentially responsible parties in terms of environmental liability. Professional environmental advisors (e.g. risk assessors, environmental auditors) may be sued by clients for negligence in case errors and omissions in their services resulted in clients' losses.

To protect themselves from environment impairment-related loss exposures all these private parties can contract both *first-party* (property) and *third-party* (liability) insurance policies. Most active segments of the environmental insurance market are as follows (Hannah, 2000; Balmer *et al,* 2000; Kreuzer, 2001; OECD, 2003):

- Contaminated site rehabilitation
- Redevelopment projects (brownfield developments)
- Environmental consulting
- Project design (architecture and engineering)
- Property merging and acquisition
- Land transactions
- High-risk industrial and commercial operations
    - waste management,
    - extractive industries,
    - manufacturing and process industries with high hazardous potential

There are special policies developed for certain industries and even facilities (mines, petrochemical plants, waste management facilities); the most illustrative example is underground storage tank (UST) compliance policies (Dybdahl, 2004). Another aspect of market differentiation is specializing of some insurance companies on particular client segments: lenders, contaminated site owners, consultancy firms, etc. (Balmer *et al*, 2000).

The development of environmental insurance started with EI policies that target third parties as potential victims of environmental accidents. Meanwhile, international insurance sectors has moved away from primary focus on liability insurance approach to environmental risks.

Many modern policies are of first-party insurance type providing coverage to 'polluters'. Gradual pollution incidents are as a rule excluded from coverage available only for specific cases like the UST, asbestos, or landfill policies. The coverage is generally limited to bodily injury, property damages and response (cleanup) costs (OECD, 2003; Dybdahl, 2004). Deductibles and self-insured retentions are widely used (Broderick *et al,* 2000; Kreuzer, 2001).

Insurers currently offer environmental polices issued on claim-made or manifestation basis[4] that differs from 'act committed' and 'loss occurrence' trigger-of-coverage formulas applied in old policies. This approach aims at limiting coverage in time and overcome problems with latency of gradual pollution incidents.

The policy period for operational cover is mostly limited to one year (Kreuzer, 2001; Broderick *et al,* 2000). Despite significant resistance to provide coverage beyond a single year, a handful of three-year policies are available in certain cases. Multi-year policies are common for property transfers with policy term up to hen years and even more (Broderick *et al,* 2000). Many companies offers expended reporting period up to three years for additional premium (Broderick *et al,* 2000). Longer policy terms are more attractive for policyholders due to long-tail nature of environmental impacts of industrial activities. Actually, long-term contracts is beneficial for both parties: the insurer is able to conduct thorough monitoring of insured's activities that alleviates the threat of moral hazard. The longer and more stable relationships the more the insure contributes to decreasing risk hazardous potential of the policyholder's property.

[4] This means that a claim must be made against the policy holder and reported to the insurance company during the policy period and extended notification period. It does not matter when the event that gave rise to the claim occurred.

Box 3.2. Key environmental insurance products

- **Pollution Liability (PL) Insurance**: a range of policies protecting the insured against unexpected losses resulted from pollution conditions emanating from the designated location. The cover generally extends to third-party claims for property damage and bodily injury, on-site and off-site environmental cleanup costs, legal defense and investigation costs. The coverage many be available for a specific site of a site portfolio. It is triggered if the insured discovers environmental impairment or receives a claim form affected third-party (a company or individual). The policy can be amended to cover diminishing property value (first- and third-party) and first-party business interruption. This class of insurance is divided into i) operational pollution coverage; and ii) historic contamination coverage.

- **Warranty and Indemnity Environmental Insurance (Property Transfer Pollution Liability):** this type of insurance designed to give back-to-back cover for environmental warranties and indemnities particularly on the sale and purchase of land or as part of a merger or acquisition. Cover is limited to liability arisen from a particular contract.

- **Remediation Cost Cap (Stop-Loss) Insurance:** this is a first-party environmental remediation cover designed for sites subject to active cleanup activities. It targets site operators, owners, or lenders for who may incur financial losses in case of anticipated costs overrunning. The policy is offered on a claim-made basis. The insurers generally undertake this type of risk when a remedial action work plan with costs estimates is developed by a potential insured. The coverage is limited to unexpected pollution issues (undiscovered pollution sources, additional Regulators requirements, etc.) when the remediation project is underway and do not cover poor project cost estimation, faulty workmanship, defective materials, and time delays.

- **Contractors Pollution Liability Insurance:** these type of insurance is tailored to protect contactors undertaking construction and engineering works at brownfield sites for claims and liabilities arisen from their performance of contracting operations including contaminated soil cleanup and site remediation. Both field operation and professional services may be covered. Policies are issued on claim-made basis but occurrence cover is also available. They refer to environmental impairments at a work site and related adverse off-site effects and associated remediation costs.

- **Professional Indemnity (PI) Insurance:** provides the insured (architects, engineers, environmental consultants) with protection for being sued by a client for negligence. Many general PI policies contain pollution exclusions; environmental insurers offer coverage with no exclusions and indemnify professional advisors for errors and omissions resulting from professional services an opinions.

- **Specialized Covers:** some insurers offer specialized polices based on above-mentioned categories tailored to address specific operations: hazardous waste storage (especially, underground storage), waste disposal at landfills, asbestos removal, lead abatement, transportation of hazardous substances including radioactive materials.

- **Secured Creditor Insurance:** first-party coverage targeting banks and other lending institutions financing real estate transactions. In the event of environmental impairment and subsequent loan default these policies cover outstanding loan value, estimated cleanup costs (in case of direct liability for environmental damage) and, in some cases, third-party claims.

Over one hundred different environmental insurance policies is currently available at the marketplace (ERRA, 2004). The overview of major types of modern environmental insurance cover available at today's market is presented in Box 3.2.

Professional risk carriers currently tends to provide combined coverage in the form of a single EI policy. The most common combined insurance policy addresses operational and historic contamination cover (PL insurance). This provides cover for claims for third-party damage and injury arising from historical contamination, long-term contamination migrating off-site and future spills, run-offs and leaks. It also covers clean-up orders for the insured's own site or third party land from the enforcement authorities. Where sites are heavily contaminated and remediation is required, cost cap cover can be placed to limit escalation in costs, followed by historical contamination cover to provide assurance that the financial consequences of the remnants of contamination not removed by the remediation are minimized.

In general, most insurance policies being issued at this time are designed specifically to match specific needs of the deal or situation. Various types of cover available at today's insurance market form the building blocks of a solution to the specific risks the client is faced with.

3.3 Insurance for environmental safety: policy considerations

3.3.1 Insurance mechanisms for reduction of industry-related environmental risks

Risk reduction function of environmental insurance is perceived as of paramount importance by many researchers (Broderick *et al,* 2000; Schwarze, 2001; Bergkamp, 2003). Insurance can reduce risks in two ways: lowering the probability of causing harm (preventive effect) and magnitude of total risk due to creating reserves for compensations.

The preventive role of environmental insurance is based on active co-operation between an insurer and a potential insured at all stages of insurance mechanism: from risk assessment to risk allocation (OECD, 2003). Today many insurers possess sufficient technical expertise to evaluate ad classify risks before risk transfer rather than merely accept or refuse to them for undertaking. This involves detailed auditing a particular installation, assessment of site vicinity, studies on accidents history, evaluation of safety measures and protection systems.

As soon as the risk is properly assessed the insurer focuses on risk reduction and enhancing loss prevention. Insurers possessing superior knowledge on the risks associated with insured's activities are able to monitor industrial activities and verify compliance with operational standards. Reciprocal investments in risk mitigation channeled from insurance company's reserves is another way to the insurer is able to influence corporate environmental performance. In addition to direct effect of insurer's intervention – strengthening overall safety of industrial operations and lowering risks to environment and society, another positive outcome of this approach is reducing information asymmetry that threatens insurability of industry-related environmental risks and undermine the insurer's financial security. Moreover, through the size of premium charged insurers provide incentives for industrial risk reduction both before contracting the insurance and during the entire period of contractual relationships.

The premise about environmental risk reduction function of the commercial insurance has been criticized in the literature. For example, Bennett (1999) emphasized that educing insurer's risk associated with industrial risk undertaking does not necessarily results reducing risks generated by industrial operations. Since 'there is no such thing as a bad risk, there are only mispriced risks' (The Economist, 1994; 10), the insurer who found a good solution to minimize his/her own risk with help of 'traditional' financial instruments (e.g. through reinsurance) can save resources that would otherwise be invested in tailoring additional safety measures at industrial sites.

However, latest reports observe that insurers currently have become more and more involved in developing customer's environmental risk management strategy. In addition to loss prevention and financial protection granting several insurers are engaged in integrated crisis management services (OECD, 2003). In broader perspective, modern environmental insurance can be considered as a flexible private surrogate regulation mechanism (OECD, 2003).

In the research literature the question on what type of insurance (first-party or third party) works better for accident prevention and risk reduction has raged to heavy debates. Several authors point out that third-party insurance implies the insurer enters into agreement with persons who can be made to bear losses incurred by victims not with actual victims. This seriously limits insurer's ability to control insured's behavior, and combat major insurance threats (adverse selection and moral hazard). For liability insurance moral hazard is a key issue since real 'causers' of damage making potentially dangerous decisions are not personally at risk. High uncertainties with assessing risks to potential victims (third-parties) originated from insured's activities puts the insures into unfavorable position. Another problem that undermine

liability insurance efficiency is court's control on insurance policy interpretation that may result in retroactive expansion of insurance coverage. Excessive coverage, high administrative costs are perceived as additional disadvantages of third-party insurance (see Faure (2001) and Bergkamp (2003) for in-depth discussion). One can trace a trend forwards first-party insurance in overall development of modern environmental insurance coverage.

However, there are arguments against first-party insurance. For example, Motkin (1996) states that first-party insurance may be perceived by the insureds as 'a license to pollute' in return for annual insurance premium. The purchase of insurance policy changes policyholder's behavior. Being sure that their losses will be compensated 'polluters' is likely to pay less attention to environmental safety of their operations and unwilling to invest into improving enterprises' environmental performance. The insured is likely to perceive additional risk mitigation costs as an unnecessary extra payment for the same purpose.

The author believes the question what type of insurance coverage matches better the purpose of preventing environmental damage cannot be answered in general terms. It depends on the existing environmental liability system, state of insurance market, and other factors that influence EI development (see Section 4.2 for details).

Environmental liability systems in many countries are in the making as well as national EI markets (Willis, 2002; OECD, 2003). At this time few empirical data is available concerning impact of environmental liability legislation on environmental safety. An illustrative example of preventive effects of strict environmental liability regime and environmental liability insurance is provided by Schwarze (2001). The author reported that German Environmental Liability Act (GELA) adopted in 1991 has led to considerable decrease in the number of environmental accidents (for the period of 1993-1997 relative frequency of industrial accidents fell down by approximatly10 per cent per annum). This effect is linked to progressive development is environmental liability insurance for individual plants which, in turn, was triggered by GELA's introduction (Schwarze, 2001).

3.3.2 Insurability of environmental liability today

The importance of insurance for securing environmental liabilities can hardly be overestimated. However, despite several reports on progressive increase in market capacity and diversification of environmental insurance cover (see, e.g., Balmer *et al* (2000), Hannah (2000), Kreuzer (2001), Dybdahl (2004)), many researchers report on generally limited capacity of modern insurance industry to absorb expected losses resulted from environmental damage (Bennett, 1999; Bergkamp, 2003; OECD, 2003). According to Bergkamp (2003), insurance

markets (both relatively established U.S. market and an emerging European market) have not kept pace with the tightening environmental liability legislation and resulted growing demand for protection from financial implications of environmental liability. At the same time, it is reported that the gap between the cover available at market place and evolving needs of potential clients has narrowed in the recent years (Willis, 2003; Dybdahl, 2004).

Today several types of liabilities are typically not covered by insurance: liability for nature resource damages, gradual pollution incidents, historical contamination. The reason is high aversion of the insurance industry about environmental risks related to industrial operation which are by nature liability risks. On one hand, insurance industry keep being suspicious about these risks due to considerable charges in environmental liability law. On the other hand, methodology for and experience in prediction and quantification of related adverse effects and economic losses of affected parties is underdeveloped. This is especially true so called nature resource (biodiversity) damages. The recent EU Directive on Environmental Liability with Regard to the Prevention and Remedying of Environmental Damage (2004) appears was heavily criticized for imposing strict liability for this type of damage that cannot be treated as insurable based on current insurance practice (OECD ,2003).

It is pointed out that introducing joint and several and retroactive liability schemes particularly aggravates the problem of legal uncertainty with respect to environmental liability and insurance (OECD, 2003) and prevents insurers from respective undertaking environmental risks. For example, major environmental liability regimes in the US (CERCLA and Resource Conservation and Recovery Act (RCRA)) include these provisions. As a result, for lion's share of on-shore industrial operations regulated by these statutes insurance coverage is very limited and mostly unavailable though these legal acts were enacted many years ago (Bergkamp, 2003).

Strict liability is not unacceptable from the insurer's perspective although gaps in cover undermines its efficiency (Schwarze, 2001). At the same time, modern insurance market looks like a patchwork due to highly specialized character.

In addition to factual and legal uncertainty of environmental risks, high transaction costs involved in bringing an action for environmental damage before the courts is referred as an additional obstacle for insuring environmental liability.

One can conclude that current environmental insurance has generally limited capacity to address entire domain of environmental liabilities imposed on economic actors. Competent authorities, therefore, face a problem of stimulating EI development to secure newly established

environmental liability regimes. Possible ways to promote EI for addressing environmental liabilities are discussed in the following two sections.

3.3.3 Environmental insurance: a problem of incentive

Under free market conditions key principle insurance actors (insurers and the potential insured - industrial operators, owners, and lenders) is able to choose either to apply insurance for environmental risk management for preserving asset values and minimizing potential losses. State authorities through developing and enforcing environmental liability legal and regulatory framework are in power to govern rational behavior of economic actors. In this section the author aims to discuss key reasons to use environmental insurance for solving environmental risk-related problems that all three actors face. EI considerations of insurers and the insured will be considered in more detail.

As mentioned above, the State looks at insurance as a tools to ensure financial security of private parties whose economic activities may cause damage to environment and ultimately, to society. If a party responsible for environmental damage (as a damage to all common goods) is insolvent, the State have to bear all remediation and compensation costs. Latest trends in development of environmental risk and liability law at national and international level shows the State understands clearly EI benefits in terms of ensuring environmental safety and encourage its incorporation, together with other financial assurance tools, into public policies for environmental protection and sustainable resource management. Moreover, under several jurisdictions introducing compulsory environmental insurance was proposed and even enacted (e.g. German Environmental Liability Act of 1991) (OECD, 2003) although this desire contradict the concept of insurance as a voluntary self-regulatory tool (see next section for more in-depth discussion on compulsory environmental liability insurance).

Attitude of modern insurance industry to environmental risk underwriting is not so well-defined. Besides general commitment for ‘greening’ business operations and making it socially responsible (or, at least, creating such image), which has become typical for most business ventures, insurance industry is motivated to develop this new segment of insurance market following pure economic considerations of yielding profits.

Impressive growth of environmental insurance markets recorded in the last few years is the best illustration of high interest of the industry to environmental risk management. It should be noted that insurers fully acknowledge difficulties related to environmental risk assessment and allocation under current legal and methodological framework. As a result, small and medium companies rarely deal with these complex risks and particularly choose to specialize in this field

despite all attractive perspectives offered by steady growth in demand for environmental insurance. Large multinational insurance companies which are able to undertake assess risks, tailor site-specific policies, create reserves sufficient to compensate potentially huge environment-related losses of policyholders dominate at the market.

Since insurability of many environmental risks is questionable, environmental risk aversion among the insurers is high enough to seek solutions to ensure their own financial safety: co-insurance schemes, insurance pools and reinsurance. Reluctance of reinsurance market to accept increased environmental risk-related exposures, a trend towards increasing prices and introducing coverage restrictions acts additional disincentive for insurers to deal with these category of risks.

As a result, modern insurance coverage is highly specialized, generally limited and often too costly (Bergkamp, 2003; OECD, 2003). Moreover, despite numerous reports on progressive developments in risk assessment and pricing methods, increased market capacity and decrease in prices of insurance coverage, it can be empirically observed that is not widespread (OECD 2003, 49). The rest of the section discusses incentives and disincentives to apply insurance for environmental risk management for the last key player – firms involved environmentally dangerous operations.

A number of factors can trigger business's interest to environmental insurance and influence the demand at the EI market. One can distinguish among *economic*, *regulatory*, and *psychosocial* considerations that govern decision-making on whether to contract insurance.

EI economic incentives for the prospective insured

Environmental impairment risks threatens normal operational mode of an industrial facility, financial security of operators, owners, and/or lenders as a result of third-party liabilities or both. Due to exposure to these risks, businesses can incur unexpected losses. In general, firms are anxious to transfer these risks to another party rather that bearing them themselves for affordable honorarium – insurance premiums. The amount of insurance costs is weighed against potential losses to be prevented; if it seems cost-efficient to pay small amounts for creating reserves for risk mitigation and compensation a company makes decision to ensure against these risks. Therefore, the price of EI products is an important factor affecting the demand for this type of insurance coverage. One should note that overall EI costs includes costs of site inspections and technical analyses and depends on complexity of manufacturing technologies, level of legal and factual uncertainty. High costs of several EI policies (e.g. gradual pollution coverage) significantly limit capacity of the modern EI market.

Environmental insurance not only contributes to preserving corporate assets though establishing financial reserves. This is an effective tool to manage risk perceptions: purchase of insurance automatically strengthens corporate value which is particularly important for property transactions.

EI regulatory incentives for the prospective insured

Business interest to environmental insurance stems from financial responsibility requirements presented in environmental liability legal and regulatory framework. Increased awareness of environmental liabilities that resulted from overall tightening of environmental legislation in many countries throughout the world increased environmental risk aversion among potentially responsible parties and, therefore, their willingness to use EI solutions for risk transfer. Introducing formal provisions for mandatory insurance as a part of authorization procedure falls the same group of clear incentives for EI application. In the free market domain specific third-party requirements (e.g. bank policies that require insurance as a condition for issuing a mortgage) serve as a private regulatory mechanism motivating firms to contract environmental insurance.

EI psychosocial incentives for the prospective insured

The insurance concept is directly linked to such a complex phenomenon as risk perception - by enterprises being sources of risk, by risk assessors and managers, by potentially affected parties, and society as a whole. Environment insurance is a powerful tool to manage risk perceptions of these third-parties. There is no doubt that purchase of insurance decreases level of risk aversion of the insured with implications of allowing him/her to less careful about routine work on seeping the facility safe (the latter aspect of insurance is extensively discussed as a moral hazard' problem above). Other outcomes are increased credibility to the particular business from the part of potential partners and bettering image in society's opinion. The latter is directly linked with economic considerations to maximize profits attracting customers to products manufactured with the commitment to sustainable development and increasing value of corporate assets.

At the same time, there is a number of psychological considerations that prevents businesses from contracting insurance including those related to environmental insurance procedure. Firstly, many companies are reserved about pre-insurance audit. Under many jurisdictions audit team is obliged to inform environmental authorities about any pollution detected during site inspection. Taking into account companies pays from their own purse for this worry, this additional 'watching' repels site owners and operators.

Secondly, environmental risk marketability is limited by underestimating significance of related adverse effects by economic actors. Due to specific nature of many environmental risks (low predictability of incidents, protracted exposure that is difficult to cover in traditional way of policy writing, and most importantly generally low probability of incidents themselves) many site owners and operators tends to give them little attention when developing corporate risk management strategies.

Thirdly, too much uncertainty in environmental risk analysis impedes clear and transparent risk segregation and differentiate insurance premiums depending on the hazardous potential of industrial facilities. As a result, enterprises do not perceive increasing expenses for industrial safety and as really cost-effective (Perrow, 1984).

In the OECD report on environmental risk and insurance (2003) an interesting psychological phenomenon was described. It was reported that prospective insureds sometimes refuses to purchase coverage having passed though pre-insurance audit and get notified by the insurer about potential insurability of company's environmental risks. In such cases satisfactory results of the inspection were wrongly perceived as a proof of acceptable level of safety high enough not to spend money on purchasing an insurance.

For business ventures a question about contracting insurance arise when they face risk of unexpected losses related to their operations including compensation and restoration costs for damage occurred. Potentially responsible parties seek to ensure their financial security and look at insurance as a solution for insolvency problem.

One can conclude that private business's attitude to environmental insurance is very cautious; many of them think of insurance as a tricky way to make a polluter pays double and more than necessary and sufficiently[5]. As a result, many companies stated clearly that they are not intended to purchase EI coverage "unless they are obliged to do so" (OEDC 2003, 50). This rather rigid position of potential recipients has led regulators to the idea of introducing a system of mandatory environmental insurance (pollution insurance) at least for particularly dangerous activities. Merits and dangers of compulsory insurance for environmental damage is the topic of the following section.

[5] In the light of intensifying command and control regulation in the field of environmental protection, operators have to invest heavily to comply with tightening operational standards and conditions of a license. Additional expenses on environmental safety like purchasing an insurance is perceived as burdensome for manufactures especially small and medium enterprises.

3.3.4 Is compulsory environmental insurance a solution?

Proposals on introducing compulsory insurance in support of the environmental liability regime has been subject to heavy debates among scholars and policy makers (see, e.g. Cowell (1992), Faure (2001), Richardson (2002), Bergkamp (2003), OECD (2003) for more in-depth discussion). Discussions are mainly focused on the scheme based on third-party (liability) insurance for environmental damage. It is worth noting that under this type of insurance it is insurer who takes responsibility for guaranteeing compensation for environmental damage occurred and is busy with managing injurer's behavior to reduce risk of damage.

In theory, the system of compulsory environmental liability insurance can be bilateral and unilateral. In the first case firms potentially responsible for environmental damage are obliged to purchase insurance coverage to be allowed to operate and the insurance industry has the obligation to provide coverage at the special conditions defined by the Regulator to certain types of applicants. The pros and cons for bilateral mandatory pollution insurance is rather a subject to academic discourse since this regime is incompatible with the very nature of insurance as a market tool for environmental risk management. Key deficiencies of bilateral mandatory insurance for environmental damage include:

- If the policy conditions are defined by the Regulator cannot be easily tailored to the specific characteristics the a site and/or plant and risks associated with industrial operations, the ability of the insurer to control the moral hazard problem (coverage-induced reduction of incentives to reduce risk and mitigate damage) – one of the key insurance threats – is considerably limited;
- This system would not the allow for the insurer to decide freely on accept or reject applicants based on preliminary assessment of risk which a particular insured may pose. This would impair the ability to control another insurance threat – the problem of adverse selection (only 'bad' risks are to be undertaken);
- Under compulsory insurance the insurer is not able to invoke defense against the third-party beneficiary of insurance based on specific conditions of coverage and exclusions if the accident occurs and damage caused. The insurer is therefore forced to compensate the victim and bear the risk of the insured's insolvency (see Faure (2001) for details).

Therefore, under the compulsory environmental insurance scheme the insurer can manage the insured's behavior only through actual monitoring of the insured that requires a great deal of

resources. Standard policy conditions including insurance premiums decrease both risk insurability and marketability. Meanwhile, the total risk is shifted from the potentially responsible party and risk reduction incentives are not effective. This explains why insurance industry is not enthusiastic about compulsory insurance, at least for environmental risks, although such regime would provide for steady demand at the insurance market and might be beneficial for this sector.

Under the unilateral environmental liability insurance, purchase of pollution coverage is still a condition for firms to operate. Insurers, in contrast, may accept or refuse to provide coverage at their own discretion. Since this regime is operational under some jurisdictions though in specific high-risk areas only, it is the focal point of any discussions on insurance in the environmental policy context.

Key policy arguments for introducing compulsory environmental liability insurance scheme can be summarized as follows:

1. **Victim protection** (legal argument): the primary reason for imposing compulsory environmental insurance on operators and other economic actors held liable for environmental damage is to indemnify the society (as a community of final recipients) from the loss arising from environmental pollution: in case of polluter's insolvency it is the insurance sector, not the State, will have to pay for environmental damage resulted from their operations.
2. **Increase in expected utility** (microeconomic argument): purchase of insurance transfers risk from the risk averse economic actors and thus increase their utility.
3. **Economic development promotion** (macroeconomic argument): regulatory intervention in the field of environmental liability insurance creates steady demand for environmental pollution coverage. At the result, development of the insurance market, which is an important segment of the post-industrial service-oriented economies, is stimulated.
4. **Environmental awareness raising and incentives for improving environmental performance** (capacity-building argument): firms obliged to buy insurance coverage will have to conduct accurate assessment of environmental risks resulted from their operations and predicted amounts of losses. As a result, the problem of environmental risk and damage underestimation (and underdeterrance) may be sorted out. Increased environmental risk aversion of

economic actors is expected to result in more investments into corporate environmental risk management strategies and improving environmental safety of dangerous facilities.

5. **Insurance as an ally to the Government** (policymaking argument). Under unilateral compulsory environmental liability insurance scheme all range of insurance-driven incentives for potentially responsible parties to improve environmental safety of their operations are enabled. Therefore, insurance industry activities will finally support government efforts to environmental security; it will serve as additional, non-administrative environmental policy tool.

At the same time, the compulsory environmental liability insurance will work properly for securing environmental liabilities only if:

- the problem of moral hazard is controlled effectively by the insurers who have incentives to do so;
- insurance market is mature enough to provide for the required insurance coverage and competitive enough to response adequately to the insureds behavior.

Opponents of regulatory intervention into environmental liability insurance point out that in current practice these two conditions are unlikely to be met. Firstly, introducing compulsory insurance scheme legislation usually limits the possibilities of the insured to be at risk through establishing special rules and conditions (e.g. no deducibles, fixed insurance premiums). This could reduce the incentive for potential perpetrators to avoid causing damage.Therefore, the problem of moral hazard, which undermines effectiveness of the bilateral compulsory insurance as discussed above, persists in the context of unilateral approach.

Secondly, despite recent boost of environmental insurance, the availability of the insurance coverage for environmental risks is still limited so far due to limited insurability of environmental risks (see Section 3.3.2). Low attractiveness of environmental risks to underwriters can be explained by low demand on the market (few companies ask for environmental insurance coverage and normal risk spreading mechanism is disabled) and wide-spread adverse selection (only bad risks are to be insured). To the extent the risk are not insurable, the insurers will be unable (or unwilling) to offer the coverage for certain environmental risks that is to be insured mandatory. Moreover, current insurance markets are not competitive enough; compulsory insurance scheme would remove incentives for insurers to tailor policies meeting specific needs and individual behavior of a potential insured. The

insurance sector may decide to manage their own risks through excessive premiums and/or monopolistic agreements on refusal to provide coverage for certain type of risks; both 'monopolistic' tools are currently in place (e.g. the Dutch insurers association defined flood risk as uninsurable (see Faure (2001) for details).

Therefore, compulsory environmental liability insurance may distort emerging insurance markets and increase their inefficiencies instead of stimulating their development as the proponents of this regime hope. Bergkamp (2003) and Faure (2001) asserts that the only interest group, that may be interested in mandatory environmental insurance, i.e. the insurance industry, does not support such proposals.

Another danger of this regime is negative impact of monopolistic high insurance premiums on industries, especially small and medium enterprises with low self-insurance capacity. The general duty to insure forces those who did not have the demand for insurance to purchase coverage and decrease the expected utility. As a result, the potential benefits from securing public purse from remediation costs may be overweighed by the societal losses incurred by affected individuals. Coupled with evidence of current immaturity of the insurance market and potential for excessive premiums, this consideration is the key argument that prevents policymakers from mandating environmental liability insurance in practice. For example, the U.K. government's attitude to the compulsory environmental insurance is that its introduction would prove more burdensome in cost to industry than expected budget savings from transferring remediation costs to private business (BCC, 2003).

There is one more concern related to introducing unliterary compulsory environmental liability insurance that is particularly important from the general policymaking perspective. Under this regime the insurance industry will be entrusted with the power to decide which firms are to continue their activities and which should be withdrawn from the market. Insurance serves as a 'virtual license to operate' and become part of overall system of environmental permits (OECD, 2003). One the one hand, this puts the insurers into rather uncomfortable position "environmental policemen" in the view of their customers. On the other hand, the government becomes dependant on the insurance industry in practical implementation of this regulatory mechanism namely on their willingness to undertake certain environmental risks. With regard to this situation, Bergkamp (2003) asserts that "where the market does not offer spontaneously the insurance it often does not make sense to promote it" (Bergkamp, 2003; 282). On should note, that insurers may be tempted to compensate uncomfortable position of a government's watchdog in the context of environmental liability regime with attempts to

manipulate the government in order to secure their economic interest in other areas. This situation is not favorable for good co-operation between decision-makers and insurance sector which is crucial for enforcement of the regime.

All these considerations are therefore arguments for a policy maker to be extremely cautious with the introduction of a regulatory duty to purchase insurance coverage. Policy researchers repeatedly stress that insurance especially compulsory liability insurance, is not the only way to ensure financial security with respect to risks of causing environmental damage. For example, Faure (2001) and Bergkamp (2003) insists that first-party insurance is more effective in terms of controlling major threats to environmental risk insurability. Many authors refer to alternative approaches to environmental risk financing that are named by the general term 'financial assurance'. Financial assurance tools include but not limited to

- guarantees issued by the a bank or any other financial institutions,
- internal reserves (self-insurance funds),
- sector pooling systems including mutual insurance associations,
- deposits paid in advance on the environmental account,
- captive insurance companies

There is a general agreement that all these financial tools are applicable to solving the problem of polluter's insolvency protecting interests of risk receptors although Bergkamp (2003) points out that compared with insurance they are much less efficient in terms of risk spreading and loss handling.

Based on the discussion of merits and dangers on making environmental risk insurance mandatory one can conclude that the problem of polluter's insolvency should not necessarily be solved through the liability insurance. It seems appropriate to develop a flexible system with licensing administrative authorities making a decision on the form and amount of the financial obligation to secure environmental liabilities of a potentially responsible party. Introduction of the duty to provide financial security in any from seems to be a viable alternative for compulsory environmental insurance.

3.4 Integrating insurance into environmental safety policies: policy conclusions

The current research attempts to assess the role of insurance in improving environmental safety of industries to contribute to assuring environmental security in a particular country and/or region. Environmental safety is proved to be regulated though imposing civil liability for environmental damage on potentially responsible parties in many countries.

Having analyzed features of environmental risks related to industrial operations and innovative responses of the insurance industry, one can conclude that modern environmental insurance can potentially be an effective tool to reinforce environmental liability regimes.

Key benefits of insurance for environmental law and policy makers include:

1. Protecting the State from bearing compensation and remediation costs associated with environmental damages caused by a polluter in case of polluter's insolvency;
2. Providing reliable source of funds to cover costs associated with polluting events;
3. Deterring polluting activities making them inefficient though the system of premiums and other policy conditions;
4. Stimulating the polluters to invest into ex ante environmental risk reduction activities; in this context insurance industry act as private surrogate regulator addressing environmental safety concerns of the society.

Environmental insurance is able to perform its beneficial function of improving environmental safety liability regime provided that key groups of interest (insurers and potential insured) are able and willing to be involved in the process:

- There are incentives for the potential **insureds** to contract environmental insurance and recipients have resources to purchase the coverage;
- **Insurers** are able and willing to undertake the risks of concern and provide adequate coverage to the insured without infringing their interests.

There may be a temptation to force them to enter into necessary agreements through introducing compulsory insurance scheme (in most cases the system based on liability insurance is discussed). However, most of the policy researchers and analysts doubt that mandating environmental liability insurance doubts would necessarily serve public interests. The key objection is to having such a regime is that this could reduce incentives for potential polluters to avoid causing damage and for insurers to promote environmental damage prevention. While

considering the policy option to introduce compulsory environmental insurance for operators, the law and policy makers should carefully examine the maturity and competitiveness of the insurance market. The researchers are not optimistic about effectiveness of implementing the compulsory insurance scheme with regard to environmental damages if the required coverage is not available on the existing insurance market especially on the concentrated one. In addition, one should bear in mind the danger to be fully dependant on the insurance industry in implementing policies based on this type of insurance.

The fact that there are other tools to ensure financial security of polluters is repeatedly stressed. A number of authors advise not to stake on the insurance solely and develop the environmental liability regime with the requirement for economic actors to establish the financial security though any form of financial assurance. In this case the competent authority would assess if the form and amount of the financial security offered by the potentially responsible party is adequate on case-by-case basis.

If the government to promote voluntary environmental insurance (both of first-party and liability type) in order to improve environmental safety of industrial operations, they should put their best efforts in encouraging the development of pollution insurance market to and let the 'invisible hand' of the market work for the benefit of the society.

To achieve this task the following policy options can be suggested:

1. define clearly financial risks associated with environmental liabilities and ensure their predictability;
2. focus on enforcement of existing environmental safety standards;
3. introduce the obligation to provide adequate financial security guarantee as a license conditions in a view of preventing the risk of insolvency;

In conclusion, one should note that if an insurance is a competitive way to comply with the requirement of ensuing financial security, its beneficial functions for regulating environmental safety of industrial operations will work to a full extent.